

Project business case evaluation summary

# Port Botany Rail Line Duplication and Cabramatta Passing Loop

**Location**

Sydney, New South Wales

**Geography**

Fast-growing cities

**Category**

National Connectivity

**Capital cost**

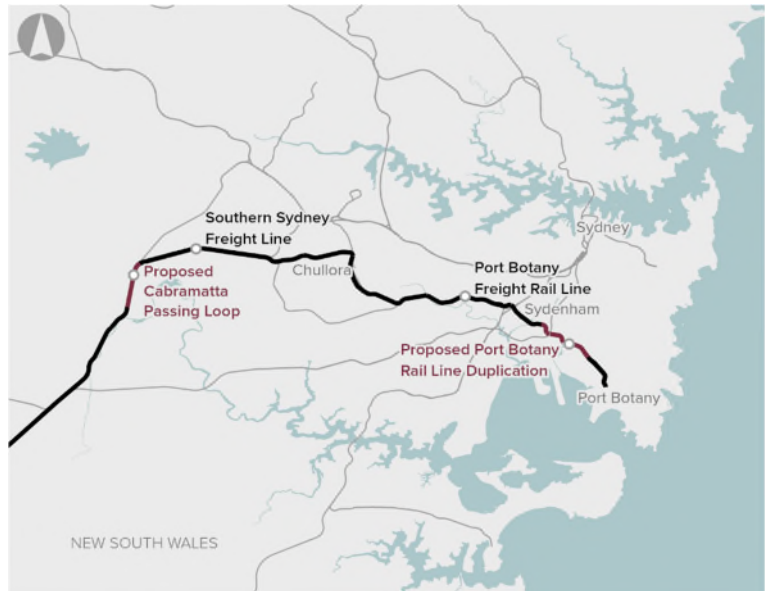
\$397.9 million (P90, outturn)

**Indicative timeframe**

Construction Start: 2021/22  
Project completion by: 2023/24

**Proponent**

Australian Rail Track Corporation



**Evaluation date**

20 February 2020

## 1. Evaluation Summary

The **Port Botany Rail Line Duplication and Cabramatta Passing Loop project** has been added to the Infrastructure Priority List as a **Priority Project**.

The annual volume of shipping containers moving through Port Botany is expected to increase by 4.5 million twenty-foot equivalent units (TEUs) over the coming decades. Investment in on-dock rail infrastructure at Port Botany to increase its capacity, combined with growth in containerised rail freight demand at metropolitan intermodal terminals, will increase pressure on the Metropolitan Freight Network (MFN). In particular, demand is expected to exceed capacity on the Southern Sydney Freight Line (SSFL) and Port Botany Rail Line (PBRL) from 2026.

The Cabramatta Passing Loop will increase rail freight capacity on the SSFL by allowing freight trains travelling in either direction to pass each other, while the PBRL Duplication will enhance the reliability, flexibility and capacity for container freight operations to and from Port Botany. Undertaking both project components concurrently provides a supply chain solution necessary to encourage freight owners to transport more containers by rail and help reduce road congestion.

The project will provide the capacity required to meet forecast rail demand generated by the Moorebank Intermodal Terminal, Enfield Intermodal Terminal, the St Marys Intermodal Terminal (from 2022), and future terminals, including a site planned near Western Sydney Airport (WSA). The proposed construction timeframe aligns and integrates with the design and construction of the Sydney Gateway (road) Project, located adjacent to Sydney Airport.

There is strong strategic merit for the project as it supports the NSW Government’s aim to increase the mode share of containers being moved by rail to and from Port Botany.

The proponent’s reported net present value (NPV) for the project is \$429.7 million, with a benefit-cost ratio (BCR) of 2.68 using a 7% real discount rate and P50 capital cost estimate. Infrastructure Australia has independently reviewed the business case and agrees with the proponent that the benefits of the proposed project would significantly exceed its costs.

The proponent, the Australian Rail Track Corporation (ARTC), proposes a design and construct delivery method, with tendering and award of the contract carried out according to ARTC's procurement policies and procedures. This is an appropriate delivery strategy, as the ARTC has the experience and capacity to deliver the project and will build, operate and maintain both components of the project once complete.

## 2. Context

Port Botany is the second largest container port in Australia by volume and handles 99% of NSW's container demand, making it a critical international gateway for Australia. In 2019, the port handled about 3 million TEUs, but over 80% of containers to and from Port Botany are transported by road. This worsens congestion on the Sydney road network, particularly in and around the already constrained Port Botany precinct, which includes Sydney Airport and the M5 Motorway.

The relatively low proportion of containers being moved by rail has been recognised for some years and the NSW Government established a target of 28% of containers being moved by rail to and from Port Botany by 2021. This target was reaffirmed in the 2018 NSW Freight and Ports Plan<sup>1</sup>.

The Moorebank Intermodal Terminal, which opened in 2019, is Sydney's largest intermodal terminal and is enabling the movement of containers by rail more competitively. The terminal is designed to provide rail port shuttle services between Port Botany and the Moorebank precinct via the SSFL and PBRL. However, with operations at Moorebank Intermodal Terminal commencing, and container volumes through Port Botany increasing, demand is forecast to exceed capacity on the MFN, particularly on the SSFL. Rail constraints on the SSFL and PBRL will limit the volume of movements through Moorebank Intermodal Terminal and, more broadly, the state's aim to carry more containers by rail.

## 3. Problem description

Container throughput at Port Botany is projected to grow from 3 million TEUs in 2019 to 5.2 million TEUs by the early 2030s, and up to 8.4 million TEUs by 2045<sup>2</sup>. Rail container movements are also forecast to increase with operations commencing at Moorebank Intermodal Terminal. The intermodal terminal is forecast to initially handle 250,000 TEUs per year, increasing to 1.05 million TEUs a year by 2030. The forecast growth in container volumes through Port Botany, combined with operations commencing at Moorebank Intermodal Terminal, Enfield Intermodal Terminal and other metropolitan intermodal terminals being proposed at St Marys and in the WSA precinct, will constrain the SSFL and PBRL in the near term.

The proponent estimates that demand on the SSFL will exceed the current capacity of 24 trains per day in each direction by 2023, with demand potentially reaching 36 trains per day in each direction by 2049. The capacity constraint on the SSFL will result in the Moorebank Intermodal Terminal being unable to operate sufficient port shuttle services to meet demand.

The proponent's analysis also estimates that demand will exceed the current capacity of 44 trains per day in each direction on the PBRL by 2026, and that demand will reach 55 trains per day in each direction by 2030. Moreover, the existing single line section of the PBRL between Botany and Mascot causes flexibility and reliability issues for rail access to the Port. Failure to address these issues will further encourage containers to be transported by road.

The 2019 *Australian Infrastructure Audit* also identified that the roads surrounding Port Botany and the road connection between Liverpool (near Moorebank) and Port Botany are heavily congested and are unreliable, with the cost of moving freight along this road corridor likely to increase over time.

Increasing road transport will continue to exacerbate road congestion and not support the NSW Government's target to increase the share of containers being transported to and from Port Botany by rail to 28% by 2021 (from a base of 18% in 2016).

The *Infrastructure Priority List* identifies these problems as nationally significant, and includes a High Priority Initiative for *Port Botany freight rail duplication* and a Priority Initiative for a *Southern Sydney Freight Line upgrade*.

<sup>1</sup> NSW Freight and Ports Plan 2018-2023, Transport for NSW, 2018

<sup>2</sup> 30 Year Master Plan, NSW Ports, 2015

## 4. Options identification and assessment

The options development process considered existing infrastructure constraints, future operational flexibility, customer needs and network reliability. Options were assessed using criteria that included maximum operating speeds, bi-directional movements and operator service needs.

A series of passing loop options to increase rail capacity were considered at different locations, such as Leightonfield, Enfield West, Cabramatta and Ingleburn. The proponent selected the Cabramatta Passing Loop as the preferred option based on a number of factors including, but not limited to, operational performance, train path benefits, scale of works required, and costs.

To improve reliability and capacity of the PBRL, the proponent considered various track extension options on the single line section between Botany and Mascot, including an 800-metre track extension at Mascot, a 900-metre track extension at Botany, and a full duplication of the single line. The preferred option was to fully duplicate the 2.9 km single line section. This was selected based on other design options inadequately meeting demand requirements, as well as the added reliability benefits driven by fully, and not partially, duplicating the single-line section.

As part of the project development phase, the proponent also considered non-infrastructure and smaller infrastructure options including Advanced Train Management System implementation, double stacking capability, and longer train options. These non-infrastructure options were discarded as they did not meet demand and/or industry operational requirements. Infrastructure Australia recommends that the proponent continue considering these options, which may not address the service need by themselves, but could form part of a program of improvements to enhance the benefits of the preferred option.

The final business case presented a combined option for PBRL Duplication and Cabramatta Passing Loop and included an economic appraisal for the project incremental to the base case.

Infrastructure Australia's Assessment Framework recommends considering at least two project options (plus a base case) in a business case. This approach ensures that the best and most feasible option is identified.

## 5. Proposal

The project comprises the PBRL Duplication and Cabramatta Passing Loop. The PBRL Duplication component involves duplicating the remaining single-line section of track between Port Botany and Mascot. The scope includes, but is not limited to:

- Construction of approximately 2.9 kilometres of track, 1.4 kilometres of track slews and four new cross-overs
- Bi-directional signalling for the duplicated track and at Botany Yard
- Construction of new bridge structures at Mill Pond Creek, Southern Cross Drive, O'Riordan Street and Robey Street
- Reconstruction of two existing bridge structures at O'Riordan Street and Robey Street
- Land acquisition.

The Cabramatta Passing Loop component has been designed to increase the capacity of the SSFL and accommodate trains up to 1,300 metres long. It is located between Leightonfield Loop and Moorebank Junction at Cabramatta, and includes, but is not limited to:

- Construction of 1.6 kilometres of new track
- Bi-directional signalling for the new loop
- Construction of two new bridges at Sussex Street and Cabramatta Creek
- Reconfiguration of the Broomfield Street road alignment and car parking between Bridge Street and Sussex Street bridge, including relocation of utilities services
- Land acquisition.

The proponent states that the PBRL Duplication component will provide double-track access between Chullora and Port Botany and enhance the flexibility, reliability and capacity of container freight operations on rail to and from Port Botany.

Together, these components are estimated to provide the capacity required to meet forecast demand generated from the Moorebank Intermodal Terminal, the St Marys Terminal (from 2022) and future proposed terminals, particularly those planned near the WSA. They will also facilitate a

shift in container mode share from road to rail which would reduce congestion on the road network.

## 6. Strategic fit

The PBRL Duplication and Cabramatta Passing Loop project strongly supports the NSW Government's aim to increase the mode share of containers being moved by rail to and from Port Botany. While the project would not be operational before the NSW Government's 2021 target<sup>3</sup>, it will play a significant role in the long-term competitiveness of transporting containers by rail.

The project also supports NSW Port's target to transport 3 million TEUs to and from Port Botany on rail by 2045. It complements a recently commenced \$120 million investment program by NSW Ports to provide on-dock rail infrastructure at the three container terminals at Port Botany. The upgrades will be delivered in stages and will eliminate the extra handling of rail container movements by rail, which currently puts rail freight at a disadvantage to road transport.

The Australian Government and NSW Government have also developed several strategies to invest in infrastructure to improve the capacity, efficiency and productivity of freight supply chains. The *NSW Freights and Ports Plan 2018-2023* identifies this project for delivery by 2023 to improve economic growth, efficiency, connectivity, capacity and sustainability of NSW's freight operations.

The project also aligns with other Australian, state and local governments' policy and planning documents, including the NSW State plan *NSW 2021* (NSW Government, 2015), *Future Transport 2056* (NSW's long-term transport Master Plan), and the *State Infrastructure Strategy*.

The NSW Government is developing the Sydney Gateway Project (Gateway) to improve the land transport network servicing the international gateways of Sydney Airport and Port Botany. Gateway is in the same vicinity as the proposed PBRL Duplication and comprises a series of road enhancements around the airport to improve the efficiency of transport movements in the precinct. The proponent is working with Transport for NSW to ensure that the planning, design and construction for both projects are appropriately integrated and co-ordinated to avoid any interface issues.

Overall, the business case demonstrates that there is strong strategic merit for the project.

## 7. Economic, social and environmental value

The proponent's economic, social and environmental appraisal of the PBRL Duplication and Cabramatta Passing Loop project estimates an NPV of \$429.7 million and a BCR of 2.68 using a 7% real discount rate and P50 capital cost estimate when evaluated over a 50-year operational period.

The majority of the project's benefits are road decongestion and accident cost savings (63.3% of the total project benefits) and environmental externality cost savings (35.6% of total project benefits). These benefits result from more containers being moved by freight rail rather than by trucks.

Infrastructure Australia reviewed the proponent's methodology and economic analysis and carried out sensitivity testing to assess the robustness of the economic results. Our analysis found that a change in the demand for Moorebank Intermodal Terminal would have the most significant impact on the project's benefits. However, even under a scenario where container volumes are capped at three-quarters of the proposed total volume and grow at half the rate forecast over the evaluation period, the benefits of the project still exceed its costs. The economic results were also somewhat sensitive to the assumed distance travelled by trucks with containers, which impacts on supply chain costs, but the project still remained positive in these tests. Our analysis demonstrates the merit of the project under a range of scenarios, including significantly lower demand forecasts.

The economic analysis also shows that both project components have economic merit when assessed individually, and that the optimal timing from an economic perspective is to deliver the Cabramatta Passing Loop component before the PBRL Duplication.

The business case indicates that carrying container freight by rail rather than by road is a major benefit of the project. While ARTC is confident in their projections of how much freight is likely to switch from road to rail over the project timeframes, we have sensitivity tested ARTC's estimate and found that the project's economic case remains strong under a worst-case sensitivity scenario.

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<sup>3</sup> the NSW Government's target is to increase rail mode share from 18% in 2019 to 28% by 2021 (NSW Freight and Ports Plan 2018-2023, Transport for NSW, 2018)

We are therefore confident that the project's economic, social and environmental benefits will outweigh its costs.

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	
<b>Benefits</b>			
Road decongestion and accident cost savings	\$443.5	63.3%	
Reduced environmental externalities	\$243.6	35.6%	
Residual value of asset	\$7.8	1.1%	
<b>Total Benefits<sup>1</sup></b>	<b>\$684.9</b>	(A)	<b>100%</b>
Total capital costs (P50)	\$249.5	97.8%	
Operating costs	\$5.7	2.2%	
<b>Total Costs<sup>1</sup></b>	<b>\$255.2</b>	(B)	<b>100%</b>
<b>Net benefits - Net present value (NPV)<sup>2</sup></b>	<b>\$429.7</b>	(C)	n/a
<b>Benefit-cost ratio (BCR)<sup>3</sup></b>	<b>2.68</b>	(D)	n/a

Sources: Proponent's business case

(1) Totals may not sum due to rounding.

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

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

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

Capital costs and funding	
Total capital cost	\$378.8 million (P50, undiscounted) \$397.9 million (P90, undiscounted)
Australian Government funding contribution	\$400 million
Other funding	N/A

## 8. Deliverability

The proponent proposes to deliver the project using a design and construct contract, with tendering and award of the contract carried out according to the ARTC's procurement policies and procedures. ARTC has the experience and capacity to deliver the project and will build, operate and maintain both the PBRL Duplication and Cabramatta Passing Loop (as part of the SSFL). The PBRL and the SSFL, which are part of Sydney's MFN, are currently operated by ARTC on a long-term lease agreement with the NSW Government.

Most of the construction would occur in the existing rail corridor. Construction of the Cabramatta Passing Loop component is proposed to occur over two years, commencing in 2021-22 and completing in 2022-23. Construction of the PBRL Duplication component would occur over 2.5 years from 2020-21 to the end of 2023-24.

The business case proposes to complete construction of the PBRL Duplication component two years before capacity is reached, as the proponent states that the early delivery of this component will provide a degree of construction buffer and flexibility, if the works are delayed for any reason. It will also enhance the reliability and flexibility of the network in advance of the capacity constraint being reached in 2026. Moreover, the proposed construction timeframe parallels and overlaps with the NSW Government's Gateway Project, which involves significant road works in the same vicinity as the PBRL Duplication. Delivery of the PBRL Duplication in a timeframe that is complementary to the Gateway Project is necessary from a constructability perspective to ensure that planning is coordinated and access requirements for the Gateway Project are met to minimise disruption.

The proponent has undertaken an adequate project risk assessment and proposes to review the risks as part of monthly reports to both the ARTC Board and Australian Government. The risk analysis identifies, rates and proposes mitigation strategies for each risk. These include, but are not limited to, construction, planning, demand and cost factors relevant to the project. Overall, the risk analysis is acceptable and consistent with this stage of project development. Ongoing planning and risk assessment will be necessary during the project development and delivery phase to update and detail the risk register with periodic reviews, as proposed. The business case also states that any project cost overruns will be covered by ARTC, thereby limiting the risk of project cost overruns to the Australian Government.

A Post Completion Review (PCR) will be undertaken by the proponent to assess the strategic fit, economic value, delivery efficiency and other project performance factors using a range of performance indicators including, but not limited to, capital cost outcomes, rail mode-share target performance, and capacity analysis. Infrastructure Australia encourages the proponent to publish the PCR of the project to assess the extent to which the expected benefits and costs have been realised. This will help to inform future projects.