

Project Evaluation Summary

Sydney Metro City & Southwest

Proponent NSW Government
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1. Summary

Infrastructure Australia has added the **Sydney Metro City & Southwest** project to the Infrastructure Priority List as a **High Priority Project**.

The rail network servicing Sydney’s CBD is currently near capacity at peak periods, and some key routes are expected to reach capacity in the early 2020s. By 2036, demand is expected to exceed network capacity, causing material impacts on service accessibility, dwell times, and crowding on stations and trains. This will affect the overall reliability of the rail network, particularly where it provides access to the CBD. The cost of these transport network constraints has been estimated at \$2 billion in lost economic benefits per year over the next 30 years.

Sydney Metro City & Southwest is the second stage of the broader Sydney Metro project. It will deliver 30.5 kilometres of metro rail between Chatswood and Bankstown. The project has two components: a 17.1 kilometre section from Chatswood to Sydenham that is primarily tunnelled; and a 13.4 kilometre section from Sydenham to Bankstown, involving conversion of the existing Bankstown rail line to metro operations. The project includes new underground metro stations at Crows Nest, Victoria Cross, Barangaroo, Martin Place, Pitt Street, Central and Waterloo. The project will increase rail capacity through the Sydney CBD, improve capacity and reliability on the rest of the rail network, and enhance resilience of the wider transport network by delivering a second harbour rail crossing.

The proponent’s revised economic analysis (May 2017) shows the project has a benefit-cost ratio of 1.3 based on conventional transport benefits, rising to 1.7 when city shaping land use impacts and wider economic benefits are included.

Infrastructure Australia identified a number of issues in the economic analysis underpinning the 2016 business case. These included issues with expansion factors, annualisation factors, and inclusion in the 'city shaping' benefits of some benefits which could be considered as transport benefits. The proponent addressed these issues through additional analysis undertaken in May 2017. Taking account of this additional analysis, Infrastructure Australia is confident that the benefits of the project will exceed its estimated costs, and that the project will provide a net benefit to the Australian economy.

2. Strategic context

Sydney accounts for about one fifth of Australia's economic output. A large proportion of this is generated through the highly productive finance and professional services sector. Following a period of relative underperformance in the decade to 2011, Sydney's economy has re-emerged as a key driver of Australian economic output in recent years. Looking further ahead, Sydney's population is projected to grow from 4.3 million in 2011 to 6.2 million in 2036, and employment is expected to increase from 2.2 million to 3.1 million in the same period.

Sydney's *Global Economic Corridor*, which runs from the CBD north to Macquarie Park and south to Sydney Airport, generates over 57% of the city's output. Sydney's CBD alone generates nearly half the output of the *Global Economic Corridor*. Sydney's CBD draws in 630,000 workers every day, and this is expected to increase to 775,000 by 2036.

The anticipated growth in Sydney's population and employment will increase pressure on its transport network. Demand for travel is expected to grow by 40% in the morning peak between 2014 and 2036, with road demand expected to rise by 33% and rail by 62%. The Australian Infrastructure Audit 2015 projected that, in the absence of interventions to address the problem, the cost of congestion in the Sydney/Newcastle/Wollongong region would more than double from \$5.6 billion in 2011 to \$14.8 billion in 2031. In terms of rail passenger growth in Sydney, the Audit projected passenger hours travelled on the Sydney rail network would increase from 400,000 hours in 2011 to 625,000 hours in 2031.

The need for infrastructure investments to address constraints to Sydney's economic growth and quality of life has been recognised through several strategic policy documents and plans. These include Infrastructure Australia's 2016 *Australian Infrastructure Plan*, the *NSW State Plan*, the NSW Government's *Plan for Growing Sydney*, the 2012 *NSW Long Term Transport Masterplan*, and Infrastructure NSW's 2014 *State Infrastructure Strategy Update*.

Based on its clear alignment with relevant strategic plans, and its potential to address a nationally significant infrastructure constraint, Sydney Metro has previously been included in Infrastructure Australia's Infrastructure Priority List as a High Priority Initiative.

3. Problem description

The rail network approaching Sydney's CBD is near capacity, with some routes expected to reach capacity in the early 2020s. The T2 Inner West and South Line is expected to reach capacity by 2020 and the T1 North Shore Line by 2021. By 2027, all rail lines into the CBD are expected to have reached capacity, and by 2036, demand is expected to exceed network capacity, causing material impacts on reliability and displacement on some services. This would lead to increased crowding on station platforms and trains, increasing dwell times and impacts on overall network reliability, particularly into the CBD.

The complexity of Sydney's rail network around the CBD constrains the utilisation of individual lines, and complicates operations. Transport for NSW is addressing operational constraints through timetabling changes where possible, and a medium-term plan to further untangle parts of the network. However, in spite of these operational improvements, the capacity of the rail network will remain constrained.

The proponent estimates that the costs of these transport network constraints will amount to \$2 billion in lost economic benefits per year over the next 30 years and an annual loss of 3,535 jobs that could otherwise be created along the Global Economic Corridor. In addition, the proponent expects these network constraints would slow the expansion of worker productivity and wage growth, and cause living costs to rise.

4. Proposal

Sydney Metro City & Southwest will deliver 30.5 kilometres of metro rail between Chatswood and Bankstown. The project has two components: a 17.1 kilometre section from Chatswood to Sydenham that will be mostly tunnelled; and a 13.4 kilometre section from Sydenham to Bankstown involving conversion of the existing Bankstown Line to metro operations. Sydney Metro City & Southwest is planned to deliver new underground stations on the North Shore (Crows Nest and Victoria Cross), in the CBD (Barangaroo, Martin Place and Pitt Street) and at Waterloo, with new underground platforms at Central Station. The project will connect to Sydney Metro Northwest at Chatswood.

Alongside the already committed Sydney Metro Northwest – which opens in 2019 – and the implementation of other investments set out in *Sydney's Rail Futures*, Sydney Metro City and Southwest is expected to lead to a 60% increase in the capacity of Sydney's wider rail network by 2036. The project will deliver two additional tracks through the CBD on a new standalone metro system, enabling an extra 30 high-capacity metro services per hour in both directions at ultimate capacity. The removal of the Bankstown Line from the City Circle will provide more train paths through the Circle for other suburban lines. The new CBD metro stations are expected to relieve crowding at existing stations.

The project is also expected to:

- Increase reliability on the T1 North Shore Line, Northern and Western Line, T2 Airport Line, Inner West and South Line inner city and suburban services
- Improve network resilience by offering alternative options to existing links across the harbour in times of planned and unplanned disruptions
- Improve transport integration by enhancing the interchange between bus, light rail, pedestrian and cycling networks, and through the provision of taxi and kiss-and-ride at key stations, and by improving linkages to park-and-ride facilities in outer stations
- Improve rail safety through reduced crowding on trains and at stations, and through the use of new technologies, such as train protection systems and platform screen doors
- Increase capacity on the bus network, enabling the redeployment of routes north and north west, as well as freeing capacity on the Sydney Harbour Bridge by reducing demand for services over the bridge
- Reduce road congestion as customers transfer to rail.

5. Options identification and assessment

The consideration of alternative options was carried out during preparation of the *NSW Long Term Transport Master Plan* and *Sydney's Rail Future*. Options were broadly categorised as follows:

- Regulatory, governance and better-use reforms
- Road, bus and light rail alternatives
- Rail network efficiency options
- Sydney's Rail Future network options.

The qualitative analysis presented by the proponent states that a mass transit (metro) is the best option to address project objectives. While a qualitative assessment is sometimes sufficient to eliminate a number of options, Infrastructure Australia would have expected a more quantitative comparison of the plausible alternatives given the scale of the project.

The proponent has presented a comprehensive assessment that details the rationale for the final project route and station locations. A combination of qualitative analysis, multi-criteria assessments and quantitative analysis were used to determine route and station locations.

6. Economic evaluation

The proponent's revised economic evaluation (May 2017) shows the project has a benefit–cost ratio (BCR) of 1.3 based on conventional transport benefits, excluding wider economic benefits (7% real discount rate and P50 costs). Including wider economic benefits and 'city shaping' benefits, the BCR increases to 1.7. Wider economic benefits are essentially business productivity benefits; 'city shaping' benefits include the increase in the value of conventional transport benefits due to change in land use, the increase in productivity due to change in land use, and cost savings due to more efficient land use.

The revised economic analysis was developed in response to issues which Infrastructure Australia identified in the original (2016) business case.

One issue was the application of expansion factors, which are used to uplift projections for the 3.5-hour morning peak into a whole day figure. For the period up to 2036, the 2016 economic analysis applied an expansion factor of 3.03, consistent with NSW guidance (3.04). However, from 2036, an expansion factor of 5.2 was used. The proponent indicated that this reflected findings from major cities overseas on the utilisation of metro networks during off-peak periods. Infrastructure Australia notes that metro networks in these cities have been operating for many years, and network coverage across these cities is significantly more extensive than in Sydney. Also, population density in comparator cities is significantly higher than Sydney's, which would impact on the utilisation of the rail network. The May 2017 revised economic analysis used the standard NSW expansion factor of 3.04 for the entire appraisal period, which slightly reduced the project's BCR.

A second issue was the Reference Case ('do minimum'), which includes the proposed Western Harbour Tunnel in 2036. This project is not currently funded. The proponent has suggested that including this scheme in the Reference Case is a conservative approach, as it will likely reduce demand for public transport in the corridor. While this approach is useful for integrated long-term transport planning, it is not appropriate for cost-benefit analysis. The May 2017 revised economic analysis did not address this issue. Adjusting the Reference Case to exclude the proposed Western Harbour Tunnel would likely increase the project's BCR.

Infrastructure Australia also identified a number of factors that could positively impact on the economic viability of the project, including:

- **Annualisation Factors:** the proponent applied an annualisation uplift of 288 days, lower than the NSW standard of 300 (for rail projects). In the revised economic analysis the proponent applied the standard NSW annualisation factor;
- **Network Resilience:** the project provides a new rail tunnel connecting the north of Sydney with the CBD, providing an alternative harbour crossing. This will increase the resilience of Sydney's transport network. While the proponent has considered network resilience benefits in the business case, these impacts have not been quantified in the economic evaluation; and
- **Appraisal Period:** The proponent has followed the standard guidance of using a 30-year appraisal period. However, the project includes assets, such as the tunnel, which are likely to have a much longer useful life. It is appropriate to therefore adopt a 50-year appraisal period, in accordance with the Australian Transport Assessment and Planning guidelines. This would have a significant and positive impact on the BCR.

The revised economic analysis also adjusted the methodology used to estimate city shaping benefits, to include transport components in the conventional transport benefits.

The proponent estimated the wider economic benefits (WEBs) on the basis that the project would provide workers with faster and more direct access to the CBD and would enhance connectivity between businesses along Sydney's Global Economic Corridor, resulting in increased business productivity and the creation of more high-value jobs. While Infrastructure Australia recognises the strategic merit of the project and its potential to generate significant WEBs, the methodology underpinning the quantification of WEBs in Australia is still under development. Likewise, the inclusion of city shaping benefits is not standard practice in transport cost-benefit analysis in Australia. For this reason, the BCR including WEBs and city shaping benefits is quoted separately to the BCR based on conventional transport benefits.

Taking account of the proponent's revised economic analysis, Infrastructure Australia is confident that the benefits of the project will exceed its estimated costs, and that the project will provide a net benefit to the Australian economy.

Benefits and costs breakdown – updated results

Proponent's stated benefits and costs		Present value (\$m, 2015) @ 7% real discount rate	% of total
Transport benefits			
Public transport user benefits		\$7,221	63%
Road user benefits		\$2,030	18%
Land use transport impacts		\$1,059	9%
Other societal benefits		\$860	8%
Residual value of assets		\$285	2%
Total transport benefits¹		\$11,455 (A)	100%
Total costs¹		\$8,680 (B)	100%
Core results	Net benefits - net present value (NPV) A – B	\$2,775	n/a
	Benefit–cost ratio (BCR)² A ÷ B	1.3	n/a
Results with city-shaping land use impacts and WEBs	City shaping land use impacts	\$252 (C)	n/a
	Wider Economic Benefits (WEBs)	\$2,713 (D)	n/a
	Net Benefits - NPV (A + C + D) – B	\$5,739	n/a
	BCR² (A + C + D) ÷ B	1.7	n/a

Source: Proponent

Notes:

(1) Totals may not sum due to rounding.

(2) The proponent calculated BCRs as the present value of total benefits, less the present value of operating costs, divided by the present value of net capital costs (i.e. treating operating costs as a negative benefit). Infrastructure Australia recommends that the BCR is calculated as total benefits divided by total costs (capital plus operating costs). This methodological difference has a negligible impact on the BCR for this project. The table shows total costs only, as operating costs are commercially sensitive.

Capital costs and funding

Total capital cost (real, undiscounted)	Pending
Proponent's proposed Australian Government funding contribution	\$1.7 billion, through the Asset Recycling Initiative
Other funding (source / amount / cash flow) (nominal, undiscounted)	The NSW Government is funding the balance of the project.

7. Deliverability

The project will be delivered by the NSW Government. The proponent has carried out a quantitative risk assessment (QRA), which was provided to Infrastructure Australia together with a peer review of the QRA. The peer review found that the QRA was based on a comprehensive risk assessment and that the process for developing the inputs was consistent with good industry practice. Some of the review's recommendations had already been implemented when the proponent responded to the peer review in late 2015.

The proponent also provided a peer review of the programming approach, which concluded that the overall program provides a sound, logical and commercially efficient approach to delivering the project. A number of key issues were identified in the peer review, some of which have already been addressed by the proponent.

The proponent developed a Reference Delivery Strategy for Sydney Metro City and Southwest, whereby TfNSW may enter into negotiations with Northwest Rapid Transit (NRT) for elements of the extension of the Sydney Metro Northwest to include the project. The existing project Deed includes an augmentation provision that provides a framework for TfNSW and NRT to negotiate any future extensions of Sydney Metro Northwest. The final delivery strategy for the project may have different possible outcomes depending on the result of the negotiations. Infrastructure Australia supports NSW exploring franchising opportunities.

The project is well-placed to learn delivery-related lessons from the Sydney Metro Northwest project, which is currently under construction. Infrastructure Australia recommends that periodic reviews be undertaken to inform the project delivery strategy.

As part of best practice project development, Infrastructure Australia recommends that a post-completion review be conducted to gauge whether the project delivery works have delivered high levels of service, and identify any lessons learnt that could be used to inform future projects.

This evaluation summary was considered by the Infrastructure Australia Board in June 2017.

Following Infrastructure Australia's process of fact and sensitivity checking the summary with the proponent prior to publication, the summary was amended to exclude the capital cost (real, undiscounted) pending NSW Government clearance for publication. This capital cost figure is sourced from the February 2016 business case (section 7.5.3).

Subsequent to the Board's consideration of the brief, in late June 2017 the NSW Government awarded a \$2.81 billion contract for tunneling work between Chatswood and Sydenham, including new twin rail tunnels under Sydney Harbour.