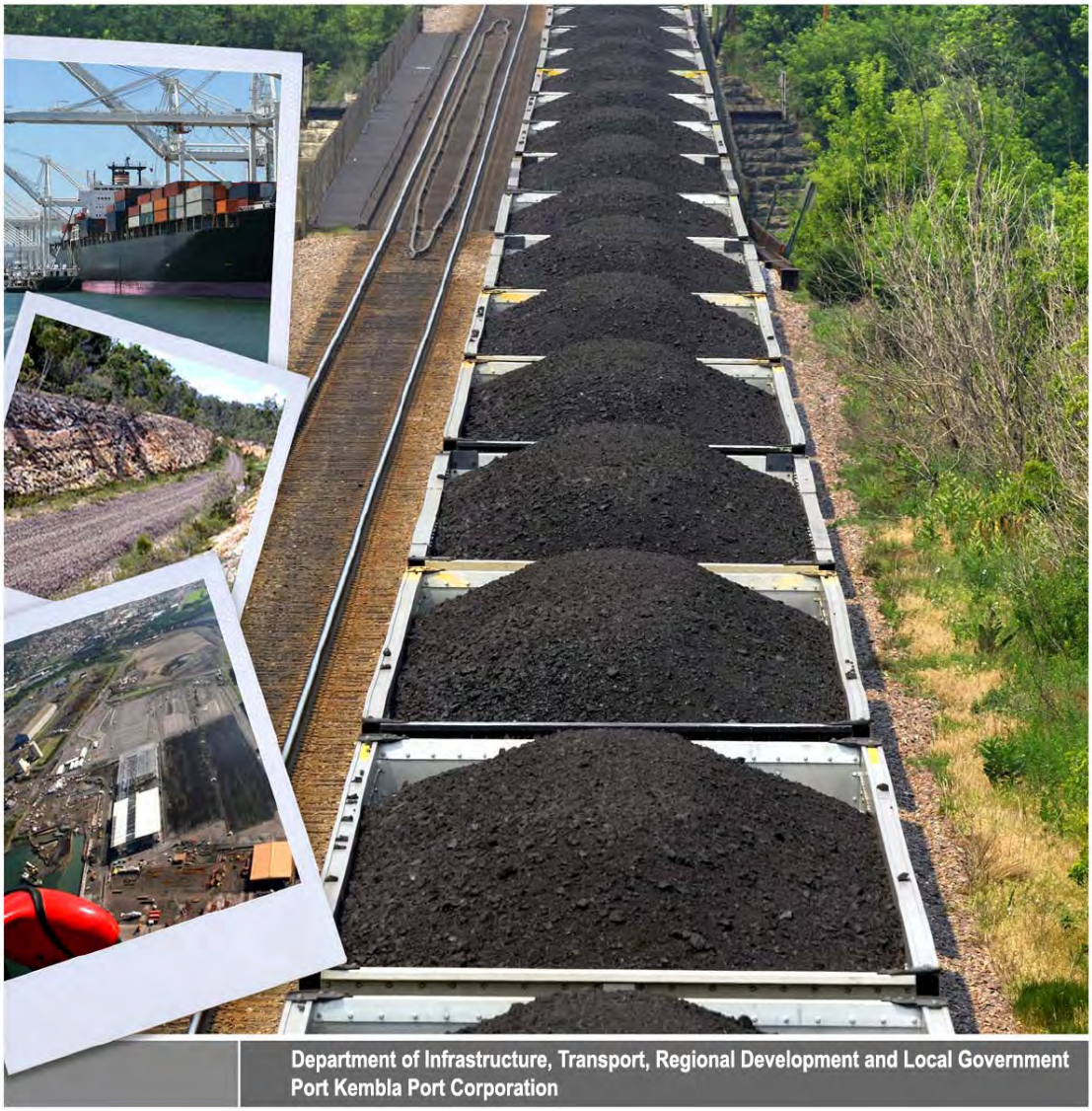



Australian Government

PORT KEMBLA PORT CORPORATION

# *Maldon-Dombarton Rail Line*
# *Pre-Feasibility Study*
# *for*
# *Port Kembla Port Corporation*

## *Report*

*7 July 2009*
*Reference H331997*

Connell HATCH
Infrastructure for Industry

# *Executive Summary*

In 2008, the Commonwealth Government called for a pre-feasibility study to complete the proposed Maldon-Dombarton rail link project on the New South Wales south coast, a project that has lain dormant for more than two decades.

The NSW Government's Illawarra Regional Strategy (Department of Planning, 2007) includes an aim to protect strategic transport corridors, including the existing Maldon to Dombarton rail corridor. The strategy has a strong focus on job creation, including capturing the economic benefits of the expansion of Port Kembla, to which the completion of the proposed rail line would be a significant contribution.

The proposed Maldon-Dombarton rail line is approximately 35 kilometres, linking the Main South rail line (National Network) at Maldon (near Picton in south-west Sydney) to an existing 15 kilometres section of dual track from Dombarton to Port Kembla. Construction work on the Maldon-Dombarton rail line was started in 1983, but the project was abandoned in 1988 due to downturn in the global economy and the closure of a number of regional coal mines.

## Findings

The key findings of this pre-feasibility study are:

a) Amongst other projects of its size and potential regional impact, the Maldon-Dombarton Line project may be rather unique. As a project that was stopped mid-construction, it is advanced in many ways, is located immediately adjacent to the third largest city in the state, will utilise a wide variety of local materials, blue collar labour and construction plant, offers a wide range of potential direct and indirect and intangible benefits to primary and tertiary regional trades, has the potential to become a catalyst for additional trade and commerce in the Illawarra region and the ability to avoid or forestall other transport congestion issues on both road and rail.

b) Significant site construction, design and detailed research has already been completed and would enable a fast track to completion of the line, with verification of existing designs to ensure that they meet acceptable standards, guidelines, legislation and stakeholder expectations.

c) The base cost $P_{50}$ estimate (50% probability mid-point) for completing the proposed project is approximately $550 million. It is important that the accuracy of the estimate and confidence level, qualifications and exclusions be acknowledged (see section 3.10 and Appendix C.

d) The potential income from current freight markets is unlikely to make the capital funding of the project attractive to a private developer. Whilst the project is attractive from a railway operations perspective, it has a negative return on investment when the capital cost of the rail line is included. This negative NPV is not remarkable as the majority of the benefits arising from the construction of the Maldon-Dombarton rail line, occur in areas external to the constructed railway. A more detailed study would be needed to determine the value (commercial and economic) of the benefits that this railway could provide. Indicative Net Present Value calculations can be found in section 5.6.

   However, the range of significant indirect and intangible benefits has not been considered in this simple financial assessment. A full economic assessment of the project would be required to accurately identify and quantify the dollar impact of these items. The project is "enabling" in nature, potentially providing a wide array of significant benefits to other regional trade and transport assets and businesses well beyond its own footprint.

e) A broad range of trade generation and usage scenarios have been considered and in both optimistic and pessimistic forms. In all but the most limited and pessimistic scenarios, there appears to be a business case for trade generation from the project. Major beneficiaries include the Port of Port Kembla and existing and proposed coal mines in the Appin-Wilton areas, as

well as potential benefits by reducing Sydney road-rail congestion in general and coal and container movements in particular (see section 5).

f) The potential to create jobs in the region is significant. The total base estimate of direct man-hours for the construction programme (approximately 1,200,000 hours over 39 months) would provide a considerable stimulus to the local construction industry and positively impact on the current Illawarra unemployment. Given the nature of the works, additional regional economic multipliers would suggest that as many or more indirect jobs may also be created.

g) The 35 kilometres rail corridor appears not to have been compromised by any development. Much of the earthworks and completed components of bridge construction remain in place and in serviceable condition.

h) Further studies are required to assess the project on environmental, social and economic criteria. These criteria are important, however they were not within the scope of this study.

i) New intermodal freight corridors serving south western Sydney industrial areas may be required by 2020 due to road and rail congestion. An improved rail linkage to south western Sydney would represent a freight opportunity for the port of Port Kembla by improving its cost and service levels and giving an access advantage to potential southern and western Sydney inland intermodal freight facilities. The Maldon-Dombarton Rail Line could become the critical link in a Port Kembla-based container supply chain to handle forecast growth in demand for the Greater Sydney region.

j) Considering the 2020 scenario, without the Maldon-Dombarton rail line, there will be a significant increase in congestion on the Illawarra South Coast Line to a point where future growth in the region may be limited. This includes possible limits to the planned increase in coal exports via the Port Kembla Coal Terminal from 12 million tonnes per annum to almost 25 million tonnes per annum, as well as limiting the capacity to provide increased rail commuter transport to the greater Sydney area. The effect of the anticipated capacity limitation will occur well before 2020 and will impose limitations on the creation of wealth and employment in the southern regions of NSW.

k) Issues associated with the long 1-in-30 grades are less now than at the time of the original proposal for the Maldon-Dombarton rail line due to improvements in locomotive technology; and

l) The line also offers potential haulage savings by requiring lesser locomotive power per tonne of coal and an opportunity to rationalise the maintenance liability of other sections of Illawarra rail links.

## Requirements for Delivery

One of the most unique features of this project is that, despite its size, it can be brought to fruition relatively quickly. This results from the previous detailed research, study, design, documentation and construction works carried out in the late 1980s. There are several elements of the original design drawings and works that now have to be checked against the backdrop of current legislation, changed design codes, standards and other compliance requirements. The same situation is true for the definition of the financial and economic business case analysis for the project.

In order to gain final approval for the project and to recommence the works in the field, it will be necessary to carry out a full feasibility study of the layout, design and cost of the remaining works described in this report. However, the feasibility study will not represent a “start from scratch” but rather involve:

- verification of the existing designs and documentation for conformance to current standards;
- model simulation of the transport networks under the current 2009 uses;

- where appropriate the adoption of more modern designs and approaches to certain elements of the works.

Hence, the feasibility study period will be considerably shorter than would be expected for a project of this size and will mostly focus on the crystallisation and quantification of all the implicit and explicit costs and benefits and a detailed business case analysis at both a financial and economic level.

Once the project approvals are in place, some clean-up, repair and field restitution works could be commenced almost immediately. The works yet to be completed are described elsewhere in this report. Fast tracking those works, as an urgent job and business creation initiative, as well as bringing significant transport benefits to the coal and other industries as soon as possible, the works could be packaged to maximise the number of viable work fronts, optimise tender opportunities for the construction sector (for all size companies), promote Australian made products, streamline project management and minimise Final Installed Costs.

The major broad construction delivery packages proposed include, but are not limited to:

a) Site clean-up and restitution;

b) Cordeaux River Rail Bridge;

c) Other Rail, Freeway and Road Bridges (carried out as several Separable Portions);

d) Avon Tunnel (including Spoil Disposal and Re-use);

e) Rail and Sleeper Supply Contract;

f) Track-works (carried out as several Separable Portions);

g) Maldon Rail Interchange;

h) Dombarton Rail Interchange;

i) Signalling and controls (carried out as several Separable Portions);

j) Services (carried out as several Separable Portions); and

k) Overall Engineering Procurement, and Construction Management.

Each of these packages will require further consideration as to the form and nature of the contract specifications. Some of the packages will be more beneficially delivered through a "Design and Construct" methodology, rather than the traditional "Construction" contract using the Owner's design, while other packages will clearly benefit by having access to Owner-supplied items, where the enormous buying power of the State or Federal Government can be optimised.

Similarly, the engineering management of the project can be streamlined by sensible consideration of the contracting strategies for the various packages and the interface with the major government agency stakeholders.

## Indirect Benefits of the Project

Completing the Maldon-Dombarton line can still help future proof the State's transport needs by providing capacity for anticipated growth. This study has identified many potential benefits in completing this link in the NSW rail transport network.

The broad collection of the benefits of this project could generally be classed as non-financial or intangible. However, their combined potential for significant regional employment, logistical

improvement, developmental and commercial stimulus and overall economic impact should not be overlooked, especially in the context of the current economic climate.

The benefits of the project, beyond the financial charges that could be recouped by the rail owner through tonne-kilometre charges, have been broadly grouped into categories that reflect the major beneficiaries. Whilst several of these benefits are likely to have impacts across a number of beneficiaries, to avoid duplication, they have been listed under the grouping that has the most significant benefit.

More detailed investigation of these benefits will be required and should be included with the feasibility study to determine the full economic value of the project.

## Regional Benefits

a) The current advanced status of the Maldon-Dombarton project is such that work could be quickly restarted and benefits described in the report could be realised sooner than most other projects of this size. In the current economic climate this attribute is of potentially major significance.

b) The Maldon-Dombarton line provides an alternative to the aging Illawarra to Moss Vale line, which is subject to significant maintenance costs and risks associated with geotechnical liabilities.

c) The potential to create jobs in the region is significant. The total base estimate of direct man-hours for the construction programme (approximately 1,200,000 hours over 39 months) could provide a considerable stimulus to the local construction industry and positively impact on the current Illawarra unemployment. Given the nature of the works, additional regional economic multipliers would suggest that as many or more indirect jobs may also be created.

d) Use of local construction material (e.g. rock, cement, steel) and equipment for further development of the Maldon-Dombarton project improves the sustainable development and economic multiplier outcomes for the project.

e) Greenhouse gas savings can be achieved by constraining growth in road freight and better use of rail network. Rail freight is up to five times more fuel-efficient per tonne-kilometre usage.

f) In the event of Port Kembla becoming a container gateway for south western Sydney (assessed in the study as part of the "optimistic case"), there would be significant reduction in volume on major road corridors in south western Sydney, leading to cash flow savings by delaying or obviating the need for other infrastructure enhancements otherwise required to manage the growing freight and passenger congestion.

g) The Maldon-Dombarton line offers a significant strategic benefit of providing passenger rail route alternatives between Sydney and the Illawarra in the event of major incidents affecting any one line; and

h) By attracting current and future freight to the Maldon-Dombarton line, there is potential to more favourably separate freight and passenger traffic between Sydney and the Illawarra region, specifically reducing congestion on the Illawarra main south coast line. This could in turn improve passenger commute times and train timetable integrity for the growing cities of the Illawarra region.

## Freight Supply Chain Benefits

i) The Maldon-Dombarton line will generate a range of operational freight benefits that will improve the viability of existing and proposed Southern and Western Coalfields developments (e.g. at Tahmoor and Wilton).

j) Once the Maldon-Dombarton line is completed, the intermodal chain for container movements can be logically connected to Port Kembla thereby reducing congestion on existing lines and cutting overall truck movements significantly.

k) The Maldon-Dombarton line will potentially improve the operational cost for rail freight by facilitating the move towards 24/7 operations and could further encourage a future modal shift away from road haulage for bulk cargoes within the Sydney-Illawarra region.

l) Better rail access to Port Kembla made possible by the Maldon-Dombarton line will further support the option for the port to be developed to supplement operations at Port Botany, as well as providing better services for its current customers.

m) The development of the Maldon-Dombarton line to a 30 tonne wagon axle load standard would allow companies to take advantage of lower operating costs associated with any carrying capacity upgrades on the attached networks.

n) The Maldon-Dombarton line will enable future development of coalfields as it could provide an alternative transport option to using roads which currently have planning restrictions on truck movements through the Illawarra; and

o) The completion of the Maldon-Dombarton line may further stimulate the possibility for other south western Sydney intermodal freight terminals, based on the assumption that the Moorebank intermodal or an equivalent facility is established, thereby opening up other commercial and industrial opportunities.

## Government Agency Benefits

p) Additional revenue for Port Kembla Port Corporation generated by increased coal tonnages and intermodal freight business arising from the use of the line.

q) There is potential to increase economic reserves of coal in NSW from lower freight transport costs associated with the development of the Maldon-Dombarton rail line.

r) Additional revenue for City Rail from potential increase in passenger capacity on the Illawarra Line, resulting from improvements in the timetable and service due to the removal of the majority of freight trains from the route.

s) Reduced maintenance costs for Rail Infrastructure Corporation and ARTC due to reduced number of heavy freight trains travelling on the City, Illawarra and Moss Vale-Unanderra lines.

t) Maldon-Dombarton line offers the potential to defer other infrastructure capacity improvement projects. It also affords the 'regaining' of previous 'lost' capacity on networks where there is little or no other cost effective option for further capacity enhancement (e.g. increased passenger train paths on the Illawarra line etc.); and

u) Additional benefits are identified in the Report.

As the project is further developed in the next feasibility stage, it is likely that the list of benefits identified above may need further adjustment. It will be essential that the impacts of all benefits can be directly attributed to the Maldon-Dombarton line itself or the changes it facilitates in local, regional and State freight strategies, logistics networks, optimisations made possible in other projects and maintenance programmes, improved operational and timetable efficiencies etc.

The Maldon-Dombarton line is an enabling project for the region and as a result it is not unexpected that many of its benefits are cross-functional and not directly attributable to the construction or direct use of the line itself. These economic or intangible benefits will be vitally important in the full evaluation of the overall "attractiveness" of the project.

The study was undertaken within the constraints of the relatively short reporting time, resources and limited access to documentation and records. Should these business cases (developed by others) prove to be encouraging, then this study would provide the basis for a future feasibility study. A future feasibility study would further investigate the specifics for completion of the project and identify and analyse in more detail the financial and economic structure of the project. This study also sets out in broad detail the major "Next Steps", required to be undertaken in any such feasibility study.

# Table of Contents

# *Appendices*

# List of Tables



# List of Figures

# 1. Introduction

The Maldon-Dombarton railway link was first considered during the construction of the Port Kembla coal loader in 1979. Until then, the NSW Government had been looking at building a coal loader in Botany Bay but had decided against it on environmental grounds. In 1980, a Port Kembla task force was established, comprising government, industry and union representatives. Its task was to consider the many options to transport coal to Port Kembla. The original approval for the coal loader was to receive 2 million tonnes per annum (MTPA) by road. Detailed feasibility studies were prepared for four options by the NSW State Rail Authority (SRA) and the Task Force reported its findings and recommendations to the NSW Government in mid-1982. In October 1982, the Premier announced that the Maldon-Dombarton rail line had concept approval.

An Environmental Impact Statement (EIS) was prepared for the project in 1983 (Dames and Moore, 1983) and the Railway Construction (Maldon to Port Kembla) Bill was submitted to Parliament and was passed in December 1983, allowing construction to commence. The original cost provided in the Act was $160 million, not to be exceeded by more than 10%. While principally intended for coal transport, the line was also proposed to carry wheat and general freight to Port Kembla (see Figure 1 for locality map).

During the time that the rail line was being built, many of the Burragorang Valley coal mines closed. From 1983 to 1988, construction commenced and proceeded to the current condition, described elsewhere in this report. The project was cancelled in June 1988 following a change of government, and reasons given for the closure were that the coal proposed to be transported had reduced to 20% of original expectations. A cost benefit analysis of all government capital works programs at that time showed the Maldon-Dombarton rail line had the worst cost-benefit ratio.

Subsequent to cancellation of the project, there have been several task forces, inquiries and proposals to complete the line by Liberal and Labour State Governments, as well as the Commonwealth Government. The NSW Government *Ports Growth Plan* was announced in 2003 with the aim of distributing port growth more equitably across the Sydney, Hunter and Illawarra regions by closing general cargo movements in Port Jackson/Sydney and relocating them to Port Kembla and Newcastle (NSW Maritime, 2009).

The existing multi-purpose berth at Port Kembla has been upgraded and transport of imported cars commenced in 2008. The additional freight task of imported cars handled out of Port Kembla is predominantly along Picton Road to the F5 Freeway at Wilton, then to the Campbelltown area. This additional road freight is considered by some politicians and others to provide an additional opportunity for use of the Maldon- Dombarton rail line to replace road freight with rail on a fixed route and reduce the associated environmental and social impacts of that road transport.

The completion of the Maldon-Dombarton rail project provides a significant opportunity to complete a strategic transport link between the Illawarra region and south-western Sydney that has potential to provide alternative freight and passenger rail routes between Sydney and the Illawarra, in the event of major incidents affecting any one line. This would be a significant infrastructure project (estimated to be $0.55 billion) that could provide stimulus to the local construction industry and provide some relief to the high unemployment rates in the Illawarra (6.6%), Fairfield-Liverpool (9.3%) and outer south-western Sydney (6.1%) areas (compared to Australian national unemployment rate of 6.0%: Data for February 2009, published by ABS 30 March 2009).

# 2. Project Scope and Approach

## 2.1 Project Scope

The Commonwealth Department of Infrastructure, Transport, Regional Development and Local Government commissioned this pre-feasibility study into the Maldon to Dombarton freight line as part of the AusLink Transport and Innovation Projects.

The Australian Government National Land Transport Network and the Nation Building program is looking at long-term development strategies for 24 defined corridors, including the Sydney-Wollongong Corridor, to which the Maldon-Dombarton rail link is connected (DITRDLG, 2009). The scope of the Maldon-Dombarton pre-feasibility study calls for an assessment of the current condition of the existing track, including identification of remedial works required to bring the track to current operational standard sufficient to carry bulk and container freight. The scope also requires an estimate of construction requirements and costs to complete the Maldon-Dombarton rail line and a realistic assessment of the likelihood of private investment in the construction of the line.

The Terms of Reference for the Maldon-Dombarton pre-feasibility study (see Appendix A) were issued on August 15, 2008 and tenders closed in November 2008. Connell Hatch and Strategic Design and Development were awarded the tender in January 2009.

This study investigated operational issues, such as compatibility with passenger trains, track gradient, and electrification, as well as environmental concerns and impacts. An analysis of the current and future freight markets was undertaken, including the potential to create a viable short haul intermodal service from Port Kembla to south-western Sydney. The regional rail transport needs and capacity for existing freight networks to meet this demand were investigated.

This study has consolidated information from the original design, the extent of the works constructed, modern construction techniques, those remaining or additional works required, carried out trade assessments and construction estimates to complete the rail line. These have formed a basic pre-feasibility report on the aspects required for completion of the project. However, this study was not intended to address the project's detailed revenues or benefits, financial or economic business cases.

Should these business cases (developed by others) prove to be encouraging, then this study would provide the basis for a future feasibility study. A future feasibility study would further investigate the specifics for completion of the project and identify and analyse in more detail the financial and economic structure of the project. This study also sets out in broad detail the major "Next Steps" required to be undertaken in any such feasibility study.

## 2.2 Study Approach

The study was undertaken within the constraints of the relatively short project timeframe, limited access to documentation and records and included the following key stages:

a) Collation of data and information from previous studies.
b) Detailed literature review of Australian and overseas experience for steep gradient tunnel rail operations.
c) Field investigations to conduct condition assessments on existing works.
d) Stakeholder engagement, including business community and the Labour Council.
e) Areas of proposed industrial developments were identified and discussions were held with developers who may be potential users of the proposed line.
f) Collation and analysis of existing trade markets in the region and NSW that may use the line.
g) Scenario planning and estimation of trade attraction.
h) Technical review of original construction technique, taking into account scope of works.
i) Consideration of other tangible and intangible benefits.

j) Compilation of rudimentary financial model.
k) Review of findings by Project Reference Group.

## 2.3 Stakeholders

The scope of this study has focussed on the freight operations of the proposed rail line, and therefore a more general public consultation was not undertaken. The Port Kembla Port Corporation established a Project Reference Group for the project including representatives from:

- Illawarra Business Chamber.
- AiG Illawarra.
- South Coast Labour Council.
- Illawarra Regional Development Board.
- Regional Development Australia, Illawarra.
- Federal Members for Cunningham (The Honourable Ms Sharon Bird MP) and Throsby (The Honourable Ms Jennie George MP).
- Sea Freight Council of NSW.

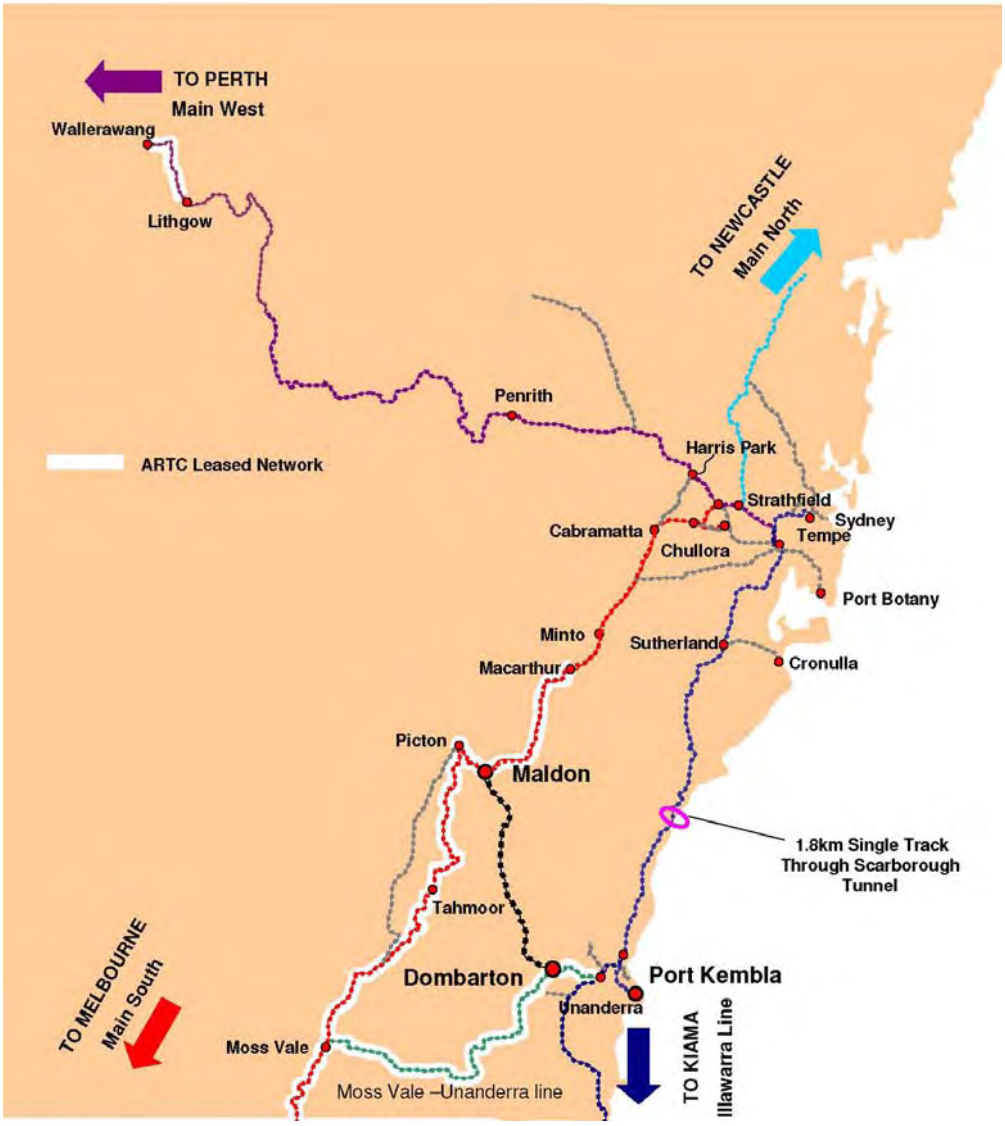
Contact was maintained throughout the course of the study through Group meetings, direct consultation and presentations from the consultants.

# 3. Infrastructure

## 3.1 Site Inspection

An inspection of the rail line and associated infrastructure was undertaken over three days in February 2009, with an additional inspection on 14 April 2009 to clarify some outstanding issues.

Figure 1 Location of Proposed Maldon-Dombarton Rail Line




## 3.2 Rail Line Route

The proposed Maldon-Dombarton rail line is approximately 35 kilometres long and it would link Maldon (near Picton in south-west Sydney) on the NSW Main South Line (Sydney Melbourne) directly to Port Kembla via Dombarton. Trains using the Maldon-Dombarton railway could travel from Dombarton to Port Kembla, a distance of some 15 kilometres over the existing double track.

The line from Dombarton heading west must negotiate the steep upward gradient of the Illawarra Escarpment. The maximum gradients on the railway are (travelling to the west from Port Kembla) upwards at 1-in-30 gradient through the four kilometres long proposed tunnel and downwards at 1-in-60. Travelling west beyond the tunnel, the line enters the Sydney Catchment Authority Metropolitan

Special Area, in undulating country. In this area, the rail line generally follows the ridge separating the Cordeaux and Avon Rivers. It then crosses the Cordeaux River, leaves the Sydney Catchment Area, passes under a number of roads (including Picton Road), under the F5 Freeway passes and over the Nepean River, before joining the Main South line near Maldon.

## 3.3 Existing Infrastructure

Approximately two-thirds of earthworks have been completed, as well as the entry cuts to the tunnel portals and construction access roads to the tunnel and the catchment area.

Figure 2 shows a snapshot of the rail route and identifies the general location of completed and yet to be constructed works.

A summary of the works required for the operation of the rail line, the status of the works completed and an indication of remaining work required are given in Table 2.

The original *Maldon-Port Kembla Project Position Report* (SKP, 1989) states a number of contracts reaching final completion with Final Certificates issued, including contracts on the western side of the Avon Tunnel. These contracts were Contract C7.2, No. 1 Portal Access Road, C7.3 No 2 Portal Access Road, C7.4 No 1 Portal, C8 & 9 Earthworks & Drainage West Portal to Cordeaux River, C15.2 Nepean River Bridge approach structures and C21.5 Earthworks siding at Maldon Triangle.

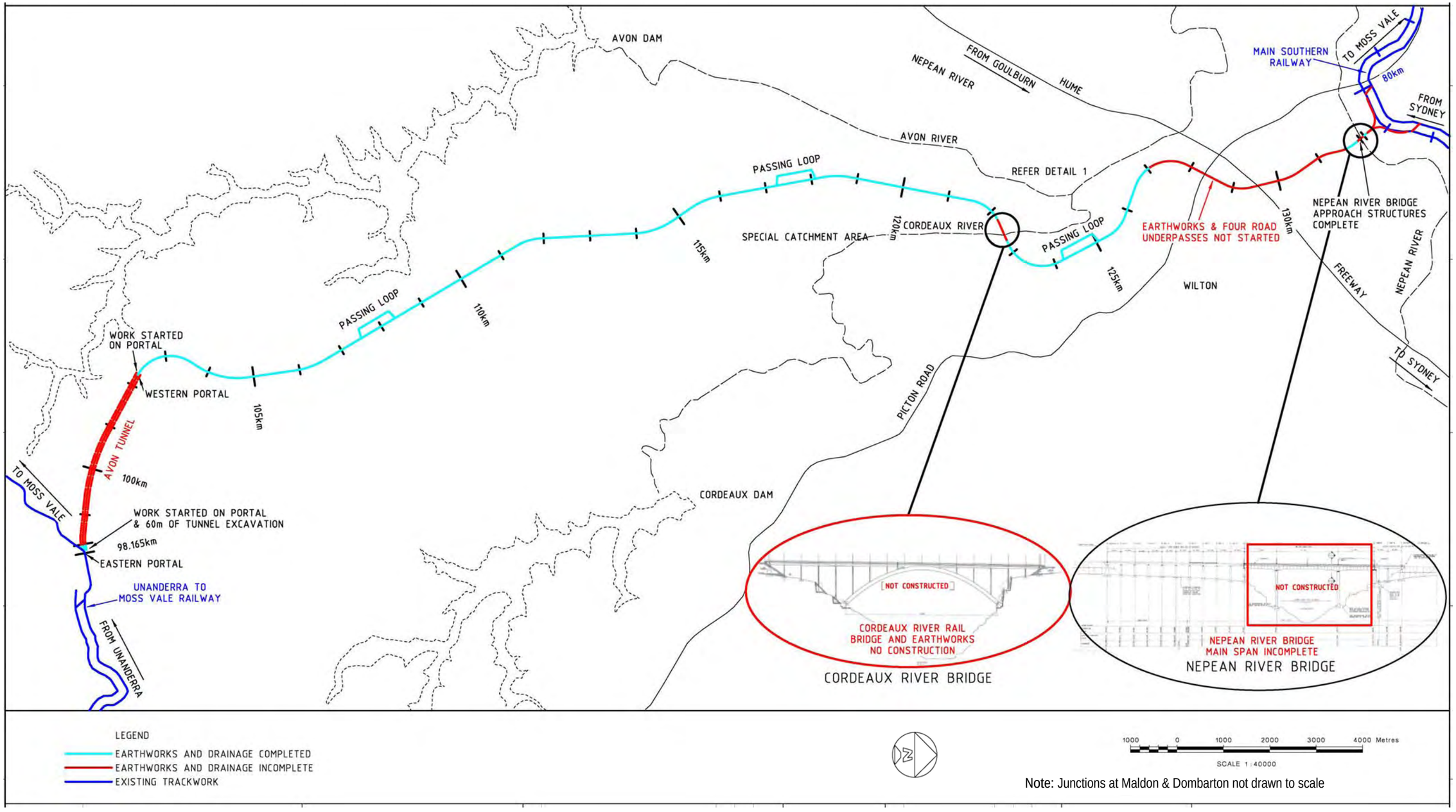
However, the site investigations undertaken as part of this pre-feasibility study show that the there are discrepancies between the working plan drawings, the *Project Position Report* (SKP, 1989) and the field observations. Some of the discrepancies are shown in Table 1.

Table 1 Some Discrepancies between Working Plans and field observations

| | Location | Structure | Observations |
|---|---|---|---|
| Waterway Openings | 102.580 km | 4 / 1200 mm x1800 mm RCBC | Not on Working Plans |
| | 108.795 km | 1 / 1200 mm RCP | On Working Plans but unable to locate |
| | 114.170 km | 1 / 1350 mm Steel Pipe | On Working Plans but unable to locate |
| | 121.035 km | 1 / 1050 mm Steel Pipe | On Working Plans but unable to locate |
| | 124.820 km | 1 / 1800 mm RCP | On Working Plans but unable to locate |
| | 125.820 km | 1 / 1800 mm RCP | On Working Plans but unable to locate |
| Fauna Underpasses | 102.800 km | 3220 mm x 2780 mm Steel Underpass | Unable to locate |
| | 104.780 km | 3220 mm x 2780 mm Steel Underpass | Unable to locate |

The full extent and quality of the construction would need to be assessed in a detailed feasibility study to identify whether the construction is still compliant with current approval requirements.

Figure 2 Status of construction




Note: Junctions at Maldon & Dombarton not drawn to scale

Table 2 Summary of Work Required to complete Rail Line to Current Operational Standard for Bulk and Container Freight

| Item | Required | Completed | Additional |
|---|---|---|---|
| Environmental impact assessment | Yes | EIS completed in 1983 | Environmental assessment needs to be reviewed and updated to reflect current legislation and best practices. |
| Tunnel | 4 km length | • 2 portals prepared<br>• 60 m entry cuts on Eastern portal completed | Design needs to be reviewed and updated to reflect current standards and practices for operation and construction. |
| Earthworks and surface drainage west portal to Cordeaux River bank | 20 km | 20 km | Needs to be reviewed for current standards and railway operations. Some drainage repairs and batter stabilisation required. Additional earthworks may be required to support extension of the passing loops (from 650 m to 900 m) to accommodate longer trains. |
| Openings | Concrete box culverts | 2 locations of 4 / 1200 mm x 1800 mm | • Site Inspection showed some variations in location, size and type. Check is required for later documents (design and approvals) supporting the as-built condition.<br>• No critical issues observed (e.g. washaways, scouring).<br>• Some maintenance issues identified (e.g. some corrosion at inverts of steel culverts).<br>• Review is required to ascertain where underpasses for fauna are installed and any additional requirements. |
| | Steel Pipes | 25 locations of varying sizes (1050 mm to 2100 mm diameter) and numbers | |
| | Reinforced concrete pipes | 20 locations of varying sizes (675 mm to 1350 mm) and numbers | |
| | Steel underpasses for fauna may be required | 4 locations of 3220 mm x 2780 mm steel underpasses not located | |
| Cordeaux River Rail Bridge | 244 m length | Nil | Design needs to be reviewed and updated to reflect current standards, practices and railway operations. |

| Item | Required | Completed | Additional |
|---|---|---|---|
| Earthworks and drainage, Cordeaux River to Special Catchment Area boundary | 4 km | 4 km | Needs to be reviewed for current standards and railway operations. Some drainage repairs and batter stabilisation required. Additional earthworks may be required to support extension of the passing loops (from 650 m to 900 m) to accommodate longer trains. |
| Earthworks and drainage, Special Catchment Area boundary to Maldon. | 6.5 km | Nil | Design and review required to reflect modern construction methods and materials. Crossings for gas pipeline, Sydney Water Corporation water supply pipeline, telecommunications and utilities required. |
| Picton Road, Condell Park Road and Janderra Lane bridges | 3 | Nil | Design required. |
| F5 Freeway overbridge | 1 | Nil | Design required. |
| Nepean River Bridge – 3 main spans | 189.6 m | Nil | Design needs to be reviewed and updated to reflect current standards, practices and railway operations. 3 main spans to be completed. |
| Nepean River Bridge approach spans (total length: 240.1m) | 12 spans<br>240.1 m | 12 spans<br>240.1 m | Inspection required to verify adjustments that may be needed to design. |
| Signalling and communication | Yes | No | Design required. |
| Tracks work and connections | Yes | No | Design required (see section 3.6). |
| Electrification | Unlikely | No | Design if required. |
| Construction and maintenance access roads | Yes | Most in place as service roads | Additional roads required to service construction and maintenance activities. |
| Unanderra-Dombarton – double track | 10 km | 10 km | Undertaken as part of complementary works to original project. Foundations, some with masts attached. |
| Princes Highway Bridge to replace level crossing | Yes | Yes | Undertaken as part of complementary works to original project. |

## 3.4 Earthworks and Drainage

An inspection of the existing infrastructure has identified that key elements of the route appear to be in good condition, including 100 metres of the approach to the Nepean Bridge, although a more detailed engineering assessment would be required as part of the feasibility study for all bridges.

The bulk earthwork and drainage civil works completed from the Western portal to the Special Catchment Area boundary are summarised as follows:

### *3.4.1 Earthworks*

All major earthworks were completed, which included 31 cuttings (maximum height of 15.8 m) and corresponding embankments (maximum depth 18.5 m). Figure 3 shows the typical cross sections applied in embankments and cuttings from the original designs.

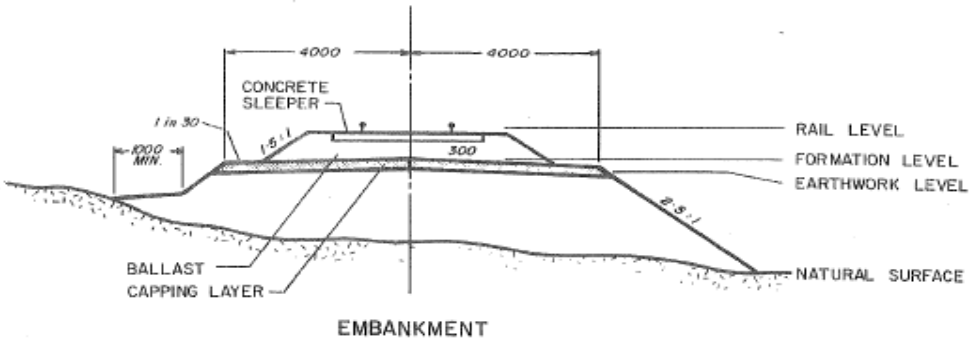
Figure 4 shows a portion of the cutting at location 123.5 to 124 kilometres. Some cuttings along the alignment require some final trim, erosion protection and top batter drainage to be completed. The majority of cuttings and the embankments were not scoured and appeared stable (see Figure 4).

There is some instability identified in some steep cuttings, and further studies will need to investigate the possibility of major construction to modify and stabilise the batter slopes in some cuttings (see Figure 5).

The earthworks were originally designed for an electrified line and the formation widths were constructed to 8 metres (see Figure 3). In the areas of the passing loops, the track formation width was designed for 12.5 metres. The passing tracks were proposed to be offset from the main track by 4 metres.

The bottom ballast layer is completed for approximately 24 kilometres.

Figure 3 Typical Cross-section of Earthworks (original design drawings)



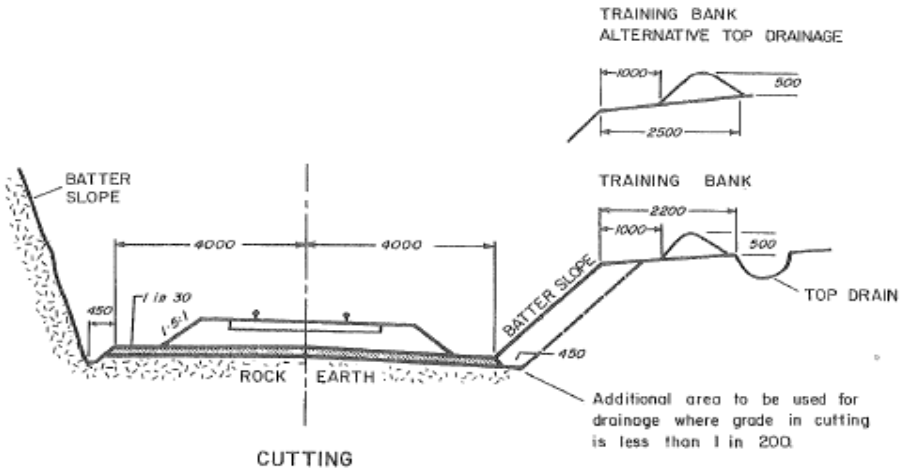




Figure 4 Cutting and Earthworks at Location 123.5 -124 kilometres

Note: Sound rock faces and pre-ballast.

Figure 5 Cutting at 116 kilometres

Note: This location shows signs of some instability from the fallen rocks.

### *3.4.2 Openings - Waterways and Fauna Crossings*

Most waterway crossings and drains, other than the Cordeaux River Rail Bridge and the Nepean River Rail Bridge, appear to have been completed. These items comprise concrete box culverts, reinforced concrete pipes and steel pipes (up to 2100 mm diameter). Some discrepancies have been noted between the working plan drawings and the field observations.

The functional condition of the openings, particularly the steel culverts, requires further assessment. Concrete box culverts are constructed at two locations, reinforced concrete pipes at 20 locations (varying sizes), with steel pipes at 25 locations.

During the field inspection, the drainage system was inspected visually at certain sections (see Figure 6). Corrugated steel pipe with proper coatings and/or invert paving can provide a long service life. All methods of rehabilitation and maintenance require a complete inspection and evaluation of the existing pipe to determine the most appropriate choice. The rehabilitation of corrugated steel pipe often requires providing a proper coating and invert paving. Typically, structural repair is unnecessary.

The original plan for the proposed rail line was for the provision of access for fauna crossings by multi-plate steel underpasses (3200 mm x 2800 mm) at four locations. None of the fauna crossings was located during the site inspections. Field investigations included a rigorous search for the fauna crossings at two locations without finding crossings indentified in the working plans.

Figure 6 Steel Culvert showing Some Corrosion

Note: Corrosion indicates some maintenance is required to correct and control deterioration

## 3.5 Passing Loops

The original design included three intermediate passing loops, as well as a standing track at the Maldon junction with the Main South railway (see Figure 7). This study has indicated that the loops proposed are shorter than those required to accommodate trains currently operating in the area; in particular, coal trains operating to the Port Kembla coal terminal. This terminal can operate with trains of up to 860 metres long.

Based on this and the need for the Maldon-Dombarton railway to not limit train lengths, to maximise its use, the study assumed that the loops would have 900 metres of standing room between clearance locations.

The original design provided for 4 metres between the track and the passing loop. It is noted that this spacing, whilst being consistent with the spacing of similar tracks elsewhere, is less than the current ARTC standards for new construction.

The estimate for the construction of the railway provides for a basic extension of the earthworks to accommodate the longer passing loops and for the additional track required.

Figure 7 Wide Formation at Passing Loop at 117.7 kilometres

## 3.6 Junctions and Connections to ARTC Leased Network

The Maldon-Dombarton railway connects at each end into the ARTC-leased railway network. As such, ARTC will have a significant influence on the project, even if it is not involved with the project development, assessment or the eventual "ownership" of the track.

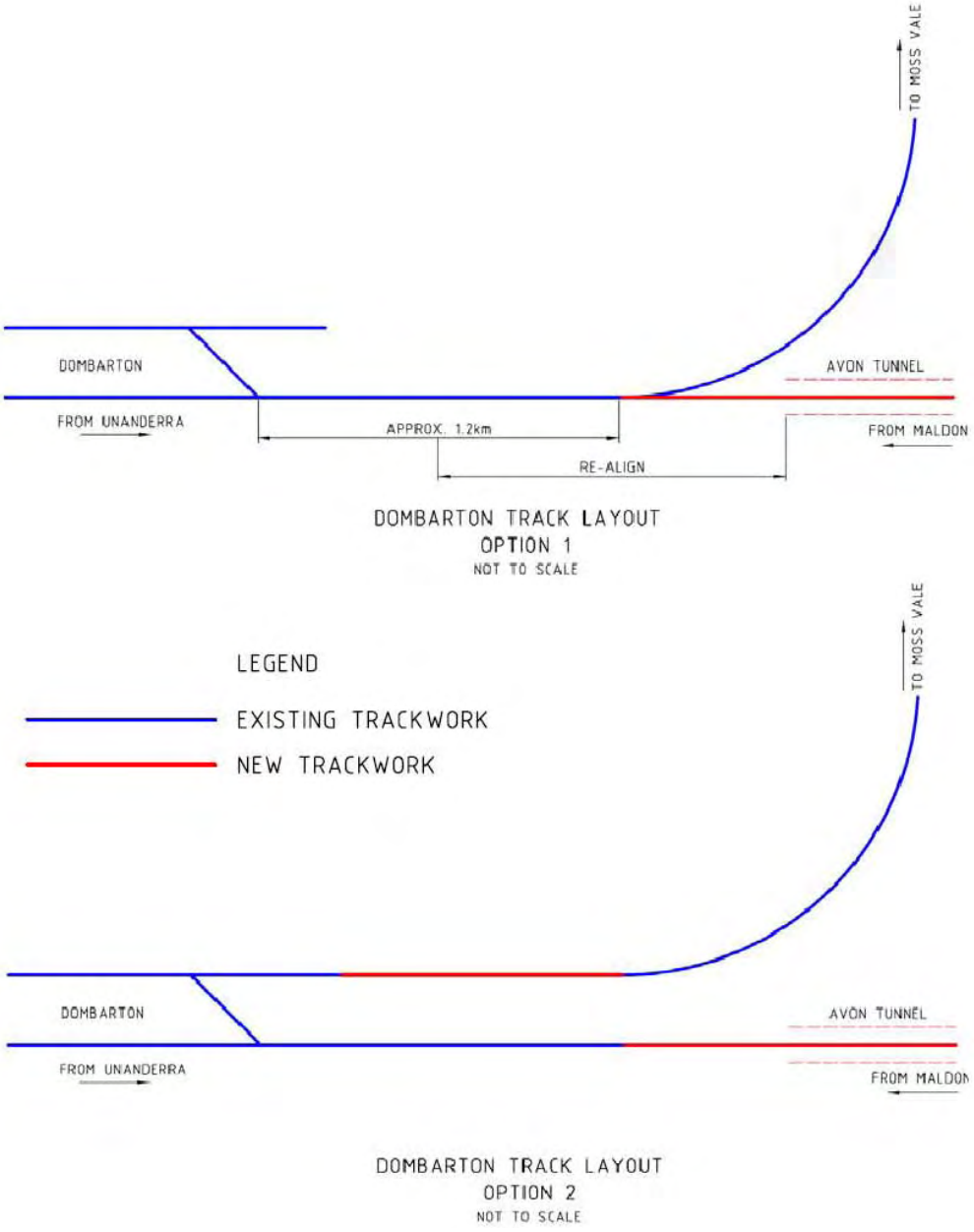
### *3.6.1 Dombarton Junction*

The railway from Unanderra to Dombarton is part of the Unanderra to Moss Vale railway. This railway was upgraded in part from Unanderra to Dombarton when the track was duplicated as part of the original construction of the Maldon-Dombarton line in the 1980s. During the original construction works, the Princes Highway level crossing was replaced with a bridge over the highway, and electrification masts and mast foundations were also installed. This work is understood to have been carried out as a part of the Maldon-Dombarton project. Figure 8 shows the upper end of double track section at Dombarton with the track and masts constructed.

Figure 8 Double Track at Dombarton

The proposed Maldon-Dombarton rail line joins the Unanderra Moss Vale line, approximately some 1.2 kilometres beyond the end of the double track shown in Figure 8. For this study, two options were considered. The first option requires some track realignment and the installation of a new turnout, whilst the second option requires the construction of 1.2 kilometres of track, but no new additional turnout. These are illustrated schematically in Figure 9.

Figure 9 Two Options for Dombarton Junction




### *3.6.2 Maldon Junction*

The original design drawings indicate the design was finalised for this junction. The drawings showed three stages in the design. The visual inspections undertaken as part of this study indicated that there was scope to construct the connection to the original design drawings. The inspection also indicated that there may be scope to apply a less costly arrangement, whilst still following the intent of the original design connections to the existing track. This is shown in Figure 10 and two later development stages were also considered and these are shown in Figure 11.

It is noted that the final junction at Maldon will need to be closely reviewed as the project advances. This is because the Main South railway is curved, the lengths of straight track (required for connections) are limited and there are new standards for track centres and turnouts for the Main South to be addressed with ARTC. In addition to this, the location of the single track bridge over the Nepean River, in relation to the Main South track, limits the length that can be provided at the Junction for standing/passing trains at Maldon Junction.

Figure 10 Proposed Initial Maldon Junction

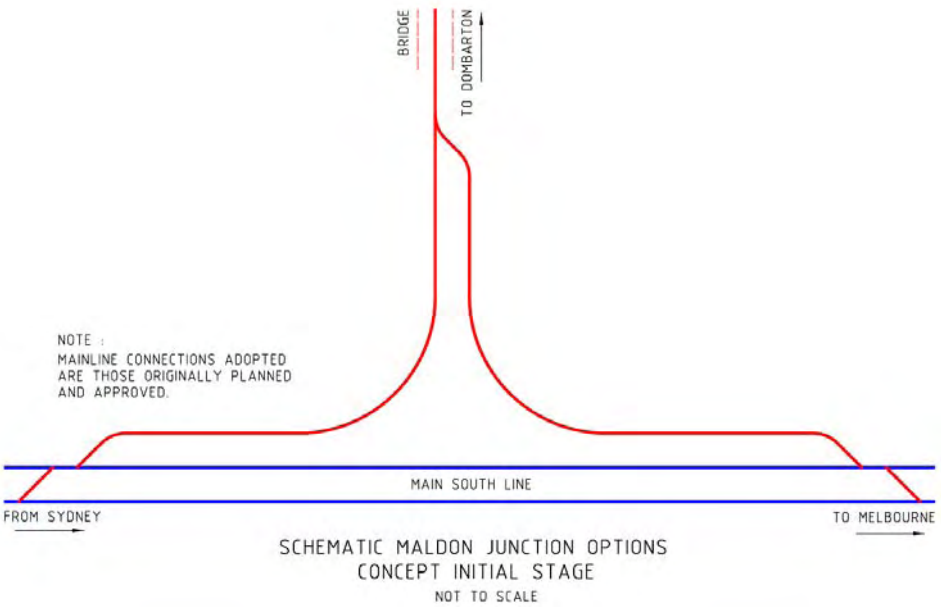
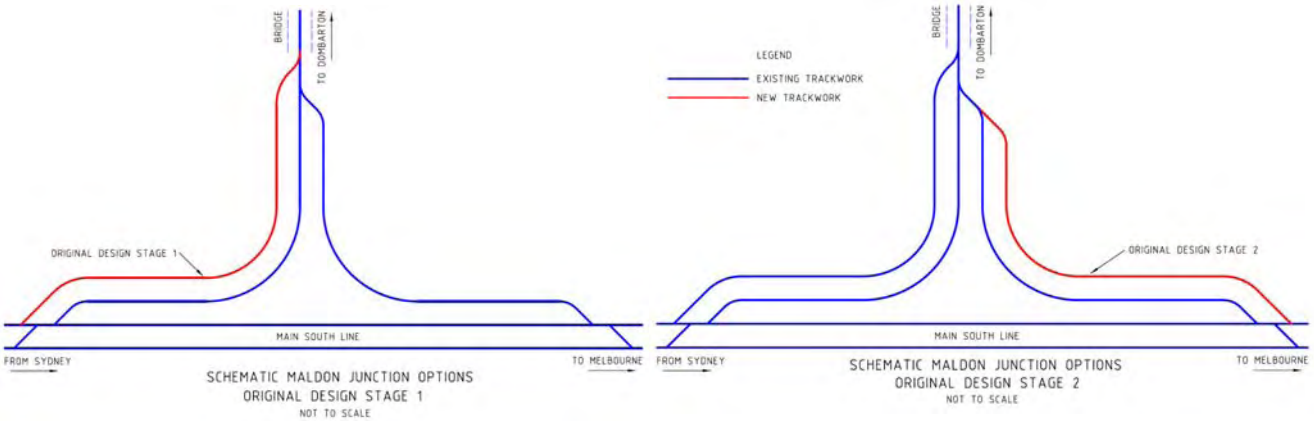



Figure 11 Original Proposed Maldon Junction Options



## 3.7 Tunnel and Portals

Initial excavation (approximately 60 metres) has been conducted at the entry of the eastern portal (see Figure 12). At the western portal, initial excavation was commenced and then abandoned. The western portal area is now flooded.

Figure 12 Eastern Tunnel Portal

## 3.8 Access Tracks and Fire Breaks

Basic earthworks construction for access tracks has been completed. These tracks are currently used as fire trails. It is estimated that additional work would be required to extend the tracks for construction and maintenance requirements. Some new tracks would be required to provide access to individual properties along the rail corridor.

Some removal of vegetation would be required to clear the existing earthworks where there has been re-growth over the last two decades. Some clearing may be required for the new earthworks construction at the Maldon end of the corridor.

Figure 13 Track Formation showing Vegetation Regrowth at 112.4 kilometres

## 3.9 Bridges

Two major river bridges are required. The Cordeaux River crossing will require a 244 metres bridge and no work has been completed (see inset in Figure 2 and Figure 14 ).

The Nepean River Crossing has its approach spans constructed (240 metres: 12 spans). The three (3) major spans of the Nepean River Bridge have not been constructed (total 189.6 metres) (see inset in Figure 2 and Figure 15).

The estimate for the Cordeaux and Nepean River bridge works provides for a precast post-tensioned incrementally constructed bridge with a maximum span of less than 100 metres. This is considered to be a far more cost-effective structure and more inline with other bridges currently under construction or consideration.

Figure 14 Cordeaux River – Original Design showing Area not constructed

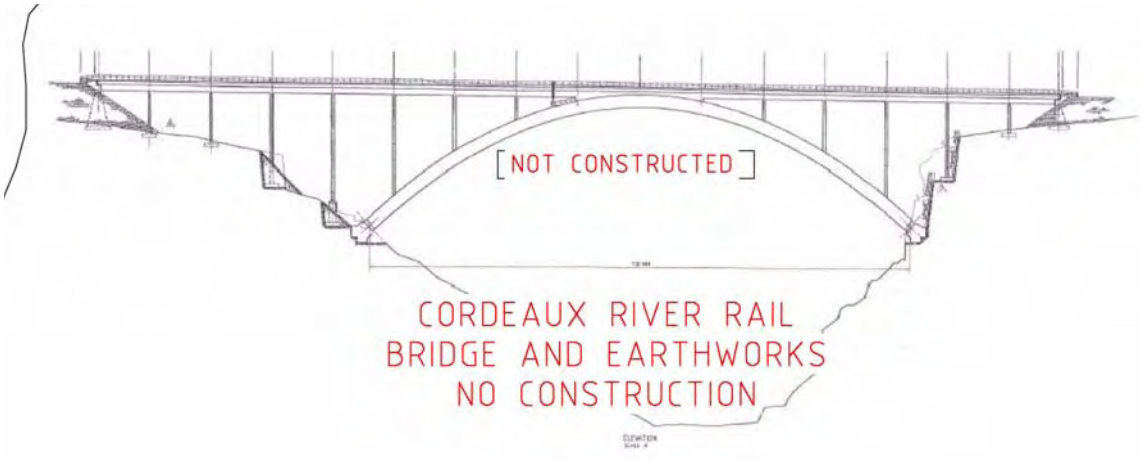
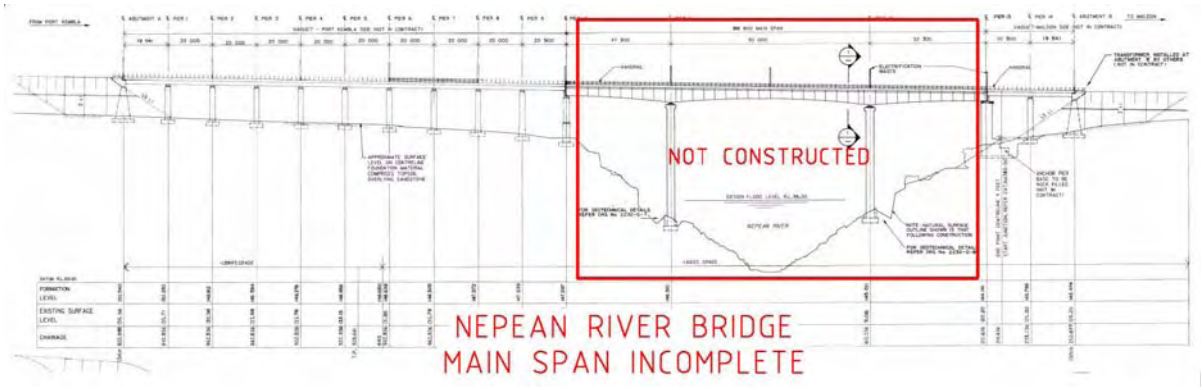



Figure 15 Nepean River Bridge – Original Design showing Area not constructed



## 3.10 Cost Requirements for Completion of the Line

In preparing the cost estimation, modern construction techniques (rather than original design technologies) were used, where deemed reasonable and value adding. The modern construction techniques included tunnel-boring machines, precast concrete tunnel linings, incrementally-launched bridges and precast prestressed and post-tensioned bridge systems. Consequently, several major elements of the infrastructure included in the estimate differ in either form or nature from that shown on the original drawings. Additional information relevant to the estimate is included in Appendix C1.

The estimated base cost to complete the project to original specifications, excluding electrification, would be approximately $550 million (January 2009 value). Electrification would increase the cost to approximately $749 million. Pricing of several of the major infrastructure elements has been verified by current contractors.

The estimates of the work to be completed (see Table 3) are base estimates and, as such, do not address the detailed construction risk profiles of the major tunnel or bridge works, potential impacts of changed design standards, the impacts of lapsed approvals, preparation of an Environmental Impact Statement, permits or changes to legislation or regulations, additional ARTC requirements for junction tie-ins, escalation or foreign exchange variations on overseas procurement, economic conditions or contractor market effects. Consequently, the estimate is considered to be a $P_{50}$ class estimate and, in this respect, there is an equal likelihood (50%) of the estimate being either exceeded or underspent.

Should more confidence be required in the estimate, then an ad hoc provision against the above mentioned risks and uncertainties (excluding escalation) could be made by adding a further 15-20% contingency to the costs. However it should be noted that this additional contingency is no substitute for a full risk-based assessment of the project which should rightly be the subject of a full feasibility study.

The order of accuracy of the base estimate for this pre-feasibility study is +/- 20% (as required by the terms of reference). It is noted that, for a study such as this, the accuracy is generally accepted as being +/-25%.

Considerable care should be taken in the use of these estimates, both in the reliance on their orders of accuracy, contingency, escalation and implied confidence levels.

## 3.11 Indicative Schedule

Indicative schedules have been developed for the proposed feasibility study and the construction project based on experience with other studies. The conventional (see Figure 23, in Appendix C) and fast track (see Figure 24, Appendix C) schedules should be considered as preliminary and can be refined with further definition of scope for the next stages.

The feasibility study could be completed with conventional project delivery in thirteen (13) months, whilst a fast track delivery would allow completion of the study in nine (9) months. Details regarding the qualifications around the preliminary schedule are included in Appendix C2. Estimated time for completion of construction with conventional delivery is approximately 39 months, whilst with fast tracking construction could be completed within 28 months.

Table 3 Estimated Costs to complete Proposed Maldon-Dombarton Rail Line

| Item | Description | Cost # ($ millions) | |
|---|---|---|---|
| | | Non Electrification | Electrification |
| Direct Capital | Site Infrastructure | $3.6 | $3.6 |
| | Bridges and Crossings<br>Nepean R Bridge: $28 million<br>Cordeaux R Bridge: $40 million | $113.4 | $113.4 |
| | • Tunnel Construction (4 km tunnel & fit-out)<br>• Tunnel boring: $73.1 million<br>Tunnel lining & fit-out: $47.5 million | $124.8 | $124.8 |
| | Earthworks and drainage | $83.7 | $83.7 |
| | Railway Construction & minor works<br>Track installed (incl. junctions): $39 million<br>Passing loops: $5.5 million | $47.7 | $47.7 |
| | Railway Electrical (railway signalling & electrification) | $13.600 | $153.4 |
| | *Sub-total – direct* | *$386.8* | *$526.6* |
| Indirect Capital | Project Indirects:<br>• EPCM (approx. 70%)<br>• Commissioning (approx. 4%)<br>• Owners costs (approx. 21%)<br>• Pre-running costs (approx. 5%) | $77.4 | $105.3 |
| | Contingency | $85.9 | $116.9 |
| | *Sub-total - indirect* | *$163.3* | *$222.2* |
| Total Estimate ( $2009) | | $550.1 | $748.8 |

# Qualifications:

- Bridge cost estimates made using a conceptual design using modern precast post-tensioned concrete construction;
- Estimates are base estimates and DO NOT address the risk profile of the major tunnel or bridge works. That is, the estimate is considered to be a $P_{50}$ and, in this respect, is equally likely to be exceeded or underspent;
- No allowance has been made in this base estimate for:
  - Sound barriers and noise mitigation matters;
  - Tunnel ventilation additional to the door concept discussed in Section 4;
  - Additional land acquisition;
  - Legal advice;
  - Planning or licence approvals for construction and operation;
  - Escalation, foreign exchange allowances or contractor market fluctuations; and
  - Additional studies to identify/quantify additional or indirect benefits of the proposed Maldon-Dombarton rail line.
- No allowance for purchase of land; and
- No allowance for preparation of additional environmental impact assessment.

Additional information on cost estimate is included in Appendix C1.

# 4. Technical and Operational Opportunities and Issues

## 4.1 Locomotive Technology

In the last decade, Australia's freight railways have undergone ownership and operational changes, as well as significant technological changes in diesel electric locomotives. In particular, these changes to greater efficiency, "gripping" power and reliability to the locomotives create vastly improve the capability of moving freight on the long 1-in-30 grades on the Maldon-Dombarton line. The original plan in the 1980s required the electrification of the line but, by 1996, electricity charges had increased significantly, making electric-powered locomotives less economic compared to the diesel ones. Operators such as Pacific National no longer use electric locomotives and, if the Dombarton-Maldon line was electrified, there would be considerable difficulties finding commercial electric locomotives to service the line. Diesel-powered locomotives offer relatively greater flexibility in that the only restrictions on its deployment will be axle loadings.

The arrival of new-generation diesel-powered locomotives with more effective gripping power will enable significant cost savings, when negotiating the 1-in-30 gradient Maldon-Dombarton Rail link. The benefits mean that only half the diesel locomotives used ten years ago will be needed to negotiate the steep grade out of Wollongong.

The need for additional tunnel ventilation has to be considered when using diesel electric traction instead of originally proposed electric traction. This study proposes the use of doors as an effective method of achieving this and further study is required for confirmation.

## 4.2 Electronic Train Brakes Technology

A recent development in train braking systems has been the introduction of electronic control of the train brakes in each wagon of the train, which overcomes a significant operating issue with older train air-braking systems that are slow to respond to the driver's application. This is a particular issue when controlling the speed of a train moving downhill, where delays and safety issues can result.

In relation to the operation of heavy trains down the 14 kilometres of 1-in-30 grade, the risks and operating issues will reduce in time as operators make decisions as to how and when they introduce electronic braking to their trains. Already, Queensland Rail National operates exclusively with electronic brakes in its coal fleet in the Hunter Valley. It is expected that all operators will follow suit with major new fleet purchases, and that some will retro-fit electronic braking to their existing locomotives and wagons.

In terms of benefits for the proposed Maldon-Dombarton rail line, the availability of locomotives with electronic brakes would improve efficiency of the freight rail line, reducing fuel consumption, increased network capacity, have longer and faster trains, reducing unexpected delays and "runaway" risks on steep grades. This will have the net effect of making the chosen line grading safer for loaded coal trains.

## 4.3 Electrification

The original Maldon-Dombarton railway project included providing the railway with overhead electric power wires to power trains. This study investigated the electrification option and provides an estimate for overhead electric power.

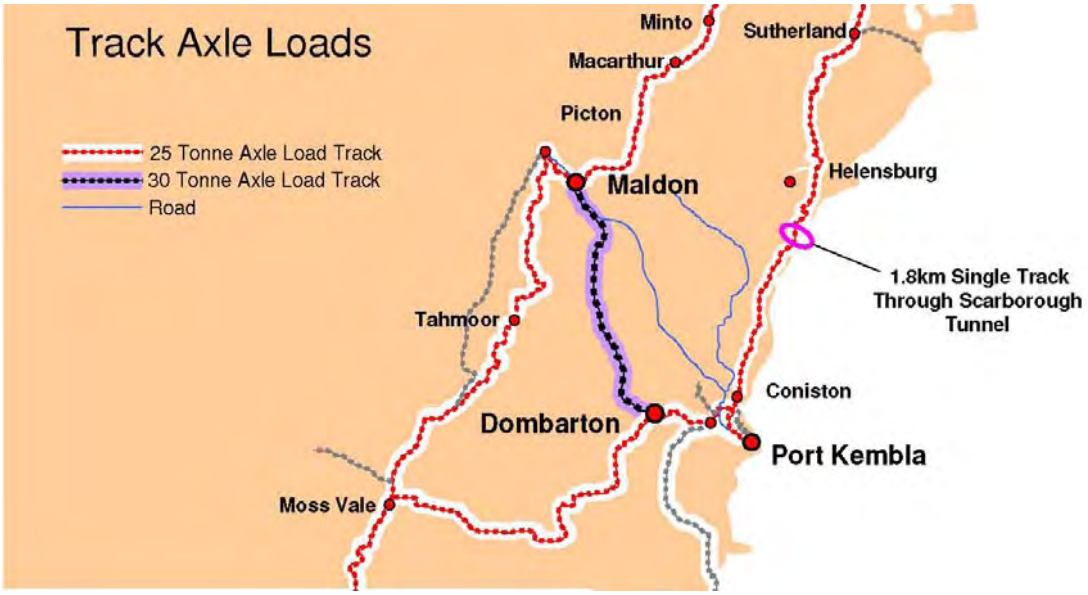
The review of electrification and its costs has indicated that there is likely to be little commercial value in providing overhead power, as railway operators in NSW have ceased to use electric powered locomotives to move freight, even where overhead power is available and when serviceable locomotives were available.

## 4.4 Axle Loads

The term "axle load" in relation to a railway refers to the maximum load that can be carried over that railway on each axle, on the two wheels of the axle. Current standards for railway construction in NSW would have the Maldon-Dombarton track constructed with a capacity to carry 30 tonne axle loads. This is the capacity of the tracks carrying coal to the port of Newcastle, where the existing tracks have been reassessed and upgraded, where necessary, to carry these axle loads. In general terms, the NSW rail network outside the Newcastle coal rail Network is limited to a maximum axle load of 25 tonnes or less (see Figure 16).

As the NSW rail network, into which the Maldon-Dombarton railway connects, is limited to a maximum axle load of 25 tonnes, there would be limited scope to utilise the greater capacity and operating efficiency of the 30 tonne axle load capacity of the Maldon-Dombarton Railway. Notwithstanding this, the 30 tonne axle load capacity could be considered for coal rail transport from the south-western coal fields, with some associated review of the implications and ability to increase axle loads over from Dombarton to the Port Kembla coal terminal.

Figure 16 Axle Loads



## 4.5 Capacity to move Trains carrying Double Stacked Containers

The railway can be constructed to allow trains travelling over it to carry containers that are stacked two high. This not only would require the new tunnel to be constructed larger than that which is proposed, it would also require that the line not be electrified. The tunnel size change to allow double stacking would increase the tunnel diameter by approximately one metre and its cross section by 25-30% (see Figure 17).

The review has indicated that, providing double stacked capability, although being an ARTC requirement, is unlikely to produce any short- or medium-term benefit. This is because there are significant limitations that currently preclude double stacking in the railways into which the Maldon-Dombarton railway connects (see Figure 18). These include:

- at the Maldon end on the main south:
  - to the north the overhead electric wires commence at Macarthur;
  - to the south a number of tunnels the first of which is near Picton; and
- at the Dombarton end on the Illawarra line at Unanderra, the railway is fitted with overhead electric wires.

Figure 17 Schematic showing Profile of Double Stacked Train in Tunnel

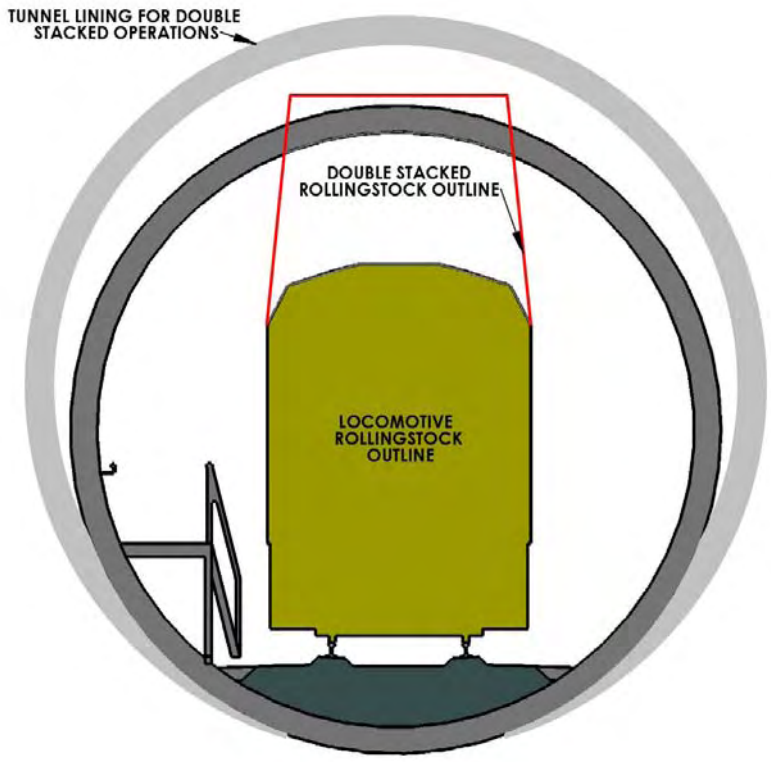
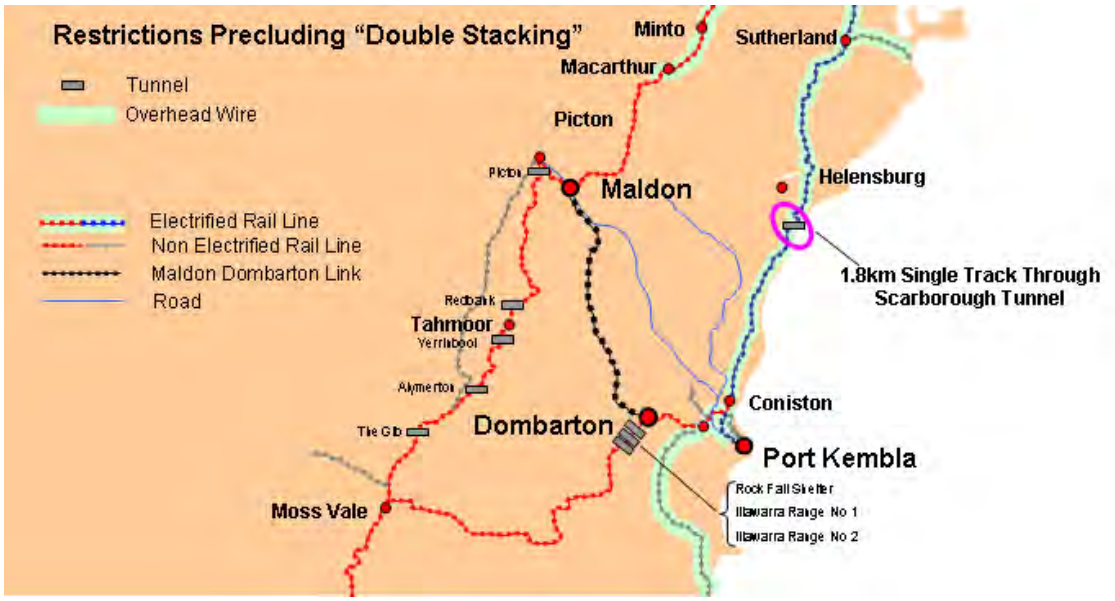


Figure 18 Adjacent Rail Network Limitations for Double Stacking




## 4.6 Steep / Limiting Grades

Currently, coal trains travelling from the Western Coalfields (Lithgow) to Port Kembla need to have sufficient power to travel (in the loaded condition) up the maximum track gradient on the journey. In addition to this, it is usually the practice to have sufficient locomotive power on the train to start on the grade from the stopped position. This is an important consideration to ensure that the train can move on, even after stopping. The maximum gradient encountered on this journey is 1-in-40. There are also other similar but slightly less steep grades (1-in-42, and 1-in-43) encountered on the western and Illawarra lines.

Empty coal trains returning to the Western Coalfields experience 1-in-33 grades in many locations on the western line between Valley Heights and Katoomba. For these coal trains, the maximum force to move the empty train (up 1-in-33) is around 25% to 30% of that required to haul the loaded train (up 1-in-40).

If these trains were travelling over the Maldon-Dombarton line, they would still encounter the 1-in-42 grade (Lithgow to Clarence) but encounter the steeper gradient of 1-in-30 on the return journey to Maldon.

For coal trains originating in the south-west (e.g. Glenlee - Winton), travelling to Port Kembla via Sydney will also encounter the steep grades on the Illawarra line (1-in-40 and 1-in-43: Como - Engadine) and will require similar locomotive power. In the event that these trains were to use the proposed Maldon-Dombarton line to get to the coal loader at Port Kembla, they would avoid the steep grades on the Illawarra line (Como - Engadine) and would encounter a maximum grade of 1-in-60. On the return journey, they would have to travel empty over the 14 kilometres of 1-in-30 grade.

For these trains, the maximum force to move the loaded train to Port Kembla via the Maldon-Dombarton line (1-in-60) is around 65% to 70% of that required to haul the loaded train through Sydney and over the Illawarra line (Como – Engadine: 1-in-40). The result of this is that trains

originating in the south-west (e.g. Glenlee – Winton) will be able to be hauled with fewer locomotives. Currently, these trains run with four 81-class locomotives hauling, whereas, using the Maldon-Dombarton line would reduce the required number of locomotives to three.

There are distinct advantages in using the Maldon-Dombarton line rather than the Illawarra line, including the use of less diesel fuel, efficiency improvements in freight movement as a dedicated freight line and reducing congestion on the Illawarra passenger service line, thus an overall reduction in delays and transport costs.

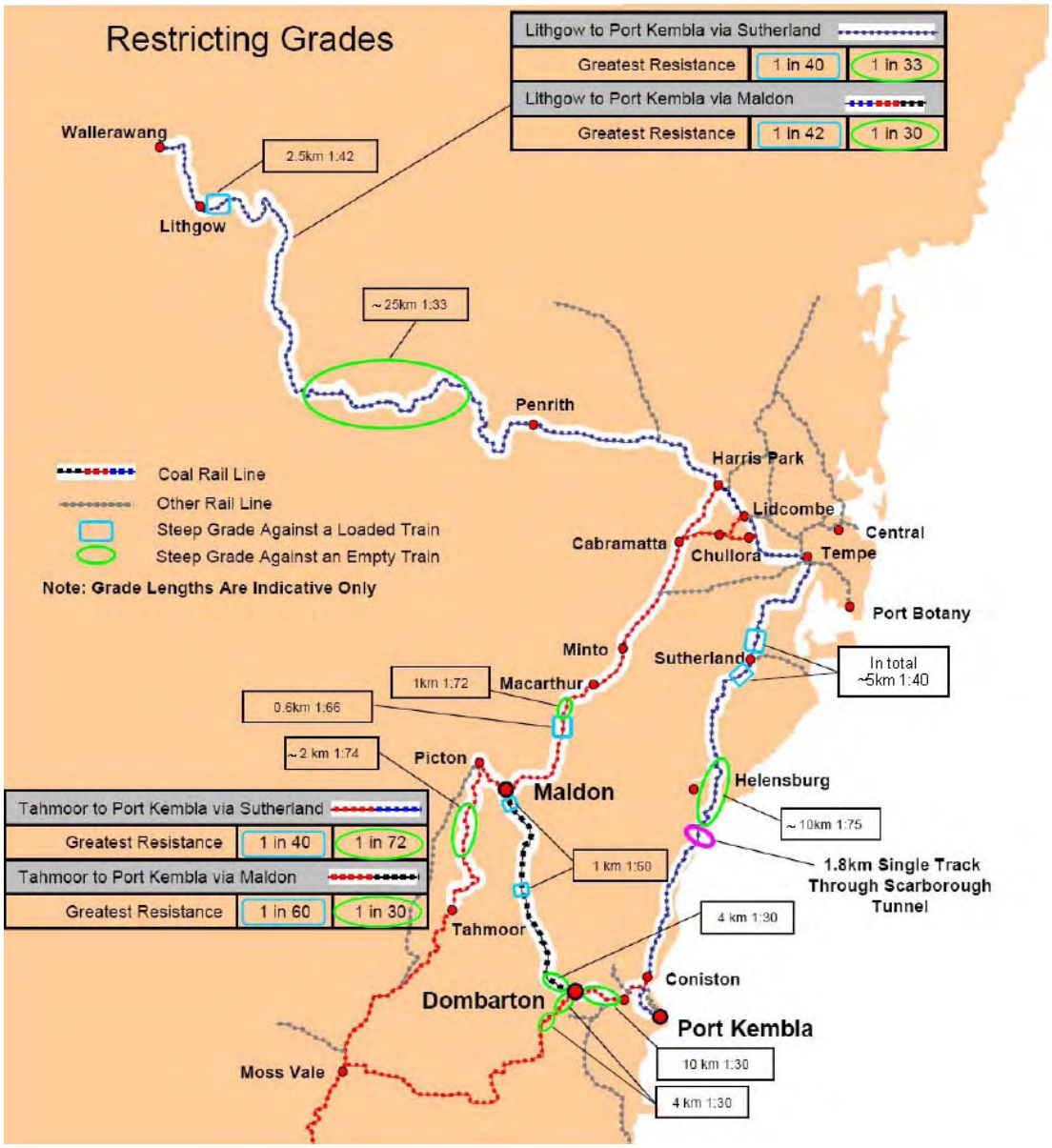
The proposed Maldon-Dombarton line improves the current situation that exists on the Moss Vale Unanderra line, where trains using this line out of Unanderra operate over a similar grade (approx. 1-in -30) and for a similar length (14 km). In addition, after approximately 700 metres, trains proceeding to Moss Vale then encounter another 4 kilometres of 1-in-30 grade. The Maldon-Dombarton line would offer a reduced risk factor for the steepest section of track through a tunnel where the track is covered and the rails do not get wet in the rain. The tunnel track is less curved and much stiffer, both of which result in less resistance to pulling a train.

There are geological issues associated with the Moss Vale and Illawarra lines. Loaded freight trains may worsen the condition of the track and there have already been issues with reliability in the last few years on each of these lines. The single line section of the Illawarra line between Scarborough and Coalcliff includes a narrow tunnel which limits the capacity on the Illawarra line. Additional information relating to the grades is shown in Figure 19.

It is understood that there are no plans to provide double track through this area to overcome the capacity limitations.

A reduction in the heavy freight trains will improve the reliability of passenger and other freight services on the Illawarra/Sydney line.

Figure 19 Limiting Grades




## 4.7 Train and Passing Loop Lengths

In determining the required length of passing loop for the proposed Maldon-Dombarton rail line, the products likely to be transported on the line were examined for train operations. This included determining the number, dimensions and carrying capacity of the various wagons and the number of locomotives required for the specific products (see Table 4), various grades encountered on the lines required to deliver the trains to the Maldon-Dombarton connection. This enabled an estimate of the train lengths for the various products being transported.

Table 4 Potential Product considered for Maldon-Dombarton Line

| Product | Number of wagons/cars (approximate) | Approximate train length (metres) |
|---|---|---|
| Coal | 45 | 854 |
| Grain both export and domestic | 40 | 618 |
| Limestone | 34 | 625 |
| Minerals & Iron Ore | 35 | 650 |
| Motor vehicles | 19 | 452 |
| Intermodal | 25 | 600 |
| Passengers | 8 | 180 |

The most appropriate length for passing loops considers all combinations of trains and products. Since the coal trains are the longest for the proposed line, then a passing loop of 900 metres would be adequate for all trains other than future intermodals. This passing loop length does not meet ARTC standards.

## 4.8 Traffic Capacity and Curfews

The Illawarra freight train chain capacity has some challenging system characteristics. RailCorp advice is that there are no formal curfews on freight trains in the greater Sydney metropolitan area. Freight train paths are designed to give priority to suburban and interurban trains in order to minimise disruptions to these passenger systems. As a result, freight train paths are designed inline with insufficient passing loops along the track infrastructure. Consequently, track redundancies are limited and, thus, there is lower utilisation of freight train paths.

The Maldon-Dombarton line has the potential to provide an additional link between the Main Southern and the Illawarra lines, creating a suitable redundancy in the event of an incident on either line. Information provided by RailCorp (pers. com. RailCorp operations staff) and Port Kembla Port Corporation has indicated that existing infrastructure on each side of the Maldon-Dombarton line (Main Southern and Illawarra line) has the capacity to feed and not restrict the Maldon-Dombarton line. This means the Maldon-Dombarton line could potentially provide a greater freight train path utilisation due to increased capacity and track redundancy.

## 4.9 Passenger Train Operations

The proposed Maldon-Dombarton railway will support the diesel powered passenger trains that operate elsewhere in NSW. Endeavour railcar trains (see Figure 20) that are currently in operation in NSW have operated over the track between Unanderra and Moss Vale and would be suitable for this task. These trains currently operate beyond Kiama to Bomaderry and on the Main South line through Maldon.

It is noted that the proposed tunnel will have air monitoring equipment to ensure the air in it meets a suitable quality before a further train will be admitted to the tunnel.

Figure 20 A Passenger Rail Car (Endeavour) near Maldon


## 4.10 Tunnel and Ventilation

The tunnel will be cut by using a tunnel boring machine which will produce a circular tunnel. This is the most cost-effective construction method and provides the best result, allowing for the options of adequate space for all types of wagons and locomotives, as well as walkways and additional area for ventilation.

Using diesel engines in tunnels requires ventilation which can be provided by ventilation shafts and physical ventilation. The 1-in-30 gradient of the proposed tunnel will allow natural ventilation of the tunnel by the passage of a train. A "door" is proposed for the eastern portal, which will generally be open but will close behind the west-bound trains. This ventilation mechanism system has been used successfully at Rogers Pass (Canada), Trans-alpine pass (Christchurch to Greymouth in New Zealand) and Cascade Tunnel in the Rocky Mountains (USA).

The tunnel will be monitored for temperature, gas concentration, particulate matter and air velocity. In the event these measured values exceed the specified guidelines, locomotives will electrically shut down.

Other matters, such as drainage, fire and life systems, emergency lighting and communication, will need to be considered in finalising the tunnel design.

## 4.11 Compatibility of Passenger Services on the Line with Freight Trains

Passenger services have been considered between Unanderra and Macarthur, with trains either being powered by 1500 volts DC or self-propelled diesel rail cars, such as those currently available in the Endeavour fleet.

At present, there is no 1500 volts DC power available between Unanderra and Macarthur, and 45 kilometres of new power infrastructure would be required, complete with sub-stations and other safety equipment. It is estimated that the cost of transformers and electrification of the double track between Unanderra and Port Kembla, as well as electrification between Macarthur, would be approximately $150 million. The return on investment and cost benefit assessment for the expected traffic flows would make this a less attractive proposition, due to the high costs.

The use of diesel passenger rail cars, such as those currently used for the Moss Vale-Unanderra line, is unlikely to cause any issues of compatibility with freight trains.

## 4.12 Mine Subsidence Issues and Mitigation

Coal reserves are located under the Maldon-Dombarton rail corridor and detailed investigation of the impacts of mine subsidence on the proposed rail line will be required as part of more detailed investigations.

## 4.13 Track Ownership

Construction for the Maldon-Dombarton Rail Project was started in 1983 and stopped in 1988. At that time, it was owned by the State Rail Authority. It is currently owned by the Rail Infrastructure Corporation and is classed as Country Rail Network (CRN) Non Operational. It forms a link to two lines which are part of the ARTC-leased network (see Figure 21).

A decision to build the Maldon-Dombarton line today would be based on modern standards and technologies and reflect the service and performance standards required by the user to make it competitive in its markets place both currently and into the future. It is noted that the defined interstate rail network may reflect higher standards established by the Australian Transport Council performance standards than required by the users.

## 4.14 Statutory and Planning Framework

There have been numerous changes to environmental and planning legislation since the preparation of the Environmental Impact Statement for the project which was completed in 1983 (Dames and Moore, 1983).

Assessment and approval for major infrastructure projects in New South Wales are considered under Part 3A of the NSW *Environmental Planning and Assessment Act, 1979* (EP&A Act), when declared by Ministerial Order or by a State Environmental Planning Policy (SEPP). The need for development consent for this proposal is negated by SEPP (Infrastructure) Policy. However, a project application and preliminary environmental assessment will assist the Department of Planning in determining the requirements for the key issues to be addressed in the environmental assessment.

### *4.14.1 State Environmental Planning Policies (SEPPs)*

#### State Environmental Planning Policy (Infrastructure) 2007

The aim of the SEPP (Infrastructure), 2007 is to clearly define the environmental assessment and approval process for public infrastructure and, in general, override the consent requirements for Regional Environmental Plans. Clause 79 (1) deems that "Development for the purpose of a railway or rail infrastructure facilities may be carried out by or on behalf of a public authority without consent on any land" and includes reference to operational, construction and associated activities relating to rail infrastructure.

The proposal is appropriately characterised as development for the purposes of a railway. Clauses 79 and 94 allow development without consent. Whilst development consent is not required to construct or operate the railway, there is an obligation under Part 5 EP&A Act to consider the environmental impacts of this activity.

Road haulage of coal to the Port Kembla Coal Terminal was previously regulated by SEPP No 7 Port Kembla Coal Loader (1982), which has now been replaced by the Infrastructure SEPP 2007. Generally, transport is restricted to hours between 7.00 am and 6.00 pm Monday to Saturday, with no transport on Sundays or public holidays. This applies to haulage of coal on the Springhill Road and Port Kembla Road, between Masters Road Mount St Thomas/Coniston and Old Port Road Port Kembla.

The Infrastructure SEPP identifies requirements for consultation with local government and other public authorities, including:

- Local councils - Part 2, 1, 13–15 set out consultation requirements relating to potential impacts on council-related infrastructure or assets, local heritage and flood liable land; and
- Public authorities other than councils - Part 2, 1 and 16 require consultation with specified authorities (other than councils), which involves provision of written notice of the proposal to specified authorities and consideration of their responses.

Consultation should be undertaken with the three councils affected by the proposal (Wollongong City Council, Wollondilly Shire Council and Wingecarribee Shire Council) and with the Sydney Catchment Authority (SCA), Department of Environment and Climate Change, Department of Primary Industries and the Department of Water and Energy during the development of a Review of Environment Factors (REF) to ensure consistency with relevant regulatory controls that will apply.

#### State Environmental Planning Policy No 44 – Koala Habitat Protection. (SEPP 44)

Schedule 1 of SEPP 44 identifies that koala are known to occur in each of Wingecarribee Shire Council, Wollondilly Shire Council and Wollongong City Council. While the requirements of the SEPP 44 do not apply to this proposal, it is good practice to consider SEPP 44 criteria in the environmental impact assessment.

A detailed flora and fauna assessment will need to be prepared for the proposal. The flora and fauna assessment should consider any potential impacts on koalas, koala feed trees or their habitat.

### *4.14.2 Other State Legislation*

The provision of the SEPP Infrastructure overrides the consent requirements for the Regional Environmental Plans (REPs) and various state legislation. However, Part 1 of the SEPP Infrastructure states that:

> *Nothing in this Policy (except clause 9) affects any requirement under another Act to obtain an approval, licence or permit for or concurrence to any development of a kind specified in Part 3. Examples of Acts imposing such requirements include the Fisheries Management Act 1994, Forestry Act 1916, Heritage Act 1977, Mine Subsidence Compensation Act 1961, Mining Act 1992, National Parks and Wildlife Act 1974, Protection of the Environment Operations Act 1997, Roads Act 1993, Rural Fires Act 1997 and Water Management Act 2000.*

The SEPP also states that "Development that does not require consent under Part 4 of the [EP&A] Act and is not a project to which Part 3A of the [EP&A] Act applies or exempt development will be subject to the environmental assessment and approval requirements of Part 5 of the [EP&A] Act". The preparation of an environmental assessment under Part 5 should address these matters:

- *Protection of the Environment Operations Act (NSW),* 1997 – to determine whether an environmental protection licence is required for construction activities. The works will involve the excavation works and the extraction of more than 30,000 tonnes of material and be deemed a scheduled activity pursuant to the Protection of the Environment Operations Amendment (Scheduled Activities and Waste) Regulation 2008 and thus an Environment Protection Licence will be required.
- *National Parks and Wildlife Service Act (NSW),* 1974 – to determine any consents in relation to the management of Aboriginal sites.
- *Threatened Species Conservation Act (NSW),* 1995 (TSC Act) – to determine any considerations in relation to threatened species or endangered ecological ecosystems. The railway route traverses mostly uncleared land through the Illawarra Escarpment and the Metropolitan Special Area catchment lands and is known to include threatened species and endangered ecological communities. Section 5A of the EP&A Act lists a number of factors to be taken into account in deciding whether there is likely to be a significant impact on threatened species, populations or ecological communities or their habitats. A detailed assessment will be required to determine if the proposal is likely to have a significant impact on any species or communities listed under the TSC Act. A Species Impact Statement is required if a significant impact on a threatened species, population or ecological community, or ecological community, or its habitat is identified.
- *Fisheries Management Act (NSW),* 1994 - Provisions in Part 7A covers the identification, assessment and proclamations of threatened species, populations and ecological communities and key threatening processes. The railway requires several crossings of watercourses and licence or permit conditions cannot be established until a detailed assessment of significance for threatened species is undertaken (EP&A Act seven part tests). Permits are required for:
  - dredging or reclamation work (Division 3, Section 198-204); and
  - works that may affect fish passage (Division 8, Section 218-220).

### *4.14.3 Regional Environmental Plans (REPs)*

The provision of the SEPP Infrastructure overrides the consent requirements for the Regional Environmental Plans (REPs). However, consideration for various matters during construction and operation of the railway will need to consider the REPs outlined below.

#### Drinking Water Catchment Regional Environmental Plan No 1

The aim of the Drinking Water Catchments Regional Environmental Plan No 1 (REP) is to create healthy water catchments that will deliver high quality water while sustaining diverse and prosperous communities, and came into force on 1 January 2007. The REP includes provisions for assessment and approval of development and activities under Parts 4 and 5 of the EP&A Act and these apply to proposals located within the Special Areas. The proposal is located within the Upper Nepean River sub-catchment, which is within the hydrological catchment of Sydney's drinking water supply and within the Metropolitan Special Area.

Activities within the drinking water catchment area are governed by the Sydney Water Catchment Management Regulation 2008 for environmental and water quality protection purposes. In particular, development and activities within the Metropolitan Special Area must incorporate any current recommended practices and performance standards consistent with the Special Areas Strategic Plan of Management 2007 (SASPoM) (SCA, 2007).

#### Illawarra Regional Environmental Plan No 1

The Illawarra REP No 1 (IREP 1) aims to maximise the opportunities for the people of the region and that State of NSW to meet their individual and community economic and social needs, with particular reference to the way in which these needs are related to the allocation, availability, accessibility and management of the region's land resources, having regards to the objectives specified in Parts 2 – 16 of IREP 1. IREP 1 applies to the whole of Wollongong City Council and Wingecarribee Shire Council local government areas (LGA). This instrument has generally been superseded by the Illawarra Regional Strategy, but has yet to be repealed.

#### Illawarra Regional Strategy 2006-31

The Illawarra Regional Strategy includes an aim to protect strategic transport corridors, including the existing Maldon-Dombarton rail corridor. It has a strong focus on job creation, including capturing the economic benefits of the expansion of Port Kembla, to which the completion of the rail line would be a significant contribution.

#### Sydney Regional Environmental Plan No 20 – Hawkesbury Nepean River

The aim of the Sydney Regional Environmental Plan No 20 – Hawkesbury Nepean River (No 2 – 1997) (SREP 20) is to protect the environment of the Hawkesbury-Nepean River by ensuring that the impacts of the future land uses are considered in a regional context. SREP 20 applies to the whole of the Wollondilly LGA, as it is part of the Hawkesbury-Nepean catchment area.

Part 2 Clauses 5 and 6 of SREP 20 set out general and specific planning policies that must be considered when determining activities under Part 5 of the Environment Planning and Assessment EP&A Act.

### *4.14.4 Local Environmental Plans (LEPs)*

The proposal is located within three local government areas: Wingecarribee Shire Council, Wollondilly Shire Council and Wollongong City Council. As such, public utility undertakings (being rail transport undertakings) are exempt from the need to obtain development consent. The rail corridor has been identified on LEPs, and local zonings have taken this into consideration.

The Illawarra Escarpment Strategic Management Plan (Wollongong City Council 2007) has identified areas of the escarpment in the Dombarton area as "core" and "biophysical support", which identifies escarpment and foothill land with high environmental values and are part of important ecological corridors.

### *4.14.5 Commonwealth Legislation*

Under the provisions of the *Environment Projection and Biodiversity Conservation Act (Cth),* 1999 (EPBC Act), actions that are likely to have a significant impact on a matter of national environmental significance (NES) or on the environment of Commonwealth land require Commonwealth assessment and approval. Matters of NES are listed threatened species and ecological communities, migratory species protected under international agreements, Ramsar wetlands of international importance, the Commonwealth marine environment, World Heritage properties, National Heritage places and nuclear action.

An assessment of the proposal against matters of NES needs to be conducted. The proposal may need to be referred to Australian Government's Department of Environment, Water, Heritage and the Arts (DEWHA) for determination as to whether or not the action is a controlled action.

## 4.15 Environmental Assessment Issues

An environmental assessment will be required to supplement information prepared for the original EIS, and to update and clarify planning requirements and any new environmental information.

Vegetation is largely undisturbed throughout the SCA-controlled lands except for cleared intrusions for service roads, fire trails and the original alignment of the rail line. There has been further residential and commercial development in areas around Wilton, and re-zoning of lands.

Environmental and social issues to be considered will include:

- Need to determine whether the existing construction work is consistent with the approvals and permits required.
- Need for further vegetation clearing in SCA area to establish usual firebreak for rail infrastructure.
- Protection of threatened species and endangered ecological communities, and investigation of environmentally sensitive areas.
- Erosion control and water management measures (e.g. bunding, swales etc.) will need to meet the requirements of the SCA for the protection of Sydney's drinking water catchments, both for construction activity as well as operation and maintenance of the railway.
- Spoil management - excavation of material from tunnel, ventilation shafts and cuttings and associated impacts. Opportunities for reuse of material should be sought.
- Noise and dust generated from train movements adjacent to residential areas (Farmborough Heights and Wilton) and through the SCA Metropolitan Special Area.
- Construction activities at river crossings and upland swamps, in terms of protection of water quality, aquatic and terrestrial flora and fauna.
- Increased reliability and lower transit times, as well as benefits arising from modal shift.
- Disturbance associated with the construction and operation of maintenance and access roads.

- Environmental incident mitigation and management.
- Potential for locating or disturbing of sites with indigenous artefacts or significance.

A Construction Environmental Management Plan will need to address the environmental protection issues (soil and water management), social and cultural heritage and incident management issues, and activities within the SCA lands will need to meet the requirements of the SASPoM.

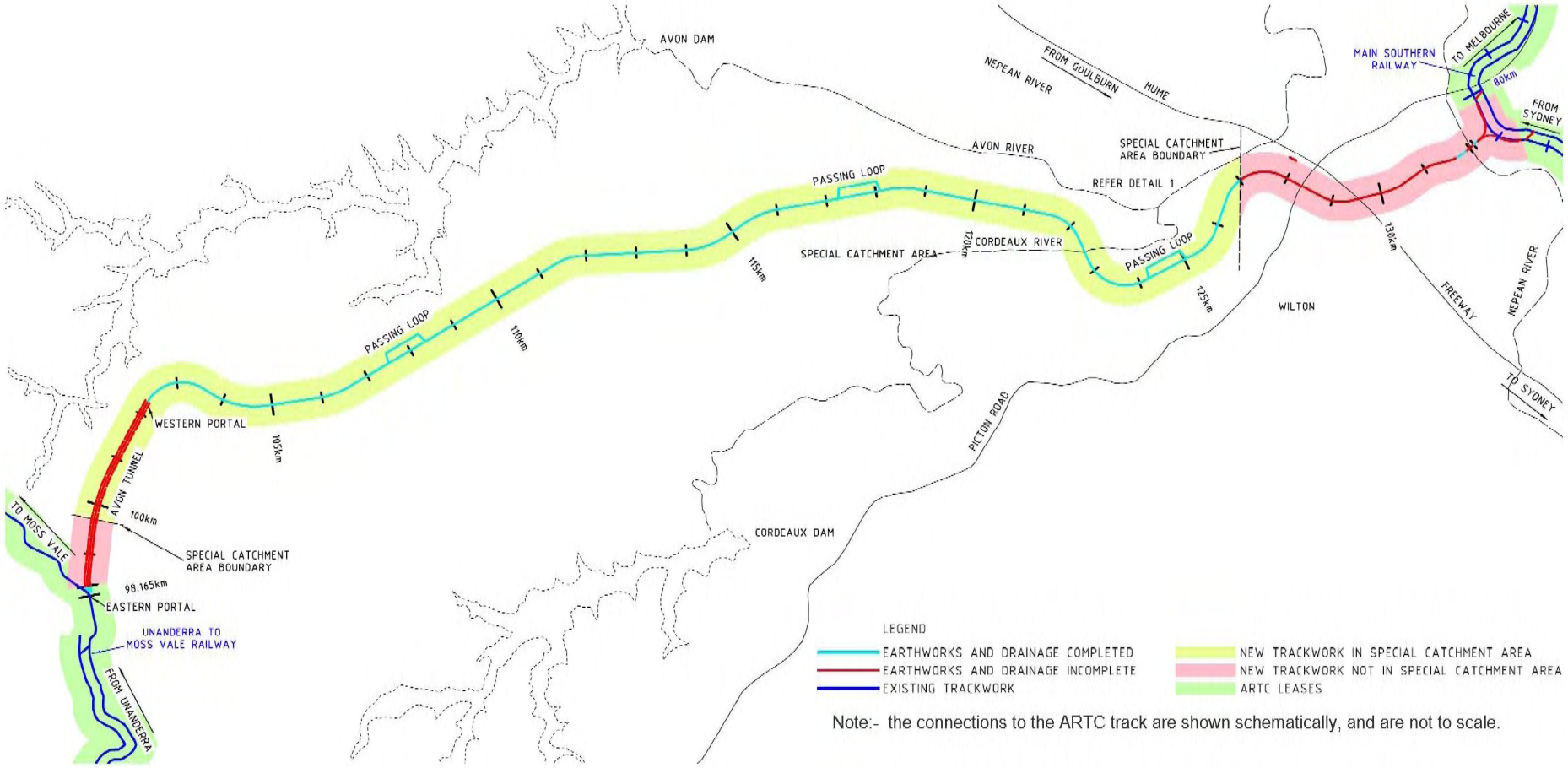
### 4.16 Sustainability and Climate Change

Transport is one of the fastest growing sources of greenhouse gas emissions, mainly due to growth in road transport. Rail is widely acknowledged as a low-carbon form of freight transport and it would seem logical that increasing the use of rail would be encouraged as part of Australia's overall plan to reduce carbon emissions from the transportation sector. According to the Australian Rail Association, a train between Melbourne and Sydney will use 45,000 litres less fuel, replace 145 semi-trailers and save 135 tonnes of greenhouse gas emissions. There are also savings in other externalities, such as tyre compound wear and road congestion.

Specific examples of reduction in carbon emissions with the completion of the Maldon-Dombarton line are:

- Diversion of freight trains from the Illawarra line will improve the reliability of the passenger transport network on that line.
- Diversion of grain haulage from western NSW through to Port Kembla, reducing rail congestion to the Port of Newcastle.
- Technological innovations in rail, such as braking and locomotives, will play a part in reducing green house gas emissions. The fight against climate change will be based on technological innovation and behaviour change.
- Potential for use as a passenger rail line and consequent reduction in passenger vehicle trips.
- Reduction in the number of coal and other freight truck movements, leading to improvements both for traffic and road condition improvements.
- Energy efficiency of rail transport is greater than road transport and the diversion of freight from road to rail will reduce greenhouse gas emissions;

Figure 21 Track Ownership



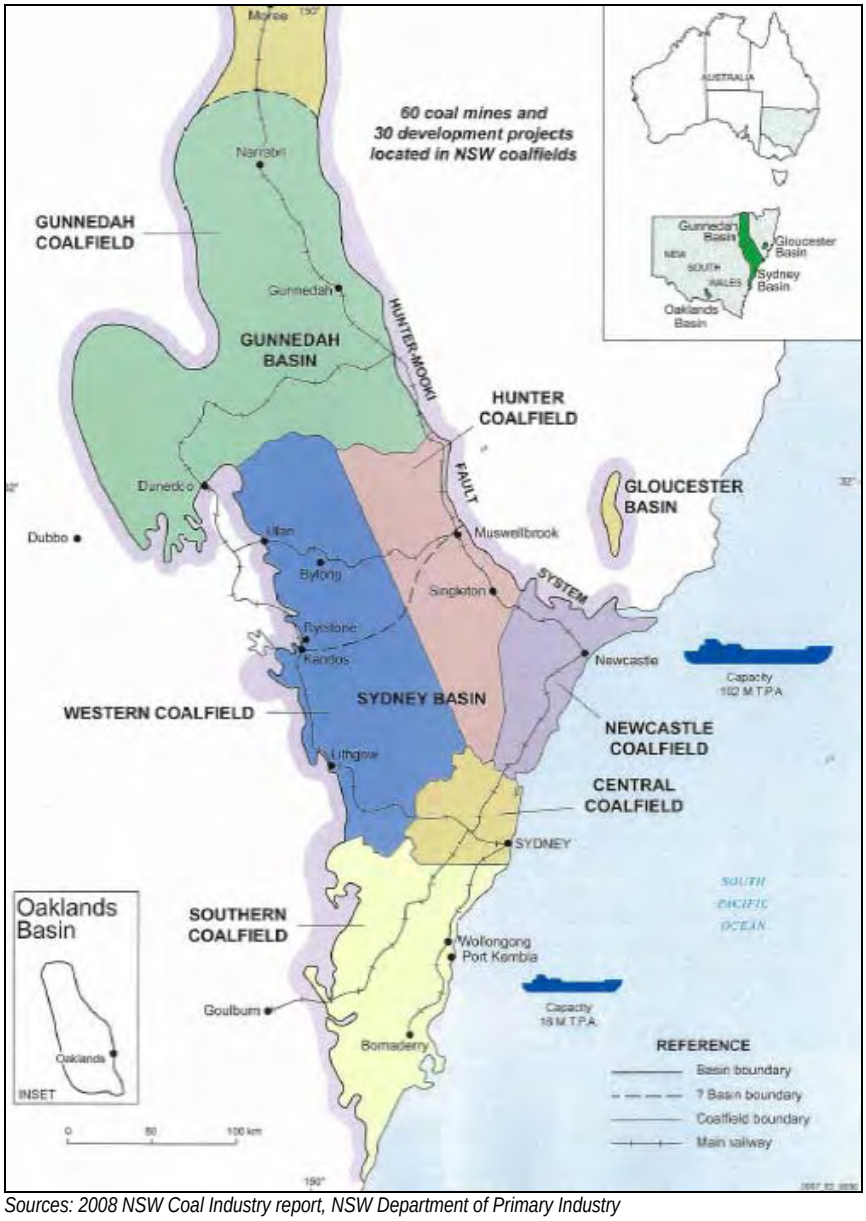
# 5. Freight Transport and Markets

The port of Port Kembla is primarily an export gateway, catering for bulk coal, grain and minerals export trades (see Figure 22). The area is also a major manufacturing centre, with the BlueScope Steel Mills the dominant consumer of raw materials and producer of domestic freight in the region.

The existing road and rail infrastructure carries large volumes of coal, minerals, grain and steel into and out of Port Kembla, and many of these volumes are forecast to grow over the next 20 years. New types of freight could also be generated as Port Kembla Port Corporation takes on new roles from the constrained Sydney ports.

It is highly likely the volume growth in export and domestic freight into/out of Port Kembla would encourage haulage companies to utilise the Maldon-Dombarton line, if constructed.

Figure 22 New South Wales Coal Fields




*Sources: 2008 NSW Coal Industry report, NSW Department of Primary Industry*

A detailed analysis of the freight and transport markets was undertaken and is reported in detail in Appendix B.

## 5.1 Existing Trades in the Region

Coal and grain are the major commodities currently handled by rail, with coal mines in the Southern and Western Coalfields exporting through Port Kembla. Exports have now reached almost 13 MTPA after several years at around 9 MTPA. Almost a third is hauled to port by road from nearby mines, while the remainder is transported from more distant sites, mostly west of Lithgow, via the Western and Illawarra rail corridors. A further 3 MTPA of coal is hauled by private rail network into BlueScope for domestic and export purposes.

Grain from the southern and western growing areas is exported from Port Kembla, but volumes have been in decline since 2000 due to prolonged and severe drought events and higher domestic consumption. Export trains currently use the Moss Vale-Unanderra line, while flour and grain services to the Manildra plant at Nowra also use the Illawarra line. Grain trains are not significant users of rail in this region and the train capacity does not exist to move large volumes to port in the heavy seasons. This is due to the limited number of suitable and available wagons and a reluctance to invest in more wagons, since the return on the freight is not apparently justified. The new Melbourne terminal is now the preferred export point for grain grown in the far south-west of NSW.

## 5.2 Future Trade – Coal, Grain and Minerals

Two views of future demand to 2030 have been analysed (Conservative and Optimistic) and, generally, the Conservative forecast is based on the assumption that existing mine sites have a finite life and the output from new coal mine sites will replace the output of some of the existing sites, as well as creating volume growth. The Optimistic view assumes that vast majority of existing sites remain operational by 2030 and all of the known new sites are operating by 2030.

Potential mine developments in both the Western and Southern Coalfields will lead to further export increases, particularly when strong international commodity prices return and credit flows return to normal.

The Maldon-Dombarton line will benefit from State Environmental Planning Policy (SEPP) 7 which limits the amount of road haulage of coal into Port Kembla, and nearly all new developments can be assumed to be rail users. This includes potential new mines in the Western Coalfields and Oaklands areas west of Albury.

Export volumes of grain through Port Kembla are unlikely to increase in the foreseeable future, unless GrainCorp decides to close the Newcastle export terminal in response to falling NSW export tonnages and urban encroachment.

There is considerable potential for growth of bulk product haulage of other commodities such as copper concentrate, limestone and rail ballast. A major iron ore mine is being planned for western NSW, which could produce up to 3 MTPA. Other goods, such as oilseeds, cement and sand, are also potential users of rail infrastructure in the future. Steel volumes, too, are expected to increase in line with domestic growth, with some of the road-hauled product attracted to rail if the Maldon-Dombarton corridor was built, providing a more direct route into western Sydney distribution centres, although there are cost and convenience barriers to overcome.

## 5.3 Intermodal Potential

In October 2003, the NSW Government announced the Ports Growth Plan. The Plan provides a framework which the Government, industry and the community will work to ensure the future growth and development of port capacity in NSW. One of the core directions of the plan was that containers, general cargo and car stevedoring from Port Jackson will be progressively encouraged to relocate to Port Kembla. The Plan will distribute the benefits of port growth more equitably between Sydney, the Hunter and Illawarra regions, and will provide long-term capacity for containers, bulk goods and general cargo.

The efficient transport of international containers in NSW will be a particularly important part of the state's infrastructure demand and could be enhanced on the Maldon-Dombarton line being built. This chain would arise from the need for a new container port for Sydney and NSW as Port Botany (and its transport network) reaches capacity. Port Botany, for the last 30 years, has handled virtually all of NSW's container trade and has experienced an average annual growth rate of 8%. The port handled 1.78 million containers (TEUs) in 2007/08 and this figure is projected to continue growing at 5-6% per year, and exceed 3 million (TEUs) by 2025.

Port Kembla Outer Harbour is well positioned to develop a container port that could supply containers cheaply into major industrial areas in Sydney's south and south-west. The Maldon-Dombarton would provide an unimpeded freight-only, rail corridor allowing for train efficiencies unachievable on the shorter Port Botany – south western Sydney corridor. The operating model is based on the assumption that an 'inland port' terminal model would be used in south western Sydney, allowing for quick train loading/unloading at each end of the cycle and 24/7 operations.

Additional expansion works would be required at Port Kembla port to facilitate this potential. The Optimistic Case includes approximately 4 MTPA of intermodal freight of this nature and, thus, the completion of the proposed Maldon-Dombarton rail line presents an opportunity to develop intermodal terminal facilities to handle bulk and container freight seamlessly at Port Kembla.

## 5.4 Future Trade Forecasts

Future potential freight volumes to 2020 and 2030 have been estimated in both Conservative and Optimistic cases (see Table 5 Current and Future Volumes for Both Cases are shown below (a, b
). The Conservative case consists of coal, grain and minerals volumes with low growth forecasts and discounted volumes for proposed coalmines that may or may not go ahead by each milestone year.

The Optimistic case includes greater future coal volumes derived from application of higher probability figures for the new mines being developed. This case also includes assumptions regarding quantum increases, due to specific policy decisions (such as the closure of the Newcastle grain export terminal) and the development of new trades focused on Port Kembla Port. In particular, the development of new intermodal (container) and motor car supply chains are assumed.

The Optimistic Case also assumes that motorcars can be transferred to rail with the associated development of holding yards in the south-western Sydney area. The Optimistic Case therefore constitutes the upper cap on volumes that will use rail corridors into Port Kembla.

Table 5 Current and Future Volumes for Both Cases are shown below (a, b

Conservative forecast freight volumes ('000 tonnes)

| PK freight summary | current | | 2020 | | 2030 | |
|---|---|---|---|---|---|---|
| | Road | Rail | Road | Rail | Road | Rail |
| Coal | 5,000 | 7,360 | 4,571 | 11,049 | 3,715 | 14,668 |
| Grain | 100 | 1,400 | 90 | 1,568 | 82 | 1,820 |
| Other mining | 285 | 1,850 | 340 | 4,491 | 324 | 7,439 |
| Steel | 1,000 | 1,000 | 1,219 | 1,219 | 1,486 | 1,486 |
| Intermodal | - | - | - | - | - | - |
| Motor | - | - | 210 | - | 420 | - |
| mode total | 6,385 | 11,610 | 6,430 | 18,326 | 6,027 | 25,413 |
| Total | 17,995 | | 24,757 | | 31,440 | |

Optimistic forecast freight volumes ('000 tonnes)

| PK freight summary | current | | 2020 | | 2030 | |
|---|---|---|---|---|---|---|
| | Road | Rail | Road | Rail | Road | Rail |
| Coal | 5,000 | 7,360 | 4,571 | 13,099 | 5,572 | 19,228 |
| Grain | 100 | 1,400 | 100 | 2,009 | 100 | 2,698 |
| Other mining | 285 | 1,850 | 365 | 7,641 | 412 | 9,188 |
| Steel | 1,000 | 1,000 | 1,219 | 1,219 | 1,486 | 1,486 |
| Intermodal | - | - | - | 2,149 | - | 3,849 |
| Motor | - | - | 210 | - | 420 | - |
| | 6,385 | 11,610 | 6,465 | 26,117 | 7,990 | 36,448 |
| Total | 17,995 | | 32,582 | | 44,438 | |

## 5.5 Corridor Scenarios

The allocation of all current and potential freight traffic types to the road and rail corridors available depends on several factors, including path availability, trucking and rail operating costs, rail access charges, passenger train congestion, carbon costs, etc.

This report has considered four future corridor scenarios for use of the rail network, with B the most probable and D the most optimistic.

A New and existing traffic in the immediate Maldon area uses the Maldon-Dombarton line (essentially Tahmoor Coal Mine and some new mines).

B Additionally, volume growth over and above that traffic currently using the Illawarra line switches to the Maldon-Dombarton line.

C All freight currently using the Illawarra line switches to the Maldon-Dombarton line to allow for passenger train growth on the Illawarra.

D Additionally, all freight on the Moss Vale-Unanderra line also switches to the Maldon-Dombarton line, due to improved operational features of the new line.

The forecast tonnages of coal transported on each rail corridor under these four scenarios are summarised in Table 6.

Table 6 Forecast Coal Tonnages

Conservative forecast

| Current Volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Rail | | | | | |
| *Inner rail* | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| *Moss Vale - Unanderra* | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Illawarra* | 5.7 | 5.7 | 5.7 | 1.4 | 1.4 |
| *Maldon Dombarton* | 0.0 | 1.7 | 1.7 | 6.0 | 6.0 |
| Totals | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |

| 2020 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Rail | | | | | |
| *Inner rail* | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 |
| *Moss Vale - Unanderra* | 5.7 | 2.3 | 2.3 | 2.3 | 0.0 |
| *Illawarra* | 5.4 | 5.4 | 3.5 | 1.3 | 1.3 |
| *Maldon Dombarton* | 0.0 | 3.4 | 5.3 | 7.5 | 9.8 |
| Totals | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 |

| 2030 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| Rail | | | | | |
| *Inner rail* | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 |
| *Moss Vale - Unanderra* | 8.4 | 4.1 | 4.1 | 4.1 | 0.0 |
| *Illawarra* | 6.3 | 6.3 | 2.9 | 1.0 | 1.0 |
| *Maldon Dombarton* | 0.0 | 4.3 | 7.7 | 9.5 | 13.6 |
| Totals | 21.4 | 21.4 | 21.4 | 21.4 | 21.4 |

Optimistic forecast

| Current Volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Rail | | | | | |
| *Inner rail* | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| *Moss Vale - Unanderra* | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Illawarra* | 5.7 | 5.7 | 5.7 | 1.4 | 1.4 |
| *Maldon Dombarton* | 0.0 | 1.7 | 1.7 | 6.0 | 6.0 |
| Totals | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |

| 2020 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Rail | | | | | |
| *Inner rail* | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 |
| *Moss Vale - Unanderra* | 6.8 | 3.4 | 3.4 | 3.4 | 0.0 |
| *Illawarra* | 6.3 | 6.3 | 3.5 | 1.3 | 1.3 |
| *Maldon Dombarton* | 0.0 | 3.4 | 6.2 | 8.4 | 11.8 |
| Totals | 21.4 | 21.4 | 21.4 | 21.4 | 21.4 |

| 2030 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 5.6 | 5.6 | 5.6 | 5.6 | 5.6 |
| Rail | | | | | |
| *Inner rail* | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| *Moss Vale - Unanderra* | 10.4 | 5.5 | 5.5 | 5.5 | 0.0 |
| *Illawarra* | 8.8 | 8.8 | 4.3 | 1.6 | 1.6 |
| *Maldon Dombarton* | 0.0 | 4.9 | 9.4 | 12.2 | 17.7 |
| Totals | 29.4 | 29.4 | 29.4 | 29.4 | 29.4 |

Under Scenario B, probably the most realistic, coal tonnages alone would reach 7.7 MTPA (conservative) and 9.4 MTPA (optimistic) on the Maldon-Dombarton line.

## Train Paths

The use of each corridor can be derived at a high level from the forecast volumes, combined with estimates of train-set characteristics. Train pathing in practice is the product of more complex calculation, but these estimates offer an indication of the number of paths required on each corridor to meet potential demand. Table 7 shows how demand for train paths will grow over the medium term and the important role that the Maldon-Dombarton could play in accommodating this demand as passenger trains grow on the existing corridor such as the Illawarra Line.

The increase in freight paths required to handle this growth, in the absence of the Maldon-Dombarton line, would be difficult for the Illawarra Line to accommodate in its current capacity as a commuter passenger rail line.

Table 7 Current, conservative and optimistic estimated train path use

| Commodity | Daily Train Paths | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Current | | Scenario B Conservative | | | | | | Scenario B - Optimistic | | | | | |
| | *2009* | | *2020* | | | *2030* | | | *2020* | | | *2030* | | |
| | Moss Vale Unanderra | Illawarra | Moss Vale Unanderra | Illawarra | Maldon-Dombarton | Moss Vale Unanderra | Illawarra | Maldon-Dombarton | Moss Vale Unanderra | Illawarra | Maldon Dombarton | Moss Vale Unanderra | Illawarra | Maldon Dombarton |
| Coal | 2 | 5 | 2 | 3 | 5 | 4 | 3 | 7 | 3 | 3 | 6 | 5 | 4 | 9 |
| Grain | 2 | 1 | 2 | 1 | 0 | 2 | 1 | 0 | 3 | 1 | 0 | 4 | 1 | 0 |
| Minerals | 1 | 2 | 3 | 2 | 3 | 6 | 2 | 6 | 6 | 2 | 6 | 7 | 2 | 7 |
| Steel | 0 | 1 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 2 | 0 | 0 | 2 | 11 |
| Intermodal | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 6 | 0 | 0 | 1 |
| Motor cars | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Sub total | 5 | 9 | 7 | 8 | 8 | 12 | 8 | 13 | 12 | 8 | 19 | 16 | 9 | 28 |
| Total | 14 | | 23 | | | 33 | | | 49 | | | 53 | | |

A small number of unused freight paths are now available on that line outside of peak passenger periods. In practice, however, they are not well timed for efficient train operations, and there is not sufficient train stowing track capacity in the Port Kembla precinct to hold trains during the windows in which the additional paths are available.

A study by the Port Kembla Coal Terminal into coal chain capacity now underway will address this issue more definitively.

## 5.6 NPV Summary

The estimated base cost of construction of the Maldon-Dombarton line, unelectrified, is $550 million. A high-level indication of the viability of the project in financial terms has been attempted for this analysis. The results of the net present value (NPV) analysis are negative, where the full cost of construction is taken into account. This is because annual direct returns on the investment, in the form of access charges minus recurrent maintenance costs, are very low in relation to the initial outlay. Competitive corridor costs (road and rail) limit the ability to price up access charges on this fairly short track section towards the necessary levels to generate returns on the investment. This could change, however, if other corridors, particularly rail corridors, become unavailable for freight use, allowing access price increases.

Broader economic and export corridor capacity benefits are not included in this analysis. For each corridor scenario and freight forecast, two NPV calculations are shown, with different treatment of the capital construction cost, and discount rates (see Table 8 and Table 9). The payback period is 50 years from 2010, although freight volume projections as at 2030 are held steady to 2060 for the purpose of the calculation.

Table 8 NPV for Conservative and Optimistic Freight Forecasts – 8% discount rate

| NPV results | | Scenario B | | Scenario D | |
|---|---|---|---|---|---|
| *Discount rate - 8%* | Units | Conservative | Optimistic | Conservative | Optimistic |
| excluding initial capital cost | $m | 36 | 82 | 79 | 135 |
| including initial capital cost* | $m | (514) | (468) | (471) | (415) |

Table 9 NPV for Conservative and Optimistic Freight Forecasts – 4% discount rate

| NPV results | | Scenario B | | Scenario D | |
|---|---|---|---|---|---|
| *Discount rate - 4%* | Units | Conservative | Optimistic | Conservative | Optimistic |
| excluding initial capital cost | $m | 73 | 176 | 153 | 276 |
| including initial capital cost* | $m | (477) | (374) | (397) | (274) |

*Note:* * *For both Table 8 and Table 9 the initial capital cost is treated as a grant, and annual interest and depreciation costs are not included. If all financial costs are included, NPV values do not turn positive at any point in the life of the asset and the calculation would not be meaningful.*

The negative NPV as has been determined above for the Maldon-Dombarton railway construction is not remarkable as the majority of the benefits arising from the construction of the Maldon-Dombarton railway, occur in areas external to the constructed railway. A more detailed study would be needed to determine the value (commercial and economic) of the benefits that this railway could provide.

For the conservative freight volumes identified as part of Scenario B (the most initially realistic corridor scenario), the 'operating' NPV has been calculated at approximately $73 million (at a discount rate of 4%) or $36 million (at 8%). These results turn substantially negative when the initial $550 million construction cost is subtracted.

Results are better for the more optimistic corridor and volume forecasts, but still only cover approximately 50% of the construction cost.

### External Benefits of the Project

When assessed within its own battery limits, the project will be non-commercial in a strictly financial sense. However, should the project proceed, indications are that a full resource cost analysis would show that substantial indirect financial values and benefits will accrue to other regional aspects of trade and transport. This is not unexpected given that the nature of the Maldon Dombarton Line is one of an enabling piece of infrastructure that if constructed could generate significant efficiencies and positive impacts.

The Optimistic case for Scenario B includes the higher freight volumes, as well as a "rough" estimate of the some of the external benefits, especially of the container transport freight task. The volumes

that the Maldon-Dombarton line would divert from the Botany-Liverpool road network generate high externality cost savings (according to benchmark externality cost values for road and rail).

Other benefits (including indirect and broader economic benefits) are not included in the NPV figures shown above. These and other external benefits are summarised in section 7 of this report. A more detailed economic study would be needed to fully identify and quantify these external and indirect benefits and cost savings mentioned above. Such a study would be able to provide the answer to the obvious question, "Does the Project generate a suitably positive Benefit-Cost Ratio and Internal Rate of Return at a full economic level of assessment, under the range of optimistic and pessimistic trade scenarios developed in the current report ?". Given the broad nature and type of benefits and cost savings indentified to date, consideration of "mini-max", "maxi-min" and "DeBono" assessments would be helpful in this regard.

# 6. Requirements for Delivery

Perhaps one of the most unique features of this project is that, despite its size, it can be brought to fruition relatively quickly. This is as a result of the previous detailed research, study, design, documentation and construction works carried out in the late 1980s. While the design drawings and contracts were complete and ready for construction at the time, there are several elements of the works that now have to be checked against the backdrop of current legislation, changed design codes, standards and other compliance requirements. The same situation is true for the definition of the project's financial and economic business case analysis.

In order to gain final approval for the project and to recommence the works in the field, it will be necessary to carry out a full feasibility study of the layout, design and cost of the remaining works described earlier in this report. However, the feasibility study will not represent a "start from scratch" but rather involve verification of the existing designs and documentation for conformance to current standards, model simulation of the transport networks under the current 2009 usages and, in some cases, adopting more modern designs and approaches to certain elements of the works, as outlined in earlier sections of this report. Hence, the feasibility study period will be considerably shorter than usual and will mostly focus on the crystallisation and quantification of all the implicit and explicit costs and benefits and a detailed business case analysis at both a financial and economic level (see section 8).

Once the project is approved, some clean-up, repair and field restitution works could be commenced almost immediately. The works yet to be completed are described elsewhere in this report. With a view to fast tracking those works, as both an urgent job and business creation initiative as well as bringing significant transport benefits to the coal and other industries as soon as possible, the works should be packaged so as to maximise the number of viable work fronts, optimise tender opportunities for the construction sector (for all size companies), promote Australian made products, streamline project management and minimise Final Installed Costs.

The major broad construction delivery packages proposed include, but are not limited to:

a) Site clean-up and restitution;

b) Cordeaux River Rail Bridge;

c) Other Rail, Freeway and Road Bridges (carried out as several Separable Portions);

d) Avon Tunnel (including Spoil Disposal and Re-use);

e) Rail and Sleeper Supply Contract;

f) Track-works (carried out as several Separable Portions);

g) Maldon Rail Interchange;

h) Dombarton Rail Interchange;

i) Signalling and controls (carried out as several Separable Portions);

j) Services (carried out as several Separable Portions); and

k) Overall Engineering Procurement, and Construction Management.

Each of these packages will require further consideration as to the form and nature of the contract specifications. Some of the packages will be more beneficially delivered through a "Design and Construct" methodology, rather than the traditional "Construction" contract using the Owner's design,

while other packages will clearly benefit by having access to Owner-supplied items, where the enormous buying power of the State or Federal Government can be optimised.

Similarly, the engineering management of the project can be streamlined by sensible consideration of the contracting strategies for the various packages and the interface with the major government agency stakeholders.

# 7. Beneficial Externalities of the Project

Whilst construction on the project was stopped in 1988, completing the Maldon-Dombarton line can still help future proof the State's transport needs by providing capacity for anticipated growth. This study has identified many potential benefits in completing this link in the NSW rail transport network.

The broad collection of the benefits of this project could generally be classed as non-financial or intangible. However, their combined potential for significant regional employment, logistical improvement, developmental and commercial stimulus and overall economic impact should not be overlooked, especially in the context of the current economic climate.

The benefits of the project, beyond the financial charges that could be recouped by the rail owner through tonne/kilometre charges, have been broadly grouped into categories that reflect the major beneficiaries. Whilst several of these benefits are likely to have impacts across a number of beneficiaries, to avoid duplication, they have been listed under the grouping that has the most significant benefit.

More detailed investigation of these benefits will be required and should be included with the feasibility study to determine the full economic value of the project.

## Regional Benefits

a) The current advanced status of the Maldon-Dombarton project is such that work could be quickly restarted and benefits described here realised sooner than most other projects of this size. In the current economic climate, this attribute is of potentially major significance.

b) The Maldon-Dombarton line provides an alternative to the aging Illawarra to Moss Vale line, which is subject to significant maintenance costs and risks associated with geotechnical liabilities.

c) The potential to create jobs in the region is significant. The total base estimate of direct man-hours for the construction programme (approximately 1,200,000 hours over 39 months) could provide a considerable stimulus to the local construction industry and positively impact on the current Illawarra unemployment. Given the nature of the works, additional regional economic multipliers would suggest that as many or more indirect jobs may also be created.

d) Use of local construction material (e.g. rock, cement, steel) and equipment for further development of the Maldon-Dombarton project improves the sustainable development and economic multiplier outcomes for the project.

e) Greenhouse gas savings can be achieved by constraining growth in road freight and better use of rail network. Rail freight is up to five times more fuel-efficient per tonne/kilometre usage.

f) In the event of Port Kembla becoming a container gateway for south-western Sydney (as described in the optimistic option), there would be significant reduction in volume on major road corridors in south-western Sydney, leading to cash flow savings by delaying or obviating the need for other infrastructure enhancements otherwise required to manage the growing freight and passenger congestion.

g) The Maldon-Dombarton line offers a significant strategic benefit of providing passenger rail route alternatives between Sydney and the Illawarra in the event of major incidents affecting any one line.

h) By attracting current and future freight to the Maldon-Dombarton line, there is potential to more favourably separate freight and passenger traffic between Sydney and the Illawarra region, specifically reducing congestion on the Illawarra main south coast line. This, in turn, could

improve passenger commute times and train timetable integrity for the growing cities of the Illawarra region.

### Freight Supply Chain Benefits

i) The Maldon-Dombarton line will generate a range of operational freight benefits that will improve the viability of existing and proposed Southern and Western Coalfields developments (e.g. at Tahmoor and Wilton).

j) Once the Maldon-Dombarton line is completed, the intermodal chain for container movements can be logically connected to Port Kembla, thereby reducing congestion on existing lines and cutting overall truck movements significantly.

k) The Maldon-Dombarton line will potentially improve the operational cost for rail freight by facilitating the move towards 24/7 operations and could further encourage a future modal shift away from road haulage for bulk cargoes within the Sydney-Illawarra region.

l) Better rail access to Port Kembla made possible by the Maldon-Dombarton line will further support the option for the port to be developed to supplement operations at Port Botany, as well as providing better services for its current customers.

m) The development of the Maldon-Dombarton line to a 30 tonne wagon axle load standard would allow companies to take advantage of lower operating costs associated with any carrying capacity upgrades on the attached networks.

n) The Maldon-Dombarton line will enable future development of coalfields, as it could provide an alternative transport option to using roads which currently have planning restrictions on truck movements through the Illawarra.

o) The completion of the Maldon-Dombarton line may further stimulate the possibility for other south-western Sydney intermodal freight terminals, based on the assumption that the Moorebank intermodal or equivalent facility is established, thereby opening up other commercial and industrial opportunities.

### Government Agency Benefits

p) Additional revenue for Port Kembla Port Corporation generated by increased coal tonnages and intermodal freight business arising from the use of the line.

q) There is potential to increase economic reserves of coal in NSW from lower freight transport costs associated with the development of the Maldon-Dombarton rail line.

r) Additional revenue for City Rail from potential increase in passenger capacity on the Illawarra Line, resulting from improvements in the timetable and service due to the removal of the majority of freight trains from the route.

s) Reduced maintenance costs for Rail Infrastructure Corporation and ARTC due to reduced number of heavy freight trains travelling on the City, Illawarra and Moss Vale-Unanderra lines.

t) Maldon Dombarton line offers the potential to defer other infrastructure capacity improvement projects. It also affords the 'regaining' of previous 'lost' capacity on networks where there is little or no other cost effective option for further capacity enhancement (e.g. increased passenger train paths on the Illawarra line etc.).

u) Additional income tax proceeds may accrue to the Federal Government from the increased jobs generated by the construction of the line, increased mining and freight activities and related business generation; and

v) Additional royalties to the NSW Government may arise from the production from new coal mines that may be encouraged to develop with the introduction of improved rail access to Port Kembla.

As the project is further developed in the next feasibility stage, it is likely that the list of benefits identified above may need further adjustment and where possible, quantification to assist in developing a comprehensive benefit-cost analysis and/or a strategic merit test which is used to identity alignment of projects with government strategies and policies.. It will be essential that the impacts of all benefits can be directly attributed to the Maldon-Dombarton line, itself, or the changes it facilitates in local, regional and State freight strategies, logistics networks, optimisations made possible in other projects and maintenance programmes, improved operational and timetable efficiencies, etc.

The Maldon-Dombarton line is an enabling project for the region and, as a result, it is not unexpected that many of its benefits are cross-functional and not directly attributable to the construction or direct use of the line itself. These economic or intangible benefits will be vitally important in the full evaluation of the overall "attractiveness" of the project.

# 8. Future Issues for Considerations

The Maldon-Dombarton line was originally commissioned to handle an expected boom in coal exports from the Southern and Western Coal Fields. While that boom never eventuated, there are fears NSW's future growth could be hindered by a lack of vital infrastructure. The Maldon-Dombarton line will enable the State to increase capacity on the network to move goods efficiently in the future and reclaim passenger capacity on the Illawarra line.

Since the State Government stopped construction of the line in 1988, there have been many attempts to revive the project, with several task forces set up by Liberal and Labour State Governments, as well as the Commonwealth.

NSW has three key seaports for the import and export of products, which play a significant role in supporting Sydney and boosting the State's prosperity. The NSW Government's Ports Growth Plan (NSW Maritime, 2009) calls for Port Kembla to support any future growth from Sydney and Newcastle. The Maldon-Dombarton line will play a pivotal role in that plan. Creating the line will strengthen the economy, create jobs and lock in the long-term economic prosperity of the Illawarra.

The next phase of the development of the Maldon-Dombarton project - the feasibility study - would require a more detailed analysis of existing structures, engineering requirements, demand for usage of the line, economic modelling and environmental concerns.

Some of the key engineering issues that will need to be addressed in the more detailed study will include:

a) Refining and updating the design of bridges, tunnel and rail infrastructure to meet current legislative requirements and standards.

b) Need to identify the discrepancies between the Working Plans, the *Project Position* Report (SKP, 1989) and the field observations.

c) Refining the construction and operating estimate to +/- 10%.

d) Undertaking a detailed consideration of contracting and project management strategies.

e) Assessing the water quality and hydrological performance and adequacy of the existing culverts and drainage system.

f) Ensuring that the design meets the current and future freight and passenger market requirements of higher axle loads.

g) Determining the appropriate ventilation system incorporating the fire and life system standards for rail tunnels.

h) Dynamic train path modelling for passenger and freight train movements.

i) Developing designs that are sustainable, considering carbon footprint and greenhouse gas emissions.

j) Design would consider land use and planning issues, including future development of residential and industrial areas adjacent to the rail corridor, especially in relation to noise and dust.

k) Full risk assessment and inclusion of a risk-mitigated premium in the estimate to derive a P90 or better class of estimate.

The environmental assessment will be required to supplement information prepared for the original EIS and to update and clarify planning requirements and any new environmental information. Vegetation is

largely undisturbed throughout the Sydney Catchment Authority (SCA) controlled lands except for cleared intrusions for service roads, fire trails and the original alignment of the rail line. There has been further residential and commercial development in areas around Wilton and re-zoning of lands.

Environmental and social issues to be considered will include:

a) Need for further vegetation clearing in SCA area to establish usual firebreak for rail infrastructure.

b) Protection of threatened species and endangered ecological communities and investigation of environmentally sensitive areas.

c) Erosion control and water management measures (e.g. bunding, swales, etc.) will need to meet the requirements of the SCA for the protection of Sydney's drinking water catchments, both for construction activity and operation and maintenance of the railway.

d) Spoil management - excavation of material from tunnel (and associated works) and cuttings and associated impacts. Opportunities for reuse of material should be sought.

e) Noise and dust generated from train movements adjacent to residential areas (Farmborough Heights and Wilton) and through the SCA Metropolitan Special Area.

f) Construction activities at river crossings and upland swamps, in terms of protection of water quality, aquatic and terrestrial flora and fauna.

g) Disturbance associated with the construction and operation of maintenance and access roads.

h) Environmental incident mitigation and management.

i) Potential for locating or disturbing of sites with indigenous artefacts or significance.

A Construction Environmental Management Plan (CEMP) will need be prepared for the project to address the environmental protection issues (soil and water management), social and cultural heritage and incident management issues. In particular, the CEMP will need to address activities within the SCA Metropolitan Special Area such that the CEMP complies with the recommended practices and performance standards consistent with the Special Areas Strategic Plan of Management (SCA, 2007).

Some of the key economic, financial and management issues that will need to be addressed in the more detailed study will include:

a) Clear identification and "ring fencing" of all benefits, both tangible and intangible, to determine all the benefits of the proposed project.

b) More rigorous assessment and stress testing of trade predictions.

c) Determination of possible revenue mechanisms +/- 10%.

d) Financial and economic analysis of the costs and benefits.

e) Consideration of private/public funding and financing possibilities.

f) Additional discussion with all stakeholders, especially the "above" rail operators.

g) Consideration of how this project can be progressed in the context of ownership of the project; that is, the existing rail operators and owners may have different and/or conflicting priorities.

# 9. Findings

The key findings of this pre-feasibility study are:

a) Amongst other projects of its size and potential regional impact, the Maldon Dombarton Line project may be rather unique. As a project that was stopped mid-construction, it is advanced in many ways, is located immediately adjacent to the third largest city in the state, will utilise a wide variety of local materials, blue collar labour and construction plant, offers a wide range of potential direct and indirect and intangible benefits to primary and tertiary regional trades, has the potential to become a catalyst for additional trade and commerce in the Illawarra region and the ability to avoid or forestall other transport congestion issues on both road and rail.

b) Significant site construction, design and detailed research has already been completed and would enable a fast track to completion of the line, with verification of existing designs to ensure that they meet acceptable standards, guidelines, legislation and stakeholder expectations.

c) The base cost $P_{50}$ estimate (50% probability mid-point) for completing the proposed project is approximately $550 million. It is important that the accuracy of the estimate and confidence level, qualifications and exclusions be acknowledged (see section 3.10 and Appendix C.

d) The potential income from current freight markets is unlikely to make the capital funding of the project attractive to a private developer. Whilst the project is attractive from a railway operations perspective, it has a negative return on investment when the capital cost of the rail line is included. This negative NPV is not remarkable as the majority of the benefits arising from the construction of the Maldon-Dombarton rail line, occur in areas external to the constructed railway. A more detailed study would be needed to determine the value (commercial and economic) of the benefits that this railway could provide. Indicative Net Present Value calculations can be found in section 5.6.

However, the range of significant indirect and intangible benefits has not been considered in this simple financial assessment. A full economic assessment of the project would be required to accurately identify and quantify the dollar impact of these items. The project is “enabling” in nature, potentially providing a wide array of significant benefits to other regional trade and transport assets and businesses well beyond its own footprint.

e) A broad range of trade generation and usage scenarios have been considered and in both optimistic and pessimistic forms. In all but the most limited and pessimistic scenarios, there appears to be a business case for trade generation from the project. Major beneficiaries include the Port of Port Kembla and existing and proposed coal mines in the Appin-Wilton areas, as well as potential benefits by reducing Sydney road-rail congestion in general and coal and container movements in particular (see section 5).

f) The potential to create jobs in the region is significant. The total base estimate of direct man-hours for the construction programme (approximately 1,200,000 hours over 39 months) would provide a considerable stimulus to the local construction industry and positively impact on the current Illawarra unemployment. Given the nature of the works, additional regional economic multipliers would suggest that as many or more indirect jobs may also be created.

g) The 35 kilometre rail corridor appears not to have been compromised by any development. Much of the earthworks and completed components of bridge construction remain in place and in serviceable condition.

h) Further studies are required to assess the project on environmental, social and economic criteria. These criteria are important, however they were not within the scope of this study.

i) New intermodal freight corridors serving south western Sydney industrial areas may be required by 2020 due to road and rail congestion. An improved rail linkage to south western Sydney would represent a freight opportunity for the port of Port Kembla by improving its cost and service levels and giving advantaged access to potential southern and western Sydney inland intermodal freight facilities. The Maldon-Dombarton Rail Line could become the critical link in a Port Kembla-based container supply chain to handle forecast growth in demand for the Greater Sydney region.

j) Considering the 2020 scenario, without the Maldon-Dombarton rail line, there will be a significant increase in congestion on the Illawarra South Coast Line to a point where future growth in the region may be limited. This includes possible limits to the planned increase in coal exports via the Port Kembla Coal Terminal from 12 million tonnes per annum to almost 25 million tonnes per annum, as well as limiting the capacity to provide increased rail commuter transport to the greater Sydney area. The effect of the anticipated capacity limitation will occur well before 2020 and will impose limitations on the creation of wealth and employment in the southern regions of NSW.

k) Issues associated with the long 1-in-30 grades are less now than at the time of the original proposal for the Maldon-Dombarton rail line due to improvements in locomotive technology; and

l) The line also offers potential haulage savings by requiring lesser locomotive power per tonne of coal and an opportunity to rationalise the maintenance liability of other sections of Illawarra rail links.

# *10. References*

ABS (2009) 6291.0.55.001 Labour Force, Australia, Detailed - Electronic Delivery. Table 16. Labour force status by Regions and Sex. Time Series Workbook published 30 March 2009: www.abs.gov.au/

Dames and Moore (1983) *Maldon-Dombarton-Port Kembla Railway Environmental Impact Assessment.* Prepared for State Rail Authority of New South Wales, October 1983.

DoP (2007) *Illawarra Regional Strategy: 2006–31*. New South Wales Department of Planning (DOP 07_004), www.planning.nsw.gov.au, Wollongong. January 2007.

DITRDLG (2009) Australian Government Department of Infrastructure, Transport, Regional Development and Local Government web site (updated 18 March 2009) – Nation Building Program: www.nationbuildingprogram.gov.au/

NSW Maritime (2009) *NSW Ports Growth Plan.* Published on NSW Maritime web site (updated 16 February 2009) www.waterways.nsw.gov.au/ports/ports_plan.html.

SKP (1989) *Maldon-Port Kembla Railway Project Position Report*. Prepared by Sinclair Knight Partners (SKP) Sydney for the State Rail Authority of NSW, January 2009

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# *APPENDIX A*
# *Terms of Reference*

**TERMS OF REFERENCE (PK 2008/13)**

## Terms of Reference

The Australian Government has committed $300,000 in 2008-09 to undertake a pre-feasibility study of a rail line between Maldon and Dombarton. This broad-scale approach would form a basis for a further study to be undertaken to prove the economics of the proposal, should this study find the line to be feasible.

The scope of the study will include:

1. Construction
   a. An assessment of the current condition of the existing track, including:
      i. identification of remedial works required to bring the track to current operational standard sufficient to carry bulk and container freight; and
      ii. Identification of the level of work completed and the remaining work to complete the line.

   b. A review of technical and cost factors associated with completing the Maldon - Dombarton corridor as either a non-electrified railway or as an electrified DC 1500V railway, including:
      i. operations in the Avon Tunnel including capacity for double stacking of containers;
      ii. operations along a 14 kilometre, 1:30 gradient; and
      iii. compatibility of passenger operations with freight train operations.

   c. Identification of other associated issues that may influence/impact on the construction of the line, including (but not limited to):
      i. Environmental;
      ii. Land / corridor requirements.

2. Current Freight Markets
   a. An analysis of current freight markets and movements (including global shipping factors) to and from Port Kembla and the surrounding region including (but not limited to):
      i. Freight type: bulk; break-bulk; containerised etc
      ii. Volumes
      iii. Origin and destination analysis of freight types

3. Existing Transport Networks
   a. An analysis of current road and rail networks that service freight to and from Port Kembla, including (but not limited to):
      i. Volumes moved by mode;
      ii. Contestability of modes for freight types;
      iii. Existing barriers/constraints on freight movements on these networks;
      iv. an assessment of the viability and adequacy of the Moss Vale – Unanderra line for current freight movements.

4. Future Freight markets
    a. An analysis of future freight markets out to 2020, including global trends that influence shipping patterns to/from Port Kembla, including, but not limited to:
        i. Coal and other bulk products;
        ii. Containerised and break-bulk freight;
        iii. Existing and proposed intermodal terminal networks (including those in south-western Sydney around Minto, Macarthur) and their relevance to regional freight movements and movements to/from Port Kembla;

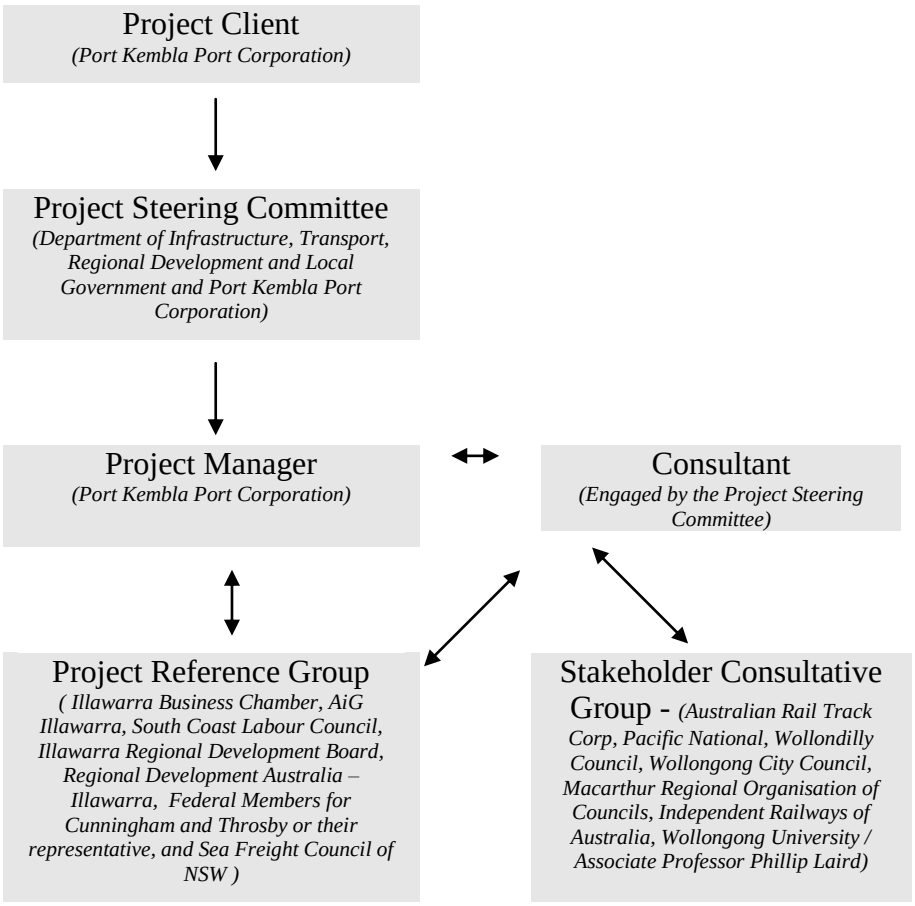
    b. Analysis of the potential for a Maldon-Dombarton rail line to generate new freight markets to and through Port Kembla and the region; including
        i. Identification of potential new market players;
        ii. Possible origin/destination movements and volumes for new freight markets using the line;
        iii. A degree of certainty of market take up with the completion of the line.

5. Costs
    a. Estimate the likely order of construction costs +/- 20 per cent;
        i. to complete the track to its original design parameters; and
        ii. taking into account any variations to those parameters (such as electrification, double stacking requirements and the like)

    b. Identify the scope and provide a realistic assessment of the likelihood of private sector investment in the construction and operation of the line.

**Governance**

The following governance framework is proposed for the conduct of the study.




A **Project Steering Group** consisting of representatives of the Port Kembla Port Corporation and the Department will oversight and steer the study.

It is proposed that the Steering Group would appoint a consultant to carry out the study.

The Department and the PKPC have identified a range of stakeholders that could provide input to the study. Following the announcement of this study, the PKPC developed its own working group to develop a study framework. Following this work that was undertaken, the PKPC have indicated that a two-tiered approach to consultation is appropriate, consisting of:

- A **Project Reference Group** that will be briefed on, and provide input at, defined study stages. The initial briefing on the proposed approach for the study will be given once consultants are engaged. Further briefings/consultations will be undertaken as below:
    - Following completion of investigations into Item 1 of the Terms of Reference;
    - Following completion of Items 2-4; and
    - On production of a draft report.

  The Project Reference Group is proposed to consist of representatives of:
    - Illawarra Business Chamber;
    - AiG Illawarra;
    - South Coast Labour Council;
    - Illawarra Regional Development Board;
    - Regional Development Australia, Illawarra;
    - Federal Members for Cunningham and Throsby, or their representative; and
    - Sea Freight Council of NSW.

- A **Stakeholder Consultative Group** that would consist of the organisations listed below, that would be written to individually to seek their input:
    - Australian Rail Track Corporation;
    - Pacific National;
    - Wollondilly Council;
    - Wollongong City Council;
    - Macarthur Regional Organisation of Councils;
    - Independent Railways of Australia (a freight container movement company based in the Macarthur region); and
    - Wollongong University / Associate Professor Phillip Laird.

Given the scope of the study is focussed on the freight operations of the line, it is not proposed to include a more general public consultation process.

**Timeframe**

It is expected that the study would require up to 3 months to be completed. This would aim to see the study finished in early 2009.

# *APPENDIX B*
# *Transport Demands and Forecasts*

# Table of Contents

## *TABLES*

## *FIGURES*

# 1. Demand Analysis Framework

In relation to the movement of export goods into Port Kembla, freight corridor usage is a factor of a number of criteria such as;

- Available road and/or rail infrastructure,
- Government policy and regulatory provisions,
- The economics of each alternative corridor, and
- Customer service level requirements e.g. cycle time and reliability.

Any changes to the factors influencing the selected corridors create an opportunity for transport operators to review routes and modes and re-appraise the cost and time involved in freight movements. The freight corridors for the main products accessing Port Kembla have been in place for a considerable time and are a combination of both road and rail options. Existing rail routes are the Moss Vale-Unanderra and Illawarra lines. Road freight routes are Picton Rd/Mt Ousley Rd and the Illawarra Highway. Freight operators will make their corridor decisions based on the economic cost of these alternatives and the lead time requirements of their customers.

The existing freight corridors form the base point for analysis of current and future freight demand in and out of Port Kembla.

For the purposes of this study, demand is dimensioned on a number of levels. We have commenced the analysis by gathering volume data by industry or commodity: coal, grain, steel, minerals, intermodal, motor vehicles, and other commodities. Transport mode, being road, rail or conveyor (for some domestic coal) is then considered. The market is then split into domestic and export consumption, and the planning horizons are set at 2010, 2020, and 2030 to allow for volume growth into the future. Growth rates are derived from available industry data, stakeholder opinion, and demographic trends. The framework for demand analysis is outlined in Table 1 below.

Table 1 - Framework for Demand Analysis

| | Dimension | Description |
|---|---|---|
| 1 | Industry sector or commodity | Coal, grain, steel, intermodal, motor vehicles and others (concentrates, iron ore, serpentine, limestone, aggregates, biofuels, sand, cement and timber) |
| 2 | Mode of transport | Road, rail and conveyer (domestic coal only) |
| 3 | Market | Domestic or export oriented |
| 4 | Timeframe | 2010, 2020 and 2030 |
| 5 | Existing and future freight corridors | Contestable corridors includes road to Port Kembla, Illawarra line, Moss Vale-Unanderra line and Maldon-Dombarton line. Non-contestable corridors include road to Lithgow, private rail line and conveyor. |
| 6 | Annual growth rates | Volume estimates based on stakeholder information, industrial data and demographic trends. Rates range between -1% (export grain from south) to 6% (intermodal destined for west Sydney). |
| 7 | Probability | The likelihood of current and proposed mines operating by 2020 and 2030 and the associate freight task being contestable for the Maldon-Dombarton line. |

*Source: Sd+D*

Corridors are broadly divided into contestable and non-contestable corridors. Contestable corridors are those freight corridors that may, under certain circumstances, be interchangeable. Non-contestable corridors will not be impacted by the introduction of the Maldon-Dombarton Line, and these include road movements of coal from mine to most domestic consumption points.

In addition to the routes currently used, four possible future corridor demand volume scenarios (A, B, C and D) have been analysed as shown in Table 2 below. These scenarios reflect some of the possible outcomes that could arise for the direction of rail freight volumes in future, largely driven by the increasing pressure on from passenger services on the metropolitan network. Scenario 'A' has a new Maldon-Dombarton route added to the network, with no change to the status of the existing freight usage of other lines. Scenario 'B' considers freight volumes if future freight growth was directed off the Illawarra line and onto the Maldon-Dombarton. Scenario C extends this concept by moving all current long haul freight off the Illawarra and onto the Maldon-Dombarton line. Scenario 'D' contemplates all freight from the Moss Vale-Unanderra line also being transferred to the new corridor due to operator preference.

These hypothetical scenarios are aimed purely at estimating the maximum demands (in terms of volumes and train paths) that could be placed on the new corridor over the long term if it were built, in light of Sydney's continued economic and demographic expansion.

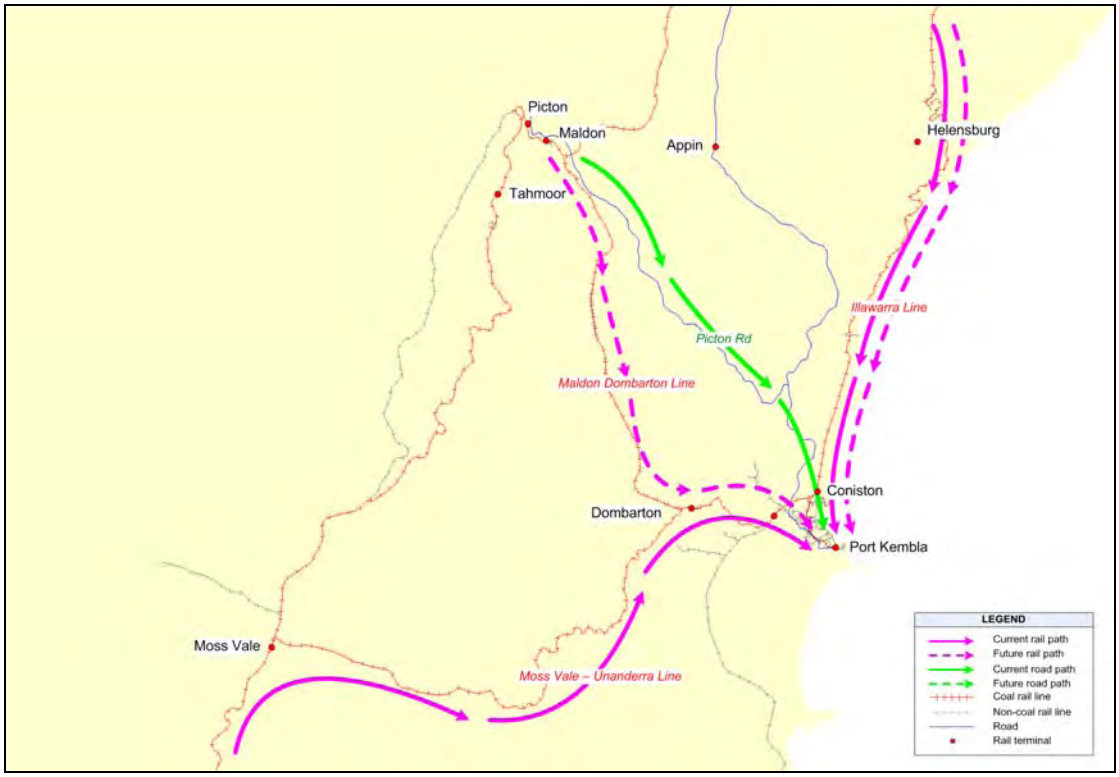
Table 2 - Corridor scenario summary

| Scenario | Description | Possible Drivers Influencing the Scenario | Implications |
|---|---|---|---|
| "As Is"<br>Existing freight use corridors | Comprised of long established road and rail links.<br>Road – Picton Rd, Mt Ousley Rd<br>Rail – Illawarra Line, Moss Vale-Unanderra Line | – Access to rail loading points<br>– Proximity to Port Kembla<br>– Lead time requirements of customers | – Freight path limitations<br>– Freight train 'curfews' |
| "A"<br>Maldon-Dombarton line is completed to compliment Illawarra and Moss Vale-Unanderra lines | This scenario retains the existing corridors and identifies freight volumes that would switch to the Maldon-Dombarton Line on economic grounds. An example is coal from the Tahmoor mines. | – Freight cost benefits<br>– Cycle time benefits<br>– Ability to change in the short term | – Immediate economic benefit to freight users in switching to the new corridor<br>– |
| "B"<br>Maldon-Dombarton is built and all future growth volume is excluded from the Illawarra line | Existing freight traffic remains on the Illawarra line but new project freight would be channelled via the Maldon-Dombarton or Moss Vale Unanderra lines | – Passenger traffic growth on the Illawarra<br>– Improved operating hours | – Most coal export growth in southern and western regions would be funnelled through the Maldon-Dombarton via Merrylands |
| "C"<br>Maldon-Dombarton line is completed and all long distance freight trains are prohibited from the Illawarra Line (due to passenger train needs) | This scenario retains existing corridors and identifies freight volumes switching from the Illawarra to the Maldon-Dombarton line. | – 24 hour operation on parts of network<br>– Available train paths<br>– Cost of freight movement<br>– Cycle time benefits | – capital costs elsewhere in the metropolitan network eg Harris Park 'Y' |
| "D"<br>As per Scenario C and operators switch freight from the Moss Vale-Unanderra to the Maldon-Dombarton line | This scenario assumes all rail freight into Port Kembla is makes use of the Maldon-Dombarton line. | – Compensatory cost savings available from non-use of the Moss Vale-Unanderra Line<br>– Minimal negative cycle time impacts | – capital cost impacts as per Scenario C<br>– Some possible negative time impacts for grain traffic<br>– Possible need for double track on upper sections of Maldon-Dombarton line |

*Source: Sd+D*

The potential corridors are shown in Figure 1, below.

Figure 1 - Current and potential future corridors




*Source: Sd+D*

### *Growth to 2020 and 2030*

Forecasting freight volume growth is difficult in the current economic environment and there is extreme uncertainty as to the timing and nature of any future upswing in commodity demand. The general approach taken here is to assume a return to modest growth over the period 2009-11 for mining and general freight, with an increase in growth rates towards those reflecting the longer term trend towards increased global commodity prices in line with energy consumption trends. These general assumptions are married to information available in regard to the timing and scale of future mining ventures relevant to the Port Kembla freight corridors, and similar specific production information regarding key commodities such as grain.

### *Coal Mining*

Forecasting future coal volumes involves consideration of a range of local and global factors. Global factors relate mostly to international demand and pricing, while the local factors centre on the life of the existing mines, the future development prospects, and the feasibility and costs of logistics chains. Against a cautious assumption regarding a return to export demand by 2011, we have also attempted to assess future production levels by making assumptions regarding the life of current mines and the probability of new projects coming on line, for both 2020 and 2030.

Clearly not all projects currently in development will proceed in the timeframe, while others not yet identified will. If all potential projects were assumed to go ahead, then future annual volumes would be significantly in excess of industry growth forecasts and supply chain capacity. In this analysis, therefore, a probability factor has been applied to each, which serves to limit the overall future volume calculation, while identifying all projects taken into account.

In the following section, upper and lower growth parameters are shown, illustrating the use of these factors.

*Other freight*

Growth factors for most other freight sectors is more straightforward, and the volumes less significant to the overall feasibility of the Maldon-Dombarton line.

The main area requiring detailed assessment is the intermodal sector, which is not a market represented in Port Kembla currently. This freight sector will only be significant to this project if Port Kembla develops a container facility – in which case the rail freight volumes on the new corridor could become very significant. All aspects of this potential development are outlined in detail in section Error! Reference source not found..

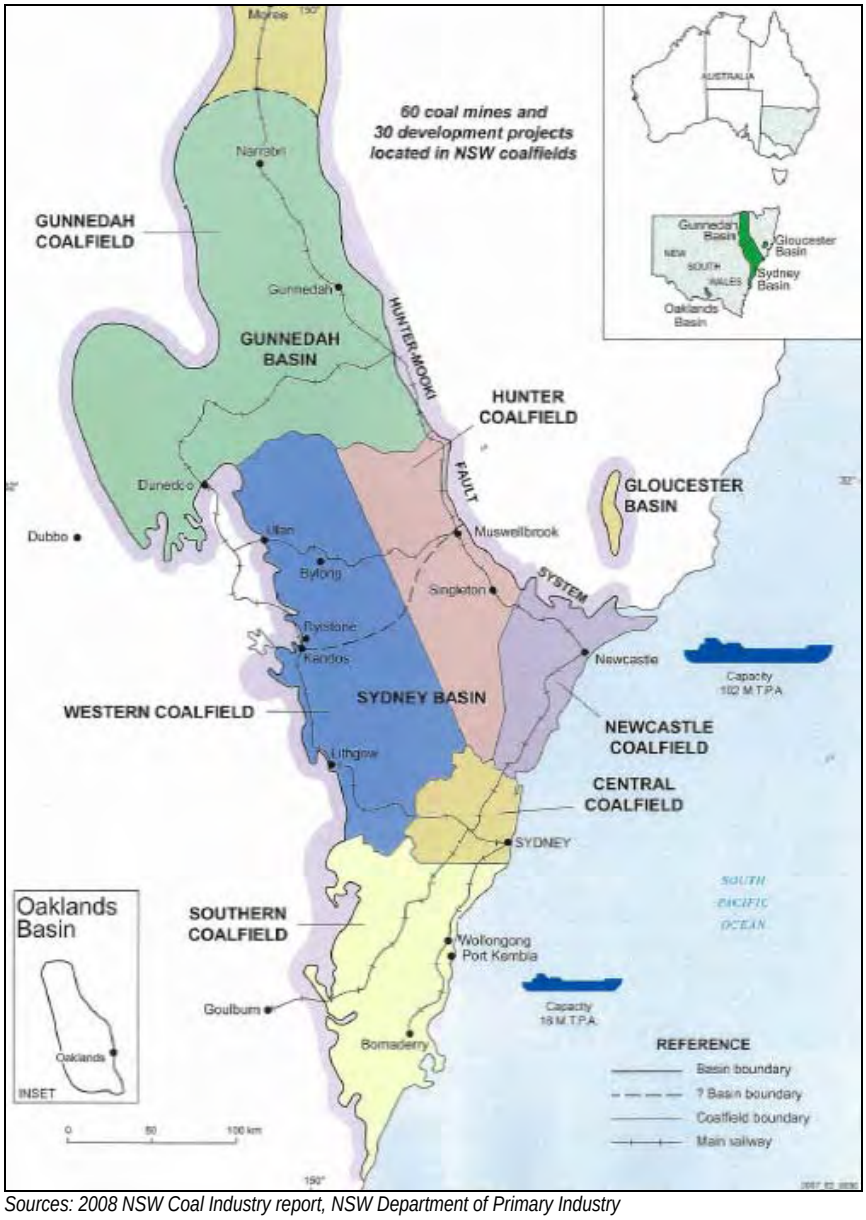
# 2. Demand Forecast

## 2.1 Coal

### *2.1.1 Overview of Sector*

The New South Wales coal industry deposits are divided between the Sydney basin, Gunnedah basin, Gloucester basin, and the Oaklands basin. The major deposits within those basins are divided into the Gunnedah Coalfield, Hunter Coalfield, Newcastle Coalfield, Western Coalfield, Central Coalfield, and Southern Coalfields. Within those coalfields there are 60 mines and 30 development projects.[1] Figure 2 below outlines the broad geographical location of the coalfields within the basins.

Figure 2 - New South Wales Coalfields




*Sources: 2008 NSW Coal Industry report, NSW Department of Primary Industry*

[1] *2008 NSW Coal Industry Profile, NSW Department of Primary Industry*

In 2006-07, the NSW coal industry produced 170.3 million tonnes of raw coal yielding 131.3 million tonnes of saleable coal (77% yield), and this volume generated $8.1 billion of sales revenue.[2]

The split of the volume between export and domestic sales is shown below in Table 3 below.

Table 3 - 2006-07 Volumes and values of sales

| | Volume | Sales Value |
|---|---|---|
| Export markets | 91.5 Mt | $6.2 billion |
| Domestic markets | 34.5 Mt | $1.7 billion |
| Mine stocks | 5.3 Mt | $0.2 billion |
| Total | 131.3 Mt | $8.1 billion |

*Sources: 2008 NSW Coal Industry report, NSW Department of Primary Industry*

Future trends for the industry are expected to be positive with NSW coalfields well placed to continue to be an important supplier of black coal in world markets. Estimated coal reserves in New South Wales as at 30 June, 2006 were 12,405 Mt, and the NSW Department of Primary Industry further estimates that new mines coming on line by 2012-13 will generate an additional 50 Mt per annum of production.[3]

Production and saleable volumes by coalfield for 2006-07 are represented in Table 4, and indicate the relative size of the coalfields within the broader industry in NSW. These numbers are represented as averages for the coalfields, with individual mines within each coalfield producing a range of production figures dependent on a variety of factors.

The figures demonstrate that the Southern and Western coalfields, while producing a high yield, are significantly smaller in production than the Hunter coalfields being services by Port Waratah Coal Terminals.

Table 4 - 2006-07 Average coalfield production

| Coalfield | Raw Production | Saleable Production | Yield |
|---|---|---|---|
| Hunter | 5.83 Mt | 4.28 Mt | 73% |
| Newcastle | 1.48 Mt | 1.21 Mt | 82% |
| Southern | 1.68 Mt | 1.32 Mt | 79% |
| Western | 2.17 Mt | 1.91 Mt | 88% |
| Gunnedah | 0.92 Mt | 0.86 Mt | 93% |

*Sources: 2008 NSW Coal Industry report, NSW Department of Primary Industry*

Coal was exported to 26 countries during the 2006-07 period with NSW coal exported through the Port Waratah Coal Services Newcastle Coal Terminals ('PWCS') and the Port Kembla Coal Terminals ('PKCT'). PWCS handled 80.5 Mt of export coal while PKCT handled 10.7 Mt of export coal.

Domestic coal consumption in NSW is predominantly divided between the needs of the power generation industry and the steel making industry. Of the 2006-07 domestic sales of NSW coal, 29.5 Mt was consumed by the power generation industry, while 4.0 Mt was consumed by the steel making industry. Table 5 on page 7, outlines the domestic consumption of NSW coal.

[2] *IBID*

[3] *IBID*

Domestic coal consumption can be further broken down into;

- Seven coal fired power stations in NSW, located near Lithgow (Mount Piper and Wallerawang), on the Central Coast (Vales Point, Eraring and Munmorah), and in the Hunter Valley (Liddell and Bayswater),
- Five steel works located at Waratah, Laverton, Rooty Hill, Whyalla, and Port Kembla, and
- A number of smaller volume consumers such as the Berrima cement works.

Table 5 - 2006-07 domestic consumption of NSW coal

| Domestic User | Volume | Consumption % |
|---|---|---|
| Electricity | 29.51 Mt | 85.7% |
| Steel | 4.01 Mt | 11.6% |
| Coke works | 0.253 Mt | 0.74% |
| Cement | 0.320 Mt | 0.93% |
| Other | 0.393 Mt | 1.14% |
| Total | 34.49 Mt | |

*Sources: 2008 NSW Coal Industry report, NSW Department of Primary Industry*

### *2.1.2 Policy Drivers*

Where the movements of freight and passengers by road and rail share the same infrastructure, or where freight movements pass through densely populated areas, over-riding policy often ensures that the interests of passenger commuters take priority over freight. This policy can work to change the logical corridor of freight movements, or the available operating hours for the movement of freight. In those circumstances, policy decisions can impact the operating costs and efficiency of links between product sources and markets.

In order to assess the feasibility of new infrastructure, such as the proposed Maldon-Dombarton rail line, it is important to note the major policy decisions that may have an impact either directly or indirectly. Some examples of decisions that have an impact on the movement of coal from mine to Port Kembla Coal Terminal include;

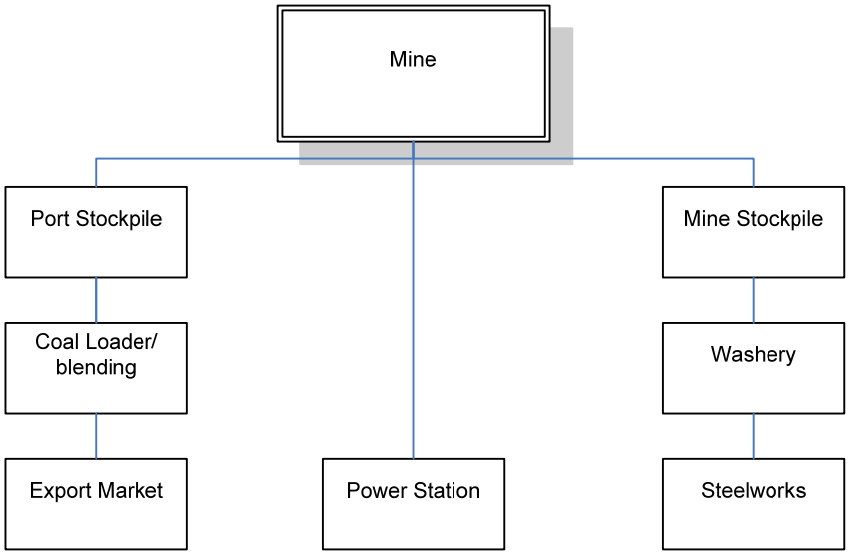
- The imposition of curfews on the operating hours on the coal loader at Port Kembla Coal Terminal. Such decisions limiting the available working hours of the equipment impose limitations on the train and truck turnaround times, stockpile sizes, and port throughput capacity.
- The imposition of curfews on the movement of coal trains on the Illawarra Line. Limiting the available hours for coal trains to run on the Illawarra Line, while making the greatest possible access for passenger trains in peak hours, contributes to freight bottlenecks and reduces the Port Kembla Coal Terminal throughput capacity.
- The imposition of restrictions on the available corridors for freight trains may lead to longer travel times and increases in train turnaround times. An example of this restriction is the prevention of freight train movements in the Sydney Metropolitan system past Strathfield Station.

Government strategies to remove freight from road networks also influence the design of future freight corridors. Expressions of interest processes for new mining leases in NSW stipulate acceptance of the use of rail transport for minerals extracted from the leases in order to be considered by the Government bodies issuing the document to the market.

### *2.1.3 Supply Chain Structure*

A generic supply chain structure for the coal industry is shown at Figure 3, below.

Figure 3 - Generic supply chain structure the coal industry




*Source: Sd+D, assembled from industry sources*

The coal supply chain uses both rail and road transport for the movement of thermal and metallurgical coal to port for export and to domestic markets such as power generators and manufacturing (e.g. steel or cement production).

- Rail transport is used where the haulage distances are favourable and where the mine site is in proximity to the rail network.
- Road transport is used where the distances from mine to port are relatively short, and where domestic consumption points (particularly power stations) are in relatively close proximity to mines.
- Road transport is used where the access to rail loading infrastructure is not available or where the capital cost of building that infrastructure is excessive.
- Conveyor transport is used for short distances within mine leases and between mines and stockpiles at local power stations.

Mine sites within 20-40 kms of the port are serviced by road transport, and these include Appin, NRE No.1, and West Cliff. Each of these sites is not located near the existing rail network so road movements from the mine site to a potential rail loading point would involve additional inefficient movements and additional cost.

Mines sites such as Tahmoor, Baal Bone and Charbon have access to the rail network and use rail transport for movements to port. Bluescope's steel making plant at Port Kembla also uses their own rail assets to transport coal from Delta and Dendrobium, though this is a "closed system" using a private rail network and can be seen as an element in the production process.

There are limited movements from the Hunter Valley coalfields by rail to Port Kembla Coal Terminal. These movements are to enable blending of coal prior to loading with a view to lifting the calorific content of a particular export consignment to satisfy the needs of the customer. There are 2 train paths per day available for these movements, and their corridor is down the Illawarra Line.

There are new developments at Wilton and Sutton Forrest and these are likely to use rail because of;

- Proximity to existing rail infrastructure, such as the Tahmoor and Moss Vale loading points and the Moss Vale-Unanderra rail line, and
- The requirement to articulate a rail freight strategy in the process of obtaining new leases. As noted above, the strategy of Government to reduce the reliance on road freight as well as the nature of the freight itself, leads new developments towards a rail freight strategy.

### *2.1.4 Freight Flows and Volumes*

The following sections provide further detail on the current freight flows and potential freight volumes applicable to the Maldon-Dombarton rail line. The information presented below has been gathered through stakeholder interviews and published resources.
Port Kembla Coal Terminal is the preferred loading point for export coal originating from the Southern and Western coalfields. While there is some marginal attraction to a small number of Hunter Valley mines, the conditions under which those mines might move export coal to Port Kembla make those movements opportunistic based on high volumes of exports and premium pricing for those commodities.

Annual rail throughput at PKCT (2008) is 6.8 Mtpa with the remainder 4.9 Mtpa by road from Bulli, Appin and Tower collieries.

The current usage of mandatory daily coal trains paths is summarised as (a) six paths from Western coalfields; (b) two paths from Metropolitan mine (Helensburgh) and two from the North for Centennial (ex Newstan). Some additional paths are available on a conditional basis, and are used particularly where delays have affected usage of the mandatory paths.

Table 6 on page 10, indicates a summary of the approximate volumes from each coalfield, split into volumes for domestic and export sale. This information has been summarised and approximated to protect commercially sensitive information. Where specific volume data was not able to be gathered, approximations have been used based on publicly available data.

These numbers form the base from which volume growth predictions are calculated in later sections of the report.

#### *Western Coalfields*

The western coalfields are located in the central west region of NSW in a corridor that extends from west of the Blue Mountains through Lithgow and Mudgee towards Dunedoo. The mines service both domestic and export markets, and coal is moved from these regions to local consumers and to the Ports of Newcastle and Port Kembla. Export volumes are predominantly moved to Port Kembla, however some mines on the fringe of the Hunter corridors do move export volumes to the Port of Newcastle.

Movements by road are to local consumers which are predominantly power stations in the Lithgow region. Movements by rail to Port Kembla come through the Sydney network and down the Illawarra Line. These train paths pass between passenger train paths and are limited by curfew to about sixteen hours per working day. These conditions can create bottlenecks that have flow-on impacts at the coal terminal and for domestic coal buyers located at distance from the mine region.

The Western coalfields mines such as Charbon and Baal Bone are in a good position to benefit from the construction of the Maldon-Dombarton line. There is a significant opportunity for freight movements from these coalfields to move down the Main South Line to the Maldon-Dombarton Line

and then to Port Kembla, to free the Illawarra line from those freight movements and relieve some of the conflict between freight and passenger services. Figure 4 indicates current and future freight paths.

Table 6 - Mine locations, volumes and freight corridors 2006/07

| Status | Coalfield | Mine Name | % production saleable | Domestic markets (Mt) | | | | Export markets (Mt) | | | *Total Volume (Mt)* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | *Conveyer* | *Rail* | *Road* | *Total* | *Rail* | *Road* | *Total* | |
| Current | Southern | Appin | 81% | | | ☑ | | | ☑ | | |
| | | Berrima | 100% | | | ☑ | | | | | |
| | | Delta | 100% | | ☑ | | | | | | |
| | | Dendrobium | 67% | | ☑ | | | ☑ | | | |
| | | Metropolitan | 86% | | ☑ | | | ☑ | | | |
| | | NRE No. 1 | 100% | | | ☑ | | | ☑ | | |
| | | NRE Wongawilli | 70% | | | | | ☑ | | | |
| | | Tahmoor | 71% | | | | | ☑ | | | |
| | | West Cliff | 79% | | | | | | ☑ | | |
| | | *Southern Total* | 78% | 0.0 | 2.8 | 2.1 | 4.9 | 4.4 | 2.9 | 7.4 | 12.2 |
| | Western | Angus Place | 100% | | | ☑ | | | | | |
| | | Baal Bone | 75% | | ☑ | | | ☑ | | | |
| | | Charbon | 77% | | ☑ | | | ☑ | | | |
| | | Clarence | 91% | | | | | ☑ | | | |
| | | Cullen Valley | 100% | | | ☑ | | | | | |
| | | Invincible | 100% | | | ☑ | | | | | |
| | | Ivanhoe | 96% | | | ☑ | | | | | |
| | | Lamberts Gully | 100% | | ☑ | | | ☑ | | | |
| | | Pine Dale | 100% | | | ☑ | | | | | |
| | | Springvale | 99% | ☑ | | | | | | | |
| | | *Western Total* | 92% | 3.4 | 1.9 | 3.8 | 9.0 | 2.4 | 1.9 | 4.3 | 11.4 |
| | *Total Current* | | 84% | 3.4 | 4.7 | 5.9 | 13.9 | 6.8 | 4.9 | 11.7 | 23.6 |
| Proposed By 2020 | Southern | Sutton Forest | 80% | | ☑ | | | ☑ | | | |
| | | Wilton | 72% | | ☑ | | | ☑ | | | |
| | Western | Airly | 100% | | ☑ | | | ☑ | | | |
| | | Boulder | 100% | | | ☑ | | ☑ | | | |
| | | Neubecks Creek | 100% | | | ☑ | | | | | |
| | | Running Stream | 92% | | | | | ☑ | | | |
| | | Wolgan Road | 100% | | | ☑ | | | | | |
| | Oakfields | Oaklands | 83% | | | | | ☑ | | | |
| | *Total Proposed* | | 86% | 0.0 | 1.8 | 2.2 | 4.0 | 8.0 | 0.0 | 8.0 | 12.0 |

*Source: Industry discussion*

Figure 4 - Current and potential future freight flows to Port Kembla from Western coalfields


*Source: Sd+D*

*Southern Coalfields*

The Southern Coalfields are located in a corridor to the South West of Sydney which encompasses areas through Mt Kembla, Helensburgh, Appin, Tahmoor, Picton, Bargo, and Moss Vale, These mines currently use a mixture of road and rail to move their coal to port.

Tahmoor mine uses both available rail routes, via Moss Vale and via Sydney. Helensburgh is on the Illawarra line. Road transport from those mines in the South Western part of the Southern coalfields generally uses Picton Road to Port Kembla.

The Southern coalfields in the Picton/Tahmoor/East Bargo area are well suited to capitalise on the construction of the Maldon-Dombarton rail line. The line potentially solves a number of issues for these mines, such as;

- The reduction of freight traffic on the Picton Road by transferring that freight to the rail infrastructure. This opportunity is not available to mines immediately North of Wollongong,
- The reduction in travel time from mine to port through the employment of a more direct freight route than the current Moss Vale-Unanderra Line,
- Reduction of train turnaround times through use of a shorter rail route, and
- In the case of Tahmoor, reduction of rail fuel costs through the removal of the need for a push-pull configuration for loaded trains currently ascending a steep rail incline when heading south immediately outside the mine site

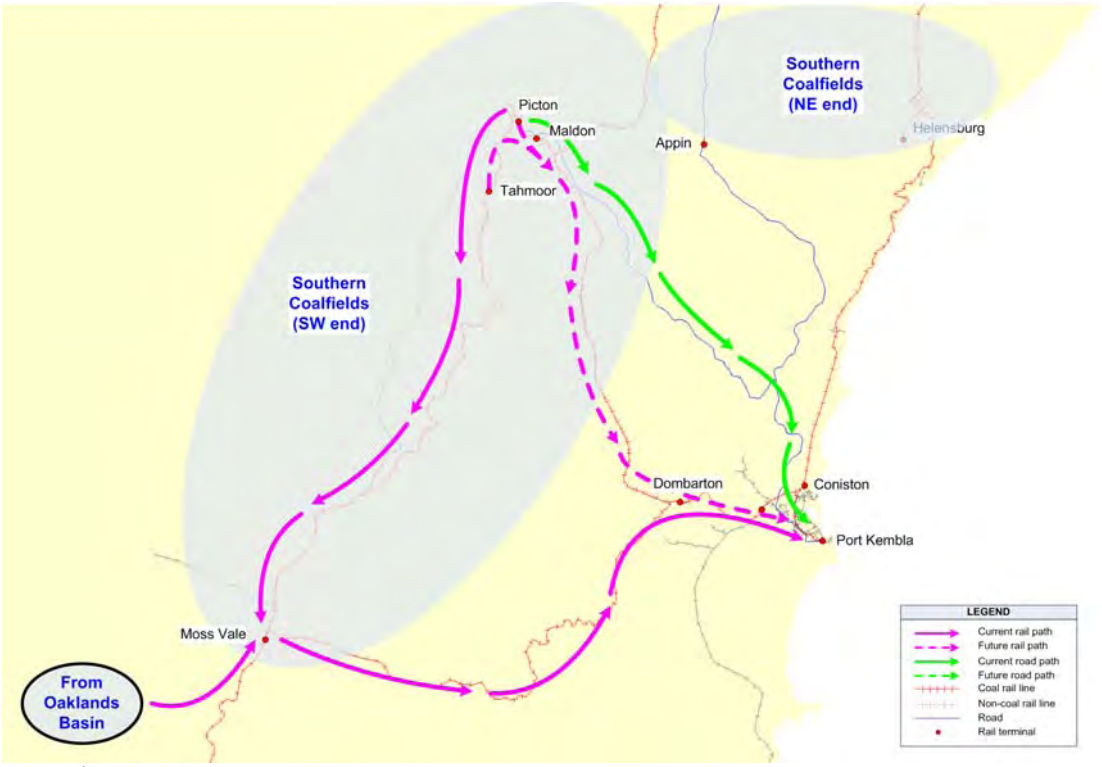
Figure 5 on page 13, indicates current and future freight paths.

Occasional congestion occurs on the Moss Vale-Unanderra Line, particularly during weekend track possessions that would be alleviated by the construction of the Maldon-Dombarton Line. Removal of freight from Picton Road is likely to reduce future competition between passenger cars and freight vehicles in an area of growing population, and also reduce the road maintenance requirements.

The Southern coalfields mines such as Appin, Bulli and Westcliff use road transport given their proximity to port and the potential costs associated with additional handling and infrastructure required to access the rail network. Their location in the immediate area north-west of Port Kembla would also indicate that if a rail option was to be feasible, loading points would need to be very close by,.

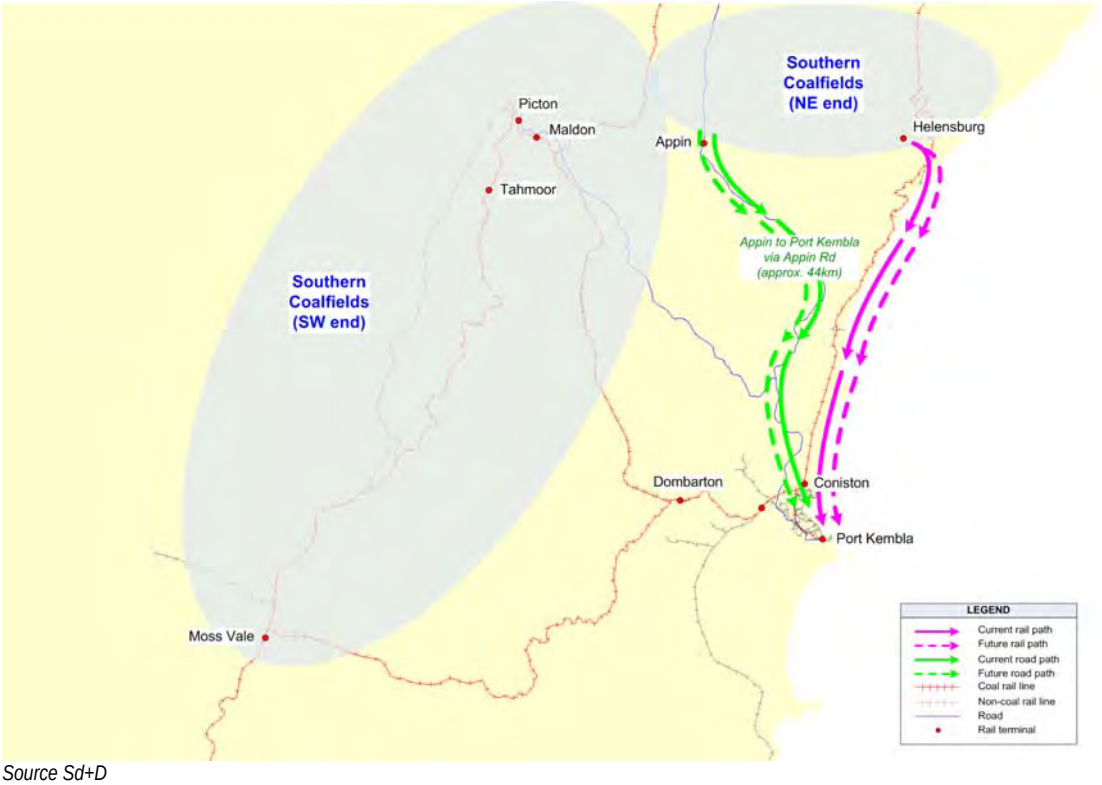
Figure 6 on page 13, indicates current and future freight paths.

Figure 5 - Current & potential future freight flows to Port Kembla from Southern (SW) coalfields




*Source Sd+D*

Figure 6 - Current & potential future freight flows to Port Kembla from Southern (NE) coalfields




*Source Sd+D*

*Other Mine Prospects*

There are two emerging opportunities for coal mine development that may impact the feasibility of the Maldon-Dombarton rail line.

The proposed Oaklands mine is located approximately 100kms West of Albury and it is anticipated that it will commence coal shipments during 2012. The proposal will have the potential to supply coal for domestic and export consumption. Export coal would be routed to Port Kembla via the Moss Vale-Unanderra Line, this coal will be required to compete with other freight (including coal) for a limited number of available train paths that corridor. Additional minerals associated with the Oaklands area are mooted as export commodities and will only increase the potential future volumes on the Moss Vale-Unanderra Line.

- The Department of Primary Industry ('DPI') is currently seeking expressions of interest for a coal mining lease in the Wilton/East Bargo area of the Southern coalfields. It is anticipated by the DPI that coal movements will commence around 2016, with the seams holding approximately 330 Mt of thermal and coking coal. The Maldon-Dombarton rail line would pass over the proposed lease and would, prima facie, be the logical mode of transport for export coal. Annual saleable production tonnage will be confirmed as part of the process of evaluating the opportunity by the successful lessee.

### *2.1.5 Industry and stakeholder perspectives*

The following comments have been gathered from industry stakeholders and are summarised under key headings.

*Industry outlook*

Like many commodity exporters, the coal industry has experienced depressed prices as a result of the global economic crisis for both thermal and coking coals in the short to medium term. The stakeholders consulted were all positive regarding the future given the global demand for coal and the extent of reserves yet to be mined.

There is a distinct belief that the New South Wales coalfields are better placed than most to capitalise on developing markets offshore, particularly in India and Indonesia.

There was also an opinion expressed generally that the immediate future will be characterised by a continuation of investment in infrastructure by the profitable companies, and a need for an industry wide focus on business basics to enable companies to weather the current economic storm.
The focus of this study is therefore beyond the immediate economic challenges facing the coal sector and other industries.

*Growth in demand*

Stakeholders are fairly confident of growth in demand of between 3-5% compounded annually. This confidence is based on a perceived recovery of growth in the Chinese economy and the continued expansion of emerging economies.

For modelling purposes however we have used organic growth rates of around 2% in addition to defined step increases in sales as new mines come on stream, as well as step decreases when current mine reserves are exhausted.

*Supply chain impediments*

The absence of continued development of rail freight and associated infrastructure was seen as the major impediment to growth of the industry. Stakeholders expressed the view that, while the Maldon-Dombarton Line was a step in the right direction, there was a clear need for an integrated and overarching rail freight strategy in New South Wales to provide a platform for growth.
Specific issues mentioned by the stakeholders included;

- Potential bottlenecks in the region of Coniston/Unanderra once the Maldon-Dombarton Line is completed
- The current curfews associated with freight movements through the Sydney network and Illawarra line represent a significant impediment to the industry
- The requirement for improvements in the signalling and passing loops on the Illawarra line
- Similar issues associated with the Moss Vale-Unanderra Line
- Improvements required to the Mudgee Kandos Line to increase train paths, as well as a reinstated link to the Ulan line
- Lack of rolling stock, particularly rolling stock of 120 tonne gross wagon capacity
- The shortage of skilled labour within the industry, and a shortage of train drivers to service the industry
- Competition for train paths with other industries looms as a potential impediment to growth. In particular, should the grain industry have a number of good seasons, then coal freight will compete for access to those train paths
- Congestion at the port for unloading may become a future impediment. There is a strong recognition that improvements in rail infrastructure must be matched by improvements in port infrastructure to avoid the transfer of bottlenecks from one point in the logistics chain to another, and to improve train turnaround times.
- In additional to port infrastructure developments, cargo build times are seen to benefit the closer mines and penalise those mines furthest away from the port. In particular, this factor is seen as a potential impediment for the mines located in the Lithgow area.
- Linked to port capacity is washery capacity, and there is a recognition amongst stakeholders that along with terminal capacity, these elements may become bottlenecks unless developments are made in tandem with rail developments.

All stakeholders spoken to were cognisant of the issues that confronted Dalrymple Bay during the review and upgrade of infrastructure for coal export through that port. The understanding of the issues that the industry confronted in relieving bottlenecks associated with the logistics flows into Dalrymple Bay was clearly displayed during the stakeholder discussions around potential growth impediments for the New South Wales industry.

*Carbon trading*

The stakeholders expressed mixed views regarding the possible impact of carbon trading on their industry in the future. All views were expressed with caution and uncertainty, however fall into two broad categories;

- Under a 'user pays' system, the impact on the coal industry will be minimal as the impact will be borne by users of coal not the mining industry, and
- Regardless of the final carbon trading scheme introduced, the impact on the coal mining industry will depend on the degree to which costs may be passed on to users. In times of high demand and prices, carbon costs may be passed onto users and in times of falling demand and prices, the industry will absorb the majority of carbon costs.

In terms of the feasibility of the Maldon-Dombarton rail line, the uncertainty surrounding the impact of carbon trading schemes has resulted in the exclusion of the potential impacts of such a scheme in this study.

*Additional comments*

There was a view expressed that construction of the Maldon-Dombarton line should accommodate 120 tonne gross wagon weights to increase capacity and open the line to the potential for a number of rail operators. In order to keep the charges by operators on the line as low as possible, it was felt by stakeholders that additional operators increased competition for freight to the benefit of the industry.

Several stakeholders also expressed the view that, regardless of the cost to complete the Maldon-Dombarton Line, that investment might be better spent on improving the current infrastructure, such as the improvements mentioned for the Illawarra Line and the Moss Vale-Unanderra Line. While this point of view might have some merit, it is outside the scope of this study to address the issue.

### *2.1.6 Summary of corridor scenarios*

The corridor choice scenarios have been created on the basis of contestable and non-contestable freight corridors. Contestable corridors are freight movements that could logically be converted to the Maldon-Dombarton Line as a result of either favourable economic benefit, favourable time to port benefit, or on the basis of improvement in the efficiency of freight flows.

Non-contestable corridors represent those O-D movements that will remain unaffected by the introduction of any new rail corridor. Movements of coal from mine to local domestic purchaser will not change from their current corridor. The same may be said of movements from local mine to washery.

Table 7 summarises the volumes currently hauled to port along 'contestable' and 'non-contestable' corridors for current demand.

Table 7 - Contestable and non-contestable corridors of current coal movements

| Status | Coalfield | *Contestable* | *Non-Contestable* | *Total* |
|---|---|---|---|---|
| Current movements | Southern | 1.7 | 10.5 | 12.2 |
| | Western | 4.3 | 7.1 | 11.4 |
| | *Total Current* | 6.0 | 17.7 | 23.6 |

The following table also outlines the likely corridor use decisions for each producer under each of the rail corridor scenarios as outlined in the Demand Analysis Framework in the previous chapter.

Table 8 – Coal freight corridor usage scenarios

| Status | Coalfield | Mine Name | Corridor Scenarios | | | | |
|---|---|---|---|---|---|---|---|
| | | | *Current corridor* | *Scenario A* | *Scenario B* | *Scenario C* | *Scenario D* |
| Current | Southern | Appin | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) |
| | | Berrima | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) |
| | | Delta | Inner rail | Inner rail | Inner rail | Inner rail | Inner rail |
| | | Dendrobium | Inner rail | Inner rail | Inner rail | Inner rail | Inner rail |
| | | Metropolitan | Illawarra | Illawarra | Illawarra | Illawarra | Illawarra |
| | | NRE No. 1 | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) |
| | | NRE Wongawilli | Inner rail | Inner rail | Inner rail | Inner rail | Inner rail |
| | | Tahmoor | Moss Vale - Unanderra | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton |
| | | West Cliff | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) | Road (Port Kembla) |
| | | *Southern Total* | | | | | |
| | Western | Angus Place | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | | Baal Bone | Illawarra | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton |
| | | Charbon | Illawarra | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton |
| | | Clarence | Illawarra | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton |
| | | Cullen Valley | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | | Invincible | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | | Ivanhoe | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | | Lamberts Gully | Illawarra | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton |
| | | Pine Dale | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | | Springvale | Conveyer | Conveyer | Conveyer | Conveyer | Conveyer |
| | | *Western Total* | | | | | |
| | *Total Current* | | | | | | |
| Proposed By 2020 | Southern | Sutton Forest | Moss Vale - Unanderra | Moss Vale - Unanderra | Moss Vale - Unanderra | Moss Vale - Unanderra | Maldon Dombarton |
| | | Wilton | Moss Vale - Unanderra | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton |
| | Western | Airly | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton |
| | | Boulder | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton |
| | | Neubecks Creek | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | | Running Stream | Illawarra | Illawarra | Maldon Dombarton | Maldon Dombarton | Maldon Dombarton |
| | | Wolgan Road | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) | Road (Lithgow) |
| | Oakfields | Oaklands | Moss Vale - Unanderra | Moss Vale - Unanderra | Moss Vale - Unanderra | Moss Vale - Unanderra | Maldon Dombarton |
| | *Total Proposed* | | | | | | |

### *2.1.7 Forecasting coal demand to Maldon-Dombarton corridor*

While volume growth forecasting is very difficult in the current economic circumstances, there is clearly considerable upside for current southern and western coal export volumes using Port Kembla. Most growth can be expected to use 'contestable' corridors – mainly the public rail infrastructure. In the most conservative 'as is' cases, considerable extra traffic is funnelled onto the Moss Vale-Unanderra corridor, which is single track. If the Maldon-Dombarton line was to be built, it would more readily cater for this traffic. The heavy volumes indicated by the maximum growth scenario are unlikely to occur in practice, but indicate an upper limit for demand for rail capacity that makes extremely heavy use of all available corridors.

Table 9 over page summarises the various corridor scenarios with potential volume growth scenarios for coal movements into Port Kembla (domestic and export). Two views of future demand to 2030 – Conservative and Optimistic.

- The conservative forecast is based on the assumption that existing mine sites have a finite life and the output from new mine sites will replace the output of some of the existing sites, as well as creating volume growth.
    - The moderate output and growth forecast is based on the assumption that 75% of the existing mine outputs will still exist by 2020, while only 50% of existing output will have continued by 2030.
    - Of the known new mine site proposals, it is assumed that 50% of these proposal will have commenced by 2020 and 75% by 2030
- The more optimistic view assumes that 75% of existing sites remain operational by 2030 and all of the known new sites are operating by 2030.

Organic growth rates of 2% per year are also applied to current and proposed mine volumes

The current total production of coal in the southern and western coal field is around 24 Mtpa, of which 16.5Mtpa is destined for domestic and export operations at Port Kembla. Under the 'Conservative' forecast, production rises to almost 29 Mtpa by 2030, of which 21 Mtpa is destined for Port Kembla. The 'Optimistic' forecast is for production to rise to almost 40 Mtpa By 2030, assuming that all currently proposed developments come to fruition by that date. If this occurred, total volumes into Port Kembla would exceed 29 Mtpa.

The most recent industry projections are for export volumes to grow rapidly over the next 4 years, reaching a cumulative 25 Mtpa by 2013. This figure, however, represents the combined estimates of current producers, rather than a co-ordinated projection taking into account all external market factors. It therefore represents a very high optimistic forecast. An export task exceeding 20 Mtpa by that date, however, could be considered reasonable in view of market confidence. There are no industry forecasts to 2030 available at present.

The following tables break down the modelled projected freight task into Port Kembla according to mode and rail corridor.

Table 9 - Future coal freight by corridor scenario (million tonnes)

Conservative forecast

| Current Volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Rail | | | | | |
| *Inner rail* | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| *Moss Vale - Unanderra* | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Illawarra* | 5.7 | 5.7 | 5.7 | 1.4 | 1.4 |
| *Maldon Dombarton* | 0.0 | 1.7 | 1.7 | 6.0 | 6.0 |
| | | | | | |
| Totals | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |

| 2020 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Rail | | | | | |
| *Inner rail* | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 |
| *Moss Vale - Unanderra* | 5.7 | 2.3 | 2.3 | 2.3 | 0.0 |
| *Illawarra* | 5.4 | 5.4 | 3.5 | 1.3 | 1.3 |
| *Maldon Dombarton* | 0.0 | 3.4 | 5.3 | 7.5 | 9.8 |
| | | | | | |
| Totals | 19.4 | 19.4 | 19.4 | 19.4 | 19.4 |

| 2030 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 3.7 | 3.7 | 3.7 | 3.7 | 3.7 |
| Rail | | | | | |
| *Inner rail* | 3.1 | 3.1 | 3.1 | 3.1 | 3.1 |
| *Moss Vale - Unanderra* | 8.4 | 4.1 | 4.1 | 4.1 | 0.0 |
| *Illawarra* | 6.3 | 6.3 | 2.9 | 1.0 | 1.0 |
| *Maldon Dombarton* | 0.0 | 4.3 | 7.7 | 9.5 | 13.6 |
| | | | | | |
| Totals | 21.4 | 21.4 | 21.4 | 21.4 | 21.4 |

Optimistic forecast

| Current Volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 5.0 | 5.0 | 5.0 | 5.0 | 5.0 |
| Rail | | | | | |
| *Inner rail* | 4.1 | 4.1 | 4.1 | 4.1 | 4.1 |
| *Moss Vale - Unanderra* | 1.7 | 0.0 | 0.0 | 0.0 | 0.0 |
| *Illawarra* | 5.7 | 5.7 | 5.7 | 1.4 | 1.4 |
| *Maldon Dombarton* | 0.0 | 1.7 | 1.7 | 6.0 | 6.0 |
| | | | | | |
| Totals | 16.5 | 16.5 | 16.5 | 16.5 | 16.5 |

| 2020 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| Rail | | | | | |
| *Inner rail* | 3.8 | 3.8 | 3.8 | 3.8 | 3.8 |
| *Moss Vale - Unanderra* | 6.8 | 3.4 | 3.4 | 3.4 | 0.0 |
| *Illawarra* | 6.3 | 6.3 | 3.5 | 1.3 | 1.3 |
| *Maldon Dombarton* | 0.0 | 3.4 | 6.2 | 8.4 | 11.8 |
| | | | | | |
| Totals | 21.4 | 21.4 | 21.4 | 21.4 | 21.4 |

| 2030 volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Corridor | As Is | A | B | C | D |
| Road | 5.6 | 5.6 | 5.6 | 5.6 | 5.6 |
| Rail | | | | | |
| *Inner rail* | 4.6 | 4.6 | 4.6 | 4.6 | 4.6 |
| *Moss Vale - Unanderra* | 10.4 | 5.5 | 5.5 | 5.5 | 0.0 |
| *Illawarra* | 8.8 | 8.8 | 4.3 | 1.6 | 1.6 |
| *Maldon Dombarton* | 0.0 | 4.9 | 9.4 | 12.2 | 17.7 |
| | | | | | |
| Totals | 29.4 | 29.4 | 29.4 | 29.4 | 29.4 |

These tables illustrate how the usage of rail corridors will change over time according to export growth and the location of new mines. The usage of the Moss Vale-Unanderra line, for instance, increases over time due to the assumed commencement of production at the proposed Sutton Forest, Wilton and Oaklands developments by 2030, leading to a volume on this route of between 8.4 and 10.4 Mtpa without the development of the Maldon-Dombarton line.

## 2.2 Grain

### *2.2.1 Overview*

The NSW grain sector is an important contributor to the state's economy and is a major exporter through NSW ports. Grain is grown is a broad band running from the Queensland to the Victorian border, and from the Western Slopes to deep in the Western Plains, with most recent growth coming from west of the Newell Highway. In season 2008/09, NSW grain growers harvested 6.5 million tonnes of winter crop from 4.4 million hectares, a 90% increase from the drought-stricken previous season. NSW grain is consumed increasingly by the domestic market, which now requires up to 6mt per year. This figure is made up of human consumption (milled wheat, malt barley for beer etc, and canola for vegetable oil) and livestock feed (lower grade wheat, barley and oats etc). A growing fraction is also used for industrial products such as ethanol and starch.

### *2.2.2 Production*

Production is highly variable due largely to inconsistent rainfall, and this has been a particular problem as climate change has begun to be recognised over the last 10 years.

NSW average winter crop production has fallen from around 8 million tonnes in the late 1990s, to about 5 million tonnes at present, after several poor seasons since 2000. Continuing underlying agronomic improvements have been outweighed by the frequent absence of rain during the late growing season, exacerbated by the increase of spring temperatures. The area that has felt this most has been the southern half of the state. Experts now estimate that some of the most significant global impacts of climate change will be in south-eastern Australia. For the foreseeable future, it is reasonable to assume that production volumes in the southern NSW grain belt will fall due to this factor.

Table 10 -Winter crop production NSW

| year | area sown ('000ha) | production ('000t) |
|---|---|---|
| 2000-01 | 3,174 | 9,956 |
| 2001-02 | 3,425 | 10,140 |
| 2002-03 | 4,809 | 3,109 |
| 2003-04 | 4,645 | 9,681 |
| 2004-05 | 4,122 | 9,766 |
| 2005-06 | 5,300 | 10,393 |
| 2006-07 | 5,713 | 2,680 |
| 2007-08 | 4,678 | 3,391 |
| 2008-09* | 4,430 | 6,500 |

*estimated

Climate change will have less well-defined impacts in the northern region, as rainfall models indicate more volatility, but less decline. Northern regions have heavier soils and can withstand some drought events more readily than the south. Northern growers can also supplement winter crops (wheat, barley, canola etc) with summer plantings (mostly sorghum). Heavy summer rain events, which are common, can hurt winter crop quality, but often provide the springboard for heavy summer crops. Overall, volume predictions for the northern area are relatively rosy.

### *2.2.3 Markets*

Price volatility is a fact of life for the grain sector, but the current forecast is for an increasing trend, driven by predictions of food security problems for the growing global population. Prices have increased dramatically in the last 3 years (illustrate), although they have contracted somewhat since the economic slowdown. Asian consumers have switched away from rice towards wheat products as affluence has grown over the last 10 years. This trend may slow as economic growth stalls. In the longer term, most industry price forecasts are strong, and there is plenty of corporate interest in quality cropping land, despite the climate problems.

NSW grain is purchased by domestic buyers on behalf of 6 major flour mills, and a strong livestock sector. Flour milling and other human consumption accounts for around 2.5 million tonnes each year, while the livestock sector has grown to around 3 million tonnes. The major mills are located in Sydney, Manildra, Newcastle and Tamworth, with two new facilities in the Southern Highlands. The livestock sector includes farms throughout the Highlands, northern slopes and southern plains. Cattle feedlots in the north west and southern border regions are among the largest consumers.

Major mill tonnages are summarised in Table 11

Table 11 - Major domestic milling/processing facilities NSW

| miller/processor | location | grain type | volume (mt) |
|---|---|---|---|
| Manildra | Manildra | wheat | 800,000 |
| | Gunnedah | wheat | 200,000 |
| | Narrandera | wheat | 100,000 |
| | Nowra | feedgrain | 100,000 |
| Allied | Sydney (Picton) | wheat | 130,000 |
| | Tamworth | wheat | 70,000 |
| Weston Milling | Enfield | wheat | 200,000 |
| Cargill | Newcastle | canola | 180,000 |
| Ingham Enterprises | Berrima | feedgrain | 150,000 |
| | Newcastle | feedgrain | 100,000 |
| Joe White Maltings | Tamworth | barley | 150,000 |
| | Thornleigh | barley | 100,000 |
| total | | | 2,280,000 |

Once domestic demand has been accounted for, the annual surplus can be exported. Grain marketing is not fully deregulated in Australia, with the abolition of the AWB wheat 'single desk'. This means that there is no 'buyer of last resort', and no agency responsible for stocking grain for next year's domestic use in the event of harvest failure. Thus annual carryover stocks are far less predictable than in the past, and there is a greater chance of importing (either from overseas or interstate) in the event of serious droughts.

### *2.2.4 Exports*

Average NSW export volumes have fallen over the last decade from around 3 million tonnes to less than 2 million tonnes and are extremely volatile, ranging from virtually nil to 5 million tonnes (1997). This decline is primarily a function of frequent recent drought events, as well as increasing domestic demand.

### *2.2.5 Future export volumes*

The future for grain export volumes is as difficult to forecast as 'next year's crop'. Increasing prices should ensure long term stability of growing areas, but yield increases cannot be predicted due to the declining productivity of some western lands, and, primarily, the increasing likelihood of rainfall shortage during the growing season. The only potential defence against this trend is genetic modification – research into genetic traits that could improve drought resistance is continuing. However, there is huge global market resistance to the introduction of GM foods, and commercialisation of any such varieties cannot be predicted for the medium term. In the longer term, however, as global food security becomes a greater problem, many experts suggest that the use of GM foods is inevitable.

On balance, a steady decline in average NSW export volumes is the most likely outcome for the next 10-20 years, punctuated by occasional strong years. Annual volumes will be lower, but the peakiness of demand throughout any given year may reduce, due to logistics factors as outlined in the section below.

Port Kembla and Newcastle are the two NSW export terminals, both owned and operated by GrainCorp.

### *2.2.6 Chain structures*

The grain industry has undergone substantial structural change in the last decade, and is now virtually deregulated. The dismantling of the export wheat single desk has simplified the logistics chains, although the market is now more volatile in terms of price fluctuations. AWB formerly operated large pool systems which protected growers from international price volatility by averaging sale prices over a period of 12 months or so for all pool contributors. Some exporters still operate pools, but smaller and over shorter periods. Growers may now choose between several export traders at harvest time, or have their grain stored under interim 'warehousing' arrangements before selling at some stage post-harvest.

Growers may deliver grain to silos operated by bulk handling companies (BHCs), of which GrainCorp is the dominant east coast company. Other sites are owned by AWB GrainFlow, Australian Bulk Alliance (ABA) and smaller players. Alternatively, increasing numbers of growers are using on-farm storage options, to minimise interruptions to harvesting. These options include field bins and storage bags. Post-harvest, these growers can deliver grain directly to consumers (typically local mills or

livestock producers) by truck, or deliver to BHC silos for sale to a range of traders when trucking costs are lower.

Once grain has been delivered to the silo, the eventual buyer of the grain makes arrangements to hold and transport it to domestic user or export location, either by road or rail. Since de-regulation, rail transport arrangements are now made by the BHC company, rather than the individual export trader. GrainCorp has a contract with Asciano for the haulage of export grain to port from its sites, while AWB GrainFlow has a similar contract with niche operator El Zorro. Traders buying grain at these silos make use of the long term rail freight contracts held by the owners.

When ships are nominated to arrive at a port terminal, GrainCorp and the other BHCs work together to assemble cargoes from grain held throughout the networks, using the rail contracts. The current season, 2008/09, is the first to operate under these new conditions, and logistics practices are still being ironed out between BHCs and exporters. The rail operators now have bi-lateral contracts with BHCs, and no relationship with grain owners, simplifying the chains.

There are, however, a much smaller number of trains available to the export trade, due to the extreme demand volatility. This means that trains alone cannot meet export demand at peak periods. Increasing volumes will be moved by truck to port on occasion, where there is a price premium on early season exports.

### *2.2.7 Future use of Port Kembla for export grain*

Port Kembla has the largest and most modern of the NSW terminals, with storage capacity of over 200,000 tonnes, and the ability to export around 3mt per year. Its usage in recent years, however, has been curtailed by the development of the Melbourne Port Terminal (by AWB and ABA) which now attracts some volume from southern NSW (south and west of Junee).

There is now considerable surplus export terminal capacity on the east coast, with 6 port terminals between Brisbane and Portland (Victoria) competing for an estimated average 5 million tonnes of product, compared to a capacity of around 15mt. GrainCorp owns 5 of these terminals, and is facing difficult decisions regarding closure of 1-2 facilities in the face of demand reduction. In 2009, virtually no exports are expected from Geelong and Portland, since the virtual failure of the Victorian crop, and exports through Port Kembla will also be minimal. Newcastle, by contrast, will be busy, since the northern NSW crop was strong. GrainCorp has not made any statements on this issue and Port Kembla is very unlikely to close, since it is the company's most efficient export terminal asset.

The Newcastle terminal is closest to the grain growing areas with the greatest future capacity, but is an old, inefficient facility (from a rail delivery viewpoint) and has urban residential encroachment issues. Should GrainCorp eventually decide that this facility should close, Port Kembla would handle a larger percentage of the export trade – Brisbane would also compete for far northern NSW exports. If this did occur, the Port Kembla average volume would increase by around 1mt, to about 2.5mt.

In the modelling for this study, the 'Optimistic' forecast includes the volumes arising from any decision to close the Newcastle terminal.

### 2.2.8 *Domestic grain logistics chains*

Most domestic volume movements do not involve usage of Illawarra transport corridors. The exception is grain and flour movements into the Manildra Group processing facility at Nowra. This plant produces ethanol and starches from flour and grain inputs. Flour is produced at the company's mills at Gunnedah and Manildra, while grain is sourced from silos through the state. Flour is delivered by daily trains running on well-defined timetables through the metropolitan area, while grain trains (usually 1-2 per week) use the Moss Vale-Unanderra corridor.

The future for these volumes depends somewhat on the ethanol issue. If NSW moves towards greater mandated use of ethanol in fuel, grain freight flows will be affected by the location of new ethanol plants. Manildra would probably expand production at Nowra, and other plants are mooted for Newcastle and the Riverina area. This might increase the flow of grain by rail to Nowra, but this growth would come at the cost of export grain traffic.

### 2.2.9 *Implications for Maldon-Dombarton*

At Port Kembla, the rail system could deliver up to 12,000 tonnes per day by rail until the year 2000, which was helpful in the January-March export peak season in strong years. This daily figure is now unlikely to exceed 5,000 tonnes on a reliable basis, particularly if exports through Newcastle are also required.

The current average export volumes reaching Port Kembla via the Moss Vale-Unanderra line are around 0.8mtpa – equating to around 400 train loads per year. In view of the current train capacity, there is unlikely to be any greater demand than 3 return train paths per day along the Moss Vale – Unanderra line. (This would theoretically allow for almost 2mt to be delivered in a very strong season.) Grain trains use the main southern line from Cootamundra into Moss Vale, even for exports originating in the western area centred on Parkes and Dubbo. The main reasons for this are the easier terrain, meaning that only two locomotives are required instead of three, as well as the path constraints on the alternative route through metropolitan Sydney.

Manildra Group flour trains currently use the metropolitan route, and approach Nowra via the Illawarra line. This is partly due to the fact that the Manildra Mill (Central West) train also carries flour for the Sydney market and exports in container via Port Botany. It therefore has a stop at Enfield factored into its timetable. The Namoi Mill (Gunnedah) train takes the most direct route via Newcastle and Sydney. In the event of passenger rail traffic becoming seriously congested on the Illawarra line, the Maldon-Dombarton route would be a viable alternative for these trains, and more convenient than the Moss Vale-Unanderra line.

In occasional poor seasons that might lie ahead, NSW will need to import grain for milling in Sydney and at the new mill at Picton. Trains have been used in the path to take imported grain from Port Kembla to Sydney. The Maldon-Dombarton line would be valuable as a means of supplying milling grain to Picton under these circumstances, though this would only occur for short periods in the worst drought years (perhaps 1 in 5).

### *2.2.10 Summary*

Grain volumes on rail are unlikely to grow in the foreseeable future due to:

- falling production and increasing domestic demand
- limited train capacity

The main source of future increased volume through Port Kembla would be the closure of the Newcastle terminal, of which there is no indication at present.

The Maldon-Dombarton route would be a useful alternative to the Illawarra line for Manildra Group trains, if that line becomes constrained for freight train use.

## 2.3 Other commodities - minerals, cement, aggregates, biofuels

The commodities included in the section covers include mining products such as mineral concentrates, iron ore, limestone, aggregates and sand, cement, bio fuels and timber. These commodities are not covered in the specific product chapters.

### *2.3.1 Overview of minerals and iron ore demand*

The export minerals sector has an established presence in NSW, dominated by operations in the central west region near Orange, Parkes and which utilise both the Port Kembla Gateway export facility and the Port of Newcastle. There are also a number of projects at various stages of feasibility in Western NSW that have the potential to significantly expand minerals output in NSW.

Non-coal minerals constitute approximately 27% of total mineral revenue from NSW, which in 2005-06 was an estimated $2.7billion. NSW is a relatively low cost producer of gold, base metals and mineral sands. Recent production growth has been dominated by gold and copper, however there is exploration activity for a number of other minerals. During the period 1991-92 to 2005-06, mineral outputs increased by 48%. This has been driven largely by gold and copper with other base metals such as zinc, silver and lead declining over this period. Importantly this preceded the significant jump in commodity prices in 2007-08 (and the subsequent collapse, with the exception of the Gold price). The sector has faced significant challenges since mid-2008 due to the Global Financial Crisis (GFC) which has both destabilised commodity values and undermined confidence within the investment community. This is likely to slow some of the growth over the short to medium term, although long term fundamentals remain unchanged in relation to global demand for a finite resource base. Growth is likely to be focussed on gold and copper with production of other minerals likely to remain flat or increase modestly.

Figure 7 - Map of NSW minerals operations - current and forecast


The map outlines the key mines that currently export minerals through Port Kembla along with current projects to develop new mining opportunities.

*Current Production Facilities*

Over 350,000mt of concentrates are currently shipped by rail to Port Kembla from Newcrest's Cadia Hill mine near Orange and Rio Tinto's North Parkes Mine. They are predominantly gold and copper operations and currently have long term life projections, with additional identified deposits adjacent to the current operations. Prior to the GFC North Parkes had also been planning production increases which at this stage are on hold. There have recently been reductions in staffing levels in response to the recent dramatic fall in commodity values. This has slowed the growth momentum of the mine but at this stage volumes have not yet fallen significantly. They are both significant deposits and are likely to continue in operation for the next twenty to thirty years.

Both operations utilise specialised containers that are railed to Port Kembla. The Cadia Hill product via the route through Sydney Illawarra, and North Parkes the southern route via Stockinbingal and Moss Vale. Both have regular mandatory train paths in place.

Iron ore mining has recently commenced at the Boulia Mine nearby Cowra and is likely to supply mainly domestic customers. Due to potential quality variations as the mine progresses the customer base (and hence destination) is likely to change which would require a different network path. This could result in volume shipments into the Hunter Valley as opposed to Port Kembla. Current volumes could be over 100,000mt per annum which at this stage is likely to mover into Port Kembla by road. Given the imminent closure of the Cowra branch line and uncertainty over the longer term destination for the product the volumes will be moved by road.

*Prospective Use of Maldon-Dombarton*

There are a number of potential mineral developments in Western NSW which if progressed to production will have significant implications for export volumes through Port Kembla and, potentially, the Maldon – Dombarton corridor.

Over the past decade the global economy has seen sustained demand for base minerals largely led by strong economic growth in China. This has led to significant increases in commodity values particularly in 2008. The combination of higher commodity values and the availability of existing rail networks has combined to attract exploration and development of iron ore opportunities in NSW.

There are a number of smaller iron ore producers and large scale deposit in the states far western region. The most significant of these is Eastern Iron who have identified significant Western NSW deposits stretching from north of Cobar through to Lake Cargelligo to the south.

The deposit is identified in the map above and covers a very large region of western NSW. There are a number of points where these deposits could access the existing rail network via short distance road hauls. The proposed method of mining is relatively low in capital cost due to the location of the ore body close to the surface. This makes the operation easily scalable and hence the significant constraint in terms of potential volumes is rail capacity (and cost of this capacity) to port. Initial investigation by this company has indicated that its total available rail capacity into Port Kembla would be limited to 1 train per day equating to around 1mt per annum. Trains from his deposit could access Port Kembla either via the Moss Vale-Unanderra line or the potential Maldon-Dombarton link. At this stage a further 2mt has been identified as potentially moving from the northern (Cobar) region to Newcastle. However this is subject to capacity constraints on the Hunter Valley network as well as track constraints between Dubbo and Muswellbrook and the availability of future new capacity into Port Kembla. Whilst the iron ore values have fallen significantly, the project is still considered feasible on future projections.

Significant deposits of iron ore are currently under development in South Australia. These deposits would have a significant land freight advantage if exported through South Australian ports, but due to the lack of current export infrastructure there is a remote possibility of shipment through Port Kembla. There is also potential for some further supply of product into Port Kembla for domestic consumption.
The Woodlawn mine near Goulburn is also undergoing feasibility testing for reopening by Tri Origin Minerals. Initial estimates are based on export volumes in excess of 100,000mt per annum, At this point the company is evaluating Port Botany as a likely export corridor however the product would be well suited to Port Kembla if rail capacity was available. There is continued exploration through many of these regions and further discovery and development is likely over the long term.

There are other examples of mining activity in the region (in particular the Barrick gold mining operation at Lake Cowal near West Wyalong) where the nature of the mineral does not require large volumes to be moved to the export facility. As a result these mines do not have any significant implications for rail capacity into Port Kembla.

### *2.3.2 Building and Industrial Materials*

This section includes products associated with cement and limestone production, aggregates, sand, clinker and serpentine.

The relative geographic location of Port Kembla with rail links into southern NSW and the Sydney basin makes it the natural port for the southern and western region. When combined with the growth of south western Sydney (both in strong population growth, urban and industrial development) the

southern Sydney - Illawarra transportation network will be critical to supporting this growth whilst still accommodating the needs of industries importing and exporting through Port Kembla. There are a number of significant industries that utilise the southern Sydney / Illawarra rail corridor that would either be directly or indirectly impacted by the Maldon-Dombarton line. The building and industrial materials industry currently uses this network to move significant volumes within the network space. Successful operations on rail rely on the regional paths performing as a cohesive transportation network. There is a high degree of interdependence between different paths and often problems in one path will have consequences for the other sections of the network.

The Sydney basin currently relies on the importation of raw building materials from surrounding regions due to exhaustion of local quarry products, urban development and the sandstone geological foundation underneath Sydney. This trend will grow into the future with products more likely to be drawn from quarrying operations further afield.

The industry is dominated by a number of large companies, in particular Boral (including Blue Circle), Australian Cement and BlueScope which have significant manufacturing and distribution facilities in Berrima, Maldon, Port Kembla, Enfield, Cooks River, Dunmore (Illawarra), Kandos and Marulan. They also source product from other smaller quarries within the region. They represent significant volumes that are moved in the region bounded by Sydney, Bathurst, Marulan and Port Kembla. Most of these facilities operated by either Blue Circle (Boral) or Australian Cement has a strong reliance on rail for transport between particular destinations.

Figure 8 - Key Industrial Material Facilities


The map highlights the concentration of activities within the region with a variety of products moving between the significant quarries and industrial facilities. The key facilities that accept or dispatch

product by rail are documented on the map though the smaller quarries and batching plants that use road transport exclusively are not listed.

Whilst the distances between various demand and supply points within the region are small, (particularly by rail standards) the volumes are very large and heavy (the products are by their nature highly dense). If this traffic was not moved by rail it would represent a significant increase in truck movements through the urban environment.

The nature of the industry is based on low inventory levels and reliance on delivery to requirement, particularly batching plants in metropolitan Sydney. To maintain or grow rail volumes in this corridor access to paths and sufficient buffer capacity in the network is critical to a reliable rail service.

These companies are making long term strategic decisions on manufacturing location, sourcing options and transport modes. These decisions are heavily influenced not only by the ability to access rail but also the forecast ability for the rail network to meet future demand. While not all traffics shipped in the region are directly relevant to the Maldon-Dombarton line it does represent significant use of the Sydney – Illawarra network and the main southern and western lines and are therefore impacted by the effectiveness of the various links to Port Kembla.

In addition to the local manufacturing base there is also opportunity for the export of various products including sand, limestone and cement. SCM (Sydney Construction Materials) currently have development approval for a new sand mining operation near Lithgow. SCM are planning to export an initial volume of 500k mt per annum growing to 1.5M mt per annum. This is based on running two trains per day from Lithgow to port Kembla 6 days per week.

There are reserves of hard rock aggregate in the Dunmore / Shellharbour region which supply the Sydney metropolitan region. Product from this region is currently moved by all three modes of transport - ship, rail and road. Ship access is reliant on long term access to Blackwattle Bay in Sydney Harbour which is under growing urban pressure. Industrial and population growth is also moving towards the south west and hence would make supply through the centre of Sydney unattractive compared with direct links from Port Kembla to South-Western Sydney. The ability to rail product from the region is already constrained with the difficulty for industry players to gain access to reliable paths for additional volumes.

This region currently supplies in excess of 2mt of bulk aggregate in the Sydney metropolitan area each year.

Currently ships are used to distribute bulk product from Shellharbour into Glebe Island for distribution by road throughout Sydney. Any movement of distribution hubs into the south western industrial regions would present significant opportunities to utilise the Maldon-Dombarton line.

There are also existing manufacturing material requirements particularly for companies such as BlueScope and Omya which utilise rail for receival of raw materials. Products like limestone are all currently transported by rail within the SWSI basin. However other products such as serpentine which is supplied from the Somerset mining operation at Jugiong to Port Kembla (currently supplying 35,000mt into port Kembla although there is potential for this to increase to levels close to 200,000 per annum over the next ten years) which are moved by road.

### 2.3.3 Other products

*Biofuels*

The Biofuels Industry is based on replacing current petroleum based fuels with fuel extracted from renewable resources. The industry has grown rapidly over the last few years in response to significant increases in oil prices, concerns over long term fuel supplies and government mandates to improve the environmental impact of current fuel consumption. In the Illawarra region Manildra Group already operate the largest ethanol plant in Australia in Nowra and National Biofuels are planning to build the largest Soybean processing plant in Australia predominantly for the supply of biodiesel. Both plants require the delivery of feedstock (generally grains but also flour and sugar) and then distribution of liquid fuel products and bi-products (including Dried Distillers Grain (DDG) and .soybean meal) which are generally transported in bulk for use in the stockfeed industry.

National Biofuels Pty Ltd is in the process of developing a soybean bio-fuel plant in Port Kembla which will require 1mt of soybeans per annum. Initially these will be sourced internationally and delivered by ship to Port Kembla, but the business plan is focussed on growing the domestic supply base from 50k mt and would result in additional rail requirements into port Kembla. The facility will produce soy biodiesel which given the diverse nature of the end market and small volumes will be moved by road. Customers facilities are road based and volumes do not make rail a likely option. However the facility will also produce significant volumes of Soybean meal in bulk which will require distribution to all states and could amount to in excess of 250,000mt to be moved to interstate destinations.

Ethanol production is also planned to increase significantly with Manildra Group likely to double production through the plant in Bomaderry. At this stage this is unlikely to have any rail implications for fuel distribution, since the market and customer base are centred on road transport. The plant will also result in significant increases in DDG (Dried Distillers Grain - the animal feed by-product of the ethanol process) which could have a rail application in the long term future. The plant will increase consumption of grain delivered by rail, but this increase is likely to be accommodated initially through longer train lengths on existing rail services as opposed to an additional requirement for train paths. Any increase in this commodity would, however, come at the expense of export grain volumes.

*Timber and Woodchip*

There is a long term potential for the export of timber products through Port Kembla from southern and central NSW. At this point however, the market conditions indicate that any exports in the short term are unlikely.

Given the sporadic nature of the export requirements and lack of rail loading infrastructure at points of origin at this stage it would be more likely that any requirement would be serviced by road. Previous attempts to capture some of this market by rail have proved unsuccessful.

*Fertiliser*

Port Kembla has traditionally supplied fertiliser to the agricultural regions of Southern NSW. The major supplier of product is Incitec Pivot which also has facilities in Geelong and Newcastle servicing the region. Currently an estimated average 150,000mt per annum is shipped form Port Kembla into regional NSW, however given the highly seasonal demand and the market dynamics this is all moved by road. Generally the product is stored at Port Kembla (after arriving by ship) and is then bought on an 'ex-works' basis by customers throughout the regional area who organise the transport from Port Kembla generally for delivery direct to farm, making the traffic unsuitable for rail.

### *2.3.4 Policy drivers*

There are a number of Government policy initiatives which will impact the growth of the different product segments and will have implications for industry selection of transport mode.

There is a strong push in most Western countries to increase the production of bio fuels including both ethanol for inclusion in petroleum blends and bio diesel. The outcomes are being forced through both mandated inclusion rates in the case of ethanol and various tax incentives and relief for bio diesels. Increasing concerns over environmental impact of fossil fuels combined with long term finite resources are likely to facilitate further policy development in this area.

The NTC's move towards capturing the full cost of using regional roads through the COAG Road Reform Agenda will be particularly relevant to outlying mine projects. Typically transport will account for a significant percentage of the total cost to market for these projects and hence they will be heavily dependant on low cost transport options. Increases in road user charges in this context will make the option of using road less viable and increase reliance of the option of rail.

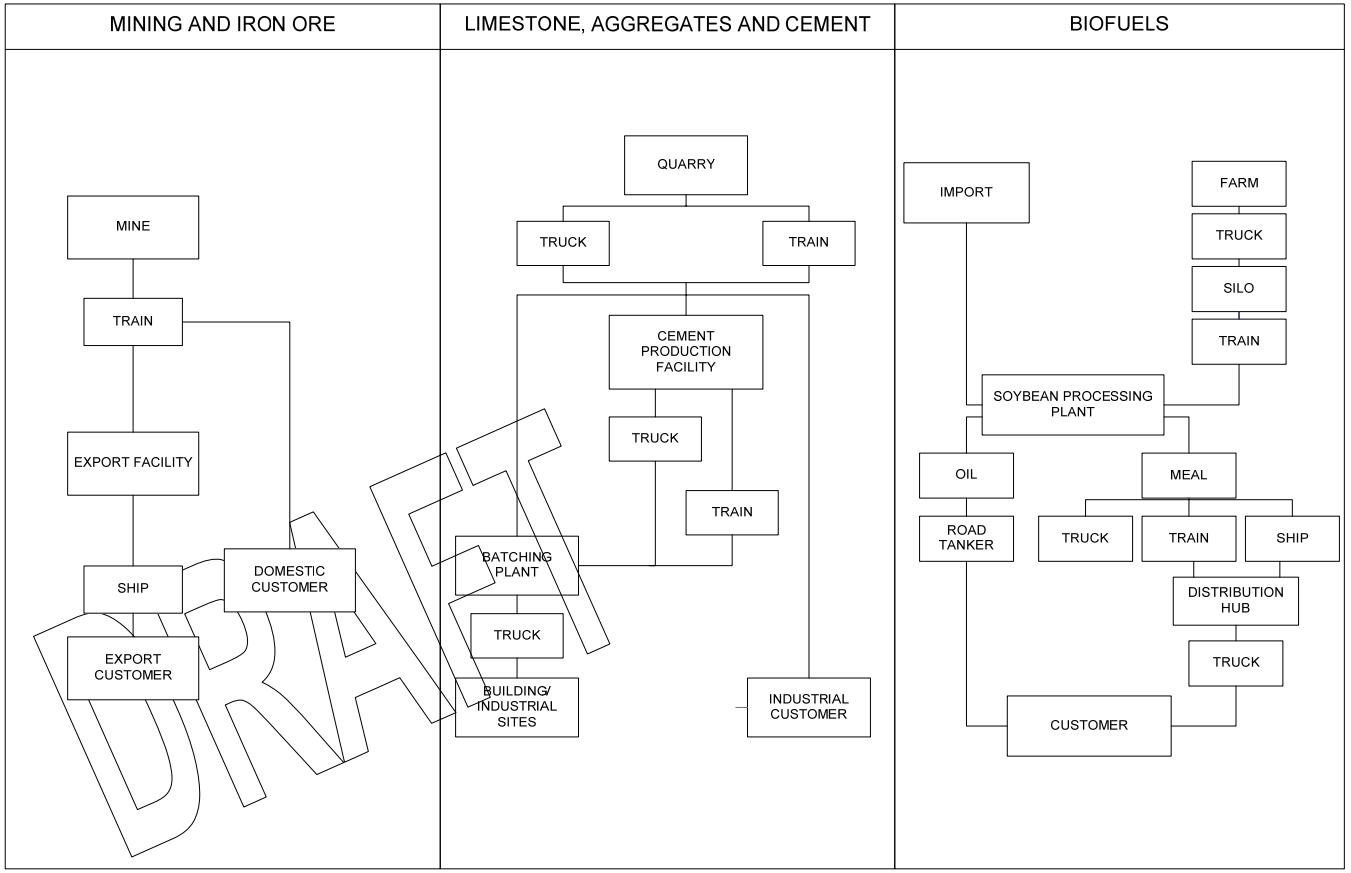
The Carbon tax environment will also start to influence modal choice particularly in the movement of bulk commodities where freight forms a significant portion of the cost base. This will increase competitiveness of rail subject to capability to complete in terms of capacity and reliability.

Lastly as population grows in the areas removed from the metropolitan centres the combination of increased population and urban congestion is likely to see policy aimed towards encouraging higher patronage of the public transport system. In the case of the Illawarra region this will continue the trend of passenger growth of commuters to Sydney and place additional long term capacity on the network.

### 2.3.5 *Supply Chain Structures*

This diagram outlines the basic supply chain structures relating to the each product segment. The supply chain diagrams highlight the strong reliance on transport and the potential to utilise rail for significant percentages of the total movements within the context of each industry.

Figure 9 - Supply chain structure by industry segment



Transport forms a key link in all the supply chains outlined, though the context varies in each sector. In the mining sector transport is a key driver in economics – particularly when developing mines in regional areas at significant distances form export facilities. In this context an efficient rail option is critical to the economic viability of new and existing mines. Even where road transport might prove viable the quantities required to be moved will have a detrimental impact on the regional road infrastructure, and eventually these costs will be captured through road pricing reforms.

The structure for industrial and building products is generally more concentrated with smaller distances involved. As a result road transport can more easily substitute rail as the economic benefits of rail over road are less substantial. However given the significant volumes moving between each of these locations within the urban regions there is a considerable social cost to be taken into account in relation to increased heavy vehicle traffic.

The demand base in this model is generally industrial and tends to operate with low inventory levels and hence the reliance on service levels is critical. The major concern raised by stakeholders in this study is concern over the business risks faced through a reliance on rail for delivery of key raw materials and the potential for business interruption as a result of network failure.

### *2.3.6 Forecasting demand and growth*

The forecast volumes are based on assumptions which take into account estimated growth for each traffic combined with a degree of probability for each new traffic coming on line over the period through to 2020 and 2030.

There are a number of scenarios which will be impacted by the future of the Maldon–Dombarton project. All of the traffic identified (both future and current) could use the existing network through the Illawarra line and the Moss Vale-Unanderra line and savings in terms of potential reductions in distance travelled would be negligible. However given the current issues with capacity and reliability utilising these paths the future of Maldon–Dombarton could be significant to the future of these developments.

The implication to these sectors is threefold:

- Provide capability for the minerals sector to expand export volumes, particularly into new commodities
- Enable significant industrial companies to incorporate rail into their long term planning in relation to facility development and strategic sourcing with confidence that the rail network has sufficient capacity in the Sydney basin.
- Provide an infrastructure that enables smaller volumes and opportunity to access rail as mode of delivery.
- Provide opportunity for new developments in this sector to access rail as a mode of transport to Port Kembla.
- Enable passenger traffic to grow between Illawarra and Sydney without reducing access to the rail network for freight.

Large volume exports of iron ore and sand could equate to an additional 3,000,000mt through the existing network and would struggle to gain access to sufficient paths. This would be exacerbated by potential growth from existing concentrate exporters. Maldon Dombarton would create significant

additional capacity to provide confidence to the investment community that if mines are developed or expanded there would be sufficient rail capacity available to support the business.

The building and industrial materials sector currently ship aggregates into metropolitan Sydney and there is scope to utilise Maldon-Dombarton as the demand moves further south west. Maldon-Dombarton would also provide opportunity to access Sydney via the Southern Sydney Freight Line thereby avoiding the passenger network on the Illawarra line and metro Sydney.

Importantly Maldon Dombarton would provide capacity into the Illawarra / South Western Sydney basin which provides confidence in the ability of rail to meet the reliability requirements to support industrial operations. Currently concerns over network capacity are influencing long term investments in production facilities and key sourcing locations. All major companies have indicated a willingness to utilise rail however harbour concerns that the network will be unable to perform given capacity constraints and the preference that will always be given to passenger freight.

There are a number of smaller volume products that currently either move by road or will move by road. The perception is that rail would be very difficult to put in place and the inability to guarantee path access to Port Kembla fundamentally undermines any commitment to achieving a rail outcome for this type of traffic.

Table 12 over page shows estimated increased freight volumes to 2030 under Conservative and Optimistic cases.

Table 12 – Other Freight - Forecast volume by Corridor (million tonnes)

Conservative Forecast

| Current Volume | | Future Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Road (Port Kembla) | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 |
| Rail | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Moss Vale - Unanderra* | 0.60 | 0.60 | 0.60 | 0.50 | 0.00 |
| *Illawarra* | 1.25 | 0.95 | 0.95 | 0.70 | 0.70 |
| *Maldon Dombarton* | 0.00 | 0.30 | 0.30 | 0.65 | 1.15 |
| *Totals* | 2.14 | 2.14 | 2.14 | 2.14 | 2.14 |

| 2020 Forecast | | Future Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Road (Port Kembla) | 0.34 | 0.34 | 0.34 | 0.34 | 0.34 |
| Rail | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Moss Vale - Unanderra* | 1.88 | 1.88 | 1.88 | 1.76 | 0.00 |
| *Illawarra* | 2.61 | 2.28 | 1.08 | 1.22 | 1.22 |
| *Maldon Dombarton* | 0.00 | 0.33 | 1.53 | 1.51 | 3.27 |
| *Totals* | 4.83 | 4.83 | 4.83 | 4.83 | 4.83 |

| 2030 Forecast | | Future Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Road (Port Kembla) | 0.32 | 0.32 | 0.32 | 0.32 | 0.32 |
| Rail | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Moss Vale - Unanderra* | 3.32 | 3.32 | 3.32 | 3.21 | 0.00 |
| *Illawarra* | 4.12 | 3.84 | 0.92 | 1.74 | 1.74 |
| *Maldon Dombarton* | 0.00 | 0.27 | 3.20 | 2.49 | 5.70 |
| *Totals* | 7.76 | 7.76 | 7.76 | 7.76 | 7.76 |

Optimistic Forecast

| Current Volume | | Future Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Road (Port Kembla) | 0.29 | 0.29 | 0.29 | 0.29 | 0.29 |
| Rail | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Moss Vale - Unanderra* | 0.60 | 0.60 | 0.60 | 0.50 | 0.00 |
| *Illawarra* | 1.25 | 0.95 | 0.95 | 0.70 | 0.70 |
| *Maldon Dombarton* | 0.00 | 0.30 | 0.30 | 0.65 | 1.15 |
| *Totals* | 2.14 | 2.14 | 2.14 | 2.14 | 2.14 |

| 2020 Forecast | | Future Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Road (Port Kembla) | 0.36 | 0.36 | 0.36 | 0.36 | 0.36 |
| Rail | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Moss Vale - Unanderra* | 3.33 | 3.33 | 3.33 | 3.21 | 0.00 |
| *Illawarra* | 4.31 | 3.98 | 1.08 | 1.67 | 1.67 |
| *Maldon Dombarton* | 0.00 | 0.33 | 3.23 | 2.76 | 5.97 |
| *Totals* | 8.01 | 8.01 | 8.01 | 8.01 | 8.01 |

| 2030 Forecast | | Future Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Road (Port Kembla) | 0.41 | 0.41 | 0.41 | 0.41 | 0.41 |
| Rail | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| *Moss Vale - Unanderra* | 4.06 | 4.06 | 4.06 | 3.91 | 0.00 |
| *Illawarra* | 5.13 | 4.76 | 1.23 | 1.95 | 1.95 |
| *Maldon Dombarton* | 0.00 | 0.37 | 3.90 | 3.32 | 7.24 |
| *Totals* | 9.60 | 9.60 | 9.60 | 9.60 | 9.60 |

### *2.3.7 Summary*

Under the Conservative forecast, the potential volumes for the range of bulk commodities using the Maldon Dombarton line will range from less than 0.3 to 3.3 Mtpa in 2020 and up to 5.7 Mtpa by 2030. The maximum potential volume on the line would be 7.2 Mtpa if all development proposals eventuated under the Optimistic forecast and Corridor scenario D.

Significant long term opportunities for increases in export and domestic volumes through Port Kembla which will place significant pressure on existing train paths without development of Maldon Dombarton. The economic environment has placed a cloud over short term growth however fundamentals for the long term remain strong.

Confidence in ability to access the network into the future is key to both potential export opportunities as well as commitment from current significant domestic rail users that the network in place servicing the region will enable a reliable effective rail service.

Without effective excess rail capacity into Port Kembla long term growth in all these sectors will be constrained. This will effect both the growth of existing traffic along with the future of new developments effecting:

- Opportunities for export industries
  Iron Ore deposits in western NSW
  Other minerals and concentrate developments
- Opportunities for domestic volumes into Port Kembla
  BlueScope - Iron Ore / Serpentine / Limestone

National Biofuels – Soybeans

- Opportunities for product movements ex Port Kembla
  Aggregates from Dunmore / Shell harbour region into Sydney metropolitan areas
  National Biofuels Meal products

In summary whilst few of the products have a direct requirement for the Maldon Dombarton as opposed to the current freight network, all of the opportunities for rail in this segment are reliant on long term confidence in access for freight to reliable, mandated, effective freight paths throughout the region.

## 2.4 Steel

### *2.4.1 Overview of sector*

Wollongong has been a significant centre for steel production in Australia for decades. The dominant player is BlueScope Steel which produces flat steel products (plate, slab, coil and welded beams) for a range of markets such as the building and automotive sectors. BlueScope's main sites are located in Port Kembla, Newcastle, Rooty Hill (Sydney), Brisbane and Western Port.

The other significant steel sector player in Australia is OneSteel which manufactures and distributes structural steel and bar and rod products throughout Australia. OneSteel's major manufacturing facilities are located in Whyalla, Melbourne, Western Sydney, Newcastle, and Brisbane.

BlueScope and OneSteel were created in the break-up of BHP, and retain a range of shared logistics services across Australia, in particular the national rail freight contract with Asciano. OneSteel, however, does not have any operational activities in Port Kembla.

Steel production in Port Kembla requires the movement of inbound bulk commodities such as coal by road and rail, iron ore by ship and limestone by rail. Outbound movements involve the use of both rail and road transport for movement of semi-manufactured and manufactured goods to Sydney, interstate locations and Port Botany (for export).

The Port Botany Steel works produces around 10 millions of product per annum and BlueScope's national logistics task exceeds 40 million tonnes per annum. Around 15 million tonnes of this involves road and rail freight movements whereas the remainder is maritime and internal mill rail operations.

### *2.4.2 Policy drivers*

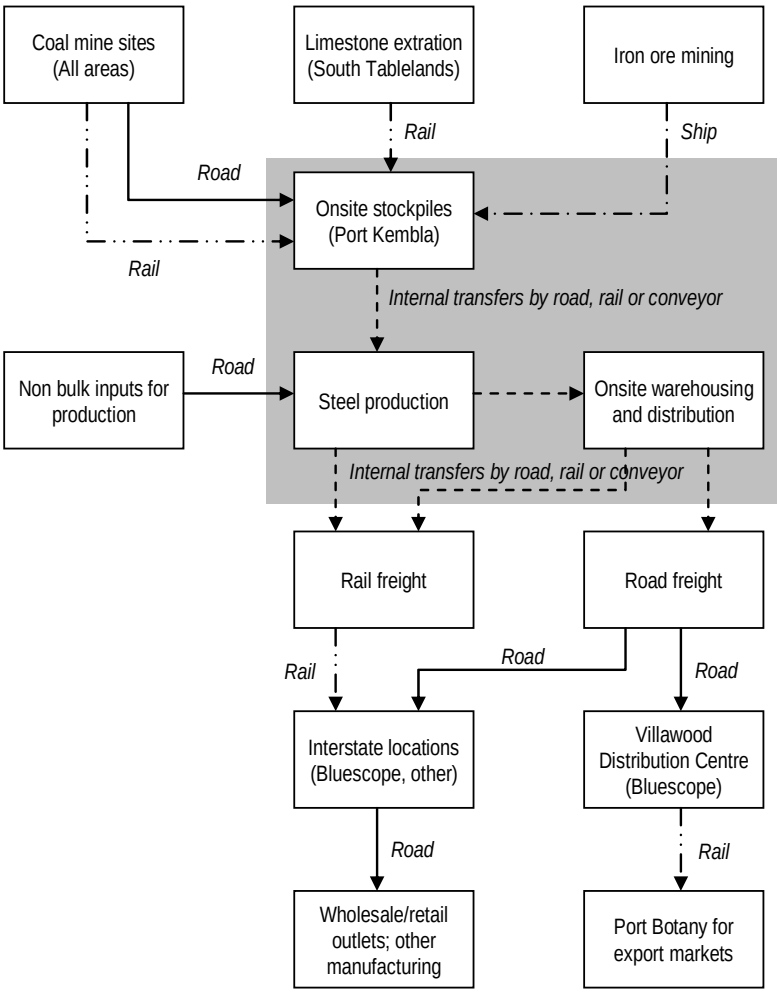
There are not specific Government policies that prescribe how BlueScope undertakes logistics operations except for its responsibilities under the general regulatory and legislative requirements such as Chain of Responsibility. As a dominant regional employer, however, BlueScope does place heavy emphasis on occupational health and safety for the community and its employees.

Rail is the mode of choice for much of its freight, due to the heavy weight of the product and the scale and regularity of movements. To the extent that BlueScope and OneSteel dominate Australian steel production, favourable rail freight access policies have a direct impact on the cost of steel products for the Australian domestic construction market.

### *2.4.3 Supply chain structure*

The steel sector uses road, rail and maritime transport to move input and output goods along the supply chain, as shown in the following diagram. The movement of coal and limestone products is considered in other sections of this report.

Figure 10 - Supply chain movement of steel

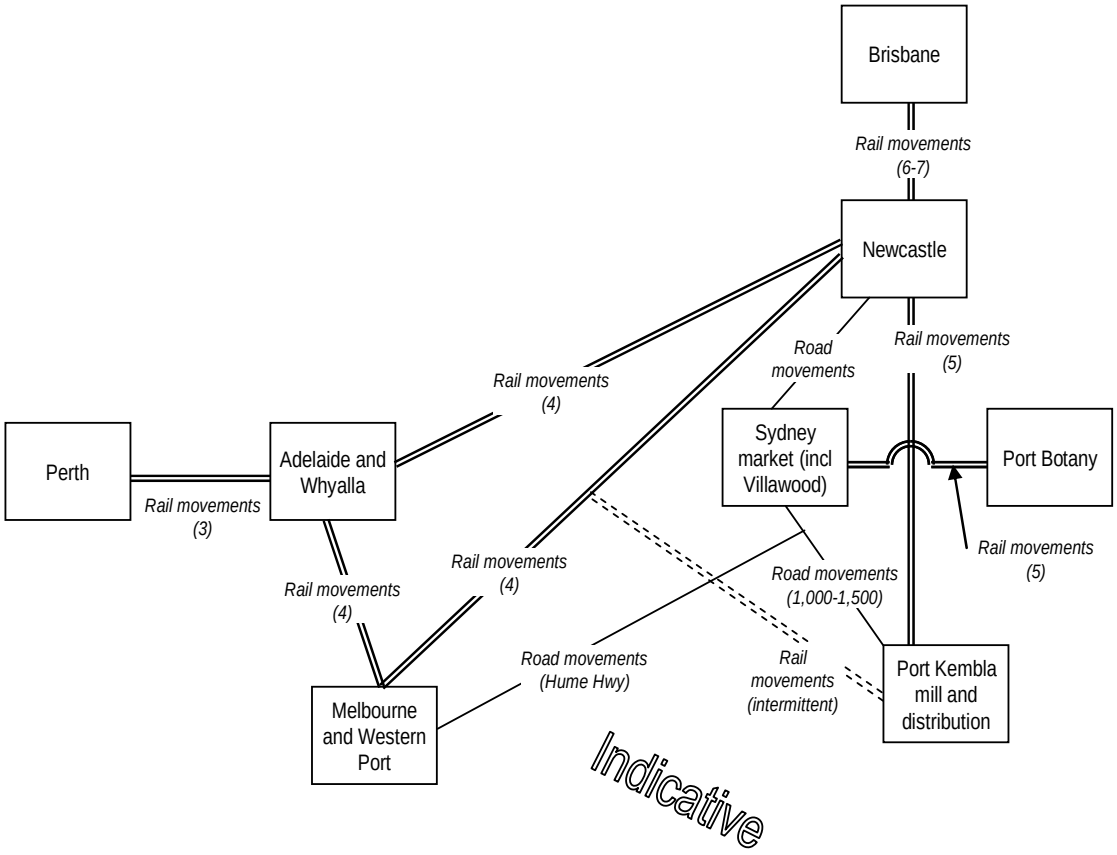



### *2.4.4 Freight flows and volumes*

In the context of this study, the relevant freight flows relate to the daily movement of heavy steel products by rail to other BlueScope sites in each capital city, as well as Newcastle and Whyalla. These operations are also coordinated in conjunction with OneSteel to optimise rail capacity and cost.
Key road and rail movements focussed serving the BlueScope Port Kembla site

*Numbers represent average weekly movements*

Figure 11 - Key road and rail movements at Blue Scope Port Kembla site




### *2.4.5 Transport and logistics methods*

BlueScope and OneSteel are joint users of an integrated network of long distance services transporting a range of products from the steelworks at Whyalla, Western Port, Newcastle and Port Kembla to distribution terminals in each capital city, as well as bulk feedstock between these plants. The three main services operating on a daily basis are:

- Port Kembla-Sydney-Newcastle-Brisbane;
- Port Kembla-Sydney-Melbourne-Adelaide-Port Augusta-Perth; and
- Whyalla-Sydney-Newcastle

These trunk services are scheduled to interchange at locations such as Sydney and Newcastle to allow access to all capitals from each of the plants in a reasonably timely fashion. They run on well-defined timetables and use premium paths on the ARTC network.

Rail services between Port Kembla and Melbourne operate via the Illawarra line into Sydney, rather than the Moss Vale line, primarily because this optimises the amount of loco power required. The 1:30 grades up the Moss Value line would require dedicated banking locomotives to push loaded trains up the Escarpment. The use of Sydney also offers flexibility regarding the loading on the east west and Brisbane services.

BlueScope sends a substantial amount of freight into the Sydney market by road - up to 300 truck movements per day. This is for two reasons:

- Many of the deliveries are direct to customers who are not located near to a rail terminal in Sydney, and the costs associated with PUD transport would be prohibitive over the short distances involved
- Short haul rail services from Port Kembla into Sydney (e.g. containerised export products to Port Botany) are not currently provided by Pacific National (BlueScope's rail provider) and previous attempts to engage new entrants have been unsuccessful as they have not been able to secure suitable rail paths through the metropolitan network.

The substantial number of truck movements into Rooty Hill, Villawood and other Sydney destinations, however, (around 100-150 per day in each direction) is relevant to this study. This traffic accounts for an estimated 15-20% of heavy freight traffic on Mt Ousley. Of this total, 20-30 movements are for the Villawood distribution centre, with the balance as Sydney metro and intrastate and interstate movements.

Some product moved to Villawood is "blended" with other inventory and moved to Port Botany in international containers by rail for export to overseas markets.

Table 13 - Current steel freight volume

| Status | Sector | Commodity | Origin | Destination | Freight Volume ('000t) | Domestic markets ('000 tonnes) | | | Export markets ('000 tonnes) | | | *2010 Volume ('000 tonnes)* |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | *Rail* | *Road* | *Total* | *Rail* | *Road* | *Total* | |
| Current | Other | Steel | Port Kembla | Newcastle | 500 | 500 | | 500 | | | 0 | 500 |
| | | | Port Kembla | Melbourne-Perth | 500 | 500 | | 500 | | | 0 | 500 |
| | | | Port Kembla | Newcastle | 200 | | 200 | 200 | | | 0 | 200 |
| | | | Port Kembla | Villawood | 100 | | 100 | 100 | | | 0 | 100 |
| | | | Port Kembla | Sydney Metro | 400 | | 400 | 400 | | | 0 | 400 |
| | | | Port Kembla | Melbourne | 300 | | 300 | 300 | | | 0 | 300 |
| | *Total Current* | | | | 2,000 | 1,000 | 1,000 | 2,000 | 0 | 0 | 0 | 2,000 |
| Proposed | | | | | | | | | | | | |
| By 2020 | | | | | | | | | | | | |
| | *Total Proposed* | | | | | | | | | | | |

Table 14 – Steel freight volume by corridor scenario over time, conservative case, ('000 tonnes)

| Current Volume | | Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Conveyer | 0 | 0 | 0 | 0 | 0 |
| Road (Port Kembla) | 1,000 | 900 | 900 | 900 | 900 |
| Road (Lithgow) | 0 | 0 | 0 | 0 | 0 |
| Inner rail | 0 | 0 | 0 | 0 | 0 |
| Moss Vale - Unanderra | 0 | 0 | 0 | 500 | 0 |
| Illawarra | 1,000 | 1,000 | 1,000 | 0 | 0 |
| Maldon Dombarton | 0 | 100 | 100 | 600 | 1,100 |
| Totals | 2,000 | 2,000 | 2,000 | 2,000 | 2,000 |

| 2020 Forecast | | Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Conveyer | 0 | 0 | 0 | 0 | 0 |
| Road (Port Kembla) | 1,219 | 1,097 | 1,097 | 1,097 | 1,097 |
| Road (Lithgow) | 0 | 0 | 0 | 0 | 0 |
| Inner rail | 0 | 0 | 0 | 0 | 0 |
| Moss Vale - Unanderra | 0 | 0 | 0 | 609 | 0 |
| Illawarra | 1,219 | 1,219 | 1,219 | 0 | 0 |
| Maldon Dombarton | 0 | 122 | 122 | 731 | 1,341 |
| Totals | 2,438 | 2,438 | 2,438 | 2,438 | 2,438 |

| 2030 Forecast | | Scenarios | | | |
|---|---|---|---|---|---|
| Pathways | As Is | A | B | C | D |
| Conveyer | 0 | 0 | 0 | 0 | 0 |
| Road (Port Kembla) | 1,486 | 1,337 | 1,337 | 1,337 | 1,337 |
| Road (Lithgow) | 0 | 0 | 0 | 0 | 0 |
| Inner rail | 0 | 0 | 0 | 0 | 0 |
| Moss Vale - Unanderra | 0 | 0 | 0 | 743 | 0 |
| Illawarra | 1,486 | 1,486 | 1,486 | 0 | 0 |
| Maldon Dombarton | 0 | 149 | 149 | 892 | 1,635 |
| Totals | 2,972 | 2,972 | 2,972 | 2,972 | 2,972 |

### *2.4.6 Industry and stakeholder perspectives*

BlueScope raises the following issues as relevant to the question of use of Maldon-Dombarton:

- Chain of responsibility legislation brings some additional costs to road transport operations
- Urban congestion is increasingly adding to the cost of road deliveries into metropolitan Sydney
- The capacity of Illawarra line to handle freight traffic in the face of increasing passenger demand may limit future volume growth on that corridor
- A shortage of professional truck drivers may impact on future growth and costs
- Lighter product volumes already on road to Melbourne via Mt Ousley, Picton and the Hume Highway have an advantage over rail, in that the direct movement across to the Southern Highlands involves steep grades and additional locomotive power

### *2.4.7 Summary*

Based on current rail freight patterns, the proposed Maldon-Dombarton rail corridor does not provide any substantial operating benefits for BlueScope due to the steep 1:30 grade to the main southern line. There is benefit however in considering the opportunity to operate a daily shuttle train from Port Kembla to Villawood and return, removing 40-50 truck movements from Mt Ousley in each direction. Some key considerations are:

- BlueScope operates in a highly cost competitive market, and therefore any transfer of freight to rail will only occur if it is cost effective relative to the cost of the road movement
- Timetabling of train paths must suit the operations at Port Kembla and Villawood, and train paths would need to be available for PN and new entrant operators on a competitive basis

## 2.5 Motor Vehicles

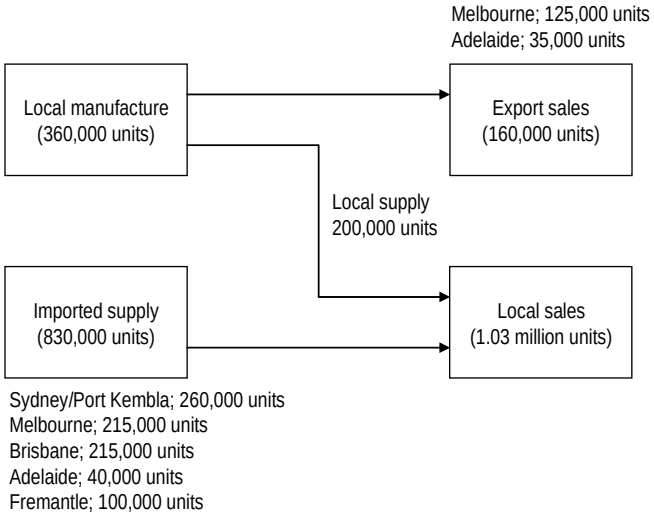
### *2.5.1 Overview of sector*

The motor vehicle sector in Australia has an annual income of more than $150 billion per annum and employs more than 300,000 people. Almost 45% of all manufactured vehicles are exported generating export earnings of around $3 billion. Around 80% of motor vehicles are imported through five capital city ports.

There are 14.7 million registered vehicles nationally, with passenger cars representing 70% of all registrations. New vehicle sales exceed 1 million units per annum, of which motor vehicles represent around 65% of demand. Nationally, volumes in 2008 are up 9% on the previous year. NSW demand in 2008 represent around 30% of national sales, down from 32% in 2007.

Port trade through Sydney has accounted for around one quarter of national import and export trade. The NSW Ports Growth Plan provides for the progressive transfer of motor vehicles from Port Jackson to Port Kembla through 2008-9 concurrent with the development of critical port and terminal infrastructure at Port Kembla.

Figure 12 - Summary of national supply and demand of motor vehicles




*Sources: Assembled from various Port Corporation data and the Federal Chamber of Automotive Industries for years 2006-7 and 2007-8*

### *2.5.2 Policy drivers*

The NSW Ports Growth Plan was announced by the NSW Premier, the Honourable Bob Carr, on 5 October 2003. The plan is a set of principles designed to provide strategic direction to allow the private sector to commence planning for major container trade growth through NSW ports, while allowing public sector providers of road and rail infrastructure to settle on their long-term development plans.

Amongst the key elements of the NSW Ports Growth Plan are the following:

- Maintain Sydney Harbour as a working port servicing an evolving mix of maritime activities which can be efficiently accommodated
- Commission a detailed master plan as part of a process of defining the future use of Darling Harbour East, White Bay and Glebe Island

- As leases expire, support the transfer of general cargo stevedoring activity from Darling Harbour and White Bay to Port Kembla, and the transfer of car import activity from Glebe Island to Port Kembla
- Use Newcastle as the long term site for future container port expansion once Port Botany reaches capacity.[4]

Policy and investment is now focussed on Port Kembla becoming NSW's vehicle importing hub, with a capacity to handle car carrying vessels and ensuring efficient handling of vehicles. Construction will increase berth by 80 metres, totalling 800 metres in length which will accommodate up to three car carrying vessels simultaneously.

### *2.5.3 Supply chain structure*

A generic supply chain structure for the production, sourcing and supply of motor vehicles is shown on the following page in Figure 13.

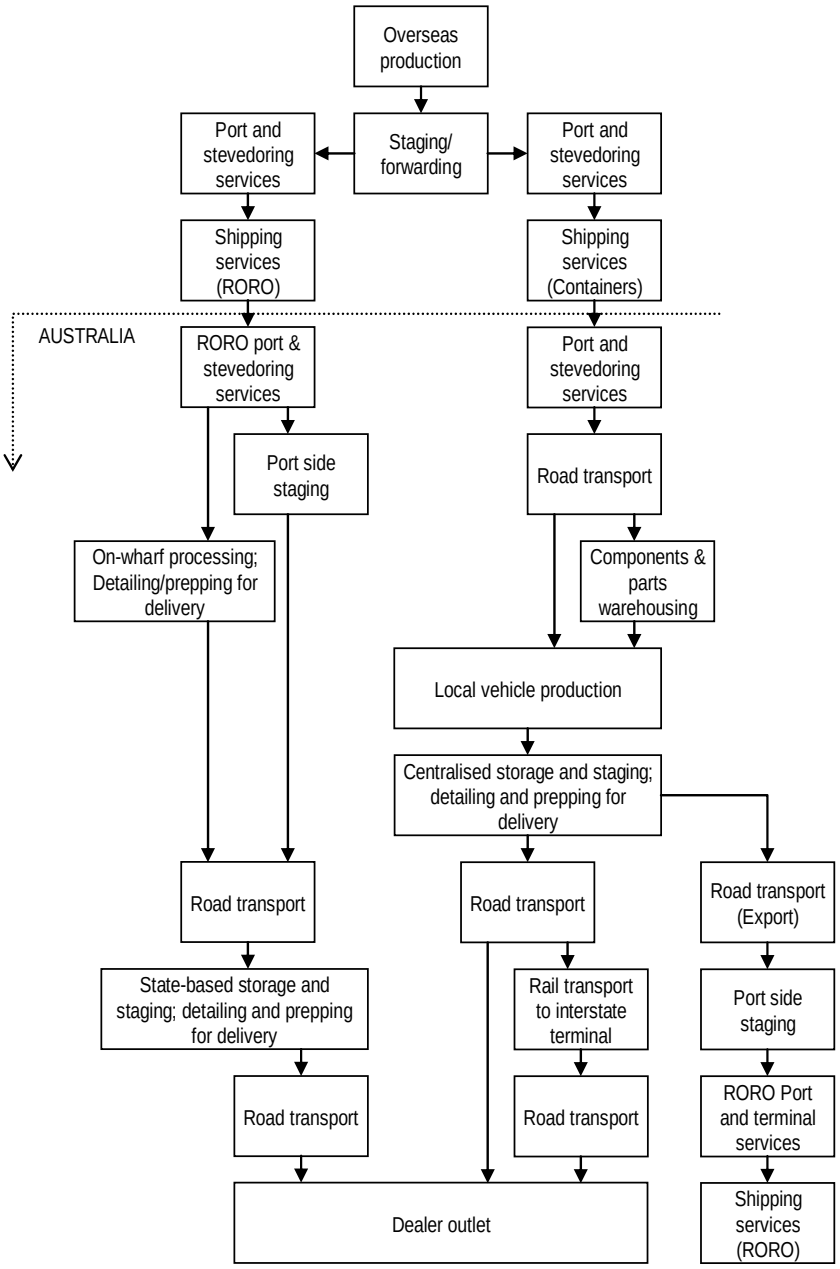
Transport within the supply chain generally uses road transport for wharf cartage and distribution activity, with the exception being the supply of vehicles from the east coast to Western Australia, to supplement the direct imports through the Port of Fremantle.

The emerging supply chain for future Port Kembla throughput however has the opportunity for integrating rail into the supply chain for part of the volume transferred to Sydney.

The specific supply chain operating through Port Kembla will largely align with this model. Storage and staging precincts in Sydney will however progressively move away from Glebe Island to Enfield and other western Sydney locations. Presently, the large facility at Ingleburn is expected to remain in the foreseeable future.

[4] *It is understood that Port Kembla is not precluded from handling container in future however Newcastle will remain the focal port for supplementary capacity*

Figure 13 - Generic supply chain structure for motor vehicle and parts supply




*Source: Sd+D, assembled from industry sources*

### *2.5.4 Freight flows and volumes*

The import of vehicles through Sydney's Glebe Island and Darling Harbour has ranged between 260,000 and 300,000 units over recent years. The immediate task for Port Kembla is considered to be around 260,000 units.

The following diagram Figure 14, provides an indicative supply chain structure which will evolve over the 5-10 years. Imported motor vehicles are handled through the AAT Terminal adjacent the berth and vehicles are either moved to storage locations in Sydney, or to the PDI operations for further processing and dealer preparations.

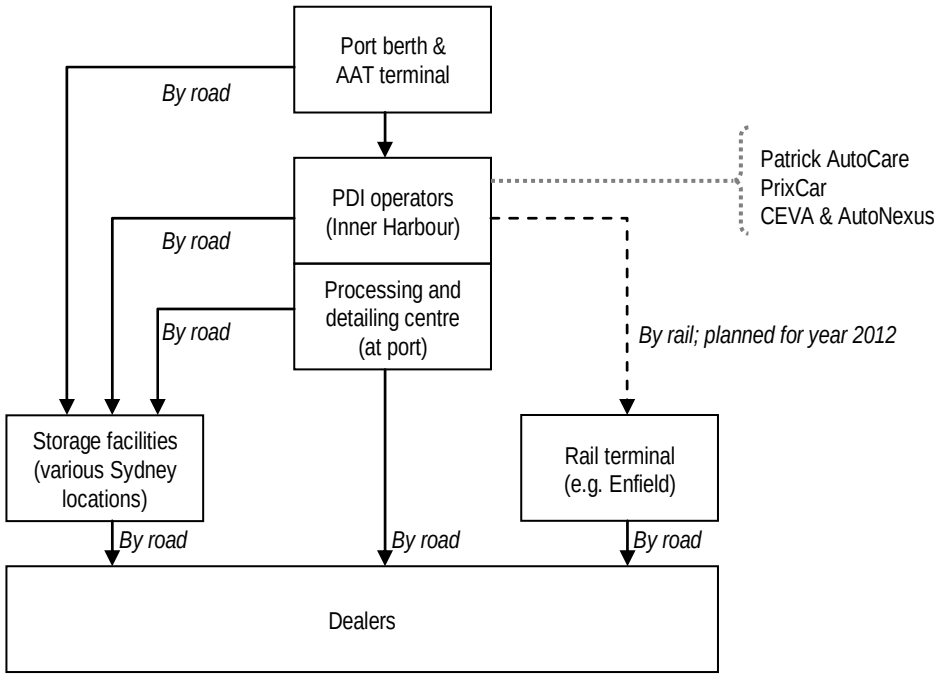
Nominal volumes as handled by the PDI operators from Port Kembla are:

- Patrick AutoCare, handling up to 120,000 units
- PrixCar, handling up to 100,000 units
- and CEVA/Auto Nexus handling up to 60,000 units

Around 50-65% of the volume is moved direct to storage facilities in Sydney, and held for around three months (with maximum to 12 months). The remainder are "processed" in the Inner Harbour and moved directly to a dealer in Sydney or regional NSW. The two supply paths ways reflect whether the manufacturer operates a "push" supply chain allocating product to markets, or a "pull" supply chain against specific customer orders. More prestigious brands tend to operate under a "pull" system.

Initially the supply chain will operate with road transport only.

Figure 14 - Proposed motor vehicle import supply chain for Port Kembla




*Source: Sd+D, assembled from industry sources*

### *2.5.5 Transport and logistics methods*

The road transport has dominated the movement of motor vehicles in Australia. With the transfer of motor vehicle imports from Port Jackson to Port Botany, there is an opportunity over the medium term to move vehicles into the Sydney market by rail.

Logistics patterns around the import of motor vehicles through Port Kembla and the transfer to other processing points still lacks an operating maturity and is likely to change as the various transport operators undertake property and equipment investments around the new supply chains.

The largest PDI operator, Patrick AutoCare, have already given considerable attention to a rail/road transport strategy for part of their land transport task however will initially their supply chain from Port Kembla using road transport during early implementation. Patrick then expect to transfer a proportion of their volumes to rail transport once critical scale is reached and infrastructure is completed; for example, completion of the Enfield Logistics Centre in Sydney's inner West.

Patrick Autocare also intends to acquire and develop land at Dapto south of Port Kembla but the scope of the operation and its links with road and rail networks are not fully developed at this stage. PrixCar and CEVA/AutoNexus are also making investments in supply chain capacity.

The supply channel for dealers in central, northern and north west Sydney will be supported by logistics services initially using road transport, though there is an opportunity for rail services to provide some transfer capacity. For dealers located in the south and south western suburbs it is likely that this demand will be serviced directly by road given the shorter distances involved, as shown in the previous diagram. This segmentation reflects the relative transport economics of "direct road" versus "road/rail" distribution corridors.

The modelled rail service assumes an 18 wagon train carrying up to 300 motor vehicles in the loaded direction, returning empty to Port Kembla due to the specialised nature of the rail wagon. Initially, the service would require a single cycle per day, increasing to two cycles per day once demand increases. At present, the Illawarra Line is the rail corridor nominated to handle this service to Enfield.

The potential for rail to operate in the motor vehicle supply chain is yet to be confirmed, but there is benefit in modelling the potential impacts over time, using assumed growth rates and road/rail modal shares. Table 15 on page 48 adopts a scenario-based approach to analysing the potential logistics task for motor vehicle imports over time; the modelling assumes an annual compound growth rate of 4% per annum.

The model is indicative to illustrate the potential role and implications of using rail within the supply chain. The land transport task assumes the potential to grow rail modal share to 45% over time commensurate with the development of handling facilities in Sydney to receive trains and store vehicles.

The model shows that one train per day will be required to handle around 60,000 to 70,000 units per annum; increasing to two train cycles per day for 170,000 units per annum.

### *2.5.6 Industry and stakeholder perspectives*

The deteriorating economic outlook for 2009 is likely to significantly impact the logistics task for motor vehicle imports for the foreseeable future as immediate demand slows. This is largely due to the ongoing supply of motor vehicles to Australia against orders placed in early 2008, and stock holdings will increase markedly causing an acute demand for storage capacity.

There is broad support amongst the various stakeholders to develop rail-based land transport strategies for motor vehicles. This support however is qualified with reference to completion of the critical infrastructure and resolution of commercial arrangements with logistics and rail providers:

- Negotiations with Sydney Ports for occupancy by Patrick at Enfield were only completed at the end of 2008, and until that point, there was a lack of certainty in investing in a rail strategy underpinned by terminal access and tenancy arrangements. In particular, agreement on "common user" access arrangements had to be resolved.
- Lead times up to two years are generally associated with procuring rail equipment and securing rail services. Consequently, has Patrick committed to, and invested in a road-based transport strategy which will extend to year 2012.
- A rail strategy is seen as beneficial over the long term given:

  The need to reduce congestion on the Mt Ousley section of the Princes Highway;

Inputs such as fuel and labour will be increasingly constrained, impacting road freight operating costs;

Carbon pricing and taxes will invariably favour rail economics

Table 15 - Motor car volumes by corridor scenario

| Scenario | | A | B | C | D | E |
|---|---|---|---|---|---|---|
| Possible threshold year | | Yr2009 | Yr2012 | Yr2015 | Yr2018 | Yr2021 |
| Port throughput | Units | 260,000 | 290,000 | 330,000 | 370,000 | 420,000 |
| Assumed annual growth | %pa | | 4% | 4% | 4% | 4% |
| % Movement to storage | | | | | | |
| *By road* | | 65% | 65% | 50% | 45% | 45% |
| *By rail* | | 0% | 0% | 15% | 20% | 20% |
| *All* | | 65% | 65% | 65% | 65% | 65% |
| % Movement to dealer | | | | | | |
| *By road* | | 35% | 15% | 15% | 10% | 10% |
| *By rail* | | 0% | 20% | 20% | 25% | 25% |
| *All* | | 35% | 35% | 35% | 35% | 35% |
| Total volume by road | Units | 260,000 | 232,000 | 214,500 | 203,500 | 231,000 |
| Total volume by rail | Units | 0 | 58,000 | 115,500 | 166,500 | 189,000 |
| Motor vehicle units per movement | | | | | | |
| *By road* | Units/trip | 8 | 8 | 8 | 8 | 8 |
| *By rail* | | 300 | 300 | 300 | 300 | 300 |
| Movements per annum | | | | | | |
| *By road* | Trips | 32,500 | 29,000 | 26,813 | 25,438 | 28,875 |
| *By rail* | Trips | 0 | 193 | 385 | 555 | 630 |
| Working days per annum | Days | 250 | 275 | 300 | 300 | 300 |
| Movements per day | | | | | | |
| *By road* | Trips | 130 | 105 | 89 | 85 | 96 |
| *By rail* | Trips | 0.0 | 0.7 | 1.3 | 1.9 | 2.1 |

*Source: Sd+D, assembled from discussions with industry stakeholders*

### *2.5.7 Relevance to Maldon-Dombarton corridor*

To date, planning associated with the movement of motor vehicles by train to from Port Kembla to Enfield has focussed on the Illawarra Line as the only possible corridor. The Maldon-Dombarton line, however, provides an alternative corridor, albeit with a longer journey distance. A key advantage is that the train would be able to access the proposed ARTC Southern Sydney Freight Line at Macarthur and travel unimpeded to Enfield without the effect of metropolitan passenger network curfews in the morning and evening peaks.

Movement via the Illawarra line is impeded by the passenger curfews and expected growth in passenger demand which will progressively constrain capacity for freight trains into the future.

A trade off between distance travelled and the comparative operating benefits of each corridor needs to be considered.

In future, the viability of expanding a rail strategy to handle an increased share of the motor vehicle trade will depend primarily on the location, availability and access to intermodal terminals in Sydney's western suburbs; for example, Moorebank, Minto, Ingleburn and St Marys.

In the Conservative modelled forecast, road movements are assumed to continue to 2030. In the Optimistic forecast, rail will be in use by 2020 to service Enfield. On modelled volumes, train path demand will be limited to one train path in each direction by 2020, potentially increasing to two train paths in each direction by around 2030.

## 2.6 International containers

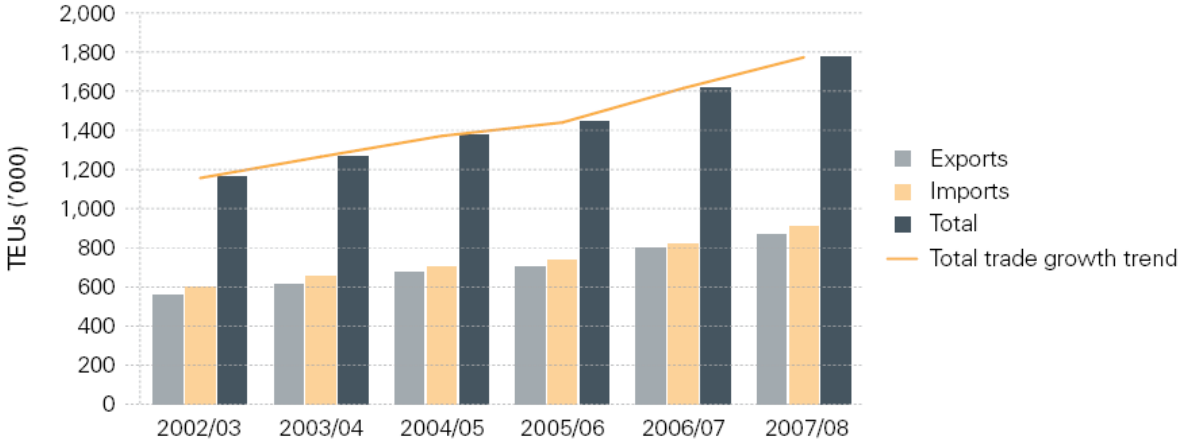
### *2.6.1 Sydney region international containerised freight demand*

As an island nation with international trade links, Australia relies extensively on the movement of shipping containers and other cargo through its ports. Over the last decade, considerable attention has been given to matching the increasing demand with capability of port terminals and land transport links through Sydney, and specifically Port Botany.

Port Botany will continue to dominate the movement of import and export containers for New South Wales. As per Sydney Ports Corporation Trade Report 2007-8 (page 3), "Total container trade grew strongly to 1.778 million TEUs, up 9.8 per cent on the previous year. Total import cargos, which represent 51.0 per cent of the port's business, rose a robust 10.7 per cent during 2007/08, with overall export cargos returning an 8.9 per cent increase". Since 1970, containerised trade through NSW ports has grown at an average rate of 7% per year.

Forward estimates of growth and demand have also been made. The FIAB report [5] stated "Over the past decade, Port Botany has experienced an average annual growth rate in throughput of 8 percent. It handled 1.2 million TEUs 2003-04, 1.34 million TEUs in 2004-05 and volume is forecast to grow at a rate of 5 to 6 percent annually to approximately 3 million TEUs by the early 2020s". Other analyses (Sd+D; 2005, 2007) also predict that total state demand will reach 4.5 million TEU's by the late 2020's.[6]

Figure 15 - Growth in Sydney's container trade




*Source: Sydney Ports Trade Report 2007-8* [7]

[5] *Freight Infrastructure Advisory Board "Railing Port Botany's Containers" (2005)*

[6] *Studies for the Sea Freight Council of NSW; see www.strategicdesign.com.au*

[7] *Sydney Ports Corporation; http://www.sydneyports.com.au/__data/assets/pdf_file/0017/5462/Trade_Report_2007-08_FINAL.pdf*

### 2.6.2 *Demand forecasts by metropolitan region*

The distribution of this demand by region within Sydney has been modelled in a number of origin/ destination (O-D) studies. Sydney Ports undertook an O-D study in 2000 to measure the distribution of demand within the Sydney Basin and has also forecast changes in this demand over time.

The following table is an extract from a recent unpublished study (by Sd+D, 2008) and applies these results to the forecast demand to 2031, and in particular to identify demand in the western Sydney areas (shaded below) [8].

Table 16 - Distribution of freight demand for containers in Sydney

| | Yr2000 | | Yr2025 | | Yr2031 | |
|---|---|---|---|---|---|---|
| | *%* | 000TEUs | *%* | 000TEUs | *%* | 000TEUs |
| City and East | *2.8%* | 28 | *1.2%* | 42 | *1.2%* | 58 |
| Botany and Southeast | *22.1%* | 223 | *23.5%* | 823 | *23.5%* | 1,128 |
| Southern Shires | *1.1%* | 11 | *0.7%* | 25 | *0.7%* | 34 |
| Central West | *27.0%* | 272 | *20.4%* | 714 | *20.4%* | 979 |
| Northern Suburbs | *5.0%* | 50 | *2.9%* | 102 | *2.9%* | 139 |
| Outer West | *22.0%* | 222 | *28.4%* | 994 | *28.4%* | 1,363 |
| Southwest | *16.0%* | 161 | *18.9%* | 662 | *18.9%* | 907 |
| Regional | *4.0%* | 40 | *4.0%* | 140 | *4.0%* | 192 |
| | *100.0%* | 1,009 | *100.0%* | 3,500 | *100.0%* | 4,800 |

*Source: Sd+D 2008, for NSW Planning*

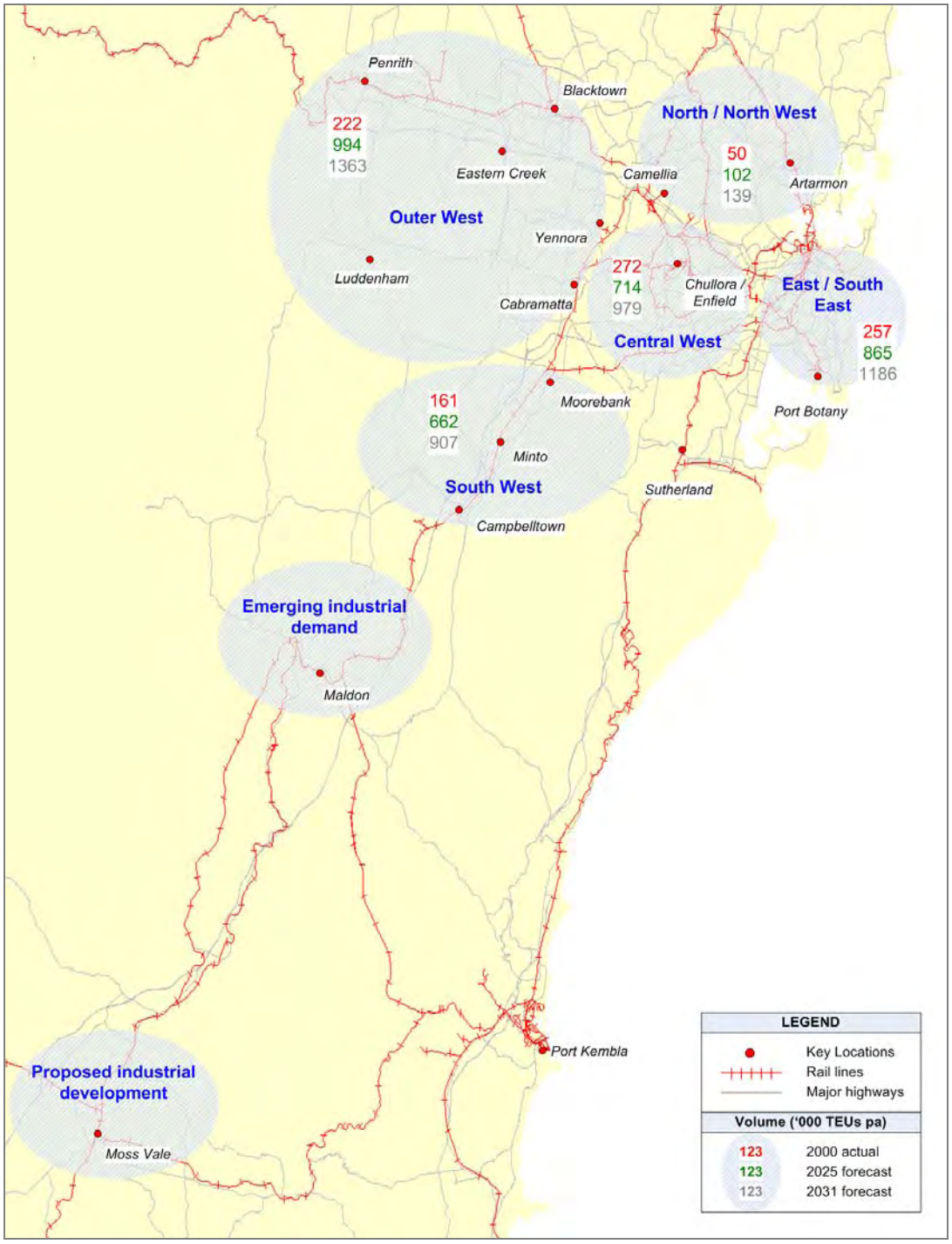
From below, the western and south western regions of Sydney are presently accounting for approximately 46% of port throughput (in international containers) and this is expected to approach 50% by 2025. Demand is presently more than 350,000 TEU's and will grow to almost 1.5 million TEU's by 2025 and 2.2 million TEU's by 2031.

This growth has substantial implications for land transport across the Sydney urban area, and by 2025 represents around 5,000 TEU's per day and a similar number of cross metro truck trips, based on present growth forecasts and mode share.

The following diagram shows the volumes for years 2000 (actuals) and forecast (2025 and 2031) by region within the Sydney metropolitan area.

[8] The percentage distribution by region is as per Sydney Ports 2000 O-D study and modelling applied to the forecast volume of 3.5 millions TEU's by 2025. Changes in the percentages for each region reflect changes in the underlying freight demographics. Similar approach adopted for 2031 however based on higher port throughput at 4.8 million TEU's. While the Ports Growth strategy limits the throughput of Port Botany to 3 million TEU's, overflow volume will be directed towards Newcastle with a proportion being transport back to the Sydney market.

Figure 16 - Container volumes by region within Sydney




*Source: Sydney Ports (2000); Sd+D (2008)*

### *2.6.3 Ports policy, context*

A raft of policy and investment decisions is in place which seeks to enhance the logistics and transport processes for containers. These are summarised as follows:

- The NSW Ports Growth Plan states that "… When Port Botany reaches capacity Newcastle will be the state's next major container facility"[9] . The former BHP steelworks site in Newcastle has been earmarked for that purpose;
- Sydney Ports Corporation has approval to develop the Enfield intermodal terminal to handle up to 300,000 TEUs per annum;
- Newcastle Port Corporation has commenced planning and approval processes in relation to a container port terminal; similarly, Port Kembla Ports Corporation is completing its Inner Harbour development and has substantial plans for expansion of the Outer Harbour;
- The target of 40% modal share for rail is a driver for planning of the Third Terminal expansion at Port Botany and the need for a substantial increase in Intermodal Terminal capacity in Sydney's west, such as Moorebank and Eastern Creek. The existing terminals at Camellia, Yennora, Minto and Villawood have a cumulative capacity of around 130,000 TEUs;
- The Southern Sydney Freight Line is being developed by the Australian Rail Track Corporation, offering a freight-only rail line from Port Botany through Enfield to Macarthur. Access to the proposed Moorebank terminal will be substantially improved by this development;
- The recent IPART study outlined a number of measures for enhancing the port-land transport interface at Port Botany. Subsequent policies and initiatives have sought to increase the performance of the stevedores and road and rail transport operators, and the allocation of capacity and port terminal access.

Notwithstanding the developmental planning in place for growth at Port Botany and the opening of a facility at Newcastle, the Outer Harbour development will establish Port Kembla as a viable alternative gateway for container trade, augmenting its growing role in the motor vehicle and RORO [10] cargo chains.

Port Kembla is ideally located as an international terminal for the rapidly expanding south-western Sydney industrial epicentre, and has considerable logistics advantages over Newcastle, particularly in relation to imports.

Several major logistics and shipping companies are understood to be exploring the capability of Port Botany as a gateway port for their trade.

The framework for a new container supply chain based on Port Kembla is outlined as an appendix to this report.

[9] NSW Maritime http://www.maritime.nsw.gov.au/ports/ports_plan.html

[10] RORO means "Roll on, Roll off" and relates to general and oversized cargo such as mining and agricultural equipment, steel fabricated products, paper reels, etc.

Figure 17 - Corridor maps (current container flows)

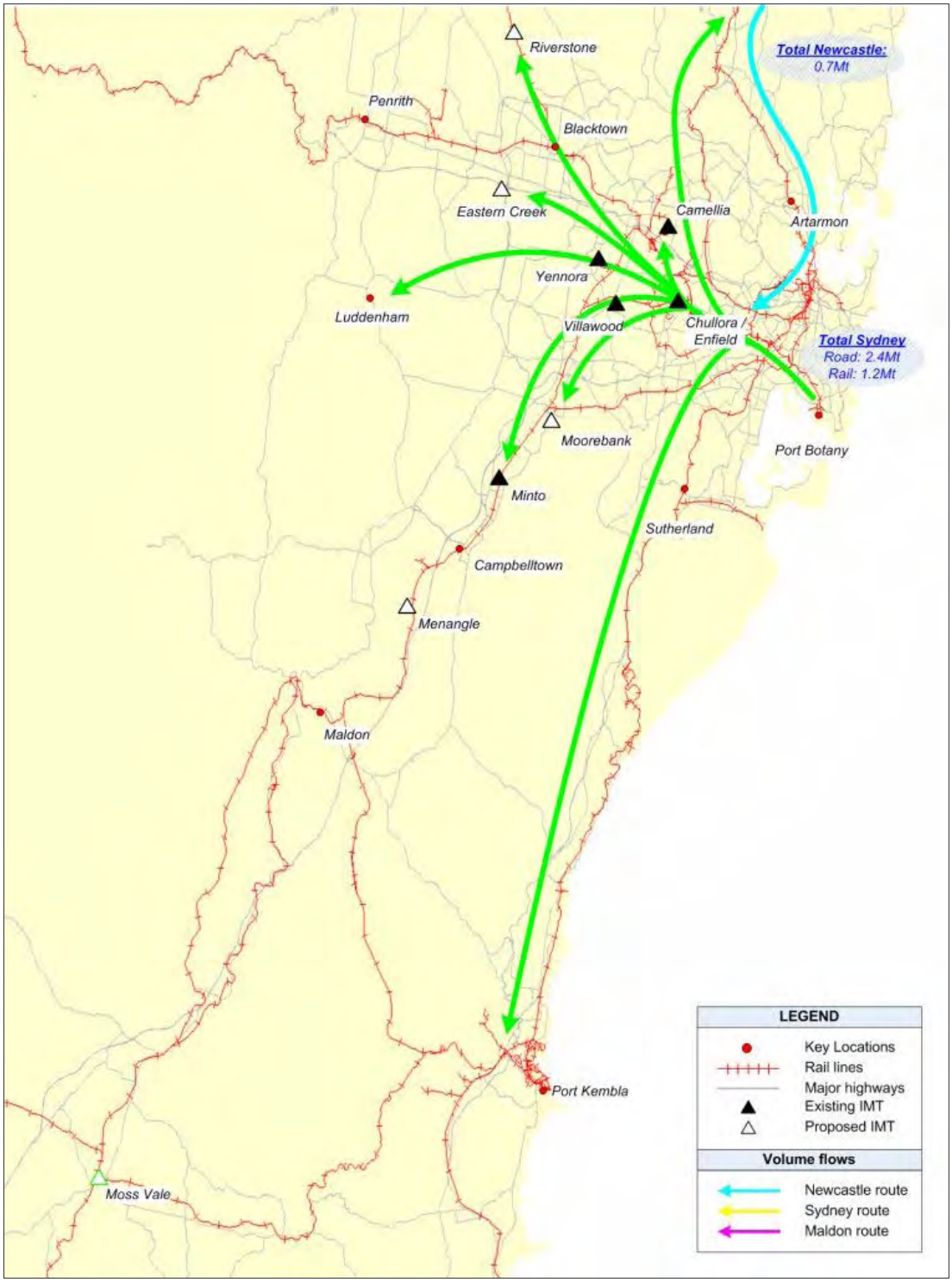
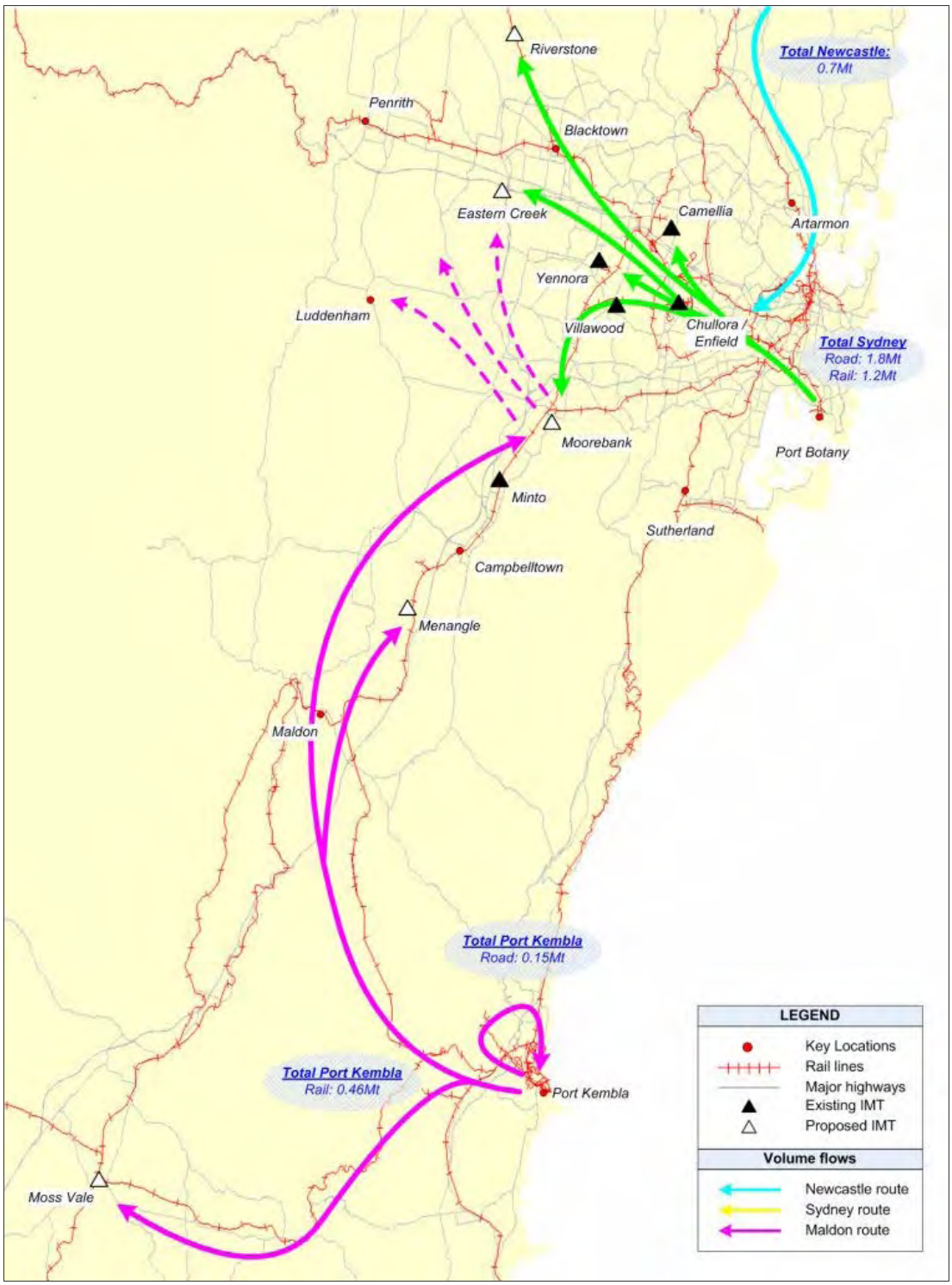


Figure 18 - Corridor maps (future container flows)



### *2.6.4 Industry and stakeholder perspectives*

The concept of supply chain servicing international container movements through Port Kembla has been discussed with a number of stakeholders including shipping lines, and road and rail operators. There was a broad interest expressed in the concept as a means of alleviating some of the congestion expected in future.

In particular, the notion of an intermodal terminal conceived as an extension of the port gate is attractive to shipping lines and could reduce the land transport costs for their end customers. The shipping lines may be the parties best placed to remove some of the transactional costs operating in the supply chain, thereby acting as a fourth party logistics provider ("4PL") to integrate the chain activities . [11]

### *2.6.5 Freight volumes and relevance to Maldon-Dombarton Corridor*

The significance of the Maldon-Dombarton proposal would be greatly heightened by any decision to develop the Outer Harbour at Port Kembla for container handling. The line would be essential to capture the key volumes into SW Sydney and take pressure from roads and rail lines currently serving the Port of Sydney and the entire southern Sydney population. The operational rail cost efficiencies offered by this route would be critical to the success of the port proposal. Likewise, the success of the intermodal model would depend on a seamless managed interface at the port, and consistent daily volumes.

If the role of Port Kembla as a container port were to expand towards its notional capacity, intermodal traffic would, in fact, approach coal traffic as the heaviest user of train paths on the new corridor. Should Port Kembla develop as a part of a container chain into SW Sydney, volumes on the rail line would probably start at a reasonably high level, and grow in steps as new train sets are added.

In the modelling for this exercise, intermodal freight volumes are only included in the Optimistic forecast scenario, reaching 2.1 Mtpa by 2020 and 3.8 Mtpa by 2030.

[11] It is recognised that stevedores and national transport companies have also sought to vertically integrate the supply chain however the shipping line aggregates the market volumes and can augment the commercial products in a more effective manner.

## 2.7 Other General Road Freight

### *2.7.1 Overview of sector*

General road freight is a sector made up of a number of different road freight components. Freight movements can be classified as;

- The physical inputs and outputs of industrial production, including packaging and waste, and
- The physical inputs and outputs of consumption, including household consumption and waste.

There is some overlap between these two elements, as production output is often consumption input however, these elements are valid as broad descriptors of the elements of freight movements.[12]

Road freight is the preferred mode of freight movement in certain circumstances;

- Where other modes (such as rail) are not available, or are not economically viable to access,
- Where freight movements are over relatively short distances, particularly those movements that are consumption inputs, and
- Where the freight is of a time sensitive nature or has specific requirements that cannot be met by any other transport modes.

The sector has undergone rapid change in both technology and overall industry change over the last 10 years or so. The development of vehicles to move greater capacities has assisted in transforming the industry, as too has the increase in fuel efficiency of vehicles, increases in the regulations governing driver and public safety, and the recognition of the industry as a key driver of economic activity in regional, State, and national economies.

This segment of the report focuses on the road movements into and out of the Wollongong/Port Kembla region.

### *2.7.2 Policy drivers*

There are several policy factors that impact the efficient and effective movement of freight by road. The predominant drivers are;

- Vehicle mass and weight limitations. Mass and weight limitations impact the total amount of freight able to be carried by any particular vehicle. These limitations also control the dispersal of weight across the various axles of a vehicle.
- Road access permits. Current policies dictate which roads are able to be accessed by B Double and larger freight carrying vehicles, limiting road freight corridors. These limitations may add either time of cost to the road freight task, but do certainly force freight down particular corridors in an effort to manage public impact, road maintenance and safety issues.
- Chain of responsibility legislation. This legislation ensures that those who intentionally breach existing regulations relating to weight, mass, driver hours, and other factors potentially impacting the safety of the freight movement task, are directly responsible for the consequences of their actions. These policies have (correctly) increased the governance responsibilities of those that move freight by road.
- Carbon trading schemes. While the impact of these schemes are not known in detail, it is anticipated that the price of road freight will increase as the impact of increasing fuel pricing and the carbon generation costs are factored into the road freight task.

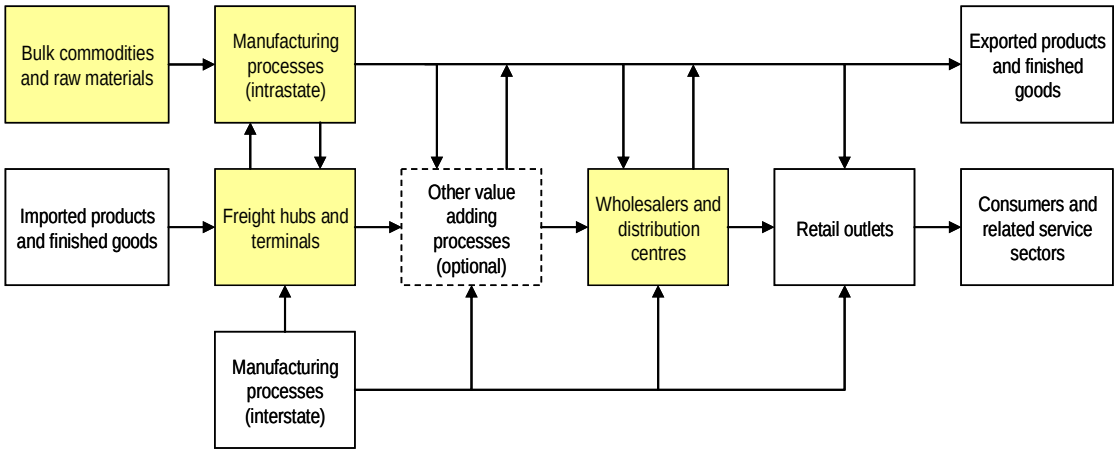
[12] *Refer Sd+D report titled "Illawarra & South Coast Freight Study", 2005 (unpublished)*

- The nature of road freight movements, and the co-existence of road and passenger freight on our roads means that policy will continue to shape the road transport task into the future.

### *2.7.3 Supply chain structure*

A generic supply chain structure for the general road freight industry is shown at Figure 19 below.

Figure 19 - Generic supply chain structure for general road freight




*Source: Sd+D*

Key nodes within this structure are the freight hubs and the distribution centres. These facilities are established to consolidate and de-consolidate bulk quantities for aggregated movement, or as feeder points to service manufacturing processes or consumer demand, represented as retail outlets. Within the Sydney basin, these key nodes are located strategically to capitalise on either access to major road networks, or access to rail infrastructure.

In the case of distribution centres, their location is very strongly related to the location of retail outlets to ensure that replenishment of stock to meet consumer demand can be achieved within time and cost expectations. Western Sydney is increasingly becoming a geographical centre for distribution and freight hub activities, and the freight movements from these activities also service consumer markets in the Wollongong/Port Kembla region.

### *2.7.4 Freight flows and volumes*

The major road access corridors for freight into the Wollongong/Port Kembla region are F6 Freeway, Mt Ousley Road and Picton Road.

Prior research indicates that there are in the vicinity of 1,330 daily truck movements on Mt Ousley Rd, including both loaded and empty movements.[13] These movements are made up predominantly of movements for Bluescope Steel, movements of coal to Bluescope and to Port Kembla Coal terminal, and 'other' movements covering inputs for the construction, retail, and waste management sectors, as well as empty returns. It is anticipated that there will also be an increase in movements resulting from the relocation of motor vehicle export traffic from Port Jackson to Port Kembla.

Table 17 below, summarises the calculated break up of daily movements for Mt Ousley Rd into the future. Motor vehicle movements include both empty and full load movements.

[13] *Maunsell, "Sydney-Wollongong Corridor Study", November, 2006*

Table 17 - Mt Ousley Rd freight traffic break up

| Freight | Movements/day (incl. empty return where applicable) | | | |
|---|---|---|---|---|
| | 2009 | 2010[14] | 2020 | 2030 |
| Bluescope | 300 | 306 | 340 | 474 |
| Coal | 390[15] | 398 | 442 | 616 |
| Other | 644 | 657 | 729 | 1015 |
| Total | 1334 | 1361 | 1511 | 2105 |
| Motor Vehicles[16] | 250 | 396 | 524 | 730 |

*Source: Sd+D & Maunsell modelling*

### *2.7.5 Summary of corridor scenarios*

It is anticipated that the freight movements that are currently designated as road movements, will continue into the future without any change of mode to rail freight.

While there may be a view that all types of road freight can be moved to rail, the road movements on Mt Ousley Rd exist as a result of the reasons noted earlier in this report
In particular, the commercial drivers that might produce a change of transport mode from road to rail for this freight, do not exist. That is, the applicable handling costs to move freight from a hub or distribution centre so that rail can be accessed outweigh the handling costs associated with a point-to-point delivery using a road movement. Rail freight cannot generally compete with road freight in downstream markets such as movements from distribution centre to retail outlet.

Specific comments relating to the products mentioned in Table 17 are as follows;

- Bluescope transport vehicles complete deliveries to customers in Sydney and Newcastle for products originating in Port Kembla. Typically, customers are not located within the vicinity of rail handling terminals, and the characteristics of the freight mean that there are specialised handling requirements that lend the freight to road transport. Limited freight services between Sydney and Wollongong means that Bluescope must use road freight to enable them to meet customers' service and lead time expectations.
- Coal operations that use road freight are comprised of mines and washeries within a 40km radius of Port Kembla. Such operations include Appin mine, Dendrobium mine, Westcliff washery, and BHP Billiton washery. In particular, where coal travels from mine to washery and then to Port for export or steelworks for consumption, the additional handling requirements make the use of rail for these movements uneconomical. The lack of rail loading facilities close to these mines also necessitates the use of road freight to avoid additional handling costs.
- General freight involves a large number of carriers and product types. Deliveries to supermarkets are controlled by consumer expectations that retail shelves will be full, and that fresh produce is available in the retail outlet as close as possible to the time of harvest. These movements will remain on road as the only cost effective transport method that ensures consumer expectations are met. Transport companies such as IPEC, Star Track Express, and

[14] *Maunsell op.cit.*
[15] *Calculated as 40% of the export volume of PKCT assuming 30 tonnes per vehicle load. This figure does not include empty running back to mines.*
[16] *These growth figures are based on figures from Meyrick & Associates, "Second Round Submission to Infrastructure Australia: Picton Road Upgrade", January 2009. Sd+D has taken a slightly more conservative approach than these numbers in the Motor Vehicles chapter of this report.*

Australia Post carry different types of freight but are governed by similar end consumer requirements for timely delivery that prevent the transfer of freight from road to rail modes.

- In the area of motor vehicles, stocks of cars are planned to be held as close as possible to the Port. After preparation and detailing, motor vehicles are 'drawn' through to dealerships to meet firm customer orders. Lead times, again, determine the mode of transport to be road as rail cannot compete with the time requirements in place to service end consumers.

### *2.7.6 Relevance to Maldon-Dombarton corridor*

The existing and projected road movements on Mt Ousley Rd are not predicted to diminish into the future as a result of commercial factors mentioned above.

Since there is no opportunity to transfer movements to rail, the current road movements are of no relevance to the feasibility of the Maldon-Dombarton Line.

## 2.8 Consolidated view of the freight task

This section summarises industry sector demand and consolidates the overall transport task. Note that the focus is only on contestable freight[17] rather than all freight across the catchment area. The current and future contestable freight projections are established based on the existing corridors. The freight task is then analysed against each of the three corridor scenarios described in the previous sections.

### *2.8.1 Total contestable freight task*

Overall, the current contestable task for freight into/out of the Port Kembla area is around 18.8Mt for which rail is the dominant mode.

Coal comprises the largest sector accounting for 70% of the total contestable freight and dominates 67% of all rail movements. Steel and most of the other bulk commodities are destined for domestic markets while grain is equally split between export and domestic. International containers would present as a new freight market for the region whereas motor car import volumes are present, however are not immediately contestable by rail.

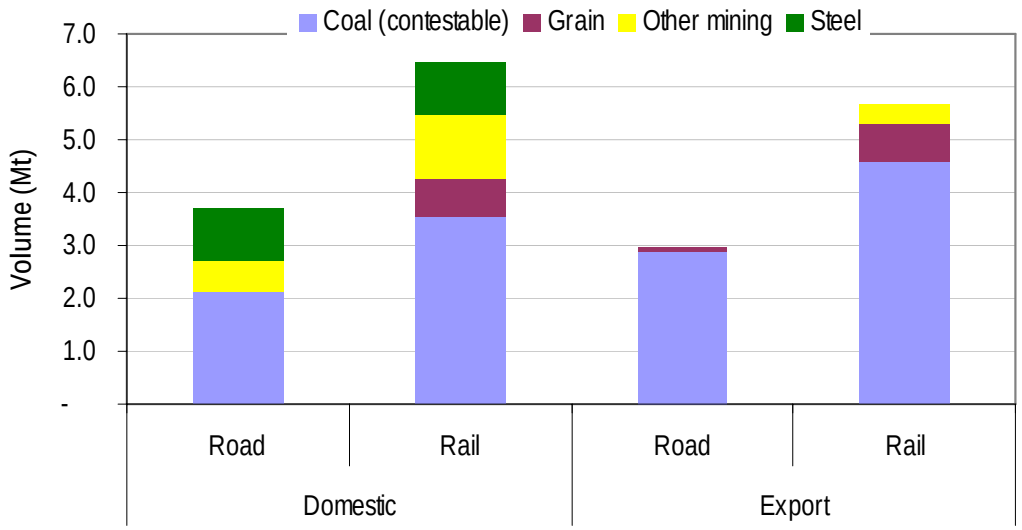
Table 18 summarises the current volumes by sector and Figure 20 over page provides the same information graphically.

Table 18 - Consolidated view of the current contestable freight task by mode and market

| Sectors | Domestic (Mtpa) | | Export (Mtpa) | | Total task (Mtpa) |
|---|---|---|---|---|---|
| | Road | Rail | Road | Rail | |
| Coal | 2.1 | 3.6 | 2.9 | 4.6 | 13.2 |
| Grain | - | 0.7 | 0.1 | 0.7 | 1.5 |
| Other mining and bulk commodities | 0.6 | 1.2 | - | 0.4 | 2.1 |
| Steel | 1.0 | 1.0 | - | - | 2.0 |
| Intermodal containers | - | - | - | - | - |
| Motor vehicles | - | - | - | - | - |
| Total by mode | 3.7 | 6.5 | 3.0 | 5.6 | 18.8 |
| Total | 10.2 | | 8.6 | | |

[17] Contestable freight refers to volumes transported along road (Port Kembla), Moss Vale and Illawarra lines only

Figure 20 - Current contestable freight task




Future contestable freight volumes are estimated to be around 25 Mtpa by 2020 and 31 Mtpa by 2030 (Conservative Case).

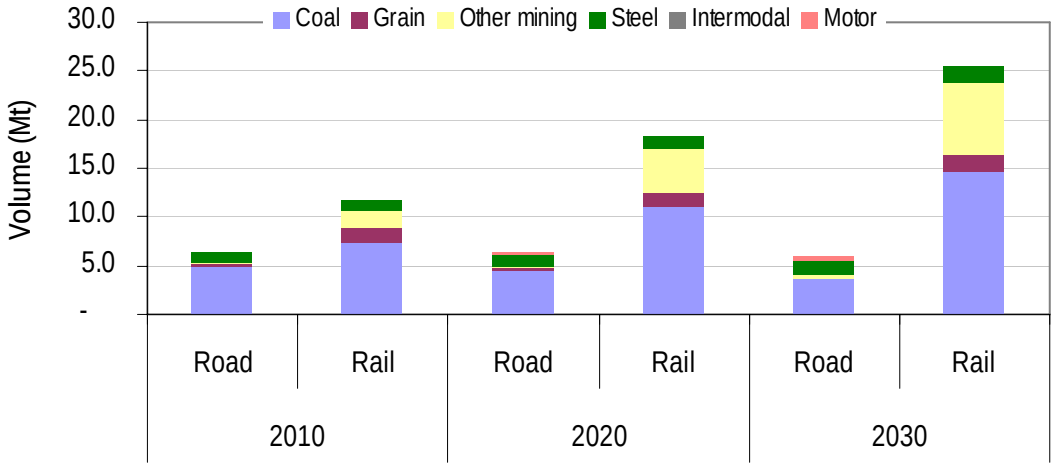
Coal will continue to be the major product hauled but significant growth is also expected for other minerals and products; primarily in iron ore, sand, biofuels and cements works. Rail is presently the dominant mode (66%) and this trend is expected to further intensify by 2020 (78%) and out to 2030 (85%) on the back of volume increases from western coalfields in particular.

Table 19 summarises future demand by sector and mode and Figure 21 presents this information graphically.

Table 19 - Consolidated view of the future total contestable Port Kembla freight task by mode and sector

| Sector | 2010 (Mtpa) | | 2020 (Mtpa) | | 2030 (Mtpa) | |
|---|---|---|---|---|---|---|
| | Road | Rail | Road | Rail | Road | Rail |
| Coal | 5.0 | 7.4 | 4.6 | 11.0 | 3.7 | 14.7 |
| Grain | 0.1 | 1.4 | 0.1 | 1.6 | 0.1 | 1.8 |
| Other mining | 0.3 | 1.9 | 0.3 | 4.5 | 0.3 | 7.4 |
| Steel | 1.0 | 1.0 | 1.2 | 1.2 | 1.5 | 1.5 |
| Intermodal | - | - | - | - | - | - |
| Motor | - | - | 0.2 | - | 0.4 | - |
| Total by mode | 6.4 | 11.6 | 6.4 | 18.3 | 6.0 | 25.4 |
| Total | 18.0 | | 24.8 | | 31.4 | |

Figure 21 - Future contestable freight task




### *2.8.2 Scenario analysis on corridors and networks*

Road freight volumes of the major commodities are expected to remain relatively constant at around 6Mtpa to 2030, however the rail volumes on each corridor will vary depending on route quality and path availability.

- By 2030, approximately 5 Mtpa could be using the Maldon-Dombarton line under Scenario A, which assumes that existing volume will be maintained on the Illawarra and Moss Vale-Unanderra lines;
- Under Scenario B, the most realistic initial scenario, 11 Mtpa would be hauled on the new corridor.
- Under scenario C, where most demand is moved off the Illawarra line, volumes on Maldon-Dombarton line would be around 13 Mtpa by 2030;
- Under scenario D, volume on the Maldon Dombarton line would be around 23 Mtpa by 2030 if track capacity allowed;

Table 20 summarises each of these points and Figure 22 illustrates the results.

Table 20 - Volumes across each contestable corridor scenario

| Time | Scenarios | By road (Mtpa) | By Rail (Mtpa) | | | | Total (Mtpa) |
|---|---|---|---|---|---|---|---|
| | | | Moss Vale | Illawarra lin | Maldon-Dombarton | | |
| 2010 | Current | 6.4 | 3.2 | 8.4 | - | 0% | 18.0 |
| | Scenario A | 6.3 | 1.5 | 8.1 | 2.1 | 12% | |
| | Scenario B | 6.3 | 1.5 | 8.1 | 2.1 | 12% | |
| | Scenario C | 6.3 | 1.9 | 2.1 | 7.7 | 43% | |
| | Scenario D | 6.3 | - | 2.1 | 9.6 | 53% | |
| 2020 | Current | 6.4 | 8.5 | 9.8 | - | 0% | 24.8 |
| | Scenario A | 6.3 | 5.1 | 9.5 | 3.9 | 16% | |
| | Scenario B | 6.1 | 5.1 | 6.5 | 11.3 | 46% | |
| | Scenario C | 6.1 | 5.8 | 2.5 | 10.4 | 42% | |
| | Scenario D | 6.1 | - | 2.5 | 16.2 | 65% | |
| 2030 | Current | 6.0 | 12.8 | 12.6 | - | 0% | 31.4 |
| | Scenario A | 5.9 | 8.5 | 12.3 | 4.7 | 15% | |
| | Scenario B | 5.5 | 8.5 | 6.0 | 11.0 | 35% | |
| | Scenario C | 5.5 | 9.6 | 2.8 | 13.6 | 43% | |
| | Scenario D | 5.5 | - | 2.8 | 23.2 | 74% | |

Figure 22 - Network share of the total freight task travelling in to/from Port Kembla

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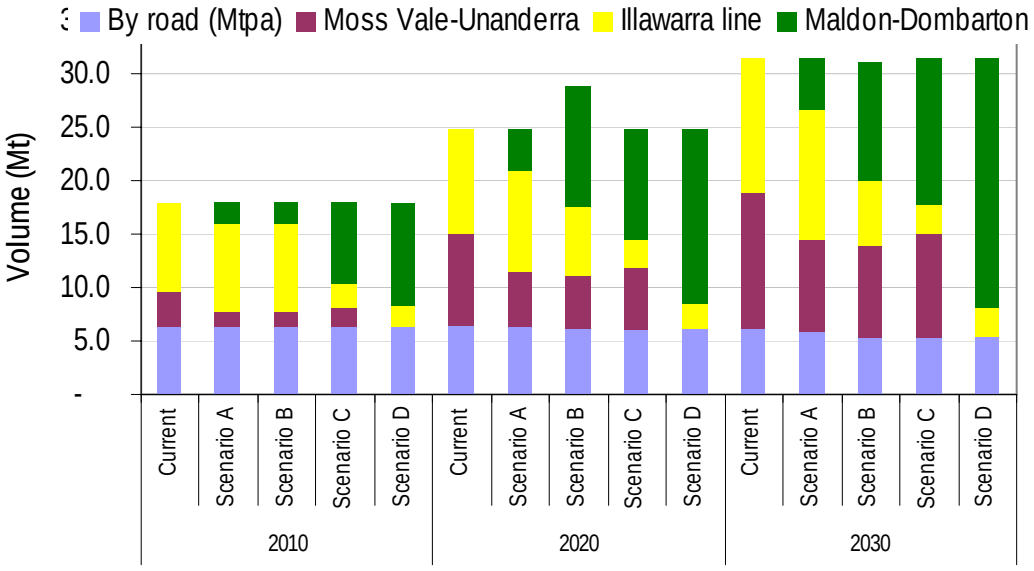
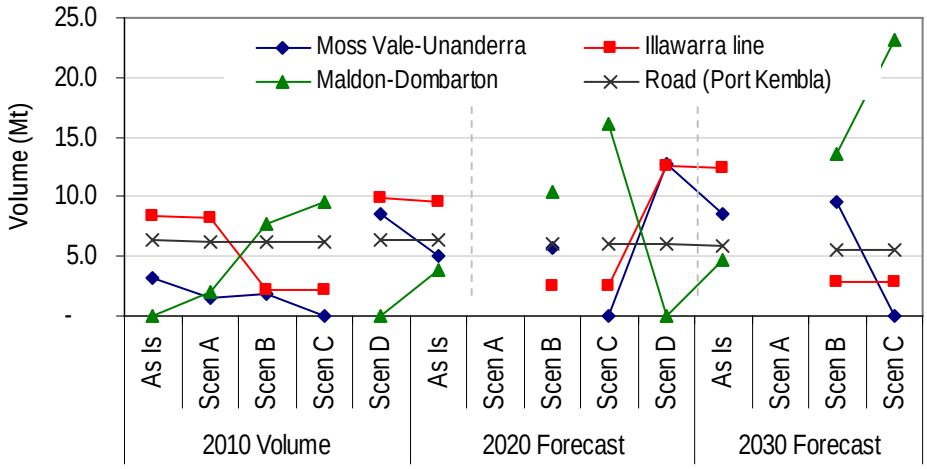



An alternative perspective to the effects of scenario is shown in Figure 23 below. It is clear that each of the corridors is proportional to each other with the exception of road, which is largely constant. Also note the stepwise drop in existing rail networks (Moss Vale and Illawarra lines) as freight is diverted to Maldon-Dombarton line.

Figure 23 - Proportionality of contestable freight on existing network and corridors




With each scenario, contestable volume of freight on the Maldon-Dombarton line increases substantially, with the conservative view being Scenario A where volume on the Maldon Dombarton is achieved as the natural pathway, all other factors remaining unchanged. This demand as a result of new proposed mines built by 2020 and ramped up by 2030.

Table 21 (next page), summarises the overall results. Depending on a scenarios, the freight task along the Maldon-Dombarton line can vary from 2.1Mt (2010) to 20.2Mt (2020) and to 30.2Mt (2030).
More specifically:

- scenario A estimate ranges from 2.1 to 11Mt
- scenario B estimate ranges from 8.2 to 21.9Mt
- scenario C estimate ranges from 9.6 – 30.2Mt

Other key points of mention are as follows:

- Coal will continue to be the primary driving force for the future contestable freight task unless the Moss Vale-Unanderra line is closed (scenario C) in which case, greater proportion of grain, steel and other mining volumes will be diverted;
- Growth is Steel movements is moderate at between 1.1Mt (2010) and 1.6Mt (2030) and only contestable under scenario B and C;
- Intermodal containers is a prospective sector linked to the capability of the port to act as an alternative gateway with volumes of 2.1Mt by 2020 with expansion to 3.8Mt by 2030;
- Modest volumes of motor cars are contestable by 2020 but the scale of operation is negligible compared to other sectors.

Figure 24 - Volumes on the Maldon-Dombarton rail corridor by commodity

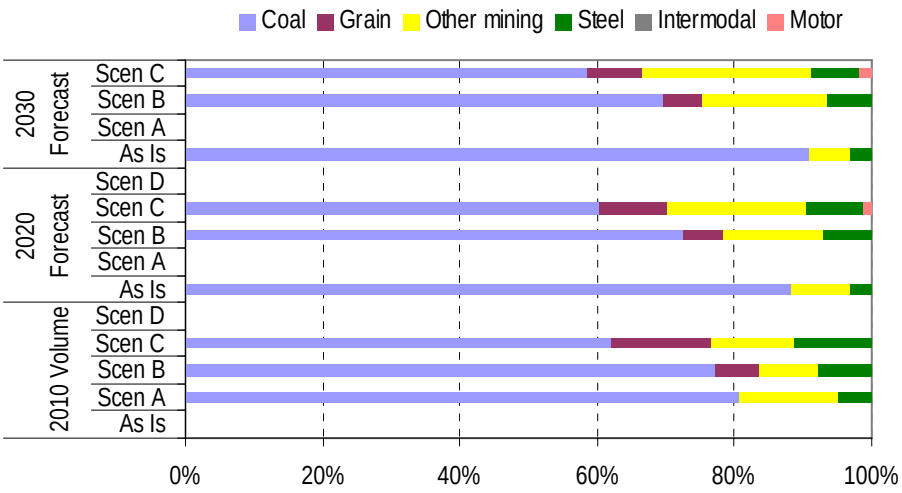


Table 21 - Overall freight volume forecasts for Maldon-Dombarton line (Conservative Case)

| Mode/Sector | 2010 Volume | | | | | 2020 Forecast | | | | | 2030 Forecast | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | As Is | Scen A | Scen B | Scen C | Scen D | As Is | Scen A | Scen B | Scen C | Scen D | As Is | Scen A | Scen B | Scen C | Scen D |
| Total transport task | 29,245 | 29,245 | 29,245 | 29,245 | 29,245 | 36,042 | 36,042 | 35,832 | 36,042 | 36,042 | 41,627 | 41,627 | 41,207 | 41,627 | 41,627 |
| Contestable Volume | 17,995 | 17,995 | 17,995 | 17,995 | 17,995 | 24,757 | 24,757 | 24,547 | 24,757 | 24,757 | 31,440 | 31,440 | 31,020 | 31,440 | 31,440 |
| *By road* | 6,385 | 6,285 | 6,285 | 6,285 | 6,285 | 6,430 | 6,308 | 6,098 | 6,098 | 6,098 | 6,027 | 5,878 | 5,458 | 5,458 | 5,458 |
| *By rail* | 11,610 | 11,710 | 11,710 | 11,710 | 11,710 | 18,326 | 18,448 | 18,448 | 18,658 | 18,658 | 25,413 | 25,562 | 25,562 | 25,982 | 25,982 |
| *Moss Vale-Unar* | 3,170 | 1,500 | 1,500 | 1,900 | - | 8,491 | 5,089 | 5,089 | 5,787 | - | 12,800 | 8,511 | 8,511 | 9,563 | - |
| *Illawarra line* | 8,440 | 8,140 | 8,140 | 2,100 | 2,100 | 9,835 | 9,504 | 6,454 | 2,503 | 2,503 | 12,614 | 12,339 | 6,031 | 2,778 | 2,778 |
| *Maldon-Dombar* | - | 2,070 | 2,070 | 7,710 | 9,610 | - | 3,855 | 6,905 | 10,368 | 16,155 | - | 4,711 | 11,020 | 13,641 | 23,204 |
| *Coal* | - | 1,670 | - | 5,960 | 5,960 | - | 3,402 | - | 7,519 | 9,769 | - | 4,288 | - | 9,514 | 13,628 |
| *Grain* | - | - | - | 500 | 1,400 | - | - | - | 609 | 1,568 | - | - | - | 743 | 1,820 |
| *Other mining* | - | 300 | - | 650 | 1,150 | - | 331 | - | 1,508 | 3,268 | - | 275 | - | 2,493 | 5,702 |
| *Steel* | - | 100 | - | 600 | 1,100 | - | 122 | - | 731 | 1,341 | - | 149 | - | 892 | 1,635 |
| *Intermodal* | - | - | - | - | - | - | - | - | - | - | - | - | - | - | - |
| *Motor* | - | - | - | - | - | - | - | - | - | 210 | - | - | - | - | 420 |
| Non-Contestable Vo | 11,250 | 11,250 | 11,254 | 11,252 | 11,253 | 11,285 | 11,285 | 11,289 | 11,287 | 11,288 | 10,187 | 10,187 | 10,191 | 10,189 | 10,190 |
| %share of conte | 0% | 12% | 12% | 43% | 53% | 0% | 16% | 28% | 42% | 65% | 0% | 15% | 36% | 43% | 74% |
| %share of conte | 0% | 18% | 18% | 66% | 82% | 0% | 21% | 37% | 56% | 87% | 0% | 18% | 43% | 53% | 89% |

# 3. Passenger Travel

## 3.1 Relevance to Maldon-Dombarton

While the primary driver for the Maldon-Dombarton railway is to provide for rail freight needs, this section examines the additional potential for passenger travel along the corridor and identifies the major triggers that might justify the introduction of passenger rail services along the corridor.

When examining demand for passenger travel on rail, the demand for peak period home-to-work commuting is normally assumed to be the major contributor to demand.

## 3.2 Current commuting patterns

*CityRail train services overview*

At present in the morning peak hour, there are four CityRail services between the Illawarra and Central. Over the entire morning 3.5 hour peak period there are 12 trains, with just under 3800 passengers entering the metropolitan area, measured at Helensburgh shown on Table 22 below.

Table 22 - Rail use (Weekday March/April 2008)

| | Measured at | No trains | Seated capacity | Passengers | Average load factor |
|---|---|---|---|---|---|
| AM peak 1 hour | Helensburgh (0801-0900 at Central) | 4 | 2716 | 1970 | 75% |
| AM peak 3.5 hours | Helensburgh (0530-0900 at Helensburgh) | 12 | 7588 | 3720 | 50% |
| PM peak 1 hour | Sutherland (1631-1730 at Central) | | | | |
| | Dapto/Kiama | 2 | 1248 | 810 | 65% |
| | Port Kembla | 2 | 1260 | 490 | 40% |
| | Thirroul/Wollongong | 1 | 840 | 190 | 25 |
| | Total | 5 | | | |
| PM peak 3.5 hours | Dapto/Kiama | 7 | 3364 | 2430 | 70% |
| | Port Kembla | 3 | 2072 | 690 | 35% |
| | Thirroul | 2 | 1680 | 240 | 15% |
| | Total | 12 | | | |

*Source CityRail Compendium June 2008*

*Station boardings and alightings*

On an average weekday, station entries and exits on the South Coast line total 25,600. In the morning peak 3.5 hour period, a total of 5800 (45% of daily) and 2600 (20% of daily) entries and exits occur respectively. Table 23 below, lists the values for the individual stations, and the information in shown graphically in Figure 25, on page 69.

Compared with other locations in the CityRail network, most stations rank very low. Wollongong has the highest overall patronage and is ranked 96 out of 293, with similar demand to medium ranked suburban stations such as Killara, Revesby, Beecroft and Warwick Farm.

Peak hour use is generally higher than the average across the suburban network, indicating that the line is more heavily used for commuting, the key exceptions being North Wollongong which serves the University, the industrial areas around Port Kembla and Wollongong which has a reasonable level of in-commuting but still a high level of out-commuting.

Table 23 - Station entries and exits (Weekday March/April 2008)

| Station | AM Peak | | 24 hour | |
|---|---|---|---|---|
| | Entries | Exits | Entries | Exits |
| Bomaderry (Nowra) | 140 | 20 | 370 | 370 |
| Berry | 40 | 10 | 80 | 80 |
| Gerringong | 30 | 10 | 60 | 60 |
| Kiama | 140 | 40 | 490 | 490 |
| Bombo | 10 | - | 30 | 30 |
| Minnamurra | 80 | 10 | 150 | 150 |
| Dunmore (Shellharbour) | 20 | - | 40 | 40 |
| Oak Flats | 360 | 120 | 810 | 810 |
| Albion Park | 170 | 30 | 410 | 410 |
| Dapto | 500 | 100 | 790 | 790 |
| Kembla Grange | - | - | - | - |
| Unanderra | 270 | 80 | 590 | 590 |
| Port Kembla | 50 | 60 | 190 | 190 |
| Port Kembla North | 10 | 20 | 60 | 60 |
| Cringila | 10 | 30 | 60 | 60 |
| Lysaghts | 5 | 10 | 20 | 20 |
| Coniston | 210 | 100 | 550 | 550 |
| Wollongong | 800 | 410 | 2060 | 2060 |
| North Wollongong | 220 | 870 | 1500 | 1500 |
| Fairy Meadow | 170 | 30 | 290 | 290 |
| Towradgi | 110 | 30 | 220 | 220 |
| Corrimal | 360 | 70 | 600 | 600 |
| Bellambi | 170 | 130 | 400 | 400 |
| Woonona | 190 | 60 | 370 | 370 |
| Bulli | 190 | 240 | 610 | 610 |
| Thirroul | 460 | 50 | 730 | 730 |
| Austinmer | 120 | - | 150 | 150 |
| Coledale | 20 | - | 30 | 30 |
| Wombarra | 30 | - | 40 | 40 |
| Scarborough | 20 | - | 20 | 20 |
| Coalcliff | 10 | - | 10 | 10 |
| Stanwell Park | 160 | 10 | 190 | 190 |
| Otford | 50 | - | 60 | 60 |
| Helensburgh | 680 | 20 | 820 | 820 |

*Source CityRail Compendium June 2008*

Figure 25 - AM Peak period South Coast Rail use (2007)

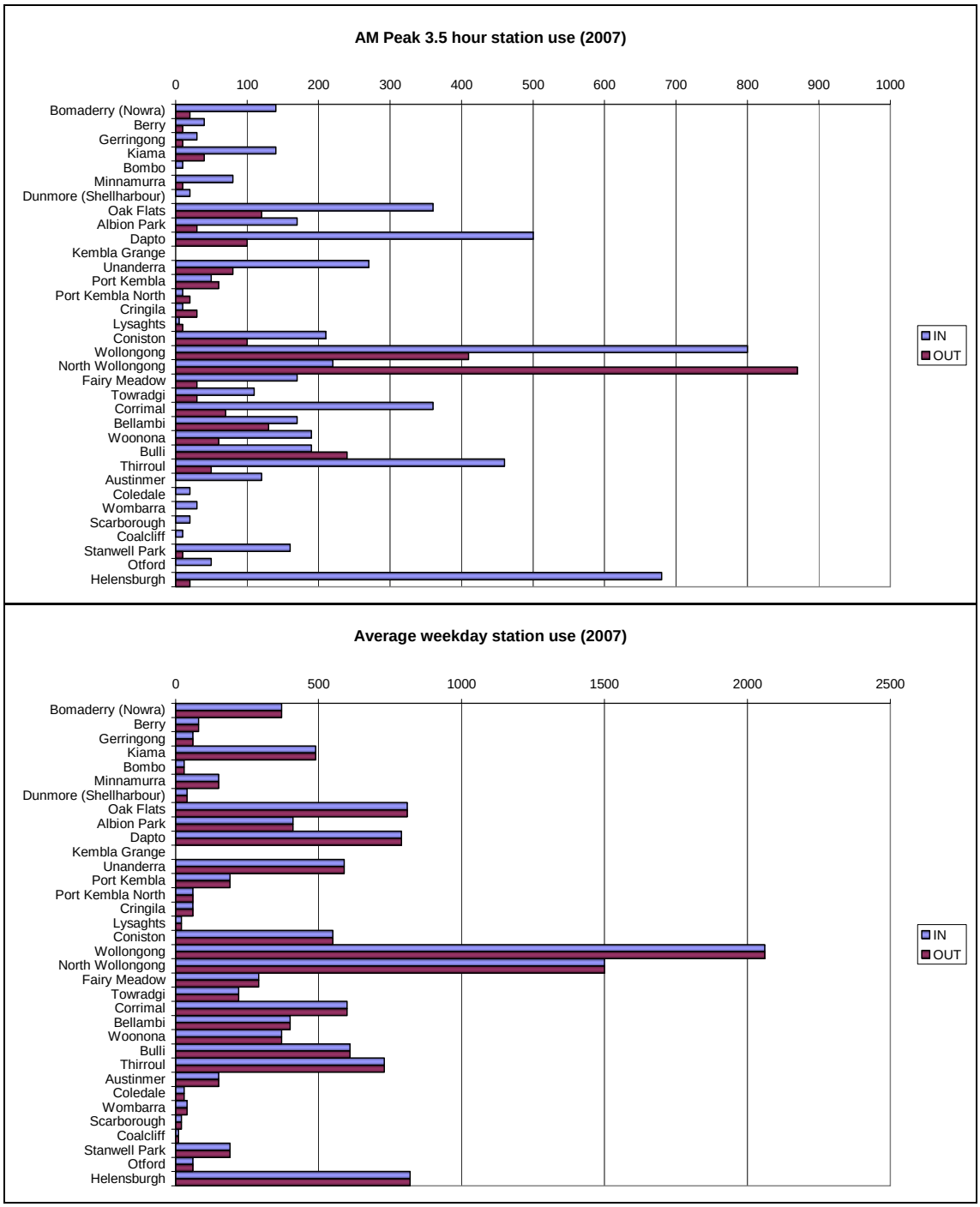


Table 24 - AM peak timetable stopping pattern (arriving Central between 8 and 9am)

| Station | Train stopping pattern AM peak hour | | | | | | |
|---|---|---|---|---|---|---|---|
| Bomaderry (Nowra) | | | | | | x | |
| Berry | | | | | | x | |
| Gerringong | | | | | | x | |
| Kiama | | | x | | | x | |
| Bombo | | | x | | | x | |
| Minnamurra | | | x | | | x | |
| Dunmore (Shellharbour) | | | x | | | x | |
| Oak Flats | | | x | | | x | |
| Albion Park | | | x | | | x | |
| Dapto | | | x | | | x | x |
| Unanderra | | | x | | | | x |
| Port Kembla | | x | | x | x | | |
| Port Kembla North | | x | | x | x | | |
| Cringila | | x | | x | x | | |
| Lysaghts | | x | | x | x | | |
| Coniston | | x | x | x | x | | x |
| Wollongong | | x | x | x | x | | x |
| North Wollongong | | x | | x | x | | |
| Fairy Meadow | | x | | x | x | | |
| Towradgi | | x | | x | x | | |
| Corrimal | | x | | x | x | | |
| Bellambi | | x | | x | x | | |
| Woonona | | x | | x | x | | |
| Bulli | | x | | x | x | | |
| Thirroul | x | x | x | x | x | | x |
| Austinmer | x | | | x | | | x |
| Coledale | x | | | | | | |
| Wombarra | x | | | | | | |
| Scarborough | x | | | | | | |
| Coalcliff | x | | | | | | |
| Stanwell Park | x | | | x | | | |
| Otford | x | | | | | | |
| Helensburgh | x | | x | x | | | x |
| Waterfall | x | | | | | | |
| Sutherland | x | | x | x | | | x |
| Hurstville | x | | x | x | | | x |
| Rockdale | x | | | | | | |
| Sydenham | x | | | | | | |
| Redfern | x | | x | x | | | x |
| Central | x | | x | x | | | x |
| Town Hall | x | | | x | | | |
| Martin Place | x | | | x | | | |
| Kings Cross | x | | | x | | | |
| Edgecliff | x | | | x | | | |
| Bondi Junction | x | | | x | | | |
| Travel times | | | | | | | |
| Nowra-Central | - | - | - | - | - | 2:44 | |
| Kiama-Central | - | - | 2:16 | - | | 2:16 | |
| Port Kembla-Central | - | 2:00 | - | 1:52 | 1:57 | - | - |
| Wollongong-Central | - | 1:46 | 1:32 | 1:38 | 1:43 | | 1:29 |
| Thirroul-Central | 1:40 | - | 1:22 | 1:19 | - | - | 1:19 |
| Austinmer-Central | 2:05 | - | - | 1:17 | - | - | 1:17 |
| Wollongong-Hurstville | - | 1:23 | 1:09 | 1:19 | - | - | 1:09 |

The current stopping pattern is extremely complex, with no timetable memory to assist passengers in selecting services. There are seven train services operating during this peak period with seven different stopping patterns. For example:

- one service Nowra-Unanderra all stops, then semi express to Central

- one service Kiama-Unanderra all stops then semi express to Central, slightly different stopping pattern
- three services starting at Port Kembla, all stations to Thirroul; 1 terminates, 1 semi express to Bondi Junction, 1 semi express to Central, all with slightly different stopping patterns
- one service Thirroul to Sutherland all stops, then semi express to Bondi Junction;
- most stations north of Thirroul have only one peak hour northbound service; passengers would need to travel south to Thirroul or Austinmer and transfer to a northbound service.

## 3.3 Home and work profiles

Using data collected in the population Census, it is possible to obtain a detailed picture of the relationship between the residence and workplace for commuters and the mode of travel that they use to access their workplace.

Table 25 - Mode used for Journey to Work

| Work location | Journey to work for residents of Illawarra SD | | | | |
|---|---|---|---|---|---|
| | | No of trips | Mode used | | |
| SD | SSD | | Private motorised | PT | Walk/cycle |
| Illawarra | | 99,246 | 91% | 3% | 6% |
| Sydney | Blacktown | 230 | 95% | 4% | 1% |
| | Canterbury-Bankstown | 972 | 95% | 4% | 1% |
| | Central Northern Sydney | 180 | 87% | 9% | 4% |
| | Central Western Sydney | 892 | 93% | 5% | 1% |
| | Eastern Suburbs | 494 | 81% | 18% | 2% |
| | Fairfield-Liverpool | 907 | 96% | 3% | 1% |
| | Gosford-Wyong | 17 | 100% | 0% | 0% |
| | Inner Sydney | 4,702 | 44% | 54% | 2% |
| | Inner Western Sydney | 394 | 85% | 15% | 1% |
| | Lower Northern Sydney | 735 | 69% | 30% | 2% |
| | Northern Beaches | 85 | 89% | 4% | 7% |
| | Outer South Western Sydney | 3,111 | 98% | 1% | 0% |
| | Outer Western Sydney | 196 | 93% | 4% | 4% |
| | St George-Sutherland | 3,707 | 88% | 12% | 0% |
| | Sydney Undefined | 168 | 62% | 38% | 0% |
| Total/average | | 116,036 | 89% | 6% | 5% |

This table shows that about 86% of workers in the Illawarra live in the Illawarra. Of these, 91% use private motorised transport to travel to and from work. About 17,000 workers live in the Illawarra and commute to work elsewhere, virtually all within the Sydney metropolitan area. Of these, the largest number, nearly 5,000, commute to Inner Sydney, with 54% using public transport. Public transport use is also relatively high to Inner Northern Sydney (mostly North Sydney-St Leonards) and the Eastern Suburbs which is served by the Illawarra/South Coast rail line. To other areas of the metropolitan area which are poorly linked with the Illawarra by public transport, public transport use is very low.

In particular, the relative proximity of jobs in the St-George-Sutherland and Outer South Western Sydney SSDs makes them attractive work destinations for Illawarra residents, but public transport use to both is extremely low. In the case of the St-George-Sutherland SSD this is despite a direct rail connection with

the Illawarra. This reflects the relatively quicker access available to these locations by car than by rail, and the relatively poor rail service frequency.

## 3.4 Potential future travel demand for work travel

The potential for growth in travel to work within the Sydney region is a function of several factors:

- growth in workforce in the Illawarra
- growth in local jobs to satisfy the needs of the future workforce, and as a result, the growth (or decline) in the need for out-commuting
- the growth in jobs in areas of Sydney accessible to the Illawarra
- any changes in accessibility by road or rail that might influence the choice of job location.

A rigorous approach to forecasting the future commuting task to/from the Illawarra is beyond the scope of this study. Thus a risk approach has been taken to producing estimates of the highest likely demand for work trips to key Sydney locations and the possible use of mode to accompany this growth.

The total demand for travel has been estimated by using population and employment forecasts produced by the Transport Data Centre that reflect the policies contained in the Metropolitan Strategy. It has been assumed that the number of commuters between Illawarra and each sub-region in Sydney would grow proportionally to the increase in jobs in each region; this assumption was then tested to ensure that the rate of commuting did not exceed the overall growth in population in the northern Illawarra.

Table 26 - Potential change in commuting, 2006-2021

| Workplace for Illawarra residents | No of trips to work | |
|---|---|---|
| | 2006 actual | 2021 estimate |
| Blacktown | 230 | 302 |
| Canterbury-Bankstown | 972 | 995 |
| Central Northern Sydney | 180 | 222 |
| Central Western Sydney | 892 | 977 |
| Eastern Suburbs | 494 | 510 |
| Fairfield-Liverpool | 907 | 1096 |
| Gosford-Wyong | 17 | 21 |
| Inner Sydney | 4,702 | 5065 |
| Inner Western Sydney | 394 | 425 |
| Lower Northern Sydney | 735 | 836 |
| Northern Beaches | 85 | 95 |
| Outer South Western Sydney | 3,111 | 4030 |
| Outer Western Sydney | 196 | 240 |
| St George-Sutherland | 3,707 | 4201 |
| Sydney Undefined | 168 | 191 |
| Total Sydney | 16790 | 19206 |

*Potential users of Maldon-Dombarton*

In order to provide an upper limit on the possible commuting demand for passenger services on the Maldon-Dombarton line, the subregions of Sydney that might be attractive to commuters using this line have been identified:

- Outer South Western Sydney
- Fairfield-Liverpool and
- Central Western Sydney.

The employment areas within each of these regions are predominantly not within ready access of railway stations. However, a highly optimistic range of potential rail mode shares has been adopted to derive a high range of possible rail demand. A lower-bound value has been chosen to match the current public transport mode share to St George-Sutherland, and the upper limit is represented by the current mode share to the Eastern Suburbs. The high level of public transport use currently achieved to Inner Sydney is not considered achievable to any other location.

By 2021, the possible range of rail commuters using Maldon-Dombarton is thus estimated at between 750 and 1000 commuting trips per day. This compares with the current public transport use of around 3600 commuters per day on the Illawarra line.

*Viability of passenger services*

Currently 12 peak period trains operate to deliver the 3600 commuters into the metropolitan area, with four trains in the peak hour within this period. On a pro-rata basis, to deliver the optimistic upper estimate of 1000 commuters who might wish to travel along the Maldon-Dombarton corridor in the morning peak, only one peak hour train would be warranted, with at most three trains over the entire morning peak period. At this relatively low level of service, rail would be an extremely unattractive option for commuters, as the long headways between services would prove a major disincentive to use rail compared to the faster and more flexible private car.

The recent Government decision to defer heavy rail to the North West sector provides an indication of the threshold levels that are considered necessary for new major public transport investment. . At present over 30,000 commuter trips are made in the corridor between the North West Sector and Parramatta-CBD, with significant forecast growth.

The clear implication of this analysis is that the line should be designed primarily as a freight-only corridor, particularly as the operation of even a small number of passenger trains would compromise freight timetable reliability. The costs of building the line to standards for passenger train use would also be prohibitive in view of the likely small usage levels.

# 4. Stakeholder perspectives

## 4.1 Synopsis of key issues raised in stakeholder engagement process

The purpose of this chapter is to summarise a range of universal or strategic issues raised by a number of stakeholders that do not relate to any specific commodity group or freight movement, as was presented in the last chapter. In particular, four key themes emerged in the discussions and can be summarised as:

- Investing in capacity to stimulate demand conducive to using rail;
- Ensuring that infrastructure investment is targeted where most needed; and
- The need to consider long term planning frameworks to address Sydney's burgeoning freight task;
- Linking Wollongong to Western Sydney's economic zone.

### *4.1.1 Investment in capacity to stimulate the right demand*

Many stakeholders, in particular current and future exporters, expressed the need for investment in new transport corridors which provided an opportunity to utilise rail in a way consistent with community and government expectations. Many stakeholders indicated that their strategic planning horizons extended 3-5 years and in the absence of new freight corridors and methods, their supply chain decisions were based on accessing existing infrastructure.

Moreover, a number individual stakeholders realised that they are not sufficiently large enough to singularly support investment in freight transport corridors, and invariably the strategic and commercial tensions that exist between private sector players did not foster collaborative alliances which would aggregate sufficient tonnage. The corollary of this approach is to perpetuate the "status quo" rather than having the confidence to explore new supply chain approaches and investment, particularly using rail.

In essence, it is necessary to invest in new capacity as the only way to stimulate new supply chain outcomes focussed on rail.

### *4.1.2 Making targeted and efficient investments*

A number of cargo and freight operators have a slightly different perspective on the Study. They agree strongly with the need to have a clear plan for the introduction of additional freight capacity to meet and stimulate future freight growth in the region. There are however concerns that this should not focus only on the Maldon – Dombarton proposal, but rather establish the capital and operational efficiency of all the various infrastructure investment options available, In particular this analysis needs to consider the relative competiveness of the pathway options, both on cost and service/transit time criteria.

- Route capacity which is inefficient to operate or does not provide an acceptable market offer will be a poor investment.
- The options should either provide, or have the capability to offer, significantly improved future performance than current, as there needs to be a capability for ongoing improvements to efficiency and service offer

In summary, this perspective challenges the Study to determine the effectiveness of substantial capital investment in the Maldon-Dombarton rail corridor against other alternatives. In particular, investment to address the operating deficiencies of the Illawarra and Moss Vale Unanderra lines was also seen as a potentially lower cost option, which needed to be evaluated against the Maldon – Dombarton option, so that the most economically attractive option to meet the region's needs could be implemented. This

avoided the region being left without a growth path if funding, economic attractiveness or other factors subsequently prevented the Maldon-Dombarton option proceeding.

Such an approach would ensure investment is efficient, at a time when longer term infrastructure funding will be limited, and other rail corridors service greater immediate demand or may be considered more strategically significant. Particular discussion was given to the need to invest in the rail corridor between Sydney and Newcastle as a major priority.

One regional council also expressed some concern that the Maldon Dombarton line could impact long term plans for development of its freight and industrial estate by channelling demand away.

#### *4.1.3 Long term planning frameworks*

While somewhat peripheral to an assessment in the Maldon Dombarton rail corridor, many stakeholders expressed frustration in the Sydney's growing congestion and its impact on the metropolitan freight task. In particular, this frustration can be attributed to (a) insufficient definition and communication around what planning is undertaken, and (b) the tactical nature of that planning where visible.

The Maldon Dombarton rail link focuses freight movements into the Port Kembla catchment, and consequently, stakeholders drew comparisons with the challenges confronting the land transport networks to Port Botany. This in turn caused a number of stakeholders to propose the notion that the Maldon Dombarton corridor provides an alternative pathway to alleviate congestion in Sydney however in the absence of an articulated long term freight planning framework, such initiatives are likely to flounder.

The opinion of one Chief Executive is that investment the Maldon Dombarton corridor is justified to the extent that it arguably defers road investment in Sydney's inner western suburbs, by creating a peri-urban corridor that delivers freight to the freight centres in Sydney's west. This was also seen in the context of adjacent ports operating within a cooperative framework.

Other stakeholders expressed concern that while the Illawarra rail line is presently "coping" with rail demand between Sydney and Wollongong, the need for expanded rail capacity that addresses future demand must be addressed. The strategic risks and operating limits associated with the Stanwell Park rail viaduct was also raised.

#### *4.1.4 Accessing Western Sydney's economic zone*

Many public sector stakeholders expressed the notion that there are economic benefits associated with linking the Illawarra area with western Sydney's economic zone. While consideration is being given to upgrading Picton Road as a key road corridor, it was argued that the establishment of a direct rail link is equally important connecting the industrial base on Wollongong with key logistics and distribution activities in Western Sydney.

# 5. Rail volume demand modelling

## 5.1 Train path modelling

The volume forecasts outlined in Chapter 2.6 (Conservative Case) can be converted into high level train path requirements through a simple estimate of the dimensions of each train likely to be hauling each product, and an estimate of the typical daily demand for these products.

The following table consolidates the average daily train paths required for each commodity based on train load size estimates, and the currently available track network. Train load estimates are based on current practice, but might vary if new wagon fleets are introduced to some traffics with greater axle load limits.

Table 27 – Volume growth on the current rail network (Conservative Case)

| Current (As Is) | 2010 | | 2020 | | | 2030 | | |
|---|---|---|---|---|---|---|---|---|
| daily train paths | Moss Vale-Unanderra | Illawarra | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton |
| coal | 2 | 5 | 5 | 5 | - | 8 | 6 | - |
| grain | 2 | 1 | 2 | 1 | - | 2 | 1 | - |
| minerals | 1 | 2 | 3 | 4 | - | 6 | 7 | - |
| steel | - | 1 | - | 2 | - | - | 2 | - |
| *intermodal* | - | - | - | - | - | - | - | - |
| motor cars | - | - | - | - | - | - | - | - |
| total | 4 | 10 | 11 | 13 | - | 16 | 17 | - |
| | 14 | | 23 | | | 32 | | |

### *5.1.1 Coal*

In addition to this simple arithmetic train path estimation, there are some qualitative and practical factors which reduce the theoretical path availability. These include the need to match incoming with outgoing paths, the risk of delays in congested areas resulting in path cancellations, the frequency of track closures, or 'possessions' and the susceptibility to customer-related delays (ie train loading problems). Trains which travel long distances to reach port have a significant probability of missing paths and creating flow on impacts for other users, despite the existence of the 'healthy train' priority approach now used in train control on ARTC track.

There is considerable difference between the characteristics of each commodity, in terms of scale and variability of demand. Coal demand accounts for the heaviest volume and features high regularity of service, particularly where pathing capacity is constrained (as per the Illawarra line). Export grain demand, by contrast is much more variable, often requiring several train deliveries per day for short periods, and long periods without any trains at all.

The Illawarra line is the main route to Port Kembla for western coal traffic, which joins the line from the freight network at Marrickville. There are a limited number of freight paths available in each direction due to the heavy incidence of suburban and inter-urban services. The track is doubled for its entire length. The current timetable shows around 15 paths allocated to coal or currently 'spare' in each direction, which are used to handle the 6-8 daily movements now required. This includes two paths allocated to the Metropolitan mine at Helensburgh.

The timing of these paths, however, suggests that they could not all be used by coal trains in practice. They are bunched into two periods, arriving Port Kembla

a) between 2100 and 0800 hours (11 paths) and
b) between 1345 and 1530 (4 paths)

At Port Kembla, trains arriving so closely in sequence must be held in 'arrival roads' before they can pass through the dump station, which takes at least 1 hour per train.

There are similarly bunched paths for empty trains departing Port Kembla, which further limits the practical take-up of theoretical paths, and reduces the effective utilisation of each trainset, since considerable time is spent waiting for the path window either at Port Kembla or at Enfield yard in Sydney. Similar pathing constraints occur between Lithgow and Lidcombe on the western line, due to passenger train priority.

Train path allocation is a complex process where competing requests for suitable paths for different kinds of product must be compiled into a timetable offering maximum benefit to the greatest number of customers. Some additional coal trains could clearly be accommodated into the current schedule, but gaining suitable train cycle times, and hence optimising the operating costs for each train, becomes increasingly difficult with each additional path.

The added complication of increasing future passenger traffic on both the Western and Illawarra lines is likely to further reduce opportunities for growth in coal traffic. Inter-urban operation between the Wollongong area and Sydney will be extended as commuter population in the Illawarra region expands. Some daytime freight paths will possibly be lost to accommodate greater frequency of services on this corridor.

A study about to be undertaken by the Port Kembla Coal Terminal is in recognition of the complexity of pathing issues and of determining the actual practical coal delivery capacity of the rail network.

While the exact number of coal trains that could be handled on the Illawarra-Western line corridor is unknown, it is clear that the Maldon-Dombarton line would open up a much less constrained route to the port for western coalfield trains, as illustrated in the map at Figure 26. This could reduce the pressure on the Illawarra line, utilising the Parramatta-Cabramatta-Maldon route which skirts the inner lines with the heavier traffic frequencies.

Figure 26 - Sydney rail freight route


### *5.1.2 Intermodal system*

Chapter 2.6 outlines the potential for an inland port in SW Sydney linked directly to a container berth at Port Kembla, made feasible by the Maldon-Dombarton line. Should Port Kembla proceed with the plan to incorporate a container terminal in its Outer Harbour development, there would be a very strong interest from freight consumers in SW Sydney.

Preliminary modelling shows that a port shuttle service operating 3 times per day on this corridor could move over 180,000 TEU per year, at a cost of $150-200 per loaded TEU, which would be very competitive with freight costs to/from Port Botany.

Table 28 is a snapshot of a model showing the indicative costs of such a service

Table 28 - Intermodal cost model

| INPUTS | |
|---|---|
| | |
| one way distance (km) | 90 |
| | |
| train cycle time | |
| one way trip time (hrs) | 2.5 |
| load time (hrs) | 1 |
| unload time (hrs) | 1 |
| total | 7 |
| downtime | 1 |
| total trip (hrs) | 8 |
| average speed (transit) | 36 |
| trips per day | 3.00 |
| trips per day (rounded down) | 3 |
| days/year | 250 |
| trips per year | 750 |
| | |
| rakes | 3 |
| train load | |
| locos | 2 |
| loco weight | 110 |
| wagons per train | 25 |
| TEUs per rake | 3 |
| import loaded (TEU per wagon) | 2.4 |
| import empty | 0.6 |
| export loaded | 1 |
| export empty | 2 |
| wagon tare | 20 |
| loaded TEU weight | 15 |
| empty TEU weight | 2 |
| | |
| wagon gross load (import) | 57.2 |
| wagon gross load (export) | 39 |
| | |
| gtks | |
| gtks/return trip | 472500 |
| gtks/year | 354,375,000 |

| COSTS | | | | |
|---|---|---|---|---|
| | | | | |
| fixed costs | | | | |
| | | | | |
| loco capital | $400,000 | fleet | 2.5 | $1,000,000 |
| loco maintenance | $100,000 | | | $250,000 |
| wagon capital | $14,000 | fleet | 82.5 | $1,155,000 |
| wagon maintenance | $3,000 | | | $247,500 |
| | | | | |
| | | | | |
| variable costs | | | | |
| | | | | |
| 2 man crew (per hour) | $130 | | | $780,000 |
| operations support | $75,000 | staff | 8 | $600,000 |
| | | | | |
| access (per gtk) | $0.004 | | | $1,417,500 |
| access (per return trip) | $1,000 | | | $750,000 |
| light engine | | | | $0 |
| fuel (per gtk) | $0.005 | | | $1,771,875 |
| fuel (per hour/loco) | $75 | | | $900,000 |
| light engine | | | | $0 |
| maintenance | | | | |
| loco (per hour) | $15 | | | $78,750 |
| loco (per km) | $1 | | | $135,000 |
| wagon (per gtk) | $0.002 | | | $708,750 |
| | | | | |
| overhead | 12% | | | $1,175,325 |
| | | | | |
| total annual cost | | | | $10,969,700 |
| | | | | |
| annual TEUs | | | | 112,500 |
| import loaded | | | | 45,000 |
| import empty | | | | 11,250 |
| export loaded | | | | 18,750 |
| export empty | | | | 37,500 |
| | | | | |
| cost/loaded TEU | | | | $172 |

Improvements on this figure could be achieved if double stacking became possible with new well wagons and greater clearances on the Southern Sydney Freight Line. However, this will not be

possible due to the difficulties posed by the electric wire over the rail at both ends of the Maldon-Dombarton link.

To achieve this level of operation (3 services per day), a single pair of locomotives would haul three wagon sets on an alternatively basis between the port and the Inland Intermodal Terminal (IIMT). The key requirement is for reliable train paths at 8 hourly intervals in each direction. The 8-hour cycle would be comfortably achieved with a distance of less than 100km in each direction, and 'rake-exchange' operation at each terminal. This pathing requirement, however, can only be offered on corridors not constrained by peak hour passenger services.

The Maldon-Dombarton line and its connecting routes would offer this kind of path quality, guaranteeing the viability of the rail service. Similar services into Port Botany can only gain a maximum of 2 trips per day, which accounts for the competitiveness of this option. To achieve this, however, dispensation may be required to bring some intermodal services into/out of the Macarthur-Liverpool section during passenger peak periods, unless the terminal were to be constructed to the south of Macarthur. This is not an unrealistic expectation, and in any case, may prove unnecessary on closer analysis.

Should the Port Kembla container facility be instigated, it could quickly claim a considerable market share from Port Botany, and would require additional train sets to operate as per the system described above. This would quickly begin to soak up available capacity on the Maldon-Dombarton, particularly if it was built as a single track route. If it were a double-track section, the route would be able to handle all foreseeable intermodal tonnage along with additional coal trains.

### *5.1.3 Total train path requirements*

The tables below illustrate the loaded train paths potentially required by 2020 and 2030, under the Conservative volume forecast case. .

Scenario A below, shows train path demand if the Maldon-Dombarton line is built, and other routes remain essentially in use as per currently.

Table 29 - Corridor scenario A (Conservative case)

| Scenario A daily train paths | 2020 | | | 2030 | | |
|---|---|---|---|---|---|---|
| | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton |
| coal | 2 | 5 | 3 | 4 | 6 | 4 |
| grain | 2 | 1 | - | 2 | 1 | - |
| minerals | 3 | 4 | 1 | 6 | 7 | 0 |
| steel | - | 2 | 0 | - | 2 | 0 |
| *intermodal* | - | - | - | - | - | - |
| motor cars | - | - | - | - | - | - |
| total | 7 | 12 | 4 | 12 | 16 | 5 |
| | 23 | | | 33 | | |

Scenario B below, illustrates estimated train path requirements if freight paths on the Illawarra line were essentially limited to those currently available, with service growth accommodated on other lines

Table 30 - Corridor scenario B (Conservative Case)

| Scenario B | 2020 | | | 2030 | | |
|---|---|---|---|---|---|---|
| daily train paths | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton |
| coal | 2 | 3 | 5 | 4 | 3 | 7 |
| grain | 2 | 1 | - | 2 | 1 | - |
| minerals | 3 | 2 | 3 | 6 | 2 | 6 |
| steel | - | 2 | 0 | - | 2 | 0 |
| intermodal | - | - | - | - | - | - |
| motor cars | - | - | - | - | - | - |
| total | 7 | 8 | 8 | 12 | 8 | 13 |
| | | 23 | | | 33 | |

Scenario C demonstrates potential path requirements if all long distance freight traffic was diverted from the Illawarra line due to passenger traffic growth.

Table 31 – Corridor scenario C (Conservative Case)

| Scenario C | 2020 | | | 2030 | | |
|---|---|---|---|---|---|---|
| daily train paths | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton | Moss Vale-Unanderra | Illawarra | Maldon-Dombarton |
| coal | 2 | 1 | 7 | 4 | 1 | 9 |
| grain | 2 | - | 1 | 2 | - | 1 |
| minerals | 3 | 2 | 3 | 6 | 3 | 4 |
| steel | 1 | - | 1 | 1 | - | 1 |
| intermodal | - | - | - | - | - | - |
| motor cars | 1 | - | - | 1 | - | - |
| total | 9 | 3 | 12 | 14 | 4 | 16 |
| | | 24 | | | 34 | |

Scenario D shows how train path demand could be concentrated on the Maldon-Dombarton line by operator choice in preference to the Moss Vale-Unanderra line

Table 32 - Corridor scenario D (Conservative Case)

| Scenario D daily train paths | 2020 Moss Vale-Unanderra | 2020 Illawarra | 2020 Maldon-Dombarton | 2030 Moss Vale-Unanderra | 2030 Illawarra | 2030 Maldon-Dombarton |
|---|---|---|---|---|---|---|
| coal | - | 1 | 9 | - | 1 | 13 |
| grain | - | - | 3 | - | - | 4 |
| minerals | - | 2 | 6 | - | 3 | 10 |
| steel | - | - | 2 | - | - | 2 |
| intermodal | - | - | - | - | - | - |
| motor cars | - | - | 1 | - | - | 1 |
| total | - | 3 | 21 | - | 4 | 30 |
| | | 24 | | | 34 | |

The optimistic case makes provision for heavier coal export volumes, additional export grain, and the introduction of the intermodal pathway into SW Sydney. Train path requirements under the most likely corridor scenario, Scenario B, are shown below.

Table 33 – Corridor Scenario B (Optimistic Case)

| Scenario B daily train paths | 2020 Moss Vale-Unanderra | 2020 Illawarra | 2020 Maldon-Dombarton | 2030 Moss Vale-Unanderra | 2030 Illawarra | 2030 Maldon-Dombarton |
|---|---|---|---|---|---|---|
| coal | 3 | 3 | 6 | 5 | 4 | 9 |
| grain | 3 | 1 | - | 4 | 1 | - |
| minerals | 6 | 2 | 6 | 7 | 2 | 7 |
| steel | - | 2 | 0 | - | 2 | 0 |
| intermodal | - | - | 6 | - | - | 11 |
| motor cars | - | - | 1 | - | - | 1 |
| total | 12 | 8 | 18 | 16 | 10 | 28 |
| | | 38 | | | 54 | |

These tables demonstrate the potential for the Maldon-Dombarton line to cater for large volumes of future freight traffic that cannot be readily absorbed by the existing network. The line would not only provide this capacity, but would offer the operating cost efficiencies needed to ensure freight capture by rail, in opposition to road transport.

These strategic and operational issues are summarised in the following section.

# 6. Strategic Perspective

## 6.1 Outline of themes

- Demand forecasts suggest that the Maldon-Dombarton line could become a vital piece of freight infrastructure as the inevitable growth of the Sydney-Wollongong region places further stress on the existing road and rail networks.

- The Sydney rail network is currently operating under conditions of stress, which will only become more intense with projected passenger journey growth in response to road congestion and long term oil price increases. The road network is already very congested, particularly in the region between the port and the industrial areas to the south and west of the city.

- There will clearly be a need for major infrastructure investments to increase the capacity to haul cost-effective freight arising from industrial and demographic growth. While new road projects (eg Motorway extensions) will be necessary to ease congestion in some areas, these will be built in response to passenger car pressure, rather than freight needs (with the possible exception of a link between Port Botany and the M4 at Concord.

- The existing rail link between Sydney and Wollongong is congested and hampered by the difficult terrain, which affects train speeds, and hence capacity at peak periods. This link is strategically significant, and the lack of alternative rail corridors between the cities can be costly in the event of a major disruption. This is exacerbated by the lack of alternative road corridors linking the city.

- The Moss Vale-Unanderra line traverses very difficult terrain and offers low speeds. Grain trains are the current dominant user of this route, since steel trains between Port Kembla and Melbourne opt for the route via Sydney (which is less steep and allows for some shunting of Sydney products). The Moss Vale-Unanderra line is single track and does not offer a feasible alternative to the Illawarra for coal traffic on any long term basis. Timetables currently allow 4 hours for the transit of a train from Moss Vale to Port Kembla, reflecting the low speeds achievable on the downhill, sharply curving sections. The track is also susceptible to landslips and stability issues and can be expensive to maintain.

- Long term export/import freight needs are more likely to be addressed by new rail links, bypassing the inner urban network as far as possible. The Maldon-Dombarton line would provide a route for western coal traffic via Parramatta and Liverpool, on corridors with considerably more train path capacity than the lines on the inner network.

- The line would also be a critical piece of infrastructure for the proposal to ease container port congestion by opening a Port Kembla terminal to serve SW Sydney. While Newcastle is the current preferred location for a new terminal, it would not be well placed to handle imports destined for the Sydney region. Newcastle would be well placed to handle regional export trade such as cotton from Narrabri, and meat from Dubbo. Port Kembla, on the other hand, with the benefit of the new rail line, would be a very realistic option for urban imports and manufactured exports from the greater Sydney region.

- Critically, the Maldon-Dombarton line provides a greenfields corridor for this type of freight service, and could be developed and funded (at least in part) in conjunction with a decision to develop Port Kembla's Outer Harbour. This proposal might constitute the best way to optimise the utility of the proposed Moorebank terminal. If this was developed as part of an integrated chain with Port Kembla it could become a very efficient intermodal facility, far exceeding the productivity of the existing Sydney

terminals, which are tied to the constrained inner Sydney rail corridors and the inefficiencies of the Port Botany rail infrastructure.

- The absence of a new rail corridor to Port Kembla will be a hindrance to growth in coal exports from the western area, and also from the Wilton area. While some new train paths are likely to be available on the Illawarra line, these are unlikely to be able to cater for even modest coal export growth. Beyond the current global credit crisis, underlying demand for coal is likely to be strong in the medium term, and supply chain limitations could become important constraints on NSW export trade.

- The line will also be useful in reducing the impact on the region's roads that would otherwise arise from the development of new mines in the Wilton area. While these mines could be required to use the Moss Vale route, the new line would be much more economic and would also ensure road trucks carrying an additional 4mt per year would not be present on the Mt Ousley Rd corridor.

- While it is important not to develop new infrastructure too far in advance of a projected export 'boom', it is equally dangerous to delay development until the boom has occurred. The difference between now and the previous attempt to build the Maldon-Dombarton line is that capacity on existing links is now approaching upper limits. The development of peri-urban routes such as this will help the Sydney region to continue to grow without its transport links becoming swamped by growth and congestion.

# 7. A Port Kembla-based international container supply chain structure

## 7.1 Introduction

While Port Kembla presently handles a small quantity of international containers, this section explores the opportunity, structure and capability of a substantial supply chain servicing international containers using a Maldon Dombarton rail link to the west of Sydney.

### *7.1.1 A container supply chain model for Port Kembla*

The structure of a new Port Kembla-based chain could be developed as follows:

- The completed Outer Harbour development at Port Kembla has an assumed capacity of 3 million TEU's throughput;
- The Maldon Dombarton rail line could carry trains rapidly from the dock to an inland intermodal terminal (IIMT) servicing the south-western Sydney industrial zone, such as the proposed Moorebank terminal, or another greenfield site, bypassing the busy metropolitan freight corridors
- The IIMT would become the collection and delivery point for import and export containers, functioning as an inland port in place of the traditional port terminal. The IIMT would feature an empty container terminal for dispatching/receiving empties, negating secondary movements to empty container parks in the port zone. Surplus empty containers would be evacuated on a daily basis back to Port Kembla by train for exporting.
- The pick-up and delivery tasks (by metropolitan consignees and consignors) would be limited to the interface with the IIMT rather than the port terminal.
- The commercial relationship between each shipping line and the customer would then reflect the cost of a set of bundled services including the IIMT and rail transport to/from Port Kembla, stevedoring and empty container services.

Two broad potential business models could be applied:

a) A shipping line or group thereof controls the supply chain from ship/port to west of Sydney and prices services as such; this role could include exclusive operation of the Port Kembla port terminal in concert with a contracted stevedore, subject to any policy requirements for open access and cost transparency; or

b) The Port Corporation has direct control of the critical chain assets and contracts third party operators to provide labour, equipment and operations management. This model is similar to that established and managed by the Port of Tauranga (NZ) which moves containers to/from Auckland by rail, except for the rail services, which are contracted on a retail basis.[18]

*Modelling potential demand*

Both models require a rapid build up of volume to fully utilise new trains and terminals and thus yield low operating unit costs. This could be achieved if a major shipping line to decide to transfer a proportion of its services from Port Botany to Port Kembla. An initial annual task of around 100,000 TEU's would be required to achieve optimal utilisation and sustainably low unit costs, to be cost competitive with the traditional services into Port Botany by road or rail.

[18] See Port of Tauranga case study at http://www.port-tauranga.co.nz/images.php?oid=1746

The Port Kembla strategy should be seen as a model which is complimentary with Port Botany, which will otherwise see doubling of road freight transport in metro Sydney by 2030 even if rail achieves a 40% share.

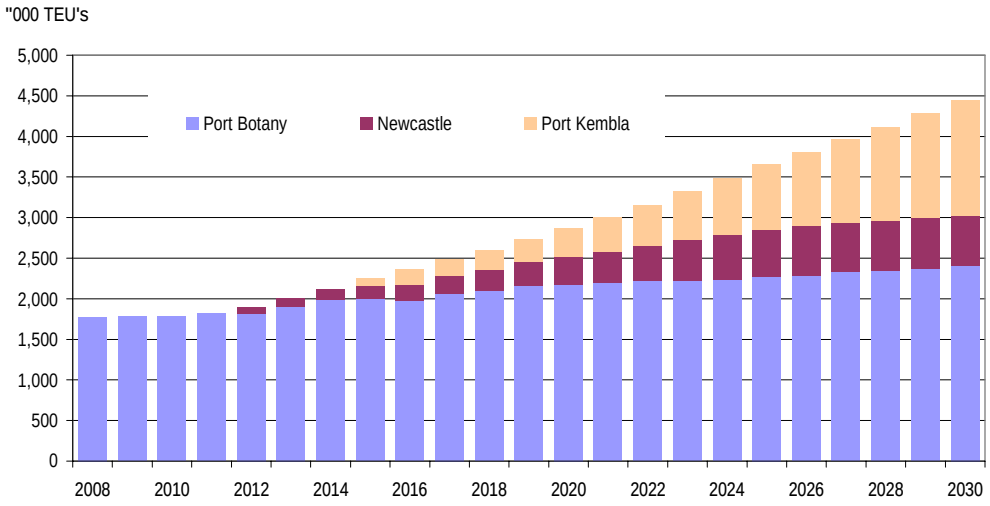
For demonstration purposes, a growth model towards 30% of total NSW trade share is shown for Port Kembla. A smaller volume threshold is used for Port of Newcastle since it would not compete effectively for western Sydney freight. The following diagram shows the share of total throughput to year 2030 of all three ports, based on an initial compounded annual growth rate of 6% (after recovery from the current economic downturn, declining over time to 4%.

Two alternative demand scenarios are outlined:

a) the "as is" model based on the current use of Port Botany, with Newcastle coming on stream at year 2012; and
b) the "alternative" model with Port Kembla commencing after year 2015 complementing Port Botany and Newcastle.

Table 34 on page 88, provides an analysis of volumes by rail and road under each alternative. This is also shown in Figure 28 over page.

Figure 27 - Potential distribution of demand across 3 NSW gateway ports



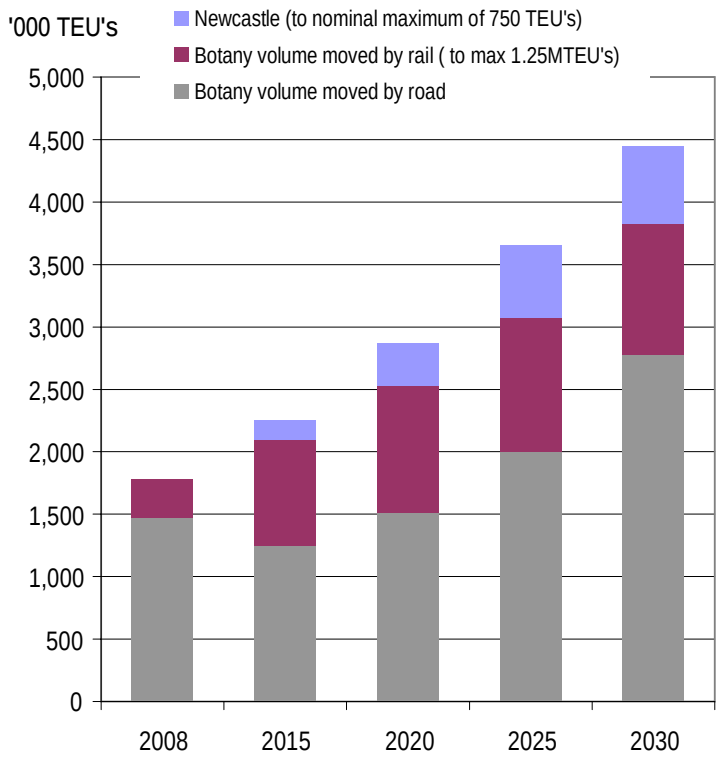

*Key observations emerging from analysis*

The following key points arise from the analysis:

- Without Port Kembla, and based on conservative forecast growth of 6%, Port Botany's volume will reach 3 million TEU's by 2020, assuming that Newcastle captures around 400,000 TEU's as well.
- With Port Kembla operating, this threshold is postponed until well after 2030, even as growth continues.
- Without Port Kembla ,as shown in Figure 4(a) , the growth in road transport to/from Port Botany doubles even after assuming that the 40% mode share targets are achieved.
- By establishing Port Kembla as an alternative for Western Sydney freight, cross metropolitan movements in Sydney is reduced by around 800,000 loaded movements; this increases to more than 1.2 million truck movements based on current back-loading and utilisation patterns.

Figure 28 - Mode share for "as is" and "alternative" port gateway models

**(a) "As is" model based on Port Botany and Newcastle**




**(b) "Alternative model" based on Port Kembla complimenting Port Botany and Newcastle**

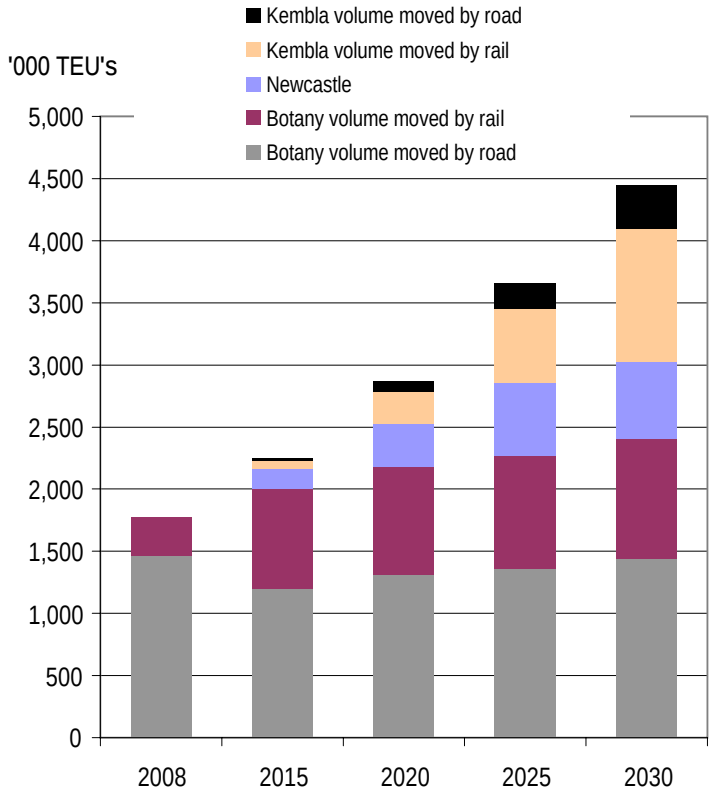


Table 34 - Market and mode share analysis of "as is" and "alternative" models

| Year | | 2008 | 2015 | 2020 | 2025 | 2030 |
|---|---|---|---|---|---|---|
| % growth | | | 6% | 5% | 5% | 4% |
| | | | | | | |
| Total NSW demand (volume) | '000 TEU's | 1,778 | 2,250 | 2,870 | 3,660 | 4,450 |
| "As is" model based on Port Botany and Newcastle | | | | | | |
| Port share of total demand as percentage of demand | | | | | | |
| *Port Botany* | % | 100% | 93% | 88% | 84% | 86% |
| *Newcastle* | % | 0% | 7% | 12% | 16% | 14% |
| *Port Kembla* | % | 0% | 0% | 0% | 0% | 0% |
| *Total* | | 100% | 100% | 100% | 100% | 100% |
| Port share of total demand as volume | | | | | | |
| *Port Botany* | '000 TEU's | 1,778 | 2,093 | 2,526 | 3,074 | 3,827 |
| *Newcastle (to nominal maximum of 750 TEU's)* | '000 TEU's | 0 | 158 | 344 | 586 | 623 |
| *Port Kembla (not operational)* | '000 TEU's | 0 | 0 | 0 | 0 | 0 |
| *Total* | '000 TEU's | 1,778 | 2,250 | 2,870 | 3,660 | 4,450 |
| Port Botany transport mode share | | | | | | |
| - Rail | | | | | | |
| *% mode share* | % | 18% | 40% | 40% | 35% | 28% |
| *Botany volume moved by rail ( to max 1.25MTEU's)* | '000 TEU's | 310 | 840 | 1010 | 1080 | 1050 |
| - Road | | | | | | |
| *% mode share* | % | 83% | 60% | 60% | 65% | 73% |
| *Botany volume moved by road* | '000 TEU's | 1,468 | 1,253 | 1,516 | 1,994 | 2,777 |
| "Alternative" model with Port Kembla complimenting Port Botany | | | | | | |
| Port share of total demand as percentage of demand | | | | | | |
| *Port Botany* | % | 100% | 89% | 76% | 62% | 54% |
| *Newcastle* | % | 0% | 7% | 12% | 16% | 14% |
| *Port Kembla* | % | | 4% | 12% | 22% | 32% |
| *Total* | | 100% | 100% | 100% | 100% | 100% |
| Port share of total demand as volume | | | | | | |
| *Port Botany* | '000 TEU's | 1,778 | 2,003 | 2,181 | 2,269 | 2,403 |
| *Newcastle* | '000 TEU's | 0 | 158 | 344 | 586 | 623 |
| *Port Kembla* | '000 TEU's | 0 | 90 | 344 | 805 | 1,424 |
| *Total* | '000 TEU's | 1,778 | 2,250 | 2,870 | 3,660 | 4,450 |
| | | | | | | |
| Port Botany transport mode share | | | | | | |
| - Rail | | | | | | |
| *% mode share* | % | 18% | 40% | 40% | 40% | 40% |
| *Botany volume moved by rail* | '000 TEU's | 310 | 800 | 870 | 910 | 960 |
| - Road | | | | | | |
| *% mode share* | % | 83% | 60% | 60% | 60% | 60% |
| *Botany volume moved by road* | '000 TEU's | 1,468 | 1,203 | 1,311 | 1,359 | 1,443 |
| Port Kembla transport mode share | | | | | | |
| - Rail | | | | | | |
| *% mode share* | % | 75% | 75% | 75% | 75% | 75% |
| *Kembla volume moved by rail* | '000 TEU's | 0 | 70 | 260 | 600 | 1070 |
| - Road | | | | | | |
| *% mode share* | % | 25% | 25% | 25% | 25% | 25% |
| *Kembla volume moved by road* | '000 TEU's | 0 | 20 | 84 | 205 | 354 |

### 7.1.2 Transport and logistics methods and cost

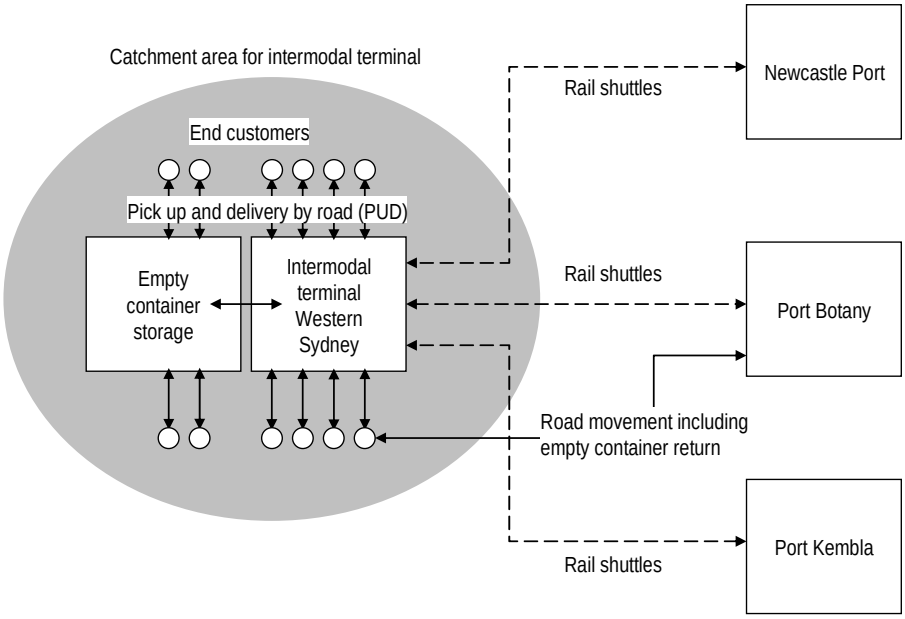
*Corridors and critical infrastructure*

The instigation of a new supply chain to handle international containers through Port Kembla would significantly reduce the number of heavy truck movements through the central west of Sydney to/from Port Botany. This strategy, however, requires the assembly of critical infrastructure, as:

- Completion of the Outer Harbour development at Port Kembla, already underway; separate analysis suggests that the development will have the capability to handle more than 1 million TEU's per annum
- New rail handling capacity will be required for arrival, storage and departure of shuttle trains into SW metropolitan Sydney, both at port.
- Completion of the Maldon Dombarton rail line as a direct unimpeded corridor to handle intermodal shuttle trains to/from western Sydney.
- Completion of a substantial intermodal terminal in the west of Sydney such as the terminals proposed at Moorebank and Eastern Creek. The Minto (MIST) terminal could provide an initial capability but would require enhancement of its network connections to receive trains from the south and longer siding length.

The following diagram outlines the alternative corridors between the Port locations and customers based in a SW Sydney intermodal terminal.

Figure 29 - Supply chain elements for direct and intermodal corridors to/from port




*Comparative costs*

The comparative cost of the corridors shown in the above diagram can be summarised in the following table. While more detailed modelling is required, the cost of a rail based supply chain utilising the completed Maldon Dombarton rail corridor could be broadly consistent with the cost of direct road transport from Port Botany.

Table 35 - Comparative costs by corridor

| Nominal average and maximum costs for road and rail corridors from Port Botany and Port Kembla<br><br>(Cost per TEU) | Port Botany | | | | Port Kembla | |
|---|---|---|---|---|---|---|
| | *By road* | | *By IMT* | | *By IMT* | |
| | *Min* | *Max* | *Min* | *Max* | *Min* | *Max* |
| Move container from port terminal to end customer and empty container return | $400 | $500 | - | - | - | - |
| Move container from port to intermodal terminal by rail | - | - | $120 | $140 | $150 | $200 |
| Pick up and delivery by road incl return of empty container (PUD only) | - | - | $120 | $200 | $120 | $180 |
| Intermodal terminal capital and handling costs | - | - | $80 | $100 | $80 | $100 |
| Container park handling | $30 | $30 | $30 | $30 | $30 | $30 |
| Movement of empty container from portside park back to port for evacuation | $30 | $50 | *See note below* | | | |
| Total costs | $460 | $580 | $350 | $470 | $380 | $510 |

*Note: The cost of the moving of surplus empty containers back to port is factored into the loaded cost, thereby allowing the empty container to "travel free".*

High level modelling of the rail costs using the Maldon-Dombarton route shows potentially positive results, indicating cost-competitiveness with Port Botany, once threshold annual volume limits (100,000 TEU) are reached. Modelling has been done on the basis of a rail shuttle service operating frequently and consistently between the port and a SW Metro terminal. A simple such service achieving three cycles per day on a 5 days/week basis could deliver imports and exports for the SW metro region at rail freight costs (ie excluding terminal and handling costs) of well under $200 per TEU, despite the 90km distance.
The reasons for the ability of this system to compete effectively with existing services into Port Botany over the shorter distance are as follows:

- a well designed new rail interface at the port would be more efficient than the current Port Botany layout, which requires considerable shunting to handle full and empty containers
- a freight-only Maldon-Dombarton line, combined with the Sydney freight-only line would allow unlimited 24-hour access into south-western Sydney
- in combination, this infrastructure would support a three-cycle per day service, which offers substantial train asset utilisation efficiencies

There are some pre-conditions for this type of service to viable, however. The rail shuttle service would have a defined daily capacity, and there would be 'carryover' volume after ship calls that would not be moved on the day of arrival, unless supplementary trucking capacity was offered. Alternatively, extra rail capacity could be provided, but at lower utilisation rates, resulting in higher unit costs.

In the early stages of development, therefore, some level of financial commitment from the Port Corporation or another agency might be required to sustain the new rail operation as volumes increase and ship calls become more frequent.

The other important cost consideration would be the rail access charge applicable on the new corridor. To attract business of this nature, access charges would need to be calculated on a similar basis as current charges applying to intermodal traffic on other parts of the existing NSW network. This issue is addressed in the [demand summary chapter].

# *APPENDIX C*
# *Cost Estimate*

# *Appendix C1: Brief Notes on Estimate*

1. Conceptual Bridge Design

- The rail and road bridges are estimated on a conceptual design using modern precast pre-stressed post-tensioned incremental concrete construction.
- The rail bridge substructure design allows for the pier construction to be similar to the existing designs anchored into the rock.
- The rail bridge superstructure design is allowed as a combination cast-insitu and precast pre-stressed concrete Tee beams which will minimise site construction costs for all bridges.
- The erection of the rail bridge spans is allowed as launched cantilevered beams from each ramp of the bridge and with the centre precast section inserted unto the cantilevers.
- The road bridges have also been allowed in the estimate as precast pre-stressed tee section beams to minimise formwork and reduce construction time of the overpasses.

2. Conceptual Tunnel Design

- The tunnel design has been modified to avoid 'dig-outs' and to suit modern tunnel boring machines.
- No allowances have been made for the increase in tunnel size to allow for the 'double stacking' of containers.
- The tunnel cross-section is suitable for electrification on 'single stack' container and all bulk and passenger trains.
- The internal layout of the tunnel infrastructure has been adjusted to optimise the space requirements, address basic life support requirements and minimise excavation.
- Tunnel ventilation is achieved via remotely operating 'suction' doors as opposed to the traditional bored vertical ventilation shafts.

3. Basis of Estimate

- The estimate is based on January 2009 costs for material supply and construction costs.
- Major global escalation adjustments will be required once the actual timeframe and options for construction are agreed.
- Costs have been sourced for current work being undertaken and on costs from suppliers for rail track, sleepers and fixings, standard precast pre-stressed tee sections. Site concrete has been allowed as being supplied from existing concrete plants within a radius of about 10 kilometres.

- No allowance has been made for accommodation of labour as it has been assumed that all labour will be available within a 50 km radius of the work.

- Rates for labour and equipment have been used from works currently under construction at sites within NSW currently. And with EBA adjustments on increase in wages for up to two years in the future.

- No allowances have been made for any redesign of the rail alignment or the track levels and all costs for this work are based on the existing drawings and earthworks.

- Only minimal costs have been allowed for cleaning of the existing track base in areas where there will be the need to remove high vegetation. All other areas will have removal of vegetation by weed eradication.

- The tunnel has been allowed as a bored construction with lining and the track laid on a continuous concrete base. Formed to allow walkways along each side of the track. No ventilation up-casts or fans have been allowed.

- All costs are based on 40 hour week with roster days and additional hours of 5 days of 2 hours per day and Saturday 6 hours a total of 56 hours per week.

- The total man-hours to construct the works including supervision not including engineering is approximately 1.2 million hours.

- This is equivalent to an average of 360 workforce average for the length of the project. This would indicate a peak workforce of about 600 for four months.

## 4. Exclusions

- No allowance for major escalation

- No allowance for sound barriers

- No allowance for ventilation shafts in the tunnel

- No allowance for land acquisition

- No allowance for legal fee's

- No allowance for Environmental Approvals

- No allowance for redesign or scope changes due to changed design codes, legislation or regulations, new ARTC requirements or modifications etc

- No allowance for risk premiums on construction activities, design growth, contractor market fluctuations or foreign exchange movements.

- Only infrastructure elements noted as not yet built on the Work As Executed drawings and report have been allowed for. All other works are assumed completed as previously recorded in site reports.

# *Appendix C2: Brief Notes on Schedule*

1. Qualifications

- The Conventional Schedule is based on 6 day per week construction as well as:
  - Some allowance for float has been made

- The Fast Track Schedule is based on 6 day per week construction as well as:
  - No allowance for float has been made
  - Early letting of critical work
  - Multiple work faces on for most work
  - Reduction of the Engineering Feasibility duration is done by increasing the work force and completing and tendering major critical design items ready for the Construction Phase
  - No demobilisation of the design team during approval

- The level of information used to prepare the preliminary schedule is considered to be conceptual, so that the preliminary timeframes provided are based on experience and involvement on a number of studies. These need to be verified in the next stage with more scope definition and by further inquiries to obtain actual delivery times and activity durations.

- The Schedule and Estimate are based on commencing the definition phase and the execution phase together to enable the project to commence at the earliest time. The risks of this approach should be minimal as a considerable amount of the existing engineering only requires minimum updating and tendering documentation to enable work to be retendered.

2. Exclusions

- No allowance for delays outside the scope of work such as strikes, accidents or other unforeseeable incidents such as environmental disruptions.

Figure 23 Proposed Project Schedule – Conventional

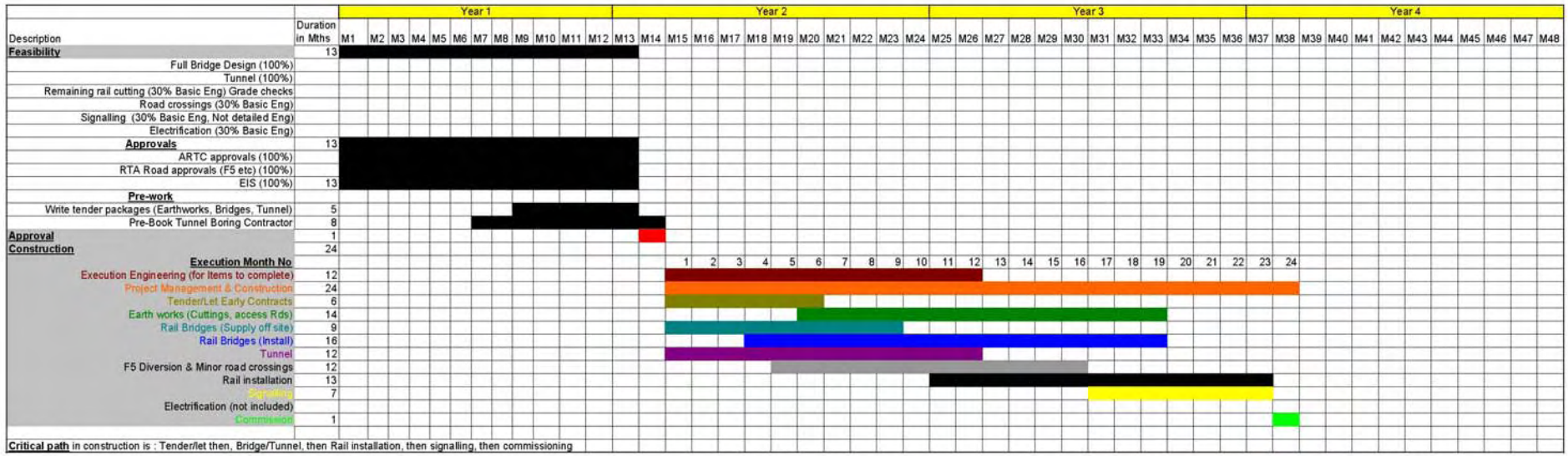


Figure 24 Proposed Project Schedule – Fast Track