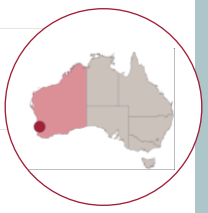
Australian Government | Infrastructure Australia

Project business case evaluation summary

METRONET: Morley-Ellenbrook Line

Location
Perth, Western Australia



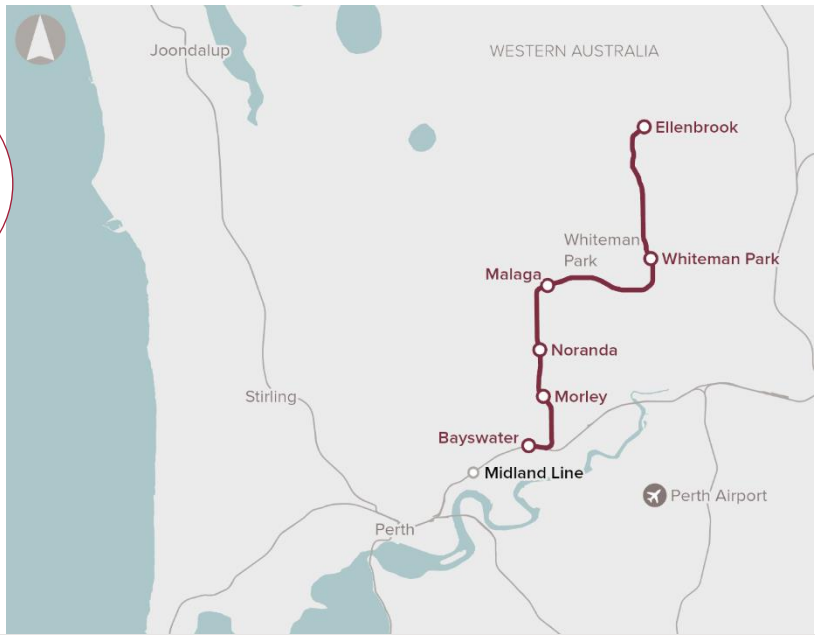
Geography
Fast-growing cities

Category
National Connectivity

Capital cost
Pending (see endnote)

Indicative timeframe
Construction Start: 2020-21
Project completion by: 2023-24

Proponent
Government of Western Australia



Evaluation date
7 April 2020

1. Evaluation Summary

The **Morley-Ellenbrook Line project** has been added to the Infrastructure Priority List as a **Priority Project**.

The corridor between Morley and Ellenbrook houses more than 150,000 residents and hosts more than 40,000 jobs. The area is experiencing rapid population growth, largely driven by the relatively low cost of housing in Ellenbrook and surrounding suburbs, with dwellings up to 30% more affordable than the median price in Perth. The corridor is expected to be one of the key areas to accommodate Perth's growing population over the next 10 years.

Current bus travel times between Morley, Ellenbrook and Perth CBD are relatively slow and require a transfer to existing rail services to reach the CBD. As a result, car use within the corridor continues to grow, placing pressure on the road network. The business case shows that road congestion imposes a high economic cost on Greater Perth's road network, estimated at $1.5 billion in 2016. In the absence of any additional capacity (other than projects already under construction or funded) the cost of congestion is projected to grow to around $3.6 billion in 2031.

The Morley-Ellenbrook Line would connect Ellenbrook to the Perth CBD through Bayswater Station, linking to the Midland and Forrestfield-Airport lines. This would improve connectivity and integrated transport options within the corridor, reduce car dependency and traffic congestion. Further, the project helps improve liveability by encouraging denser urban development patterns around stations, unlocking economic development potential and improving access to jobs. Overall, there is good strategic merit for the project, particularly in the long-term.

The proponent's estimated benefit-cost ratio (BCR) for the project is 1.1 with a net present value (NPV) of $208 million when using a 7% real discount rate.

The proponent has selected a heavy rail option, although the options assessment process found that a bus rapid transit option could deliver a slightly higher BCR. The proponent's preference for a rail solution is due to cost, scope, user preference and system capacity. In particular, the bus rapid transit option could reach capacity by 2026. Drawing on the evidence provided in the options assessment, Infrastructure Australia considers that a heavy rail solution may be required in the future to support longer term growth within the corridor.

Furthermore, having a long-term rail solution for this area can create certainty for stakeholders, catalyse a more efficient urban form, help embed sustainable travel behaviours and avoid a significant investment in a short-term bus solution.

Infrastructure Australia identified several areas in the project's economic analysis which may slightly overstate its benefits, including travel time value parameters not sufficiently supported by local evidence, and a high growth rate for long-term benefits. On balance, Infrastructure Australia supports the project because it shows strategic merit, appropriate deliverability planning and benefits that will be close to its costs.

2. Context

Western Australia's previous economic boom left Perth with a positive legacy of skills and infrastructure. Employment and population growth are rising, and north-east Perth is expected to play an important role in accommodating future economic activity.

The Morley to Ellenbrook corridor is an area running north from the inner-city suburb of Morley (9km from the Perth CBD) extending past Ellenbrook (22km from the CBD) in the far north-east of Perth. The north-east region is experiencing significant population growth and the Morley to Ellenbrook corridor remains one of the only corridors in Perth without a rapid transit connection. It is facing four key challenges: lack of connectivity, road congestion, poor urban form and risk of continued urban sprawl.

The corridor encompasses an area of more than 150,000 residents and has experienced strong population growth. This trend is expected to continue with growth forecast at 3.3% per annum between 2016 and 2031, compared to 1.8% per annum growth across the Perth metropolitan area. Malaga is a significant employment centre in the corridor with almost 16,000 workers. It covers an area of 660 hectares and has important connections to the Kewdale intermodal freight terminal, and Perth Airport.

3. Problem description

There has been significant planning in the 13km corridor between Morley and Ellenbrook, but no investment in rapid public transport. The corridor has continued to rapidly develop, and without intervention, its challenges will continue to compound. The poor connectivity within the corridor is leading to higher travel times to jobs, services and education facilities throughout Perth. In recognition of these challenges, Infrastructure Australia included a Priority Initiative for Transport Connectivity between Morley and Ellenbrook on the *Infrastructure Priority List* in February 2019.

For many residents around Perth, they can typically reach the CBD via train in 20-30 minutes. By contrast, residents of the corridor face a public transport trip of around 50 minutes for a similar distance. Additionally, the corridor has the highest level of car usage for journeys to work among all corridors in Perth, which has created high levels of road congestion, a problem that is forecast to become more severe in coming years as population rises.

The business case echoes the 2019 Infrastructure Australia Audit, stating that road congestion imposes a high cost on the Perth economy, estimated to be around $1.5 billion in 2016. In the absence of any additional capacity (other than projects already under construction or funded) the cost of delay is projected to grow to around $3.6 billion in 2031.

The corridor and its immediate surrounds are characterised by low density urban form. More than 80% of the dwellings in the established areas of the corridor are separate houses, which is higher than the Greater Perth average of 77%. The combination of rapid population growth, low density development and a high dependence on cars is increasing the risk of urban sprawl, which will impose additional economic costs.

4. Options identification and assessment

The proponent undertook a comprehensive options development and assessment process. As recommended by Infrastructure Australia's Assessment Framework, the proponent identified a wide range of options and assessed them using a quantitative multi-criteria analysis and rapid cost-benefit analysis, before undertaking detailed cost-benefit analysis in the business case.

The proponent initially identified a list of more than 100 options, before filtering those to a final longlist of 14 options. The following options were assessed using a quantitative multi-criteria analysis framework:

- Seven heavy rail-only options
- Two bus rapid transit-only options
- Four hybrid bus rapid transit-heavy rail options
- One hybrid private vehicle-bus option.

From these 14 options, a shortlist of four options was assessed using rapid cost-benefit analysis:

- Option 1A: A new heavy rail line along a Perth-Morley-Ellenbrook alignment, including tunnelling from the CBD to Malaga
- Option 1B: A hybrid heavy rail–bus rapid transit option following the Option 1A alignment
- Option 7A: A new heavy rail line along a Bayswater-Ellenbrook alignment, via Tonkin Highway
- Option 7C: A bus rapid transit-only option following the Option 7A alignment.

Based on the outcomes of the rapid cost-benefit analysis, Options 1A and 1B were excluded from further analysis. While both options generate large economic benefits, they failed to return a net benefit to the community due to high capital costs. The proponent refined and developed the scopes of Option 7A and Option 7C following the rapid cost-benefit analysis. The change in scope, along with other modelling refinements, affected both the benefits and costs of each option.

We note that bus rapid transit systems developed and in planning in other jurisdictions indicate that the bus rapid transit option considered in the business case could have been scoped to provide a higher capacity. However, we acknowledge that this would likely have led to higher costs.

A detailed cost-benefit analysis was undertaken for Options 7A and 7C to estimate their net economic benefits to the community. The cost-benefit analysis found that heavy rail (Option 7A) has a lower benefit-cost ratio and net present value than the bus rapid transit option (Option 7C).

Noting these findings, the proponent has identified heavy rail (Option 7A) as the preferred option as the bus rapid transit option (Option 7C) would result in lower density land use outcomes in the short-term, would require users to transfer at Bayswater Station to reach the Perth CBD, have insufficient capacity to meet demand after 2026, and provide poor connectivity to two major tourism facilities.

5. Proposal

The proposed solution is a 21-kilometre at-grade heavy rail line using the median of the Tonkin Highway.

The project's key features include:

- Four at-grade stations at Morley, Noranda, Malaga, and Ellenbrook
- Two elevated stations at Bayswater and Whiteman Park
- Provision for a future station at Bennett Springs East
- Predominately at-grade rail line from Malaga to Ellenbrook via Whiteman Park
- Approximately 30 minute one-way journey from Ellenbrook to the CBD
- By 2031 a train every 10 minutes in the peak and every 15 minutes off-peak.

6. Strategic fit

Improving public transport in the corridor supports existing state government policies, including the *State Planning Strategy 2050* (WA) and the *Morley Activity Centre Plan*. Morley is one of ten designated Strategic Metropolitan Centres in Perth. Ellenbrook is classified as a Secondary Centre and is progressively being developed in-step with population growth within the surrounding residential areas to support the longer-term evolution of the corridor. The project is also a key component of the broader METRONET program, which is the WA Government's program to create a well-connected Perth with more transport, housing and employment options.

This project also responds to the Priority Initiative for *Transport connectivity between Morley and Ellenbrook,* which is included on Infrastructure Australia's *Infrastructure Priority List.* It also broadly aligns with the findings of the *Australian Infrastructure Audit 2019*, which identified Perth as a fast-growing city and recognised the social inclusion benefits of providing transport options to outer suburban areas.

The proponent's business case found that most of the benefits of the project are for saving people time on their journeys, with travel time savings for public transport and road users comprising over 85% of project benefits. Safety and other community benefits are smaller, totalling 8% of project benefits. While the opportunity to catalyse a more efficient and sustainable land use form is a key theme in the business case, the proponent did not measure urban renewable benefits in the economic appraisal.

Overall, Infrastructure Australia considers that the project has good strategic merit, particularly in supporting longer term growth within the corridor.

7. Economic, social and environmental value

The proponent's stated core results for the economic appraisal report a benefit-cost ratio of 1.10 and a net present value of $208 million, at a 7% discount rate and using a P50 cost estimate. Including wider economic benefits (WEBs), the benefit-cost ratio increases to 1.20 with a net present value of $430 million (P50).

The results presented in the business case indicate that the preferred option has a marginal economic, social and environmental case. Infrastructure Australia's review found that some areas of the cost-benefit analysis may be overstated but still considers that the benefits of the project will be close to its costs.

Infrastructure Australia recognises that this is one of the largest public transport projects being developed in Western Australia, and that the business case has been developed through a rigorous governance structure led by the METRONET agency. The business case included a detailed cost-benefit analysis which measured a wide range of benefits including tourism and passenger amenity benefits, in addition to conventional transport appraisal benefits (i.e. crowding and travel time savings).

During our review Infrastructure Australia found that there is a risk that the proponent's forecast patronage growth rate and land use changes may not be fully realised in the assumed timeframes. The proponent assumes that patronage will grow by an average of 2.8% through to 2074, which is greater than historical observed growth rates.

We also identified that the land use changes and urban renewal outcomes expected from the project will be critical in achieving the estimated project benefits. We recommend the proponent implements active land use policies to ensure that these benefits are realised, since land use changes typically occur over a long period.

While the transport benefits associated with forecast land use changes have been included in the business case, the urban renewal benefits from a more compact urban form have not been included at this time. The net impact of including these benefits is unclear as there may be both positive and negative impacts.

Our review also found some areas of the cost-benefit analysis differed from the national economic appraisal guidelines. For instance, the analysis used a higher value of travel time and business use proportion which was not sufficiently supported by local evidence. The economic appraisal estimated tourism benefits, behavioural change benefits, and users' preferences for a particular mode of transport. There is a risk that these may have already been estimated within the transport demand model.

The proponent included option/non-use benefits (i.e. the value of improved infrastructure to non-users) in the core economic appraisal. Infrastructure Australia recommends reporting these benefits separately as a sensitivity test, as the methodology for measuring these benefits are still in development.

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,2018/19) @ 7% real discount rate		% of total
Benefits			
Public transport travel time savings	$1,472		63%
Reduced crowding in public transport	-$8		0%
Net transfer penalties[4]	-$39		0%
Station amenity benefit	$27		1%
Fare expense savings	$13		0%
Road user travel time savings	$544		23%
Vehicle operating cost savings	$118		5%
Road crash benefits	$93		4%
Community and other benefits	$104		4%
Total benefits[1]	**$2,324**	(A)	**100%**
Total costs[1] (see endnote)	**$2,116**	(B)	**100%**
Net benefits - Net present value (NPV)[2]	**$208**		n/a
Benefit-cost ratio (BCR)[3]	**1.10**		n/a

Source: Proponent's business case

(1) Totals may not sum due to rounding.
(2) The net present value is calculated as the present value of total benefits less the present value of total costs (A – B).
(3) The benefit–cost ratio is calculated as the present value of total benefits divided by the present value of total costs (A ÷ B).
(4) Net transfer penalties represent the additional travel costs perceived by public transport users who interchange during their journey

The proponent's reported capital costs and funding is presented in the following table.

Capital costs and funding	
Total capital cost	Pending (see endnote)
Australian Government funding contribution	$500 million
Other funding	The Western Australian Government would fund the components of the project not funded by the Commonwealth.

8. Deliverability

The proponent has applied the WA Department of Finance Infrastructure Procurement Options Guide to determine the procurement option for the preferred packaging option. Two stakeholder workshops were held to determine the initial packaging and approach. The workshops considered balancing the control of project cost and risk against achieving the stated objectives and outcomes.

The preferred packaging option includes a single large package for civil works, new and existing structures, rail structures and systems, stations, and bus depot. Two smaller packages would be developed for forward works and main road preparatory works.

The preferred procurement option is an 'alliance model', which the proponent identified as being optimal for the large rail works package. This model is typically used in situations where there is considerable complexity, particularly where the project might have numerous interfacing works which increases the potential for unknown risk. It may also be applied in cases where procurement times are quite short. This model was preferred as it allows the proponent to adopt a risk share structure whereby all parties have some responsibility for scope, delivery, and risks. However, the nature of the risks appear to be reasonably well understood within the business case.

The proponent has also undertaken a constructability assessment. The assessment involved a broad review to identify critical factors that may impact the project, such as site constraints and disruption to traffic. Many of the project sites along the alignment appear to be constrained due to local roads surrounding parts of the alignment. Further, the proponent believes that disruption to traffic in the vicinity of many of the sites along the alignment is likely.

Overall, the risk assessment and mitigation approach appear appropriate and consistent with this stage of business case development. Further ongoing work will be required as part of the delivery and construction process as is typical for a project of this type as detailed work progresses.

The proponent has developed an initial Benefits Management Plan for the Morley-Ellenbrook Line. The Benefits Management Plan outlines 10 benefit measures, each associated with a specific key performance indicator, core data source, reporting frequency, and responsible reporting officer. Infrastructure Australia recommends that the benefits realisation plan focuses on measuring land use uptake and the extent to which land benefits have been realised.

The proponent has committed to undertaking a benefits management process throughout the project lifecycle. Infrastructure Australia encourages the proponent to assess the extent to which expected project benefits and costs have been realised and publish a Post Completion Review to inform the development of future projects.

This evaluation summary has been amended to exclude the capital cost (nominal, undiscounted) as the project is currently in active procurement.