



2008-2024  
Interstate and Hunter Valley  
Rail Infrastructure Strategy  
Overview

30 June 2008

# Introduction

## ARTC Background

Land transport is one of the most significant elements affecting the Australian economy.

Traditionally, rail has performed well in the transportation of bulk commodities, but poorly in the intermodal sector.

Although there has been some turn around, particularly on the East-West corridor, there is still a need for rail to develop into a more viable logistics option for the Australian market.

Critical to this is the ongoing development of the Melbourne-Sydney and Sydney-Brisbane corridors.

These are tough corridors with significant topographical and other land management constraints; road has traditionally had an advantage on this route.

Further to this, the rail infrastructure on this corridor

has not been maintained at a level necessary to make it attractive to the market; transit times have been too slow, train lengths too short and reliability has been poor..

All assessments are that the Australian logistics market is going to double over the next 15-20 years. At present, it will be virtually impossible for road infrastructure development to keep pace with this massive level of growth.

It is therefore essential that rail plays a much greater role in adding value to the Australian logistics framework. The ongoing challenge is to breathe new life into the nation's rail system, elevating it to a standard where the market considers it an efficient, reliable and preferred mode of freight transport.

The focus of this submission is on the interstate standard gauge network connecting the port and key terminal infrastructure of Brisbane, Melbourne, Adelaide, Sydney and Perth and the adjacent Hunter Valley network.



# 2

## Key Findings

Whilst this submission largely focuses upon investment in infrastructure to meet projected freight growth there are some key policy settings that should be addressed so as to encourage growth. These include:

- A carbon pricing scheme should include transport, with permits administered at the appropriate 'upstream' level.
- Government should not interfere in the market response to rising fuel costs by artificially lowering the price, other than to assist with structural adjustment.
- In the event that pricing and investment in the road / trucking sector does not move to a more commercial basis, Government should provide adequate funding to rail to achieve the same outcomes.

In the medium-term a number of enhancements to increase infrastructure efficiency are proposed and these include the following:

- Development and implementation of the Advanced Train Management System communications based control technology to replace outdated signalling systems and generate additional capacity on the interstate network and around port interfaces,
- Extensive additional track and other enhancements to provide additional freight capacity on the RailCorp network between Sydney and Newcastle.
- An upgrade of infrastructure between Melbourne – Adelaide to allow of an increased train length of 1800 metres.

- Track upgrading to improve operating conditions in western Victoria and between Cootamundra and Parkes.
- Development of the Moorebank Common-User Intermodal Terminal in Sydney
- Provision for double-stacking of container services between Melbourne and Sydney
- A new alignment on the Liverpool Ranges in the vicinity of Ardglen.

In addition to the projects that deliver network and operational enhancement a number of medium-term projects are proposed to ensure adequate capacity in the network is delivered. These include:

- Completion of full double-track Melbourne and Sydney.
- Development of passing lanes between Newcastle and Brisbane.
- Provision of new and extended crossing loops Melbourne and Adelaide.
- Construction of additional crossing loops between Adelaide and Perth.
- Implementation of a third track between Maitland and the foot of Nundah bank (near Newdell).
- Double-track from Muswellbrook to Gunnedah and Muswellbrook to Anvil Hill, plus additional loops beyond Gunnedah and Anvil Hill to Turravan and Ulan respectively.

Additional crossing loops, and some sections of double-track, north and west of Muswellbrook.



## Market and Regulatory Environment

Currently the interstate standard gauge network is owned or leased by ARTC with the following exceptions:

- Perth - Kalgoorlie is controlled by Babcock and Brown Infrastructure. ARTC has in place a whole-sale agreement on this section.
- Macarthur to Newcastle is controlled by RailCorp. ARTC is to extend its control from Macarthur to Chullora following completion of the Southern Sydney Freight Line.
- NSW / Queensland Border to Acacia Ridge is controlled by QR.

The Hunter Valley network is also covered in this document as it is a significant section of national infrastructure managed by ARTC.

There are a number of other rail networks that may be of interest to Infrastructure Australia but are not covered in this submission and these include -

- Pilbara railway lines
- Urban passenger networks in each of the Australian states
- Queensland network north of Brisbane
- Regional branch lines in all of the Australian states

In reviewing regional branch lines ARTC believes that this infrastructure needs to be considered in terms of rail's role as part of a broader logistics chain. Investment in regional rail should therefore be considered in terms of the optimal transport solution to moving product to and from regions.

ARTC would advocate a separate review of regional lines and assess the market and logistics changes which have impacted regional transport and logistics and the development of an appropriate strategy for regional rail infrastructure which can be value adding in the 21 Century to Australia's regional transport needs.

ARTC's submission recognises that freight volume between states is projected to significantly increase over the Infrastructure Australia planning period. The nation's rail network will be critical in accommodating this additional freight task.

In preparing this submission ARTC undertook substantial modelling to identify not only what infrastructure may be required to support expected market growth, but reviewed a number of external factors and considered a range of likely scenarios that may result in an increased

market share utilising rail.

The factors that are likely to drive this growth in rail volume include :

- Shifts in road / rail cost relativities, which are expected to result in a large increase in rail's general freight market share.
- A comprehensive, well structured carbon pricing scheme, which would further enhance rail competitiveness. Other anticipated future input cost changes, in particular truck driver wages, will also enhance rail's position.
- Coal, iron ore and other minerals are expected to grow strongly, with most of the new volume likely to be on rail.

It is desirable for rail to support a greater share of the freight task moving forward for the following reasons:

- The expected increase in rail market share is a result of the market responding appropriately to price signals.
- Rail is safer and more environmentally friendly than road, and in particular is more fuel efficient.
- The growth in minerals exports is underpinning Australia's economic growth.

There are however a number of factors that combine to make rail infrastructure investment complex and challenging. These factors include:

- Issues with the institutional structure of the transport industry and the role of Government within the industry, and consequent difficulties for rail track owners and operators in planning for long-term investment.
- The historical long-term decline in rail's competitiveness.
- Evidence of a reversal in rail's competitiveness in general freight between capital cities.
- Uncertainty over future pricing of carbon emissions, and future oil prices, and how these will affect both total general freight volumes, and rail's market share.
- Uncertainty over the future direction of road-user charging, and the direction of other significant road cost inputs, and the effect that this may have on rail competitiveness.
- The direction of economic regulation of ARTC and the consequences of regulatory structures for ARTC's ability to invest.

- The difficulty of using public private partnerships for funding rail capital works due to the complexity of rail infrastructure.

In addition to infrastructure development there are a number of structural matters that may limit rail's ability to support an expanded freight task.

The following key areas of policy will support rail growth:

- Mechanisms to price the effect of external impacts, such as carbon pricing, will deliver better social outcomes, and are likely to favour rail transport.
- Increased commercialisation of the road sector, with Government intervention to address areas of inequity including a mass distance pricing regime for heavy vehicles will promote efficient resource allocation and is likely to favour rail transport.
- Commercially balanced, light-handed economic regulation and a national approach to safety regulation, will promote timely investment and efficient and responsive rail operations.
- Integrated land-use / transport planning that recognises and reinforces the role of rail will assist rail competitiveness.
- Support for mechanisms to encourage investment in long life above rail assets, including rollingstock and locomotives, that will in time to deliver economic and environmental benefits.



## Existing Infrastructure & Future Projects

The rail industry has in place a number of strategies to address existing and some short term bottlenecks.

ARTC both invests its own funds, and receives occasional funding from the Australian Government, through programs such as AusLink.

In its proposal to the NSW Government for the lease of the NSW interstate and Hunter Valley network ARTC proposed an investment program of \$872 million, fully funded by ARTC on a commercial basis. This investment was primarily directed at addressing long standing maintenance issue and improving the efficiency and competitiveness of the North-South corridor.

In the years following the commencement of the ARTC lease ARTC received contributions from the Australian Government and added its own additional funding. The resulting investment is described in the document *North-South Corridor Strategy* [copy attached].

ARTC's investment program North-South now stands at \$2.1 billion and is aimed at achieving the following outcomes:

	Melbourne - Sydney	Sydney - Brisbane	Melbourne - Brisbane
<b>Transit Time</b>	<b>Hours</b>	<b>Hours</b>	<b>Hours</b>
2005	13.5	19.4	32.9
2010 (1500 m)	10.5	15.1	25.6
2010 (1800 m)	11.6	15.1	26.7
<b>Reliability</b>	<b>%</b>	<b>%</b>	<b>%</b>
2005	55	55	45
2010	75	75	75
<b>Availability</b>	<b>%</b>	<b>%</b>	<b>%</b>
2005	50	35	60
2010	75	60	85

ARTC's current 5-year investment program was commenced in 2005 and will be largely completed by June 2009. The current scope of this program is provided below:

### Melbourne - Sydney (Figure 1)

- Concrete sleepers of the entire ARTC track between Melbourne and Sydney.
- Southern Sydney Freight Line. This is the construction of a dedicated freight track between Chullora and Macarthur in Sydney's south.
- Installation of Automatic Signalling on sections of track south of Sydney.
- Overtaking loop on the double track at Harden.
- Seven passing lanes and two loop extensions Junee - Melbourne.
- Conversion of broad gauge track between Seymour - Wodonga to create double track.
- Single track bypass of Wodonga town centre.
- Establishment of a triangle at Tottenham to provide a direct connection between the North-South and East-West corridors.
- Upgrade of the dual section between Tottenham and Dynon rail freight terminal.
- Replacement of Murrumbidgee River Bridge, Wagga Wagga.

### Sydney - Brisbane (Figure 2)

- **Concrete sleepers** between Sydney and the Queensland border.
- An approximate doubling of the number of long **passing loops** on the North Coast.
- Installation of the Centralised Traffic Control (CTC) **signalling between Casino and Acacia Ridge**.
- **Loop upgrades** between Newcastle and Acacia Ridge

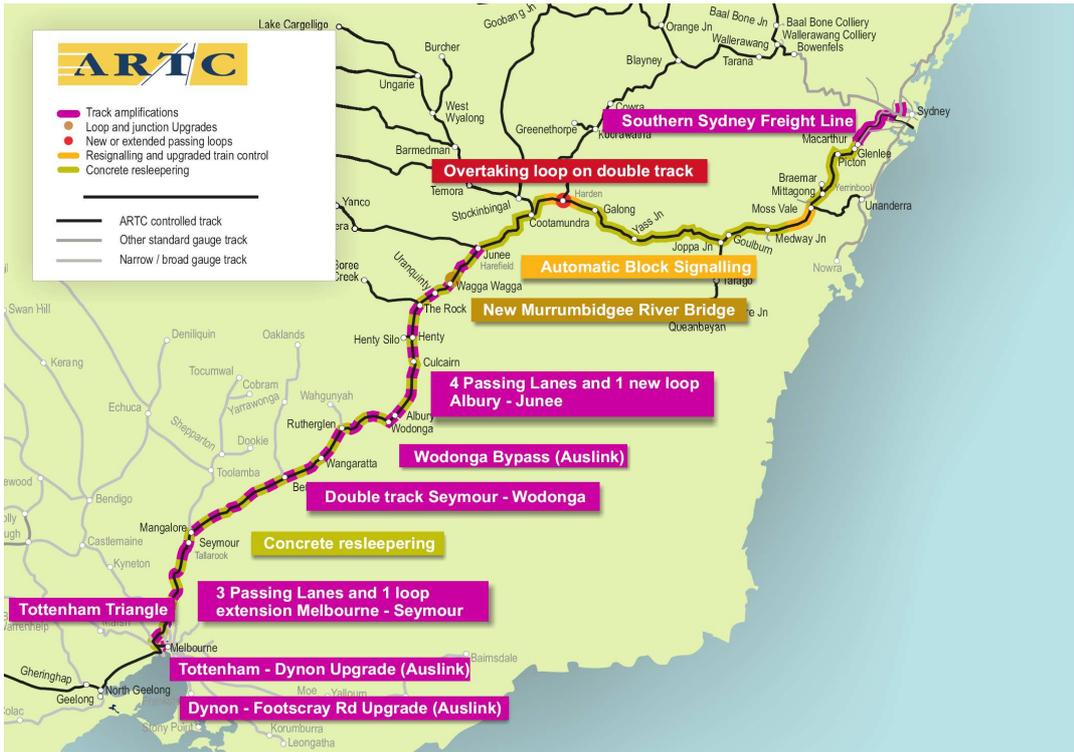


Figure 1 -



Figure 2 -

### Train Control Consolidation (figure 3)

This recently completed project, aligns with the North–South investment upgrade and combines physical projects with work process changes designed to significantly improve train control delivery.

Key physical projects included the replacement of old signal technology with new on two sections of the Main South, closure of signal boxes controlling yards at 10 locations, and the upgrade of the two key train control centres to Network Management Centres.



Figure 3 -



Figure 4 -

## East-West Upgrades (Figure 4 & 5)

ARTC is also continuing to invest in the east-west corridor to maintain its competitiveness. Significant recent and ongoing projects are:

- Increasing the height clearance for trains to 6500 mm to allow double-stacked containers to be carried between Parkes and Perth.
- Passing loop extensions for 1800 metre trains at Kinalung and Matakana.
- ARTC’s innovative **In Cab Automated Points System (ICAPS)** technology has been rolled-out across the Port Augusta - Kalgoorlie corridor to allow train drivers to enter loops without stopping.

- Construction of a third track along the length of the Minimbah Bank starting from the north of Whittingham Junction.
- Newdell Junction and Drayton Junction upgrades
- Antienne to Muswellbrook duplication will extend the existing double track
- Installation of the Ulan line Centralised Train Control digital signal technology.
- Construction of up to six new passing loops on the Ulan line.
- Additional and extended passing loops between Muswellbrook and Werris Creek
- Two sets of projects are planned for the Werris Creek – Narrabri line which is currently part of the



Figure 5 -

## Hunter Valley (Figure 6 & 7)

ARTC’s 5 year investment program in the Hunter Valley now stands at over \$1.0 billion. The Hunter Valley program is funded commercially by ARTC subject to industry commitment to the program. The investment includes the projects detailed below. This is detailed in the Hunter Valley Corridor 2007–2012 Capacity Strategy:

- Sandgate overbridge between coal trains accessing Kooragang Island and the Sydney – Brisbane main line
- Bidirectional signaling (signals on both tracks in both directions) between Maitland and Branxton

NSW Country Regional Network managed by ARTC on behalf of the NSW Government. The projects are:

1. CTC to replace the electric staff system.
2. Extension of up to 8 loops to provide additional capacity.

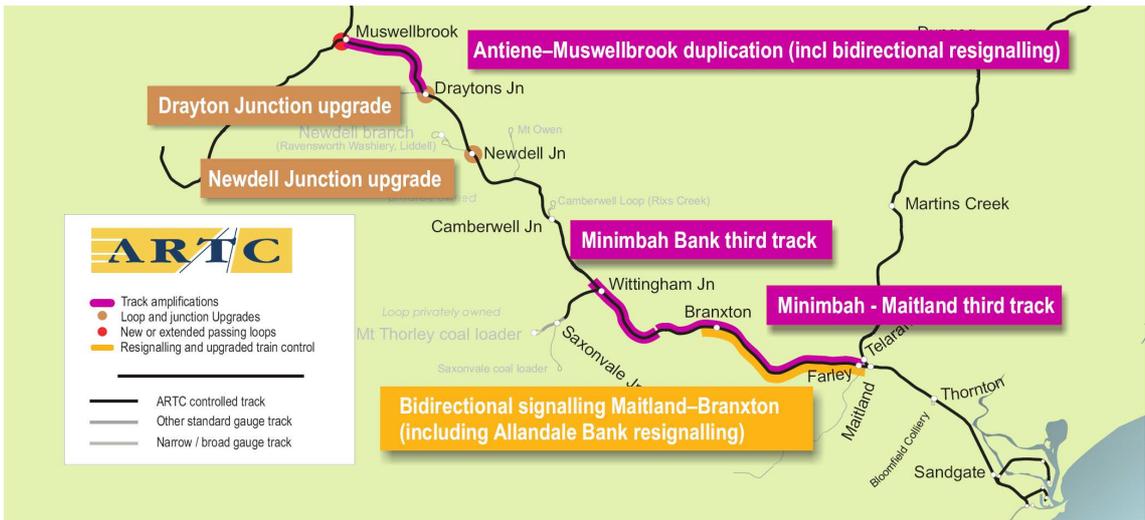


Figure 6 -

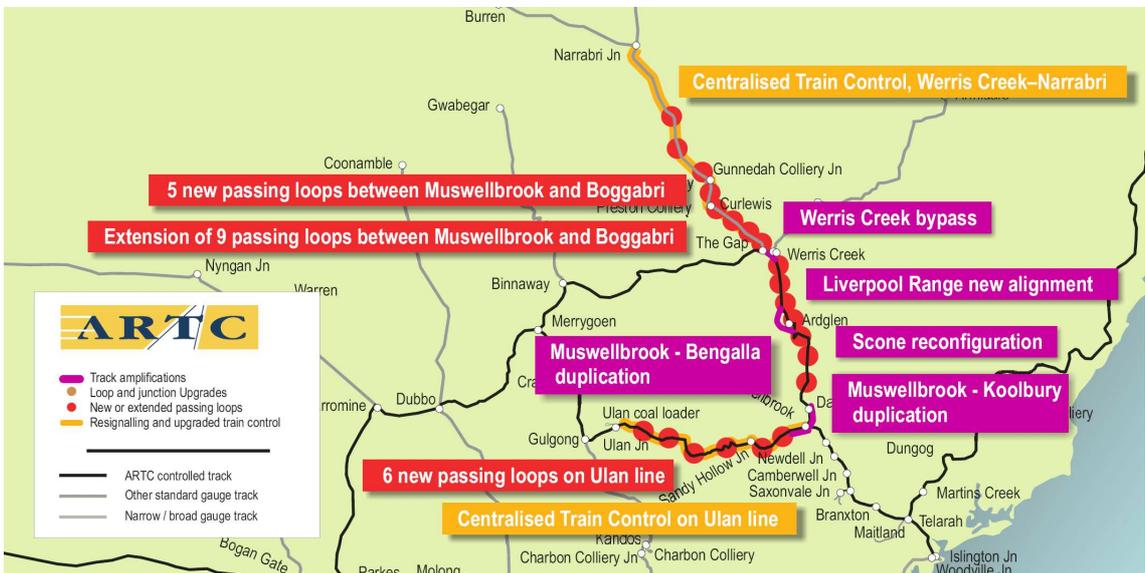


Figure 7 -

### Current AusLink Projects

The Australian Government has made a further \$550 million available for projects associated with rail freight across Australia under AusLink 1. Key Auslink 1 projects associated with the interstate and Hunter Valley network include:

- \$20.3 million for development of the ARTC Advanced Train Management System (ATMS) to provide a new train control and safeworking system for the interstate and Hunter Valley network.
- \$4.7 million for the Ernst and Young study into the North-South Rail Corridor.
- A \$69.6 million contribution to the National Train Communications System.
- \$110 million for works to improve freight access through northern Sydney and on the Port Botany line.
- \$110 million for a new rail link from the Dynon intermodal precinct to the Port of Melbourne and the upgrade and elevation of Footscray Road.

- \$80 million for the Port River Expressway and associated rail track modifications, including a new direct connection to the Adelaide port area
- \$14 million to help construct a North Quay Rail Loop extension at the Port of Fremantle, and a new access road to the terminal.
- An \$8 million contribution to the cost of extending eight rail loops to 1800 metres on the interstate line between Kewdale and Kalgoorlie.
- A \$20.1 million contribution to the cost of replacing the final 76km of timber-sleepered track with concrete sleepers between Koolyanobbing and Kalgoorlie.
- \$11.5 million towards the cost of eliminating the Daddow Road level crossing at Kewdale

# 5

## Demand Forecasts

ARTC has developed an integrated and optimised programme of projects for the next 15-years.

The projects have been based around the following principles:

- Detailed intermodal volume projections have been produced based on scenarios around fuel prices, carbon prices and other key cost inputs. Coal and minerals projections have been developed based on producer forecasts.
- Projects to enhance the efficiency of the rail networks have been identified, and recommended implementation dates have been developed based on economic and financial analysis.
- Projects have been identified to ensure capacity remains ahead of demand while maintaining service levels.

As a general approach to infrastructure planning, ARTC takes a positive view of potential volume growth – this allows projects to be identified and progressed in a timely manner to ensure sufficient capacity in the event that the projection of growth in demand is accurate. In the event that growth is not so fast, projects can be slowed down accordingly.

Until recently, ARTC’s projections of demand growth were based on historical rates of growth plus 1% – 2%, and a broad continuation of historical rail market share, other than for the North-South Corridor where a significant market share increase was forecast following the completion

of the North-South Corridor upgrade works.

However it is possible that transport is facing a significant shift in its underlying costs that would result in a more significant growth environment. The key elements of this new environment are:

- Continued rising fuel costs.
- Continued rising labour costs, in particular for long-distance truck drivers.
- Introduction of a carbon trading scheme.
- Introduction of mass-distance charging for road truck access.
- Increased urban congestion.
- Continued rising demand for NSW coal.
- Continued rising demand for other Australian minerals.

For the purposes of this Infrastructure Strategy ARTC has therefore considered it prudent to model a range of scenarios that represent a departure from historical trends.

More detail on the modelling methodology and assumptions is provided in the paper *Intermodal Market Analysis* [copy attached].

(All prices \$2007/08)	Low	Medium	High
Oil Price (US\$ / barrel)	\$80.00	\$100.00	\$150.00
A\$ / US\$ Exchange Rate	\$0.85	\$0.75	\$0.65
Carbon Price (A\$ / tonne CO2)	\$25.00	\$50.00	\$100.00
Labour Costs	No real change	25% real increase	50% real increase
Road-User Charges	No real change	50% real increase	100% real increase

Table 1 -

**Scenario Assumptions**

ARTC’s approach has been to postulate levels for key input costs as at 2017/18. This allows rail market share to be predicted for that year and a compound rate of growth to reach that market share to be determined. Costs are then held constant in real terms from 2017/18 to 2023/24. It is important to note that the effect of the road / rail relative price changes has been applied progressively with a lag of 5 years.

The assumptions for the three scenarios are shown in Table 1.

In all scenarios rail reliability and availability are assumed to improve significantly for the Melbourne – Sydney, Sydney – Brisbane and Melbourne – Brisbane corridors in 2009/10 with the completion of the North-South upgrade works. Otherwise reliability and availability are assumed to remain constant for all modes.

It is important to note that while the oil price in the low scenario is below current price levels, ARTC believes that the freight market has not yet responded to the recent dramatic increases in fuel costs. Accordingly, even the low scenario will involve significant growth in rail volumes.

Given the magnitude of the freight cost increases that have already occurred, and the potential size of future changes, there is a very good prospect that the total size of the freight market will be impacted. ARTC has taken this into account in its modelling.

ARTC is also cognisant that the effects of fuel pricing and other costs may lead to long term alterations to the supply chain and logistics market. This has the potential in the longer term to adjust the transport logistics of components for goods from the present world market to more localized supply chains. ARTC doesn’t believe their structural change will have a significant impact in the 15 year horizon.

**Market Share and Volume Outcomes**

Figure 8 shows estimated rail market share in 2004/05 (which has been taken as the base year as it is the last year before the market was affected by significant cost increases), 2009/10, and under high, medium and low scenarios in 2017/18. It should be noted that there is no allowance for lag in these estimates and the 2009/10 market share in particular is not likely to reach this level until some years afterwards.

The notable feature of this data is the significant increase in market share captured by rail on the short and medium haul routes.

Even under the low scenario, rail is achieving market shares of 30% - 40% on Melbourne – Sydney, Sydney – Brisbane and Sydney – Adelaide, and over 80% on Melbourne – Brisbane.

Under the high scenario, which is potentially the most plausible scenario in light of recent experience, rail is achieving around 60% market share on Melbourne – Sydney, Sydney – Brisbane and Sydney – Adelaide, and well over 80% on Melbourne – Brisbane.

**Predicted Rail Market Share (unlagged)**

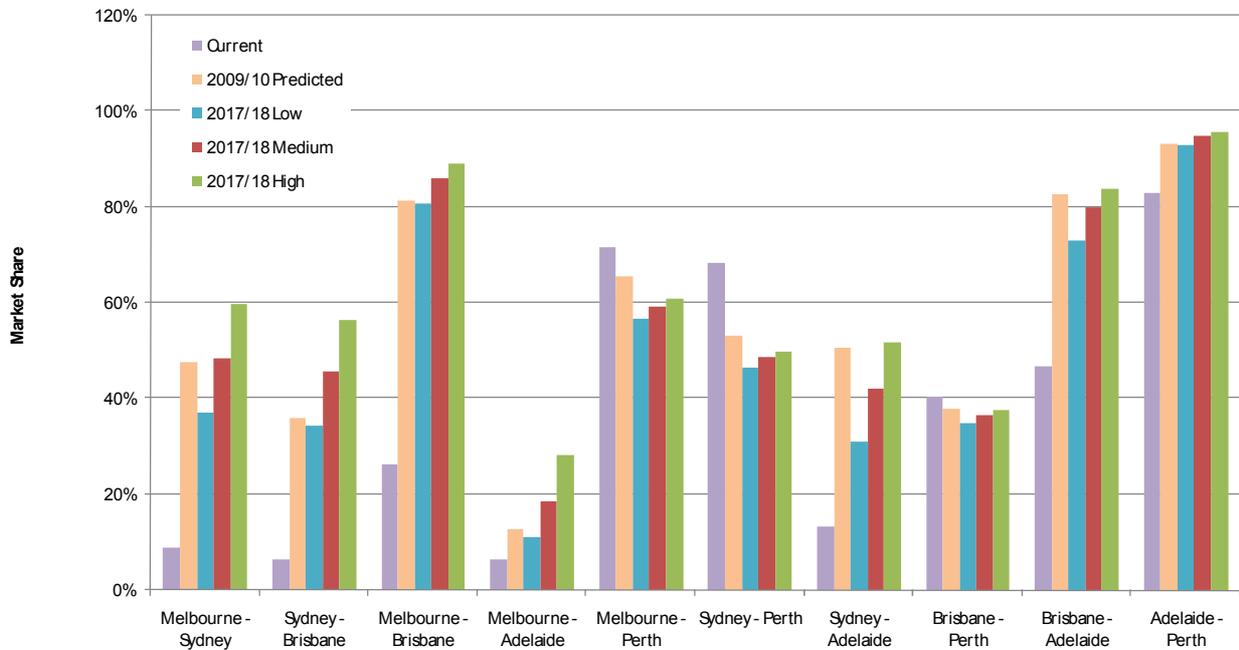


Figure 8 -

## 6

## Infrastructure Adequacy

As a result of these demand forecasts a number of areas on the interstate rail network will become constrained and will not adequately cater for projected growth.

The further major enhancements and capacity improvement projects that ARTC wishes to pursue on the north-south corridor over the next 15 years are as follows:

- Capacity enhancement through Northern Sydney. The line between Sydney and Newcastle, and in particular the southern end of it, is recognised as the major bottleneck on the north-south corridor. Freeing-up capacity in this area is key to rail increasing its levels of reliability and to presume adequate capacity.
- Development of a new multi-user intermodal terminal at Moorebank. This will remove the constraints of the current limited terminal capacity and provide a more efficient and better located option. It would also facilitate the introduction of double-stacking out of Sydney.
- Increased terminal capacity in Brisbane. ARTC is concerned about existing intermodal terminal capacity in Brisbane and has not seen reliable plans for improvement. Without this being addressed in the short term this will become a major constraint to capacity enhancement.
- In common with the rest of the network, the Network-wide Train Communications System will be rolled-out across the north-south corridor over the next 12 months. This will upgrade the in cab communication systems of locomotives, replacing the multiple state-based model with a single system

powered by Telstra's 3G Network.

- The north-south corridor would need to be upgraded to Advanced Train Management System from 2011, however, this relies on Government assistance. This initiative would enhance capacity on the interstate mainline and around congested Port interfaces
- Development of passing lanes between Sydney – Brisbane
- Double track Wodonga to Junee and Seymour to Tottenham to provide full double track between Sydney and Melbourne

The projected outcomes from the delivery of these works is shown in the table below. In addition there are a number of major strategic choices that need to be made, which include:

- *Inland Route:* There is a long-standing proposal for a new route between Melbourne and Brisbane following a corridor that remains to the west of the Great Dividing Range for as much of the distance as possible. This proposal is currently subject to a \$15 million study requested by the Australian Government. ARTC has not identified a compelling requirement to pursue an Inland Route in the 15-year timeframe of this Strategy.
- *Double stacking Melbourne – Sydney.* Clearing the Melbourne – Sydney line for double stacking would offer a cost saving of 1.5% to 2.5% in the largest general freight market, while providing significant additional capacity. Economic analysis suggests that this project is justified in a 2015/16 timeframe.

	Melbourne - Sydney#	Sydney - Brisbane*	Melbourne - Brisbane	Brisbane - Adelaide
<b>Capacity (Superfreighter pairs per week)</b>				
2009	10	8	16	2
2014	36	33	45	3
2019	59	67	64	4
2024	74	92	77	5
<b>Transit Time (Hours)</b>				
Target	10.4	15.1	28.0	40.0
2009	11.2	14.7	25.9	37.3
2014	10.1	14.2	24.8	36.1
2019	10.1	14.1	24.7	36.0
2024	10.2	15.0	25.7	37.3
<b>Reliability (% freight available on-time)</b>				
2009	55%	55%	45%	45%
2014	85%	75%	75%	75%
2019	85%	85%	85%	85%
2024	85%	85%	85%	85%

# Transit time to Chullora in 2009 & to Moorebank thereafter.

\* Transit time to Chullora in all years.

**East–West**

The major enhancements that ARTC wishes to pursue on the east-west corridor over the next 15 years are as follows:

- Increased train length Melbourne – Adelaide. Moving from the current corridor limit of 1500 metres to 1800 metres would add both capacity, and efficiency to the corridor. There is a requirement for a number of loops of less than 1500 metres to be extended on this line. There is also a significant number of existing “1500 metre” loops that are physically 1800 metres and can be made to accommodate 1800 metres with relatively straightforward signalling changes. These circumstances suggest that 1800 metres is a logical and cost-effective strategy.
- Double stacking Sydney – Parkes. Clearing the Sydney – Parkes line for double stacking would allow both Sydney – Perth and Sydney – Adelaide traffic to go to a double stacked container configuration. This would improve the capacity and efficiency of the line. It would also complement the introduction of double-stacking between Melbourne and Sydney.
- Track upgrading western Victoria and Cootamundra – Parkes. Upgrading of these line sections would allow increases in speed and axle load. This would increase efficiency and reduce transit time.
- In common with the rest of the network, the Network-wide Train Communications System will be rolled-out across the east-west corridor over the next x years.
- It would be desirable to upgrade the east-west corridor to Advanced Train Management System

from 2011. This initiative would enhance capacity on the interstate mainline and around congested Port interfaces.

A number of initiatives are specifically targeted to increase capacity including:

- Provision of new and extended crossing loops Melbourne and Adelaide.
- Construction of additional crossing loops between Adelaide and Perth.
- Crossing loop extensions and control system upgrades between Cootamundra and Crystal Brook
- Grade separation of Torrens and Goodwood Junctions in Adelaide

The projected outcomes from the delivery of these works is shown in the table below. In addition there are a number of major strategic choices that need to be made, which include:

This Strategy does not make provision for double-stacking between Melbourne and Adelaide in its 15-year timeframe. While ARTC sees this as a desirable longer-term goal, economic analysis suggests that it is not required until present scenarios during the next 15 years.

The Strategy also does not make provision for an Adelaide Hills bypass, which is an option for achieving double-stacking and also offers some other operational benefits. Such a bypass requires further research and may be justified for reasons not directly associated with rail performance. In the event that Government decided to pursue a bypass, it may bring forward the time at which implementation of double-stacking is economically justified.

	Melbourne - Perth	Melbourne - Perth Express	Sydney - Perth#	Sydney - Perth Express	Melbourne - Adelaide	Adelaide - Perth	Sydney - Adelaide
<b>Capacity (Superfreighter pairs per week)</b>							
2009	11	2	6	5	3	5	4
2014	11	3	6	5	7	5	8
2019	14	3	7	6	12	6	15
2024	16	3	8	7	17	7	19
<b>Transit Time (Hours)</b>							
Target	58.0	50.0	74.0	50.0	12.0	42.5	28.0
2009	55.7	47.7	54.3	52.3	11.6	41.1	22.6
2014	55.3	47.3	53.8	51.8	11.5	40.8	21.4
2019	55.7	47.7	54.4	52.4	11.5	41.2	21.4
2024	56.5	48.5	55.3	53.3	11.8	41.7	21.8
<b>Reliability (% freight available on-time)</b>							
2009	75%	80%	80%	80%	55%	80%	55%
2014	75%	80%	80%	80%	55%	80%	85%
2019	75%	80%	80%	80%	55%	80%	85%
2024	75%	80%	80%	80%	55%	80%	85%

# Train Numbers include Parkes - Perth

### Hunter Valley

ARTC is pursuing five enhancements to the Hunter Valley network.

First there is a short-term goal to introduce trains of up to 1350 metres on the line to the Gunnedah basin. Trains on this corridor are currently limited to 740 metres. Moving to the longer train configuration will improve efficiency for these producers as well as increase capacity for both the rail network and the port.

The second aim is to offer 30 tonne axle loads to the Gunnedah basin. At present axle loads are limited to 25 tonnes, where the rest of the Hunter Valley area operates at a standard 30 tonnes. Whether to adopt 30 tonne axle loads is a matter for the industry, which will ultimately meet the cost. ARTC's role is to provide all of the information it requires, mainly future pricing, to allow it to make an informed decision.

A new alignment of rail over the Liverpool Range will deliver the third enhancement, the elimination of the current 1 in 40 gradient and thereby the need to use of assistance engines, known as "bank" engines to move loads up hill. The 1 in 40 gradient also represents a barrier to trains longer than around 1350 metres and the new alignment will create the opportunity to consider going to longer trains on this line, which would represent the fourth enhancement.

The fifth initiative is a long term aim to allow North American sized rollingstock. As discussed in Section 3, this will allow increased efficiencies in loading and the acquisition of off-the-shelf rollingstock.

A number of initiatives are specifically targeted to increase capacity including:

- Progressive development of a third track the full distance from Maitland and the foot of Nundah bank.
- Loop extensions and, subsequently, double tracking of the corridor between Muswellbrook and Gunnedah, with additional loops between Gunnedah and the connection point for the Narrabri mine.
- Additional loops on the Ulan line, with double track extending from Muswellbrook to the junction for the Anvil Hill mine.

The initiatives proposed are projected to be required to meet the following tonnage forecasts

	<b>2009</b>	<b>2014</b>	<b>2019</b>	<b>2024</b>
Total Export	133 mt	220 mt	244 mt	278 mt
of which:				
Upper Hunter	93 mt	128 mt	115 mt	117 mt
Ulan Line	29 mt	64 mt	75 mt	102 mt
Gunnedah Basin	11 mt	28 mt	54 mt	59 mt