

Pakenham Roads Upgrade



PURPOSE OF EVALUATION

Committed and funded project



EVALUATION OUTCOME

Funded proposal (not eligible for the Infrastructure Priority List)

ASSESSMENT FRAMEWORK STAGE



LOCATION

Pakenham, VIC

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 2022/23

Completion by: Q2 2025/26

EVALUATION DATE

8 September 2022



CAPITAL COST

\$330.2 million (P50, outturn)

\$401.5 million (P90, outturn)

FUNDING COMMITTED (P90)



Australian Government:
\$401.5 million, May, 2021

Review summary

Infrastructure Australia has evaluated the business cases for the **Pakenham Roads Upgrade** (comprising Racecourse Road and the McGregor Road Interchange upgrades) in accordance with our Statement of Expectations, which requires us to evaluate project proposals that are nationally significant or where Australian Government funding of \$250 million or more is sought. We have evaluated the two business cases together, reflecting the Australian Government funding commitment of \$401.5 million for delivery of the Pakenham Roads Upgrade package. Given its funding status, the project is not eligible for inclusion on the *Infrastructure Priority List*.¹

The two projects that form the Pakenham Roads Upgrade package are intended to address current and future transport network congestion and safety issues by improving access to residential areas and the Pakenham Activity

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

Centre², located to the southeast of Melbourne. McGregor Road and Racecourse Road both provide north-south connections between the Princes Highway (north) and Princes Freeway (south), which serve dual functions of connecting residential and industrial areas of Pakenham, as well as forming part of the primary tourist and freight route between Melbourne and Phillip Island and the South Gippsland region. McGregor Road and Racecourse Road are already performing below minimum levels of service in terms of delays and are forecast to further deteriorate. However, the evidence presented in the business case does not provide certainty that the forecast benefits will be realised. The preferred option for the combined package is estimated to have a benefit cost ratio (BCR) of 0.94 and net present value (NPV) of -\$18 million meaning the costs marginally exceed the benefits over the life of the project.³ There are several assumptions and costing approaches that are not well substantiated in the business case, and this creates a high degree of uncertainty given the marginal BCR. These include:

- the demand modelling approach could overstate demand
- the magnitude of business travel benefits, which significantly exceed benchmarks from other similar locations, even allowing for the forecast increase in local industrial and commercial development
- the scale of operating costs relative to capital costs, which are significantly lower than typical benchmarks.

Conversely, the quantification of some additional benefits such as reliability and emissions reduction from fuel burn is lower than expected. In addition, land use forecasts assumptions adopted for alignment with planned growth in local precincts is significantly lower than the growth implied in the need for investment⁴. These factors, if appropriately quantified, could potentially increase forecast benefits.

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

Project description

The project includes upgrades to Racecourse Road and the McGregor Road Interchange as follows:

- Racecourse Road Upgrade scope includes 2km of lane duplication (that is, from 1 to 2 lanes in each direction) between Southeast Boulevard and Henry Street, increase from 2 to 3 lanes in each direction between Princes Freeway northern interchange and Bald Hill Road, signalisation of the freeway interchange terminals and widening of the westbound freeway on-ramp from 2 to 3 lanes.
- McGregor Road Interchange Upgrade scope includes new east-facing on-and off-ramps to the Princes Freeway, ramp widening, 1 kilometre of new auxiliary lanes between McGregor Road and Koo Wee Rup Road, 250m lane duplication (that is, from 1 lane either direction to 5 total) on McGregor Road between Princes Highway and Webster Way, intersection capacity upgrade and shared use path on the east side of McGregor Road.

Construction of the package is estimated by the proponent to create a total of 2,400 jobs, of which 860 would be directly employed by the package and 1,540 would be generated by flow-on impacts of expenditure.

Review themes

Strategic Fit	The case for action, contribution to the achievement of stated goals, and fit with the community.
Case for change	<p>Strong historic growth in Pakenham, without commensurate upgrades to road infrastructure, has resulted in delays, unreliable travel times and increased crashes.</p> <p>Over the last 20 years, Pakenham has experienced 6% growth in population per annum and 4% employment growth per annum. In the shorter term, further growth is expected in Pakenham as a result of local infrastructure upgrades⁵ and current development of the Officer-Pakenham State Significant Industrial Precinct. In the longer-term, population growth is expected as a result of the Pakenham Major Activity Centre in the east (an additional 23,000 population by 2041) and future employment precincts in the south-east, which are forecast to target an additional 5,700 jobs by 2060. This growth will continue to increase travel demand and increase pressure on the transport network.</p>

² Pakenham Activity Centre will provide new development, local employment and a diverse range of retail, commercial and residential options.

³ Using a 7% real discount rate, P50 capital cost estimate and 30-year appraisal period.

⁴ Reflects relatively low growth in benefits between 2027 and 2036, which does not match the business case’s strategic narrative for the project, which is centered around both shorter- and longer-term growth in a number of local precincts.

⁵ Healesville-Koo Wee Rup Road Upgrade and Monash Freeway Upgrade Stage 2.

Alignment	<p>The project aligns with principles outlined in Victorian Government legislation (<i>Transport Integration Act 2010</i>) and strategies such as <i>Plan Melbourne</i>, <i>Department of Transport Strategic Plan (2021-2025)</i>, <i>Growth Corridor Plans</i>, <i>Victorian Road Safety Strategy (2021-2051)</i>, <i>Victoria's Infrastructure Strategy (2021-2051)</i> and the <i>Victorian Freight Plan 2018</i>, although this package of projects is not specifically mentioned in these strategies.</p> <p>The project also aligns with several 2019 Australian Infrastructure Audit challenges and opportunities, such as <i>rapid growth in Melbourne has put legacy infrastructure under increasing strain</i>, and recommendations from the 2021 Australian Infrastructure Plan (i.e. Recommendation 4.1 - <i>maximise the overall benefits of transport investments by aligning transport programs with place-based objectives</i>).</p>
Network and system integration	<p>Future infrastructure projects within the Pakenham precinct are expected to complement the Pakenham Roads Upgrade by improving the end-to-end journey of users and include:</p> <ul style="list-style-type: none"> • Healesville - Koo Wee Rup Road Upgrade (joint project of the Australian and State governments) • Racecourse Road Level Crossing Removal (State project) • McGregor Road duplication beneath Level Crossing Removal Project grade separation (Council project) • McGregor Road and Greenhills Road sealing (Council project). <p>The delivery of the Racecourse Road Interchange Upgrade as part of the Healesville-Koo Wee Rup Road Upgrade is currently being considered by the Australian and Victorian governments.</p>
Solution justification	<p>A multi-criteria analysis (MCA) framework, including some quantitative measures, was used to short-list alternative options for detailed economic appraisal. Two options (plus a base case) were evaluated in detail in each of the project business cases and were informed by stakeholder impact analysis, movement and place assessment, social impacts, environmental impacts, financial appraisal, economic appraisal and risks by option.</p> <p>However, while the options analysis process appears to be robust and the preferred option as a result of the MCA is consistent with the ranking in the economic appraisal, all categories appear to have been weighted equally. We recommend that complex applications of MCA consider the weighting of each category according to its importance to government policy and the extent to which each option delivers the category objectives.</p> <p>Further, the cost benefit analysis presents the Base Case as an option, rather than the standard approach in which options are assessed incremental to the Base Case. As the project is being progressed on behalf of the Australian Government, the business case notes that only response options within the bounds of the funding committed were assessed, which may have limited the robustness of the analysis.</p>
Stakeholder endorsement	<p>An analysis of the project's scope in relation to impacts on stakeholders and their level of influence has been undertaken by the proponent although it is not clear to what extent stakeholders support the project package.</p> <p>The proponent's stakeholder engagement plan identifies a comprehensive list of stakeholders including local council, local ministers, transport operators, government agencies and statutory authorities, industry bodies, special interest groups, the local Registered Aboriginal Party, local hospitals and healthcare services, local residents and business and road users.</p> <p>Stakeholder input has been sought in the development of options and opportunities to provide feedback on the preferred design option is planned.</p>

Societal Impact	The social, economic and environmental value of the proposal, as demonstrated by evidence-based analysis.
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Quality of life	<p>The project is expected to improve community access to a number of local retailers and services. It could also provide local access to job opportunities in the adjacent industrial area, while the freeway and highway also provide broader access to employment in Melbourne and tourism within the Latrobe Valley and Gippsland regions.</p> <p>The economic appraisal demonstrates there will be benefits from improved travel times to access jobs and services and reduced cost of living through reduced vehicle operating costs. However, the package is not expected to impact noise pollution⁶ and there is no evidence of significant disadvantage in the area (Australian Bureau of Statistics, Socio-Economic Indexes for Areas) that would be addressed by improving connectivity to social infrastructure and services.</p>
Productivity	<p>The project could improve broader connectivity to job opportunities in Melbourne and it is estimated to deliver significant benefits for business-purpose trips as well as light and heavy commercial vehicles accessing industrial precincts in the area. However, the estimated proportion of business travel appears high, even for an area with high commercial and industrial use. This could have the effect of overstating business travel benefits and overall productivity benefits.</p>
Environment	<p>The options assessment presents the results of a number of environmental impact assessments including aboriginal cultural heritage and historic heritage, arboriculture, contaminated land, ecology, land use planning and surface water. Environmental protection and heritage works have been included in the cost estimate and after mitigation, all environmental residual risks were rated as low, except for contaminated land (medium) and ecology (significant).</p> <p>The planning and environmental approval pathway required for the delivery of this package has been identified, although no information is provided on the status of these approvals in the business case.</p> <p>The economic appraisal demonstrates that the package is estimated to have a marginal negative impact on air pollution, water pollution and greenhouse gas emissions.⁷ These environmental externalities are estimated to generate a small dis-benefit as users will travel longer distances to access the corridor and the emission impacts of stop-start travel (resulting in increased fuel burn) have not been captured in the economic appraisal (only distance-based costs).</p>
Sustainability	<p>The economic appraisal has been undertaken over a 30-year period, reflecting the relatively long life of road projects. The preferred option is 'future-proofed' for longer-term growth, and an alternative, scalable option with reduced scope (length of upgrades, number of lanes and reduced pedestrian signals) is also included in the economic appraisal. This is estimated to have a negligible impact on the economic appraisal results (that is, no change in the BCR and a \$2 million improvement in the NPV).</p> <p>The project's Value Creation and Capture Plan⁸ also identifies the opportunity for greater reuse of materials (for example, reclaimed asphalt pavement, crushed concrete and crushed glass fines) as a mechanism for value creation. However, an assessment of alternative options for sustainable design has not been completed so it is not clear whether these will be costed and incorporated into the final design.</p> <p>While it is not apparent that the projects within the package have been aligned to state-based sustainability plans, an Infrastructure Sustainability Council sustainability assessment is planned to be undertaken.</p>

⁶ Included in environmental externality benefit based on kilometres travelled. This is a small positive benefit for the individual projects but a small dis-benefit when delivered as a program (likely as a result of people travelling longer distances to access the benefits on these roads).

⁷ Included in environmental externality benefit based on kilometres travelled.

⁸ The plan suggests that the use of recycled materials during construction such as reclaimed asphalt pavement, crushed concrete and crushed glass fines, could be provided by local suppliers at no marginal cost. Although, this has not been confirmed through an assessment.

Resilience	<p>The project is expected to improve the resilience of the transport network in response to incidents that occur on the Princes Highway and Princes Freeway, the two major east-west movement corridors connecting Melbourne and the east of Victoria, by providing improved north-south connectivity between these major movement corridors. Potentially significant benefits of increased transport network resilience include enabling road users to circumvent incidents from crashes or other events, although these have not been quantified.</p> <p>Racecourse Road is currently identified as being a flood risk, becoming inundated in all flood-modelled events (including as frequent as 1 in 5-year rain events), with some of the Project Area being contained within Land Subject to Inundation Overlays. The proponent states that significant flood mitigation infrastructure is likely to be required to maintain existing flood conditions, where higher flood immunity than existing is unlikely to be achieved without adversely impacting nearby private properties. It is not clear whether flood mitigation measures included in the package scope would also benefit adjacent properties.</p> <p>The impact of flooding events on project delivery has been included in the cost estimate, although no analysis of expected increase in flooding events has been provided.</p>
Deliverability	The capability to deliver the proposal successfully, with risks being identified and sufficiently mitigated.
Ease of implementation	Construction is programmed over nearly 3 years from Q1 2023 to Q4 2025. No significant risks have been identified and the project is being delivered using an incentivised target cost contract. However, the proposal for three contracting packages could introduce some additional interface risks if not managed strategically during delivery.
Capability & capacity	<p>Major Road Projects Victoria (MRPV) has experience delivering projects similar in scope and complexity to the Pakenham Roads Upgrade and is expected to have the required level of skill and expertise to deliver the project.</p> <p>The business case includes role positions and full-time equivalents by financial year, although it does not appear to include a specific resourcing strategy. Resourcing capability and capacity constraints in the current heightened market are acknowledged (in particular labour shortages of senior delivery executives, experienced bid directors and design engineers) which is in line with Infrastructure Australia's 2021 Infrastructure Market Capacity Report's forecast. These industry-wide capacity pressures need to be managed to mitigate impacts to the project's delivery time, scope and costs.</p>
Project governance	<p>The business case includes a proposed governance framework for delivery. The recommended delivery agency for this project is MRPV. MRPV is a special purpose project team responsible for planning and delivering major road projects for Victoria within the Major Transport Infrastructure Authority.</p> <p>The delivery strategy follows the MRPV Program Delivery Approach, including a panel of contractors and a two-stage incentivised target cost model – stated to include elements of Alliance and Design and Construct contracts. The business cases also include a high-level assessment of alternative delivery packaging options although no formal market sounding is proposed.</p>
Risk	A comprehensive risk register was included in each business case. This has been used to estimate probabilistic cost contingency estimates with the appropriate level of statistical significance (i.e., P50 and P90). However, limited information appears to have been included on the planning approvals pathway or how the sequencing of this package would align with other competing projects and programs. There is also the potential to include additional interface risks to reflect the three contracting packages proposed to deliver the projects.
Lessons learnt	Lessons learned from previous projects have been included in the business cases through a communications and engagement lessons learned workshop in November 2021. In addition, MRPV host fortnightly knowledge and learning sharing workshops where teams can come together to openly discuss aspects of projects that worked well and can be implemented on other projects, as well as aspects that could be improved and difficulties that could be avoided on future projects. The business case specifically identifies a number of learnings

from the Monash Freeway Upgrade (Stage 2) and Healesville-Koo Wee Rup Road Upgrade. A Post Completion Review plan was not provided as part of the submission. However, the business case includes a high-level post completion review strategy and identifies key performance indicator measures within the Benefits Management Plan.

Economic appraisal results (preferred option)

The business cases include economic appraisals of each project, plus the combined package and a scalable option with reduced scope. The preferred option for the combined package estimates a BCR of 0.94 and NPV of -\$18 million, using a 7% real discount rate, P50 capital cost estimates, and evaluated over a 30-year period.

The net benefits of the package are estimated to be greater than the sum of the individual projects, reflecting greater benefits from delivering both projects together:

- Racecourse Road Upgrade alone is estimated to result in a BCR of 0.84 and NPV of -\$33 million.
- McGregor Interchange Upgrade alone is estimated to result in a BCR of 0.71 and NPV of -\$27 million.

The economic appraisal summary results are presented below for the combined package at 4%, 7% and 10% discount rates). Detailed results for the individual projects and combined package at 7% discount rate are presented on page 8.

Economic Appraisal Results

	Discount rate:	4%	7% (central)	10%
Core evaluation results ¹ (Racecourse Road)	BCR:	1.34	0.84	0.56
	NPV (\$m):	\$81	-\$33	-\$83
Core evaluation results ¹ (McGregor Interchange)	BCR:	1.07	0.71	0.51
	NPV (\$m):	\$8	-\$27	-\$42
Core evaluation results ¹ (Combined)	BCR:	1.38	0.94	0.68
	NPV (\$m):	\$127	-\$18	-\$87
Key benefits measured:	The benefits measured include travel time savings, vehicle operating cost savings, tolls, environmental externalities, crash cost savings and the residual value of assets. Benefits from reliability, resilience to incidents, land use change/urban renewal and wider economic benefits such as agglomeration from business clustering and improved labour supply, have not been quantified. Inclusion of these benefits is likely to have increased the BCR for each project.			
Key observations and issues	<p>Overall, there is some uncertainty that the project benefits will be realised:</p> <ul style="list-style-type: none"> • 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 and 2036) 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. These have been used to significantly scale up the VITM results, which is likely to overstate benefits as forecast speeds from VISSIM have not been fed back into VITM to estimate the impact of additional induced demand. • The estimated proportion of business travel appears high, even for an area with high commercial and industrial use. This could have the effect of overstating business travel benefits and overall productivity benefits. • Dividing average annual operating and maintenance costs by total, undiscounted capital costs results in a percentage that is significantly lower than typical benchmarks from other similar projects. This means that the costs defined in the 			

business case are likely to be understated.

Conversely, it appears some benefits could have been quantified using a more evidenced-based approach, including:

- reliability (that is, reduced buffer time built into journeys) and resilience (based on the reduction in probability and consequences of incidents from crashes and other events)
- demand growth is relatively marginal between 2027 and 2036, which is inconsistent with the shorter-term growth drivers included in the need for investment (for example, completion of local transport projects and developments). Changes to land use forecasts could have a significant impact on benefits with discounting.

Sensitivity tests indicate that changes to the benefits, costs and discount rates (in particular) can influence the BCR between 0.56 and 1.34 for Racecourse Road and 0.71 and 1.07 for McGregor Road Interchange. When both options are combined, the BCR ranges between 0.68 and 1.38 and NPV between -\$87 million and \$127 million.

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

Project development

To address the identified need for investment, the project options have been developed to meet the following objectives:

- improve transport network efficiency
- improve community satisfaction with journeys
- increase business and employment activities
- improve road safety outcomes
- increase active and inclusive communities.

An MCA framework, including some quantitative measures, was used to short-list six alternative options for detailed economic appraisal. In addition to a Do Minimum Base Case, which includes ongoing operations and maintenance and level crossing removal, the MCA assessed seven options across both locations, with some options including better use of existing infrastructure rather than new capital investment. These include safety/efficiency improvements, capacity upgrades and complementary network improvements. However, there does not appear to have been consideration of alternative modes or non-capital options such as demand management, as recommended in the Infrastructure Australia Assessment Framework.

The MCA included 18 criteria across six categories (benefits, risks, disbenefits, uncertainties, costs and time to deliver). They were rated qualitatively (low, medium, high) incorporating some quantitative measures. Weighted scores were not applied to rank options.

Further analysis was undertaken for two short-listed options for each project (that is, excluding and including wider network improvements identified through traffic modelling). This included financial appraisal, economic appraisal, qualitative ratings of alignment with problems and benefits, level of service assessment, stakeholder impact analysis, movement and place assessment, social impacts, environmental impacts, financial appraisal, economic appraisal and risks by option. It is not clear how the outcomes of all these assessments were combined, but it is noted that the preferred option is consistent with the ranking in the economic appraisal.

A key consideration in current project development is the impact of COVID-19, which may reduce commuting trips as a result of increased working from home and reduced population growth due to the reduction in net overseas migration. There is also likely to be a compound effect as returning to the office and overseas migration slowly recovers. These impacts have been reflected in the business case by excluding traffic data from 2020-21 and adjusting traffic data collected during other projects such as the Suburban Roads Upgrade in 2017-18 (scaled up to 2020). The project states that Victoria is expected to fully rebound from COVID-19 in 2024 and that traffic has already returned to pre-COVID-19 levels. However, this may not be realistic noting the shift to working from home. We would normally expect a scenario test for COVID-19 reflecting reduced commuting and population growth consistent with the worked example presented in the Infrastructure Australia Assessment Framework. This creates a risk that demand could be slightly overstated.

Proposal engagement history



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 (7%, \$m,2021/22)			% of total (combined)
	Racecourse Road	McGregor Interchange	Combined	
Costs				
Total capital costs (P50)	\$199	\$90	\$289	95.4%
Operating costs	\$10	\$4	\$14	4.6%
Total costs^{1,2}	\$209	\$94	\$303	100%
Benefits				
Travel time savings	\$106	\$25	\$168	59.2%
Vehicle operating cost savings	\$47	\$32	\$80	28.2%
User charges – tolls	\$0	\$0	\$0	0%
Environmental externalities	\$2	\$2	-\$1	-0.4%
Crash cost savings	\$10	\$3.4	\$24	8.5%
Residual asset value	\$10	\$4.7	\$13	4.6%
Total benefits¹	\$176	\$67	\$284	100%
Net present value (NPV)³	-\$33	-\$27	-\$18	n/a
Benefit-cost ratio (BCR)⁴	0.84	0.71	0.94	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.