NSW Infrastructure Capability Assessment

Transport Baseline Report

September 2011

Report Outline

- **Transport Industry Overview and Current Situation**
- Ports and Intermodal
- Roads
- Rail

New South Wales has a number of demographic and other related characteristics that have driven the development of transport infrastructure in NSW

Population

- The vast majority of the State's 7.2m population is located along the coastal edge of the State
- Almost two-thirds (64%) reside in the Sydney Statistical Division – a proportion that has remained stable since the mid 1990s; an area accounting for less than 2% of the NSW State land area
- The Hunter Statistical Division accounts for 9% of NSW residents
- The Illawarra Statistical Division accounts for 6% of NSW residents
- Four in every five NSW residents live along a coastal strip of c. 250kms centred on Sydney (about one sixth of the straight line length of the NSW coast line)
- Sydney is Australia's most populous city (4.5 million persons)

Employment and Economic Development

With an economy that accounts for an estimated 20% to 25% of Australia's Gross State Product, Sydney is the location of:

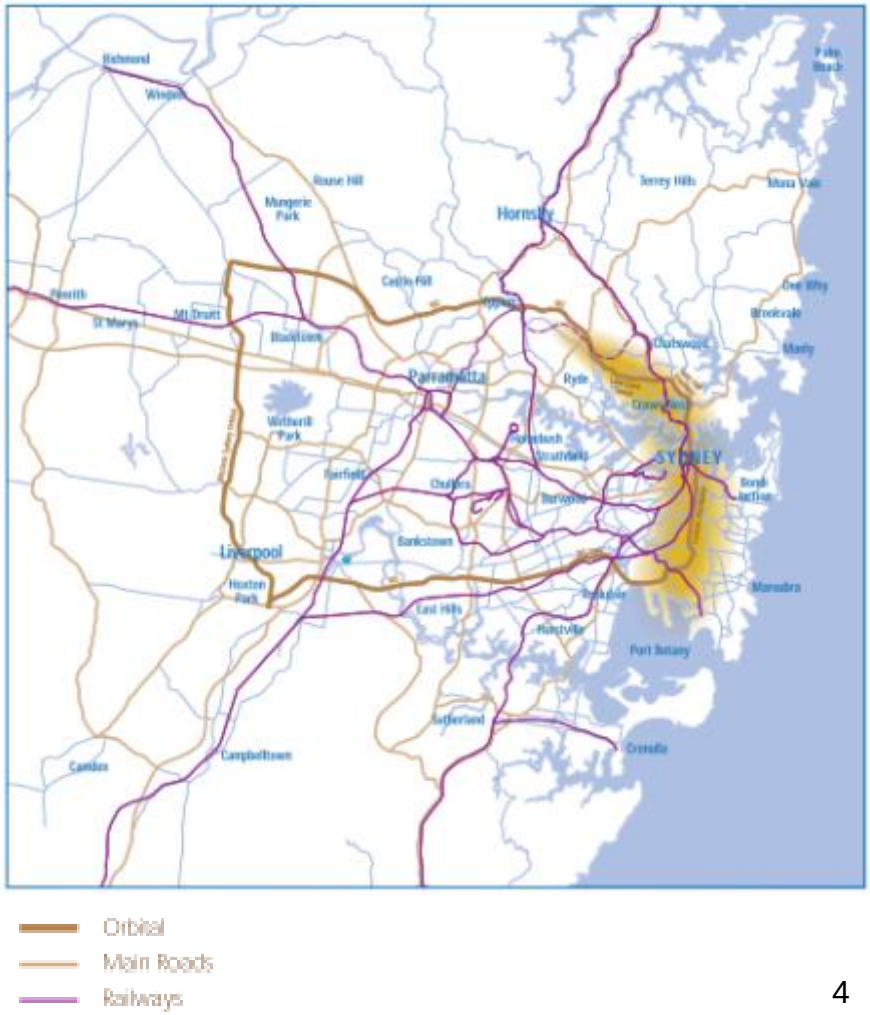
- The country's busiest airport with almost 35 million passenger movements (one third greater than Melbourne) including 11 million international passenger movements (double that of Melbourne) and just under one half of all domestic airline traffic of 51 million passengers
- The country's second largest by throughput container port – accounts for one-third of containers (measured as Twenty-foot equivalents) handled by the five major main land capital cities container ports
- A labour force of 2.5 million (20% of the country's total labour force)
- Of the 5.5 million international visitors to Australia in 2010/11, just over 50% visited NSW and NSW recorded the largest share of visitor nights at 36%.

Within the Greater Sydney region there has emerged a distinct economic arc comprising significant activity centres and generators

- Within an arc from Kingsford Smith airport and swinging northward via Port Botany through the CBD and Macquarie Park is a major economic zone; an economic zone of national significance

- The evolution of this zone has seen the development of significant road congestion particularly in the airport-Port Botany-CBD precinct and on sections of the major motorway – M2, M4, M5 and F5 (as shown in maps later in this paper). Traffic volumes are such that journey-to-work, on-business trips and the movements of goods are negatively impacted having implications for NSW's productivity

Sydney's Economic Arc



The port, road and rail infrastructure network in NSW is geographically dispersed from the coast and is particularly concentrated in the region bounded by Newcastle, Wollongong and Greater Sydney

Transport Infrastructure in NSW

Ports and Intermodal

- 4 major commercial seaports, 2 regional ports
- 5 major intermodal terminals in Sydney supported by regional intermodal terminals
- 3 new intermodal terminals planned for Sydney

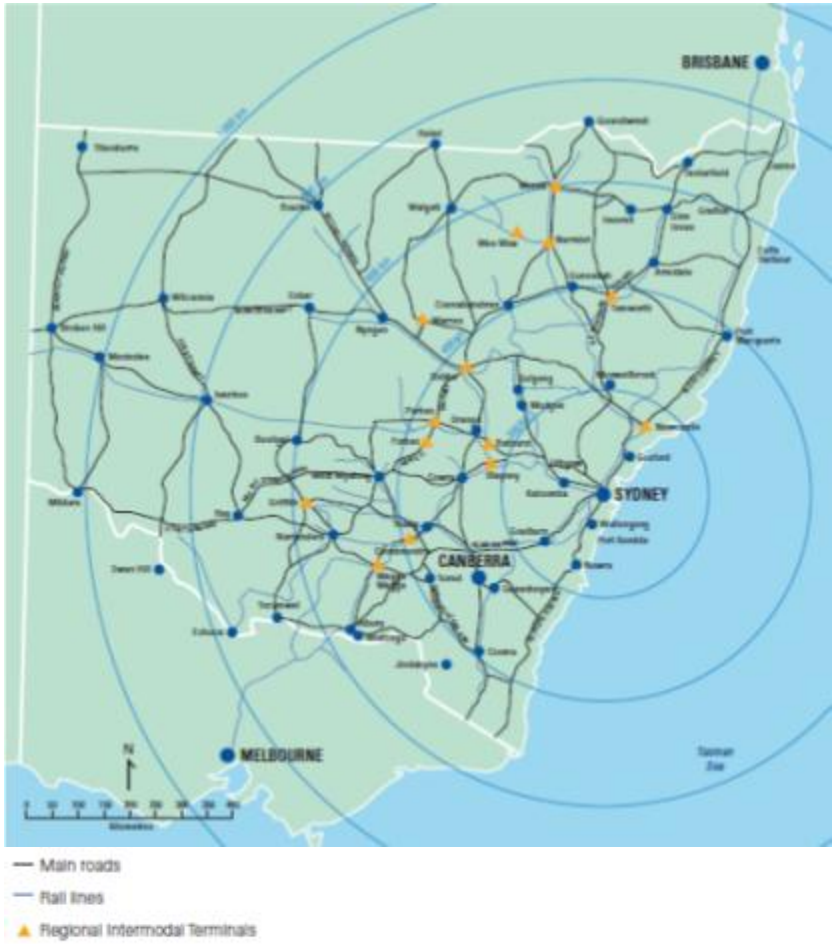
Roads

- The NSW road network spans more than 180,000 kms of road shared by passenger and freight vehicles

Rail

- The NSW passenger and freight rail network comprises the Metropolitan, Country, Interstate and Hunter networks which span 9,605 track kilometres

NSW Transport Infrastructure [1]



[1] Sydney Ports Corporation (2010) Annual Report 2009/10, p52

The NSW government owns or regulates almost all land transport infrastructure in the State

EXAMPLE

Transport Infrastructure Industry

Key Players	Policy and Regulation	Ownership and Concessions	Operations and Maintenance	Service Provision
Roads	• Transport for NSW	• NSW Roads and Maritime Services • Buses – State Transit Authority, Private Bus	• NSW Roads and Maritime Services • Airport Motorway Group • Transurban/ Hills Mway Group • Interlink Roads • Westlink Motorway Limited • Sydney Harbour Tunnel Company • CCT Motorway Group Holding • Leighton Contractors	• Buses – State Transit Authority, Private Bus Companies • Light Rail • Freight operators • Freight distributors and forwarders
Rail	• Transport for NSW • IPART • National Rail Safety Regulator • ITSRR • ATSB • OTSI	• Transport for NSW (Country Link) • RailCorp • ARTC • Privately owned railways and sidings	• RailCorp • Country Rail • ARTC • Airport Link	• Passenger rail – City Rail, Country Link, Great Southern Railway • Freight operators – Pacific National, QR National, Patrick
Ports/ Terminals	• Transport for NSW • IPART • Customs and Border Protection • Maritime Safety Regulator	• NSW Roads and Maritime Services • Sydney Ports Corporation • Port Kembla Port Corporation • Newcastle Port Corporation • Port of Yamba • Port of Eden • Hunter Development Corp	• Containers - DP World, Patrick, Hutchison • Bulk Liquids - Vopak, Origin Energy, Orica Australia, Terminals, Elgas, Shell • Container Parks P&O, Patrick, Austate/ ACFS, Warehouse Solutions	• Ferries – Manly operators, Sydney Ferries, Matilda • Freight Terminals (Metro) • Freight Terminals (Regional) • Freight distributors and forwarders eg – Startrack Express

Over the past decade, transport planning and management have focused on capacity and expansion programs primarily by mode rather than a truly fully integrated transport-land use and / or whole supply chain approach

Transport Planning

- Transport planning in NSW has largely been disconnected from land use planning and has not delivered new transport infrastructure in a coordinated way
- Transport planning has typically focused on addressing capacity problems through a project and mode specific focus
- Growth in population, housing and employment, particularly in Sydney's outskirts has led to large areas poorly serviced by transport infrastructure and public transport services
- As Sydney's metropolitan area continues to grow it will become increasingly difficult to improve transport infrastructure without a comprehensive, coordinated and integrated transport plan with long term commitment

Integrated Approach

- There is a need for long term strategic planning, coordination and integration
- This means that transport planning must consider:
  - Complementary land use that will help to support transport infrastructure
  - Comprehensive travel demand management approach
  - Multimodal infrastructure and non infrastructure solutions
  - Transition and implementation to ensure commitment to drive the planning through to delivery
- Understanding the whole supply chain and the differing planning and implementation life-cycles for elements (e.g. terminals, track capacity and port infrastructure) is important as performance will default to the weakest link / lowest capacity

The recently released State Plan aims to improve strategic planning, coordination and integration across the transport sector in NSW

Sector Planning [1]	
Document	**Objectives**
NSW 2021: A plan to make NSW number 1	Support economic growth, improve productivity and competitiveness and quality of life of NSW citizens
20 Year State Infrastructure Strategy	Sets out long term infrastructure requirements for the state
10 Year Infrastructure Plan	Based on the 20 year strategy will set out investment priorities
5 Year Infrastructure Plans	Will identify immediate priority projects creating certainty for businesses and communities
Infrastructure Strategy Statements	Will be prepared for key infrastructure sectors
Metropolitan Transport Plan	To effectively link Sydney's land use planning with its transport network
Regional Strategies	Identify ways in which regional areas can manage growth

NSW 2021 [2]

- NSW 2021 – 10 year plan to coordinate and integrate policy and budget decision making
- The Plan focuses on 5 key strategies including
  - Rebuilding the economy
  - Returning quality services
  - Renovating infrastructure
  - Strengthening local environment and communities
  - Restoring accountability to government
- Renovating infrastructure involves
  - Investing in critical infrastructure such as the North West and South West Rail Links; developing sectoral strategies for key industries such as freight
  - Building liveable centres
  - Securing potable water supplies

[1] NSW Treasury (2011) Infrastructure Statement 2011-12 NSW Budget Paper No.4
[2] NSW Government (2011) NSW 2021 – A Plan to Make NSW Number One

The condition of transport infrastructure is ageing – if the maintenance regimes are not sufficient to keep the assets performing effectively, there is a risk of a major infrastructure refurbishment and renewal backlog

Ports and Intermodal

- There is limited publicly available information on the condition of port and intermodal infrastructure

Roads

- The overall physical condition of State roads appears to be improving with rural roads performing better than other State roads
- The road and bridge asset base is ageing with over 30% of roads over 35 years and 50% of bridges over 30 years

Rail

- Based on a measure of overall track condition, the Metropolitan Network is rated as ‘good’
- The Country Rail network (in particular, the grain network) has severe speed limit restrictions and low axle load limits
- Over half the Country Rail Network is not operational (commercial and infrastructure considerations)

There are a number transport network corridors and precincts that are at capacity and will require a suite of infrastructure and non-infrastructure solutions to meet and 'manage' demand

Ports and Intermodal

- Congested port and landside operations and impacts on neighbouring suburbs
- As integral elements of the import and export supply chains, intermodal terminal capacity and efficiency needs close attention

Roads

- Service quality is deteriorating due to rising congestion particularly in urban areas (e.g. M5, M2, M4, F5)
- Increasing use of the private car means there is a need to manage growth in vehicle kilometres
- The NSW freight task continues to grow with the majority of freight moved by road
- Demand management will need to play an increasingly important role in managing scarce road capacity

Rail

- Some peak rail services operate well above capacity in terms of train load factors (eg Western line)
- The growing demand for passenger services in the Metropolitan area will have significant implications for the efficient movement of freight where it shares the network (or interfaces) with passenger services

From a user perspective, the performance of the transport network is largely focused on service metrics which can be influenced by infrastructure performance – understanding the relationships is key

Ports and Intermodal

- Rail and road interface performance is improving, but slowly
- KPIs suggested for consideration by IPART include: landside logistics transparency, supply chain productivity, off-peak container slots used, truck waiting times, ship queues, container storage time, and modal shift

Roads

- NSW road network performance is measured by a number of physical quality (ride quality, durability) and service quality (safety, reliability) indicators – all showing some overall improvement over time
- Are these the most appropriate measures for road performance?

Rail

- The performance of rail networks (in particular passenger networks) is largely focused on 'On Time Running' (OTR) which can be influenced by both 'above rail' and 'below rail' factors
- 'Below fail' failures or poor infrastructure performance can lead to poor OTR – eg - signal, track, level crossing or point problems; extreme weather such as storms and heat waves

There are a number of key transport infrastructure issues that warrant further discussion and investigation

Ports and Intermodal

- Congested portside operations
- Congested landside operations
- Meeting container trade growth
- Accommodating development at the ports of Newcastle and Kembla

Roads

- The role of initiatives to alleviating congestion through infrastructure as well as non infrastructure solutions (e.g. travel demand management strategies)
- Managing effective maintenance and an ageing asset base
- Improving road safety

Rail

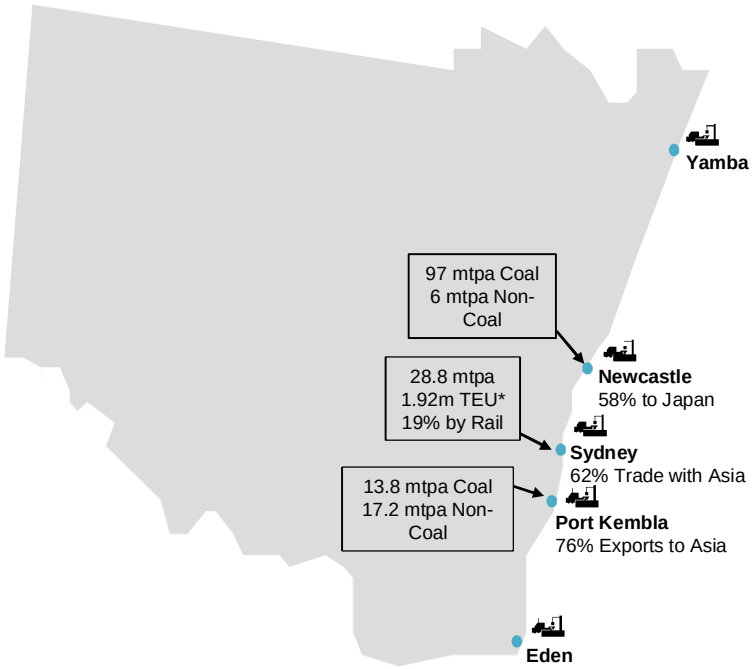
- Accommodating growth in passenger services – market growth and mode shift
- Alleviating congestion through infrastructure and non infrastructure solutions
- Encouraging mode shift to rail for freight movements – long distance (intrastate and interstate) and urban / peri-urban
- Managing maintenance
- Improving rail safety

Report Outline

- Transport Industry Overview and Current Situation
- **Ports and Intermodal**
- Roads
- Rail

NSW has four key major commercial and two regional seaports which are an integral part of the State and National transport system

2009/10 Annual Reported Export Volumes [1]



Infrastructure	Description [2]
Port Infrastructure	4 major commercial seaports: • Sydney Harbour (cruise vessels, bulk liquids, dry bulk, general cargo) • Port Botany (containers and bulk liquids) • Port Kembla (coal, steel, grain and vehicles) • Port of Newcastle (coal, aluminium, steel and grain) 2 regional commercial seaports: • Port of Yamba (fishing, timber, livestock, petroleum) • Port of Eden (fishing and woodchip exports)
Intermodal Freight Terminals	5 major intermodal terminals in Sydney • Cooks River, Chullora, Villawood, Yennora, Minto 3 new intermodal terminals planned for Sydney • Enfield, Moorebank, Eastern Creek Regional intermodal terminals - major terminals at Parkes, Cootamundra and Werris Creek
Passenger Ferry Terminals	• Owned and operated by NSW Maritime, Sydney Ferries

* Equivalent to 0.95m full TEU imported and 0.44m full TEU exported (ratio of 2:1 with empties 27% of TEU trade)

[1] Port Corporation (2010) Annual Reports 2009/10
[2] Engineers Australia (2010) NSW Infrastructure Report Card

Note: Sydney represents Sydney Harbour and Port Botany

Container origins and destinations in Sydney are metropolitan centric

Containerised Imports [1]

- Import destinations are heavily concentrated in metropolitan locations
- 85% of total containers are packed or unpacked within a 40km radius of Port Botany
- This has implications for the location of future intermodal terminals and freight transport and logistics services and initiatives
- Containerised products from the hinterland (particularly agricultural commodities) also play a part in making up the container trade for Sydney

[1] Freight Infrastructure Advisory Board (2005) Railing Port Botany's Containers

Intermodal terminals require efficient road and rail connections located close to customer origins and destinations

Sydney's Existing and Planned Intermodal Terminals [1]

- Intermodal terminals in Sydney are located close to key motorway networks or the dedicated freight line
- Sydney's intermodal terminals form a key part of the import and export supply chain
  - 5 major intermodal terminals in Sydney (Cooks River, Chullora, Villawood, Yennora, Minto)
  - 3 new intermodal terminals planned for Sydney (Enfield, Moorebank, Eastern Creek)
- Since 85% of total containers are packed or unpacked within a 40km radius of Port Botany, new intermodal terminal developments should ideally be located within the 40km radius
- Given the growth in residential development in Sydney's outskirts, the key challenge is finding appropriate sites
- Intermodal terminals require large, long parcels of land that can accommodate trains up to 1500m+ (or even 2kms) long

[1] Sydney Ports Corporation (2010) Annual Report 2009/10

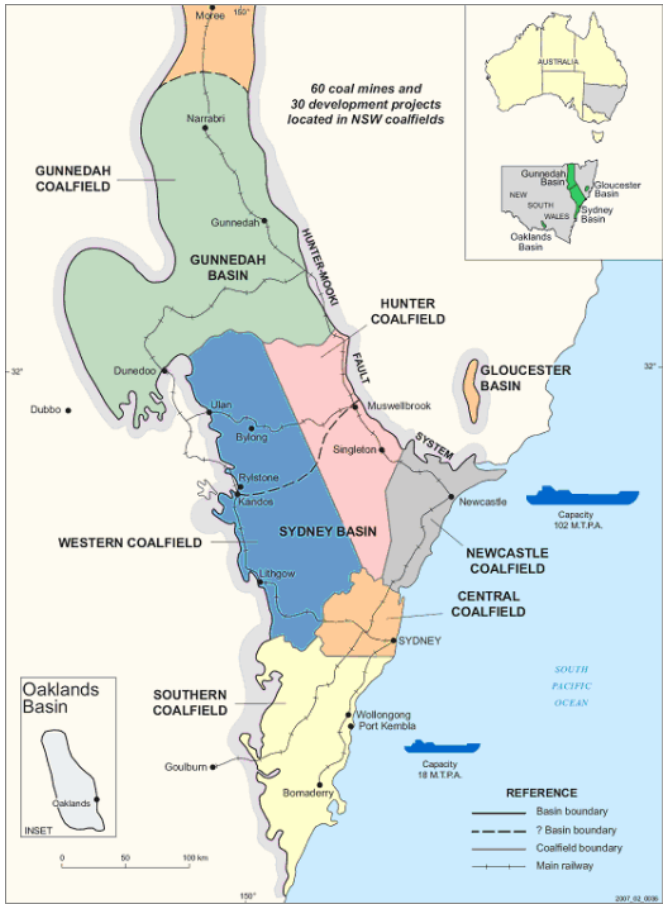
Regional intermodal terminals provide important consolidation points, supplement the Sydney terminals and contribute to national supply chains

Regional Intermodal Terminals [1]

- Regional intermodal terminals provide the freight transport network with a number of key benefits including:
  - Provide an important consolidation and de-consolidation points for freight into and out of regional areas
  - Support the Sydney intermodal terminals by providing addition capacity
  - Contribute to the national supply chain eg – Parkes intermodal terminal forms an part of the Melbourne to Brisbane freight route as well as the transcontinental East-West corridor

[1] Sydney Ports Corporation (2010) Annual Report 2009/10

The major coal fields in the Sydney and Gunnedah Basins are the key drivers of export growth for the ports of Newcastle and Kembla



Export Growth

Despite the global financial crisis, the Port of Newcastle exported a record 93 mtpa and Port Kembla 14 mtpa in 2009

Port of Newcastle
The Port of Newcastle has development approval to double coal exports to 211 mtpa comprising 145 mtpa for Port Waratah Coal Services (PWCS) and 66 mtpa for Newcastle Coal Infrastructure Group (NCIG). There is also potential for a further 90 mtpa for Terminal 4 at PWCS but this is contingent on take-or-pay contracts with coal producers

Port Kembla
Studies are progressing to expand Port Kembla capacity to 25 mtpa in two phases. Phase 1 (by 2012) to 21 mtpa via operational improvements. Phase 2 (by 2015) to 25 mtpa via new infrastructure. A feasibility study for the Maldon to Dombarton and Port Kembla rail link is also being progressed

Emergence of other industries
Implications for the emerging coal seam gas industry are unknown – such as agricultural land transferred to new mining activities with emergence of LNG industry

NSW Department of Primary Industries (2011) Map of NSW coalfields (http://www.dpi.nsw.gov.au/minerals/resources/coal/coalfields)

Port planning responsibilities and the planning documentation to support these responsibilities is evolving

NSW Government has three key roles:

- Managing Sydney*, Kembla and Newcastle commercial ports (Port Corporations)
- Managing Eden and Yamba regional ports (NSW Maritime)
- Strategic transport and land use planning for ports and intermodal terminals (Transport for NSW)

Port operations are regulated in three main areas:

- Market competition in stevedoring and freight-forwarding operations (ACCC and IPART)
- Development of port infrastructure and operations (Department of Environment)
- Port safety and security (NSW Maritime & Australian Customs/AQIS)

Key planning documents are:

- NSW Port Growth Plan and Freight Strategy (currently being revised?)
- Better Regulation Statement (NSW Maritime 2010)
- Annual Reports (for all three port corporations)
- Reforming Port Botany's Links With Inland Transport (IPART 2008)
- SPC Port Freight Logistics Plan (SPC 2008) and SPC Logistics Review (SPC 2009/10)
- Railing Port Botany's Containers (Freight Infrastructure Advisory Board 2005)
- Port Botany Landside Improvement Strategy (SPC Cargo Facilitation Committee 2011)
- Port Industry Forum Report (Port Kembla Port Corporation 2009)
- Hunter Valley Coal Chain Logistics Team (HVCCLT)

* NSW government announced plans to lease Port Botany for 99 years (2011 Budget)

In developing new infrastructure in the port sector, there are a number of stakeholders that need to be involved as illustrated by the situation relevant to the Sydney Ports Corporation

Key Port Stakeholders [1]

Transport Chain
- Sydney Ports Users Consultative Group
- Sydney Ports Cargo Facilitation committee

Rail Groups
- Botany Rail Steering Group
- Botany Rail Operations Group
- Botany Corridor/Botany Rail Yard/Container Terminals Interface Group (Joint working Group)

Sydney Ports Corporation

Government Agencies
- Ministry of Transport
- RailCorp
- Roads and Maritime Services
- Local Councils
- Australian Rail Track Corporation

Industry Groups
- NSW Sea Freight Council
- Australian Logistics Council
- Shipping Australia
- Transport Industry Associations

[1] Sydney Port Corporation (2008) Port Freight Logistics Plan

Note - NSW government announced plans to lease Port Botany for 99 years (2011 Budget). The role of Port Botany in port development is likely to evolve

There is limited publicly available information on the condition of port infrastructure

Condition

- Issues with Rail Mounted Gantries (RMGs) at the Patrick Terminal has resulted in lower and inconsistent loading productivity and subsequent loss of some rail share [1]

Condition Data

- Sydney Ports are undertaking a five-year program to inspect all marine structures in Sydney Harbour and Port Botany
- This will entail detailed visual inspections and testing to assess the condition and structural integrity of the port facilities, wharves, jetties, moorings and berthing platforms.

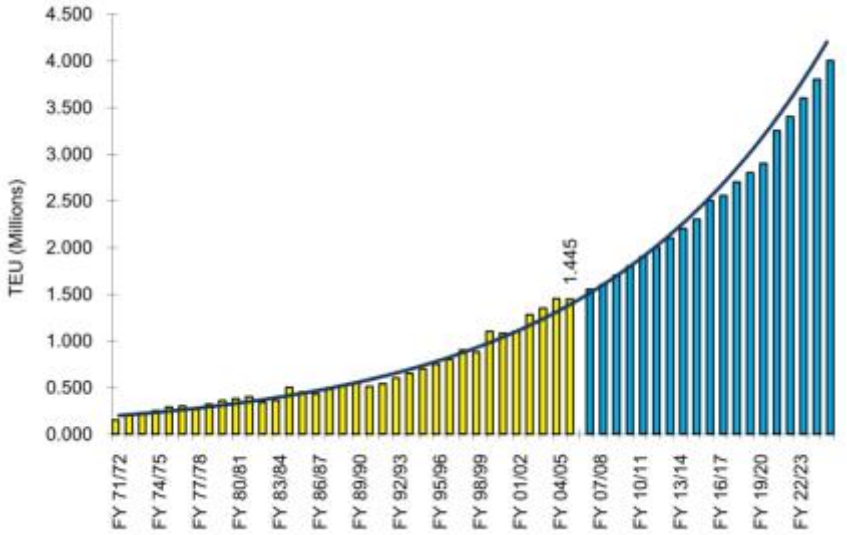
[1] Sydney Ports Corporation (2010) Annual Report 2009/10

Port trade, particularly container trade, appears to be moving from a modest growth phase to one of more dramatic growth thereby presenting a range of challenges

2008/09 Port Trade Volumes

Port	Import (Mass tonnes)	Export (Mass tonnes)	Total Throughput	Cruise Vessel Visits
Sydney	20,304,032	7,449,990	27,754,022	119
Newcastle	3,027,138	92,812,719	95,839,857	3
Port Kembla	7,329,944	17,063,783	24,393,727	0
Eden	447	1,198,725	1,199,172	0
Yamba	4,709	11,293	16,002	0
NSW Total	3,066,270	118,536,510	149,202,780	122

Forecast Growth in Port Botany Container Trade [1]



- Sydney ports is the only NSW ports that handles large volumes of containers
- The volume of freight to pass through Sydney each year is forecast to more than double by 2025
- Trade through Sydney in 2009/10:
  - 28.2m tonnes (1.5% growth)
  - 1.92m TEU (8.6% growth)
  - 19% of TEU transported by rail

[1] Engineers Australia (2010) NSW Infrastructure Report Card 2010

There are a number of port side and landside capacity improvements underway to help manage port trade growth

Port Botany Expansion (PBE)

- $1 billion infrastructure project that will add significant container handling capacity
- Hutchison Port Holdings (HPH) will operate this new third container terminal from 2012
- Second bulk liquids berth (BLB2) to help secure NSW energy supply

Hunter Valley Coal Chain Logistics Co-ordinator (HVCCLC) [1]

- Approximately 35 coal mines owned by 14 coal producers
- Coal rail haulage distances of up to 450 kilometres
- Day-to-Day Planning and Scheduling: coordinated vessel berthing, stockpile layouts and train sequencing so as to fulfil customers orders in the shortest possible timeframe
- Long Term Capacity Planning: Over the longer 10-year horizon using sophisticated simulation and optimisation modelling tools to continuously assess the adequacy of existing port infrastructure
- Two Coal Terminals and the new Mayfield Portside Lands bulk liquids/container terminal

Port of Yamba [2]

- The main general cargo berth is at Goodwood Island wharf. The wharf is 70 metres long and has a paved storage area of 5,000 square metres. The Port handles approximately 12,000 mass tonnes of cargo per annum and provides a link to Norfolk Islands, New Zealand and the Pacific Islands

Port of Eden [2]

- The Port is home to one of the largest fishing fleets in NSW and also has significant capacity to service the needs of a variety of importers and exporters. Woodchip export is currently the major trade for the port. An 8 hectare cargo storage facility is located adjacent the Multi Purpose Wharf

[1] HVCCC (2011) http://www.hvccc.com.au/Pages/welcome.aspx
[2] NSW Maritime (2011) http://www.maritime.nsw.gov.au/ports/ports-home.html

There are a number of port side and landside capacity improvements underway to help manage port trade growth (cont)

Port Botany Landside Improvement Strategy (Road and Rail) [1]

- Make landside supply chain more efficient, consistent and transparent moving to 24/7 operations
- Stage 1 (2011) implement Operational Performance Management (OPM) framework (covering truck tracking tags, truck marshalling areas and time penalties) and regulation of rail servicing pricing
- Stage 2 (2012) implement Demand Management System and review empty container park performance and rail performance standards, also 'Performance Leases' for terminal operators

Southern Sydney Freight Line (Rail) - Extension of dedicated freight rail to Minto intermodal terminal ($192m in 2006 dollars)

Empty Container Parks

- Maximum capacity of 60,000 TEU with Glebe Island used for emergency overflow
- Stage 2 of PBLIS will review container park performance

Maldon to Dombarton and Port Kembla Rail

- A feasibility study for the Maldon to Dombarton and Port Kembla rail link is being progressed. There is 14km double track from Port Kembla to Dombarton and a 35km partly completed link including the Avon tunnel between Dombarton and Maldon. This link is a key to opening up additional rail capacity between the Sydney regional and Kembla and will have implications for both dry bulk and intermodal traffic growth

[1] Port Botany Landside Improvement Strategy (SPC Cargo Facilitation Committee 2011)

As integral elements of the import and export supply chains, intermodal terminals particularly in terms of capacity and efficiency needs are critical links and possible bottlenecks

Intermodal Logistics Centre (ILC) at Enfield

- $300m intermodal terminal with empty container storage, warehousing and light industry
- Estimated 300,000 TEU per annum

Moorebank Intermodal Terminal

- Federal Government committed $70m for detailed planning and approvals
- 220 hectares and close to key transport corridors (Southern Sydney Freight Line, M5, M7)
- Estimated 500,000 TEU per annum
- Staged development from 2013 and operational by early 2016

Port Botany Rail Taskforce

- Working towards standardised train lengths of 600m (for example, Cooks River needs rail sidings to be lengthened to accommodate the optimal length of 600m plus locomotives)

Intermodal Terminal Capacity (TEU) [1]

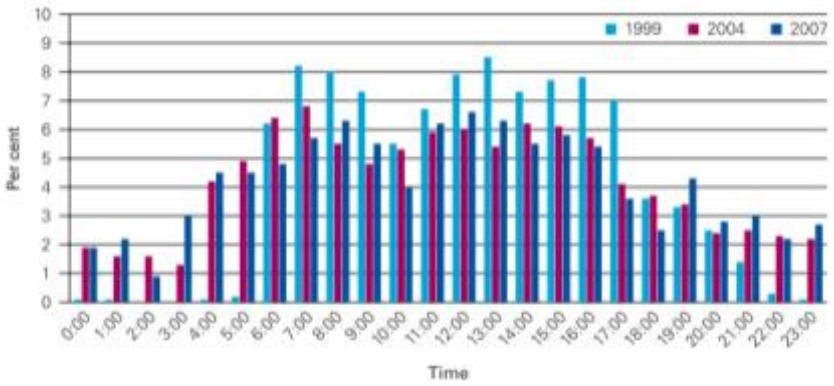
Location	Users	Sidling Length (Metres)	Estimated Capacity
Camellia	Patrick PortLink	300	80,000 TEU
Chullora	Pacific National (Interstate Operations only)	680	300,000 TEU
Cooks River	Maritime Container Services	500	150,000 TEU
Villawood	Mannway	350	20,000 TEU
Minto	Macarthur Intermodal Shipping Terminal	390	45,000 TEU
Yennora	Patrick PortLink/QR National	500	50,000 TEU

[1] Sydney Port Corporation (2008) Port Freight Logistics Plan

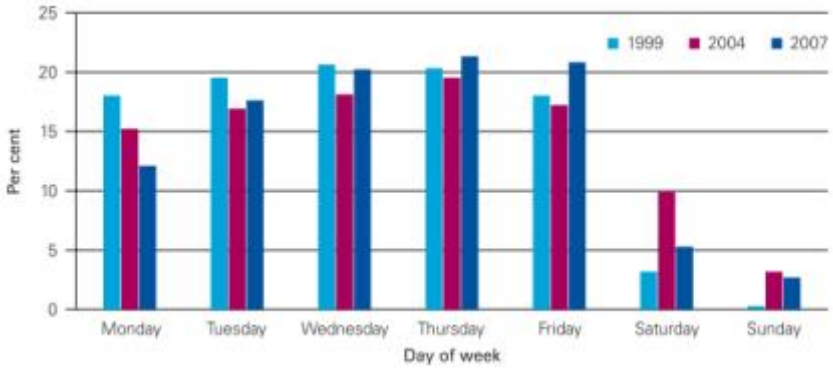
Rail and road interface performance is improving, but slowly

- Sydney Ports Corporation continues to work with industry to develop full performance measures that will be operational by the end of 2011
- Roads - Stage 1 of PBLIS has started to deliver statistics on truck and stevedore performance indicators. The Port Road Taskforce has also introduced mandatory performance regulations
- Rail - the Port Botany Rail Team has been looking to improve the misalignment between rail windows (allocated by stevedores) and train paths (allocated by ARTC and RailCorp)
- Truck arrivals by time of day (slowly spreading) and by day of week (weekends very underutilised) – high efficiency container trucks (HECT), 24/7 operations, improved road access for Restricted Access Vehicles (RAV) and increased rail/terminal capacity will assist to spread freight flows
- KPIs suggested for consideration by IPART include: landside logistics transparency, supply chain productivity, off-peak container slots used, truck waiting times, ship queues (in particular at Newcastle), container storage time, and modal shift

Port Botany Truck Arrivals by Hour of Day [1]



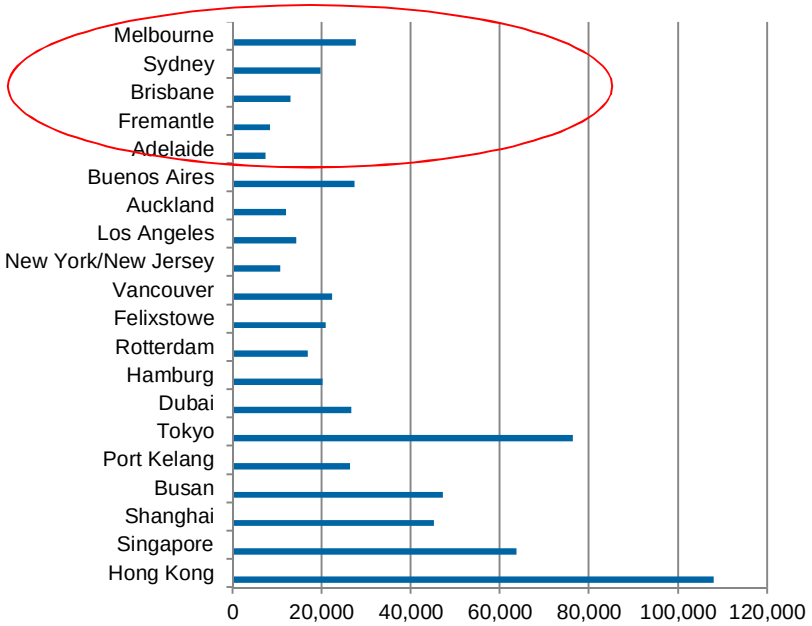
Port Botany Truck Arrivals by Day of Week [1]



[1] Sydney Port Corporation (2008) Port Freight Logistics Plan

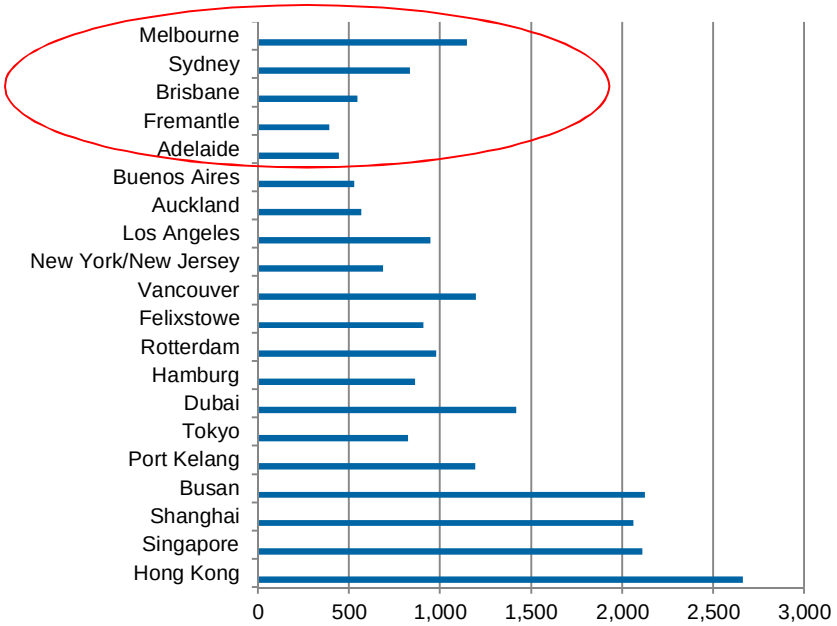
Port infrastructure productivity measures indicate that Sydney is not substantially different from other Australian ports

Yard Utilisation, 2006-07
TEU Throughput per Gross Hectare [1]



- Sydney = 19,708 TEU per hectare
- Australian five ports median = 13,040 TEU per hectare
- Overseas ports median = 26,683 TEU per hectare

Berth Productivity, 2006-07
TEU Throughput per Berth Metre [2]

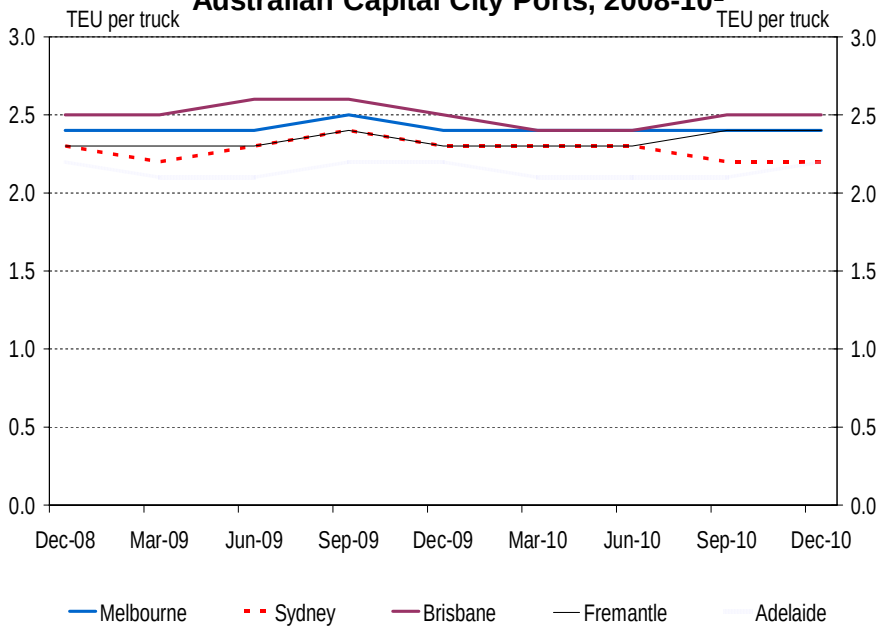


- Sydney = 834 TEU per berth metre
- Australian five ports median = 545 TEU per berth metre
- Overseas ports median = 945 TEU per berth metre

[1] BITRE Information Paper 65, 2009 Australian Container Ports in an International Context, Annex A Statistical Tables, Table 5
2 BITRE, Information Paper 65, 2009 Australian Container Ports in an International Context, Statistical Tables, Table 4

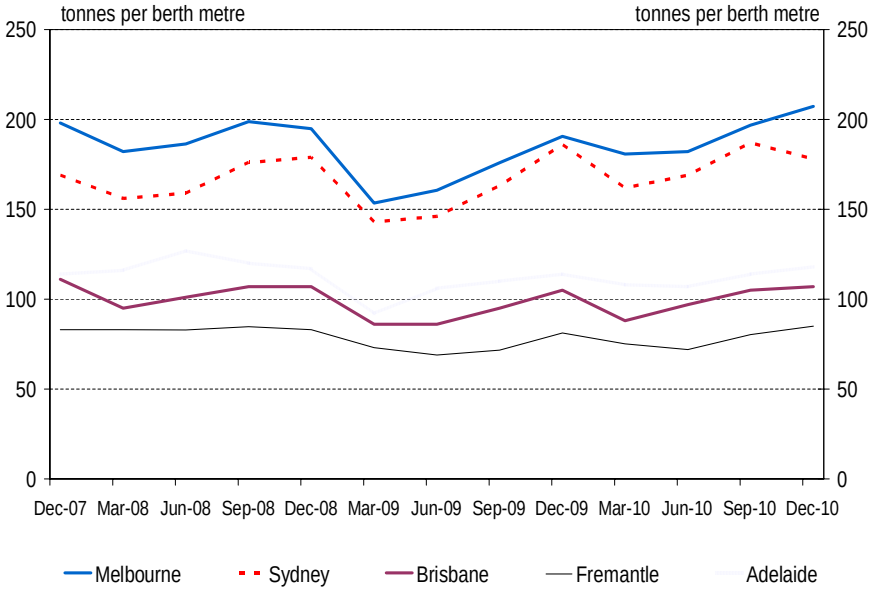
Truck and terminal storage performance indicators illustrates that Sydney is not substantially different from other Australian ports for the former and significantly better than smaller ports on the latter

Truck Productivity - Comparison of Sydney with Other Australian Capital City Ports, 2008-10[1]



- Sydney at Dec 2010 = 2.2 TEU per truck
- Australian five ports median at Dec 2010 = 2.4 TEU per truck

Terminal Storage Productivity – Comparison of Sydney with Other Australian Capital City Ports, 2007-10[2]

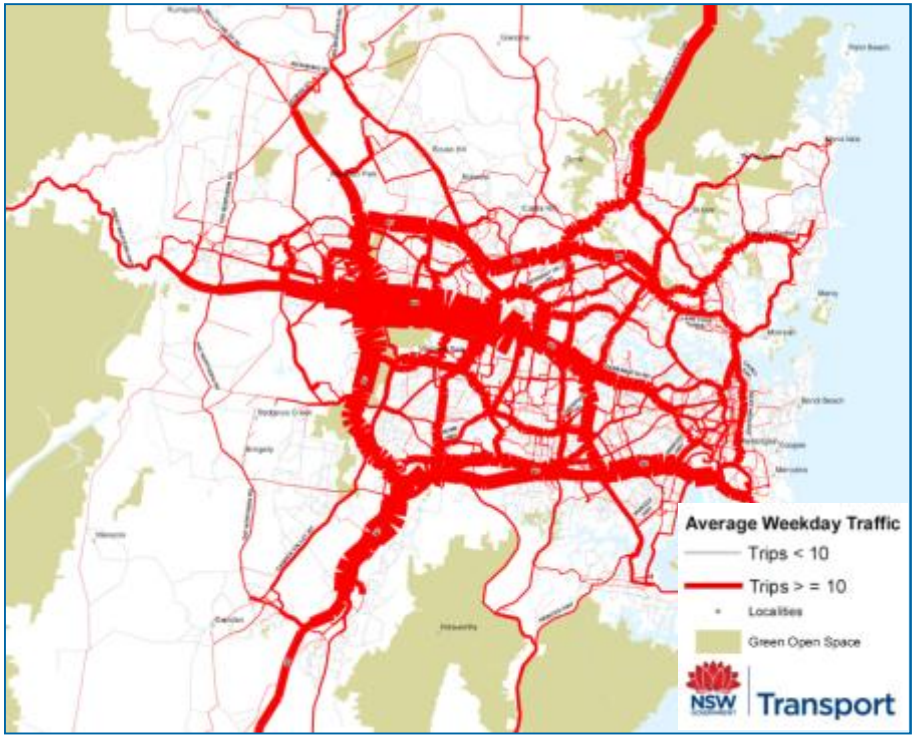


- Tonnes per berth metre is a measure of the density of a terminal's storage system. It provides a measure of terminal storage productivity
- Sydney at Dec 2010 = 178 tonnes per berth metre
- Australian five ports median at Dec 2010 = 118 tonnes per berth metre

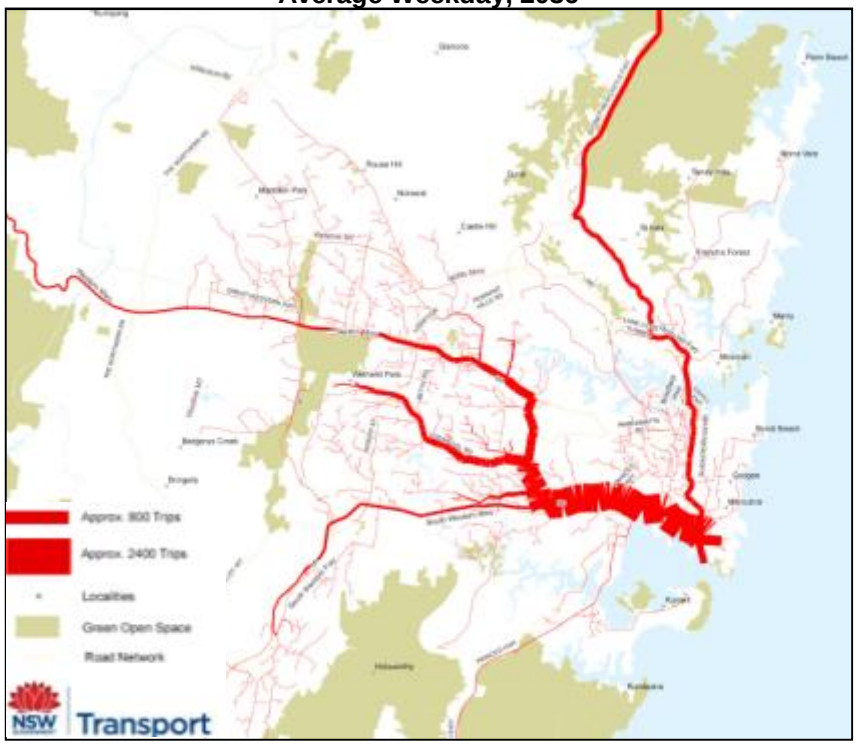
[1] BITRE, Waterline 49, July 2011, Table 1.1
2 BITRE, Waterline 49, July 2011, Table 2.1

The growing freight task will have significant implications for the road system, particularly on east – west routes from the Port

Forecast Heavy Vehicle Commercial Trips, Average Weekday 2036



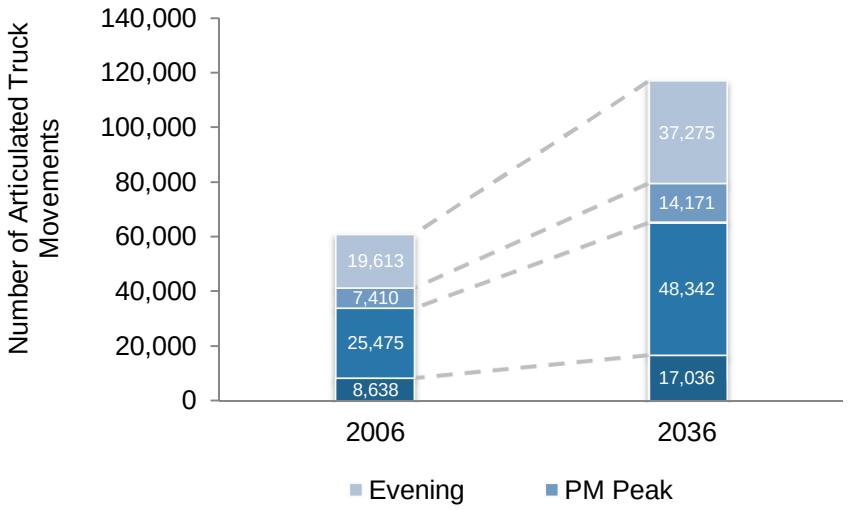
Forecast Heavy Commercial Vehicle Trips from Port Botany, Average Weekday, 2036



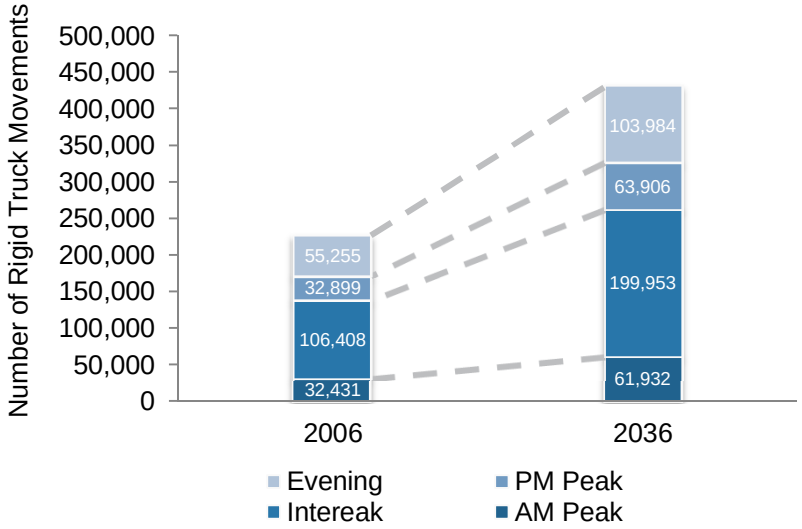
Source – Bureau of Transport Statistics – Freight Movements in Sydney
http://www.bts.nsw.gov.au/ArticleDocuments/80/tf2010-01-transfigures.pdf.aspx?Embed=Y

Articulated and rigid truck movements in Greater Sydney region are expected to double by 2036 with rigid trucks accounting for over three times activity levels of articulated trucks

Growth in Articulated Truck Movements by Time of Day, 2006-2036



Growth in Rigid Truck Movements by Time of Day, 2006-2036



Source – Bureau of Transport Statistics – Freight Movements in Sydney , http://visual.bts.nsw.gov.au/freight/#

There are a number of key issues for further exploration and discussion

Issue	Description
Integrated Transport Planning and Land Use	• Development of Master Plans for all three port corporations and intermodal terminals is critical. Issues such as land availability, rail sidings, truck access and container storage need to be explored • Development of additional port infrastructure consistent with appropriate and compatible land use plans including identification of buffers and other related policies (e.g. National Port Strategy) • Determination of a long-term strategy for both cruise and passenger (ferry) vessel berths and terminals including integration with urban developments • Need to facilitate mode shift off roads to rail (40% target for rail – still valid?)
Congested Portside Operations	Key themes of the 2006 IPART review were: • Congestion is causing unnecessary and expensive delays at the port-landside interface • Long term shipping (not landside) contracts are the commercial driver for stevedores • Stevedores' power over access to landed containers has an impact • Lack of transparency in systems through which road carriers gain access to containers
Congested Landside Operations	Congestion at Port Botany and inadequacy of landside infrastructure (roads, rail and intermodal terminals) - noting that growth in trade brings implications for the whole supply chain and infrastructure Improved integration (and capacity) of inter/multi-modal and single mode supply chains – mine to port and port to distribution hubs (and visa-versa)
Meeting Container Growth	Freight task growth (e.g. container trade at typically 2-2.5 times GDP) and a disproportionate rise in import volumes (boxes) and growth on interstate corridors Meeting high levels of container growth particularly import (but also export) boxes through Botany Development of significant additional container handling capacity beyond Port Botany in the longer term
Accommodating Development at Port of Newcastle	Major development of export terminals and berths and channel expansion (length and depth) The NSW Ports Growth Plan identifies Newcastle as the location for the next major container terminal once Port Botany reaches capacity. About 35 hectares at Mayfield Portside Lands has been set aside for this purpose
Accommodating Development at Port Kembla	Continued development of Port Kembla as a 'spill over' or relocation facility for Port Jackson and its role (and timing thereof) as a container port for NSW as Port Botany reaches capacity

Report Outline

- Transport Industry Overview and Current Situation
- Ports and Intermodal
- **Roads**
- Rail

The NSW road network is publicly and privately owned, totals more than 180,000 km of road with the majority of the network length managed by local government

Asset [2]	Extent of Asset
RTA state managed roads	17,984 km
RTA managed regional roads (unincorporated regional areas)	2,970 km
Council managed regional roads	18,257 km
Council managed roads	145,648 km
Traffic signal sites	3811
Bridges and culverts	5071
Tunnels	22

Private Concessions on NSW Toll Roads

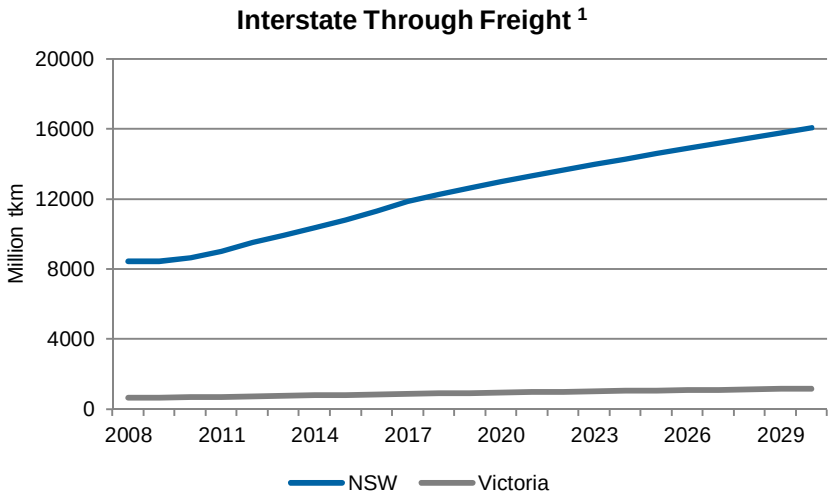
Concession Holder	Motorway	Network Length
Airport Motorway Group	Eastern Distributor	6 km
Transurban/Hills Motorway Limited	M2	21 km
Interlink Roads	M5	22 km
Westlink Motorway Limited	M7	40 km
Sydney Harbour Tunnel Company	Sydney Harbour Tunnel	2.3 km
CCT Motorway Group Holding	Cross City Tunnel	2.1 km

Characteristics

- Roads and Maritime Services owns 26.1% of NSW State government owned infrastructure [1]
- Regional road networks provide access to 27.4% people who reside in regional or remote areas
- Urban networks that make up a relatively small faction of the total road network provide road access to 72.6% of the NSW population [3]
- Non-RTA managed roads (i.e. Council managed roads) account for just under 90% of the road kms in NSW
- Infrastructure owners have responded to increases in the freight task by expanding access to the network for heavy vehicles through the higher mass limits network

[1] NSW Treasury (2011) Infrastructure Statement 2011-12 NSW Budget Paper No.4
[2] RTA (2010) Annual Report 2009-10
[3] ABS (2010) 1379.0.55.001 National Regional Profile, New South Wales, 2005-2009

As a ‘freight corridor state’, NSW will continue to play a critical role in the movement of freight across the State and National road network



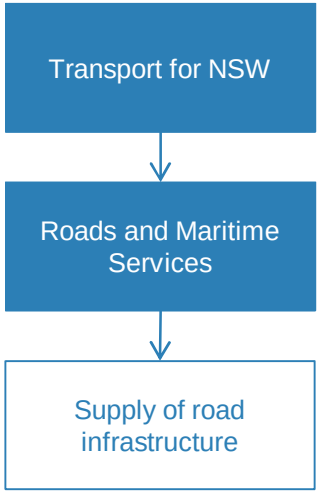
Freight Growth

- NSW is a ‘corridor through state’ where freight travels along inland corridors between the southern and northern Australian states and territories
- Volumes are significantly higher in NSW than Victoria and are expected to continue to increase
- Managing and funding the asset in response to the increasing freight task, particularly in the context of a national network accessed by interstate freight, will be a key challenge for the NSW government

[1] BITRE (2010) Report 121 - Road freight estimates and forecasts in Australia: interstate, capital cities and rest of state

Roads planning is now the responsibility of Transport for NSW while Roads and Maritime Services is accountable for service delivery and asset management

Roads Planning Governance



In April 2011, it was announced that strategic planning in the NSW transport sector would be the responsibility of Transport for NSW with the transport entities being responsible for service delivery

Transport for NSW Planning [1]	
Document	**Objectives**
Strategic and Business Plans	Identifies high level direction for the NSW road network
Roads Program	Identifies maintenance and capital investment by urban and regional areas
Total Asset Management Approach	Provides an approach to asset management
Project and Work Plans	Provides detailed project timelines and funding approaches for significant investments in capital and maintenance

[1] RTA (2010) Annual report 2009-10

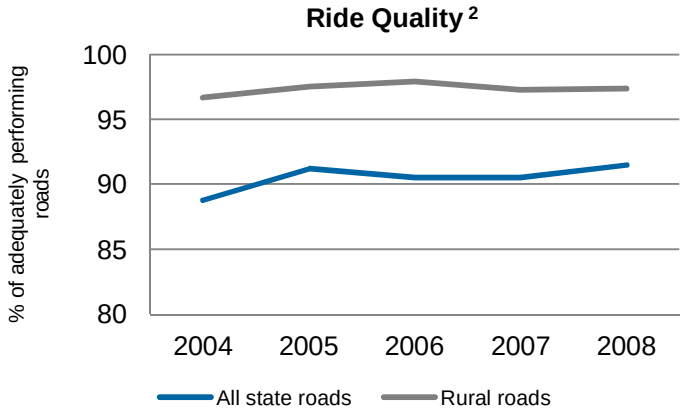
The overall physical condition of State roads appears to be improving with rural roads performing better than other State roads

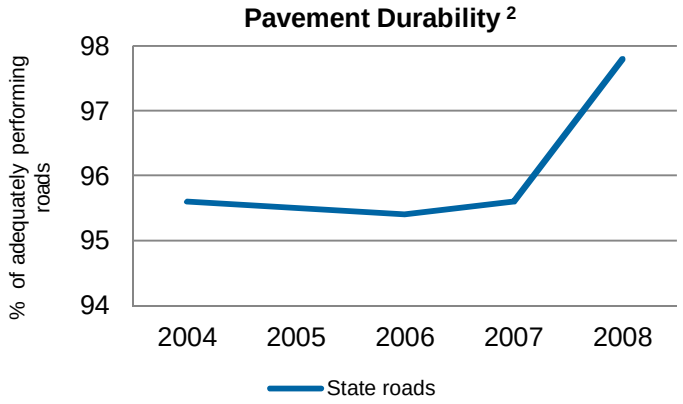
Definitions

- Ride quality – Measures the undulations in the road, smother roads lead to less wear and tear costs experienced by the user
- Pavement durability – Measures amount of surface cracking, plays an important role in the safety of the road, deterioration accelerates if road surface is cracked
- State roads – The primary network of principal traffic carrying and linking routes for the movement of people and goods within the State's urban centres
- Rural roads – Provide travel between smaller towns and districts [1]

Trends and Regional Variations

- Condition of NSW roads varies between urban and rural areas
- Rural roads are typically in better condition given lower usage and less freight traffic
- Maintenance programs have contributed towards improved network conditions state wide, which are reflected in key in improved ride quality and pavement durability
- The graphs show a general upward trend in adequately performing roads for ride quality and durability
- The ride quality graph also suggests that rural roads perform on average higher than all state roads

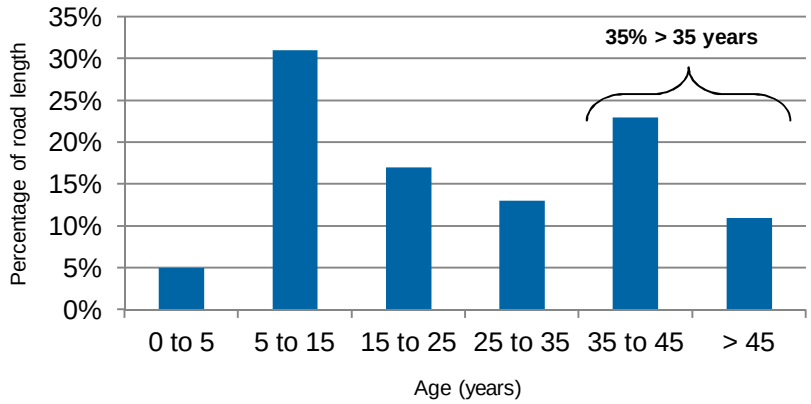




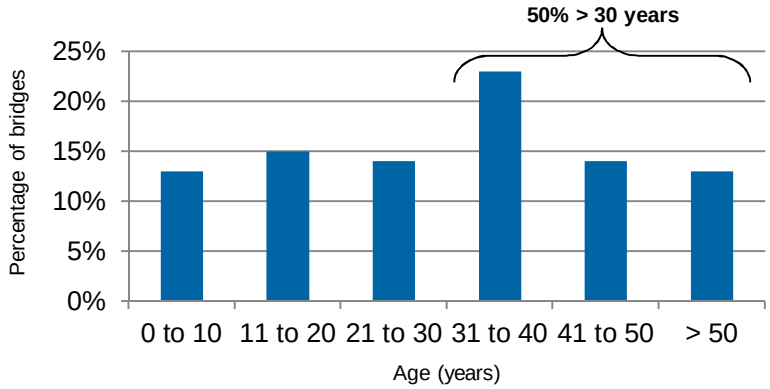
[1] Ausroads (2011)
[2] RTA (2009) Condition of NSW state roads: update September 2009

The road and bridge asset base is ageing with over 30% of roads over 35 years and 50% of bridges over 30 years – ensuring effective ongoing maintenance will be an important issue

Road Age Profile [1]



Bridge Age Profile [1]



Characteristics

- 35% of road pavements are greater than 35 years old
- 50% of bridges are greater than 30 year of age, with 82 greater than 100 years old
- Expected life of bridges is no greater than 100 years, unless it's a high value bridge [1]
- This would imply that maintenance and replacement expenditure will continue to increase into the short and medium term future
- Timber bridges are a distinguishing feature in NSW road assets, predominantly owned by local governments (LGA) they also pose a considerable cost burden
- The Timber Bridge Partnership presented a 50:50 funding opportunity to LGAs with the state Government. The conclusion of the project saw the replacement of 172 bridges across 57 LGAs

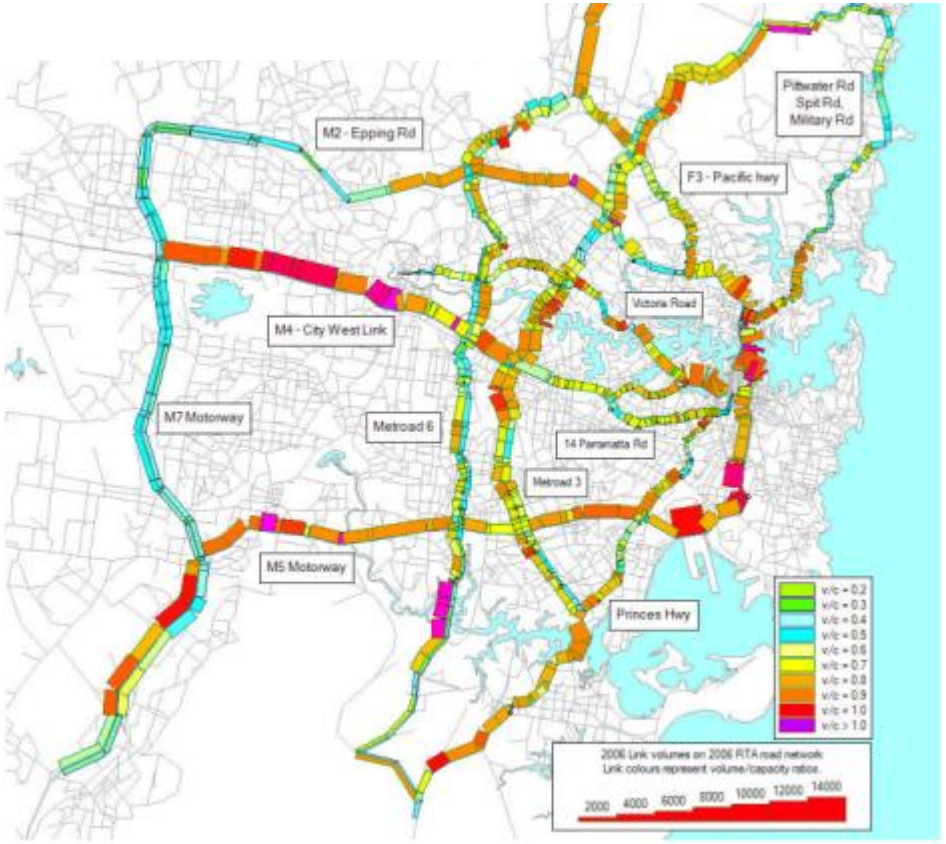
[1] RTA (2009) Annual Report 2009-10

While the overall physical condition of the Metropolitan road network may be improving, service quality is deteriorating due to rising congestion particularly in urban areas

Current Network Capacity

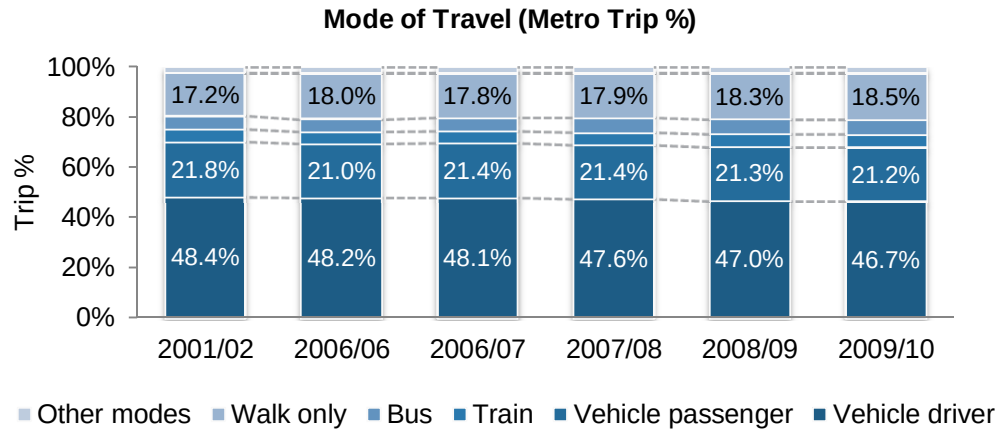
- The map the highlights areas of congestion on Sydney's roads
- Corridors highlighted yellow, blue and green indicate roads with a capacity ratio under 0.7. This capacity ratio implies that traffic speeds and journey times are generally acceptable [2]
- Orange segments indicate that journey times and speeds are unreliable, accidents begin to occur and impact on congestion
- Red and purple sectors experience a significant slowing of speeds, potentially to a stand still
- It is clear that the major trunk roads, the M5 and M4, which connect the densely populated areas of Sydney's west and south west experience significant capacity constraints
- The diagram also highlights the restrictions in the freight precincts, around Port Botany, and corridors

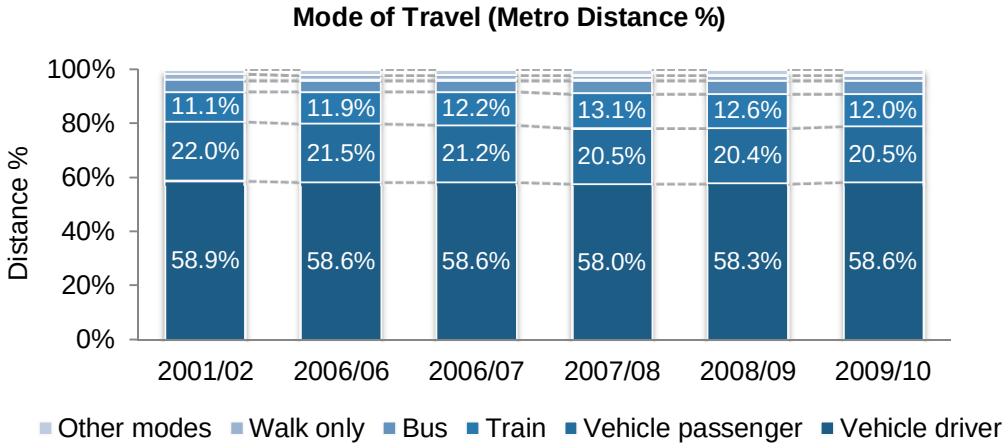
Volume Capacity Ratios on Major Sydney Roads, 2006 [1]



[1] NSW Government (2008) Infrastructure Audit Submission to Infrastructure Australia
[2] Territory and Municipal Services (2008) ACT Light Rail

Car usage continues to represent ~80% of the transport mode share, leading to a significant consequential cost of congestion



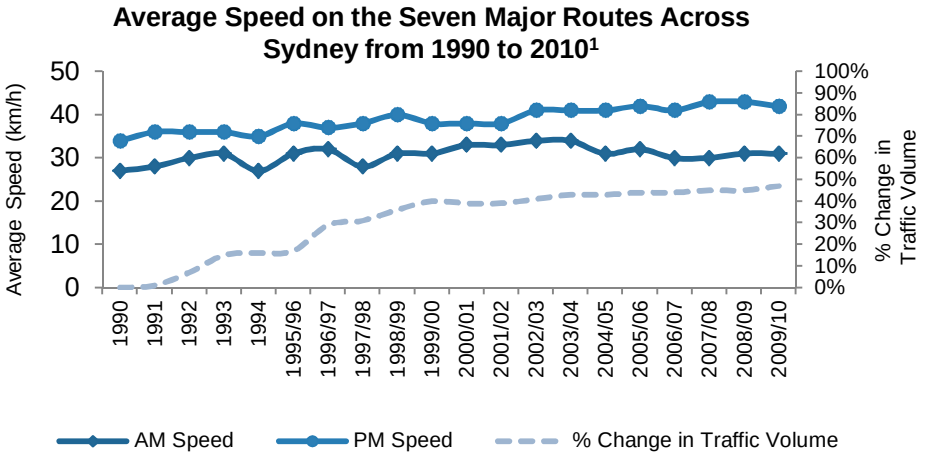


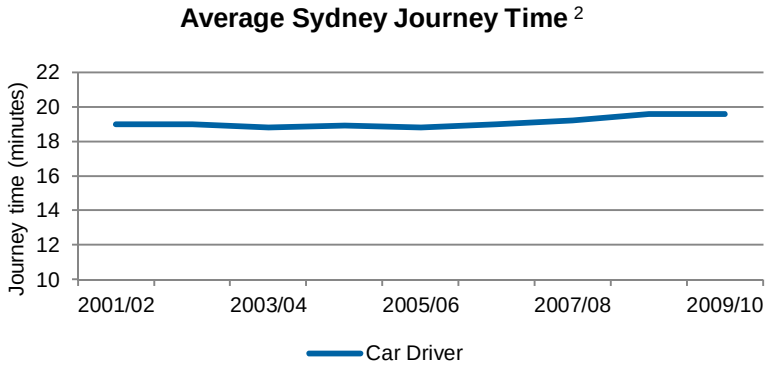
Discussion

- Sydney's congestion cost is the highest in Australia when compared to other major urban cities [1]
- Avoidable costs of Sydney's urban congestion are forecast to reach $7.8 billion per annum by 2020
- Annual vehicle kilometres travelled continues to increase and is forecast to rise another 23% by 2020
- Private car usage represents ~80% of all transport trips in Sydney
- While there has been some shift to active modes, car is by far the dominant mode
- Car trip lengths are also increasing

Source – Bureau of Transport Statistics 2009/10 Household Travel Survey Summary Report, 2011 Release
Key transport indicators for residents of the Sydney Statistical Division
[1] BITRE (2007) Estimating urban traffic and congestion cost trends for Australian Cities: Working paper 71

Average road speeds and journey times in Sydney appear to be stable, however volumes have grown by ~50% over the last 20 years



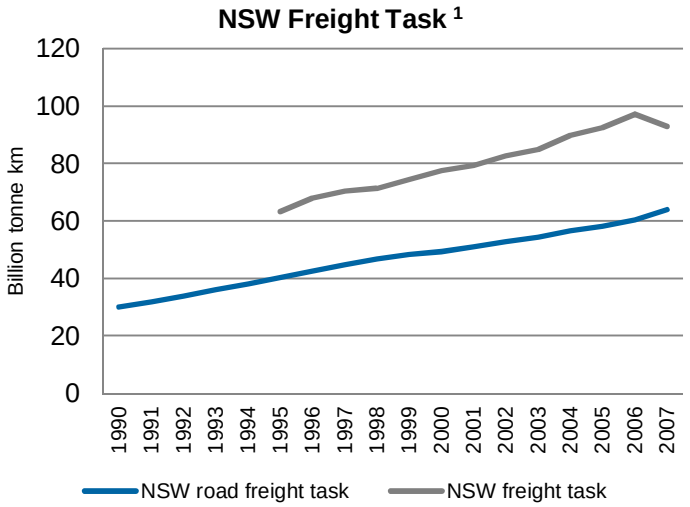


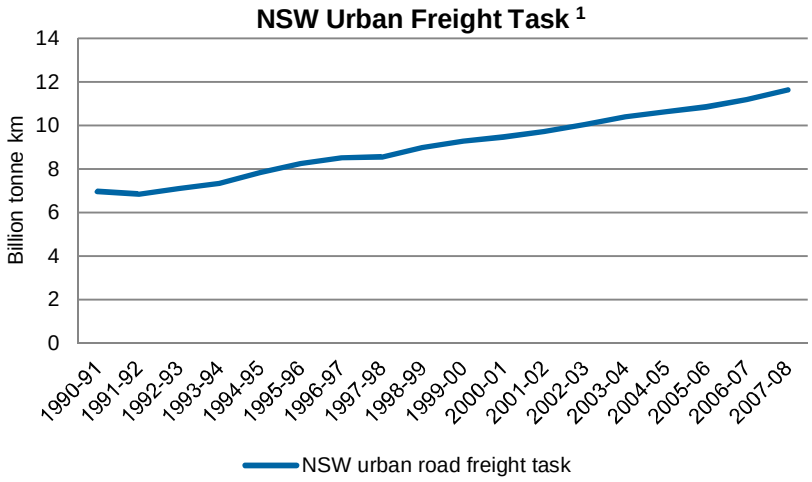
Indicators of Congestion

- Average road speeds and journey times provide an indication of the level of network congestion
- Average road speeds appear to be steady (approximately 30 km per hour in the morning peak and 42 km per hour in the afternoon peak)
- Since 2007/08, journey times have plateaued which coincides with the recent slowing in Gross State Product, a possible response to the global financial crisis

[1] RTA - Annual Speed and Traffic Volume Data in Sydney (note series change in 1994)
Note – Seven Major Routes include F3, M2, M4, M5, Pittwater Road, Princes Highway, Victoria Road
[2] Bureau of Transport Statistics (2011) 2009/10 Household Travel Survey: Summary report 2011 release

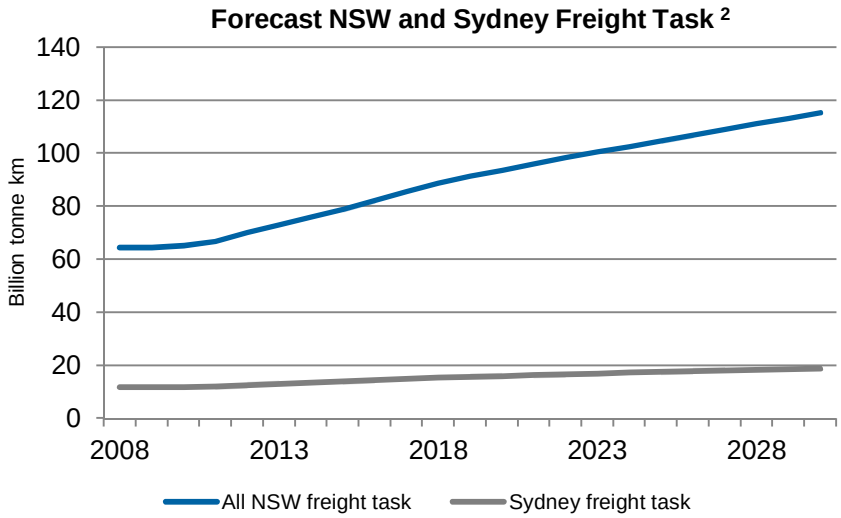
The NSW freight task continues to grow with the majority of freight moved by road





Increasing Freight Task

- Upward trends in in both the overall and urban NSW freight tasks is evident from BITRE data shown in all three graphs
- Forecasts confirm that this trend is expected to continue
- NOTE: Although the growth in articulated trucks is expected to continue on a strong growth path, the overall vehicle numbers on the road are relatively small in comparison to light commercial and passenger vehicles (BTRE, 2007)



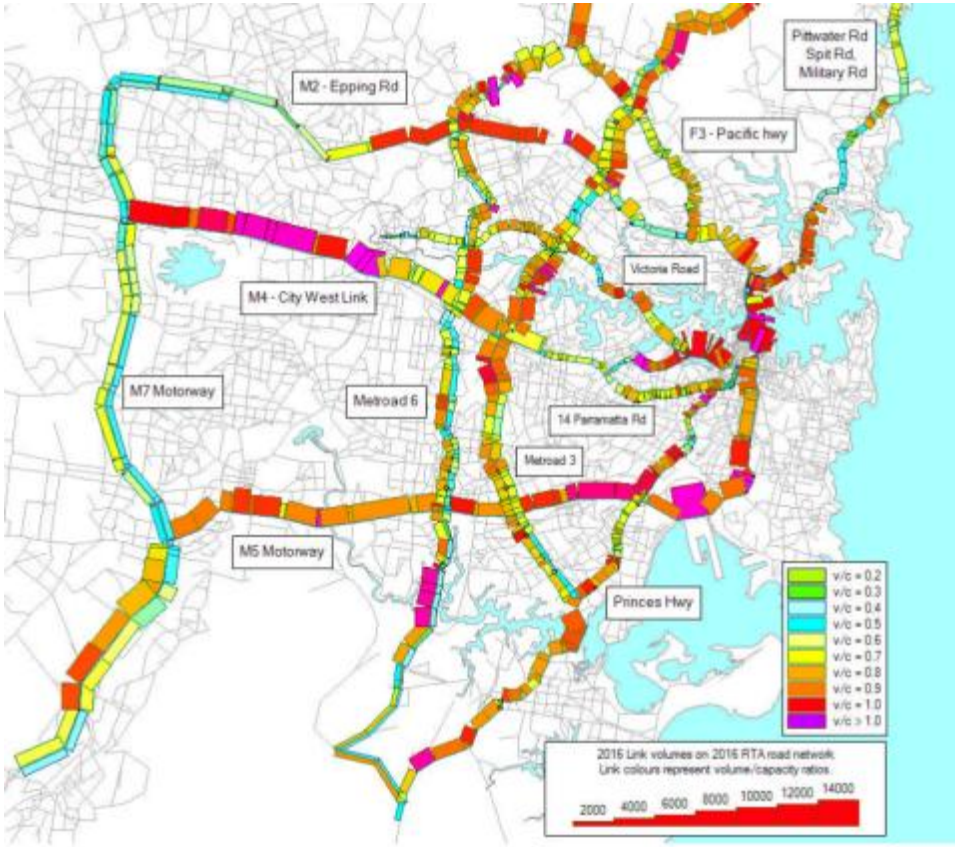
[1] BITRE (2011) The Australian Infrastructure Yearbook
[2] BITRE (2010) Report 121 - Road freight estimates and forecasts in Australia: interstate, capital cities and rest of state

Urban congestion is forecast to continue to increase across the Sydney region

Future Network Capacity

- The future volume capacity ratios in the Sydney region are forecast to increase across the whole network
- Roads connecting the north-west and south-west population growth centres will continue to experience unreliable travel times and increases in road incidents
- Roads around freight precincts, Port Botany and industrial centres to the west of the CBD, will suffer from significant congestion and unreliability
- Some relief may be provided in the medium term with the completion of projects aimed at capacity increases on the M2/M5/F5

Future Volume Capacity Ratios on Major Sydney Roads, 2016 [1]

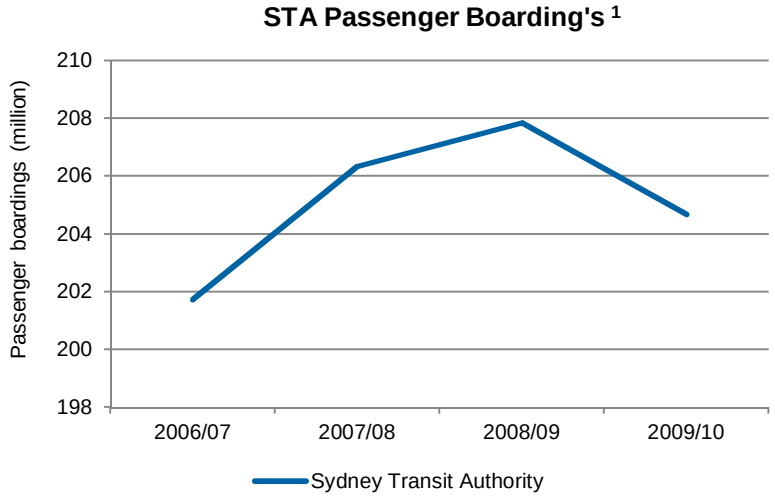


[1] NSW Government (2008) Infrastructure Audit Submission to Infrastructure Australia

Demand management could play a role in managing scarce road capacity and increasing public transport use can help in accommodating growth in trips that would other wise have been on roads

Example – Sydney Bus Network

- There is currently 133 km of bus lanes managed by Roads and Maritime Services in NSW, with bus services provided by the Sydney Transit Authority [1] and other private bus operators such as Forrest Coaches and Hills Buses
- The bus network consists of two different types of bus lanes: Bus lanes which other select vehicles such as taxi's and motorcycles can use; and bus only lanes
- The network applies time restrictions on suitable areas of the network i.e. City-bound bus lanes operate in the peak AM
- Bus fleet numbers are set to increase which will have implications for supporting infrastructure such as bus depots and the road network [2]
- There may be opportunities to restructure the bus network in Sydney to free up additional capacity. There are a number of bus routes which funnel buses into the Sydney CBD which can become congested particularly in peak periods. Additional data has been requested to further explore this issue



[1] STA (2010) State Transit Proactive release of performance information 2009/10 financial year
[2] NSW Treasury (2011) Infrastructure Statement 2011-12 NSW Budget Paper No.4

There are a number of infrastructure and non infrastructure initiatives that can improve capacity

EXAMPLES

Infrastructure Solutions [1]

Pacific Highway

Upgrades and road lane duplication to improve travel times, road safety and freight efficiency

Hunter Expressway

Various upgrades to cut travel times, relieve and reduce congestion

Hume Highway

Continued work on various bypasses to improve the efficiency of freight movement and the bypass will improve road safety in effected towns

M2/M5/F5

Widening activities to increase capacity and improve travel times

Great Western Highway

Increases in length of dual carriageway to reduce travel times

Princes Highway

Bypasses, upgrades and realignments to reduce travel times and vehicle operating costs

Central Coast

Continued carriageway widening to improve capacity

Bus Priority Lanes

Investigations in the feasibility of Bus Rapid Transit in the Northern Beaches

Non Infrastructure Solutions

Efficient/Effective Use of Assets

- **Managed Motorways -** Uses data collection and control tools such as: traffic lights on motorway on ramps, hard shoulder running, variable speed limits and traveller information services allows increases in reliability and creates travel time savings, providing more consistent motorway management. Such investment is typically used to combat congestion. Existing NSW schemes include the M4 and Sydney Harbour Tunnel in the Sydney metropolitan region

Travel Demand Management

- **Passenger Mode Shift -** The development and enhancement of public transport services in terms of reliability, accessibility and adequate facilities to make public transport more desirable
- **Freight Mode Shift -** The National Land Freight Strategy is currently being developed by Infrastructure Australia and the National Transport Commission to address the rapidly growing road freight task. The transfer of freight from road to rail has also been identified as a medium to long term solution
- **Road Pricing** (as part of a comprehensive travel demand management strategy for greater Sydney). Road pricing is already being used on private motorways in the Sydney region with time of day pricing being used on infrastructure such as the Sydney Harbour Bridge. The feasibility of a more wide spread road pricing system is currently being explored by the COAG Road Reform Plan for heavy vehicles

[1] NSW Treasury (2011) Infrastructure Statement 2011-12 NSW Budget Paper No.4

NSW road network performance is measured by a number of physical quality and service quality indicators – all showing overall improvement over time

Physical Quality Indicators

Ride Quality

- Measures the undulations in the road, smother roads lead to less wear and tear costs experienced by the user
- Data shows improvement across all state roads, regional and urban
- Rural roads on average perform better than urban roads

Pavement Durability

- Measures amount of surface cracking, plays an important role in the safety of the road, it's strength and durability, deterioration accelerates if road surface is cracked
- Pavement durability has dramatically increased since 2007

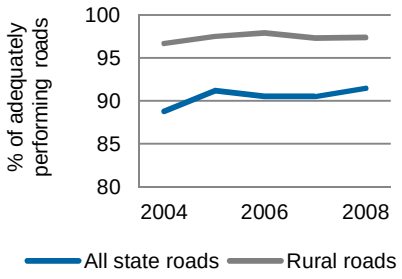
Service Quality Indicators

Reliability

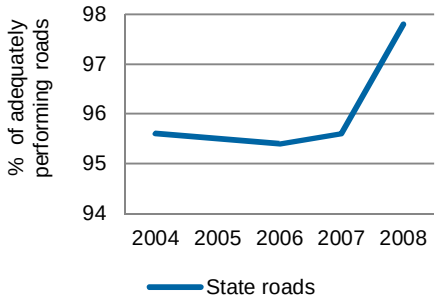
- Measures journey speed (time)
- Minor improvements in road speed have been made however the general trend is a plateauing effect

Safety

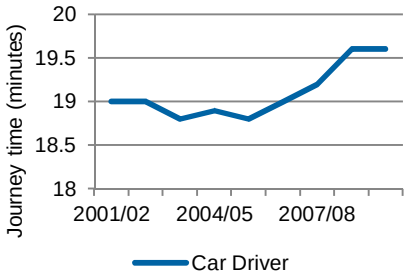
- Records trends in road injuries and fatalities
- Safety appears to be improving with a decrease in road fatalities since 2002 of 19%



RTA (2009) Condition of NSW state roads: update September 2009



RTA (2009) Condition of NSW state roads: update September 2009



Bureau of Transport Statistics (2011) 2009/10 Household Travel Survey: Summary report 2011 release

There are a number of key issues that warrant further investigation and discussion

Issue	Description
Integrated Planning	• Need a holistic integrated approach to road infrastructure planning that includes land use, economic, social and environmental issues as well as other transport modes • How resilient is the network? • How does the road network respond to emerging industries eg - Coal mine and other mining activities in the state?
Alleviating Congestion Through Infrastructure and Non Infrastructure Solutions	• The physical quality of State roads may be improving, but service quality is deteriorating due to rising congestion - particularly in freight precincts (eg - Port Botany and Airport) and on major motorways (eg - M5) and at a number of important junctions/ intersections • Need to explore non infrastructure solutions/ policy levers to alleviate congestion such as a comprehensive travel demand management strategy which includes pricing mechanisms, travel behaviour change, Transit Oriented Developments, public transport initiatives • Continue to undertake remedial works on 'pinch points' across the road network as well as lane capacity / widening in urban areas and passing opportunities in rural areas • Development of additional bus priority and related measures (bus lanes extensions – physical and time of operation, extension of clearways, tidal flows arrangements, other general road works such as interchange improvements)
Managing Maintenance	• Maintenance of and upgrading ageing infrastructure will be a key challenge and an increasing expense (bridges, road asset) • Continuation of Timber Bridge Partnership with local government to meet replacement target • Maintaining high level of pavement performance (roughness and durability) via targeted effective maintenance regimes
Road Safety	• Need more information on road safety performance • What impact are new road upgrades having on road safety incidents?

Report Outline

- Transport Industry Overview and Current Situation
- Ports and Intermodal
- Roads
- **Rail**

There are 3 'below rail' track operators and 3 'above rail' passenger train operators in NSW where freight trains are privately operated

NSW Rail Network [1]

NSW Below Rail and Above Rail Coverage

'Below rail' track operators are:

- **Country Rail** (regional NSW and grain networks)
- **Australian Rail Track Corporation** (regional NSW, interstate and Hunter Valley)
- **RailCorp** (metropolitan network servicing Sydney, Newcastle, Wollongong and Lithgow)

'Above rail' passenger train operators are:

- **CountryLink** (CRN network)
- **CityLink** (RailCorp network)
- **Great Southern Rail** (long distance interstate)

'Above rail' freight train services are all privately operated. The three main operators are: **Pacific National, QR National, Patrick PortLink**

[1] Rail Infrastructure Corporation (2010) Annual Report, p8

The NSW passenger and freight rail network comprises the Metropolitan, Country, Interstate and Hunter networks which span 9,605 track kilometres

Asset	Owner	Extent of Asset
Metropolitan Network	Owned and managed by RailCorp	1,440 km [2]
NSW Interstate	Owned by Country Rail Infrastructure Authority (CRIA)	2,190 km [1]
Hunter Valley Network	Owned by Country Rail Infrastructure Authority (CRIA)	450 km [1]
Country Regional Network (CRN)	Country Rail Infrastructure Authority (CRIA)	5,525 km [1]
Total		9,605 kms

General Information

- All networks in NSW are standard gauge
- This is not consistent with the majority of track in other Australian states which operate on broad and narrow gauge
- NSW Government policy provides reasonable priority to passenger services

[1] CRIA (2011) Country Rail Infrastructure Authority 2011
[2] NSW Government (2007) Five Yearly Infrastructure Report to the Council of Australian Governments

The Metropolitan Network spans the Sydney metropolitan area, is owned and managed by RailCorp and provides access to City Rail passenger services and freight operators

Characteristic [1]	Metropolitan Network
Areas	Sydney metropolitan area, Central Coast, Blue Mountains and Illawarra lines
Track length	1,400 km Passenger and freight network
Stations	377
Tunnels	70 km
Bridges	1,141
Total asset value	> $19 billion

CityRail Network Map [2]

Source:

[1] Railcorp (2011) Corporate Plan 2011-16
[2] CityRail (2011) http://www.cityrail.info/stations/network_map

The public entity CountryLink operates passenger services over four regions throughout regional NSW while rail freight services are privately operated

CountryLink Network Map [1]

Passengers, General Freight and Grain

The Country Rail and ARTC networks cover regional NSW and provide important links to intermodal terminals, regional towns, and the grain belts of NSW

Passenger train services are provided by CountryLink on three main routes:

- **North Coast** to Brisbane
- **North Western** to Moree/Armidale
- **Western** to Dubbo/Broken Hill
- **Southern** to Canberra/Melbourne

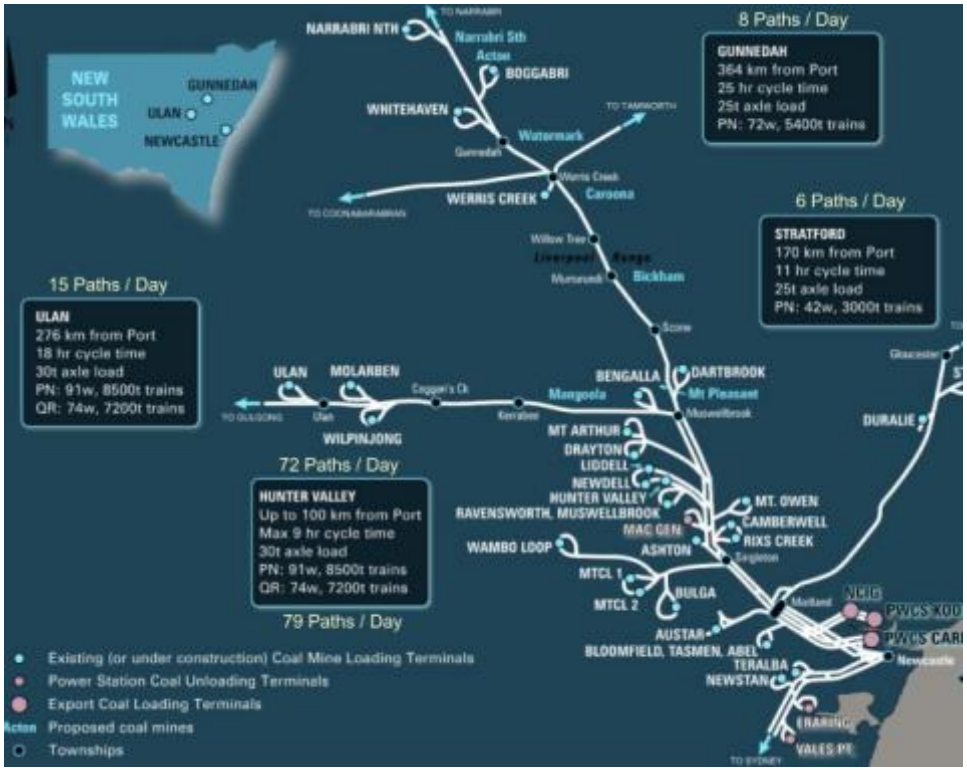
Freight train services are provided by private operators that connect with privately operated intermodal terminals

The NSW Grain Freight Review (Australian Government 2009) found that the 'long period of uncertainty surrounding the fate of the branch line network has contributed to missed or delayed opportunities for related private investment and economic development.'

[1] CountryLink(2011) http://www.countrylink.info/timetables/network_map

ARTC operates the 'below rail' track for the Hunter Valley Coal Chain Coordinator (HVCCC) which is used by private operators Pacific National and QR National

HVCCC Network Map

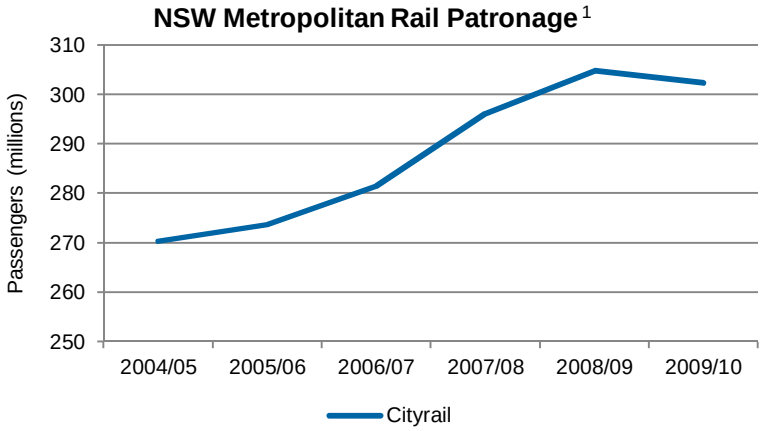


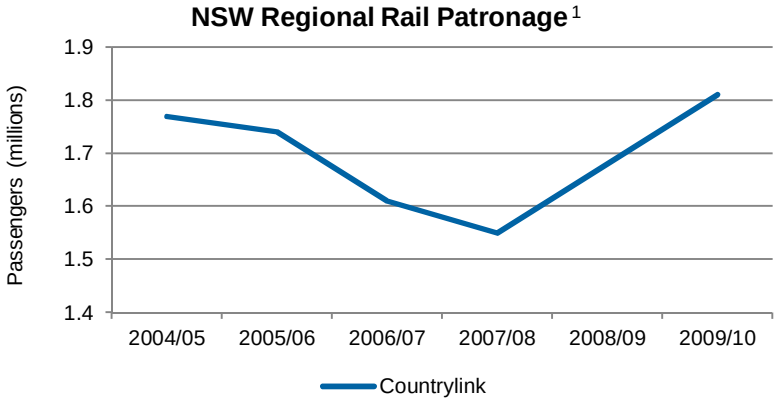
HVCCC and ARTC Coal Network [1]

- The HVCCC plans and co-ordinates the co-operative daily operation and long term capacity alignment of the Hunter Valley Coal Chain
- Spread over 450km and growing, HVCCC is driven by the need to export very large coal volumes from a very concentrated network. Complexity is compounded by the fact that there is no more than two weeks visibility on how many vessels are arriving and from which mines the coal needs to be transported
- The ARTC network provides for 3 large train haulage operators and 2 smaller train haulage operators (45+ trains / 16,000 trips per year)
- The ARTC network currently provides the following number of paths per day:
  - 72 paths for Hunter Valley (30t axle load)
  - 15 paths for Ulan (30t axle load)
  - 6 Paths for Stratford (25t axle load)
  - 8 paths for Gunnedah (25t axle load)
- Future planned track upgrades include
  - 2012 Minimbah to Maitland third track
  - 2013 Nundah Bank/Hexham relief roads
  - 2014 Muswellbrook Junction
  - Staged Gunnedah Line/Liverpool Range

[1] Korean Business Forum (2011) Presentation to NSW Government

The rail network of NSW needs to accommodate growth in both the urban and regional markets, however the urban task far outweighs the regional task





Discussion

- General trends indicate rail passenger patronage is increasing across the metropolitan and regional rail networks
- With Government policy aiming to direct a higher proportion of the freight task onto rail, passenger services will face increasing competition for rail paths
- Physical rail infrastructure will be placed under greater strain due to the increase in services with higher payloads

[1] Railcorp(2010) Annual report 2009-10

There are a number of organisations responsible for rail network planning in NSW

Metropolitan

- Metropolitan network planning is the responsibility of Transport for NSW (which includes Transport Construction Authority)
- RailCorp is responsible for service delivery and asset management

Country Regional

- The Country Rail Infrastructure Authority is responsible for rail network planning on the Country Regional Network

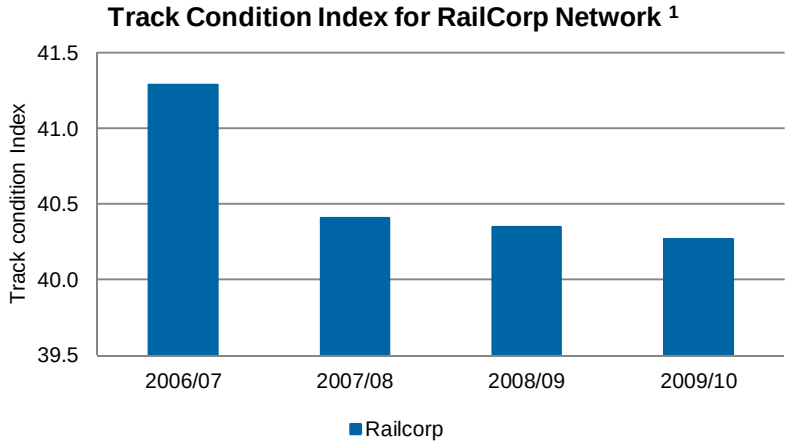
Interstate

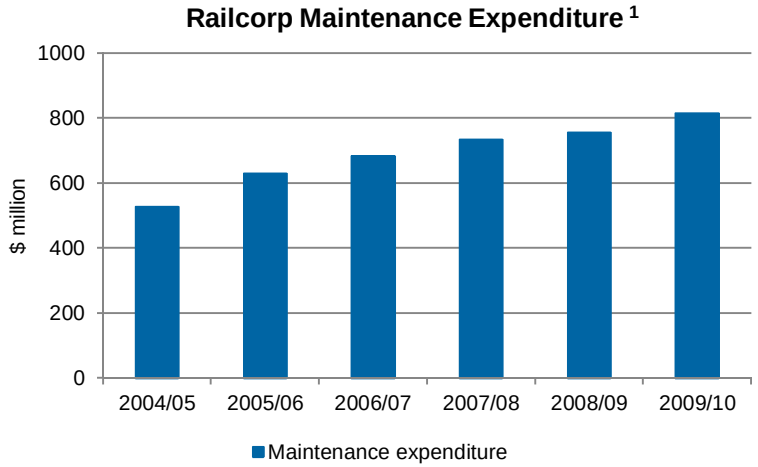
- Interstate network planning is the responsibility of the Commonwealth and State governments (through the Country Rail Infrastructure Authority in NSW)
- The Australian Rail Track Corporation (ARTC) was formed in 1997 after the Commonwealth and State Governments agreed to a national approach for interstate rail access
- ARTC plays a key role in the management and operation of the network

Hunter

- The Hunter coal network is part of the ARTC leased network
- The Hunter Valley Coal Chain Coordinator plans and co-ordinates the co-operative daily operation and long term capacity alignment of the HVCCC
- HVCCC is driven by the need to export very large coal volumes from a very concentrated network in short time periods

Based on a measure of overall track condition, the Metropolitan Network is rated as 'good'



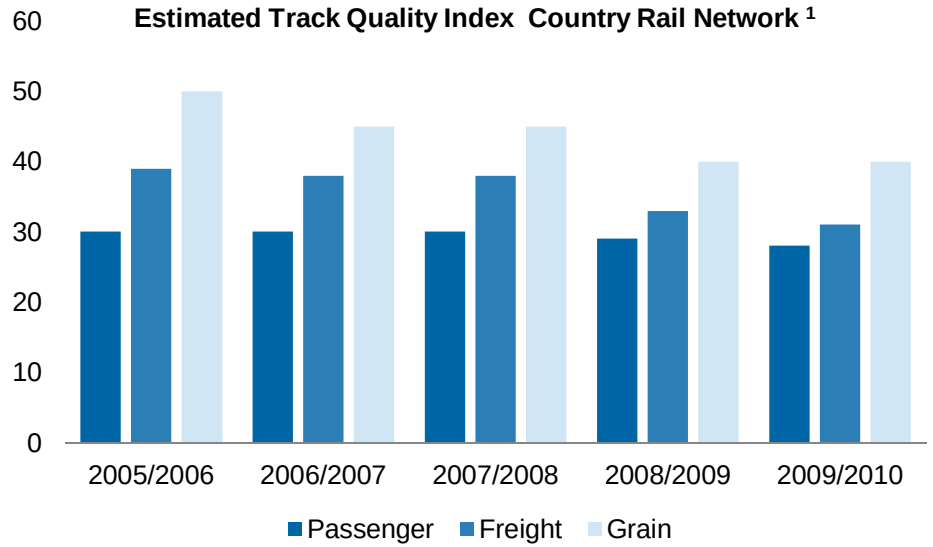


Track Condition Index

- Track Condition Index (TCI) provides an indication as to condition of the physical below rail infrastructure
- The lower the index the better the condition
- A TCI of 45.00 indicates an acceptable score
- A TCI of 40.00 or below reflects very good condition
- Railcorp TCI data indicates that the track condition is improving
- This appears to reflect the upward trend in maintenance spend by Railcorp and the completion of track upgrade works
- 2009 saw the completion of 63 km of track reconstruction to replace timber sleepers with concrete and 94.5 km of replacement track to reduce the risk of faults

[1] Railcorp(2010) Annual report 2009/10

The Country Rail network (in particular, the grain network) has severe speed limit restrictions and low axle load limits impacting transit times and gross train sizes (weight)



NSW Grain Rail Network Speed Restrictions	
Class 5 Track	Class 3 Track
55%	45%
40 km/h speed limit	70 km/h speed limit
19 tonne axle load	19 tonne axle load

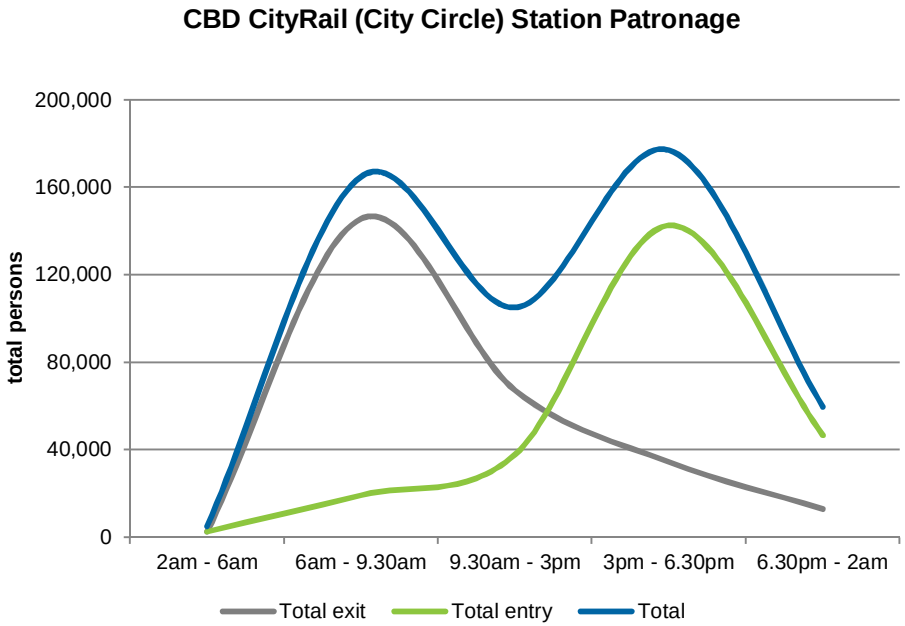
Passengers, Freight and Grain Rail

- The condition of the Country Rail network is significantly worse than the metropolitan network. The network was constructed in the late 1800's and now has severe operating speed limits and axle load limits
- 55% of the grain rail network is Class 5 Track which is limited to 40km/h speeds and 19 tonne axle load limits. Many of these lines are further restricted to 20km/h because sleepers on the branch lines are timber and there are also many timber bridges. Temporary speed restrictions (TSRs) on the grain network are stable but remain high (RIC 2010)
- Where axle loads are low, train sizes can "max" on weight before length (subject to passing loop lengths)
- Train length is 'typically' dictated by length of passing loops where the smallest loop length can dictate train length on a particular route
- Passenger trains operate on higher quality sections of the network meaning travel times are faster and more reliable than general freight and substantially more reliable than the grain rail network
- Over half the Country Rail network is not operational (3,139kms). However, this is not entirely due to the condition of the asset. Due to volatile annual grain volumes and geographically dispersed assets, the grain network is costly to maintain and service provision is not always commercially viable
- Country Rail is investing $140m though ARTC to upgrade track conditions thereby improving rail freight coverage, capacity and reliability

[1] Rail Infrastructure Corporation (2010) Annual Report 2009/10

Note – Track Quality Index excludes lines operated and/or leased by ARTC

The CBD metropolitan passenger network is characterised by concentrated peak demand periods very 'typical' of a commuter railway

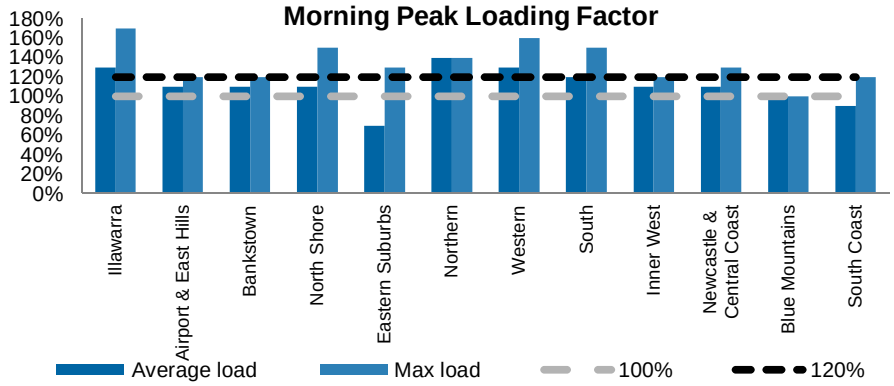


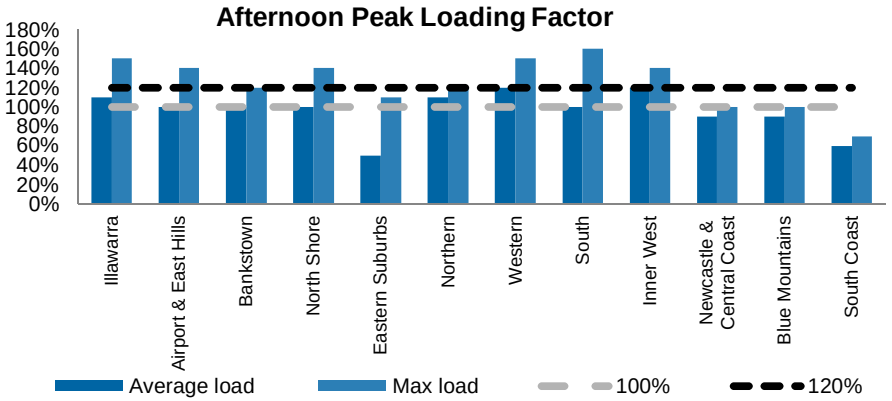
Peak Travel

- The figure shows the total number of passengers that enter and exit to and from CityRail stations in the Sydney CBD at different times of day
- The metropolitan passenger network experiences two highly concentrated peak demand periods during the week as commuters travel to and from the Sydney CBD
- In the morning peak, the major flow is from suburbs to the City
- The pattern reverses during the afternoon peak when the flow is from the City to suburbs

CityRail (2008) A Compendium of CityRail Travel Statistics

Peak rail services operate well above capacity in terms of passenger loads per train service





Discussion

- 61% of all train trips by Sydney residents are made during the 'peak'. The 'peak' is defined as train trips arriving at the destination between 6.00am and 9.30am or departing between 3.00pm and 6.30pm on an average weekday (BTS, 2003)
- The loading factor is used as an indicator of the capacity of CityRail network with respect to meeting demand. Periods where the average peak load is above a reasonable target indicates periods of insufficient 'above rail' capacity – typically in peak commuter periods of weekdays and wide spread across the CityRail network
- 'Below rail' investments are part of the solution to capacity short-comings in the term of additional train paths via additional track; upgraded signalling and other measures

CityRail (2011) http://www.cityrail.info/about/our_performance
Note – 100% capacity = every seat is taken; 120% 11-12 people standing in each vestibule

The growing demand for passenger services in the Metropolitan area will have significant implications for the efficient movement of freight where it shares the network (or interfaces) with passenger services

- The anticipated growth in the volume of containerised freight moved by rail will place more pressure on existing rail arrangements.
- In the Metropolitan network, freight is prohibited on the network during peak commuting period and where freight trains share the network, priority is given to passenger services
- This represents a significant constraint to rail freight efficiency, particularly during the peak commuter hours and hence curfews prevent any activities by freight trains on the metropolitan network
- As a consequence of these constraints, reliability decreases from 80% to 30% between Newcastle and Sydney and 60% to 40% between Macarthur and Sydney
- The majority of Sydney's existing intermodal terminals are located on the shared passenger rail network rather than on dedicated freight lines
- The NSW Government has highlighted the need to shift freight transport from road onto rail, which puts further stresses onto the already limited capacity
- On the ARTC leased network, speed limitations are imposed to most of the freight operations
- The expansion of the intermodal freight terminal network in Sydney at locations such as Enfield and the proposed new developments planned for Moorebank, for example, will increase pressures on the overall rail network (and adjoining roads) unless capacity elsewhere in the supply chain is provided

[1] Sydney Ports Corporation (2010) Annual Report 2009/10; Sydney Ports Corp – Port Freight Logistics Plan

There are a number of capacity and congestion relief programs underway including RailCorp's Clearways program and freight network enhancements

Infrastructure

South West Rail Link
11.4km dual track extension with 2 new stations, station upgrades, commuter car parks and vehicle stabling facilities
North West Rail Link
New rail link to the north west growth centre
Commuter Car Parks and Interchanges
Car parks and interchanges across the Cityrail network
Country Regional Rail Network
Steel re-sleepering and bridge renewals
Southern Sydney Freight Line
Currently under construction by ARTC this 30 kilometre dedicated freight line is located in the existing rail corridor between Macarthur and Sefton. The SSFL is expected to increase the efficiency of the whole eastern seaboard rail freight network.
Northern Freight Line
Set of initiatives to increase the capacity and reliability of passenger and freight train services on the Main North Line between Sydney and Newcastle. It is expected to reduce the delays resulted from freight and passenger trains competing for the track between Sydney and Newcastle.
Port Botany to Enfield Freight Line
Range of initiatives to ensure supply can cater for future demand

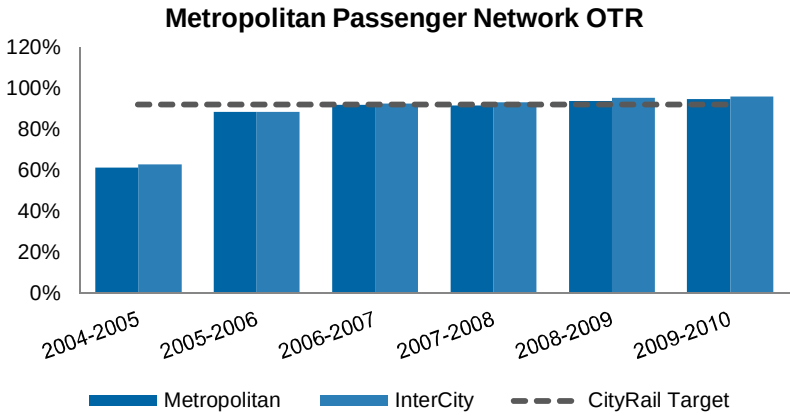
Non Infrastructure

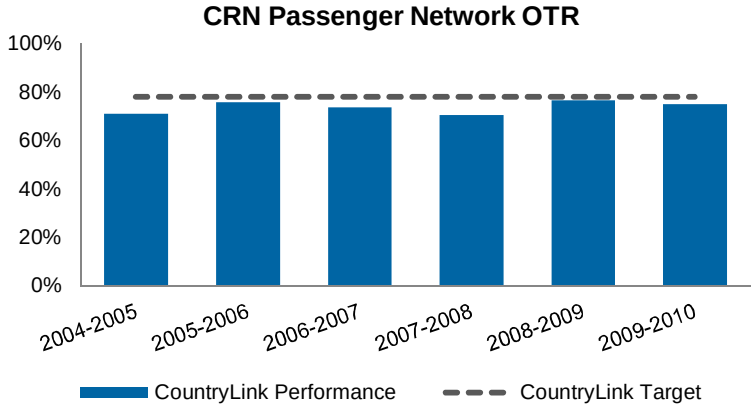
Automatic Train Protection (ATP)
Accidents such as Amagasaki in Japan (107 deaths) or Waterfall in NSW (7 deaths) are examples in which the train speed was higher than the safe speed for track conditions. Automatic Train Protection (ATP) is a system that relays signal information, track speed information and other track information to trains, and can automatically slow or stop trains if they exceed the track speeds or approach signals at STOP at too high a speed. It will also stop trains that pass a signal at STOP unless a specific procedure is followed. Its implementation was a recommendation of the Special Commission of Inquiry into the Waterfall accident.

RailCorp's Clearways

At a total estimated cost of $2 billion, the Clearways project is aimed at improving reliability and increasing capacity on the CityRail network by 'removing bottlenecks and junctions, reducing congestion and delays, minimising the impact of incidents at network levels (CityRail 2010). During 2009-10 a number of project were progressed (Cronulla branch line duplication; Sutherland-Oatley-Loftus area resignalling; Kingsgrove to Revesby quadruplication; Richmond line duplication

From a passenger perspective, the performance of rail networks is largely focused on 'On Time Running' which can be influenced by both 'above rail' and 'below rail' performance





Performance

- OTR is the key service reliability indicator for the passenger rail network and measures the percentage of services arriving on time
  - Metro target – 92% of metro services arriving within 5 minutes
  - Country target – 78% of country services arrive within 10 minutes of the scheduled arrival time
- While OTR appears to be close to or meeting the target of 92%, it is important to note that the performance threshold was changed in 2004-05 (formerly metro services needed to arrive within 4 minutes)
- OTR performance can be influenced by 'above' or 'below' rail factors:
  - 'Above rail' factors – such as passenger or staff illness or injuries, slow passenger boarding times, vandalism
  - 'Below rail' factors – such as signal, track, level crossing or point problems; extreme weather such as storms and heat waves
- 'Below fail' failures or poor infrastructure performance can lead to poor OTR

CityRail (2011) http://www.cityrail.info/about/our_performance

There are a number of rail infrastructure issues that require further investigation and discussion

Issue	Description
Integrated Planning and the Role of Rail in the Transport System	• Determination of role for LRT (on-street and dedicated alignments) in the greater Sydney context and whether applicable in other major urban centres • Determinate role of rural / regional pax rail services – and developing infrastructure to meet needs to attain performance metrics able to deliver mode shift including reliability (e.g. reduction in TSRs) • Determination of the role of rail in key agriculture sector markets – in particular, grain – and the challenges that task volatility year-on-year means for rail infrastructure / grain network with focus on improved 'below rail' performance / reliability and investments to grow mode share
Accommodating Growth	• Accommodating growth in urban rail demand – emerging new population centres; mode shift to PT; dealing with over crowding and operational issues associated with infrastructure performance (e.g. service reliability impacted by 'below rail' failures • Accommodation of growth in coal – in terms of volumes and geographical spread of network(s) (e.g. beyond the Liverpool Ranges and into the Namoi Basin) and developing interfaces with port facilities
Alleviating Congestion Through Infrastructure and Non Infrastructure Solutions	• A key issue / challenge will be 'accommodating' more freight on rail whilst also operating more peak and off peak Pax trains on what is in many parts a 'shared ' railway • Continue with on-going implementation of Clearways Program
Encouraging Mode Shift to Rail	• Developing 'attractive' intercity services underpinned by infrastructure that delivers paths and speeds to drive mode shift from private car • Delivering mode shift to rail by development of a network of IMTs (including Newcastle) and additional track capacity (e.g. duplications) to accommodate short-haul movements (e.g. import boxes to greater Sydney area) and as well as long haul movements (e.g. interstate movements which may or may not be related to a Sydney port-of-call)
Managing Maintenance	• Need infrastructure performance statistics and maintenance expenditure (including unplanned maintenance and renewals; planned vs delivered maintenance and renewal performance
Rail Safety	• Need more information on rail safety performance • Safety is a key focus of the rail industry with significant investment in systems and practices to minimise risk and users and third parties – need data