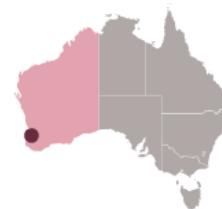


Mitchell and Kwinana freeways upgrade: Phases 2 and 3



PURPOSE OF EVALUATION
Proposal seeking funding



EVALUATION OUTCOME
Investment-ready Proposal

**ASSESSMENT
FRAMEWORK
STAGE**



LOCATION

Perth, Western Australia

GEOGRAPHY

Fast-growing cities

SECTOR

Transport

OUTCOME CATEGORY

Efficient urban transport networks

PROPONENT

WA Government

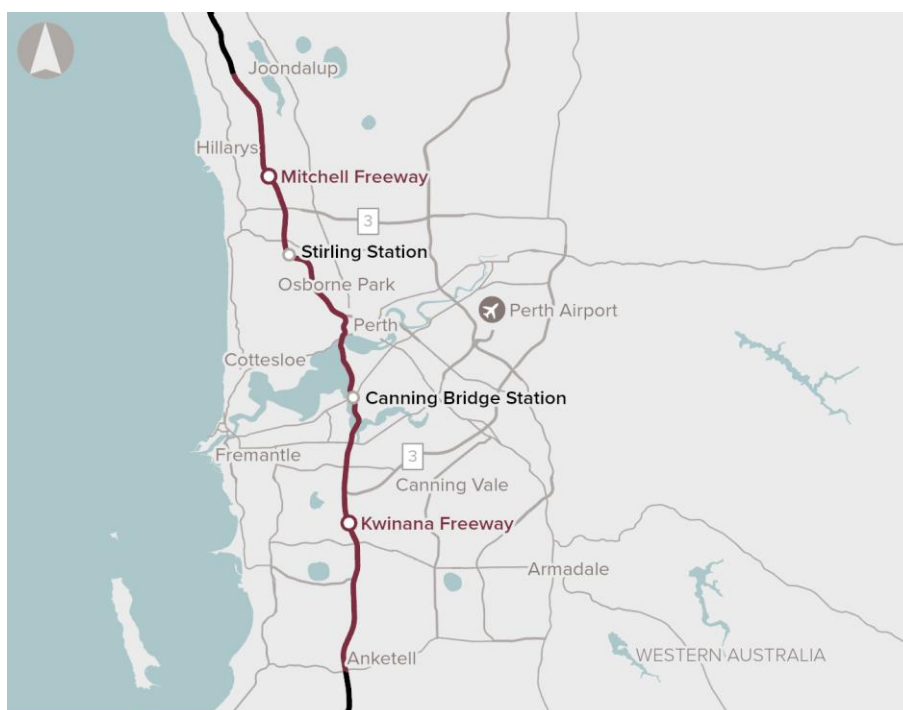
INDICATIVE DELIVERY TIMEFRAME

Construction start: 2021

Completion by: 2026

EVALUATION DATE

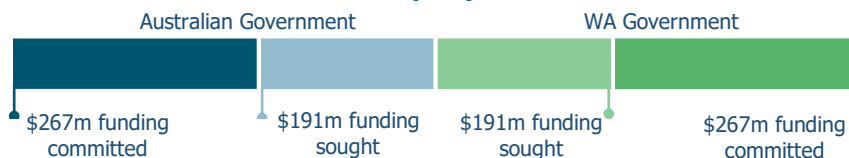
8 September 2022



CAPITAL COST

\$916 million (P90, outturn)

FUNDING COMMITTED/SOUGHT (P90)



Review summary

Infrastructure Australia has evaluated the business case for Mitchell and Kwinana freeways upgrade: Phases 2 and 3 in accordance with our Statement of Expectations of 2 March 2022, which requires Infrastructure Australia to evaluate project proposals that are nationally significant or where Australian Government funding of \$250 million or more is sought. As a result of our assessment, **Mitchell and Kwinana freeways upgrade: Phases 2 and 3 has been added to the Infrastructure Priority List as an Investment-ready proposal.**

The proposal responds to nationally significant problems of operational capacity constraints along the Mitchell and Kwinana Freeway corridors, with congestion and safety issues that will worsen over time. These multi-modal transport corridors are aligned with the linear north-to-south pattern of settlement in Perth and are essential in

providing safe and efficient mobility. These two interconnected freeways form a key north-south corridor through Perth and are part of the National Land Transport Network.

The proposed package of multi-modal transport interventions includes Smart Freeway technology, road optimisation measures and the provision of additional travel lanes to better manage traffic. Additionally, a behavioural change program and proposed upgrades to the Principal Shared Path (PSP) network (adjacent to the freeway corridor) aim to encourage a shift to more sustainable modes of transport. Public transport enhancements include upgrades to Canning Bridge Station and Stirling Station.

With an estimated total capital cost of \$916 million (P90, nominal), the proponent is seeking a 50% contribution from the Australian Government to match the Western Australia Government's 50% contribution. At present the Australian Government has committed \$267 million to the completed components of the proposal.¹ The total unfunded portion of Phases 2 and 3 of the program is around \$382 million, therefore a further \$191 million is sought from the Australian Government.

The proponent's business case reports that the societal benefits of the proposal would significantly outweigh the associated costs, with a Benefit Cost Ratio (BCR) of 4.56 and a net present value (NPV) of \$3,008 million.²

Our support of the proposal acknowledges:

- The national significance of the underlying problems, including sizeable operational inefficiencies along the Mitchell and Kwinana freeways during peak periods due to capacity issues and uncontrolled access for merging traffic. The proposal will deliver significant travel time savings for commuters across private vehicle and active transport modes.
- Upgrades to Canning Bridge Station and Stirling Station, which will improve their current configurations that result in poor access for pedestrians and inefficient service routing for buses.
- Completion of critical parts of the PSP network, providing continuous shared paths for bicycle users and pedestrians
- The proponent has undertaken a methodical and extensive process to assess individual interventions and the packaging of options, including:
 - Proposed transport interventions were collaboratively developed through a Stakeholder Working Group between Main Roads WA, the Public Transport Authority (PTA), the Department of Transport (DoT), and WA Treasury
 - The process to determine an appropriate delivery model will follow Main Roads WA and PTA procurement methodology, which is consistent with Infrastructure Australia's guidelines.

In summary, the Mitchell and Kwinana freeways upgrade: Phases 2 and 3 proposal responds to a clear strategic need for infrastructure and technology interventions that when individually and collectively delivered, would provide a safe, efficient, and resilient transport corridor to address current issues and sustain future growth within and around Perth.

Proposal description

The proposal has three core objectives:

- Improve forecast journey times and reliability for users on the freeway corridor
- Improve safety outcomes on the freeway corridor for users
- Use existing infrastructure more efficiently to cater to future demand.

The proposal includes the following key components:

- **Smart Freeway technology** - a suite of traffic management technologies on Kwinana Freeway, from Safety Bay Road to the Narrows Bridge, and on Mitchell Freeway, from Hester Avenue to Vincent Street. Technologies may include Variable Speed Limit (VSL) signs, Coordinated Ramp Signals (CRS), Vehicle Detection Stations (VDS), Closed Circuit Television (CCTV), Automatic Incident Detection (AID), Bluetooth Beacons (BB), Vehicle Detection Stations (VDS), All Lanes Running (ALS), Variable Messaging Signs (VMS), Control and data system upgrades and other Intelligent Transport System (ITS) devices
- **Road optimisation in the CBD area** - includes additional lanes between the Mitchell Freeway and frontage roads, additional Smart Freeways technologies and additional bridge structures in the Central Business District
- **Additional lanes** - new lanes on the Mitchell Freeway southbound from Hodges Drive to Hepburn Avenue; Kwinana Freeway southbound from Judd Street (Mill Point Road) to Canning Highway; Kwinana Freeway

¹ See [Infrastructure Investment Program](#) for details.

² Based on a 7% real social discount rate, P90 capital cost estimate, and evaluated over a 30-year period.

southbound from Roe Highway to Berrigan Drive; and both directions within the CBD between the Narrows Bridge and Loftus Street bridge

- **Canning Bridge Station upgrade** - increased capacity, improved accessibility and reconfiguration to address safety and congestion concerns
- **Stirling Station upgrade** - upgrades to improve user experience and increase capacity and accessibility and the provision of more efficient bus feeder networks and additional services in surrounding suburbs
- **Active Transport** - completion of critical gaps in the existing 'cycle freeway' network along Mitchell Freeway and around the CBD
- **Your Move** - a behavioural change program to balance travel demand across several modes of transport for the freeway corridor.

Further information about the proposal can be found at: [Transforming Our Freeways \(mainroads.wa.gov.au\)](https://mainroads.wa.gov.au)

Review themes

Strategic Fit	The case for action, contribution to the achievement of stated goals, and fit with the community.
Case for change	<p>The underlying problems include operational inefficiencies along the Mitchell and Kwinana freeways during peak periods due to capacity constraints and uncontrolled access for merging traffic. The proponent also identified that current configurations of public transport stations within the freeway corridor are resulting in poor access and inefficient routing.</p> <p>The proposal also seizes an opportunity to complete gaps in the Principal Shared Path (PSP) network, which provides 30 kilometres of dedicated but discontinuous cycle paths parallel to the freeway corridor. Completing the gaps on the Mitchell Freeway requires less than five kilometres of new PSP network that would significantly improve amenity and safety by providing continuous shared paths for bicycle users and pedestrians.</p>
Alignment	<p>The proposed package of interventions contributes to the achievement of relevant national and state policies and plans. At a national level, this includes strong alignment with the <i>Australian Infrastructure Plan (2016)</i>, which calls for implementation of smart technology as a solution in heavily utilised urban corridors and improved station access.</p> <p>The proposal also aligns with various state policies and strategies that calls for the better use of existing road infrastructure, integration of public and active transport, and interventions improving journey times. These include the <i>Smart Freeways Policy (2020)</i>, <i>Perth and Peel@3.5 (2018)</i>, and the <i>Western Australian Bicycle Network Plan (2017)</i>.</p> <p>Notably, <i>Perth and Peel@3.5</i> outlines a long-term growth strategy for land use and infrastructure provision and suggests that the seamless movement of people and freight across 'North-West' and 'South Metropolitan' subregions are key to economic development and regional livability. It further highlights that 'upgrading the existing network, particularly Mitchell Freeway, will be key to unlocking unemployment opportunities.</p>
Network and system integration	<p>The proposal relates specifically to Phases 2 and 3 of the broader Strategic Program, although there is limited information provided in the business case to fully understand how these phases align with the preceding and subsequent phases. While the proponent has confirmed that the predicted benefits for Phases 2 and 3 are independent from the other phases, which provides a level of confidence in the realisation of benefits from the proposal, further insights into subsequent stages would have enabled a better understanding of the overall network approach.</p>
Solution justification	<p>A longlist of 13 interventions was developed by a Stakeholder Working Group (comprised of Main Roads WA, the PTA, the DoT and WA Treasury) on the basis that they addressed the problems facing the freeway corridor and aligned with 11 assessment criteria. The Stakeholder Working Group further refined the longlist of interventions to a shortlist of nine, which were then distilled into four packages of options:</p> <ul style="list-style-type: none"> • Option 1: 'Better use' • Option 2: 'Capital moderate' • Option 3: 'Capital intensive'

- Option 4: 'Capital intensive and better use'.

Adopting a Multi-Criteria Analysis (MCA) followed by a rapid Cost-Benefit Analysis (CBA), the proponent identified Option 4 as the preferred option. A detailed CBA was conducted on the recommended Option 4 in the business case to evaluate the costs and benefits through a rigorous assessment.

The proponent has undertaken a methodical and extensive process to assess individual interventions and the packaging of options, and we agree that the preferred option is the best solution to resolve the identified problems.

Stakeholder endorsement

The proposal is supported by relevant government stakeholders which form the Stakeholder Working Group, with evidence of a comprehensive consultation process, particularly during the concept development and options evaluation phases.

We note that changes to the station and bus interchanges that result in re-routing of pedestrian access paths and construction of additional southbound freeway lanes are proposed interventions that would require consultation with affected property owners and the wider community during subsequent stages of the planning and delivery process. No community consultation has been undertaken to date.

Societal Impact

The social, economic and environmental value of the proposal, as demonstrated by evidence-based analysis.

Quality of life

Once implemented, the proposal would ease congestion and capacity constraints through road, public and active transport interventions along one of Perth's key transport corridors. Given that the corridor is essential for mobility through the region, the proposal would improve access to key employment centres and social infrastructure, encouraging greater economic and social participation.

The proposal is expected to improve safety outcomes by reducing the number of traffic accidents for road users on both the Mitchell and Kwinana freeways, while also mitigating their impact on traffic. It will also improve safety outcomes for public transport users at bus stations, as well as active transport users in the CBD.

Productivity

The preferred option would help to increase the overall efficiency and reliability of the main commuter and freight transport corridor within and around Perth.

The majority of benefits are travel time savings (101%), with vehicle operating cost savings (1%) and travel time reliability (1%) accounting for significantly smaller proportions. There are some disbenefits associated with environmental externalities (-3%) and increased crash costs due to increased road use. While some wider economic benefits (WEBs) are probable, none have been monetised in the CBA as part of the business case.

Benefits of the preferred option are largely attributed to smart freeway technologies. Interventions that incorporate these technologies are lower cost than major infrastructure responses, accounting for the high BCR of the proposal.

Environment

Potential environmental impacts from the construction and implementation of proposed interventions would be further assessed (and seek relevant approval) as part of the subsequent planning and design stages.

The proposal is expected to result in an environmental dis-benefit of \$124 million in net present value terms. This reflects that total demand for the freeway network (due to re-routing of trips to the freeway) and the wider Perth metropolitan road network is higher with the proposed interventions, resulting in higher overall Vehicle Kilometres Travelled (VKT).

The preferred option scored highly against ability to improve the environment and amenity as part of the assessment criteria during the MCA process. This included the proposal's ability to improve local air quality (e.g., reduces diesel particulates etc.) and promote sustainable modes of transport (e.g., walking and cycling).

Sustainability

Through connecting the PSP network and implementing the Your Move behaviour change program, the proposal promotes sustainable modes of transport. However, the proposal, through the travel time savings it delivers, encourages road use. This results in higher

total VKT and greater environmental externalities through increased emissions of greenhouse gases.

Resilience Improvements in congestion and safety of the transport network is likely to improve long term resilience of the network. Furthermore, as part of the scope of road optimisation in the CBD area, the pavement design level on the Sutherland Street entry ramp will need to be revised to account for the 100-year flood level.

Deliverability **The capability to deliver the proposal successfully, with risks being identified and sufficiently mitigated.**

Ease of implementation There are residual risks which may impact ease of implementation, including the following which are categorised as 'high' or 'very high':

- **Judd Street to Canning Highway:** significant clearing or approvals required for constructing noise walls due to their location. Proposed noise walls may also compromise residents' views and therefore require extensive community/stakeholder consultation and environmental approvals
- **Canning Bridge Station upgrade:** as an Aboriginal Heritage site, there is potential complexity relating to changing or new requirements for construction, which will need to be confirmed through additional stakeholder consultation.

Capability & capacity Main Roads WA has a prequalification panel that allows contractors to express their interest before a tender is issued. Recent market sounding confirmed that there is sufficient interest in similar projects (based on size and technical requirements) with at least four to five bidders per project.

Location, resourcing, and capacity is an emerging issue given the increasing competition for engineering and construction related materials and labour from supply chain constraints, forecast growth in the resources industry and the national infrastructure pipeline. While this is a national issue, the increase in demand for structures, civil trades and labour is particularly pronounced in Western Australia due to large project commitments.³ This is likely to put upward pressure on the real cost of labour and give rise to competing demand, placing pressure on workforce capacity to deliver infrastructure to budgeted timelines.

Of the longlisted procurement options, only the Design and Construct (with early contractor involvement) and Alliance models were considered appropriate for this project and shortlisted on that basis. Both procurement models are commonly used for Main Roads WA projects, although the selection of a preferred procurement model has not been finalised.

Project governance The package of transport interventions was developed through close collaboration between Western Australia's three transport agencies: Main Roads WA, the PTA and the DoT.

This coordinated and integrated approach to transport planning reflects the freeway corridor's multi-modal nature and the critical role it plays in providing connectivity across Greater Perth.

Main Roads WA and the PTA will be involved in the ongoing governance of the proposal through monitoring Key Performance Indicators as part of the proponent's benefits realisation and management strategy.

Risk Risk analysis was undertaken through both qualitative and quantitative assessments of each of the interventions of the preferred Option 4. Overall, 234 residual risks were identified across all interventions, with a total of 35 risks being identified as having residual risk ratings of 'high' or 'very high'. Notably, all 'very high' risks relate to the Stirling Station Upgrade, including the risk of pedestrians being struck by a bus and items falling from elevated structures onto the railway or freeway. The proponent has identified appropriate mitigation strategies for the residual risks associated with the construction and operations phases of the proposal.

³ Infrastructure Australia 2021, *Infrastructure Market Capacity* (p.54), Sydney, Australia, Available: [Infrastructure market capacity | Infrastructure Australia](#)

Lessons learnt

The proponent's review of procurement models used for recent road projects in Australia and New Zealand found that the majority of projects adopted a traditional procurement model unless it was a toll road (mainly New South Wales and Victoria), in which case the Public Private Partnership (PPP) model was adopted. Specifically, the proponent provides details of projects that adopted a traditional procurement approach where the Design and Construct model was mostly used and the risks involved. This has informed the proponent's procurement approach.

The proponent has not completed a Post Completion Review Plan. We encourage the proponent to publish the findings of any reviews undertaken to capture the lessons learned from design and delivery for the benefit of future projects.

Economic appraisal results (preferred option)

The proponent's business case reports that the societal benefits of the proposal would significantly outweigh the costs, with a Benefit Cost Ratio (BCR) of 4.56 and a net present value (NPV) of \$3,008 million.

	Discount rate:	4%	7% (central)	10%
Core evaluation results¹	BCR:	6.24	4.56	3.44
	NPV (\$m):	\$5,437	\$3,008	\$1,739
Key benefits measured:	Travel time benefits comprise just over 100% of benefits (there are also some disbenefits associated with the intervention). The majority (~80%) of these travel time savings arise from the road and cycling based interventions. Non-monetised benefits are not discussed within the business case.			
Key observations and issues	Benefits are dominated by travel time savings. In our view the estimates of travel time savings appear reasonable given that: <ul style="list-style-type: none">• Analysis of travel time benefits was conducted in line with Australian Transport Assessment and Planning (ATAP) guidelines, including ATAP-sourced parameter values⁴ for the value of time and methodological approach to the benefit calculation.• To the extent that a relatively high annualisation factor underpinned travel time savings, the proponent clarified the factor was calculated from actual data recorded at permanent count sites on major roads in WA. It was also noted that an alternative annualisation factor is unlikely to materially affect CBA results. Benefits are broken down by type of benefit for all: <ol style="list-style-type: none">1. Road and cycling interventions2. Public transport interventions. While both sets of interventions are comprised of multiple sub-interventions, benefits are not broken down into these sub-interventions, so it is not clear whether a particular sub-intervention is responsible for most of the benefit or all are contributing equally. Finally, the proposal remains net beneficial to a range of sensitivities applied to the magnitude of costs and benefits.			

(1) Costs reported in this table are based on P90 cost estimates.

Proposal development

Developing the proposal involved extensive stakeholder consultation, with workshops and online surveys being utilised to group the initial longlist of interventions into four shortlisted options.

Analysis of the options was conducted in two stages. Initially, an MCA was applied, undertaken using an online survey platform. Six assessment criteria and their relative weightings were agreed upon by the stakeholder group, and the two

⁴ Guidelines and parameter values can be viewed at <https://www.atap.gov.au/>

highest MCA scoring options (Option 2 and Option 4) were shortlisted for further analysis.

A rapid Cost-Benefit Analysis (CBA) was subsequently undertaken for the two shortlisted options. Based on the CBA, Option 4 (including six individual interventions) was recommended for further evaluation, based on the following:

- Provides the highest overall economic benefit to the community
- Provides the highest net benefit
- Provides the most diverse set of benefits in catering to users of several transport modes.

Option 4 scored 4.5% higher than Option 2 (second-placed) at the MCA stage, and also delivered greater benefits to the community, with a higher BCR as compared with Option 2. Option 4, which involves a combination capital intensive and better use intervention, was finally evaluated in a detailed CBA.

The proposal does not explicitly consider or comment on potential COVID-19 impacts to the efficacy of the intervention. However, it is noted that:

- No additional demand modelling has been undertaken since the business case was completed in early 2021
- Demand modelling was not adjusted to reflect reduced traffic or public transport trends during COVID-19.

Despite this, data recently collected demonstrates that traffic and transport impacts of COVID-19 were short-term (in the order of four months), as Kwinana and Mitchell Freeway traffic volumes are now at or exceed pre-COVID levels and public transport patronage is over 85%. In addition, there is a recent trend of government and major CBD employers to encourage workers to return to the office at least three to four days a week.

More broadly, it is noted that the proponent's business case was completed in 2020, where it was expected that all construction would take five years to complete, and all interventions operational by 2026. At the time of this evaluation, some of the proposed interventions have already been implemented or are under construction.

Proposal engagement history

The early-stage proposal for the *Mitchell and Kwinana freeways upgrade* was initially included on the *Infrastructure Priority List* in 2018 and subsequently updated in 2019 to include additional road sections along the freeway corridor.



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,2020)			% of total for 7% results
	4%	7%	10%	
Discount rate (real)	4%	7%	10%	
Costs				
Total capital costs (P90)	\$702	\$626	\$562	74%
Operating costs	\$335	\$219	\$151	26%
Total costs^{1,2}	\$1,037	\$845	\$713	100%
Benefits				
Travel time savings	\$6,533	\$3,882	\$2,466	101%
Vehicle operating cost savings	\$70	\$35	\$18	1%
Travel time reliability benefit	\$80	\$46	\$28	1%
Crash benefits	\$27	\$13	\$7	0%
Environmental externalities	-\$236	-\$124	-\$66	-3%
Total benefits¹	\$6,474	\$3,852	\$2,452	n/a
Net present value (NPV)³	\$5,437	\$3,008	\$1,739	n/a
Benefit-cost ratio (BCR)⁴	6.24	4.56	3.44	n/a

Source: Proponent's business case

- (1) Totals may not sum due to rounding.
- (2) Costs reported in this table are based on P90 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.