Contents

1 Overview

This chapter covers current freight and passenger demand in the North-South Rail Corridor (the Corridor). It examines rail and road services on the existing Melbourne-Sydney-Brisbane (inter-capital) coastal routes, the inland (Newell Highway) route, and sea and air services. Freight from intermediate points within the Corridor, regional freight and freight that either enters or exits from outside the Corridor are also discussed.

1.1 Methodology

The Study analysed current freight demand in the Corridor by first establishing total freight flows by origin, destination and commodity. Modal shares (rail, road, sea and air) were then determined.

A robust database of current demand was developed. Information in the database included:

- Tonnages between different origins and destinations (OD pairs) in the Corridor:
  - between Brisbane, Sydney and Melbourne;
  - to or from non-capital city points (coastal or inland routes); and
  - from regional inland areas to export ports.
- Commodity type and transport mode; and
- Passenger numbers on relevant routes.

Rail freight data was provided by Pacific National, Queensland Rail, Patrick Portlink and Lachlan Valley Rail Freight, as well as the Australian Rail Track Corporation (ARTC) and RailCorp. This rail data was used in modelling, but for confidentiality reasons only broad indications are provided in this Study. Sea and air data was sourced from the Department of Transport and Regional Services (DOTARS) and the Bureau of Transport and Regional Economics (BTRE) respectively. RailCorp provided passenger data. Road freight data was derived after discussions with DOTARS and the BTRE. The Study Team also interviewed more than 30 key Australian transport organisations.

1.2 Total freight flows

The Study revealed that 220 million tonnes of freight were moved along the Corridor (inter-capital and related regional) in 2004. Approximately 22 million tonnes of freight were shifted between Melbourne, Sydney and Brisbane. The Melbourne-Sydney route made up 47%, (10.3 million tonnes) of inter-capital city movements in the Corridor. The Sydney-Brisbane route shifted 32% (7.0 million tonnes) of total freight and the Melbourne-Brisbane route moved 21% moved (4.5 million) of total freight. Freight flows between Tasmania and points in the Corridor are largely subsumed in the inter-capital data because of transhipment to and from Melbourne to other capital cities.

Coastal freight flows to and from intermediate points in the Melbourne-Sydney-Brisbane corridor (or non-capital city freight) formed nearly 24 million tonnes of total freight volumes in 2004. Freight flows between Western Australia and South Australia and Queensland and New South Wales totalled 12 million tonnes in 2004.

The main freight markets by commodity and origin or destination, across all modes, are set out in Table 1.

Table 1 - North-South Rail Corridor, main freight movements in millions of tonnes, 2004

Region/ commodity	Manufactured products	Grains and oilseeds	Agricultural products	Non-metallic minerals	Steel & metals	Timber & timber products	Coal	Other commodities	Total (all commodities)
Southeast QLD (west of Brisbane)	1.1	1.6	1.0	0.7	0.3	0.9	4.1	0.3	10.0
Northern NSW	0.6	2.6	1.9	2.4	0.3	0.3	100.8	1.9	110.8
Central NSW	0.6	2.2	1.0	2.1	0.2	0.5	13.8	2.8	23.2
Southern NSW	0.8	2.2	2.9	0.8	0.1	0.5	0.0	1.9	9.2
Northern VIC	0.4	0.1	1.4	0.9	0.1	0.0	0.0	1.1	4.0
WA/SA	4.8	0.0	1.3	0.1	1.4	0.1	0.9	3.8	12.4
Northern Queensland	0.5	0.0	1.9	0.6	0.2	0.0	0.0	2.2	5.4
Coastal	5.5	0.3	3.5	4.4	4.7	1.3	0.0	4.0	23.7
Inter-capital	18.0	0.1	2.0	0.0	0.5	0.2	0.0	1.1	21.9
Total	**32.3**	**9.1**	**16.8**	**11.9**	**7.9**	**3.9**	**119.5**	**19.1**	**220.8**

Source: The Study Team, *FreightSim*.

Freight in the Corridor is dominated by coal, followed by other minerals, grain, other agricultural products, manufactured goods and steel.

The main freight routes are between the three capital cities for manufactured products; coastal routes for steel and agricultural products; and inland areas to ports for grain and other agricultural products.

The first five rows of the table show freight from regional areas to ports, dominated by coal. However, the two major coal flows, Hunter Valley (row 2) and Blue Mountains (row 3) mostly cross the Corridor rather than move along it, and are not the main focus of this Study. The same applies to other commodities, including grain, other agricultural products and non-metallic minerals such as zinc. These are relevant to Corridor options when they move along the Corridor or might divert into the Corridor if infrastructure is upgraded, but less relevant when the movement is simply inland to port.

The sixth row shows freight, mainly manufactured goods, between points in the Corridor and South Australia and Western Australia. The seventh row is the equivalent data for north Queensland, with agricultural/horticultural products as the largest item. The flows between Tasmania and points in the Corridor are largely subsumed in the inter-capital data because of transhipment to and from Melbourne to other capital cities.

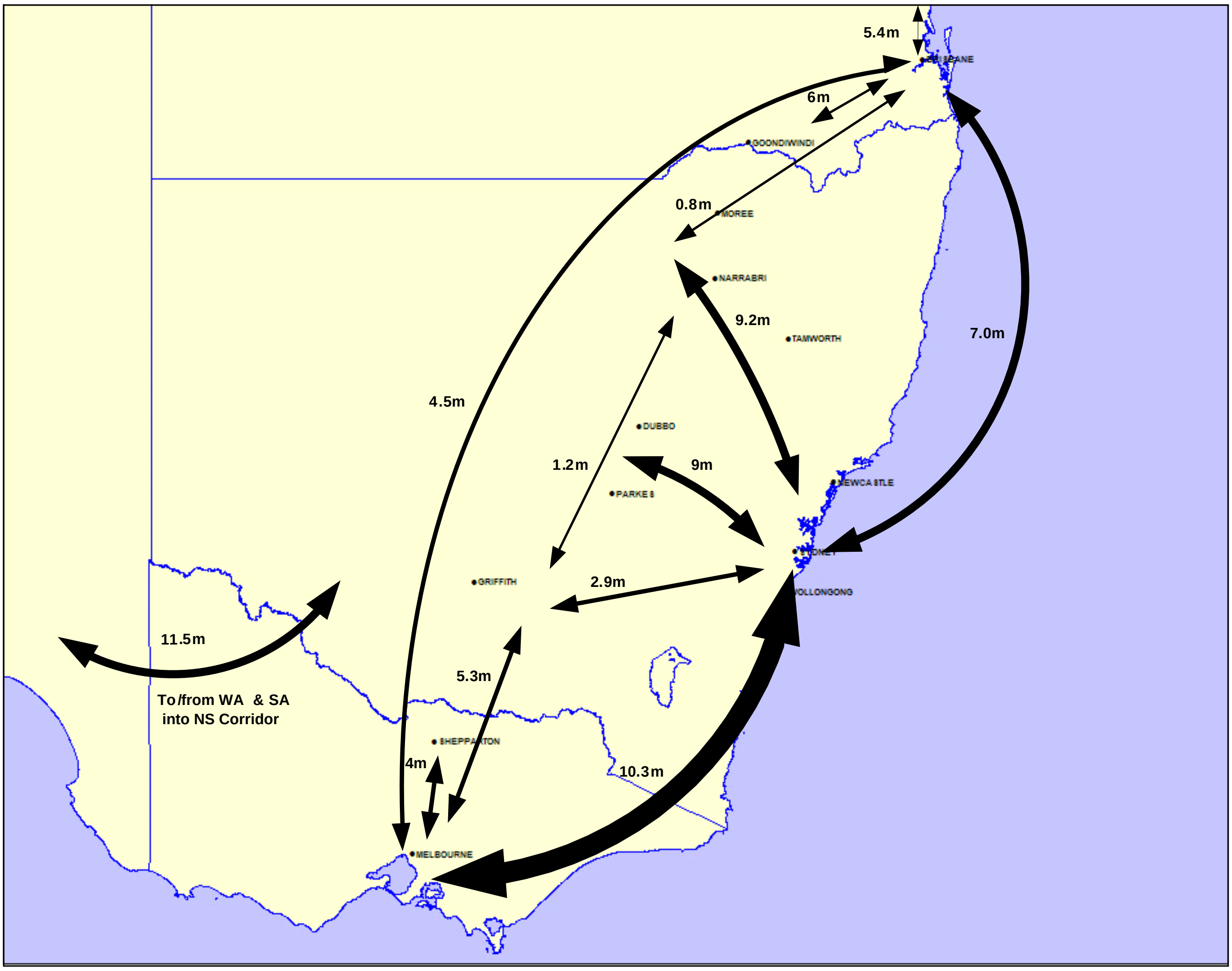
The eighth row shows freight, largely manufactured products, steel and minerals, within the Corridor on the Coastal Route, for example, Newcastle-Brisbane. The equivalent inland movements within the Corridor are minor and are not shown.

The final row refers to freight between Melbourne, Sydney and Brisbane, consisting largely of manufactured products and steel.

The most significant freight flows in the Corridor are shown in Figure 1, below.

The data is reported in tonnes because that is what matters when considering infrastructure capacity and hence options for the Corridor. Data on the freight task, normally reported in net tonne kilometres (NTK), would show different relativities because of differing journey lengths.

Figure 1 - Freight flows within the Corridor (tonnes, excluding coal freight)



Note: There are significant volumes of coal freight movements from the Hunter Valley to Newcastle, central New South Wales to Wollongong and southern Queensland to Brisbane that are not included in this figure, which also excludes 23.7 million tonnes moving to and from intermediate points between Geelong/Melbourne-Sydney-Brisbane, often on coastal routes.

Source: The Study Team's freight flow database, FDF

Some of the drivers behind the freight flow patterns include:

- 'Derived demand' from GDP and population growth, reflected in flows of manufactured goods between cities;
- A reduction in international trade barriers, leading to increased manufactured imports and less domestic freight;
- An increase in concentration of domestic manufacturing and wholesale distribution centres, leading to increased domestic freight; and
- A steady upward trend for output of some agricultural products, dependent on improving production techniques.

This broad pattern will remain over the next 25 years. There will be substantial overall growth, for example, the southeast Queensland area is expected to grow because of possible diversion of coal and grain traffic.

1.3 Modal shares

As rail freight data was confidential, the modal shares reported in Table 2 are broad indications derived from other sources.

Table 2 - Estimates of modal shares on inter-capital routes in 2004

	Melbourne-Brisbane*	Melbourne-Sydney	Sydney-Brisbane
Rail	30%	9%	11%
Road	61%	89%	76%
Sea	9%	1%	12%
Air	1%	1%	1%

Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes on the Melbourne-Brisbane route. These estimates were derived from non-confidential data.

Note: Sydney – Brisbane rail share does not include land-bridging. Land-bridging would add in the order of 1%-2% to rail mode shares.

Note: All numbers rounded.

Source: FDF, BTRE, the Study Team. The data is estimated percentages of total tonnes.

Modal shares reflect the different prices and service characteristics of each mode, relative to customers' needs. The differences between the modes are listed below.

- Sea has the lowest rates per net tonne kilometre (NTK) and is reliable, but offers a slower and less frequent service than the other modes. Loading and unloading costs are significant for containers on short-haul routes, steel and other items that have to be lifted, but low for bulk items such as petroleum;
- Rail offers logistical advantages for bulk movements (coal, minerals, grain), but relatively slow door-to-door transit times for other freight because of infrastructure constraints. Rail suffers from pickup and delivery (PUD) costs at each end, so the door-to-door costs charged to customers are less competitive, especially on short-haul trips. Rail also has inferior service quality to road in terms of on-time reliability and ability to serve customers' preferred departure and arrival times;
- Road offers fast service, flexibility and reliability, so it dominates freight transport along the Corridor even when prices for its services are higher than other modes. Door-to-door transit times are shorter than rail or sea, and about 98% of arrivals are within 15 minutes of scheduled times; and
- Air transport offers speed and reliability, but at higher prices than sea, rail and road.

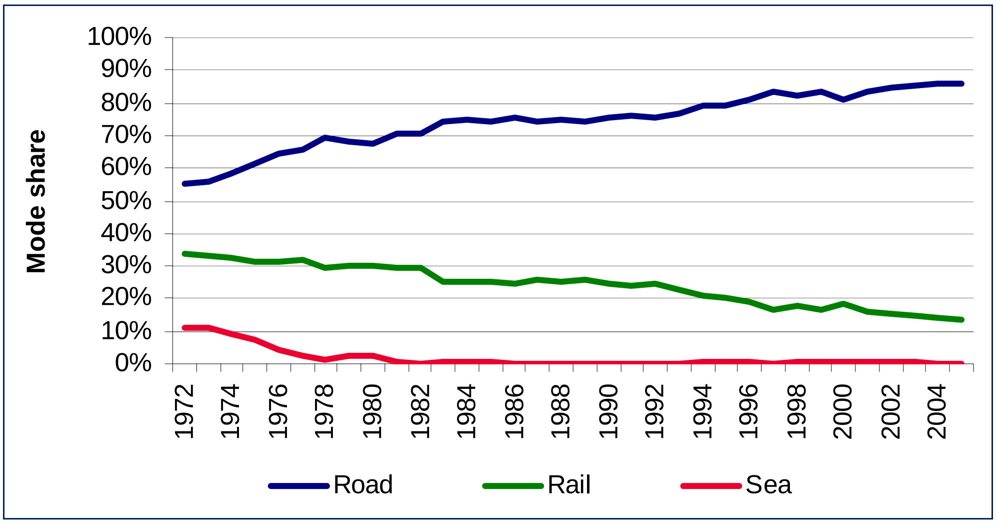
Modal shares vary between commodities. Certain bulk products such as petroleum and cement move largely by sea; other bulk products such as grain, zinc and coal move by rail; express and 'just-in-time' items (supermarket provisions) move by air or overnight truck. All other freight moves by rail or road.

Products that have low value compared with weight or volume (such as coal, steel and bulk paper products) are sensitive to transport price and capacity, and relatively less sensitive to timeliness. These products are typically transported by rail or sea. Products that have relatively high value, such as express deliveries and retail products, are more time-sensitive and relatively less price-sensitive. These freight types typically use air transport. Lighter or 'cubic' freight can be priced in terms of dollars per cubic space rather than on a dollar per tonne basis. Cubic capacity on trucks is typically larger than most rail containers so road has an advantage over rail in this area. Where there is bulk loading and unloading, as for grain and coal, rail or sea have the advantage over road.

Several big companies and a large numbers of owner/drivers provide linehaul road services in a very competitive price and service environment. Two (potentially three) interstate and three regional companies provide rail services in the Corridor.[1]

Outside bulk commodities, the rail share of markets in the Corridor has been declining for decades because of improving road and truck design, congestion on the tracks, and the time and cost of local pickup and delivery. Rail market shares are around 9% between Melbourne-Sydney, around 11% between Sydney-Brisbane, and around 30% between Melbourne-Brisbane. The Melbourne-Brisbane modal share has grown recently and is higher than other routes because road cannot offer an overnight service, and pickup and delivery costs for rail have lower relative importance. Chart 1 shows the consolidated modal share of road, rail and sea on the Corridor.

Chart 1 - Consolidated modal share of road, rail and sea on the Melbourne-Sydney-Brisbane corridor from 1972-2005



Note: The modal shares are weighted averages from the Melbourne-Sydney, Melbourne-Brisbane and Sydney-Brisbane routes. This means that the modal share on the largest freight route (Melbourne-Sydney) will have a large bearing on the consolidated modal shares displayed above.

Source: BTRE, Information Sheet 22: Freight Flows between Australian Cities, 2002.

The survey of freight firms and key customers confirmed that poor reliability, availability and transit times deter greater use of rail. If rail infrastructure and service were enhanced (at a comparable price) sufficiently, leading to a marked improvement in rail freight journey times, reliability, and availability, customers would be more inclined to use rail. The current AusLink/ARTC five-year rail investment program will help in this regard. In the meantime, rail operators have had to offer linehaul freight rates well below those of road to make up for inferior service.

[1] This breakdown of rail operators in the Corridor is subject to change as a consequence of Toll's acquisition of Patrick.

1.4 Passenger services

Passenger services in the Corridor consist of trains in urban Sydney and regional New South Wales that use the same tracks as freight trains, limited longer distance services (for example, Sydney-Melbourne) and Brisbane urban services that use the same corridor as the northern end of a potential inland route. These passenger services use train paths that would otherwise be available to freight trains. Growth in passenger train numbers may increase network congestion and lower the performance of the rail network, including freight trains.

Improved roads and cars and low airline fares have resulted in minimal growth in rail passenger services in the Corridor. None of the relevant New South Wales CityLink trains that serve the commuter areas outside Sydney show growth.

Problems arise in those parts of Sydney where suburban passenger trains conflict with freight trains. Curfews were imposed to prohibit freight trains from accessing the Sydney metropolitan network to the south of the Hawkesbury River and to the north of Macarthur from 6 am to 8.30 am and 2.30 pm to 6 pm during the morning and evening peak commuter traffic periods. The curfews are highly disruptive to freight operations, reducing the on-time reliability of freight trains entering the Sydney network.

A proposed freight-only line in southwestern Sydney may reduce congestion problems in the area. The same problems through northern Sydney could be eased by focused infrastructure upgrades but major infrastructure challenges need to be addressed.

2 Introduction

2.1 Background

The Department of Transport and Regional Services (DOTARS), following an announcement by the Minister for Transport and Regional Services on 17 September 2005, commissioned a study to examine options for the Corridor over the next 25 years. The aim of the North-South Rail Corridor Study (the Study) is to analyse the options available and provide a solid basis for growth in freight demand in the Corridor.

The Corridor is presently served by:

- Rail freight and passenger services on the existing Melbourne-Cootamundra-Sydney-Central Coast-Brisbane line;
- Road freight and passenger services, largely on the Newell Highway between Melbourne and Brisbane, the Hume Highway between Melbourne and Sydney and the Pacific Highway between Sydney and Brisbane;
- Sea freight services; and
- Air passenger and freight services.

The main types of freight carried along the Corridor by land are containerised or palletised freight (mainly manufactured products) and steel. Bulk commodities such as petroleum and cement are carried by sea, while high-value (relative to weight) express items travel by air.

Passengers travel by car, bus and train over the shorter and medium distances, and predominantly by air for longer distances. The focus of this Study is road freight as the main alternative to rail freight. The economics of sea and air freight for this Corridor mean they provide only marginal competition for rail.

The traffic has origins and/or destinations within the Corridor, but may come from or go to points outside it. Urban commuting makes up other freight and passenger movements in the area, as does east-west carriage of coal and grain to ports. These types of traffic are not covered in this Study except when mentioning their indirect effects.

Rail was once the predominant choice for land freight and passenger transport in the Corridor. For many decades there has been a steady decline in its modal share on inter-capital city routes and a consequent rise in road's modal share[2]. This was the result of improvements in road and truck design, consistent regulation among jurisdictions and deregulation in the road transport industry. Intense competition between trucking firms has also gradually reduced the relative linehaul costs of road freight. Rail's pickup and delivery (PUD) costs and ageing infrastructure, management and working practices left the sector exposed to competition. In addition, certain industries and distribution centres have relocated to outer urban areas well served by new roads but often not by rail.

Rail services in the Corridor were seen by many interviewees surveyed for the Study as too slow and unreliable to make up for lower door-to-door prices. A large train has lower capital, labour and fuel costs per net tonne kilometre than trucks, but the total cost to customers, including the hidden costs imposed by unreliable services, are usually higher than road freight on the shorter sectors.

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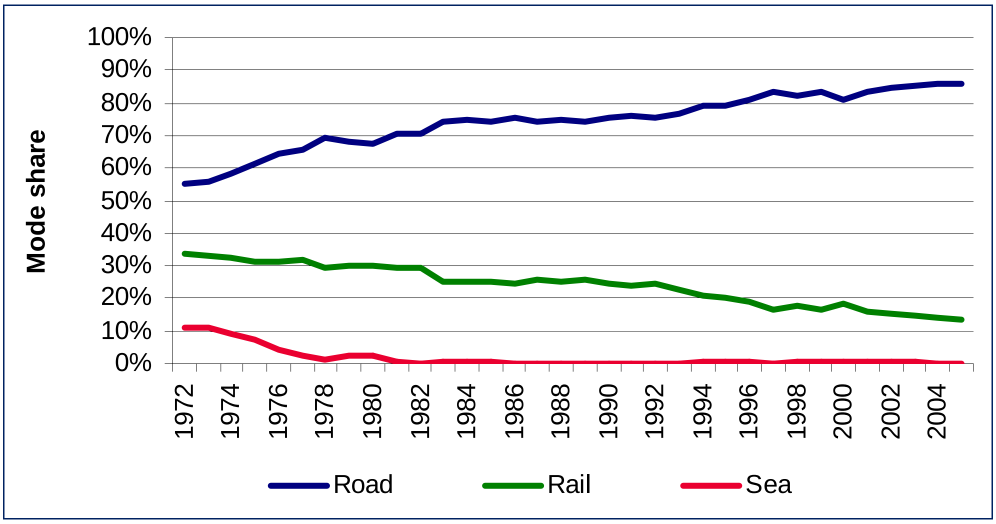
[2] BTRE, Working Paper 40, *Competitive Neutrality Between Road and Rail.*

Rail's market share of land freight in the Corridor is low, ranging from under 10% to around 30% depending on the sector.[3] Chart 2 shows the gradual erosion of rail and sea's modal share on inter-capital city routes in the Corridor since 1972.

Chart 2 - Consolidated modal share of road, rail and sea on the Melbourne-Sydney-Brisbane corridor from 1972-2005



Note: The modal shares are weighted averages from the Melbourne-Sydney, Melbourne-Brisbane and Sydney-Brisbane routes. This means that the modal share on the largest freight route (Melbourne-Sydney) will have a large bearing on the consolidated modal shares displayed above.

Source: BTRE, Information Sheet 22: Freight Flows between Australian Cities, 2002.

Rail's modal share is lowest on the shorter sectors – Melbourne-Sydney and Sydney-Brisbane – where PUD costs form a larger percentage of total costs than on the longer Melbourne-Brisbane sector, and where trucks offer an overnight service. The level of purely 'local' traffic on rail is even lower. For example, most of the rail freight on the Melbourne-Sydney sector is not 'true' Melbourne-Sydney traffic, but Tasmania-Sydney traffic. In this sector, rail is used to transport freight types where it has logistical advantages, such as grain and shipping containers, and less lucrative time-insensitive freight.

Similarly, better roads and vehicles and low-fare airlines have left rail passenger services behind except for urban commuting. A high-speed Sydney-Melbourne passenger train service has been considered, but its economics were such that it did not proceed.

The rail infrastructure through most of the Corridor is now being extensively upgraded by the Australian Rail Track Corporation (ARTC) at a cost of $1.67 billion, which will increase capacity, average speeds and reliability.

Beyond that, there is scope for further improvements in the congested greater Sydney area, other enhancements to the existing route (including passage through the Cowan Bank) and a new, more direct inland line between Melbourne and Brisbane. Road upgrades will continue on the Corridor, with major work on the Pacific Highway and other improvements on the Newell and Hume Highways.

[3] The market share is higher on routes such as east coast-Perth where PUD costs have less relative importance. It is also nearly 100% higher for export commodities such as grain and coal.

3 Market definition

The economic definition of a market usually comprises four dimensions:

3.1.1 Product market

The products covered by this Study are the:

- Transport of freight; and
- Transport of passengers.

3.1.2 Geographic market

The geographic market relevant to transport demand in the Corridor is as follows (each includes traffic in both directions):

- Melbourne-Sydney;
- Melbourne-Brisbane;
- Sydney-Brisbane;
- Interstate freight (and passengers) heading north to Brisbane, which is then transferred to northern Queensland;
- Interstate freight heading south to Melbourne, which is then transferred to Tasmania, South Australia, regional Victoria or Western Australia;
- Interstate freight moving between South Australia or Western Australia and Brisbane;
- Freight between Sydney and Adelaide via Melbourne;
- All intermediate points of freight and passenger demand on the existing “coastal” rail route;
- All intermediate points of freight and passenger demand on potential inland routes; and
- Regional areas which produce export freight volumes that could be moved to export ports via some of the proposed route options.

3.1.3 Functional market

The functional market in this Study is defined as:

- Long-haul rail transport;
- Long-haul road transport;
- Sea transport (coastal shipping); and
- Air transport.

3.1.3.1 Functional sub-markets

Several components of the supply chain are defined as sub-markets for the purpose of this Study. They are included in the door-to-door cost of long-haul road, rail, air or sea freight:

- Short-haul road transport between;
  - rail terminals and customer warehouses; and
  - rail terminals and third-party providers (such as freight forwarders);
- Rail terminals;
- Rail sidings;
- Stevedoring infrastructure; and
- Airports.

The time and financial costs of these components of the supply chain are important determinants when deciding to send freight or passengers by a particular transport mode.

3.1.4 Temporal market

The temporal market refers to the time taken for competitive pressures to be felt. In this case, the market for freight services is judged to be competitive or contestable. Actual and potential competitors in the freight transport market could respond to an incumbent's marketplace behaviour within one to two years and therefore exert some competitive discipline on the incumbent. This assumption is expected to remain valid over the 25-year period of this Study. It is relevant to the dynamic programming model, which assumes competition over the long term. This means equilibrium prices are set at long-run marginal costs.

4 Industry analysis

This section examines current freight flows and the drivers of demand, and informs subsequent work on growth in demand and factors that would change rail's market share.

Passenger services in the Corridor are addressed in section 6: ***Passenger Services***.

4.1 The demand for freight transport services

4.1.1 General conditions

The demand for transport services is linked to demand in other sectors, for example, manufacturing, retail, building and construction. In practice, this means strong economic performance and a rise in consumer demand for housing and retail goods, reflected in Gross Domestic Product (GDP), will lead to a corresponding increase in demand for transport services. Transport demand also depends on price. The slow, long-term decline in real transport costs helps explain why demand has grown slightly faster than GDP, and why some industries have found it beneficial to concentrate their production.

There are factors other than GDP and relative prices that explain demand patterns in freight transport use:

- The demand for transport of grain and other agricultural export commodities from inland areas to ports is related to production. In the short term, weather patterns will affect crop performance, while a gradual improvement in production efficiency due to improved farming techniques, new strains of grain etc will affect demand in the long term. Export prices may fluctuate greatly depending on world supply and demand, but the market clears each year and there is little impact from these price fluctuations on transport demand. Note that long-term world price trends may eventually affect the agricultural production mix;
- The reduction of international trade barriers and the relative growth of manufacturing in China and southeast Asia has seen an increase in imports from these countries. Ships bring these imports to the main metropolitan markets so that only local transport is required;
- The consolidation of the Australian economy (through mergers and acquisitions) has reduced the number of companies with large scale and scope. As firms have merged, they have closed some plants and boosted the production throughput of others. This has created customer markets spanning larger geographic areas, which require additional transport services;
- Companies have also centralised their operations, decreasing the number of production facilities to achieve lower unit costs derived from economies of scale. The reduction in the number of production facilities has resulted in greater demand for transport services to reach customer markets;
- The supply chain logistics systems of large Australian retailers such as Coles Myer and Woolworths have undergone structural changes in recent times, including the consolidation of distribution centres. Retailers have reduced the number of distribution centres by around 75%, from roughly 30 or 40 distribution centres to 10 or 12;
- Population growth is another underlying determinant of demand for freight and passenger transport services; and
- Lower trade barriers have improved export opportunities abroad for Australian producers. Large volumes of agricultural products, coal and minerals from regional areas on the eastern seaboard have increased the required capacity and composition of transport services to export terminals.

A freight transport market consists of the transport of a particular commodity between a particular origin and a particular destination. In practice, some markets can be grouped together for analysis if their transport economic characteristics are similar, for example, similar time and price sensitivities, frequency and capacity requirements.

4.1.2 Demand for various types of domestic freight

The nature of demand for transport services, and rail's share of the demand, depends on the product being transported:

- Transport demand for products which have low value compared with weight or volume, such as steel and bulk paper products, is sensitive to transport price and relatively insensitive to timeliness. A delay in transit has less impact because the amount of value or capital cost tied up in the freight is relatively low. However, the absolute amount of capital cost is often significant especially when shipping large volumes; and
- The opposite applies to transport demand for products that have high value compared with weight or volume. Examples are postal and other express delivery products, and some final retail products, which are time-sensitive ('just in time') and less price-sensitive. Transport costs for these products are a relatively low proportion of the total value or supply chain cost of final products (typically less than 10%).

Products tend to be carried by the transport service with the most suitable characteristics. Bulk products requiring large one-off capacity such as petroleum and cement move around the coast, including the Corridor, almost entirely by sea. Sea freight is slow and relatively infrequent, but inexpensive on a per unit basis. At the other end of the scale, express items move by air or overnight truck. In between, products move by road or rail depending on the relative price and service quality offered by the transport modes, and the time and service quality preferences of customers. It is in this area that modal shares are most likely to change if relative performance or price changes.

These observations about demand are borne out by transport statistics and by interviewees' responses to the questionnaires.

4.1.3 Demand for manufactured goods

The manufactured freight market consists of heterogeneous or differentiated products, and each product has different transport requirements. Some freight customers require high levels of reliability (within 15 minutes of scheduled delivery at certain times of day) while other customers are satisfied if their shipment arrives within several hours of the scheduled time and do not have a strong preference about what time of day the freight is received.

The manufactured freight market can be analysed according to the service standards freight customers require or by the weight and/or value of the products.

Table 3, below, lists three manufactured freight sub-markets and outlines the levels of service customers expect in the three categories. The express market is one that rail freight cannot serve now and is unlikely to in the future. Freight that is sensitive to reliability and availability moves mainly by road but could switch to rail if service quality improved. The reliability/price-sensitive freight segment is shared between road and rail, with road transporting most of this freight on short-haul routes. Rail transports it when routes extend beyond 1,000 kilometres as rail becomes cheaper relative to road because the significance of PUD costs decline as distances increase.

Table 3 - Analysis of the manufactured goods freight market in the North-South Rail Corridor

Market Type	Customers' requirements	Road's capacity to deliver	Rail's capacity to deliver
Express market	**Availability** Morning and late evening departures preferable. **Reliability** This is the segment most sensitive to reliability. Customers expect above 95% reliability standards, especially for time-slotted freight **Transit time** Fast transit times to provide freight to customers as quickly as possible.	Road's capacity to deliver fast and reliable services suit the express market's dispatch/receive windows. Customers' average rating was 9.3 out of 10.	Rail cannot currently deliver services that meet customers' requirements on the north-south routes. Express customers' average rating was 3.4 out of 10. The ability of rail to provide these services in the future appears limited even with planned transit time and reliability improvements.
Availability and reliability-sensitive market	**Availability** Departure times are preferred after business closes (5-6 pm) and arrival times the next morning before business opens (8 am), the next morning plus one for Melbourne-Brisbane. **Reliability** Meeting a very high proportion of 30-minute delivery windows is necessary to avoid losing customers or penalties for late arrival. **Transit time** Customers do not explicitly monitor transit times; rather they track departure and delivery times of freight	Road service standards appear to differ little between the express market and this one. Short-haul routes in the Corridor allow road to deliver short, reliable transit times with the flexibility to depart and/or arrive to suit customers' preferences.	Poor reliability does not allow rail to compete effectively for reliability-sensitive or 'time-slotted' freight. Slow transit times also mean rail cannot compete effectively for freight that requires 'overnight' or 'next day plus one' services.
Reliability/price-sensitive market (non availability-sensitive market)	**Availability** Overnight services are not required. Freight can be dispatched and received at various times over a 24-hour period because of long order delivery lead times or 24-hour dispatch/receive inventory systems. **Reliability** Longer delivery windows or do not need deliveries first thing in the morning **Transit time** Transit time has little impact within broad limits. This type of freight has relatively longer delivery lead times.	Road wins most of this market on the short-haul routes because of high reliability and competitive door-to-door prices relative to rail. Road is less competitive when the distances increase.	Poor reliability means rail requires a price discount to win modal share from road. As the reliability of rail improves in future years, it will be able to offer a smaller discount and hold the same modal share, gain a greater modal share, or both.

Transport operators will tailor a suite of different service standards to suit their customers' needs. This allows them to be more profitable than if they offered one price to all customers.

Table 4 shows the proportions of the manufactured freight market estimated by the Study Team to apply to each customer category.

Table 4 - Proportions of manufactured freight market in the Corridor in 2004

	Percentage of Melbourne-Brisbane	Percentage of Melbourne-Sydney	Percentage of Sydney-Brisbane
Express freight	5%	5%	5%
Availability and reliability-sensitive freight	60%	70%	70%
Price-sensitive freight	35%	25%	25%

Source: The Study Team, based on stakeholder consultation and interviews with market participants.

These proportions are expected to change over the 25-year forecasting timeframe to 2029. Some firms interviewed by the Study Team spoke of the increasing use of 24-hour supply chain operations, like those currently used by Coles Myer and Woolworths. This means fewer customers are likely to require the narrow dispatch/receive timeslots of evening departure for next morning (or next morning plus one day for Melbourne-Brisbane freight).

Rail's current slow and unpredictable operations mean it is a weak competitor to road for between 65% and 75% of the manufactured freight market. Rail services, however, are a better substitute for road services when delivery windows are longer than 30 minutes and customers are willing to dispatch and accept freight throughout the day. Rail services would also be a better substitute if service quality improved.

One stakeholder interviewed for the Study commented that there is a blurring between what is express and general freight. He contended that there is very little difference in the way both types of freight is delivered. Moreover, more than half of the general task is moved as express freight. He believes transport operators should offer a discount for slower general freight.

Rail freight services have a competitive advantage over road freight for 'land bridging' services, for example, Tasmania to Sydney services through Melbourne or transporting imports via the Port of Brisbane to Sydney. Rail connections with ports halve the PUD costs associated with land bridging movements. Land bridging forms approximately 2% of the inter-capital city freight task in the Corridor.

4.1.3.1 Cubic and dense manufactured freight

The manufactured freight market has products with two distinct physical characteristics: cubic (lightweight) and dense (heavy) freight. Cubic freight, which is estimated to comprise 20% of the manufactured freight market, comprises products such as dry foods (for example, biscuits) and electronics. These products are typically light enough that the cubic area inside a truck's trailer is full before the truck reaches its maximum weight restriction.

Dense freight accounts for approximately 80% of the manufactured freight market. Rail is more competitive with road when offering prices for dense products as it offers relatively cheap per tonne rates for every additional tonne above a base load of five to eight tonnes.

Prices for cubic freight are often quoted in dollars per cubic metre rather than dollars per tonne (which is the conventional pricing method). On a per tonne basis, cubic freight is more expensive than dense freight, especially on rail, because:

- Cubic freight is lighter, which means a higher dollar per tonne figure for the full load;
- Rail containers (ranging from 20 to 48-foot containers) have significantly less cubic space than B-double trucks; and
- The price per tonne for every tonne above the base charge on rail services is between one-third and one-seventh of the price offered by trucks.

4.1.4 Demand for freight transport from regional areas to export terminals

The main export products from regional areas in the Corridor are:

- Wheat;
- Wine;
- Frozen meat and fresh produce;
- Cotton; and
- Rice.

Exporters tend to sell into extremely competitive foreign markets and are therefore price-sensitive. The degree of price sensitivity is also dependent on competition among road and rail services in particular regional areas. For example, Griffith is not served by interstate highways and misses large amounts of passing road traffic, while centres such as Narrabri and Dubbo are situated at the junctions of interstate highways and experience intense road competition. In these centres, road competition and road-rail competition mean customers are sensitive to price movements.

Exporters also need to meet international shipping services several hours prior to departure to load their goods. This means exporters do not require the strict 15-minute arrival reliability demanded of some domestic services but need to arrive within a two to three hour window.

Other service characteristics typically demanded by bulk exporters are large units of transport capacity, a minimum frequency of services (for example, three times a week) and good connections at intermodal and export ports. The logistical considerations mean that nearly all export grain and coal moves to the port by rail. Road competes with rail for freight such as other agricultural products.

Rail tends to become less competitive with road as the distance of the customer from the intermodal terminal or 'railhead' increases. If this distance is within about 15 kilometres, rail is usually competitive. Beyond that, rail becomes less competitive, and is not competitive at all when the distance is over 100 kilometres.

Domestic interstate and export-based transport services are subject to large seasonal changes in demand. Strong consumer demand in the three or four months prior to Christmas traditionally increases demand for transport services by 10%-20% above levels observed for the rest of the year. Agricultural and grain producers harvest over a period of a few weeks or months, and very large quantities of commodities require movement to export terminals over several months, a pattern that tends to favour rail using depreciated equipment. During other periods of the year, these producers have lower or infrequent demand. This provides challenges for transport providers to maintain high year-round asset utilisation.

4.2 The supply of freight transport services

In response to the significant seasonal variations in freight demand, suppliers of transport services have to plan strategically to maintain commercially satisfactory operating margins. The ability to obtain a return on investment is crucial when companies are considering buying commercial assets such as locomotives, wagons and B-double trucks.

4.2.1 Road

The road industry is intensively competitive. It consists of:

- Major players such as FCL, K&S, Linfox, Scott's Transport and Toll. Big companies generally have their own trucks and contracted-in services, and most are affiliated with train operators via contracts or commercial relationships; and
- A large number of small companies and owner-drivers.

Technical efficiency is steadily improving due to increases in allowed maximum weights as truck design, roads and bridges improve. The Study found that recently introduced Chain of Responsibility regulations will make it difficult for some smaller players to survive. Difficulties in recruiting drivers and the ageing profile of existing drivers may push up wages and hence overall operating costs (this is discussed further in chapter 4: ***Demand Analysis***).

4.2.2 Rail services for domestic freight

In the Corridor, the largest rail operator is Pacific National (formerly National Rail and FreightCorp). Queensland Rail (QR National) began services in the Corridor in 2004, and Patrick Portlink (now owned by Toll) runs services in regional New South Wales and Victoria. Recent media coverage and terminal acquisitions suggest SCT has plans to also enter the Corridor.

The ARTC manages the track throughout most of the Corridor and charges for access to the network. It operates the interstate track from Melbourne to Macarthur in south western Sydney, from Newcastle to the New South Wales/Queensland border on the main interstate Coastal Route, the Hunter Valley and routes west of Sydney through Parkes towards Broken Hill. RailCorp manages the Sydney metropolitan network for both passenger and freight trains.

Following are the cut-off times to deliver freight to rail terminals prior to train departures on the inter-capital city routes[4]:

- Melbourne bound for Sydney – 4 pm;
- Melbourne bound for Brisbane – 6 pm; and
- Sydney bound for Brisbane – 11 am.

The supply of train capacity on the interstate network in the Corridor is currently constrained due to a limited number of train paths at commercially attractive departure times. Like road, sea and air services, the ability of train operators to offer high frequency services provides higher service standards and appeal for freight customers. The current AusLink/ARTC investment program will help alleviate those constraints and allow train operators to plan capital investment programs.

[4] The cut-off times on the return legs are similar to those stated here.

4.2.3 Rail services for export freight

Rail services also operate in export-producing regions of New South Wales, southeast Queensland and northern Victoria. Train services to regional areas transport a high proportion of grain, minerals, coal and agricultural freight to export port terminals.[5] Patrick Portlink, Pacific National and a small number of other private companies provide regional services for export producers.

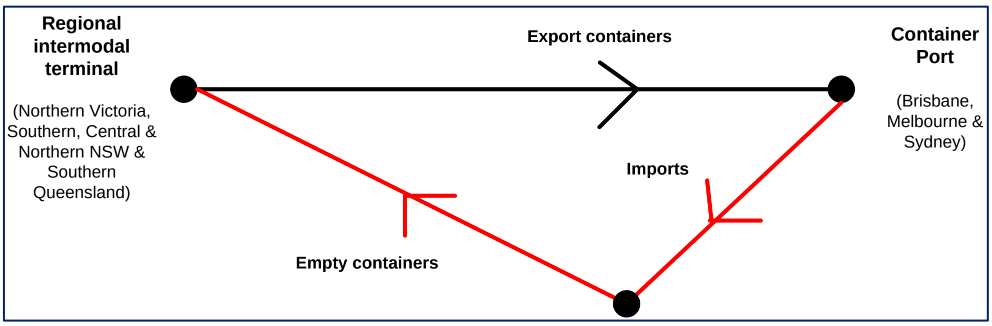
Other relatively small operators cross the Corridor or operate on small parts of it, offering contract or 'spot rate' services for large seasonal freight such as cotton. They include:

- Manildra (Pacific National operates trains on its behalf) transports bulk grain from Manildra, Shoalhaven and Gunnedah;
- Silverton (recently purchased by West Australian train company South Spur Rail) operates contract project trains from Moree, Narrabri and Wee Waa for agricultural products such as grains and cotton on a seasonal basis; and
- Lachlan Valley Rail Freight operates throughout New South Wales on a contractual or 'spot hire' basis and also offers shuttle services between Newcastle, Minto and Port Botany. Lachlan Valley Rail Freight currently uses leased locomotives and rolling stock but is said to be considering investing in its own train operating assets.

Figure 2 shows the services provided by train operators to exporters in regional areas (primarily agricultural products). The three-part train operations involve:

- Moving import containers from ports to city rail terminals for customer pickup (this is most common in Sydney where road access is limited);
- Transporting empty containers to regional areas to be loaded with goods by exporters for future consignments; and
- Shifting export containers from regional areas to container terminals.

Figure 2 - Pattern of rail services for import, empty and export containers to and from export terminals

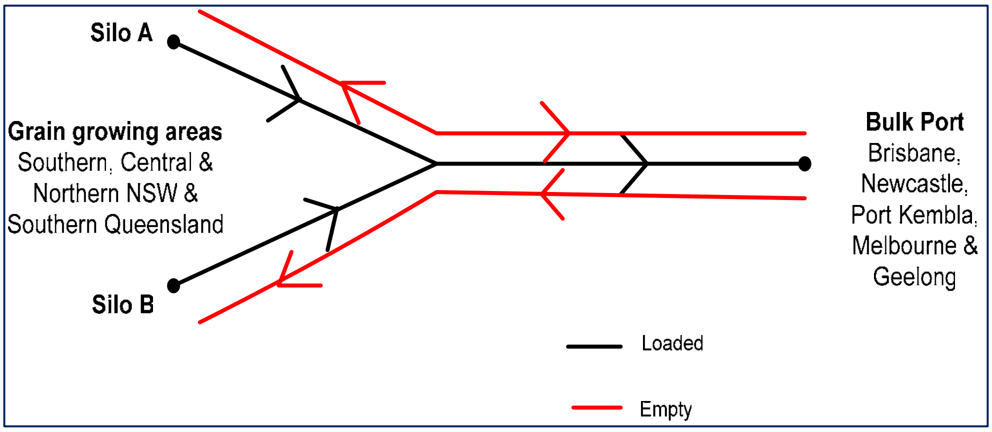


Source: The Study Team.

[5] A much smaller percentage of freight transported by rail from regional areas is for domestic consumption. Most customers (for example, feedlots, and flour mills) are dispersed and are more readily served by road.

Figure 3 shows the pattern of land transport services to (loaded) and from (empty) bulk export terminals. It also displays the main bulk terminals and grain-growing regions in the Corridor.

Figure 3 - Pattern of land transport services to and from bulk export terminals



Source: The Study Team.

4.2.4 Coastal shipping

Coastal sea freight along the Corridor consists of Australian registered vessels operated for large commodity companies, and overseas registered vessels operating under single or multiple voyage permits. The permits allow the use of overseas-registered vessels only where an Australian vessel is not available. One local operator (PAN) has a limited general freight coastal service along the Corridor, but has indicated possible expansion of capacity.

4.2.5 Air cargo

Airlines in the Corridor carry freight on passenger planes, and there are limited all freight services, for example, for Australia Post.

The freight data presented and described later in this chapter shows that relatively small volumes of high-value express freight move by air; manufactured products move by road or rail (the choice depends on the service quality and price performance of road and rail and the relative importance of sensitivity to price compared with sensitivity to reliability and other aspects of service quality); some bulk commodities including paper, steel and export grain largely move by rail; and other bulk commodities including petroleum and cement move by sea.

4.2.6 Freight forwarders

Freight forwarders contract with end-freight customers to transport goods by road, rail, sea or air from door-to-door. It takes responsibility for the safe and on-time arrival of customers' goods using one, two or sometimes three different transport providers within the logistics supply chain industry for the entire operation. The freight forwarder pays the rail, road, sea or air transport providers for moving the goods on their behalf.

As of June 2006, the major freight forwarders in the Corridor include:

- FCL;
- K&S Freighters;
- Linfox; and
- Toll.

4.2.7 Metropolitan pickup and delivery (PUD)

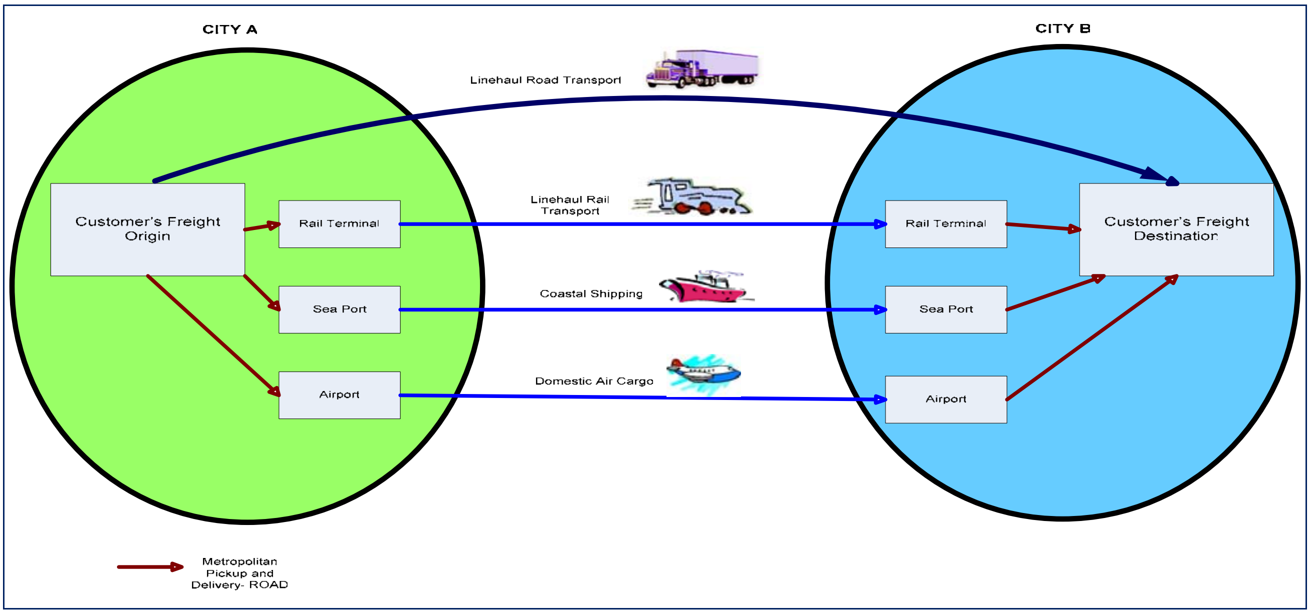
Cost and time implications of rail terminal services and metropolitan PUD services have a major impact on modal choice, especially on short-haul routes, notably Sydney-Melbourne and, to a lesser extent, Brisbane-Sydney. These effects are particularly evident in those parts of the major metropolitan areas that are distant from the intermodal terminals, where freight is transferred from trains to trucks.

Road has considerable advantages over point-to-point rail and local PUD services because of the relative utilisation achievable with a B-double truck operating door-to-door services, weight and cubic size advantages (over rail container on a flat bed), the ability to proceed direct from unload to load point without returning to a container depot, and the comparative ease of loading and unloading.

These advantages are accentuated at present by rail's reliability problems, which will reduce once infrastructure is upgraded. (Time-slotted shipments will generally travel by road to avoid delays in rail linehaul and terminal handling). Rail operators have to offset this with lower linehaul prices or, where this is uneconomic, forgo the business.

Figure 4 shows the range of transport services freight forwarders can utilise to shift goods from freight origins in city A to freight destinations in city B.

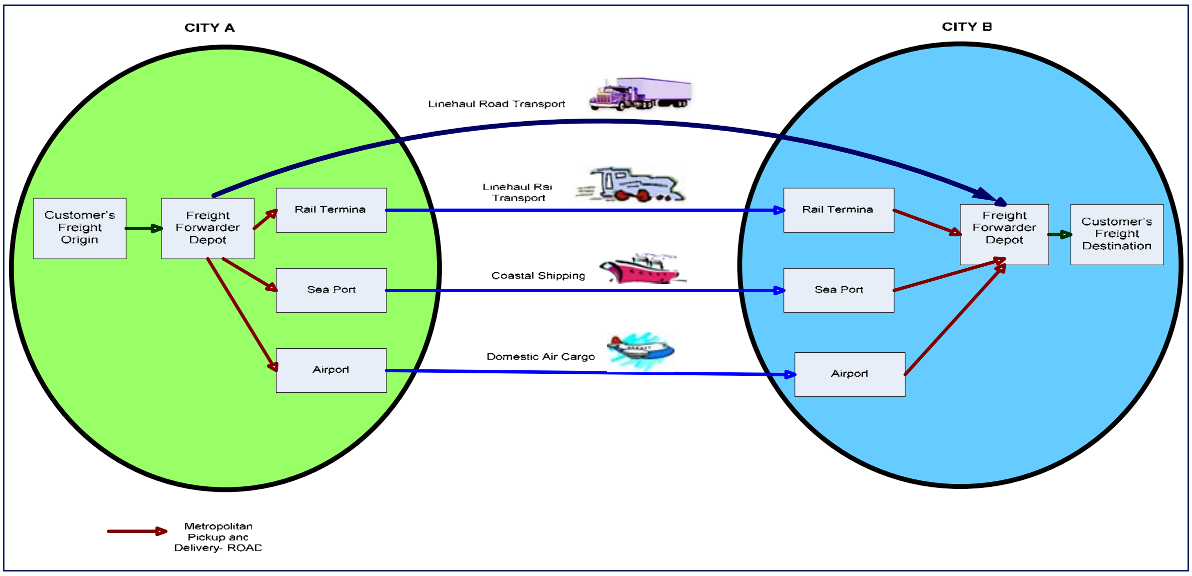
Figure 4 - Typical freight forwarder operations for door-to-door interstate transport services for single customers



Source: The Study Team.

Figure 5 shows how freight forwarders transport goods from multiple customers in city A on interstate routes to city B. They collect freight in city A and consolidate the goods into a single container or truck to be transported to rail, sea or air terminals for interstate linehaul transport. Alternatively, a truck can transport multiple customers' goods from the freight forwarder's depot in city A to its depot in City B prior to distributing the goods to end customers.

Figure 5 - Typical freight forwarder operations for door-to-door interstate transport services for multiple customers



Source: The Study Team.

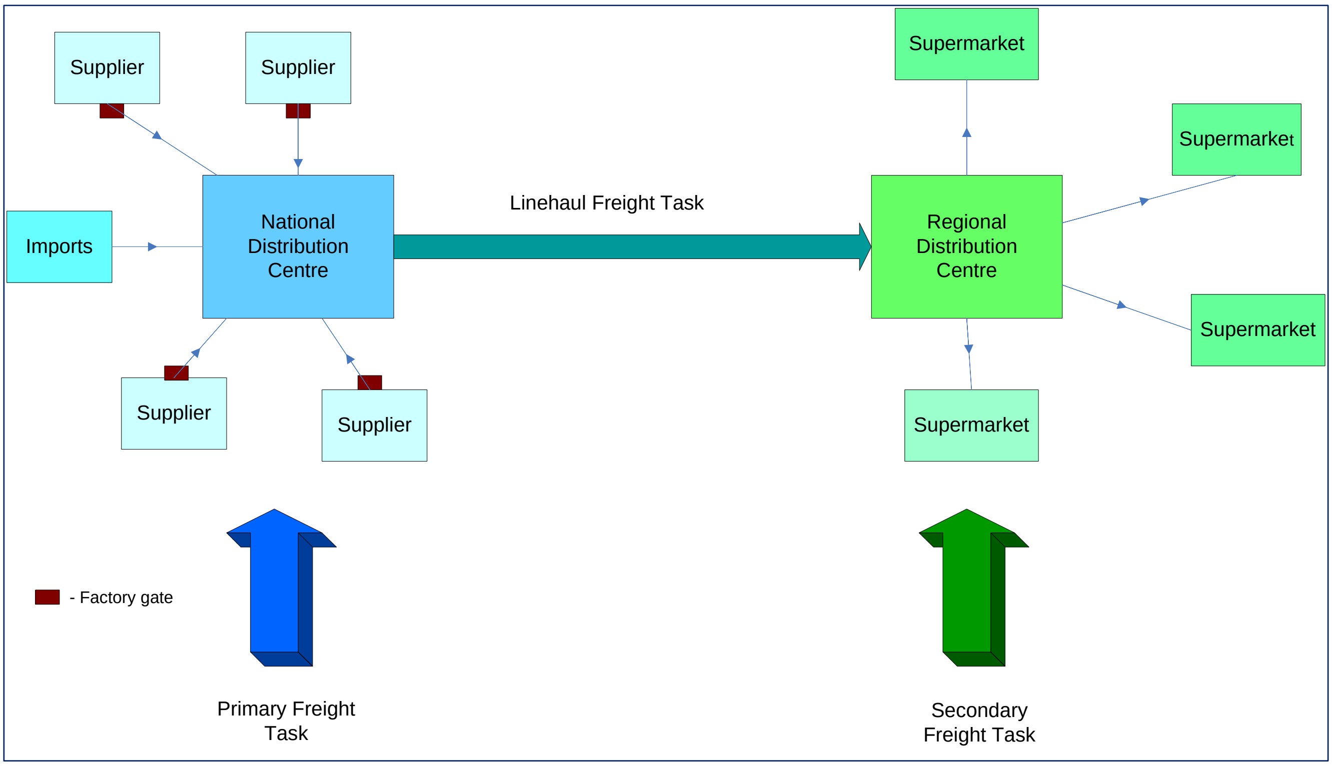
4.3 Recent market developments

Over the past few years, the large Australian retailers, Coles Myer and Woolworths, have begun implementing new arrangements for their supply chain logistics network. Instead of following the previous standard practice of allowing suppliers to consign and deliver freight to them, retailers are now negotiating with suppliers to send their own transport firms to pick suppliers' goods from the 'factory gate' (the suppliers' premises). These arrangements are referred to as 'factory gate pricing'. Factory gate pricing has restructured the retailers' domestic transport supply chain into three distinct stages:

- The primary freight market – from suppliers' doors to the retailers' distribution centres (DCs);
- The linehaul or interstate freight market – to re-position freight between the retailers' DCs; and
- The secondary freight market – from the retailers' DCs to supermarkets.

Factory gate pricing operations are shown in Figure 6.

Figure 6 - The primary, linehaul and secondary freight tasks of the retailers' supply chain logistics networks



Note: Freight is also dispatched to supermarkets in the secondary market from national distribution centres.

Source: *Company interviews conducted for this Study.*

Road is the sole provider of secondary market transport services and enjoys a large proportion of the primary freight market. According to some of the transport companies and customers interviewed for this Study, rail has the potential to penetrate the primary freight market. Rail and road are substitutable for linehaul or interstate transport services.

The 24-hour operation of the retailers' DCs dictates that they have the ability to dispatch and receive freight over an entire day. This implies that retailers do not require overnight interstate transport services – evening departures and early morning arrivals – as their operations can receive and dispatch freight around the clock. The retailers' operational arrangements allow rail to compete strongly with road on price for retailers' business, especially for their less urgent freight requirements.

Automated ordering systems in supermarkets and DCs have increased the lead time for transport companies between being notified of an order to transport goods and actually delivering those goods. Longer lead times reduce the competitive advantage of road as rail can organise to leave slightly earlier and increase its reliability.

4.3.1.1 Land bridging

Land bridging – rail freighting of containers between a ship at a particular port and a town elsewhere – has declined significantly over the past two years. A shortage of world liner cargo vessels in 2002 and 2003 because of the China-led trade boom meant many ships were not calling into Brisbane to shorten their round trip travel times. Instead, large amounts of imported goods that were usually unloaded in Sydney or Brisbane were being transported by rail to either Brisbane or Sydney. As the supply of liner cargo vessels increased, the need for shorter round trip journey times has decreased so many vessels now call at both Sydney and Brisbane. As a result, land bridging services between Brisbane and Sydney has declined by 70% between 2002 and 2005 on this route.

There is also a significant amount of land bridging on the Melbourne-Sydney route of freight originating from and destined for Tasmania. The rail connection with Melbourne's port reduces the PUD costs usually associated with rail movements from Melbourne. As Tasmanian freight is relatively less time-sensitive, Tasmania-Sydney freight moves by rail rather than road. The Study indicated that most rail freight volumes in both directions on the Melbourne-Sydney route are Tasmanian freight being land bridged to or from Sydney through Melbourne.

4.3.1.2 Foster's shift of production from Sydney to Brisbane

The dynamic of freight flows on the Sydney-Brisbane corridor was altered when the Foster's Group shifted its production facility from inner Sydney to Yatala in Brisbane. The large volume of goods sent from Brisbane to Sydney has resulted in a more balanced freight flow between the two cities. Previously, there were greater amounts of freight travelling to Brisbane from Sydney than in the opposite direction. This development has forced up the prices of freight transport services from Brisbane as spare capacity heading south to Sydney is now limited.

4.4 Relative reliability of transport services

The on-time reliability of road (within 15 minutes of scheduled departure) is above 95% and some interviewees put it closer to 98%. Coastal shipping is also relatively reliable despite its slower transit times, operating around 90% of its services to within satisfactory margins around scheduled arrivals. Interstate rail transport, however, offers relatively unreliable services to freight customers. Since 2000, rail freight peak on-time reliability twice reached 60% to 70% on the inter-capital routes in the Corridor but fell closer to 40% in 2005 as the rail network became increasingly congested.

In interviews, the following reasons were put to the Study Team as causes of rail's recent poor reliability:

- The rail network is heavily constrained;
- Departure reliability of train operators from terminals is too low;
- The Sydney metropolitan network's passenger priority and morning and evening freight train curfews; and
- One-off events such as industrial action, floods and derailments.

These reliability issues are discussed in further detail in chapter 4: ***Demand Analysis*** and chapter 5: ***Infrastructure Assessment.***

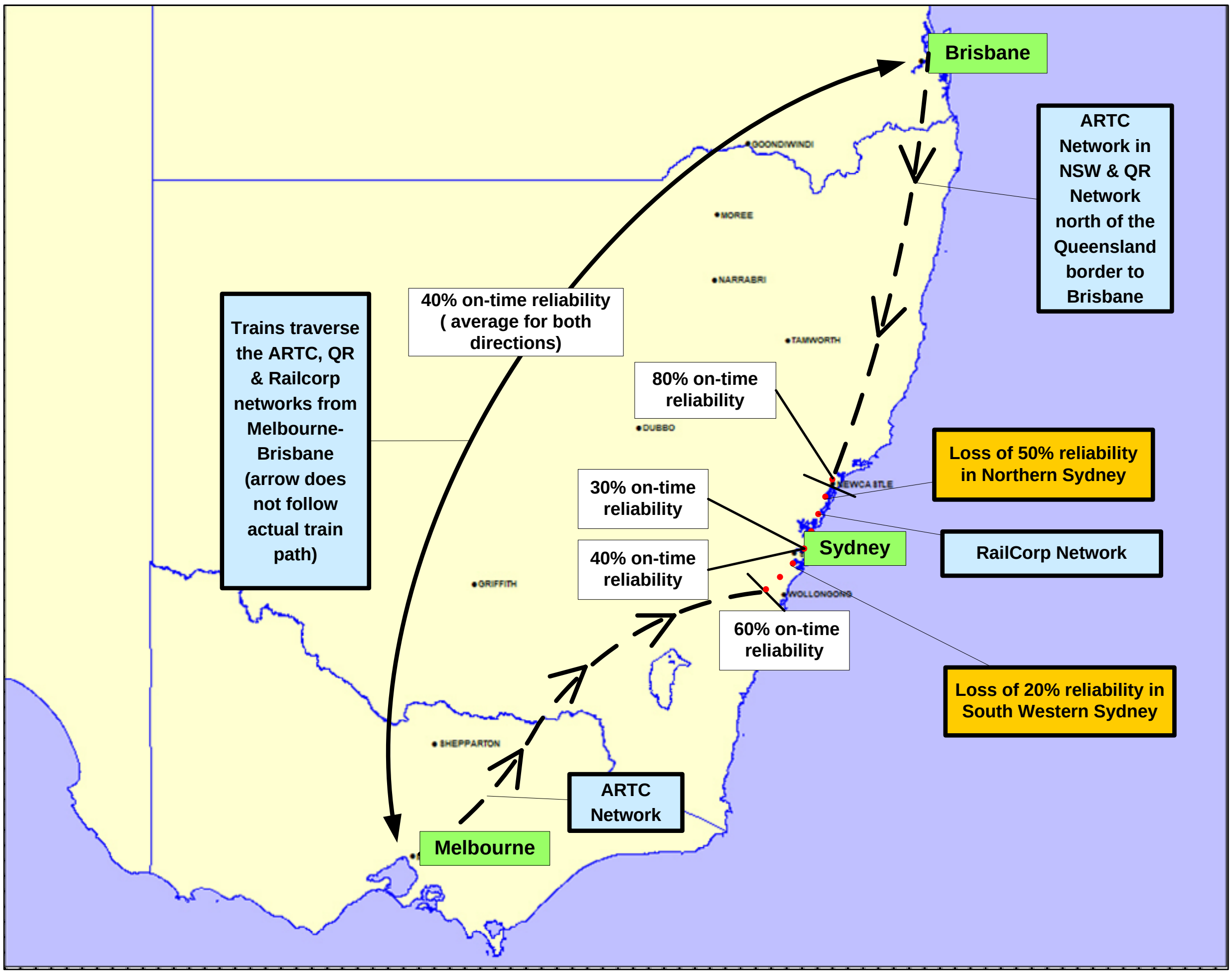
Industry data shows that trains that depart from terminals on time are between 5% and 15% more likely to arrive within 15 minutes of the scheduled arrival time. Issues such as terminal efficiency, terminal management and occasionally infrastructure reliability arise.

The on-time departure problems are exacerbated by the congested network in the Corridor. This means that late-running trains risk losing their slots (train paths) and have little opportunity to catch up lost time due to infrequent passing loops. This is true for ARTC's interstate network and especially true when trains enter Sydney as train paths through RailCorp's network are narrow with only a small margin for error. For example, freight trains have to enter the RailCorp network within a 10-minute window to keep the train path.

Rail operators told the Study Team that the greatest hindrance to high rail reliability on the inter-capital city routes is congestion in the Sydney metropolitan network. Reliability data from the industry confirms this. Traversing the busy commuter network in Sydney significantly reduces freight trains' already unsatisfactory reliability. The Sydney network also appears to affect the reliability of trains heading to Sydney or traversing through Sydney (for example, Melbourne-Brisbane trains) more than trains departing Sydney.

Figure 7, below, demonstrates the fall in reliability as trains traversed the Sydney metropolitan network in 2005. It shows freight trains' on-time reliability at around 80% when they leave ARTC's network heading into Sydney, before dropping to roughly 30% by the time trains reach their Sydney terminals. Trains leaving the ARTC network near Macarthur in south western Sydney and entering the Sydney network reported on-time reliability of roughly 60%. By the time these trains reached the Sydney terminals, on-time reliability had fallen to approximately 40%.

Figure 7 - On-time reliability of trains heading to Sydney from Melbourne and Brisbane, and Melbourne-Brisbane trains in 2005



Source: *Industry sources, averaged*

Figure 7 shows freight trains losing 50% reliability (travelling from the north) and 20% reliability (travelling from the south) as they traversed the Sydney network in 2005. The Study Team's analysis suggests that these large reductions in on-time reliability costs rail between 2% (Melbourne-Sydney) and 10% (Brisbane-Sydney) market share.

Figure 7 further shows that freight trains on the Melbourne-Brisbane route in both directions averaged approximately 40% reliability in 2005. As trains on this route travel through Sydney, stakeholders attribute a significant proportion of the reliability problems to the difficulty of manoeuvring freight trains through the Sydney rail network. The magnitude of reliability losses caused by the Sydney network on the Melbourne-Brisbane route is likely to fall somewhere between the 20% and 50% reliability losses suffered on the southbound Brisbane-Sydney and northbound Melbourne-Sydney routes. If an average on-time reliability loss of 35% was taken, it would shift reliability on the Melbourne-Brisbane route from 40% to around 75%. Holding all other demand parameters constant, the Study Team's modal share model shows that the reliability improvements would increase rail's modal share in both directions by approximately 15%.

4.5 Relative availability of transport services

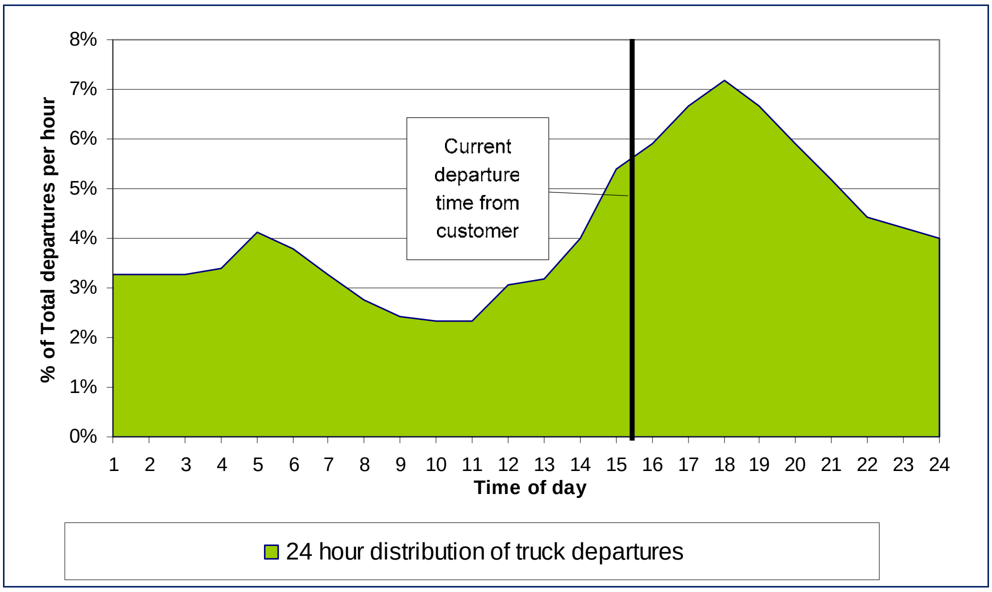
Road's ability to supply services at a time of day when freight customers demand them was assumed to be at 99% in 2004. Trucks' flexibility and relatively fast transit times allow departure times which are tailored to suit customers' preferences. Conversely, rail's slower transit times force trains to depart earlier than trucks to present freight to customers by 8 am to 9 am the next morning or the next morning plus one (as explained below).

As road can provide 'overnight express' and 'next-day' services under 1,000 kilometres, rail struggles to compete on short-haul routes such as Melbourne-Sydney and Sydney-Brisbane. Industry interviews indicate that rail's ability to offer services that suit the freight market's demand for dispatch and receival times is higher on longer routes. Melbourne-Brisbane rail services can achieve what is expected by customers and provided by road. Trucks cannot provide 'overnight express' services between Melbourne-Brisbane so freight customers generally expect services that leave in the evening and arrive in the morning next day plus one.

This analysis assumes that trains will have to arrive at their destination by 5 am to 6 am to allow for the three hours of terminal handling and PUD. This ensures freight can arrive at customers' premises by 8 am to 9 am.

Chart 3 shows that customers transporting freight from Melbourne-Brisbane have to dispatch freight from their premises at 3.30 pm (based on a train departure of 6-6.30 pm). Based on typical truck departure patterns from Melbourne-Brisbane, a 3.30 pm departure time allows train operators to meet the demands of approximately 40% of freight customers. The remaining 60% of customers demand services later than the 3.30 pm dispatch time required to use rail services (but still have their freight to customers in Brisbane by 8 am to 9 am a day and a half later) so those customers have little choice but to use road services.

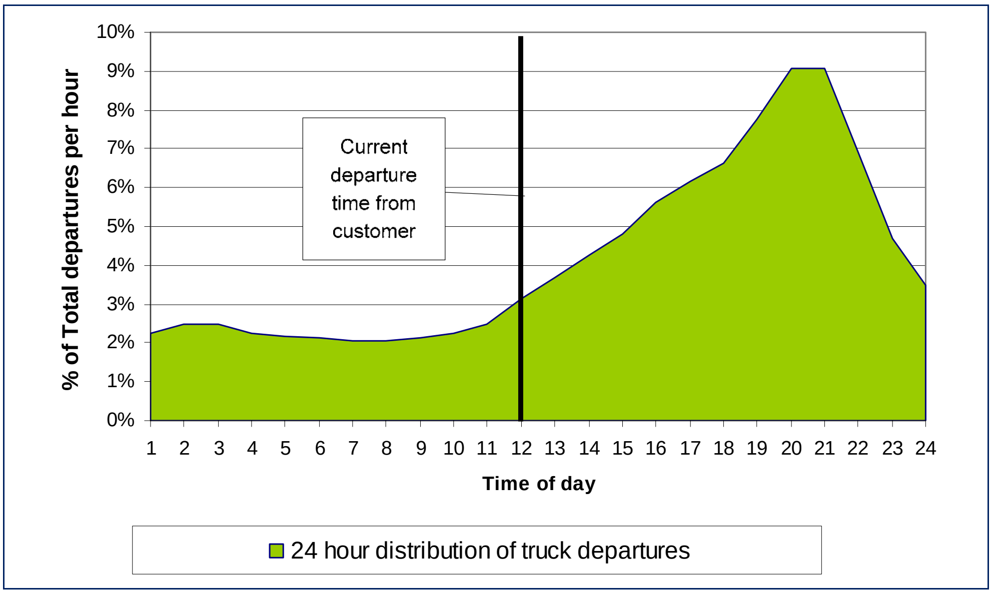
Chart 3 - Histogram of truck departures over a 24-hour cycle from Melbourne-Brisbane and freight departure times from customers using rail services (black line)



Source: *Pacific National 2004 Infopak 2004* and Booz Allen Hamilton, *Interstate Rail Network Audit, 2001.*

Chart 4 shows departure times for road and rail services from Melbourne-Sydney. Based on typical truck departure patterns from Melbourne-Sydney, midday departure times from customers' premises and 3 pm train departures allow train operators to meet the demands of approximately 25% of freight customers. The remaining 75% of customers demand services later than the midday dispatch time required to use rail services (but still have their freight to customers in Sydney by 8 am to 9 am the next morning) so those customers have little choice but to use road services.

Chart 4 - Histogram of truck departures over a 24-hour cycle from Melbourne-Sydney and freight departure times from customers using rail services (black line)



Note: The train departure is based on a typical departure time of Pacific National trains departing Melbourne-Sydney at 2.30-3 pm. The departure time on the Sydney-Melbourne route is typically 5.30-6 pm (arrives at the train terminal at 10 am the next day and customers' premises by 1 pm the next day) so freight would have to leave customers' premises in Sydney by roughly 3 pm.

Source*: Pacific National 2004 Infopak 2004* and Booz Allen Hamilton, *Interstate Rail Network Audit, 2001.*

Average door-to-door rail transit times on the Sydney-Brisbane route of roughly 25-28 hours imply there is little point in trying to schedule trains to arrive at 5 am to 6 am as freight would need to leave customers' premises at 5 am to 6 am the previous day. As there appears to be little demand for early morning departures, train operators on this route tend to operate middle-of-the-day departures for middle-of-the-day arrivals the following day. This allows trains to depart and arrive between the morning and afternoon freight train curfews in Sydney and avoid peak commuter train periods in Brisbane.

Approximately 25% of the manufactured freight market appears to not require overnight express services on this route (as identified in section 4.1.3), so rail competes more effectively for this section of the market against road and possibly sea on price and reliability. Survey information indicates that this portion of the Sydney-Brisbane manufactured freight market was approximately 1.5 million tonnes in 2004. Rail does not appear to be an adequate substitute for road freight for the remaining 75% of the market.

5 Data sources and methodology

The database of current transport demand was constructed by identifying multiple data sources, putting the data in a consistent format suitable to estimate future demand, and cross-checking where possible. Modelling was not necessary to assess current demand, though modelling of future demand had to be calibrated to check that it produced results for the current period consistent with real data.

5.1 Data sources

At times it has been difficult to obtain good data about the transport industry in Australia. Air and sea data is readily available, but locating reliable road freight data by origin-destination and commodity type has been a challenge. Rail data has also been limited since some operators were privatised. However, this Study has benefited from recent detailed research on road freight data from FDF Management (FDF), a specialist transport data company and the Bureau of Transport and Regional Economics (BTRE). Rail operators were willing to provide detailed rail freight data, and RailCorp agreed to share rail passenger data.

It was agreed with DOTARS and the BTRE that the best source of road freight data was *FreightInfo*, a database developed by FDF, in a revised form following input from the BTRE. FDF's research on road freight has resulted in more detailed and useful data than that available from official sources. *FreightInfo* also incorporates data on sea and air transport largely from official sources.

The best source of rail freight data was from the rail operators themselves: Pacific National, Queensland Rail, Patrick Portlink and Lachlan Valley Rail Freight, and ARTC, the rail infrastructure provider. For confidentiality reasons, the data reported in this Study does not include the rail operator-sourced data. The Study uses the rail freight data in *FreightInfo* to estimate inter-capital city freight movements and should be seen only as providing general orders of magnitude. For its modelling and forecasting, the Study Team used actual data from the railway operators.

The best available coastal shipping data was the port-to-port shipping data collected by DOTARS for 2004.

The Study Team interviewed railway companies, major freight firms and a cross-section of major customers to determine the aspects of demand that explain the observed modal shares. The interviews were supplemented with a detailed questionnaire that sought information about each company's freight mix and the reasons for its current choice of mode and future choices if rail service improved.

Passenger numbers were provided by RailCorp and examined in a separate process, as the growth drivers are different from those that apply to freight.

5.2 *FreightInfo*

FreightInfo is a comprehensive transport database developed by FDF and uses a system of 132 regions to describe the origin and destination of every freight flow within Australia. It also records international imports and exports. *FreightInfo* regions coincide with geographical areas used by the Australian Bureau of Statistics (ABS) to report census, economic and other social data. Regions correspond to Statistical Sub-Divisions (SSDs).

FreightInfo records the mass of the freight carried (specified in tonnes), its origin (a SSD), its destination (a SSD), the commodity carried and the mode of transport. The database of freight flows is based on a combination of direct interviews and analysis of published statistics. The BTRE validates the *FreightInfo* database via the use of truck counts on interstate highways, market estimates of rail freight volumes and air and sea freight data collected by DOTARS and the BTRE.

The updating of the 2004 *FreightInfo* database by the BTRE will not be validated until after the Study is completed. The Study Team was still able to benefit from this update to cross-check estimated road freight volumes, especially in regional areas where there are no alternative sources of data.

5.3 Building a freight database

It was important to put substantial effort into developing a sound database for current freight and passenger demand in the Corridor and understand the forces behind this data to provide a basis for robust future estimates.

The freight database was developed by compiling origin/destination flows from the best available sources, validated or cross-checked as much as possible. The freight information required to build the database were:

- Tonnages between the different origins and destinations in the Corridor:
  - the major cities of Brisbane, Sydney and Melbourne;
  - intermediate points between the three cities;
  - inland points to export ports; and
  - points along a possible inland route.
- A breakdown of this data by commodity type and mode; and
- Passenger numbers on the relevant routes.

The Study Team took the 2001 *FreightInfo* database and used the *FreightSim* forecasting tool (described in chapter 4: ***Demand Analysis***) to estimate total freight growth from 2001 to 2004 and thus the total Corridor freight market in 2004.

The Study Team adjusted *FreightSim*'s forecast 2004 volumes by:

- Replacing estimated sea freight data with actual coastal sea freight data from 2003/04 where applicable;
- Using actual rail freight flows from rail operators; and
- Using stakeholders' freight surveys to validate road and rail modal shares on capital city and regional routes (estimated rail volumes were checked against observed rail volumes to ensure broad consistency).

The Study Team then identified approximately 551 origin-destination (OD) pairs relevant to this Study and divided them into the following geographical regions:[6]

- Main inter-capital city routes (Melbourne-Sydney-Brisbane) – 6 OD pairs;
- Southern Queensland – 23 OD pairs;
- Northern New South Wales – 43 OD pairs;
- Central New South Wales – 38 OD pairs;
- Southern New South Wales (Riverina) – 52 OD pairs;
- Northern Victoria – 18 OD pairs;
- Freight to and from western states (Western Australia and South Australia) – 46 OD pairs;
- Non-capital city OD pairs in coastal regions – 132 OD pairs;
- Domestic intra-New South Wales OD pairs – 118 OD pairs; and
- Northern Queensland – 75 OD pairs.

It was important to use data from official and industry sources because of changes in the rail sector in recent years, including:

- The privatisation of predecessor railways to become Pacific National. The new management has made substantial changes to the way the railway is run, and have diverted a substantial amount of freight that they previously carried on trucks. There have also been changes to prices charged to customers on some services as management gained a clearer picture of the business' true costs; and
- The entry of QR National into the market, providing interstate services in the Corridor.

5.4 Interviews and questionnaires

Major freight firms and a cross-section of customers were the source of information about current modal choice decisions for different commodities, as well as likely future decisions. More than 30 organisations were interviewed, including multiple divisions in large firms. The Study Team asked the firms about the types of freight they handled, the main origins and destinations, the mode(s) used and why, and about service characteristics, costs and prices.

The questionnaire is summarised in Box 1, below.

[6] As a general rule, only OD pairs for the existing coastal corridor and from Western Australia, South Australia and North Queensland with over 10,000 tonnes per annum were included in the analysis.

Box 1 - Examples of typical freight survey questions

Freight types transported between city pairs per annum (calendar year)

Commodity or freight type*	Melbourne-Sydney	Melbourne-Brisbane	Sydney-Brisbane
	'000 net tonnes pa	'000 net tonnes pa	'000 net tonnes pa
Manufactured goods			
Steel			
Cars			

Note: During interviews the proportion of freight on forward and backhaul legs was discussed.

What percentage of your freight tasks are transported by road and rail?

Commodity or freight type*	% by Road			% by Rail		
	Melb-Syd	Melb-Bris	Syd-Bris	Melb-Syd	Melb-Bris	Syd-Bris
Manufactured goods						
Steel						
Cars						

What are the current rail and road freight costs for containerised traffic in terms of $ per tonne?

	Weight of freight per container/wagon	Rail transit costs only $ per tonne*	Door-to-port rail costs $ per tonne	Door-to-port costs $ per tonne
Melbourne-Sydney	tonnes per container			
Melbourne-Brisbane	tonnes per container			

Time and price-sensitive freight

What percentage of the freight task is time-sensitive freight?									
0-4.9%	5-9.9%	10-14.9%	15-20%	20-30%	30-40%	40-60%	60-80%	80-100%	100%
What percentage of the freight task is price-sensitive freight?									
0-4.9%	5-9.9%	10-14.9%	15-20%	20-30%	30-40%	40-60%	60-80%	80-100%	100%

The importance of factors that affect intermodal rail and road demand

Factors that influence choice between road and rail	Required service levels (please state preferred service levels where possible)	Relative importance – % weight out of 100%	Rating – rail current 10 – excellent 1 – dreadful	Rating – road current 10 – excellent 1 – dreadful
Price				
Journey time				
Reliability				
Availability				
Loss and damage				
Flexibility				

The firms interviewed by the Study Team are listed in Table 5.

Table 5 - Companies interviewed by the Study Team

Train operators	Track operators	Freight forwarders	Freight customers	Other stakeholders
Lachlan Valley Rail Freight	ARTC	FCL	Amcor	Australian Logistics Council
Pacific National	QR Access	K&S	Australia Post	Australian Shipowners Association
Patrick Portlink	RailCorp	Linfox	AWB	National Transport Commission
PN Rural & Bulk		Patrick Autocare	BlueScope Steel	Port of Melbourne
QR National		Patrick Logistics	Coca-Cola Amatil	Shipping Australia
QR (Rural)		Sadleirs	Coles Myer	Thompson Clarke
SCT Logistics		Toll (six divisions)	Fisher & Paykel	
			Foster's Group	
			GrainCorp	
			Incitec Pivot	
			Smorgon Steel	
			Toyota	
			Woolworths	

Box 2 displays some of the comments made about current demand in the interviews and questionnaires, grouped together and edited in order to preserve confidentiality.

Box 2 - Feedback from freight forwarders

Feedback from freight forwarders

Freight forwarders commented that the fundamental characteristic of service quality is reliability as only a small proportion of freight is not time-sensitive. They judged 75% and even 95% reliability to be unacceptable for rail, as it means freight is late once a month (assuming daily services). Reliability needs to be within close proximity of road's reliability of 98% before it will be competitive on medium or short-haul routes. Currently, rail's capacity and reliability are insufficient to run to these performance parameters so nearly all interstate short-haul freight in the Corridor is moved by road.

Long-haul routes (minimum length is Melbourne-Brisbane) are serviced by a combination of rail and road. Given the time and cost associated with double-handling (PUD) at both ends, the Melbourne-Brisbane route is the minimum distance in which rail has the performance and price to be competitive with road. Rail is not particularly competitive on the Melbourne-Sydney and Sydney-Brisbane routes as PUD charges make up a very high proportion of door-to-door costs.

Freight forwarders find the freight imbalances on forward and return legs manageable. With smart marketing and lower freight rates on the return leg, adequate volumes can be sourced.

Most freight needs to be at customers' doors by 7 am so train operators need to work backwards from there to work out the departure time, taking into account unloading or terminal times, truck delivery and train transit times. It is therefore important to be able to unload trains by 5 am to 6 am.

Crude products (steel, zinc, paper and waste paper) are less time-sensitive and generally delivered over a seven-day timeframe. Despite lead times being longer, reliability is still important. However, there are larger margins for error – three to four hours instead of 30 minutes for time-slotted freight to retailers.

Rail becomes more competitive with road when freight becomes more dense. Lighter or cubic freight is easily hauled by road but heavy freight is limited to 45-46 tonnes on a B-double truck.

The major supermarket chains have 80% of the retail food market in Australia and determine prices and delivery processes because of their dominant position. The residual part of the market is more difficult and costly to serve as it is disaggregated.

The interviews revealed that end customers essentially make decisions about how the freight will be transported. Freight forwarders provide freight options in terms of departure and receivable times and price for both modes. The customers then make the trade-off between price and when a product must be received. Included in the options are prices (door-to-door), degree of reliability, time of departure and arrival.

Customers primarily make decisions on:

- Time-sensitivity (on-time reliability and the ability to serve the customers' preferred departure and arrival times);
- Least cost (e.g. lowest price is a very large determinant of whether freight moves by rail or road); and
- Ability to hold inventory (holding inventory is a large cost hence the move to 'just in time' delivery). Road still has the vast majority of short-haul routes as rail's storage and handling costs are high.

Freight forwarders arrange their commercial and business operations so that any freight sent by road and rail provides equal revenue streams or margins. They have the flexibility to switch between road and rail, which allows them to tailor freight solutions to customers' needs.

Competition, truck accidents and the environment are becoming large corporate issues so rail is becoming more popular with larger freight customers.

Source: The Study Team's stakeholder surveys

Box 3 sets out some observations made by freight customers during consultations with the Study Team.

Box 3 - Feedback from end customers

Feedback from end customers

Capacity at peak times during the day/week is an issue for rail as the current infrastructure doesn't have sufficient train paths or train capacity to cater for spikes in freight volumes. Rail, like road, also struggles to meet high seasonal demand from September to December.

Reliability is still the largest issue for rail, according to large freight operators and customers. They believe a significant price discount is required for rail to gain modal share increases due to the higher commercial risk they face when using rail (customers generally price the cost of risk into the discount required by rail). One cause of higher commercial risk is the instance of single point failures with rail services.

Prior to Christmas 2005, a series of events – industrial action, train derailments and a flood washing the track away – severely hampered rail reliability on the east-west routes. Prior to Christmas, nine of the 12 weeks were considered by customers to be 'bad'. This affected the overall reputation of rail freight.

Unlike the traceability of freight on trucks, customers commented that freight forwarders have a distinct lack of control or awareness of container location once containers are dropped at rail terminals.

Customers consider damage on road and rail to be very low. They view damage and loss as an important consideration if theft or damage from one mode becomes worse than the other.

Customers noted that road is difficult to compete with on routes under 1,000 kilometres. Above that threshold, rail becomes a more viable substitute for road. Sea becomes a competitive threat to land transport modes on routes with distances above 1,500 kilometres.

New South Wales and Victoria fluctuate in annual grain and agricultural volumes. High freight volatility makes supply chain management difficult. Grain volatility is a long-term phenomenon and handled with an 18-month supply program. Regional freight also has a volatile profile over the short term as coordinating the freight supply with the large lumpy volumes of shipping vessels requires cyclical planning. This is because there is only one day's storage capacity at the ports' facilities.

Some customers said train operators' poor customer service quality is a major problem and could extend back to track operators. Express freight customers consider rail services as the last option if road capacity is constrained during the peak months from October to December. Customers presently use rail for large capacity movements over short time periods on short-haul routes. This is generally during peak demand when trucks cannot offer the capacity within the narrow window of time.

Customers observed that express or reactive freight tasks are suited to road. Road also tolerates or adapts to shorter lead times better than rail. Given the short lead times between ordering, production, storage/processing and dispatch, customers commented that they will always need to use some road for linehaul as trucks are flexible and can respond to short-term demands quickly, whereas rail is chunkier (in terms of capacity/volumes) and less responsive.

Some customers commented that they are starting to use rail for its linehaul freight task on a more regular basis because of the lack of availability of truck fleets. Tightness in the supply of truck drivers is attributed to driver shortages, truck shortages, changes in the Chain of Responsibility legislation and escalating fuel prices.

Customers consider there is no flexibility with factory gate pricing and it could force transport prices higher. During trials, large customers report that the system resulted in higher net transport costs than under previous arrangements.

5.5 Key assumptions

Door-to-door rail services include an additional six hours to the terminal-to-terminal linehaul transit times of trains. The six hours is based on stakeholder interviews and is a conservative estimate of the following:

- The average time taken to transport goods from customers' point of freight origin to the rail terminal (the goods may also be consolidated at a freight forwarder's depot prior to reaching the rail terminal);
- The average time a container sits in a rail terminal prior to the train departure;
- The average time a container sits at the destination rail terminal after the train arrives; and.
- The average time taken to transport goods from the destination rail terminal to customers' point of freight destination (the goods may also be deconsolidated at a freight forwarder's depot prior to reaching smaller customers).

6 North-South Rail Corridor freight flows

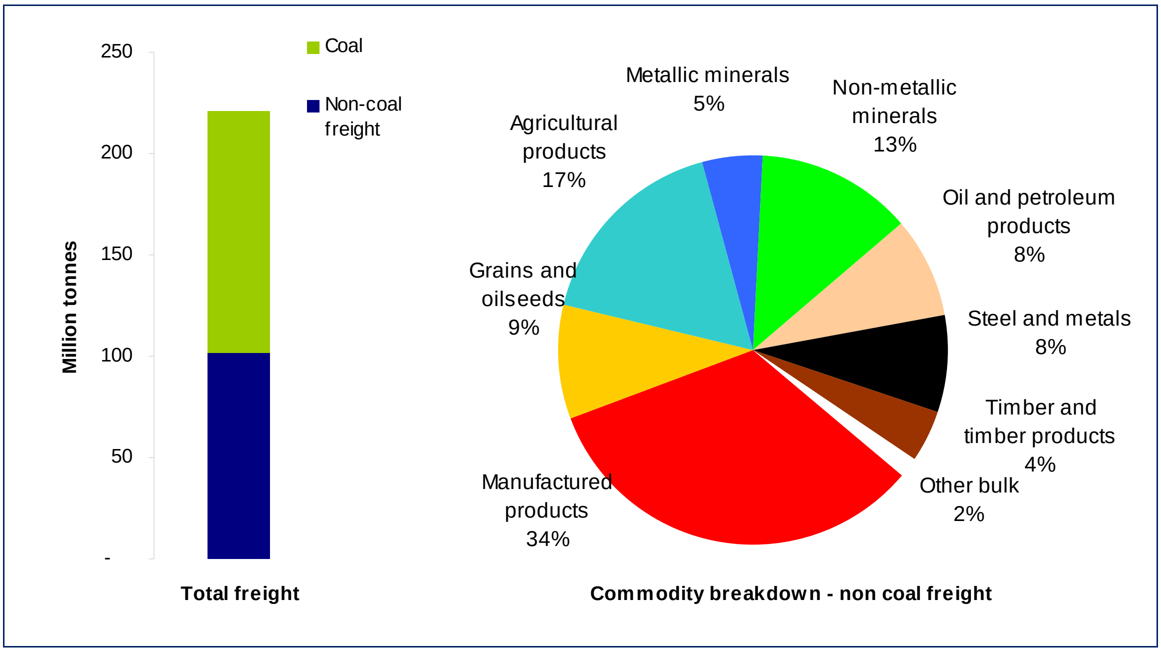
This section discusses patterns evident in freight flows on and into the Corridor, based on analysis conducted using the sources and methodology described in the ***Data sources and methodology*** section in this chapter.

6.1 Introduction

Freight within the Corridor's geographic market outlined in section 2.1 is dominated by coal traffic in the Hunter Valley and manufactured goods between Melbourne, Sydney and Brisbane. Large volumes of steel and petroleum products are also shifted by sea and land.

Figure 8 shows the total regional and inter-capital freight on the Corridor in 2004, including freight to and from the Corridor and regional locations in Northern Queensland, Tasmania and South Australia/Western Australia.

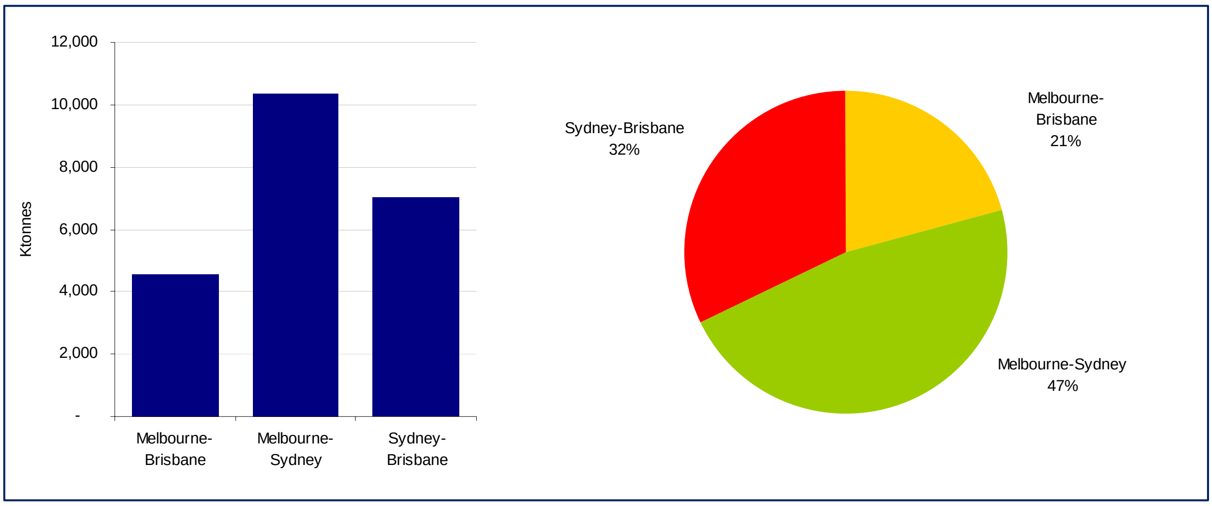
Figure 8 - Total freight flows in and onto the Corridor in tonnes (left) and breakdown of non-coal freight by commodity (right)



Source: FDF, BTRE, Study Team estimates

Estimates of freight flows show 10.3 million tonnes of freight flowing between Melbourne and Sydney in 2004, 7 million tonnes moving between Sydney and Brisbane, and 4.5 million tonnes moving between Melbourne and Brisbane (see Figure 9).

Figure 9 - Freight on the Corridor inter-capital routes in tonnes (left) and share of total Corridor inter-capital freight (right) in 2004

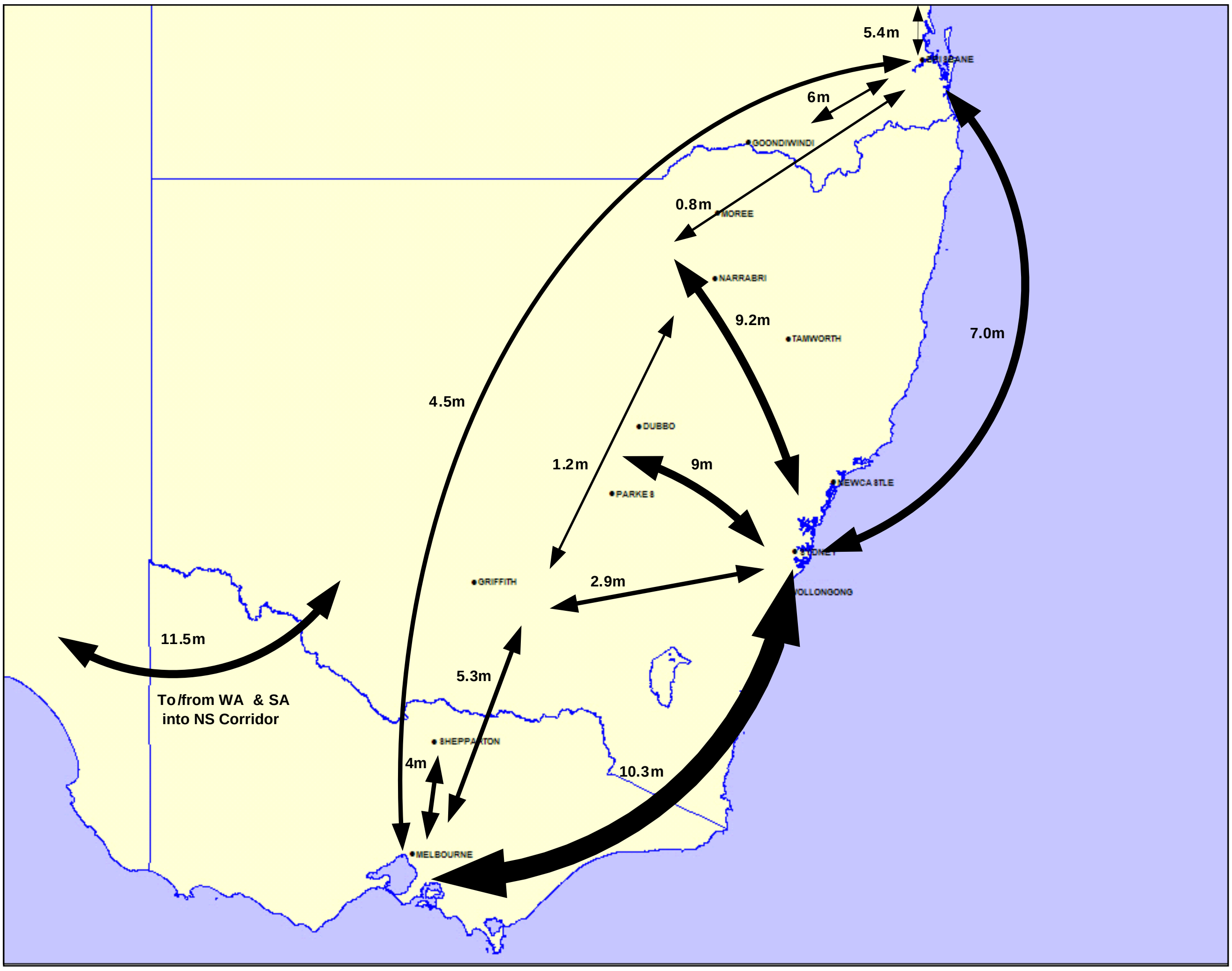


Source: FDF, BTRE, ACIL Tasman estimates

The pie chart in Figure 9 shows that freight tonnages on the Melbourne-Sydney route comprises 47% of the inter-capital city movements in the Corridor. The Sydney-Brisbane route comprises 32% and the Melbourne-Brisbane route comprises 21% of total freight.

Figure 10 shows the magnitudes of the main freight flows within the Corridor.

Figure 10 - Magnitude of freight flows within the Corridor, 2004 (excluding coal freight)



Note: There were approximately 0.1 million tonnes of freight flowing from northern New South Wales to Melbourne, 0.2 million tonnes from central New South Wales to both Melbourne and Brisbane, and 0.2 million tonnes from southern New South Wales to Brisbane in 2004. The 1.2 million tonnes figure is the estimate of intra-New South Wales freight flows to and from inland regional areas.

Note: There were 23.7 million tonnes moving to and from intermediate points between Geelong/Melbourne-Sydney-Brisbane, often on coastal routes. It was not included in the map due to difficulties with interpretation of the relevant arrow running between Melbourne and Brisbane.

Source: The Study Team's freight flow database, FDF

6.2 Melbourne-Brisbane route

The Melbourne-Brisbane route – traffic heading in both directions and the sum total – is perhaps the most important OD pair in the context of this Study because of its longer distance and the lower relative importance of rail PUD costs. The distance between Melbourne and Brisbane on the existing coastal rail route is approximately 1,954 kilometres. The route via the Newell Highway (the most direct and frequently used road freight route between Melbourne and Brisbane) and connecting highways in Victoria and Queensland is approximately 1,670 kilometres. The two interstate rail operators serving this route, PN and QR National, use the South Dynon (PN) and Laverton North (QR National) intermodal terminals in Melbourne and Acacia Ridge in Brisbane to service the market.

The modal shares estimated using *FreightSim*, supplemented by the Study Team's surveys and interviews, indicate that trucks currently carry most of the freight on the Melbourne-Brisbane route (see Table 6). These estimates suggest that trucks carried approximately 61% of freight moved on the Corridor in 2004. The rail share in the same year was 30%. The same estimates showed that rail volumes represented 32% of total freight moving from Melbourne to Brisbane and 28% on the backhaul leg. Road freight is especially strong on the Brisbane-Melbourne route.

Table 6 - Modal shares (tonnes), Melbourne-Brisbane route, 2004

Mode/route	Melbourne-Brisbane	Brisbane-Melbourne	Both ways
Rail	32%	28%	30%
Road	59%	63%	61%
Sea	9%	9%	9%
Air	1%	1%	1%
Total	100%	100%	100%

Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Note: All numbers rounded.

Source: FDF, BTRE, the Study Team's freight database

Data recently released from BTRE showed that sea transported 8.6% of freight from Melbourne to Brisbane in 2004 (manufactured and agricultural products) -see Table 6.

Service and relative price characteristics of rail, road and sea reported in Table 7 demonstrate road's ability to attract higher volumes during 2004 on the Melbourne-Brisbane route.

Table 7 - Service and relative price characteristics on the Melbourne-Brisbane route, 2004

	Road	Sea	Linehaul rail	Door-to-door rail
Typical transit time	21-27 hours	3-3.5 days	36 hours	42 hours
Typical reliability	95%	90%	35-45%	35-45%

	Road	Sea	Linehaul rail	Door-to-door rail
Typical availability	99%	10%	40-45%	40-45%
Typical capacity	20-40 tonnes	20-40,000 tonnes	1,500 tonnes	1,500 tonnes
Relative price	0-30% above door-to-door rail	30-50% below door-to-door rail	30-60% below road	0-30% below road

Note: The combined PUD times from customers' freight origin and destination points to the rail terminals in each city are assumed to be six hours.

Source: Shipping industry expert, the ARA Report compiled by Port Jackson Partners and the Study Team's freight survey.

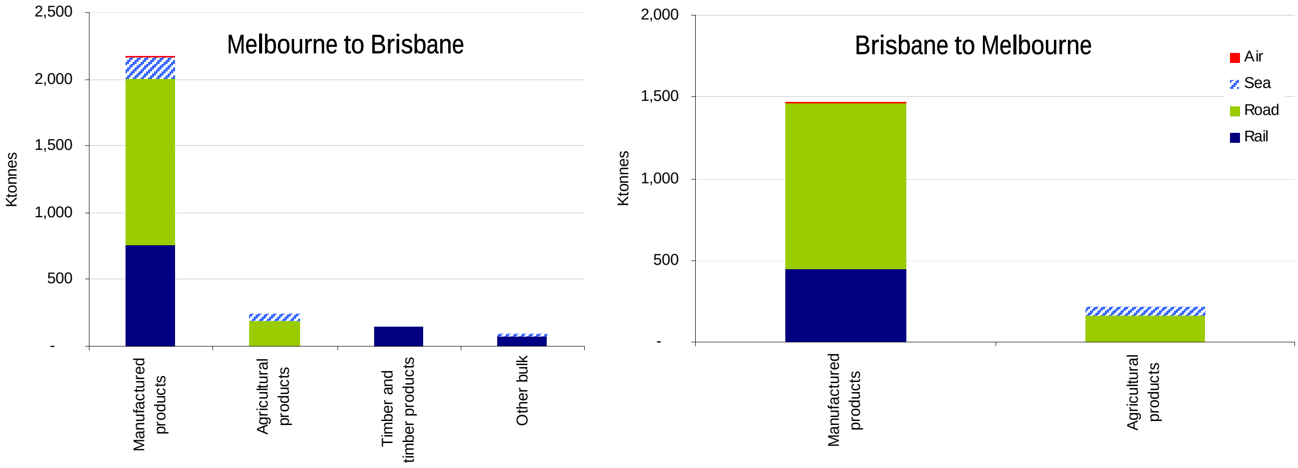
Results from the Study Team's surveys indicate that door-to-door rail prices are typically below road prices by up to 30% (though this can vary for 'cubic' or light freight). As the market is highly sensitive to road prices, rail services generally have to discount to between 10% and 20% to compensate customers for an inferior service quality.

Road services are clearly faster than either rail or sea services. Depending on truck driver arrangements (drivers may swap at a halfway point or sleep and wait to continue the leg in another truck), trucks can complete their door-to-door transit (as low as 21 hours) twice as quickly as door-to-door rail transits (42 hours). Road is also significantly more reliable than rail, although coastal shipping typically offers reliable though less frequent services. The large number of six-axle articulated semis and B-doubles (two semitrailers) compared to shipping vessels and trains mean road also offers a far more regular service than rail or sea.

The industry standard on the Melbourne-Brisbane route for journey time is evening departure and morning arrival two days later (or next day plus one). Road's transit time, however, allows it to offer 'next day' express delivery services on the Melbourne-Brisbane route at a premium price. Next day delivery also reduces the capital costs associated with finished goods in transit, another advantage for road over other modes. Despite being approximately 20% more expensive than rail in both directions, road's superior service enabled it to hold over 60% of the Melbourne-Brisbane freight market in 2004.

Poor reliability caused by Sydney's metropolitan network, limited passing loops and late train departures has hindered rail's reliability and therefore ability to obtain higher modal shares on the Melbourne-Brisbane route. Customer interviews also suggest that greater weight is placed on reliability on the Brisbane-Melbourne route than on other east coast routes due to higher emphasis on guaranteed service arrival as lead times are longer. As with other inter-capital city routes, customers demand rail services that arrive with sufficient time to deliver goods prior to the opening or closing of business (depending on receipt/dispatch patterns). It is understood that all time-slotted and express freight will be transported by road, generally at a premium rate.

Figure 11 - Freight by commodity and mode (tonnes) in 2004



Note: Timber and timber products and other bulk products are not of material size on the Brisbane to Melbourne leg and are therefore not included.

Source: FDF, BTRE, the Study Team's freight database

Figure 11 also shows the significantly larger volumes of manufactured and agricultural freight carried by road rather than rail. Road's ability to transport time-sensitive manufactured goods quickly and reliably with regular departures attracts a large proportion of this freight segment. Rail's low level of reliability and much longer door-to-door transit times mean it must price well below road prices to attract freight customers (those that are less time-sensitive). Based on the Study Team's interviews, roughly 65% of freight on the Melbourne-Brisbane route is sensitive to availability and reliability but roughly 90% to 95% is price-sensitive. Customers must make a trade-off between service quality and price.

6.3 Melbourne-Sydney route

The Melbourne-Sydney route is the shortest and busiest interstate route in the Corridor. At approximately 930 kilometres by rail and 900 kilometres by road, the route is easily covered by within one hour by air, 10 to 16 hours by land and 36 hours by sea. The short distance of the route naturally lends itself to road transport; and rail and sea are generally severely hampered by double-handling or PUD time and costs in Melbourne and Sydney. Chullora (PN) and Yennora (QR National) are the Sydney terminals train operators use to service the market. In Melbourne, they use South Dynon (PN) and Laverton North (QR National).

The effect of the inferior service and price offering from rail relative to road is shown by the modal shares of freight tonnage reported in Table 8.

Table 8 - Modal share (tonnes), Melbourne-Sydney route, 2004

Mode / Route	Melbourne-Sydney	Sydney-Melbourne	Both ways
Rail	9%	10%	9%
Road	89%	88%	89%
Sea	2%	1%	1%
Air	1%	1%	1%
Total	100%	100%	100%

Note: These estimates are derived from non-confidential data.
Note: All numbers rounded.

Source: FDF, BTRE, the Study Team's estimates.

The Study Team estimates that road dominated the 10.3 million tonne Melbourne-Sydney freight transport market in 2004, carrying 89% of total freight. Modelling indicates rail's modal share was only 9% and coastal shipping just 1%. The interviews conducted with stakeholders indicated that most freight carried by rail on this route was actually traffic transiting through Melbourne's rail and port terminals between Tasmania and Sydney. Despite having the capacity to shift large volumes of freight in short time periods – ideal for movements of products like steel, petroleum and bulk paper – rail and sea could not overcome the high service standards offered by road.

The high proportion (or ratio) of PUD time to total door-to-door transit time on the Melbourne-Sydney route means rail is not competitive or readily substitutable with road for time-sensitive freight. The freight surveys indicated that approximately 70% of freight on the route is sensitive to reliability and availability, 5% is express freight and 25% is less time-sensitive. As the PUD costs comprise nearly half the door-to-door rail costs on short-haul legs, total rail prices are on average roughly 5% above road prices on the Melbourne-Sydney route in both directions (though within this average there would be a portion of the market for which rail freight was cheaper).

The performance characteristics for road, rail (linehaul and door-to-door) and sea are shown in Table 9.

Table 9 - Service and relative price characteristics on the Melbourne-Sydney route, 2004

	Road	Sea	Linehaul rail	Door-to-door rail
Typical transit time	10-12 hours	1.5 days	15 hours	21 hours
Typical reliability	95%	90%	45-50%	45-50%
Typical availability	99%	10%	25%	25%
Typical capacity	20-40 tonnes	20-40,000 tonnes	1,500 tonnes	1,500 tonnes
Relative price	0-30% below door-to-door rail	20% below door-to-door rail	0-30% below road	0-30% above road

Note: All numbers are indicative. The combined PUD times from customers' freight origin and destination points to the rail terminals in each city are assumed to be six hours.

Data source: Shipping industry advice, the ARA Report compiled by Port Jackson Partners and the Study Team's freight survey.

The challenging commercial environment facing rail on short-haul routes is reflected in Table 9. Rail's low modal share can be attributed but not limited to:

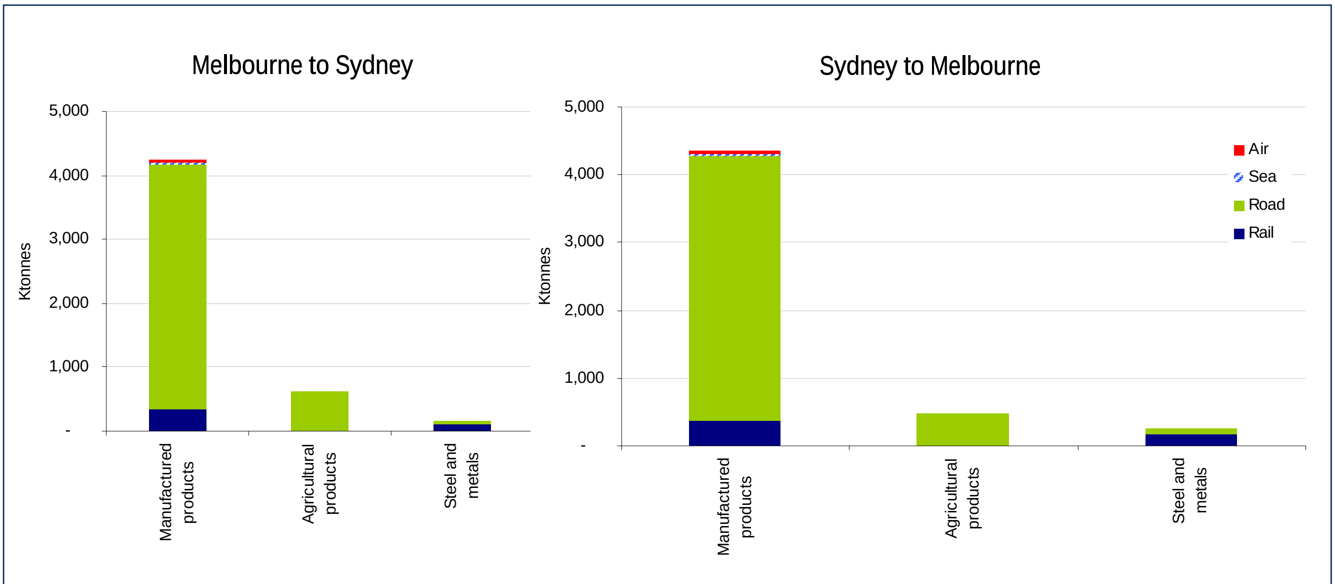
- Rail's door-to-door transit time being roughly twice as long;
- Rail services arriving late half the time;
- Rail not offering the same frequency and regularity of services per day (or continuity of services throughout the day) as road, or not enough services that leave during the evening after the close of business, as the trains would not arrive until lunchtime the day after (businesses prefer freight to arrive prior to opening for business each morning);
- Rail's door-to-door price being more expensive on average than road;
- The freight train curfews in Sydney during peak commuter train periods;
- Road being able to offer services at shorter notice; and
- A greater risk from a failure at a single point blocking the track, confirmed in some freight users' eyes by troubles in late 2005 on the Nullarbor route. There was also a perception by a small number of freight users that containers could be misplaced at terminals, or otherwise hard to track.

In interviewing freight users, they indicated that price is currently the main means by which rail can get business on this route, given the large amount of 'spot hire' capacity and high door-to-door service standards offered by road. In terms of journey times, overnight service is the road industry standard, although better times can be achieved for daytime 'express' services (express services comprise less than 5% of total tonnages). There is some demand (25%) for 'next day' services if price discount and capacity requirements can be met.

Service availability at short notice during afternoon and evening truck departure slots is high on the Melbourne-Sydney route due to large 'spot hire' capacity. A recent market development is linehaul slotted services within 30 minute arrival windows which are being serviced by trucks. However, the interviews indicated that most businesses are still reliant on receiving freight prior to business hours (between 7 am and 9 am).

Manufactured goods are the dominant commodity transported between Melbourne and Sydney, making up 90% of the total (see Figure 12). Manufactured goods tend to be more sensitive to time and reliability than bulk commodities or semi-processed products.

Figure 12 - Freight by commodity and mode (tonnes), 2004



Source: FDF, BTRE, the Study Team.

6.4 Sydney-Brisbane route

The Sydney-Brisbane route is 1,016 kilometres by rail and approximately 970 kilometres via the Pacific Highway. Chullora (PN) and Yennora (QR National) are the Sydney terminals train operators use to service the market and both operators use Acacia Ridge in Brisbane. Despite being a similar distance to the Melbourne-Sydney route, the terrain is more difficult and average speeds on this route are lower than on the Melbourne-Sydney route. This has the effect of allowing rail to be a little more competitive than on the Melbourne-Sydney route.

Given the lower average speeds, truck and train drivers would breach regulations governing industry safety (Chain of Responsibility legislation) if they drove continuously between Sydney and Brisbane. This makes it a challenging route for transport operators, according to the industry interviews by the Study Team.

Table 10 - Modal shares (tonnes) on the Sydney-Brisbane route, 2004 (excluding land bridging)

Mode / Route	Sydney-Brisbane	Brisbane-Sydney	Both ways
Rail	11%	11%	11%
Road	81%	72%	76%
Sea	7%	17%	12%
Air	1%	1%	1%
Total	100%	100%	100%

Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly overestimate the true volumes. These estimates are derived from non-confidential data. This data does not include land-bridging freight carried by rail. Including land-bridging would add 1%-2% to rail's mode share.

Note: All numbers rounded.

Source: FDF, BTRE, the Study Team.

Table 10 indicates that road attracted a far larger share of the total freight market than rail in 2004. Without the large PUD time and monetary costs associated with rail and sea, road transported 76% of freight volumes. By comparison, rail managed only 11% of total freight volumes. Coastal shipping transported 12% of total freight.

Table 11 shows that road's door-to-door transit time is half that of the equivalent rail transit time. Road is nearly twice as reliable as rail, and tailors its departure times to better meet the market's preferences. The table shows the parity between door-to-door road and rail prices on the Sydney-Brisbane route, despite linehaul rail prices being around 10% to 30% below road prices. The large proportion of PUD costs to total door-to-door rail costs places pressure on train operators' margins as the PUD costs limit the ability to price below road prices.

Table 11 - Service and relative price characteristics on the Sydney-Brisbane route, 2004

	Road	Sea	Linehaul rail	Door-to-door rail
Typical transit time	14 hours	1.5 days	22 hours	28 hours
Typical reliability	98%	90%	45%	45%
Typical availability	99%	10%	25%	25%
Typical capacity	20-40 tonnes	20-40,000 tonnes	1,500 tonnes	1,500 tonnes
Relative price	0-20% below door-to-door rail	30-50% below door-to-door rail	10-30% below road	0-20% above road

Note: The combined PUD times from customers' freight origin and destination points to the rail terminals in each city are assumed to be six hours.

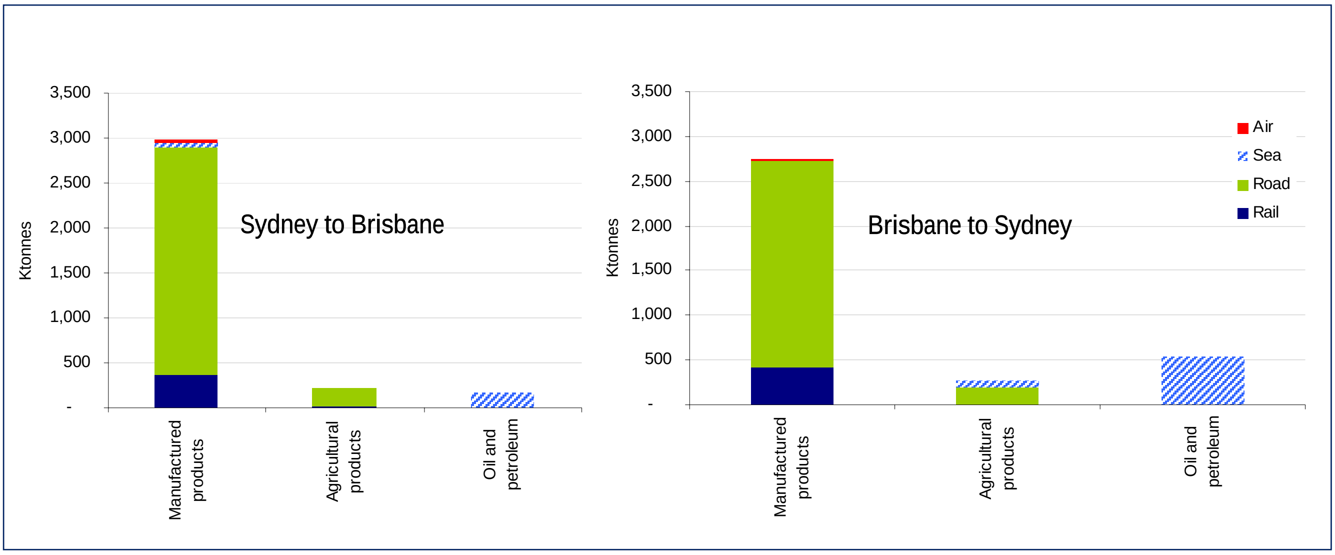
Source: Shipping industry experts, the ARA Report compiled by Port Jackson Partners and the Study Team's freight survey.

Trucks' transit time of 14 hours enables a late afternoon or early evening departure (depending on the origin and destination positions in each city) for arrival around the beginning of the working day. Rail's 28-hour door-to-door transit time means it cannot tailor a next day service that arrives prior to businesses beginning daily operations. This places it at a disadvantage.

Manufactured goods and petroleum products are virtually the only two commodities transported between Sydney and Brisbane. Seventy-five per cent of these manufactured products are estimated to be time-sensitive. Road's ability to serve manufactured product customers better than rival modes means it controls a large proportion of freight on the route. Coastal shipping's ability to move large capacities in predictable periods of time gives it a comparative cost and logistical advantage over land when transporting large quantities of bulk commodities. Consequently, coastal shipping transported all petroleum products between Sydney and Brisbane in 2004.

The breakdown of commodities transported between Sydney and Brisbane is shown in Figure 13.

Figure 13 - Freight by commodity and mode (tonnes), 2004



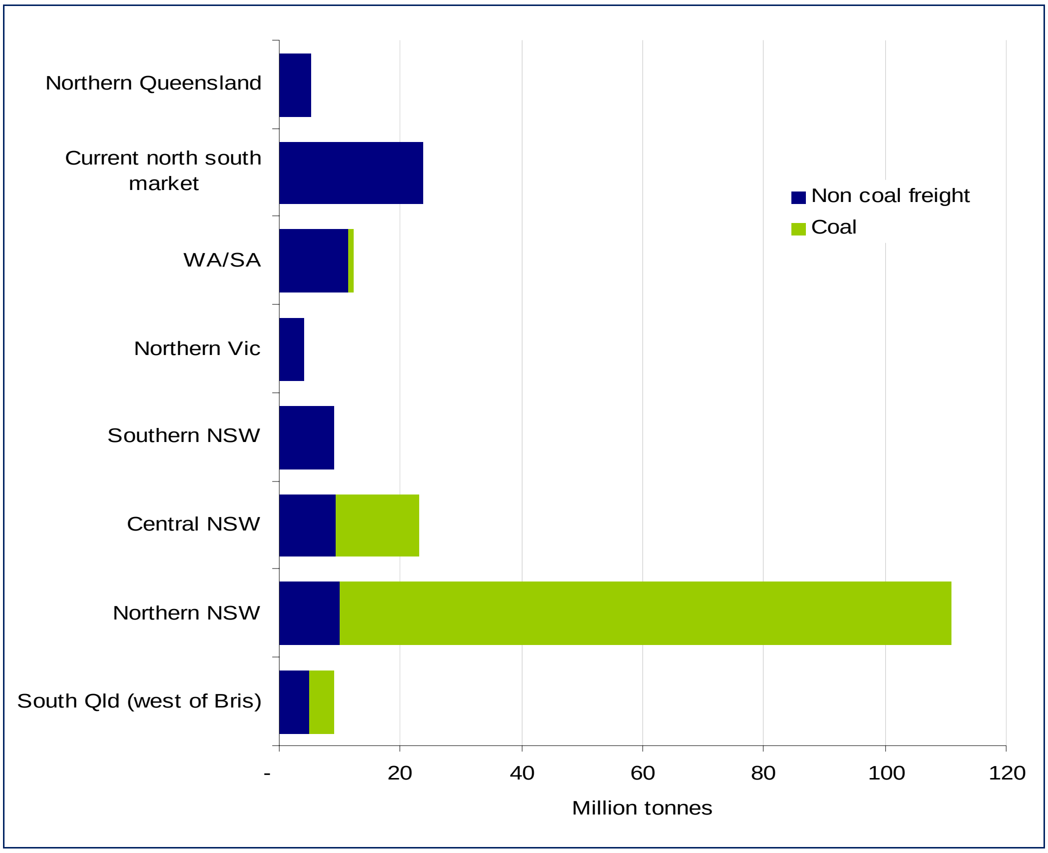
Source: FDF, BTRE, the Study Team.

6.5 Regional freight movements within the North-South Rail Corridor

The Study Team used seven distinct geographic regions to analyse regional freight movements. This regional grouping includes freight from Western Australia, South Australia and north Queensland that travels on routes using rail and road infrastructure in the Corridor (for example, Perth to Brisbane freight that arrives at Parkes or Sydney before heading north to Brisbane) and intermediate points in coastal regions (for example, Newcastle to Brisbane or Albury to Sydney). Each region comprises numerous OD pairs to other regional areas, although most significant OD pairs from regional areas are to export terminals in capital cities.

Figure 14 shows the relative sizes of the freight tasks from various geographic regions important to this Study. Coal traffic from the Hunter Valley and central New South Wales dominates the other commodities within the regional freight task. As shown in Figure 14, 120 million tonnes or 55% of the 220 million tonnes of freight transported in the Corridor in 2004 was coal. (However, much of the coal traffic is of secondary interest in the context of this Study, with relatively limited movement on north-south sections as opposed to the main Hunter Valley line).

Figure 14 - Regional freight movements within and into the North-South Rail Corridor, 2004



Source: FDF FreightInfo, BTRE, the Study Team.

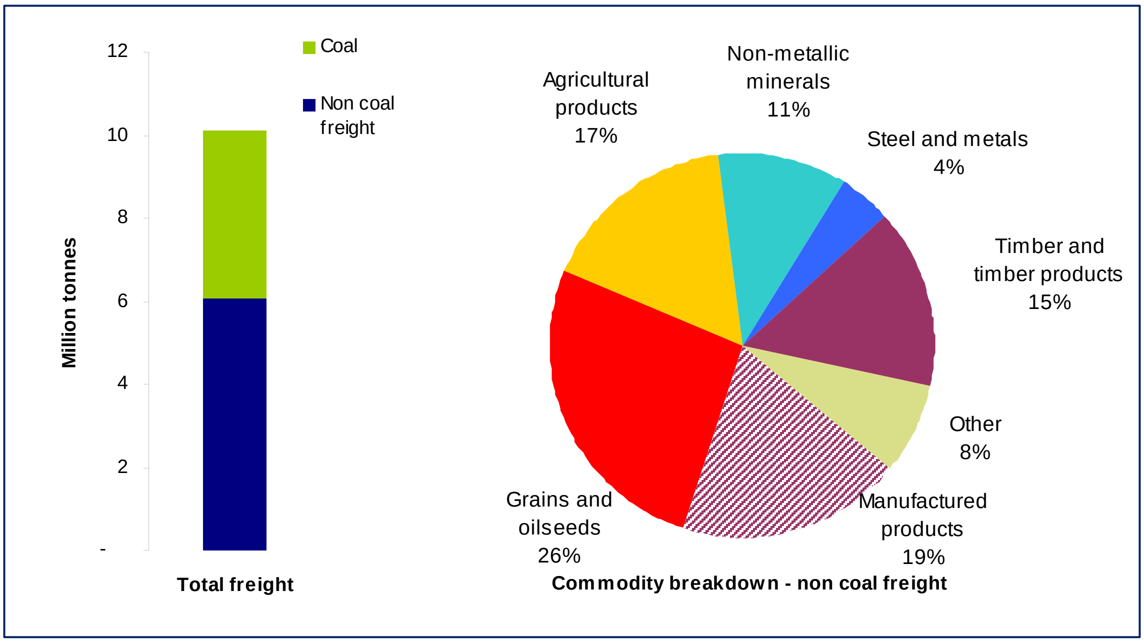
Freight moving between regions along the Coastal Route provided the largest quantity of non-coal regional freight in 2004, with just under 24 million tonnes (just over the total Melbourne, Sydney and Brisbane freight task). Freight flows either originating or ending in Western Australian and South Australia to/from Brisbane and New South Wales locations (for instance, Sydney to Adelaide train services travel via Melbourne) totalled 12 million tonnes in 2004.

Non-coal freight from northern and central New South Wales was estimated at 10.1 million and 9.5 million tonnes respectively in 2004. The southern New South Wales freight task was estimated at 9.2 million tonnes in 2004 and northern Victoria's freight task was estimated to be 4 million tonnes. Non-coal freight from south Queensland was estimated at 6 million tonnes. If coal was included, southeast Queensland freight totalled 10 million tonnes.

6.5.1 Southeast Queensland

Figure 15 shows that total freight from the area of south Queensland west of Brisbane was estimated at 10 million tonnes in 2004. Approximately 4 million tonnes of coal was transported from the Surat Basin (approximately 250 kilometres to the west of Brisbane) to the Port of Brisbane for export, of which 99% was estimated to have been moved by rail.

Figure 15 - Regional freight movements, southeast Queensland, (left) and breakdown of non-coal freight by commodity (right) 2004



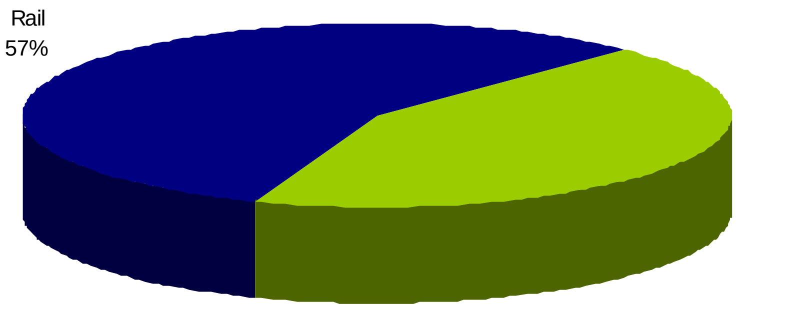
Source: FDF FreightInfo, BTRE, the Study Team.

Of the remaining freight task from southeast Queensland, grains and oilseeds comprised approximately 1.6 million tonnes. Roughly 70% of grain freight from southeast Queensland was estimated to have been transported to the Port of Brisbane by rail, with the remaining 30% of grain transported from Toowoomba to Brisbane by road in 2004. Rail is limited by the constrained infrastructure in the hilly area near Toowoomba. Other important freight quantities transported in this region include agricultural products (1 million tonnes), non-metallic minerals (650,000 tonnes) and timber and timber products (900,000 tonnes).

Nearly all freight from southeast Queensland is transported to Brisbane and is predominantly for export. Small amounts of bulk commodities and minerals were transported to the Newcastle and Hunter region. Low levels of manufactured freight were estimated to move from Brisbane towards the southwest of Queensland in 2004.

Figure 16 shows the mode split of all freight in the southeast Queensland region.

Figure 16 - Modal shares of freight in southeast Queensland



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF *FreightInfo*, BTRE, the Study Team.

6.5.2 Northern New South Wales

Of all the regional freight areas, future freight flows from northern New South Wales are likely to be subject to the greatest change in response to new rail infrastructure route options. There is potential for extensive diversion of export grain and agricultural goods from existing road and rail routes to Newcastle towards Brisbane. This, and the possibility of coal from an area being explored near Inverell, is addressed in chapter 4: ***Demand Analysis***.

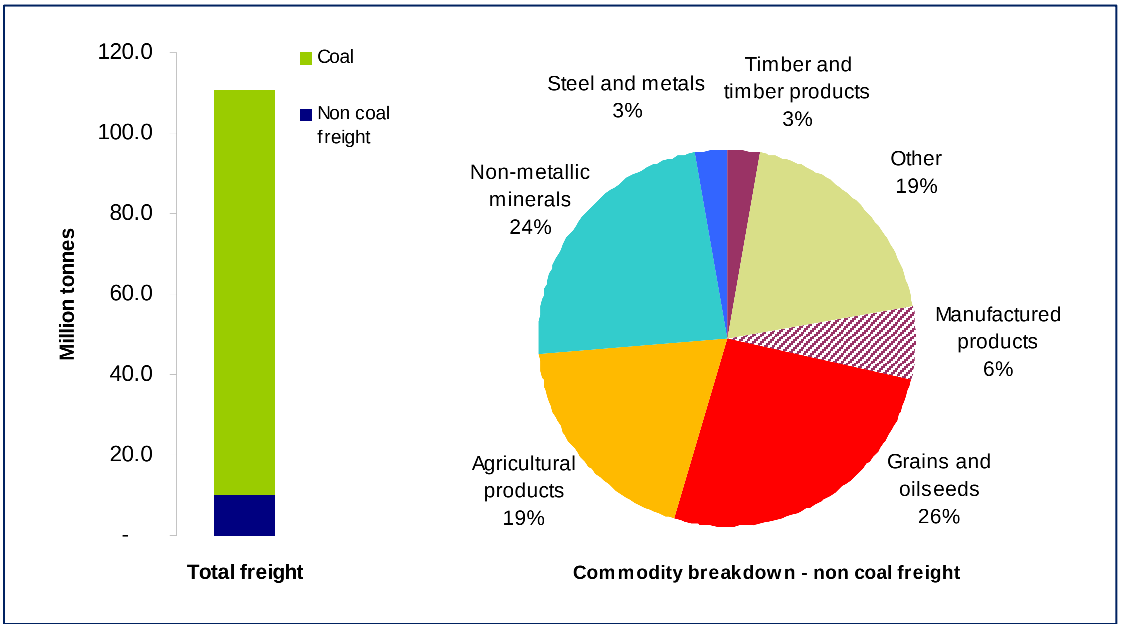
Rail and road engage in strong competition for the export freight task from northern New South Wales to Newcastle and Sydney ports. The large number of trucks moving through the region on the Newell Highway enables road to provide strong competition to rail services, despite the significant distances to New South Wales ports. It is estimated that rail carries approximately 80% of grain while road carries virtually all minerals and approximately 80% of other agricultural products.

Pacific National, Patrick Portlink and independent train operators (South Spur Rail and Lachlan Valley Rail Freight) run agricultural and bulk trains in northern New South Wales to service freight volumes. The region is serviced by train from the following intermodal terminals:

- Narrabri (dedicated user);
- Moree (multi-user – largely seasonal); and
- Wee Waa (near Narrabri – dedicated user).

Figure 17 shows current freight movements in northern New South Wales to be dominated by export coal from the Hunter and Upper Hunter Valley. Market estimates put 2004 coal volumes at approximately 100 million tonnes.[7]

Figure 17 - Regional freight movements, northern NSW, (left) and breakdown of non-coal freight by commodity (right), 2004



Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF *FreightInfo*, BTRE, the Study Team.

The size of the non-coal freight task in inland northern New South Wales was estimated at 10.1 million tonnes in 2004. The non-coal freight task largely comprised:

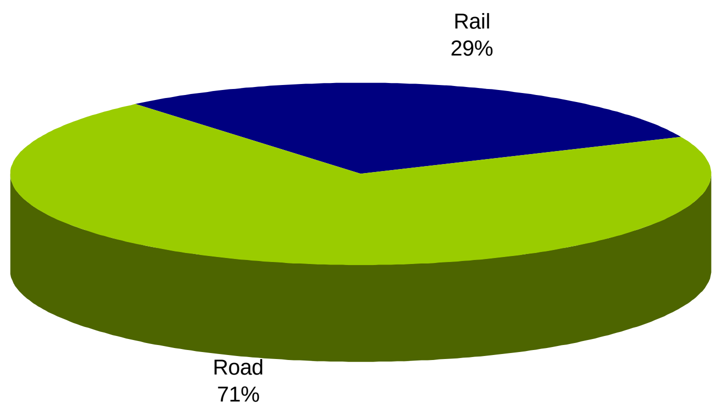
- Non-metallic minerals from the Hunter Valley – 24% of the total freight task or 2.4 million tonnes;
- Grains and oilseeds – 26% of the total freight task or 2.6 million tonnes; and
- Agricultural products (for example, cotton from the Narrabri/Moree area) – 19% of the total freight task or 2 million tonnes.

Freight volumes originating around centres such as Narrabri and Moree are far larger than freight volumes heading back to the region. It is typical that grain trains and trains hauling shipping containers will return from port calls with little or no payload freight (for example, less than a quarter of the freight heading from the region).

[7] Australian Coal Association. Source: http://www.australiancoal.com.au/ports.htm

Figure 18 shows the mode split of freight in the northern New South Wales region.

Figure 18 - Modal shares of freight in northern New South Wales



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF *FreightInfo*, BTRE, the Study Team.

6.5.3 Central New South Wales

More than half the freight task to and from central New South Wales is dedicated to rail coal traffic from the Central Tablelands to Sydney and Port Kembla. Approximately 14 million tonnes of coal was estimated to have been transported from the Central Tablelands in 2004.

Competition from road carriers is extremely strong through centres such as Dubbo, Bathurst, Parkes, Blayney and Orange as they are well served by interstate highways. The proximity of these centres to Sydney of roughly three to five hours provides road and rail operators with opportunities to offer competitive services to freight customers. Road is estimated to transport 68% of the total freight task and rail just under 32% of the total freight task (see Figure 20).

Pacific National, Patrick Portlink and an independent train operator run agricultural and bulk trains to service the central New South Wales freight task. The region is serviced by train from the following intermodal terminals:

- Forbes (multi-user – largely seasonal);
- Parkes (multi-user – transhipment hub);
- Dubbo (multi-user);
- Warren (near Dubbo – dedicated user, largely seasonal);
- Blayney (near Bathurst – multi-user, off proposed routes);

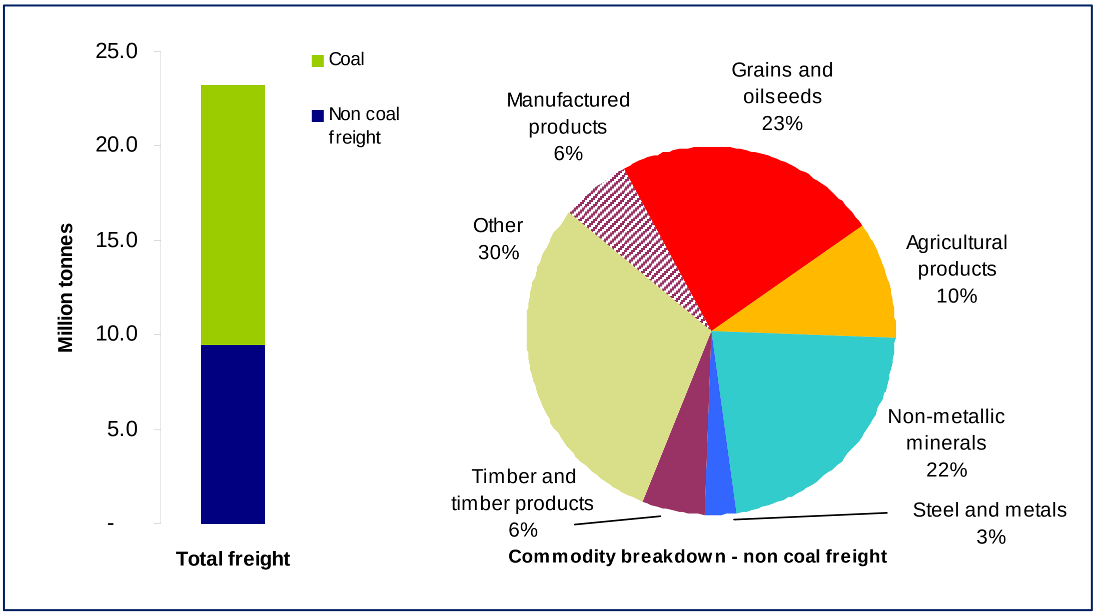
- Manildra (near Orange – dedicated user, off proposed routes); and
- Bathurst (not yet constructed).

The high density of intermodal terminals through central New South Wales enables rail services to be within 40 kilometres of a high proportion of freight volumes' origin points. This close proximity to freight minimises the PUD costs and typically enables rail to offer more competitive prices than door-to-door road services.

The size of the non-coal freight task in central New South Wales was estimated to be 9.5 million tonnes in 2004. Figure 19, below, shows that the non-coal freight task largely comprised:

- Non-metallic minerals from the Central Highlands – 22% of the total freight task or 2.1 million tonnes;
- Grains and oilseeds – 23% of the total freight task or 2.1 million tonnes;
- Agricultural products – 10% of the total freight task or 1 million tonnes; and
- Timber and manufactured goods – both holding approximately 6% of the total freight task or 543,000 and 571,000 tonnes respectively.

Figure 19 - Regional freight movements, central New South Wales, (left) and breakdown of non-coal freight by commodity (right), 2004

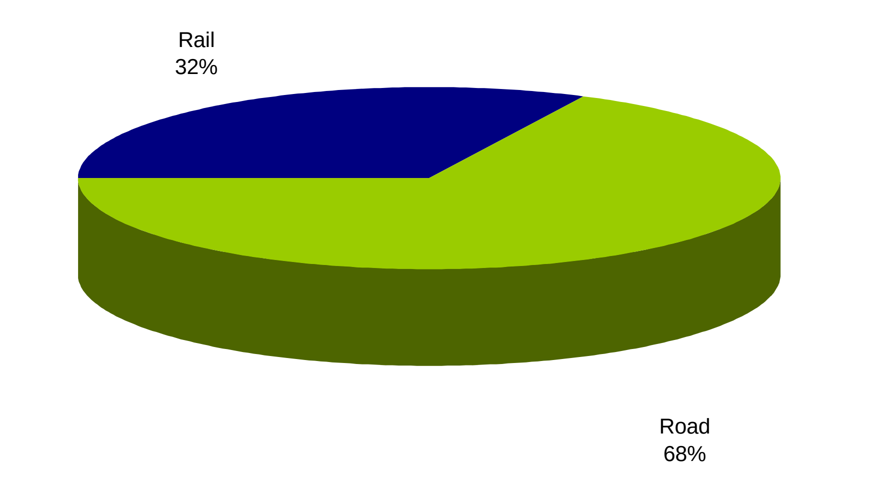


Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF *FreightInfo*, BTRE, the Study Team.

Figure 20 shows the mode split of freight in the central New South Wales region.

Figure 20 - Modal shares of freight in central New South Wales



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF *FreightInfo*, BTRE, the Study Team.

6.5.4 Southern New South Wales

The freight task from the Riverina and southern New South Wales is a growing market, predominantly of grain and other agricultural products. Export freight from southern New South Wales is served by two ports of relatively equal proximity: Port Kembla and the Port of Melbourne[8]. Deregulation of rail networks during the 1990s enabled Victorian-based train operators to begin operations into southern New South Wales and the Riverina, which diverted some of the export freight volumes from Port Kembla to the Port of Melbourne.

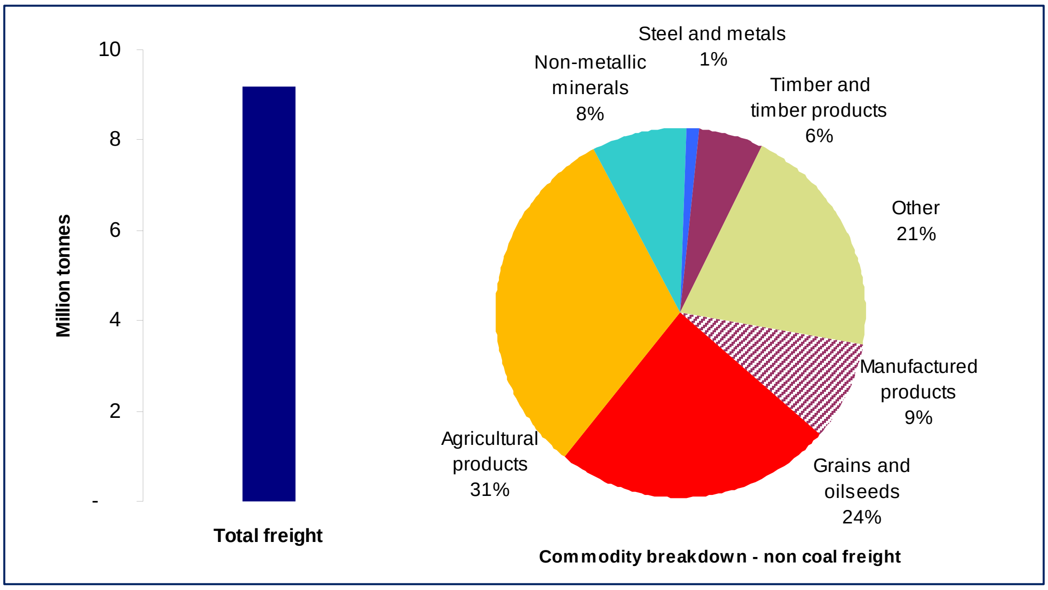
The area around Griffith is served less well by road transport than other regions in New South Wales as there is no prominent interstate highway in the region. Thus the price competition from road is not as intense and freight is less price-sensitive than northern or central New South Wales.

Figure 21 shows that the size of the freight task in southern New South Wales was estimated at just over 9 million tonnes in 2004. The freight task largely comprised:

- Agricultural products such as wine, rice and fresh produce – 31% of the total freight task or 2.9 million tonnes;
- Grains and oilseeds – 24% of the total freight task or 2.2 million tonnes; and
- Non-metallic minerals and manufactured goods –holding 8% and 9% respectivelyof the total freight task or approximately 800,000 tonnes each.

[8] Port Botany has not received export freight by rail services from southern New South Wales since 2003-2004.

Figure 21 - Regional freight movements, southern New South Wales, (left) and breakdown of non-coal freight by commodity (right), 2004



Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF *FreightInfo*, BTRE, the Study Team.

The two predominant rail operators servicing the Riverina and southern New South Wales are Pacific National and Patrick Portlink. The region is serviced by train from the following intermodal terminals:

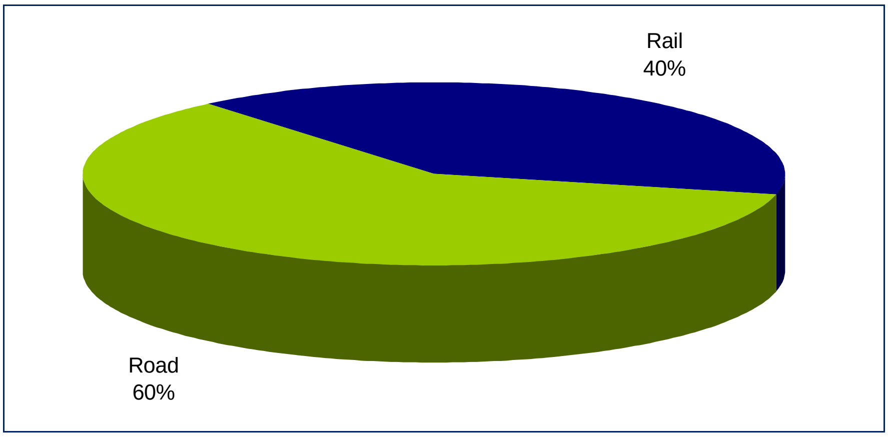
- Wagga Wagga (dedicated user);
- Cootamundra (multi-user – largely seasonal);
- Griffith (multi-user);
- Junee (dedicated-user); and
- Albury (multi-user).

There are regions in southern New South Wales without close access (within 40 kilometres) to rail terminals while other areas are well serviced by intermodal terminals. One stakeholder interviewed for the Study estimated that rail infrastructure does not currently serve grain volumes of 750,000 tonnes in southern New South Wales between Narrandera and the Murray River. Truck services tend to dominate in this area of southern New South Wales where rail infrastructure does not extend to within 40 kilometres of terminals.

It is estimated that rail had approximately 43% of the freight task to and from Port Kembla and Sydney and 38% of the freight task between southern New South Wales and Melbourne and Geelong in 2004. Interestingly, rail had 48% and 50% of freight from southern NSW to NSW (Wollongong/Port Kembla and Sydney) and Victorian (Geelong and Melbourne) cities respectively but only 13% and 0% respectively of the freight from the cities to southern NSW.

Figure 22 shows the mode split of freight in the southern New South Wales region.

Figure 22 - Modal shares of freight in southern New South Wales



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF *FreightInfo*, BTRE, the Study Team.

6.5.5 Northern Victoria

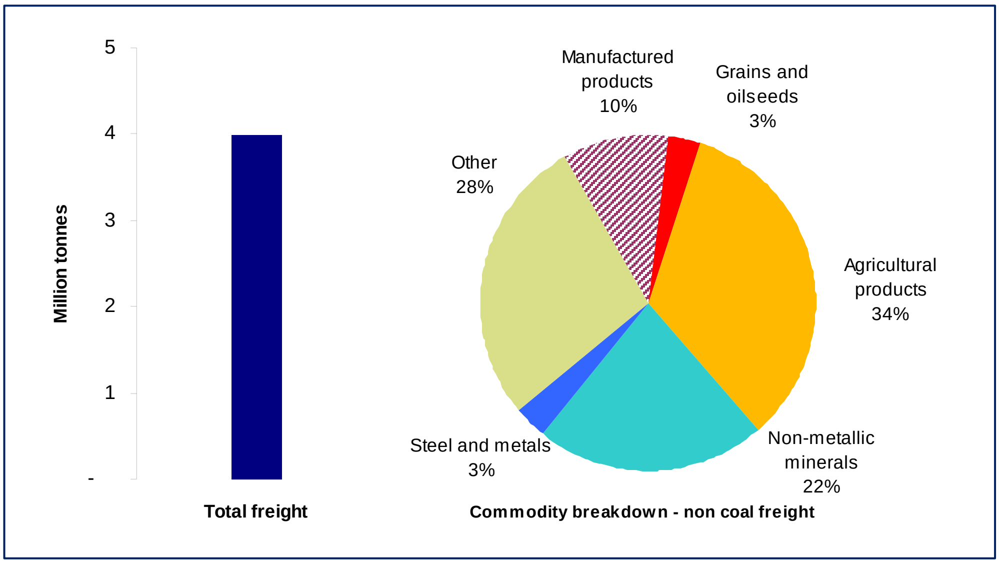
The northern Victorian freight task was 4 million tonnes in 2004. The proximity of Shepparton, the Goulburn Valley and Wodonga to interstate highways and the relatively short distance to Melbourne provided difficult operating conditions for rail operators. However, the ability to offer large capacity transport services at competitive prices provided rail with niche markets in northern Victoria.

Pacific National and Patrick Portlink jointly service northern Victoria. The region is serviced by train from the following intermodal terminals:

- Shepparton (Patrick's dedicated user facility based in Mooroopna);
- Shepparton (proposed new multi-user);
- Wodonga (multi-user); and
- Tocumwal (Pacific National's dedicated-user terminal).

The predominant commodity is canned fruit (agricultural products) sourced from the SPC/Ardmona facility in Shepparton (see Figure 23). Other commodities moving from the site include rice from southern New South Wales and goods from the Kraft facility at Strathmerton. Grains and agricultural products from Tocumwal are of similar size to the volumes shifted by rail from the Shepparton terminal.

Figure 23 - Regional freight movements, northern Victoria, (left) and breakdown of non-coal freight by commodity (right), 2004

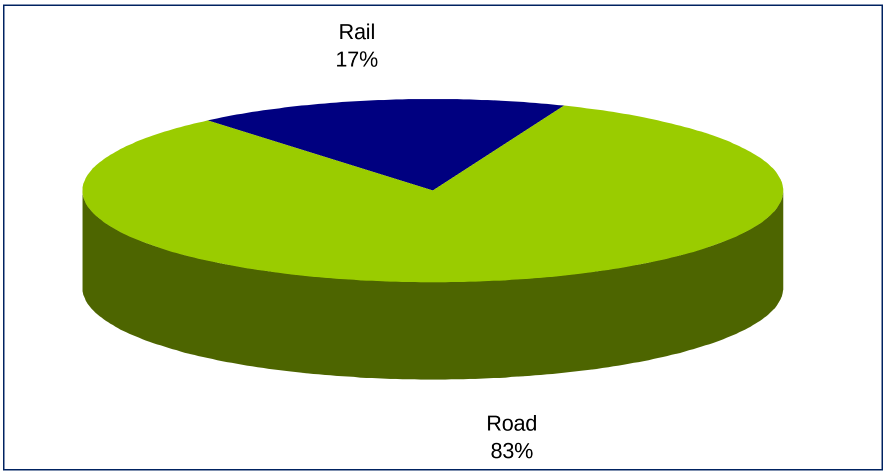


Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF FreightInfo, BTRE, the Study Team.

Figure 24 shows the modal share of freight in the northern Victoria region. Given the relatively short distances to Melbourne from main regional centres, road transport dominates the freight movements to and from northern Victoria to Melbourne.

Figure 24 - Modal shares of regional freight in northern Victoria



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF FreightInfo, BTRE, the Study Team.

6.5.6 Coastal regions in the North-South Rail Corridor

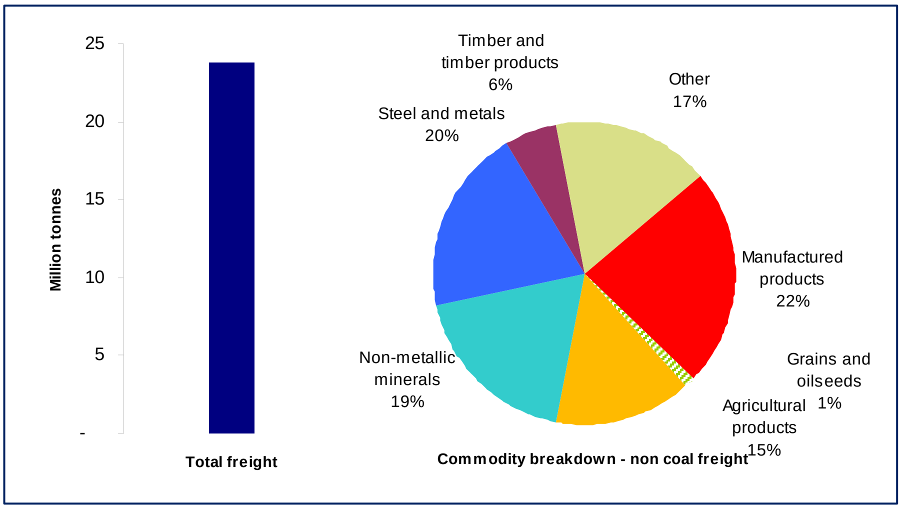
The volume of freight moving between coastal regions and cities in the Corridor (other than inter-capital) was estimated at nearly 24 million tonnes in 2004. This is slightly greater than inter-capital freight flows between Melbourne-Sydney-Brisbane. The main commodities are manufactured goods, steel, non-metallic minerals and agricultural products. For some of this freight the distances travelled are relatively short.

Coastal regions and large cities are well serviced by the interstate highway network, which provides road with the ability to service a high proportion of this freight task. Apart from steel products, rail is unable to offer competitive door-to-door service between coastal regions. Rail only attracted another 400,000 tonnes to its services in 2004, consisting of 250,000 tonnes of manufactured goods and some grain freight.

Coastal shipping's large capacity allows it to move large quantities of freight over predictable timeframes at low unit costs. This allows sea to shift an estimated 4 million tonnes in 2004 between coastal regions. Coastal shipping mainly transported less time-sensitive products with long lead times such as:

- Steel – 1.3 million tonnes;
- Oil and petroleum products – 500,000 tonnes;
- Metallic minerals – 1.2 million tonnes; and
- Agricultural products – 600,000 tonnes.

Figure 25 - Coastal non-capital city freight movements, existing Corridor (left) and breakdown of non-coal freight by commodity (right), 2004



Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF *FreightInfo*, BTRE, the Study Team.

Road carried an estimated 18 million tonnes of freight between coastal regions in the Corridor, including large quantities of:

- Manufactured goods – 5 million tonnes;
- Agricultural products – 2.9 million tonnes;
- Non-metallic minerals – 4.3 million tonnes (largely between Brisbane/Gold Coast and Richmond-Tweed Heads); and
- Steel – 1.8 million tonnes.

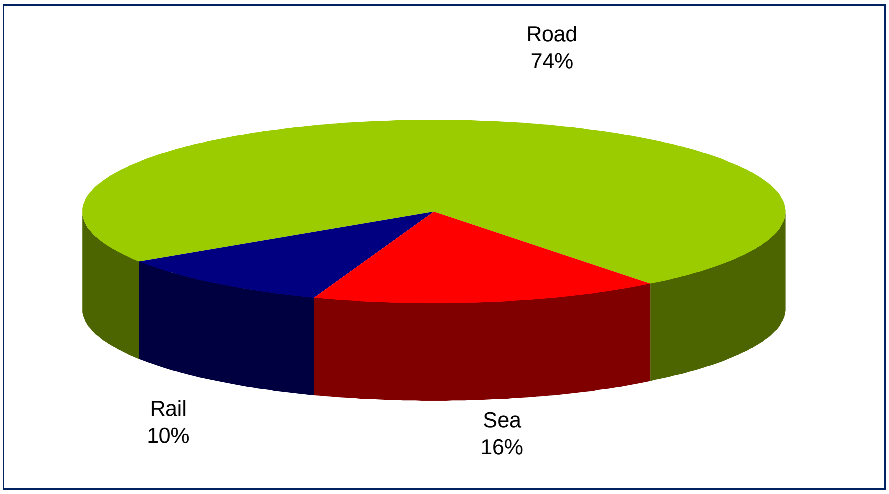
The superior flexibility, shorter transit distances, door-to-door services (for example, no PUD time delays or monetary costs) and higher reliability of road over what are often relatively short distances enable it to service most freight types more effectively than either rail or coastal shipping services.

Examples of freight movements in this category include:

- Steel from Port Kembla to Brisbane;
- Manufactured goods from Melbourne to Albury and Sydney to Coffs Harbour; and
- Mineral sands from Brisbane to Richmond-Tweed Heads.

Figure 26 shows the mode split of coastal regional freight on the existing Corridor.

Figure 26 - Modal shares of coastal regional freight on the existing Corridor



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF *FreightInfo*, BTRE, the Study Team.

6.6 Freight from Western Australia and South Australia

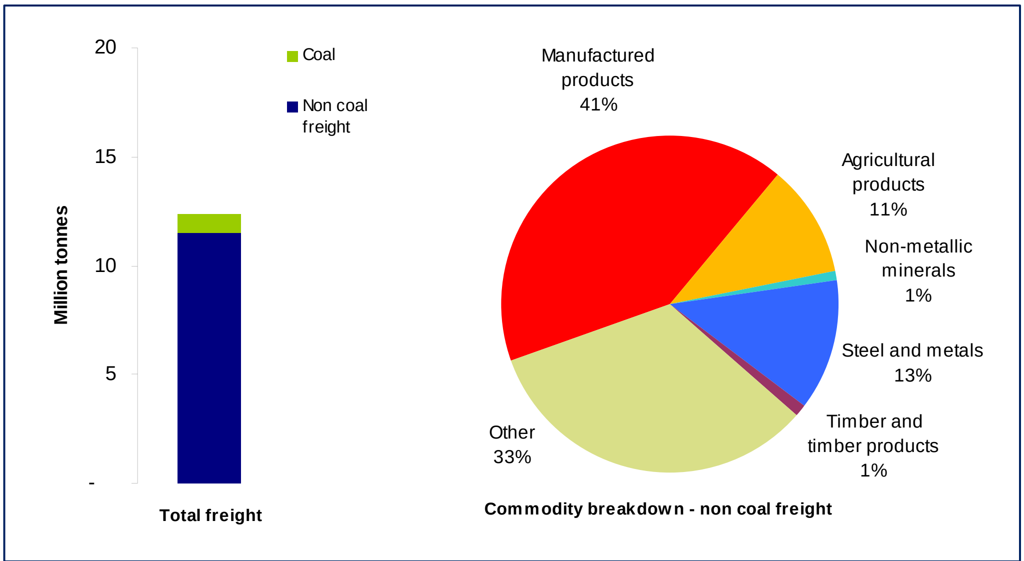
Freight moving between Western Australia and South Australia are relevant to the Corridor as it travels on routes using rail and road infrastructure in the Corridor. Examples of such freight movements are Perth to Brisbane (which arrives from Perth by rail in Melbourne, Parkes or Sydney before heading to Brisbane within the Corridor) or traffic from Sydney to Adelaide (using train services that travel via Melbourne and rail infrastructure between Sydney and Melbourne).

Freight flows between Western Australia, South Australia, Queensland and New South Wales totalled 12 million tonnes in 2004. Coal freight accounted for 7% or 890,000 tonnes (which is shipped by sea from Sydney to Whyalla).

Figure 27 shows estimates of the non-coal freight task, comprising:

- Manufactured goods – 41% of the total freight task or 4.8 million tonnes;
- Steel products – 13% of the total freight task or 1.4 million tonnes; and
- Agricultural products – 11% of the total freight task or 1.3 million tonnes.

Figure 27 - Regional freight movements from Western Australia and South Australia, (left) and breakdown of non-coal freight by commodity (right), 2004



Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF *FreightInfo*, BTRE, the Study Team.

The extremely long distance of some OD pairs within this regional segment diminishes the price and service competitiveness of road but increases the ability of coastal shipping to compete for freight volumes. For example, sea serviced roughly 50% of the freight task between Perth and Brisbane. The impending introduction of new coastal shipping services between Fremantle, Melbourne, Sydney and Brisbane indicates the viability and competitiveness of sea for distances of around 3,000 kilometres and above.

The lack of more direct rail options between Perth and Adelaide to Brisbane mean rail has to travel through Sydney. This not only slows the transit time, it also makes the arrival time subject to greater unreliability because of network congestion and freight train curfews. Thus door-to-door road services were estimated to have a higher modal share than rail on these routes.

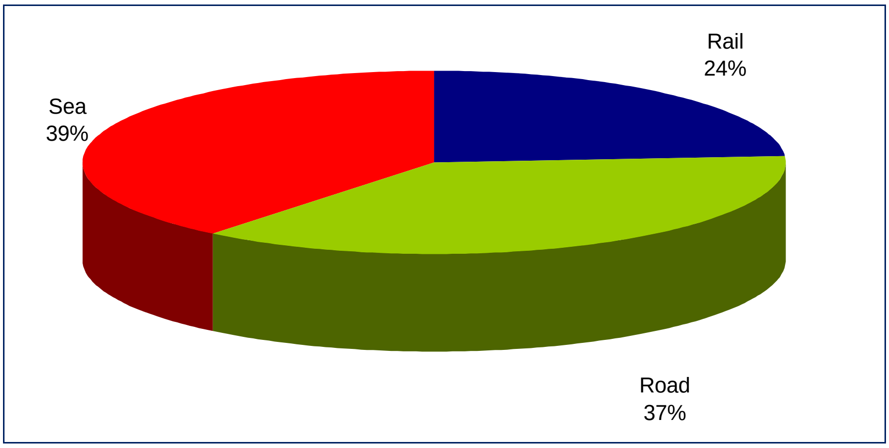
The initial estimates of modal share breakdowns for regional (as distinct from inter-capital) east-west traffic entering or exiting the Corridor are:

- Rail - 24%;
- Road - 37%; and
- Coastal shipping - 39%.

These shares vary significantly to those modal shares observed between Melbourne and Perth and Sydney and Perth, where rail services roughly 80% of land freight volumes.

Figure 28 shows estimates of modal shares of regional freight to and from Western Australia and South Australia and the Corridor.

Figure 28 - Modal shares of regional freight to and from Western Australia and South Australia and the Corridor



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

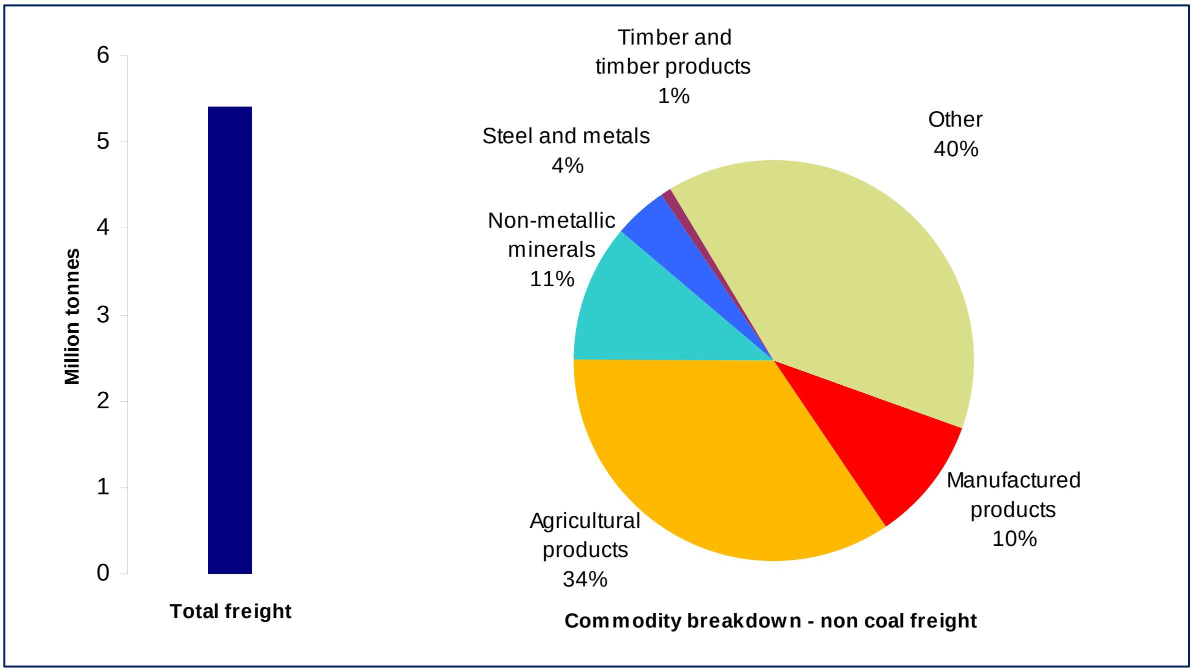
Source: FDF *FreightInfo,* BTRE, the Study Team.

6.7 Freight to and from northern Queensland

Figure 29 shows estimated freight volumes of 5.3 million tonnes to and from the Corridor and regional north Queensland in 2004. A large proportion of freight from northern Queensland comprised agricultural products such as bananas and sugar. Retail products from Sydney and Melbourne are the main items heading north of Brisbane to the Sunshine Coast, Rockhampton, Townsville and Cairns.

Most industrial traffic heading north from Melbourne and Sydney terminates at Brisbane but a higher proportion of retail-type freight continues north. When freight arrives in Brisbane from Melbourne or Sydney, most retail freight customers typically transfer the freight from truck or train terminals to their distribution centres. They consolidate their consignments before sending the freight onwards to north Queensland.

Figure 29 - Regional freight movements to and from northern Queensland, (left) and breakdown of non-coal freight by commodity (right), 2004

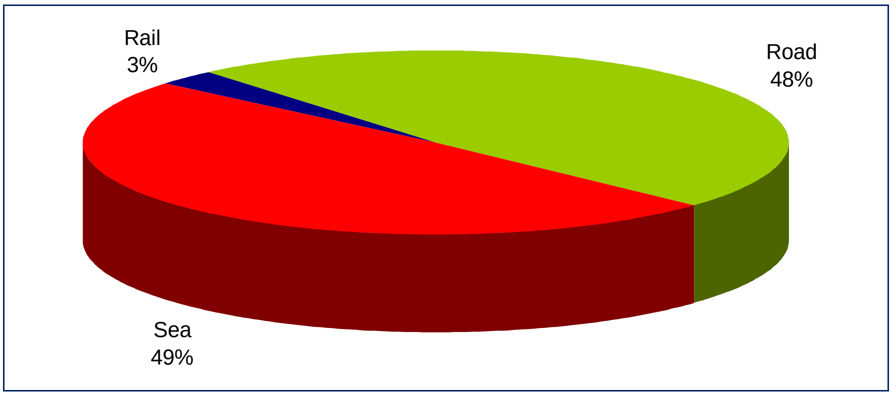


Note: "Other" includes meat, sheep, cattle, metallic minerals,gas, fertilisers, cement, oil and petroleum

Source: FDF *FreightInfo,* BTRE, the Study Team.

Figure 30 shows estimates of modal shares of regional freight to and from northern Queensland and the Corridor.

Figure 30 - Modal shares of regional freight to and from northern Queensland and the Corridor



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: FDF *FreightInfo,* BTRE, the Study Team.

Road and sea provide services for the overwhelming majority of north Queensland services. Rail carried just 3% of the freight task, an unusually low number given the long distances between most OD pairs to and from north Queensland. This is in stark contrast to the long-haul east-west routes where rail carried around 80% of the land freight task.

The main reasons for rail's low market share on routes which appear to suit its service characteristics include:

- Seamless rail services between southern capital cities and northern Queensland are in their infancy. It may take some time for rail operators to tailor their services to best suit the market. Customers may also take some time to shift freight to direct rail services to/from north Queensland as:
  - QR only operated rail services to and from northern Queensland centres to Brisbane prior to 2003-04 (QR National began interstate services in 2003/04); and
  - PN and Toll QRX only commenced coordinated operations to/from Melbourne and Sydney to northern Queensland in 2005.
- Freight on rail services needs to be transferred to/from trains in Brisbane as the infrastructure north of the city is narrow gauge, unlike the standard gauge network to the south of Brisbane; and
- Coastal shipping has a stronger presence in Queensland.

6.8 Summary and discussion

The main points emerging from the estimated freight flow volumes for 2004 in the Corridor are as follows:

- The total freight volume for the Corridor (inter-capital and related regional) in 2004 was estimated at 220 million tonnes;
- Approximately 22 million tonnes of this freight travelled between Melbourne, Sydney and Brisbane;
- The main types of freight in the Corridor in order of importance by tonnes are:
  - coal;
  - manufactured goods;
  - agricultural products;
  - steel; and
  - grain.
- The inter-capital city freight task between Melbourne, Sydney and Brisbane is equivalent to 10% of total freight movements and 30% of total non-coal freight movements;
- Coastal freight flows to and from intermediate points in the Corridor (or non-capital city freight) formed nearly 24 million tonnes of the overall freight task in 2004; and
- Coal comprised 120 million tonnes or 55% of the total freight task (but is of only secondary interest when considering Corridor options).

Table 12 shows the breakdown of freight flows estimated by the Study Team for 2004.

Table 12 - North-South Rail Corridor freight (millions of tonnes), 2004

Region/ commodity	Manufactured products	Grains and oilseeds	Agricultural products	Non-metallic minerals	Steel and metals	Timber and timber products	Coal	Other commodities	Total (all commodities)
Southeast QLD (west of Brisbane)	1.1	1.6	1.0	0.7	0.3	0.9	4.1	0.3	10.0
Northern NSW	0.6	2.6	1.9	2.4	0.3	0.3	100.8	1.9	110.8
Central NSW	0.6	2.2	1.0	2.1	0.2	0.5	13.8	2.8	23.2
Southern NSW	0.8	2.2	2.9	0.8	0.1	0.5	0.0	1.9	9.2
Northern VIC	0.4	0.1	1.4	0.9	0.1	0.0	0.0	1.1	4.0
WA/SA	4.8	0.0	1.3	0.1	1.4	0.1	0.9	3.8	12.4
Northern Queensland	0.5	0.0	1.9	0.6	0.2	0.0	0.0	2.2	5.4
Coastal	5.5	0.3	3.5	4.4	4.7	1.3	0.0	4.0	23.7
Inter-capital	18.0	0.1	2.0	0.0	0.5	0.2	0.0	1.1	21.9
Total	**32.3**	**9.1**	**16.8**	**11.9**	**7.9**	**3.9**	**119.5**	**19.1**	**220.8**

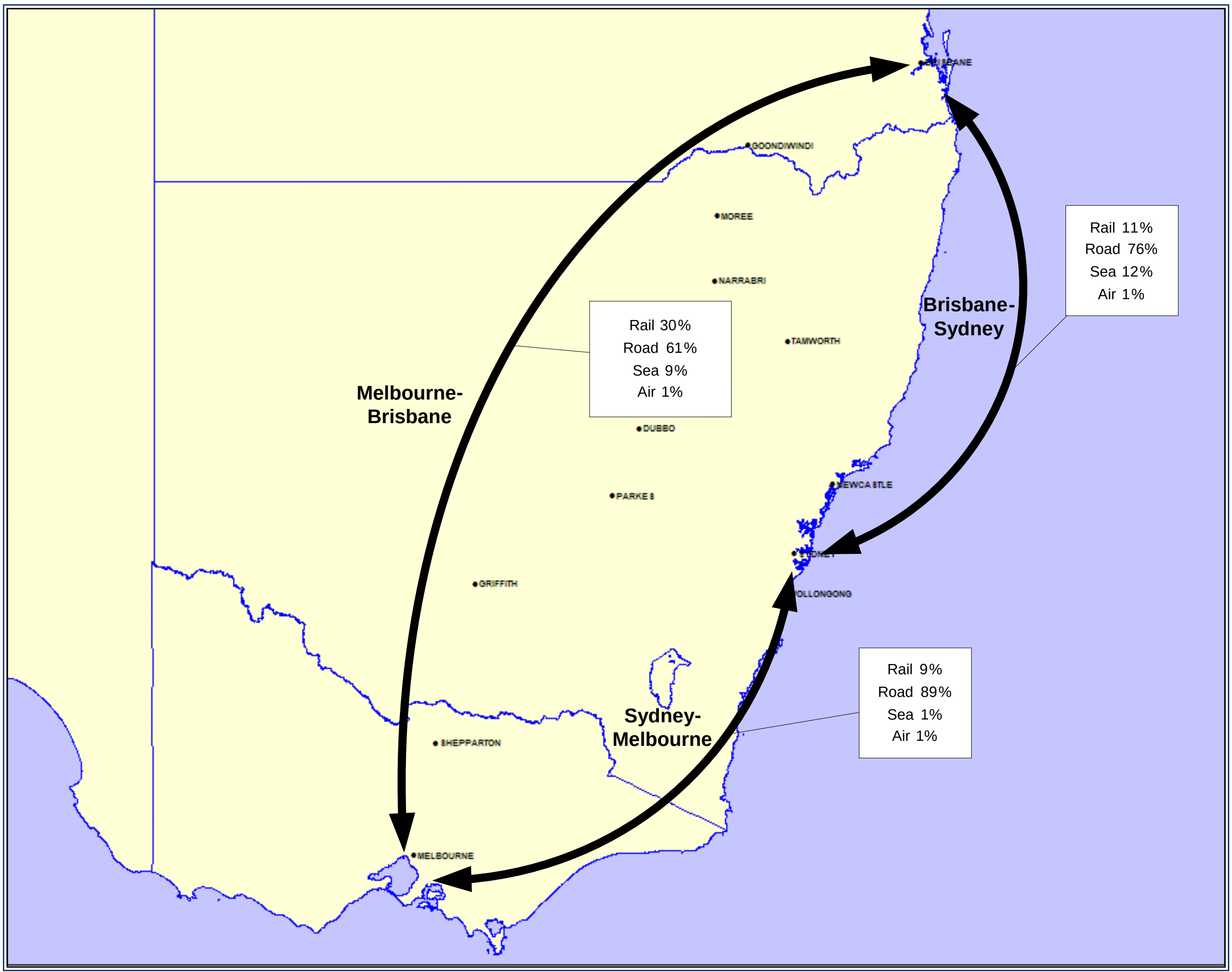
Source: *FreightSim*, the Study Team.

The modal share depends on the type of freight and its relative sensitivity to price and service quality and characteristics. Express freight mostly moves by air and some by road (but not rail), the bulkiest commodities (petroleum and steel) by sea, other bulk commodities (grain, steel, crude paper) by rail, and remaining products (manufactured goods and agricultural products) by road.

There is some substitutability between modes. Small, less time-sensitive manufactured goods can be moved by rail (but not much in the Corridor). For dense commodities such as steel, rail, road and coastal shipping are all substitutable services, depending on the capacity, price and time-sensitivity of the freight task. Export grain goes by rail because of the large volumes, but domestic grain travels mainly by road because customers are dispersed.

Figure 31, below, shows the initial estimates of modal shares on inter-capital city routes in the Corridor. Road had the overwhelming majority of modal share on all three inter-capital city routes in 2004.

Figure 31 - Modal shares on inter-capital city routes in the Corridor, 2004



Note: Confidential rail operator data provided to the Study Team indicates that these estimates for rail freight in 2004 slightly underestimate the true volumes. These estimates are derived from non-confidential data.

Source: The Study Group's stakeholder surveys, BTRE estimates, DOTARS coastal shipping data.

Major themes emerging from the Study Team's interviews with rail operators, freight forwarders and customers are that rail services are presently too unreliable to attract significant freight volumes outside the bulk commodity end of the market. Another regular observation was that PUD costs make rail uncompetitive on shorter sectors, especially Melbourne-Sydney and Sydney-Brisbane.

7 Passenger services

7.1 Introduction

Domestic air passenger services are provided by Qantas, Virgin Blue, Jetstar and (for regional services) Rex. The major development in recent years has been the growth of low-fare services, which customers have judged to be more attractive than bus or train passenger services. Some long-distance bus and train services remain, but not at levels significant for the Study.

The passenger rail services significant to the Study are RailCorp's services from Sydney to the Southern Highlands (Mittagong, Bowral, Moss Vale, Goulburn) and to the Central Coast (Woy Woy, Gosford, Wyong, Newcastle), and shorter commuter services that use parts of the same lines. Other Sydney commuter services cross the existing north-south line and add to congestion problems at certain junctions. Passenger trains in Brisbane also have priority over freight trains during peak commuter periods.

In the interests of Sydney urban passenger reliability, there is a 2.5-hour freight train curfew in the morning and a 3.5-hour curfew in the evening peak periods which are highly disruptive to freight operations and a main reason for the low reliability level. The two daily freight train curfews (the curfew is not applied over weekends) prohibit freight trains from accessing the Sydney metropolitan network to the south of the Hawkesbury River and to the north of Macarthur from 6 am to 8.30 am and 2.30 pm to 6 pm in the morning and evening peak commuter traffic periods. If freight trains fail to reach Sydney terminals by 6 am, they are effectively 'parked' until the curfew finishes.

Trains cannot depart Sydney terminals during the afternoon, which is a desirable departure time heading to Melbourne. This outcome will continue to hinder rail freight services unless transit times are reduced from 15 hours to below 11 hours (linehaul only). After the ARTC investment program is completed in 2009, linehaul rail transit times between Sydney and Brisbane are forecast to decline from 21 to 15 hours. A 15-hour linehaul transit time would ideally leave Sydney during the afternoon for an overnight service to Brisbane. This departure time is not possible with the afternoon freight train curfew.

7.2 The passenger rail market

Australian urban and total passenger rail transport has grown by approximately 1.5% on average from 1992 to 2003. Non-urban passenger rail transport has had a slightly higher growth rate of approximately 2.3% through the same period. This has not affected the overall growth rate as the average non-urban passenger task (10 million passengers) is small compared to that of the average urban passenger rail task (452 million passengers).

Table 13 - Australian rail passenger activity, 1992 to 2003

	Urban Heavy rail (million)	Tram and light rail (million)	Total urban (million)	Non-urban (million)	Total Passengers (million)
1992-93	396	103	498	7	505
1993-94	402	106	507	8	516
1994-95	420	111	530	9	539
1995-96	441	116	556	9	566
1996-97	456	118	574	10	584
1997-98	457	121	578	10	588
1998-99	463	123	585	10	595
1999-00	482	137	619	11	629
2000-01	498	137	634	12	646
2001-02	493	143	636	12	648
2002-03	466	120	586	9	595
10-year growth rate	18%	17%	18%	29%	18%
Geometric average annual growth rate	1.5%	1.4%	1.5%	2.3%	1.5%

Note: Excludes tourist services.

Source: ABS, *Year Book Australia: General Transport Activity* (2005).

On the east coast of Australia, the Sydney-Newcastle, Brisbane-Gold Coast and Melbourne areas contain the majority of the population and represent most of the passenger train travel in their respective states (DeSanti, 2005).

7.2.1 The Sydney area passenger rail network

The Sydney area passenger rail network is distinct and of particular importance for three reasons:

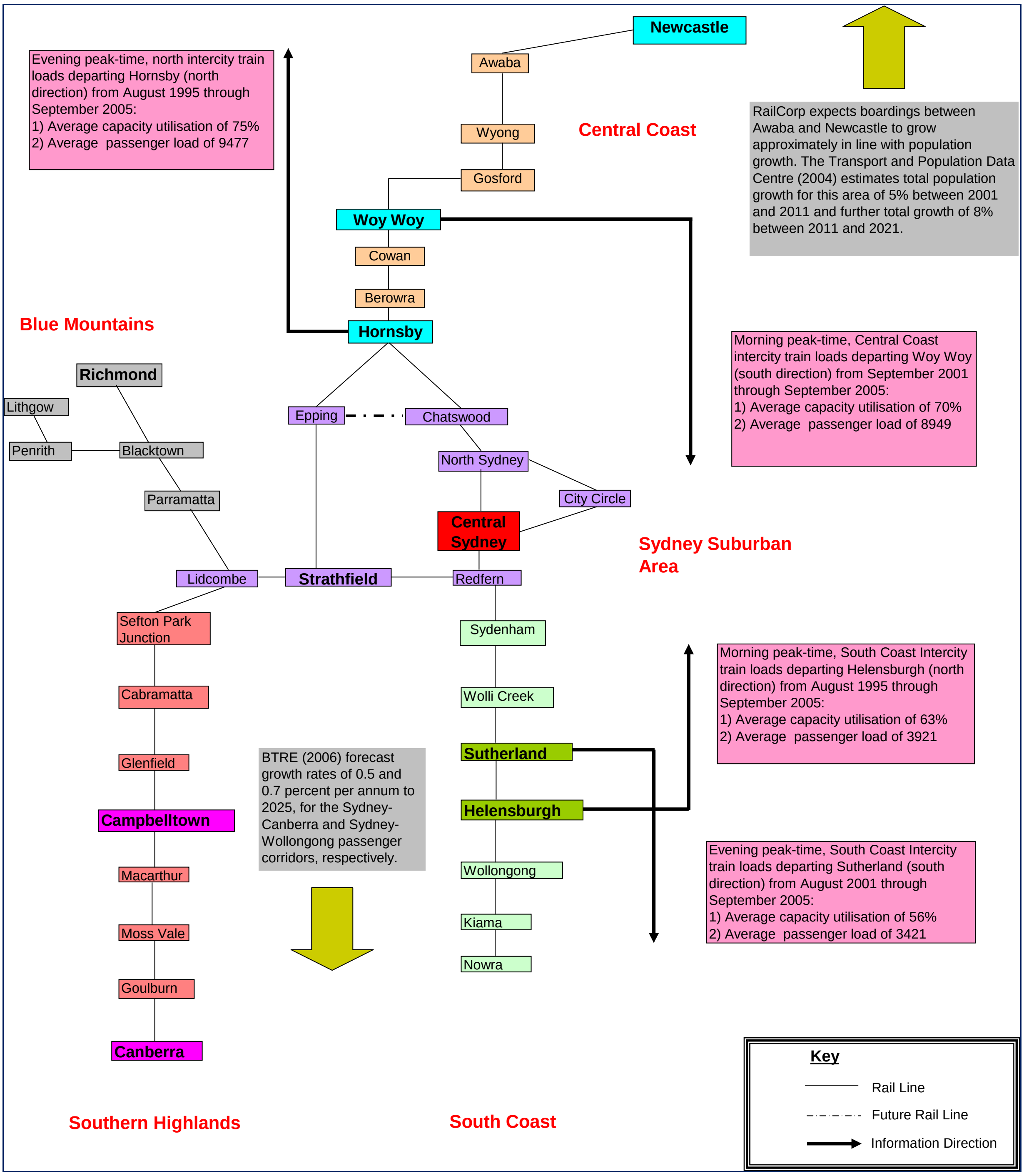
- The Sydney area passenger rail task is projected to increase in the future;
- The Sydney area will be subject to above national average population growth rates in the future. This will have flow-on effects for passenger rail demand, rail freight and road congestion; and
- The Sydney area passenger rail task is subject to congestion effects as it is carried out using the same rail network/infrastructure used to transport rail freight. Furthermore, the rail freight task is expected to increase in the future.

The Sydney passenger rail network is serviced by RailCorp, which comprises CityRail and CountryLink services. The Sydney area network consists of three main corridors:

- Sydney to Canberra – Southern Highlands corridor;
- Sydney to Nowra (via Wollongong) – South Coast corridor; and
- Sydney to Newcastle (via Woy Woy and Awaba) – Central Coast corridor.

Figure 32, below, presents a simplified map (not to scale) of the Sydney area rail network.

Figure 32 - Sydney area rail network



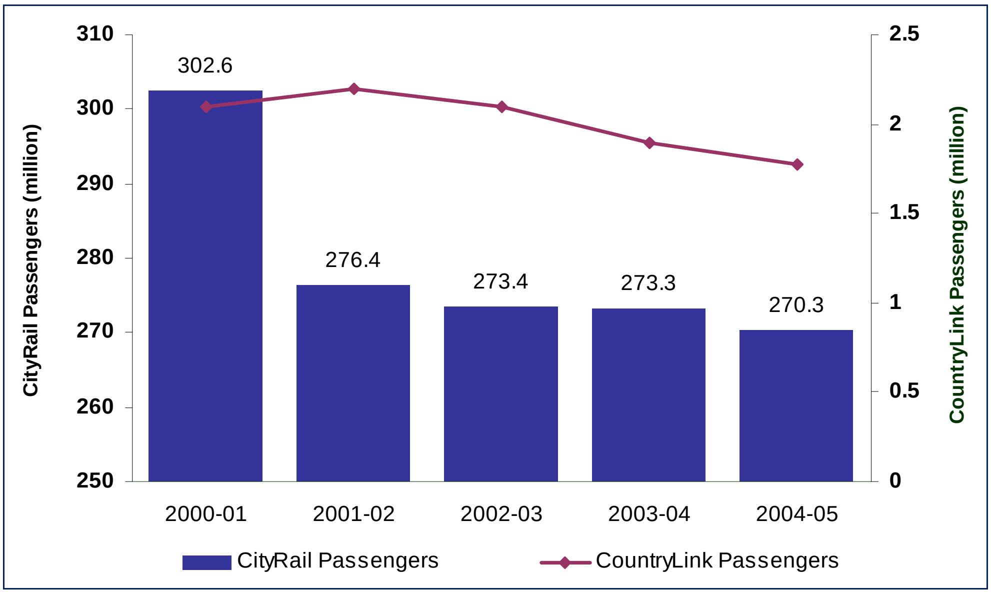
Note: This is a simplified map of the Sydney area rail network and is not to scale.

Source: *The Study Team.*

7.2.2 Sydney area passenger rail market

Despite the expected growth of passenger rail demand for the entire Sydney area, CityRail and CountryLink passenger journey numbers decreased from 2001-02 through 2004-05 (see Chart 5 below). It is necessary to examine each of the existing main north/south routes with a view to identifying specific potential future corridors/routes with high passenger growth and associated congestion implications.

Chart 5 - Sydney area urban and non-urban passenger journey numbers, 2000-01 to 2004-05



Note: 2000-01 CityRail passenger journey values are large due to the effects of the 2000 Sydney Olympics.

Source: CityRail, 2005.

7.2.3 Sydney-Newcastle corridor

In the Sydney area network, the Sydney-Newcastle corridor (serviced by CityRail) is the largest intercity market and a major rail freight route. This area (including the Central Coast) is subject to population growth, increased road congestion and a growing rail freight transport task.

7.2.3.1 Central Coast corridor (Cowan-Awaba)

The Central Coast corridor is defined as encompassing entries or exits between Awaba (south of Newcastle) and Cowan (north of Hornsby). Travel on this corridor has grown by approximately 1.3% per annum between 1997-98 and 2002-03. Approximately 7.3 million ticketed journeys were made on the Central Coast line in 2002-03.

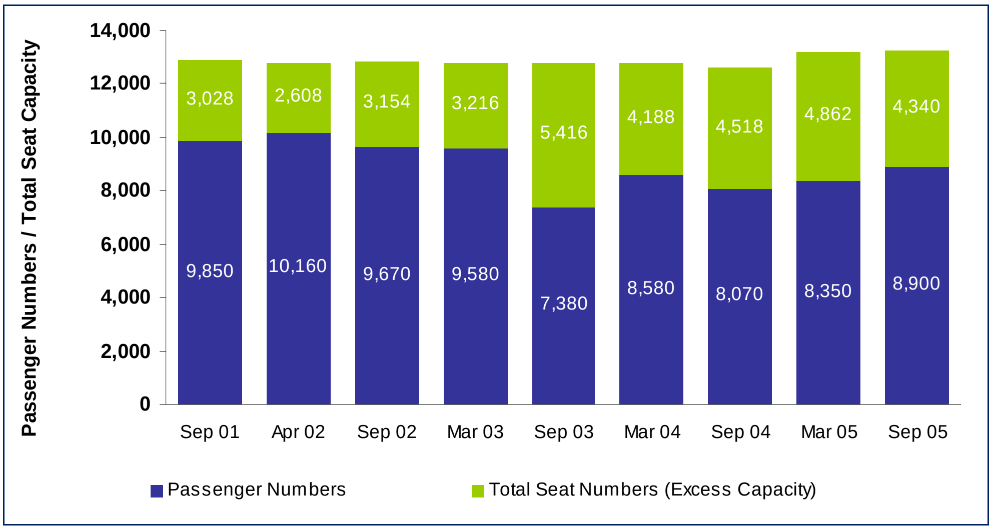
RailCorp expects total entries and exits on the Central Coast line to grow between 2005 and 2011, and in the longer term. This growth will be driven by growing populations, road congestion and improved rail access to the Macquarie/North Ryde employment area.

7.2.3.2 *Morning peak-time patronage: departing Woy Woy southwards*

Historically, patronage during peak times has been variable, having grown substantially between 1997-98 and 2000-01 and declining again in the subsequent four years (RailCorp, 2006).

In the peak 2.5-hour period, approximately 9,000 rail passengers travel south through Woy Woy. From 2001 to 2005, the average morning peak time (6 am to 8.30 am) passenger numbers decreased from approximately 10,000 to 9,000 journeys. Throughout the period, this has resulted in an average peak time utilisation rate of 69.5%, or 30.5% excess capacity (see Figure 33). Note: capacity increased slightly in 2005 but this did not have a substantial effect on the overall utilisation trends.

Figure 33 - Morning peak time, northern intercity train loads departing Woy Woy, heading south, 2001 to 2005

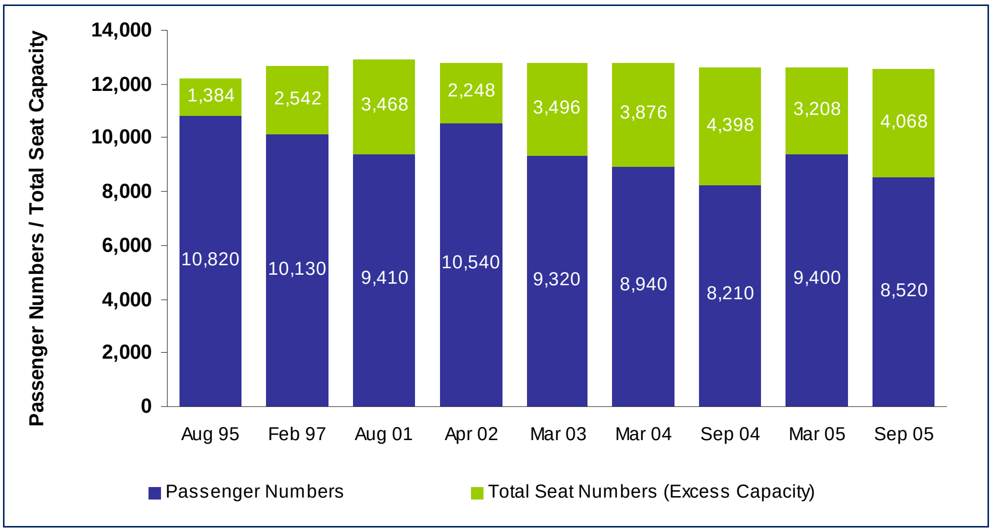


Source: RailCorp (2006)

7.2.3.3 Evening peak-time patronage: departing Hornsby northwards

From 2001 to 2005, the average evening peak time (2.30 pm to 6 pm) passenger numbers departing Hornsby (heading north) decreased from approximately 10,500 to 8,500 journeys. Throughout the period, this has resulted in an average peak time utilisation rate of 74.9%, or 25.1% excess capacity (see Figure 34). Capacity levels have not changed substantially but excess capacity has increased throughout the period.

Figure 34 - Evening peak time, northern intercity train loads departing Hornsby, heading north, 1995 to 2005



Source*:* RailCorp (2006).

7.2.3.4 Awaba to Newcastle

Boardings between Awaba and Newcastle are expected to grow approximately in line with population change. The Transport and Population Data Centre (2004) estimates total growth of 5% between 2001 and 2011 (0.49% per annum), and further growth of 8% between 2011 and 2021 (0.77% per annum). It is likely that the passenger and utilisation trends follow those of the Central Coast corridor.

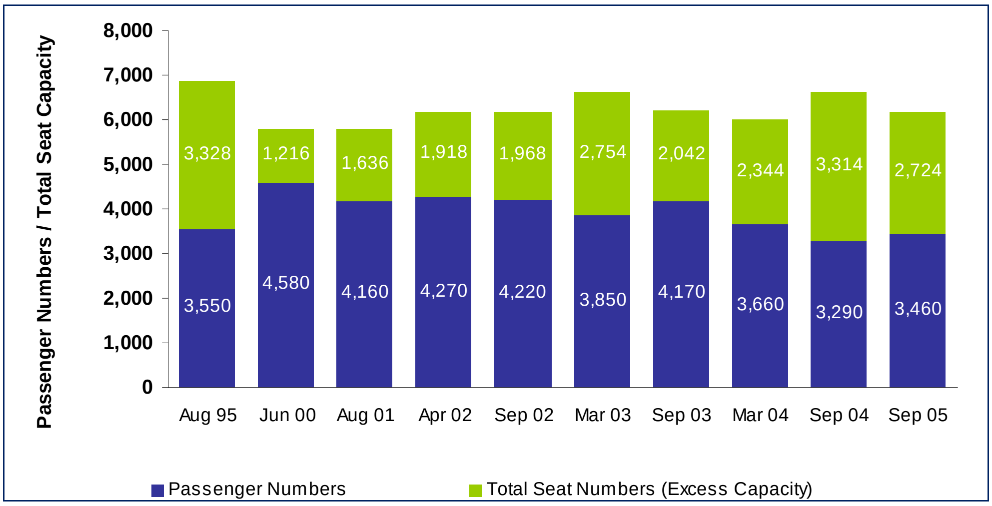
7.2.4 South Coast (Sydney-Nowra) corridor

The BTRE has forecast growth on this corridor to be 0.7% per annum between 1999 and 2025. This is between the expected growth rates for the Southern Highlands (0.5% per annum) and the Sydney-Newcastle/Central Coast (0.77% per annum) corridors.

7.2.4.1 *Morning peak time patronage: departing Helensburgh northwards*

Morning peak time (6 am to 8.30 am) passenger numbers for trains departing Helensburgh (heading north) from 1995 through 2005 have averaged 3,921, with an average capacity utilisation rate of 63.2%, or an average excess capacity of 36.8% (see Figure 35).

Figure 35 - Morning peak time, south coast intercity train loads departing Helensburgh, heading north, 1995 to 2005



Source: RailCorp (2006).

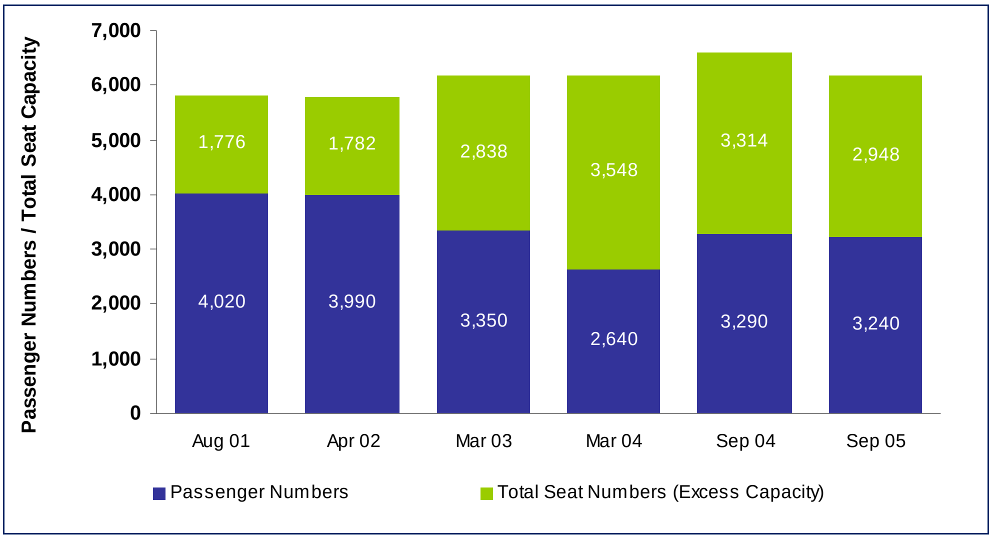
It is worth noting that while excess capacity has remained substantial, peak time passenger numbers and to a larger extent total seat numbers (capacity) are more volatile on this corridor than those on the Sydney-Newcastle corridor.

7.2.4.2 *Evening peak time patronage: departing Sutherland southwards*

Evening peak time (2.30 pm to 6 pm) passenger numbers for trains departing Sutherland (heading south) from 2001 through 2005 have averaged 3,422, with an average capacity utilisation rate of 56.2%, or an average excess capacity of 43.8% (see Figure 36).

While capacity (total peak time seat numbers) has fluctuated from a low of 5,772 to a high of 6,604, passenger numbers have been somewhat more volatile, ranging between 2,640 and 4,020. Despite this, the general trend of passenger numbers on this corridor is downward.

Figure 36 - Evening peak time, south coast intercity train loads departing Sutherland, heading south, 2001 to 2005



Source: RailCorp (2006).

7.2.5 Southern Highlands (Sydney-Canberra) corridor

The Sydney-Canberra corridor is expected to be subject to less intensive population growth than the south coast and Central Coast routes. Demand growth on CityRail and CountryLink's services to the Southern Highlands is expected to remain low.

Current services are lightly loaded and there is significant spare line capacity south of Macarthur. However, given the high demand for suburban train paths on this corridor, the majority of north-heading diesel services from the Southern Highlands will terminate at Campbelltown (RailCorp, 2006).

7.2.5.1 *Macarthur to Sefton Park Junction*

The issue of congestion on this rail corridor relates to northern passenger traffic in the morning (6 am to 8.30 am) and southern passenger traffic in the evening (2.30 pm to 6 pm). These time periods are also prime rail freight transport windows with respect to efficient and timely access to the Melbourne market.

In non-peak times, there are two freight paths available per hour in both the north and south directions during the day and three per hour at night. The current standard working timetable for freight allocates a maximum of 19 southerly paths and 20 northerly paths per day. There are potentially six southerly share paths and 15 northerly share paths available (RailCorp, 2006).

The completion of the southern Sydney freight line between Macarthur and Sefton Park Junction will substantially reduce conflict between electric passenger trains and freight trains, and bypass the commuter curfew. Some CountryLink-operated diesel passenger services may also use the new infrastructure (RailCorp, 2006).

7.2.6 Current Sydney infrastructure problems

There are a number of Sydney area rail infrastructure problems, most of which are directly related to rail congestion and constraints. In consultation with RailCorp, a number of these problems were specified:

- Major Sydney railway stations are congested;
- The main rail lines to the Sydney CBD area are congested;
- Areas subject to high rates of population growth, for example, the northwest sector of Sydney (serviced by the Sydney-Newcastle corridor) are not catered for adequately by public transport;
- The Sydney-Newcastle rail corridor is subject to capacity constraints;
- The Sydney light rail line is not allowed to expand its capacity;
- The Sydney CBD bus lines are close to capacity; and
- The major motorways surrounding the area and Sydney CBD roads are congested.

7.3 Congestion implications on rail freight transport

Around the Sydney area, passenger and freight rail are competing for the use of the same infrastructure. To combat this problem, freight train curfew**s** were introduced to the Sydney rail network in 1985. The curfew mandated that all freight trains must stay clear of the RailCorp passenger network during the morning (6 am to 8.30 am) and evening (2.30 pm to 6 pm) peak commuter times.

Total weekday freight capacity is therefore 35 southerly trains and 30 northerly trains. The current timetable allocates 22 southerly paths and 20 northerly paths, leaving 13 spare southerly and 10 spare northerly paths, most of which are late night paths (RailCorp, 2006).

7.3.1.1 Peak time passenger rail-related congestion

During the curfews, there has been on average between 25.1% and 43.8% excess capacity on the three major Sydney area routes for the period 1995 through 2005.

A continually increasing Sydney area population and subsequent passenger rail demand through time (assuming that the current rail infrastructure remained fixed) would:

- Initially increase the utilisation rates of the existing services;
- Eventually require additional rail services during the peak time periods; and
- Eventually require an extension of the peak time period, with a continuation of passenger rail services during that extension.

The data presented in section 7.2, including the change in peak time utilisation rates and growth (or lack of growth) in passenger numbers over the last five years, indicates that in the short to medium-term future, the 2nd and 3rd dot points above are unlikely to occur.

In summary, the congestion costs on rail freight transport resulting from peak time passenger rail transport are already fully realised as a result of the imposed curfew. If passenger demand growth necessitated additional services during this peak time curfew, there would be no additional impact on rail freight transport.

Additional congestion costs would be imposed on rail freight transport during peak time if passenger demand increased to a level where it necessitated an extension of the peak time period, with a continuation of passenger rail services (and the associated curfew) during the extension. The passenger demand data presented here shows that this is unlikely.

7.3.1.2 Non-peak time passenger rail-related congestion

Given the current situation, non-peak time passenger rail transport has the potential to impose additional congestion costs on rail freight transport in the Sydney area. Additional congestion is possible because there is no curfew during these non-peak-times. Passenger and freight rail therefore compete for the same infrastructure, with the level of competition being determined by each service's respective level of demand, which generally increases through time.

Thus an increase in non-peak time services would impose additional congestion on rail freight; whereas an increase in peak time services would not impose additional congestion as these costs are already imposed by the curfew in place.

In summary, population growth that results in additional non-peak-time passenger rail services imposes additional or marginal costs (in terms of congestion) on the rail freight transport task. In contrast, there will be no additional costs of an increase in the number of rail passenger services during the peaktime period.

8 Link to Demand Analysis

The data reported and discussed in this chapter is the starting point for the estimates of future demand presented in Chapter 4: ***Demand Analysis***. The ***Demand Analysis*** chapter draws on this chapter, exogenous factors such as GDP growth and fuel price assumptions, and on survey responses about how modal choice would change if rail infrastructure and rail services improved. These elements are incorporated in modelling used to produce future estimates of freight and passenger volumes in the Corridor and alternative scenarios.

Those estimates are then combined with access prices to produce revenue estimates, which feed the financial and cost benefit analysis of rail options for the Corridor.

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