

Project business case evaluation summary

More Trains, More Services — Stage 2

Location

Sydney, New South Wales

Geography

Fast-growing cities

Category

National Connectivity

Capital cost

\$2,233 million (P90, nominal outturn)

Indicative timeframe

Construction Start: Q2 2020
Project completion by: Q4 2021

Proponent

NSW Government

Evaluation date

18 June 2020



1. Evaluation Summary

The **More Trains, More Services — Stage 2 Project** has been added to the Infrastructure Priority List as a **Priority Project**.

Sydney is forecast to experience sustained population and employment growth. As a result of this growth, demand on the rail network connecting Sydney’s CBD to its surrounding suburbs and regions is growing strongly, with many services having insufficient capacity to meet demand — especially during peak periods when many customers experience overcrowding, more frequent delays and longer journey times.

More Trains, More Services (MTMS) Stage 2 is part of a multi-stage program designed to increase the capacity of the Sydney rail network by addressing key capacity constraints, and progressively transform Sydney’s rail network into a modern and reliable mass-transit system. Stage 2 will upgrade infrastructure on the T4 Illawarra, T8 Airport and South Coast lines, while also laying the foundations for future stages of MTMS.

MTMS Stage 2 has a strong strategic fit with Australian Government and NSW Government plans as it integrates transport and land-use planning, and meets capacity constraints by enhancing existing network assets. As noted above, MTMS Stage 2 is part of a broader program to improve the performance of the Sydney rail network and accommodate the growing population.

The proponent’s business case shows that the project has strong economic, social, and environmental value with a benefit-cost ratio (BCR) of 1.38 and a net present value (NPV) of \$890 million (2019 dollars) using a 7% real discount rate and P50 cost estimate. Infrastructure Australia identified some opportunities to improve the accuracy of the business case by refining the estimation of benefits associated with reductions in crowding and improvements in reliability. We also identified potential upsides associated with: the option value of being able to undertake future stages of MTMS, potential land-use benefits, and network integration benefits. After adjusting for these factors, we are confident that the project’s benefits will exceed its costs.

Managing costs will be essential for achieving the anticipated project outcomes, given that NSW and other jurisdictions are currently pursuing high levels of rail construction and maintenance activity. The proponent has independently assessed the cost estimates and has included an allowance for risk of cost increases or delays in the cost contingencies and the procurement strategy, indicating the project can be delivered within the anticipated timeframes and budget.

2. Context

The Greater Sydney Region has experienced strong growth in its economy and population over the past five years. This sustained growth has seen demand for rail trips increase significantly from 300 million trips in 2015, to 420 million trips in 2018 — an average of 7.6% growth each year.

Strong population growth is expected over the next 40 years, with the Greater Sydney Region's population projected to increase by around 60% from 5 million to 8 million. This will continue to increase demand on the city's transport network and threaten to expose key capacity constraints in the rail network. Unless rail capacity keeps pace with patronage growth, customers are likely to experience more crowding and discomfort, and increasingly unreliable train services.

The NSW Government has prepared integrated land-use and transport strategies to meet the challenges of sustained population growth and the associated demand for trips on the rail network, while achieving its strategic objective of creating of 'A Metropolis of Three Cities': a city where most residents are able to live within 30 minutes of their jobs, education and health facilities, services, and other places that they value.

A key initiative in these long-term plans is the MTMS Program, which is a 10-year initiative to progressively transform the Sydney rail network into a more modern and reliable mass-transit system, using digital technology to meet the needs of a wide variety of customers.

The MTMS Program is being delivered in stages, each of which is expected to significantly increase rail capacity and moving towards a more simple and reliable network. These stages include:

- Stage 1 – was completed in 2019, adding 1,700 weekly services through timetable enhancements, linking the Sydney Metro Northwest with the heavy rail network, and extending air conditioning to cover 100% of services.
- Stage 2 – improving the T4 Illawarra, T8 Airport and South Coast lines by investing in infrastructure asset upgrades that remove key interdependencies constraining the network's capacity. It also involves enabling works for Stage 3 and future stages, such as upgrades to the Sydney Central Terminal and trials of digital signalling systems required to deploy future timetable upgrades across the rest of the network.
- Stage 3 – builds on Stage 2 by investing in additional rail and signalling infrastructure assets and digital system upgrades to simplify and integrate the network, particularly along the T4 Illawarra and T8 Airport and South Coast lines, which will be connected to Sydney Metro City & Southwest through enhanced timetabling and upgrades to the Sydney Central Terminal.
- Future stages – leverage the digital systems tested and rolled out on previous stages, with additional track infrastructure creating 'fast lanes' on key rail corridors to the Illawarra, West and North.

3. Problem description

The increasing demand for rail trips in Sydney has been particularly acute on the T4 Illawarra, T8 Airport and South Coast lines, which typically cater for 410,000 round trips per day, or one-third of Sydney Trains customers. Between 2014 and 2017, rail patronage on the T4 and T8 lines grew by 17% and 45% respectively, meaning that they were operating at or above capacity in 2018. The T4 line was the most crowded line on the rail network during the morning peak, with passenger loads averaging 144% of seated capacity and 75% of services above the target operating capacity (135% of seating capacity). The T8 line was the fourth-most crowded line on the network, with 54% of morning peak services above operating capacity.

By 2021, Transport for NSW estimates that all T4, T8 and South Coast line morning peak services will exceed target operating capacity. As patronage continues to outstrip capacity, crowding on trains will slow train boarding and alighting, which will increase the time trains spend at station platforms and ultimately result in delays and less-reliable journeys. The *Infrastructure Priority List* recognises these challenges in the High Priority Initiative for Sydney rail network capacity.

The T4, T8 and South Coast lines share a large amount of rail track, signalling infrastructure and central terminal capacity while catering to a range of different customers with unique service requirements. This includes:

- inner-urban commuters — who value high-frequency services, such as 'turn-up-and-go', where trains depart every 10 minutes or less, even if trip times increase and seat availability reduces

- outer-urban commuters — who travel between 25 and 80 minutes from the outer suburbs to the city and value a mix of frequency, trip time and access to a seat
- inter-city commuters — travellers commuting from outside the city who commonly travel for an hour or more, require access to seating and value reductions in total journey times
- freight customers — who value sufficient service capacity and flexibility to allow them to meet changing demands for their products.

Attempting to cater to these different customers while sharing large segments of track and other interdependent assets creates operational complexity that reduces track capacity and limits reliability. The interdependency also means it is difficult to improve services for one set of customers without reducing service quality to another.

4. Options identification and assessment

MTMS Stage 2 was identified by the NSW Government after a rigorous multi-stage options development process, which was part of the strategic business case (SBC) for the broader MTMS Program. This evaluation process included an options development workshop to leverage the problems and opportunities outlined in Transport for NSW (TfNSW) and other strategic planning documents to identify a long list of 35 options. From this list of 35 options:

- 15 options, representing a wide range of approaches, were identified and developed in more detail and then filtered using a qualitative assessment and multi-criteria analysis (MCA) of key performance indicators for the program objectives.
- The resulting six options were assembled into six different implementation pathways that were assessed using a rapid cost-benefit analysis (CBA).
- The three best performing options from this rapid CBA became the MTMS Stages 2, 3 and future transformational stages.

All six implementation pathways identified the first step to increase short-term capacity as optimising the existing heavy rail assets, which is the option presented in the MTMS Stage 2 final business case. While other first-step options were considered qualitatively in the SBC, they were not considered further, as they did not provide enough short-term capacity or meet other program objectives.

The final business case for MTMS Stage 2 only completed a full CBA for one option. While best practice is to undertake a full CBA on a range of different options to address the underlying problem, in this instance the proponent has quantitatively considered a wide range of potential solutions and has combined the best performing solutions into a comprehensive package.

Infrastructure Australia considers that the proponent has undertaken a rigorous options development process. This has identified a preferred package of solutions that can meet short-term demand, while creating the foundation necessary for future stages.

5. Proposal

The proponent's business case notes that this combination of growing demand, capacity constraints, network interdependence and different customer requirements presents the opportunity to combine investments that increase capacity with additional track and signalling infrastructure that allows service independence in their operations. This approach would untangle services by removing their interdependency and is expected to not only increase service capacity, but also facilitate a simple and more differentiated service offering — one that better matches customer requirements and improves their experience.

MTMS Stage 2 would improve services for the T4, T8 and South Coast lines by:

- Undertaking enabling works on the T4 line: additional turnback capacity at the Central Sydney Terminal; new crossovers at Erskineville and Hurstville; expanded stabling; station capacity upgrades; platform lengthening; train maintenance capacity improvements; freight loop extension at Waterfall; power upgrades; and signalling modifications.
- Upgrading the T8 Airport Line: signalling upgrades; additional train maintenance storage capacity; station upgrades; and traction power upgrades.

- Procuring:
 - 17 eight-car double-deck suburban trains — including two maintenance spares; and
 - 30 New Intercity Fleet (NIF) cars to enable the extension of trains to 10-cars.
- A number of smaller initiatives aimed to integrate the newly upgraded asset with other parts of the transport network while making sure that their operation is more resilient and environmentally sustainable.

It is expected that MTMS Stage 2 will result in the following increases in peak service capacity:

- T4 suburban services between Sutherland and Hurstville increasing from 15 trains per hour to 18 trains per hour
- T8 suburban services through the Airport Tunnel increasing from 10 trains per hour to 16 trains per hour
- more regular and reliable services on the T4 and T8 suburban lines
- 25% more seats on South Coast intercity services — by increasing NIF train configuration from 8-car trains to 10-car trains.

6. Strategic fit

MTMS Stage 2 aligns strongly with the problems and opportunities outlined in the strategic transport and land-use plans of the NSW Government. It is also integrated into long-term strategic plans for the Greater Sydney Region and its surrounding regions and transport networks. *The Greater Sydney Region Plan* and the *Future Transport Strategy 2056* outline the NSW Government's strategy for accommodating the Greater Sydney Region's projected population growth — from 5 million in 2016 to 8 million in 2056 — through an integrated transport and land-use vision centred around planning 'A Metropolis of Three Cities'.

The *Future Transport 2056 Strategy* and other TfNSW strategies identify the MTMS Program as a priority initiative for the next ten years. It does so on the basis that MTMS will help deliver the capacity upgrades required to convert the heavy-rail network into a more modern and reliable 'turn-up-and-go' service.

The 2019 *Australian Infrastructure Audit* projected that the line between Mascot and Sydney will have the highest crowding levels in the Sydney rail network, with intensive residential and commercial redevelopment of the southeast Sydney light industrial areas such as Zetland, Mascot, Rosebery and Alexandria further increasing demand for rail trips.

Sydney rail network capacity is identified as a High Priority Initiative on the Infrastructure Priority List. The Priority list also includes an initiative for *Network Optimisation Program — Rail*, which proposes identifying and prioritising programs that help maximise the existing capacity of rail networks, especially programs that use data and technology to improve network performance, including timetabling and sectorisation of passenger corridors where appropriate. MTMS Stage 2 achieves this objective by reconfiguring the network in a way that facilitates timetable enhancements, increasing the capacity of existing rail lines.

Overall the project has strong strategic merit as it clearly addresses the identified problems. In particular, the project demonstrated how the service upgrades will improve customer experience by providing more reliable and regular train services, while enabling the operator to achieve operational efficiencies and deliver a more differentiated set of services that better meets the needs of customers. Furthermore, the project would reduce interdependencies within the network.

7. Economic, social and environmental value

The proponent's business case states that the project will significantly improve the community's quality of life by reducing crowding, delays and congestion on both the rail and road networks. Commuters switching from cars to public transport as a result of the upgrades will contribute to sustainability outcomes by reducing car dependency, emissions and congestion. The improvement in services, customer experience and the impact on the community's quality of life is reflected in the cost-benefit analysis, which states a BCR of 1.38 and a NPV of \$890 million (2019 dollars) using a 7% real discount rate and P50 cost estimates, excluding Wider Economic Benefits (WEBs).

A major benefit of the capacity improvements in MTMS Stage 2 is reduced crowding and delays experienced by customers on the T4, T8 and South Coast lines. These improvements mean that users will be able to use the rail network at their preferred times or instead of a different mode.

The business case used approaches from NSW Government guidelines to estimate most benefits. However, the proponent used an alternative approach for estimating the benefits of reduced crowding on trains which was developed alongside their core demand forecasting model to overcome a common model limitation. This alternative approach included conservative estimates of passengers' travel choice and assumed that 40% of passengers who could not board trains due to crowding would drive 23 km to the CBD rather than catch a train at a different time. We consider this to be overly optimistic and our analysis found that more conservative user behaviour assumptions would reduce benefits for the project. Infrastructure Australia acknowledges the difficulties inherent in accurately measuring crowding and reliability impacts in transport models, especially for projects with a primary objective of reducing crowding and improving reliability.

Infrastructure Australia also identified several potential benefits of MTMS Stage 2 that were not included in the business case. These include:

- *The option values to undertake MTMS Stage 3 and future stages* — without the capacity enhancements undertaken in MTMS Stage 2, certain components of MTMS Stage 3 and future stages cannot proceed. As such, an additional benefit of Stage 2 is that it provides the option to realise the benefits of future stages.
- *Integration benefits* — the business case for MTMS Stage 2 identifies improved integration with the rest of the transport network, such as bus facilities and services, active transport infrastructure and station access. However, these benefits were not measured in the CBA.
- *Land-use benefits* — the proponent considers that MTMS Stage 2 is a response to planned growth likely to occur in the short-term, as opposed to a catalyst for more compact development. Benefits from this opportunity were not fully captured in the business case.

Taking all these considerations into account, Infrastructure Australia is confident that MTMS Stage 2 project will deliver economic, social and environmental value to the community, improve travel conditions for rail passengers, and encourage greater public transport use.

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

Capital costs and funding	
Total capital cost	\$2,023 million (P50 — nominal outturn) \$2,233 million (P90 — nominal outturn)
Proposed Australian Government funding	\$1,116.5 million
Other funding (NSW Government)	\$1,116.5 million

The table on the following page 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 users		
Travel time savings (public transport)	\$364	11.3%
More customers travel at preferred time	\$152	4.7%
Improved reliability (less customer delay)	\$493	15.2%
Road users		
Travel time savings (road users)	\$281	8.7%
Mode shift benefit ¹	\$581	18.0%
Reduction in vehicle operating costs	\$181	5.6%
Accident cost savings	\$100	3.1%
Avoided environmental externalities	\$117	3.6%
Fares, tolls and excise correction	\$2	0.1%
Capacity		
Less crowding on trains (whole-of-network)	\$699	21.6%
Less crowding at stations	\$126	3.9%
Complexity		
Improved customer experience on new fleet	\$26	0.8%
Improved customer experience at stations	\$93	2.9%
Residual value	\$20	0.6%
Total Benefits²	\$3,235	(A) 100.0%
Capital costs (P50)	\$1,616	68.9%
Operating and maintenance costs	\$729	31.1%
Total Costs¹²	\$2,345	(B) 100.0%
Net benefits - Net present value (NPV)³	\$890	(C) n/a
Benefit-cost ratio (BCR)⁴	1.38	(D) n/a

Source: Proponent's business case

(1) This is the direct benefit to road users who are able to travel on rail in the project case, due to the additional capacity and reliability

(2) Totals may not sum due to rounding.

(3) The net present value (C) is calculated as the present value of total benefits less the present value of total costs (A – B).

(4) The benefit-cost ratio (D) is calculated as the present value of total benefits divided by the present value of total costs (A ÷ B).

8. Deliverability

Delivery of the project is advanced. The proponent completed an expression of interest process in late-2018. After a positive industry response, contracts were awarded to successful bidders in May 2020.

Prior to requesting tenders, the proponent considered and evaluated a range of procurement options for the project, taking into account lessons learned from recent rail programs. Their preferred approach for the main infrastructure works is to competitively procure two collaborative contracts described as Incentivised Delivery Partnerships. This approach enables performance-based allocation of works between two contractors and allows for management of delivery risks related to the high volume of works planned for 2021. These arrangements also provide the opportunity to incorporate future stages of MTMS into one or both partnerships.

The procurement of fleet delivery was considered separately, and the proponent opted to vary the existing contract for the New Intercity Fleet to deliver intercity carriages and use an option in the Sydney Growth Trains contract to augment the order for suburban trains. The suburban fleet approach was endorsed by the TfNSW Innovation and Planning Committee and the full fleet delivery strategy subsequently endorsed by the TfNSW Integrated Transport Committee in August 2018.

The project's risk management approach follows the Transport for NSW's Rail Program Delivery Branch Risk Management Plan, which applies to all business operations, programs and supporting activities which are undertaken or overseen by the Branch. Risk management continued through the final business case development phase and built upon the work completed in the strategic business case.

Infrastructure Australia considers that managing interface risks, including the interface with the rail network and future projects, will be essential to achieve the project objectives. We recommend an appropriate governance model is implemented to manage these risks.

While the MTMS Program will optimise parts of the Sydney rail network, the increased volume and frequency of services associated with Stage 2 (this project), Stage 3 and future stages, and other projects on the Sydney rail network are expected to result in a significant increase in long-term operating costs for the suburban rail network. The additional operating expenses will largely be met by the NSW Government. The proponent has not considered options such as changes to the fare structure or road pricing to fund the ongoing costs of the project. This could create a funding need for the NSW Government, requiring them to consider additional revenue streams.

A benefit realisation plan has been developed for the project. Benefits will be monitored within one, three and five years of project completion and will measure a range of key performance indicators related to rail travel times, crowding levels and displacement, dwell time, mode shift, station crowding, land-use outcomes, project capital and operating costs and timeline of project delivery. The benefit realisation plan does not outline the approach to measure benefits and it is not clear how some of the specified categories would be measured, in particular mode shift and land-use outcomes. We recommend further work is undertaken to ensure that benefit outcomes can be measured reliably.

Given the risks inherent in the project's delivery and operation, and the ability to reliably measure the promised upgrades in service capacity, Infrastructure Australia encourages the proponent to undertake and publish a post-completion review to assess the extent to which expected project benefits and costs have been realised. This can assist the development of future projects, including MTMS Stage 3 and future stages, and the large number of urban rail projects in progress or being prepared for delivery in Australia.

Consideration of COVID-19

The COVID-19 pandemic has significantly affected the use of infrastructure. Infrastructure Australia has been working collaboratively with the Commonwealth Government to provide advice on a staged response for managing, and recovering from, the impacts of the COVID-19 pandemic.

One critical element of our advice is to maintain a pipeline of nationally significant infrastructure investments. Nationally significant infrastructure projects are long-term investments, typically considering a 30-year view of the project's social, environmental and economic impacts. In making this recommendation, Infrastructure Australia continues to take a long-term view and has also considered the sensitivity of key planning assumptions using the best data available to us.

As noted in the 2019 Australian Infrastructure Audit, we must continue to evolve the way we plan for Australia's infrastructure to embrace uncertainty. There are still many uncertainties regarding the long-term impact of the COVID-19 pandemic on infrastructure use.

We will continue to collaborate with industry, the community and governments at all levels to understand the impacts of the COVID-19 pandemic on infrastructure decisions in Australia.