Summary of key outcomes:

Sydney's ports provide a vital economic gateway for the Australian and NSW economies. In 2001/02, Sydney's ports handled approximately $42 billion worth of international trade which represents 17% of Australia's total international trade and 56% of NSW's international air and sea cargo trade by value.

Due to its proximity to the Sydney market, Port Botany is and will remain the primary port for the import and export of containerised cargo in NSW. Currently, over 90% of container trade passing through Sydney's ports is handled at Port Botany.

3.1 Role and Significance of Sydney's Ports

The port facilities of Sydney are located at Port Botany and within Sydney Harbour. These ports, along with the airport, are the economic gateways to NSW. This is reflected by the fact that in 2001/02 Sydney's ports handled approximately $42 billion worth of international trade. This represents:

- $10,000 for each person in the greater Sydney region, which has a population of close to 4 million;
- 56% of NSW's total international air and sea cargo trade by value; and
- 17% of Australia's total international trade.

Cargo throughput through Sydney's ports (Sydney Ports Corporation owned and private berths) during 2001/02 was 24.3 million mass tonnes, with containerised cargo accounting for 43.9%. This trade comprised more than 1 million TEUs, 183,000 motor vehicles and about 13.6 million mass tonnes of bulk and general cargo.

The major containerised export commodities were non-ferrous metals (mainly aluminium) followed by chemicals and cereals (mainly wheat). The major import commodities were chemicals, manufactured goods, paper products and machinery. The major trading countries continue to be New Zealand, Japan, China (including Hong Kong) and the United States (Sydney Ports Corporation 2002).

In 2001/02, 2,259 ships visited Sydney's ports with ship visits almost evenly shared between Sydney Harbour and Botany Bay.

Port Botany is the major port for handling containers and bulk liquids in NSW. Currently, it handles over 90% of containers passing through Sydney's ports.

The port facilities within Sydney Harbour are primarily used to handle non-containerised cargo including motor vehicles, dry bulk, bulk liquids and general cargo, although these facilities also handle a small number of containers and would continue to do so in the future (Sydney Ports Corporation 2001b).

The major port areas in Sydney Harbour and Port Botany form part of Sydney Ports Corporation's 265 ha portfolio of waterfront property. In the main, Sydney Ports Corporation acts as landlord, leasing its properties to private sector operators who provide the direct services involved in handling and storing sea cargo. A Port Safety Operating Licence granted to the Corporation by the NSW Government provides the authority under which controls are exercised over navigation and related activities within Sydney's ports.

Table 3.1 describes the six types of commercial port facilities in Sydney.

Table 3.1 Port Facility Types in Sydney

FACILITY	DESCRIPTION	LOCATION
Container Terminals	Handle the transfer of containerised goods	Port Botany
Multi-purpose Terminals	Handle a mix of containerised, break-bulk (timber, paper, steel etc.), dry bulk (cement, sugar, gypsum, aggregates etc.), liquid bulk and vehicle cargoes	Darling Harbour, Glebe Island, White Bay
Passenger Terminals	Passenger (commercial) cruise terminals	Sydney Cove, Darling Harbour
Bulk liquid berths and storage	Handle and store bulk liquids – e.g. liquid chemicals & petroleum products.	Port Botany, Gore Cove, Kurnell
Container Parks	Handle the transfer, packing, unpacking and storage of containerised goods	Port Botany
Motor Vehicle Terminal	Handles the transfer and pre-delivery inspections of motor vehicles	Glebe Island

3.2 Port Operations in Sydney Harbour

3.2.1 Overview

Sydney Harbour's accessibility to shipping lanes and land transport networks and the wide range of cargoes that can be handled at its port facilities make it an important commercial port. Commercial shipping berths in Sydney Harbour are located at two complexes – Darling Harbour and Glebe Island/White Bay. In addition to its commercial shipping facilities, Sydney Harbour also has two cruise ship terminals located at Darling Harbour (Wharf 8) and Sydney Cove. These facilities are owned by Sydney Ports Corporation. There is also an oil terminal at Gore Cove and a bulk aggregate terminal at Blackwattle Bay which are not owned by Sydney Ports Corporation.

There are two approaches to Sydney Harbour:

- the Western Channel which is 210 m wide with a minimum depth of 13.7 m; and
- the Eastern Channel which is 180 m wide with a minimum depth of 10.5 m.

In 2001/02, berths in Sydney Harbour (Sydney Ports Corporation's owned and private berths) handled approximately 2.7 million mass tonnes (some $6 billion in value) of primarily non-containerised cargo. These facilities will be required to continue to meet their current share of the projected overall growth in trade, but are not expected to provide additional capacity for container handling due to the limited availability of container stacking area.

Figure 1.3 shows Sydney Ports Corporation's facilities in Sydney Harbour.

3.2.2 Darling Harbour Commercial Shipping Berths

Darling Harbour's four commercial shipping berths (berths 3, 4, 5 and 7) jointly provide about 949 m of berth length and over 17 ha of wharf space, designed to accommodate container, general, dry and wet bulk (salt and gypsum) cargoes and motor vehicles (Sydney Ports Corporation 2001a).

Patrick Stevedores currently operate the commercial shipping facilities at Darling Harbour. Land-based transport access to the berths is restricted to road access only. The berths operate 24 hours per day, 365 days per year.

3.2.3 Glebe Island/White Bay

Sites within the Glebe Island/White Bay area have been used since the mid 1800's for industrial and port activities. The area is the subject of future port infrastructure and wharf upgrading plans and a master plan has been gazetted by the Minister for Planning to guide the nature of this development.

White Bay consists of four operating berths (berths 3 to 6) leased to P&O Ports, and two berths (berths 1 and 2) currently used as lay up berths (**Figure 1.3**). The major commodities handled at these berths include containers and break bulk (timber, paper, steel etc.) cargoes. White Bay is serviced by road links and a dedicated freight rail line to Enfield and on to the metropolitan rail network.

Glebe Island has four berths (berths 1, 2, 7 and 8) (**Figure 1.3**). Berths 1 and 2 form part of the 12 ha Glebe Island Motor Vehicle Terminal, a dedicated motor vehicle discharge facility with space for 5,000 vehicles. The terminal is leased by Australian Automotive Terminals Pty Ltd (AAT) who are developing the site into an extended specialised motor vehicle handling facility. AAT is a joint venture between P&O Ports and Patrick Autocare.

Berth 7 is a dedicated dry bulk berth and is currently used by Australian Cement Holdings to import bulk cement and by Sugar Australia to import bulk sugar on a common user basis. The berth is equipped with fixed shoreside cement and sugar receiving, storage and distribution infrastructure.

Berth 8 is a dedicated dry bulk berth and is currently operated by Penrice Soda Products. It is primarily used for the storage and distribution of soda ash.

Gypsum Resources Australia (GRA) has commenced construction of a gypsum discharge, storage and distribution facility on land behind berth 7.

3.2.4 Cruise Terminals

Sydney Ports Corporation operates two passenger terminals on a common user basis at Sydney Cove and Wharf 8, Darling Harbour. Both terminals provide passenger lounges, customs halls and passenger pick-up and set-down facilities, as well as ship provisioning space.

3.2.5 Gore Cove

An oil terminal is located at Gore Cove, Greenwich (**Figure 1.3**). It has been associated with the oil industry since 1901 and the berth facilities are owned by the Shell Oil Company. The oil terminal has 20 large storage tanks and two wharves receiving up to 100 vessels annually, with throughput of approximately 4.2 million tonnes. The terminal can accommodate tankers with a maximum draught of 13.7 m, overall length of 265 m and dead weight of 136,000 tonnes.

3.2.6 Blackwattle Bay

The Blackwattle Bay wharf is located west of Darling Harbour and south of Glebe Island/White Bay (**Figure 1.3**). The commercial wharf facility is primarily used by Pioneer Concrete to import aggregate from Bass Point.

Blackwattle Bay wharf has recently been upgraded with the redevelopment of 120 m of wharf at the southern end of the bay. The asset is managed by the Sydney Harbour Foreshore Authority (SHFA) under an agreement with the Waterways Authority of NSW.

3.3 Port Operations in Botany Bay

3.3.1 Overview

Port Botany is Sydney's primary port for the handling of containers and bulk liquids. The port facilities include approximately 2,000 m of quay face and 82 ha of terminal area for container trade. There is an additional 20.7 ha of adjacent land for container depot operations.

Facilities at Port Botany include:

- two container terminals, one on the northern (operated by Patrick Stevedores) and one on the southern (operated by P&O Ports) side of Brotherson Dock;
- container parks, namely, Smith Bros, Patrick Port Services and P&O Trans Australia; and
- a Bulk Liquids Berth from which bulk liquids (LPG, petroleum products, organic chemicals and caustic soda) are transferred to liquid storage facilities operated by VOPAK, Origin Energy, Mobil, Orica Australia, Elgas and Terminals Pty Ltd.

In 2001/02, Port Botany handled about 16.7 million mass tonnes of bulk and containerised cargo.

In addition to Port Botany, Caltex Refineries (NSW) Pty Ltd owns and operates two berths for product handling and a multi-buoy mooring for crude oil import at Kurnell on the southern side of Botany Bay. Submarine pipelines exist between the refinery at Kurnell and the Banksmeadow distribution terminal (owned by Caltex).

The shipping channel to Brotherson Dock is 213 m wide and dredged to a minimum depth of 17.9 m. The ship turning basin has been dredged to 14.4 m.

Figure 1.4 shows Sydney Ports Corporation's facilities at Port Botany.

3.3.2 Container Handling Operations

P&O Port Botany Container Terminal

Container handling facilities located at berth numbers 4, 5 and 6 on the southern side of Brotherson Dock are operated by P&O Ports. The P&O Ports terminal is equipped with six container cranes, occupies an area of approximately 38.5 ha and has a quay length of 936 m. Road access to the terminal is via Friendship

Road and the terminal incorporates 80 truck parking slots. Rail access runs along the eastern boundary and links to the Botany Freight Rail Line. This facility currently handles about 440,000 TEUs per annum.

Patrick Stevedores Terminal

Patrick Stevedores operate a dedicated container terminal at berths 1, 2 and 3 on the northern side of Brotherson Dock. This terminal is equipped with six container cranes, occupies an area of approximately 44 ha and has a quay length of 1,006 m. The Patrick Stevedores Terminal currently handles about 560,000 TEUs per annum. Road and rail access is from the northeastern end of the terminal, road access being via Penrhyn Road and rail access via the Botany Freight Rail Line.

Operations at the Patrick Stevedores terminal commenced in the late 1970s, with progressive redevelopment since this time. Patrick Stevedores is now proposing to upgrade this terminal as described in **Chapter 2** *Regional Context*.

An analysis of the terminal area capacity of the upgraded terminal facilities is presented in the EIS for the Patrick Stevedores proposal. This analysis estimates that with the upgraded container handling facilities, the terminal would be able to gradually increase land-based handling capacity to 1.3 million TEUs by 2016 and would facilitate an increase in the proportion of containers moved by rail, from 25% to 40% (PPK 2002).

Current Capacity in Port Botany

The current throughput at the two Port Botany terminals is around 1 million TEUs per year. However, throughput is different to capacity. A trade forecast and capacity study undertaken by Access Economics and Maunsell Australia shows that the current capacity at the existing container terminals is about 1.1 million TEUs per year (**Appendix D**). Therefore, there is very little spare capacity at the existing container terminals at Port Botany to accommodate any increases in container trade volumes. Even with the proposed upgrades to terminal facilities at Port Botany and with modest improvements in productivity, the forecast growth in container trade indicates that Port Botany's container handling capacity would be reached by about 2010. This is discussed further in **Chapter 4** *Need for the Project*.

3.3.3 Container Parks

Three container parks are located at Port Botany. These terminals, namely Smith Bros, Patrick Port Services and P&O Trans Australia, provide storage for 5,000 TEUs, 5,200 TEUs and 8,500 TEUs, respectively. Each terminal provides full storage, inspection, fumigation and cleaning services. Smith Bros and Patrick Port Services also provide packing, unpacking and distribution services. Additional capacity will be provided by a new container trade and transport terminal being constructed at Molineux Point by P&O Trans Australia.

3.3.4 Bulk Liquids Berth

The Bulk Liquids Berth is located near the entrance to Brotherson Dock and is the busiest of Sydney's common user berths. Bulk liquid cargoes are transferred directly from ships, by pipeline, to storage facilities operated by private companies, namely:

- VOPAK – broad range of liquid chemicals and non-hazardous products, e.g. vegetable oil, stored in 70 tanks totalling 36,000 m^3; gasoline and distillate stored in 12 tanks totalling 100,000 m^3;

- Origin Energy – LPG stored in 18 tanks with a total storage of approximately 10,000 m^3;
- Orica Australia – ethylene, propane and butane in three tanks of 8,000 m^3, 14,000 m^3 and 14,000 m^3, respectively;
- Terminals Pty Ltd – ability to store a broad range of liquid chemicals in 65 tanks, with total storage of 53,000 m^3;
- Elgas Ltd – four large underground storage caverns providing a volume of 130,000m^3 for storage of 65,000 tonnes LPG; and
- Mobil – petroleum products are also transferred by pipeline from the Bulk Liquids Berth to the Mobil terminal located off the port area in Banksmeadow.

3.3.5 Kurnell

Caltex Refineries (NSW) Pty Ltd operates the largest refinery in NSW at Kurnell. The refinery has a jetty with two berths and a multi-buoy mooring facility capable of berthing ships that have a cargo capacity of 45,000 tonnes. On the northern side of the jetty, pipelines connect the refinery's tanks to the three shipping berths.

The refinery has two pipelines under Botany Bay connected to terminals at Banksmeadow and Silverwater. There are also two disused pipelines located near Yarra Bay.

The shipping channel to the Kurnell berths and swinging basin has a minimum depth of 12.2 m. The tanker terminal can accommodate ships up to 254 m overall length and 11.6 m draught.

3.4 Other Commercial Ports

3.4.1 Melbourne

Trade Profile

Melbourne supports an estimated resident population of approximately 3.5 million people (Australian Bureau of Statistics 2000 website cited December 2002).

The Port of Melbourne handles $65 billion in trade annually, contributing more than $5.8 billion to the Victorian economy (Melbourne Port Corporation 2002). Total trade through the Port of Melbourne during 2001/02 was 23.6 million mass tonnes which constitutes an 8.1% increase on the previous 12-month period.

The Port of Melbourne is Australia's largest container port. In total, 1.42 million TEUs were handled through the port during 2001/02, an increase of 7.5% on the previous year's trade. Overseas containers accounted for 1,139,000 TEUs while coastal movements accounted for the remaining 281,000 TEUs. Containerised cargoes accounted for 67% of total port trade in 2001/02.

The main containerised commodities include miscellaneous manufactured goods, dairy products, fruits and vegetables, paper and newsprint, electrical equipment and vehicle parts.

The main non-containerised commodities include cereal grains, petroleum products, motor vehicles, crude oil and cement.

Port Facilities

The total area of land managed by the Melbourne Port Corporation is approximately 483 ha. There are currently 30 commercial berths including two purpose-built international container terminals, each with four berths (Melbourne Port Corporation 2002).

The container terminals at the Port of Melbourne are West Swanson (operated by P&O Ports) and East Swanson (operated by Patrick Stevedores).

The approach to the terminals is 13 nautical miles along the South Channel and 6.1 nautical miles through Williamstown/Port of Melbourne. Channel depths vary from 13.1m in the Approach Channel to 10.9 m in the Port of Melbourne itself.

Figure 3.1 shows the port facilities at the Port of Melbourne.

The Victorian Channels Authority (VCA), which is responsible for the commercial navigation channels in Victorian port waters, has identified that future shipping access to Victorian ports, in particular the Port of Melbourne, may be limited by the inadequate channel depth to cater for the global trend towards larger container and general cargo ships.

The entrance to Port Phillip Bay and the approach channels to the Port of Melbourne berths within the Bay are not deep enough to accommodate larger ships of 6,000 – 8,000 TEUs when fully loaded. The VCA notes that whilst the Port of Melbourne is Australia's leading container port, more than 10% of existing container ships using the port are unable to load to their full capacity due to draught limitations in the shipping channels (VCA 2000, *Pinnacles pose port problem* in VCA website visited December 2002).

While smaller vessels would still be able to call, they would be increasingly disadvantaged in terms of costs, direct port connections and frequency, as they would need to make more voyages than their larger counterparts.

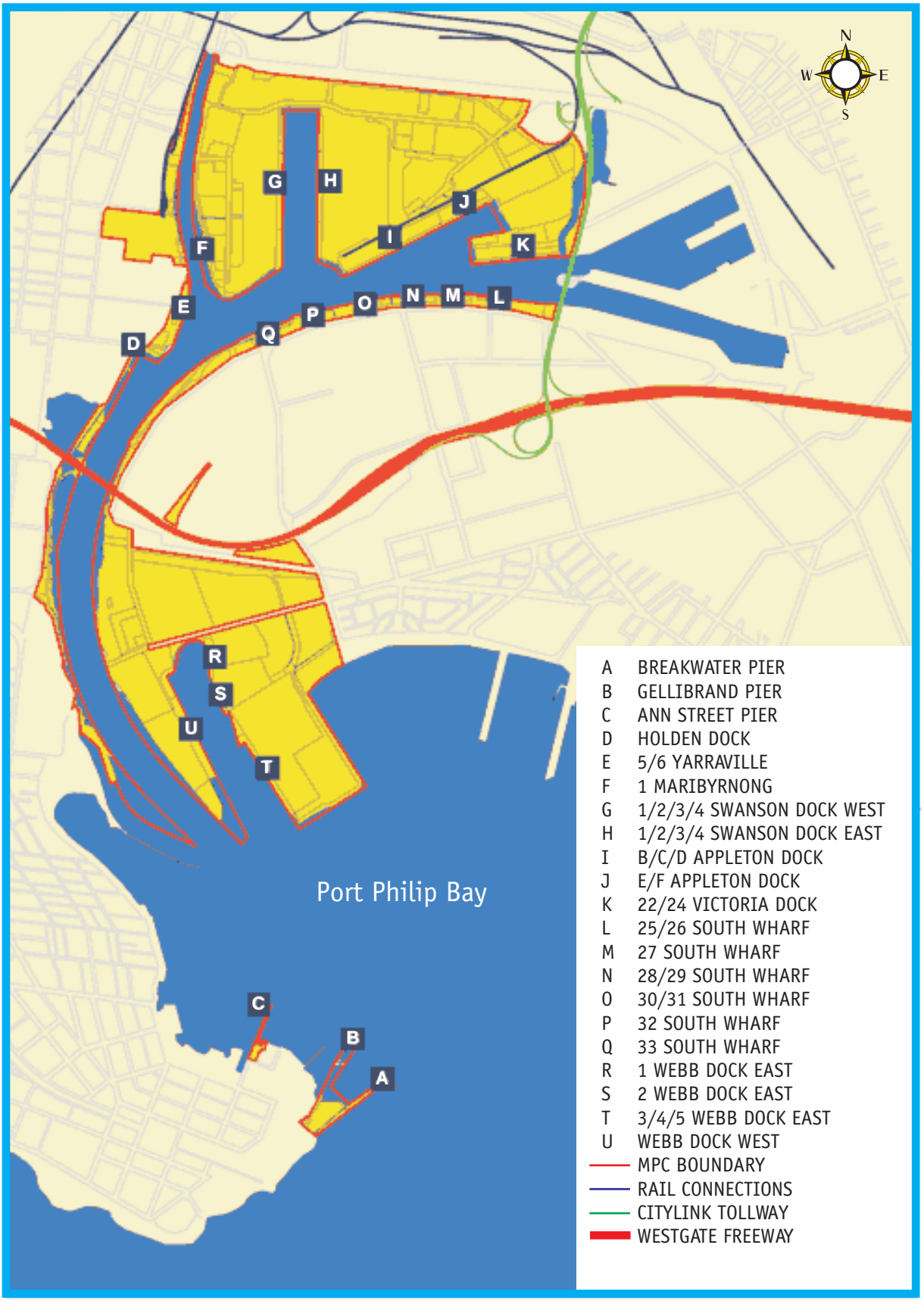
To address this future constraint, an environmental effects study on deepening of the shipping channels is being undertaken.

Transport Infrastructure

In 2000/01, 65.2% of the Port of Melbourne's cargo (measured by weight) was transported by road, 19.7% by pipeline and 13.6% by rail. The remaining 1.5% was transhipped by sea. Containerised cargo continued to be predominantly transported by road, achieving 79.4%, with rail 18.8% and sea transhipment 1.8% (Melbourne Port Corporation 2001).

Melbourne Port Corporation owns and operates a rail siding to Appleton Dock and Swanson Dock that in turn connects to other local rail sidings. Rail freight operators transport import/export containers either by direct rail link or via rail terminals close to the Port of Melbourne. Intermodal freight rail services are available from the Port of Melbourne to all major Australian mainland capital cities and regional centres, including links with all ports. There are daily rail services to NSW from the Port of Melbourne. These rail lines are shared with passenger services.

Regionally, the port is served by the Princes Highway to the east; Hume Highway, Calder Highway and Goulburn Valley Highway to the north; and Princes Highway and Western Highway to the west.



Source: Melbourne Port Corporation

Port of Melbourne **Figure 3.1**

3.4.2 Brisbane

Trade Profile

Brisbane supports a resident population of about 1.6 million (Australian Bureau of Statistics 2000 website cited December 2002).

The Port of Brisbane had a total trade throughput of approximately 23.2 million mass tonnes during 2001/02. Of this volume, the main commodities traded were oil, coal and containers. The container trade throughput during the period was 481,847 TEUs, up 6.3% from the previous fiscal year (Port of Brisbane Corporation 2002).

Port Facilities

The Port of Brisbane is Australia's third largest capital city port in terms of tonnage, and the third busiest container port. The hub of the port's activity is the Fisherman Islands complex situated on 716 ha of predominantly reclaimed land at the mouth of the Brisbane River.

The Port of Brisbane has 28 berths with 6,510 m of quay face, including seven container berths (operated as two terminals – P&O Ports and Patrick Stevedores), general cargo berths, oil terminals, and grain and coal berths.

Depths of general cargo berths are between 9.1 m and 10.4 m; container berths are 13 m to 14 m; oil berths are from 13.4 m to 14.3 m; and Fisherman Islands grain and coal berths are 13 m and 13.5 m respectively. The Brisbane River requires ongoing maintenance dredging.

Figure 3.2 presents the general layout of the facilities at Port of Brisbane.

As part of the ongoing expansion, the Port of Brisbane Corporation has commenced construction of Wharf No 8 along the northwest edge of Fisherman Islands. The new wharf will be 210 m long and capable of berthing car carriers up to 38,500 dwt and container vessels up to 70,000 dwt.

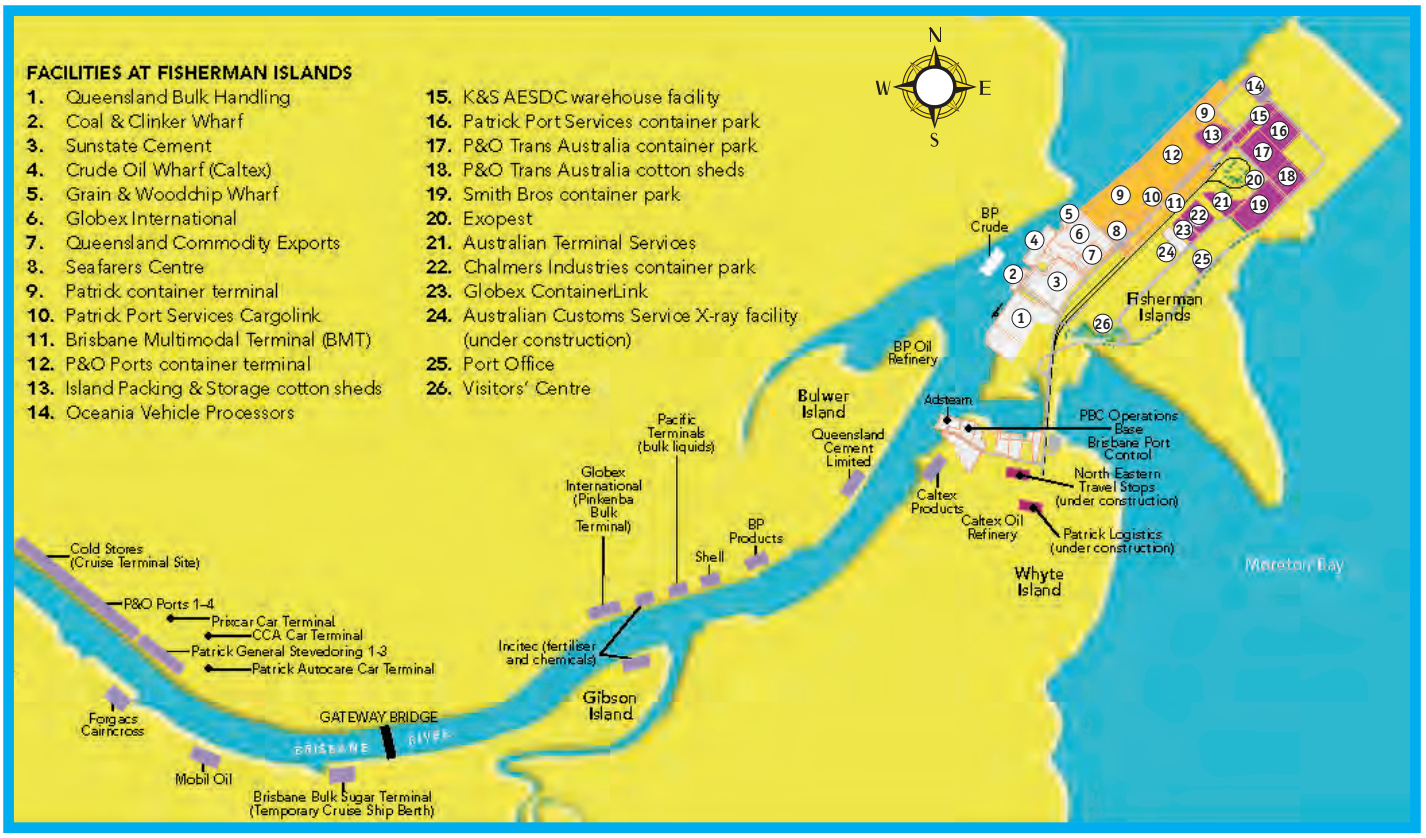
The Port of Brisbane Corporation is also undertaking a major expansion which will involve new reclamation works to provide an additional 230 ha of land that will extend the northeast extent of Fisherman Islands. The reclamation will involve constructing a perimeter bund wall (the seawall) and filling the enclosed area over approximately 25 years using material from maintenance dredging.

Transport Infrastructure

The facility has rail and road links to all major centres in Queensland.

The Brisbane Multimodal Terminal (BMT) provides rail services adjacent to the wharves of Fisherman Islands, linking the port to regional Queensland and the rest of Australia. Direct access is provided for rail containers to and from the adjacent BMT and to Fisherman Islands Container Park.

There are rail transport links from the Port of Brisbane to the north and south coasts. The rail line links to Sydney via Newcastle and to Cairns in the north. Several rail lines serve the Queensland hinterland to the west. These rail lines are not dedicated freight lines and are shared with passenger services.



Source: Port of Brisbane Corporation

Port of Brisbane **Figure 3.2**

Road transport links serving Port of Brisbane comprise:

- southern routes – Pacific, Newell and New England Highways;
- northern links – the Bruce and Burnett Highways;
- western links – the Warrego, Moonie and Cunningham Highways;
- major highways – the Gateway, Ipswich and Logan Motorways; and
- local road network linking Fisherman Islands to Brisbane CBD and beyond.

Containerised cargo is predominantly transported by road with approximately 18% transported by rail in 2001/02, which is a similar modal split to the Port of Melbourne.

3.4.3 Newcastle

Trade Profile

Newcastle supports a resident population of approximately 483,000 (Australian Bureau of Statistics 2000 website cited December 2002).

Trade throughput for the Port of Newcastle facilities in 2001/02 reached 75.5 million mass tonnes with 1,473 ship visits (Newcastle Port Corporation 2002). Newcastle's port facility comprises one of Australia's major bulk export ports and is the world's largest coal export port. Port of Newcastle's coal exports represented more than 91% of the port's total throughput during 2001/02, aided by the completion of Port Waratah Coal Services' Kooragang Coal Terminal expansion. Other commodities imported and exported through the port facilities each year include aluminium, iron, steel, lead, zinc, grains and sand. Total trade throughput increased by 2% from the previous financial year and was the second highest throughput tonnage in the port's 203 year history.

Port Facilities

Newcastle's port facilities are located approximately 150 km north of Sydney. Newcastle Port Corporation manages the port facilities. At present, the port facilities in Newcastle do not include a dedicated container terminal. In 2001/02 the port handled 12,265 TEUs of containerised cargo.

There are 15 different berths in two major docks – the Basin and the Steelworks Channel. There are five berths in the Basin with a total quay face of 1,197 m capable of handling general, bulk and roll-on/roll-off cargo. The Steelworks Channel has 10 berths with a total quay face of 2,688 m. Six of the 10 berths are devoted to coal receival and loading, and the other four are bulk ore, dry bulk and aluminium raw material berths.

The nominal channel depth of the Port of Newcastle is 15.2 m. However, currently only four berths, all for handling coal, are deeper than 15 m. The port is situated on the Hunter River which requires ongoing dredging.

Pivotal to Newcastle Port Corporation's diversification strategy is its proposal to redevelop the former BHP Steelworks site in Newcastle into a multi-purpose terminal. The design of the proposed multi-purpose

terminal incorporates a three-berth wharf with deep water access and associated transport infrastructure. Over 150 ha of land behind the wharf area is available for redevelopment.

Figure 3.3 presents the general layout of the facilities at the Port of Newcastle.

Transport Infrastructure

The Port of Newcastle is serviced by both road and rail. A dedicated freight rail spur exists to both Port Waratah and Kooragang Island Coal facilities. These spurs connect to the main rail line to Sydney. This line is also a passenger line, which limits the availability of freight transport by rail to Sydney. The Pacific Highway and F3 Freeway provide the main arterial road link between Newcastle and Sydney.

3.4.4 Wollongong

Trade Profile

Wollongong supports a resident population of 264,000 (Australian Bureau of Statistics 2000 website cited December 2002).

Wollongong's port facilities are located at Port Kembla, approximately 80 km south of Sydney. The port facilities are managed by Port Kembla Port Corporation.

Trade throughput for the Port Kembla facilities in 2001/02 reached 23.5 million mass tonnes with 650 ship visits. The primary commodities imported and exported through the port include coal, iron ore, steel, grain and timber. Total trade fell by 6% from the previous financial year but non-coal/grain/steel trade grew 14% to 1.1 million mass tonnes (Port Kembla Port Corporation 2002).

Port Facilities

Facilities at Port Kembla include the following berths with a total quay line of about 2,030 m:

- a multi-purpose berth;
- grains berth;
- bulk liquids berth;
- coal and bulk berths;
- No. 6 gateway (bulk and break-bulk common user berth); and
- Eastern Basin no. 4 (used as a roll-on/roll-off facility).

Aside from the above berths, there are five private wharves (BHP berths).

The approaches in both the inner and outer harbour at Port Kembla are 15.25 m deep. The berthing facilities at Port Kembla are able to accommodate ship sizes of between 170 m and 315 m and have depths of between 9 m and 16.25 m. Container trade volume at Port Kembla in 2001/02 was 1,038 TEUs.

Port of Newcastle **Figure 3.3**

Site for Proposed Multi - Purpose Terminal

The port facilities at Port Kembla do not currently include a container terminal, however, following a recent State Government decision to encourage the containers now being handled in Sydney Harbour (some 10,000 to 50,000 TEUs) to be relocated to Port Kembla, Port Kembla Port Corporation is proposing to extend its existing multi-purpose berth to 700 m to accommodate this trade.

Figure 3.4 presents the general layout of the facilities at Port Kembla

Transport Infrastructure

Port Kembla is serviced by a rail and road network which stretches along the eastern seaboard of NSW. Road links are via the Princes Highway and F6 Freeway towards Sydney in the north, the Princes Highway to the southern part of NSW and via the Hume Highway to the west. The railway network links Port Kembla with Sydney via the Illawarra line along the east coast and also to the main southern line to southern and western NSW. The main Illawarra line is also a passenger line, which limits the availability of freight transport by rail to Sydney.

3.5 Conclusion

Sydney's ports provide a vital economic gateway for the Australian and NSW economies. In 2001/02, Sydney's ports handled approximately $42 billion worth of international trade which represents 17% of Australia's total international trade and 56% of NSW's international air and sea cargo trade by value.

Due to its proximity to the Sydney market, Port Botany is and will remain the primary port for the import and export of containerised cargo in NSW. However, a trade forecast and capacity study undertaken by Access Economics and Maunsell Australia shows that there is very little spare capacity at the existing container terminals at Port Botany to accommodate the increases predicted in Sydney's container trade and that the existing capacity at Port Botany would be reached by about 2010.

Source: Port Kembla Port Corporation

Port Kembla **Figure 3.4**

Summary of key outcomes:

Based on the analysis of trade growth and factoring in achievable performance improvements of the existing port facilities, the first berth of the proposed Port Botany Expansion would be required no later than 2010.

Given that additional capacity at Port Botany would take about seven years to develop, the project needs to commence now to ensure that additional capacity would be available prior to significant congestion occurring. A failure to provide adequate capacity would result in additional costs which would be increasingly borne by consumers and business in the form of higher shipping and transport costs and delays in deliveries, all of which would affect the price of goods, the cost of living in NSW, and the competitiveness of NSW exports. Ultimately, this could result in businesses either being lost or relocating to other states or overseas.

As long term trade forecasting is inherently uncertain, for planning purposes it is prudent and necessary to ensure that the capacity of basic port infrastructure (terminal area and berth length) always remains ahead of the forecast demand for the given planning horizon. The proposal to provide an additional five shipping berths and approximately 60 ha of terminal area to cater for 1.6 million TEUs per year would ensure that this is possible for the next 25 years and beyond.

4.1 Introduction

Access Economics and Maunsell Australia have undertaken a trade forecast and capacity study for Port Botany which is provided in **Appendix D**. This report clearly shows that there is a need for the proposed Port Botany Expansion and provides the basis for the conclusions drawn in this chapter.

The current throughput at the existing container terminals at Port Botany is around one million TEUs per year. The Access Economics and Maunsell Australia report shows that this level of throughput is approaching the current capacity of the existing container terminals. Through a combination of leasing more land, upgrading equipment and improving productivity, the existing container terminals would be able to accommodate the predicted increases in container trade volume, at least in the short term. Beyond 2010, however, the capacity of the existing container terminals at Port Botany would be fundamentally constrained by the limited number of berths available for ships to load and unload containers.

The limitations on berth availability would result in ships having to queue for a vacant berth and ship waiting times would increase rapidly as trade volumes continued to rise. The cost of direct shipping delays would be tens of millions of dollars, however, the flow on economic costs of this congestion would be many times greater. These costs would be increasingly borne by consumers and business in the form of higher shipping and transport costs and delays in deliveries, all of which affect the price of goods and the competitiveness of exports. This could ultimately result in a reduction of NSW's economic competitiveness and in businesses either being lost or relocating to other states, New Zealand or South East Asia

The Access Economics and Maunsell Australia report shows that significant congestion would begin to occur at Port Botany by 2010. Beyond 2010, ship waiting times and costs would rise exponentially and would rapidly grow to become unacceptable unless additional berth capacity was introduced. Additional berths must therefore be provided by about 2010 to avoid the consequences of congestion at Port Botany.

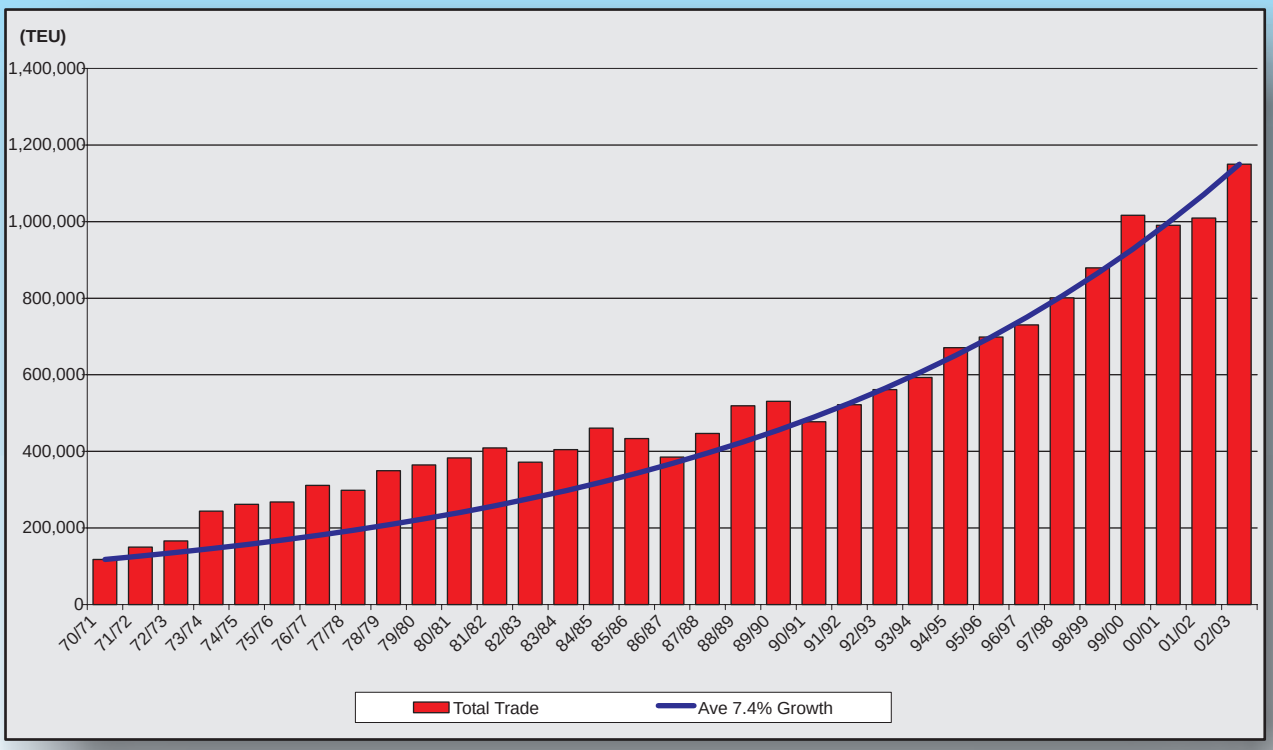
In addition to accommodating short term growth, Sydney Ports Corporation must also provide adequate capacity in the long term. The Access Economics and Maunsell Australia report shows that at least 1.2 million TEUs per year of additional capacity would be required to meet the forecast growth in container trade at Port Botany by 2025. To ensure that capacity remains ahead of the forecast demand, the proposal to provide a new terminal with capacity to cater for 1.6 million TEUs per year, would ensure that sufficient capacity would be available at Port Botany to 2025 and beyond.

Obtaining the necessary approvals for the proposed Port Botany Expansion and completing the construction of additional berths and terminal capacity would require approximately seven years. Given that additional capacity would be required by 2010, the project needs to commence now.

4.2 Container Trade Growth

4.2.1 Historic Growth in Container Traffic

The average annual growth in container trade through Sydney's ports has been more than 7% per annum since 1970. This shows that growth in container trade through Sydney's ports is part of a long term trend, which has been mirrored in other western countries such as in the United Kingdom where containerised shipping transport has increased by about 6% per annum since 1970**. Figure 4.1** illustrates container trade growth at Sydney's ports since 1970.



Average Annual Growth in Container Trade Through Sydney's Ports

Figure 4.1

In 2002/03, the total number of containers handled in Sydney's ports was 1,160,747 TEUs, of which more than 1.1 million TEUs were handled at the Port Botany container terminals, the remainder (about 45,000 TEUs) were handled through the multi-purpose berths in Sydney Harbour.

The number of containers handled through Sydney Harbour has reduced over time and dropped by about 25% during the last year due to a number of shipping lines relocating to Port Botany or consolidating services. Following a recent State Government policy decision, container trade through Sydney Harbour is to be phased out over time. Sydney Harbour will therefore not provide additional capacity for container handling in the long term.

4.2.2 Economic Outlook

Trade through Sydney's ports is closely related to the NSW economy. The Access Economics and Maunsell Australia report indicates that the long term outlook for the NSW economy is generally positive and has predicted that the Gross State Product would continue to increase at approximately 3% per annum through to at least 2012. The report suggests that economic growth may ease after this date as a result of the aging population, although the effects of this phenomenon in the long term are extremely difficult to predict and would be influenced by matters such as immigration and changes in work practices.

The recent historical increase in container growth has been driven to some degree by increases in goods being shipped in containers and, while there are still some bulk materials which could be containerised (for example paper), consistent annual increases of 7% to 8% are unlikely to continue. The potential slow down in historical growth rates may however be mitigated by strong domestic growth, expected increases in trade through globalisation and a general liberalisation of restrictions on world trade.

4.2.3 Trade Forecast

Access Economics and Maunsell Australia prepared three scenarios to predict future growth in NSW container trade as shown in **Table 4.1.** The predictions show that short term growth is expected to remain strong at levels in excess of 7% per annum, but that long term growth is expected to gradually ease from the strong growth seen in recent years. Overall, the growth in container trade at Port Botany for the full period to 2025 is predicted to be between 4.0% and 5.6% per annum.

Preliminary indications of the growth in Sydney's container trade for 2002/03 show that the total number of TEUs handled at Port Botany will exceed 1 million TEUs which represents an increase of more than 15% over the last financial year. This highlights the recent volatility of growth in container trade and the uncertainty of long term growth forecasts which have consistently underestimated actual growth. It also shows the need to adopt conservative growth forecasts for planning purposes to ensure that port facilities are provided in time to avoid significant congestion occurring.

Table 4.1 Annual Growth Rate Forecast

	EXISTING	SHORT TERM FORECAST			LONG TERM FORECAST				FULL PERIOD GROWTH
Year	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2009-10**	**2014-15**	**2019-20**	**2024-25**	
Low Growth	3.2%	8.0%	7.3%	6.2%	4.9%	3.4%	3.3%	2.6%	**4.0%**
Medium Growth	3.2%	9.0%	8.9%	6.9%	5.7%	4.2%	4.0%	3.3%	**4.8%**
High Growth	3.2%	10.5%	9.3%	8.2%	6.5%	5.0%	4.8%	4.0%	**5.6%**

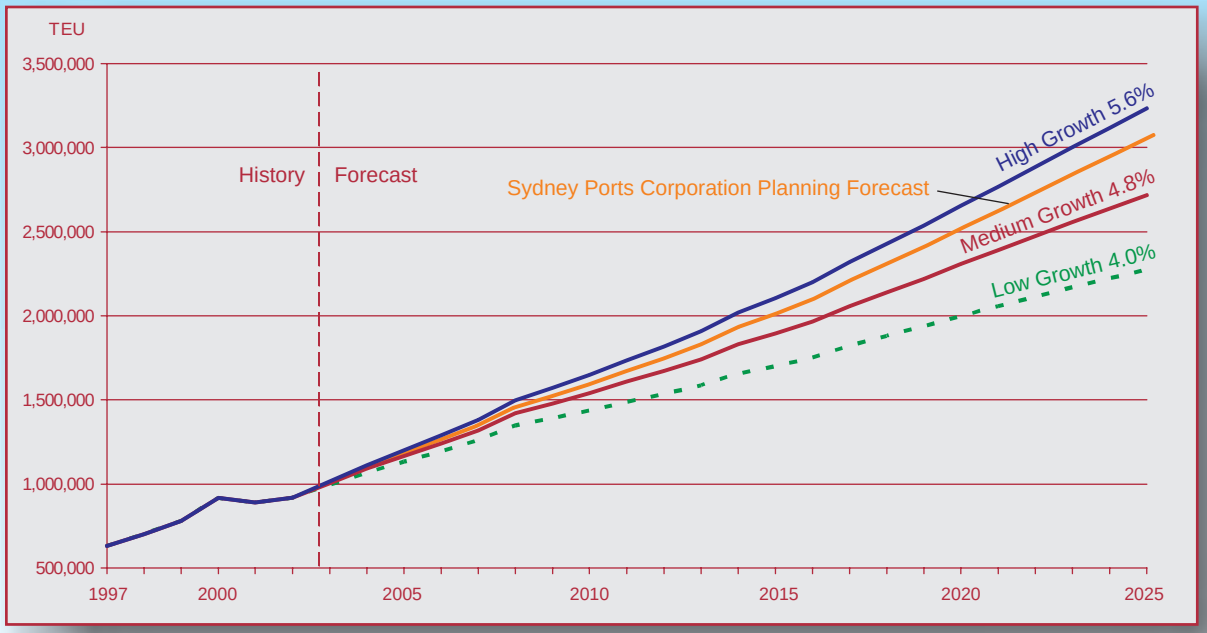
Source: Adapted from Access Economics and Maunsell Australia 2003

To determine which growth scenario is most appropriate for planning purposes at Port Botany, the Access Economics and Maunsell Australia predictions were compared with other reputable Australian and international trade forecasts including:

- the Australian Bureau of Transport and Regional Economics which has forecast Australia-wide growth in container trade of 5% per annum to 2010 (BTRE 2002);
- the United Nations Economic and Social Commission for Asia and the Pacific, which has indicated continuing substantial growth in world container trade and has projected this growth to continue at approximately 5.3% per annum from 2000 to 2010 (ESCAP/UNDP 2001);
- a recent study for the expansion of the Southampton Port, which states that conservative assumptions indicate a 5.1% annual growth rate in deep sea container trade to 2011 (Adams Hendry 2000);
- a study in 2000 for the Victorian Departments of Infrastructure and Treasury and Finance, predicted increasing growth in container trade in the period 2010 to 2020 and an acceleration of this growth of between 1% and 1.7% per annum from 2020 to 2030 (Maunsell McIntyre 2000); and
- a study for the Port of Long Beach, which predicted that container trade would increase between 5% and 6.6% per annum in the period between 2000 and 2020 (www.polb.com website visited 6 March 2003).

All of these studies provide a consistent prediction of growth of between 5% and 6% for international and Sydney container trade to 2010 and beyond. These predictions are more in line with the Access Economics and Maunsell Australia medium to high forecast growth scenarios of between 4.8% and 5.6% than the low growth scenario of 4.0%.

To meet the expected demand for container handling capacity and to foster healthy economic growth in Sydney and NSW, Sydney Ports Corporation has the responsibility of ensuring that port and transport infrastructure are available in time, at viable cost and with sufficient capacity to obviate congestion. In line with this responsibility, Sydney Ports Corporation believes that responsible future port capacity planning should be based upon a demand forecast which is between the medium growth (4.8% annual growth) and high (5.6% annual growth) long term projections provided by Access Economics and Maunsell Australia as shown in **Figure 4.2**.



Source: Adapted from Access Economics and Maunsell Australia 2003

Sydney Ports Corporation Planning Forecast **Figure 4.2**

Table 4.2 Container Trade Volume Forecast

	EXISTING	SHORT TERM FORECAST			LONG TERM FORECAST			
Year	**2001-02**	**2002-03**	**2003-04**	**2004-05**	**2009-10**	**2014-15**	**2019-20**	**2024-25**
Million TEU								
Low Growth (4.0%)	0.92	0.99	1.07	1.13	1.44	1.70	2.00	2.27
Medium Growth (4.8%)	0.92	1.00	1.09	1.17	1.54	1.89	2.30	2.72
High Growth (5.6%)	0.92	1.02	1.11	1.20	1.65	2.10	2.65	3.23
Sydney Ports Corporation's Planning Forecast	**0.92**	**1.0**	**1.1**	**1.2**	**1.6**	**2.0**	**2.5**	**> 3.0**

Source: Adapted from Access Economics and Maunsell Australia 2003

4.3 Port Capacity

To determine whether further expansion of the facilities at Port Botany is needed, it is necessary to compare the capacity of the existing facilities with the expected volume of container trade. The first step in this process is to determine the potential future capacity of the two existing container terminals at Port Botany. The two primary factors which affect the capacity of a container terminal are:

- the productivity or efficiency of the terminal operations; and
- the physical constraints of the terminal and supporting infrastructure.

The following sections examine these capacity factors in relation to the existing container terminals at Port Botany which includes the potential expansion of the existing container terminals at Port Botany by terminal operators.

4.3.1 Productivity

A determinant of terminal capacity comes from expected improvements in productivity. Productivity improvements can be derived from a number of sources including increased ship size, improved crane handling rates and increasing the amount of and efficiency of container handling equipment.

Significant productivity improvements have been achieved in recent years (since the 1998 waterfront disputes). Some further productivity gains can be expected, however, these would not be likely to repeat the gains of the last few years.

The Access Economics and Maunsell Australia report considered three different productivity scenarios for terminal capacity parameters over time:

- The "no productivity improvement" scenario which assumes that stevedore productivity continues at the levels achieved in recent times, but without any further improvements. It does not seem probable that there would be no further improvements made to productivity in the future and this scenario is therefore considered to be too pessimistic.
- The "high productivity improvement" scenario which draws on the self-appraisal of capacity by the stevedores themselves and results in a generally optimistic view of achieving "world's best" productivity performance. This argument is based upon optimisation of operations within the terminal and does not

necessarily consider other factors which impact upon the port as a whole (e.g. berth capacity constraints). Due to the nature of its trade it is highly unlikely that Port Botany would ever be able to match the productivity achieved by the very high volume international ports. Therefore, it would not be prudent to use this scenario as a basis for future port planning. This is particularly relevant given the long lead times for the construction of additional port capacity. Failure to meet these high productivity improvements could result in a significant capacity shortfall that would take many years to remedy.

- The "modest productivity improvement" scenario allows for further improvements based on investments in new equipment and modest changes in other operating parameters over time and is therefore considered an appropriate model to adopt for port capacity planning.

4.3.2 Physical Capacity Constraints

The capacity of a container terminal may be limited by one or a combination of the following factors:

- navigation and channel capacity - the daily number of ship movements allowable;
- landside transport capacity - the maximum feasible number of containers that can be handled through supporting road and rail systems and intermodal infrastructure;
- berth capacity - the maximum feasible number of containers that can be handled over the available berths; and
- terminal area capacity - the maximum feasible number of containers that can be handled through the terminal areas behind the berths.

Navigation and Channel Capacity

Port Botany has a deep water approach channel and is an all-weather port facility that is generally available for 365 days each year. The Sydney Ports Harbour Master has confirmed that due to the short approach (approximately 4.5 km), wide channel (218 m) and generally favourable prevailing weather conditions, navigation and channel capacity constraints would accommodate the expected increase in the total number of ships associated with the projected growth in container trade at the proposed new terminal as well as the existing terminals (**Appendix G**).

Landside Transport Capacity

Port Botany has good local and arterial road links and is serviced by the dedicated Botany Freight Rail Line. A landside transport study has been carried out by Maunsell Australia (**Appendix P**). This study concluded that, with the planned Sydney Ports Corporation and NSW Government initiatives to increase the rail mode share to 40% and industry initiatives to improve the efficiency of trucking, landside transport constraints would not constrain the development of future capacity at Port Botany.

Berth Capacity

A theoretical capacity for a port can be estimated using the number of berths, average ship length, productivity and crane intensity, and multiplying by the number of working hours in a year. However, long before this theoretical capacity is reached, the users of the port would be experiencing significant delays, particularly during peak periods. As port throughput increases towards the theoretical capacity, ships would

be queuing for a vacant berth, containers would be double handled and exporters/importers would be incurring delays in the movement of their cargo. These congestion factors increase exponentially as throughput approaches the theoretical capacity. Long before this theoretical capacity is reached it becomes no longer economically justifiable to trade additional containers of cargo through a particular port. In practice, it is never possible to reach the theoretical capacity.

Historical experience suggests that when berth capacity reaches around 60% to 70% of theoretical capacity, it becomes economically unjustifiable to conduct any additional trade through a port. This view is supported by industry benchmarks which show that capacity of a five berth container terminal is about 65% of the theoretical maximum (Frankel 1987; UNCTAD 1978).

Simulation modelling based on actual arrival patterns and the market split at Port Botany was conducted for the Access Economics and Maunsell Australia report. The modelling indicated that ship waiting time in excess of five hours per ship would start to occur when berth capacity at individual terminals was in the range of 60% to 65%. A delay of approximately five hours per ship would equate to a total delay of approximately 6,000 ship hours per annum by 2010. The cost of direct shipping delays at this level of congestion would be in the order of tens of millions of dollars, which would inevitably be reflected in the cost of trade. The full economic costs of this congestion, however, would be many times greater as this congestion would create a bottleneck in the overall supply chain which would impose additional costs on importers and exporters and ultimately would result in a loss of trade. Beyond a berth capacity of 65%, waiting times and costs would rise exponentially and would rapidly grow to become unacceptable unless additional berth capacity was introduced. In view of this, the appropriate limiting berth capacity rate would be 65% for the two existing terminals at Port Botany.

The Access Economics and Maunsell Australia analysis shows that, for the modest productivity growth scenario with a limiting berth capacity of 65%, the total berth capacity for the existing container terminals at Port Botany would be 1.5 million TEUs per year in 2005, 1.6 million TEUs per year in 2010 and approximately 1.8 million TEUs per year in 2025 as shown in **Table 4.3**.

Terminal Area Capacity

The area behind the berths available for stacking and handling of containers is also a factor in determining effective terminal capacity. In many ports it is area capacity which limits throughput rather than berth capacity.

Terminal area capacity, like berth capacity, is a dynamic concept, which can change very significantly due to operational and technological changes. Generally the trend worldwide is towards increased container capacity per hectare.

In general terms, as terminal operators are able to manage and vary a number of the parameters that affect terminal area capacity, it is more flexible than berth capacity. An increase in the effective terminal area capacity can be achieved by:

- investing in terminal operating equipment, technology and systems to allow higher stacking and and/or increasing the number of containers per unit area of terminal,
- leasing more land (if available), and

- transporting containers to nearby container depots which effectively act as a buffer storage area for the container terminal (especially for seasonal peaks).

There is some scope to effect increases in capacity at Port Botany over the short term through upgrading the existing facilities. Patrick Stevedores has already proposed an upgrade to its landside terminal facilities, which is discussed in **Chapter 3** *Existing Port Facilities* and is the subject of a current development application.

In addition to the proposed Patrick Stevedores upgrade, other possible improvements to the capacity of the existing terminals would include the upgrading of P&O Ports' operations including the development of an additional terminal area of 5.1 ha within the area already leased to P&O Ports and extension of the rail sidings to the rear of the P&O Ports terminal.

The benefits of these planned expansions have been included in the analysis undertaken by Access Economics and Maunsell Australia which shows that for the modest productivity growth scenario the total terminal area capacity for the existing container terminals at Port Botany would be approximately 1.4 million TEUs per year in 2005, 1.6 million TEUs per year in 2010 and approximately 2.4 million TEUs per year in 2025 as shown in **Table 4.3**.

4.3.3 Capacity of Existing Terminals

The limiting container terminal capacity at any one point in time will be the lower of the total berth capacity and the total terminal area capacity. The comparison of total berth capacity and total terminal area capacity analysis for the modest productivity improvement scenario is summarised in **Table 4.3.** This shows that berth capacity rather than terminal area capacity would be the factor limiting capacity at Port Botany after 2010 when the capacity of the existing terminal would be about 1.6 million TEUs per year.

Therefore, whilst there is opportunity to effect limited improvements in the capacity of the existing terminals over time, these improvements would help to reduce current terminal area constraints, but would not address the limiting factor caused by lack of berth capacity. The benefits of these planned expansions have been included in the review undertaken by Access Economics and Maunsell Australia, but it is clear that these works would not, by themselves, cater for the expected medium and long term growth in container trade at Port Botany.

Table 4.3 Forecast Capacity of the Existing Terminals at Port Botany

	2005	2010	2015	2020	2025
Total Berth Capacity*	1.5	1.6	1.7	1.75	1.8
Total Terminal Area Capacity*	1.4	1.6	1.8	2.1	2.4
Capacity for Planning Purposes*	**1.4**	**1.6**	**1.7**	**1.75**	**1.8**

** Numbers are in million TEUs*

4.4 Planning for Growth

Figure 4.3 compares the projected demand as a result of container trade growth described in Section 4.2 and the capacity analysis described in Section 4.3. The point at which the projected demand would exceed future capacity of the existing Port Botany terminals is indicated by the point of intersection of the capacity and demand curves in **Figure 4.3**. For the Sydney Ports Corporation planning forecast for growth, this would occur in 2010.

Even if the medium growth scenario adopted by Access Economics and Maunsell Australia were used, this would only delay the need for the new terminal for about one year and would not change the fundamental requirement to provide for future growth in container trade at Port Botany.

Table 4.4 shows that to cater for forecast growth in container trade through Port Botany to 2025 additional capacity of at least 1.2 million TEUs per year will be required.

Table 4.4 Predicted Shortfall in Capacity

	2005	2010	2015	2020	2025
Million TEU					
Demand	1.2	1.6	2.0	2.5	> 3.0
Capacity (without new terminal)	1.4	1.6	1.7	1.75	1.8
Shortfall	**(0.2)**	**0**	**0.3**	**0.75**	**> 1.2**
With New Terminal *	**-**	**-**	**(1.2)**	**(0.85)**	**(< 0.4)**

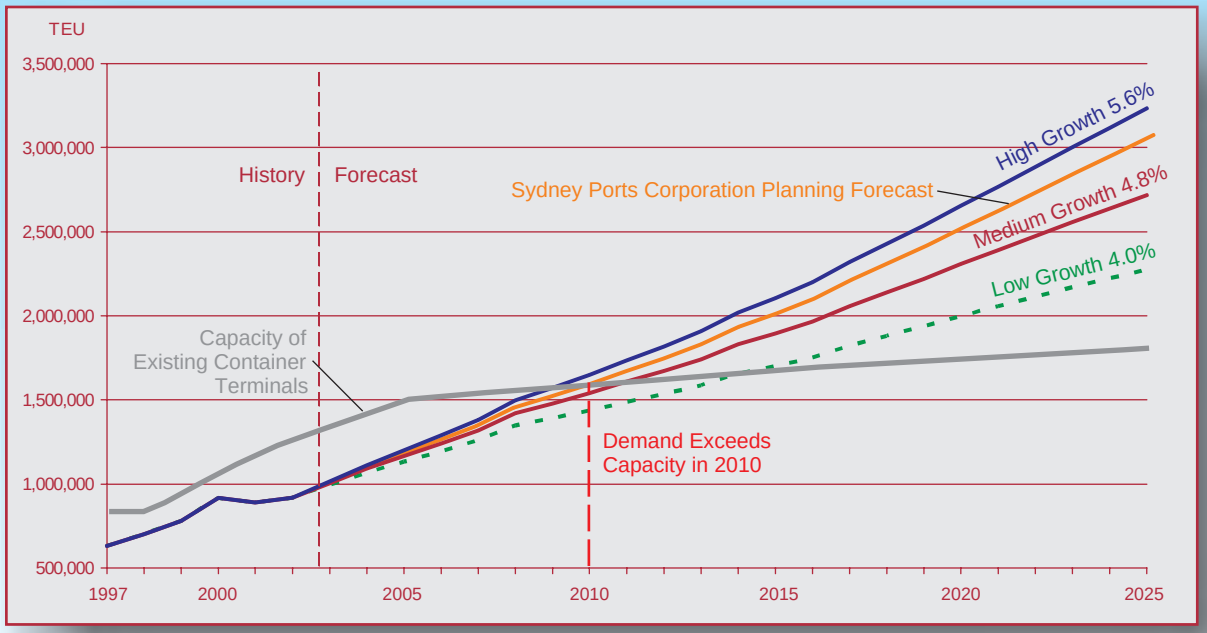
** For modelling purposes the above capacity forecasts assume full development of the new terminal area by end-2010. The new terminal once fully developed would have a capacity of 1.6 million TEUs per year. In reality terminal area and berths would only be brought on line by the terminal operator(s) to meet actual demand (refer Section 4.7).*

As long term trade forecasting is inherently uncertain and has historically been consistently underestimated, for planning purposes it is prudent and necessary to ensure that the capacity of basic port infrastructure (terminal area and wharf length) always exceeds the forecast demand for the given planning horizon. The proposal to provide a new terminal with capacity to cater for 1.6 million TEUs per year would ensure that this is possible to 2025 and beyond as shown in **Table 4.4**.

For commercial, engineering and practical purposes, port infrastructure tends to be constructed on a large scale basis. This is due to the long lead times for planning, approval and construction, the cost of the project, the economies of scale achieved through large scale investment by the port authority and the stevedore, and the ability to minimise environmental concerns It is therefore commercially and environmentally responsible to construct a container terminal which is of sufficient size to accommodate forecast growth in the Sydney container trade at least until 2025.

4.5 How Many Berths Are Required?

To appropriately provide long term capacity for the Sydney container trade, the development of additional container handling facilities at Port Botany must be able to accommodate up to 1.6 million TEUs per year.



Capacity Based on Modest Future Productivity Improvements

Source: Adapted from Access Economics and Maunsell Australia 2003

Forecast Demand v Capacity **Figure 4.3**

The number of berths required to achieve 1.6 million TEUs per year of throughput depends on a number of factors including:

- cargo – number of containers exchanged per ship call, mix of twenty-foot and forty-foot containers, mix of imports and exports, mix of full versus empty containers;
- ships – size of ships (length, width and depth), total number of ship calls, frequency of calls, variable nature of demand including seasonal peaks; and
- capacity factors – efficiency of cargo handling and the amount of ship waiting time that is acceptable to shipping companies and cargo owners.

It is also worth noting that in an operational context a berth is not a fixed length of wharf face. Rather a berth is the amount of wharf face allocated to moor a ship and obviously this varies in accordance with the length of the ship. The term "nominal" berth is used for this reason.

In analysing the number of nominal berths needed to manage the increased volumes of containers expected at Port Botany, reference is made to *World Container Terminals – Global Growth and Private Profit* (Drewry Shipping Consultants 1998). This authoritative publication provides a "rule of thumb" industry benchmark and an "at capacity" terminal benchmark to calculate container terminal capacity measurements as shown in **Table 4.5.**

Table 4.5 Wharf Length Benchmarks for Container Terminals

	ANNUAL THROUGHPUT PER METRE OF WHARF (TEUs)	TOTAL EFFECTIVE LENGTH OF PROPOSED WHARF*	TOTAL THROUGHPUT (MILLION TEU)
"Rule of Thumb" Industry Benchmark	750	1,700 m	1.28
"At Capacity" Terminal Benchmark	965.5	1,700 m	1.64

** Allowance has been made for 150 m of wharf face on the southwestern corner as this would be used by the end berth on the north south wharf face.*

Table 4.5 shows that at least 1,700 m of operational wharf face would be required to accommodate the expected shortfall in capacity of about 1.2 million TEUs per year in 2025. The table also shows that with the provision of the proposed length of wharf, the new terminal would have the capacity to accommodate approximately 1.6 million TEUs per year which would allow Sydney Ports Corporation to cater for forecast container trade growth beyond 2025.

At present the average length of ships arriving at Port Botany is a little over 200 m, although the largest ships currently visiting Port Botany are more than 280 m in length. Drewry Shipping Consultants and Maunsell Australia in a report titled *Forecast Development of Container Ship Size in Main Australian Trades* (2002) predict that by 2025, the average length of ships coming to Port Botany is expected to be 243 m, although ships in the 6,000 to 8,000 TEU range would be visiting the port by this time which would be well over 300 m in length.

When allowance is made for the need to accommodate larger ships over time, the randomness of ship arrival and adequate spacing at both ends of the wharf face and between docked ships, the 1,700 m of operational wharf face required to accommodate 1.6 million TEUs per year translates into five nominal berth lengths of 340 m each.

4.6 How Much Land Is Required?

The Access Economics and Maunsell Australia analysis shows that five berths and at least 60 ha of terminal area would be required to provide 1.6 million TEUs per year of additional container handling capacity. This is consistent with international guidelines for container ports and with the terminal areas of the existing container terminals at Port Botany as discussed below.

Terminal area capacity, like berth capacity, is a dynamic concept, which can change very significantly due to operational and technological changes. Generally, the trend worldwide is towards increased terminal area capacity per hectare. The criteria contained in the International Association of Ports and Harbours' 2001 *Port Planning and Design Guidelines* recommends a land area of between 10 and 15 ha per berth (IAPH 2001).

It can be seen from **Table 4.6** that the existing terminal areas at Port Botany are within the international guidelines of 10 to 15 ha per berth.

Table 4.6 Existing Port Botany Terminal Areas

EXISTING TERMINALS	BERTH LENGTH (M)	NO. OF NOMINAL BERTHS[1]	TERMINAL AREA (ha)	AREA / BERTH[1] (ha)
South Brotherson Dock - P&O Ports	936	3	33.5 – (38.6)[2]	10.7 – (12.4)
North Brotherson Dock - Patrick Stevedores	1006	3	43.8 – (46)[2]	13.1 – (13.7)

[1] Based on a nominal berth length of 300 m. Berth lengths of at least 300 m will be required to accommodate next generation container ships.
[2] Figures in brackets allow for development of existing leased land or proposed expansion. P&O development of 5.1 ha and Patrick Redevelopment of 2.2 ha (refer Section 4.3.2).

In the Port Botany context, there would be five berths associated with the new terminal area. Consistent with the above criteria, a nominal 12 ha would be required for each berth giving a total of approximately an additional 60 ha for landside handling and storage.

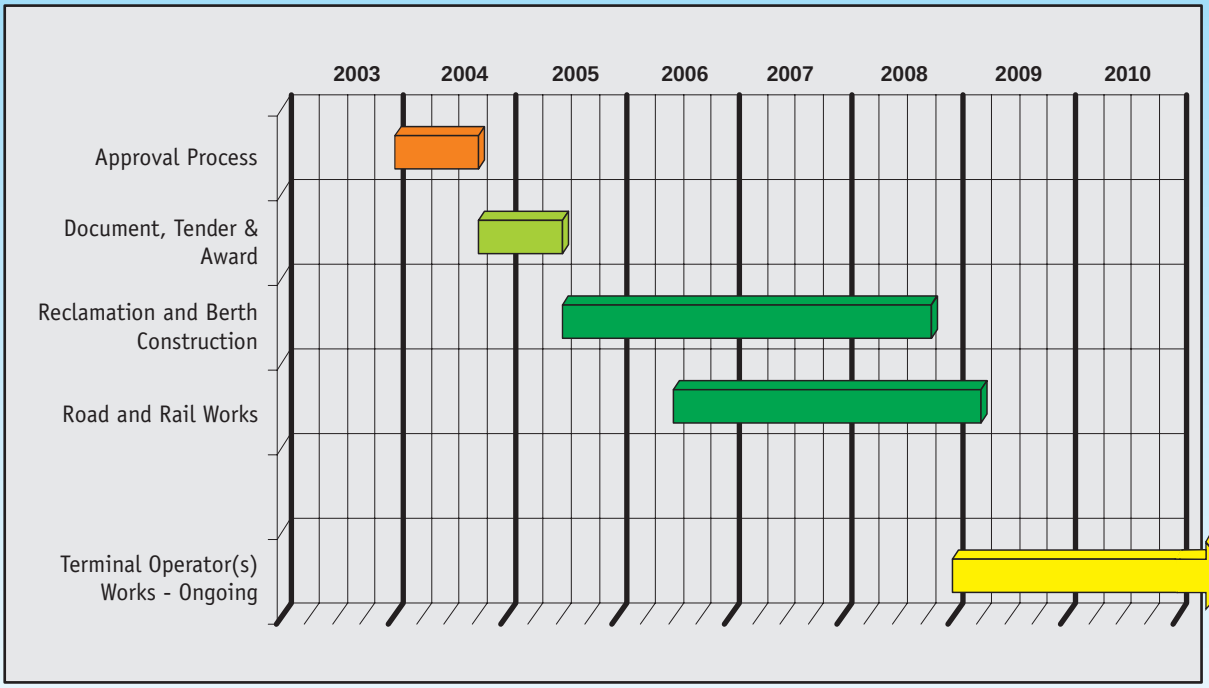
In addition to the 60 ha required for the five new berths, approximately 3 ha would be required parallel to Penrhyn Road for the Inter-Terminal Access Road and rail sidings. This gives a total terminal area for the proposed Port Botany Expansion of 63 ha for operational port purposes.

4.7 Lead Times

While it is certain that increasing trade would require new land and container berth space at Port Botany, it is not possible to precisely predict the timing of exactly when each additional berth space or additional increment of terminal area would need to be commissioned. However, the analysis in this chapter indicates that the initial stage of the proposed Port Botany Expansion would be needed by 2010.

The lead time for planning approval, tender evaluation, reclamation, berth construction, road and rail works and terminal operator's facilities would be approximately seven years. The subsequent roll-out of additional terminal equipment and capacity would have lead times of no greater than 12 to 18 months for each new berth.

The overall development programme for the proposed Port Botany Expansion is shown in **Figure 4.4**.



Indicative Development Programme **Figure 4.4**

The timetable presented in **Figure 4.4** assumes that the approval process could be completed in 9 months from lodgement of the EIS, and that a subsequent 9 month period would be required to complete contract documentation, tendering, evaluation and award of construction contract(s). This would enable reclamation works to commence in 2005 and for a terminal operator to commence construction and installation of terminal facilities and equipment in early 2009, which would mean the first berth of the new terminal could be ready in 2010.

As the lead time for incremental expansion of the terminal operators facilities would only be in the order of 12 to 18 months, it would be possible for the operator(s) to monitor actual demand and to phase in additional capacity at the optimal time to suit their commercial needs.

While the proposed new facilities would be sufficient for another major terminal operator, the final number of operators in the port and the commercial arrangements between existing and potential new operators would be determined at a later stage, in accordance with competition and market forces prevailing at the time. The expansion proposed would be designed to provide flexibility for various leasing and operational arrangements.

With the long lead time required to develop additional capacity at Port Botany and, in view of the economic savings that would result from undertaking the dredging and reclamation works in one continuous operation, the most realistic way of assuring the capacity is developed in time is for Sydney Ports Corporation to manage the reclamation and berth construction. The cost of these works would be recouped over time from lease and port charges.

In addition to the strategic issue of extended lead times, the separation or staging of the dredging and reclamation works into smaller elements is not feasible for environmental and commercial reasons. The staging of these works would entail significant remobilisation costs for major equipment and would result in a much more protracted environmental impact.

4.8 Sydney Ports Corporation Strategy

One of Sydney Ports Corporation's key responsibilities is to manage and develop port facilities and services to cater for existing and future trade needs. Given the long lead times required for planning, approval and construction of major port infrastructure and the economic impacts of not being able to meet the required trade demands, it is necessary for Sydney Ports Corporation to adopt a strategy that minimises the risk of significant congestion occurring prior to sufficient capacity being provided. As documented in this chapter, this strategy includes the adoption of medium to high demand growth forecasts and modest productivity improvements. The analysis shows that Sydney Ports Corporation must act now to ensure that the required infrastructure and capacity is in place to meet forecast demand in 2010.

If Sydney does not develop the necessary infrastructure to efficiently handle shipping and provide sufficient container handling capacity, it would put itself at risk of demotion from a "must call" status for shipping companies with the resultant loss in trade to the competing interstate ports. This loss in trade and the resultant transport and shipping penalties resulting from the use of more distant alternative ports, would see businesses fail to grow or move interstate or overseas with obvious adverse long term impacts on the NSW economy.

An efficient port is a strategic advantage in attracting business opportunities to a region. As will be shown in **Chapter 5** *Alternatives*, Port Botany, with its natural advantages such as its proximity to the Sydney market,

access to a dedicated freight rail line, good road links and its deep water channel, can respond to the changes in world shipping at relatively low cost.

As long term trade forecasting is inherently uncertain for planning purposes it is prudent and necessary to ensure that the capacity of basic port infrastructure (terminal area and berth length) always remains ahead of the forecast demand for the given planning horizon. The proposal to provide an additional five nominal berth lengths and approximately 60 ha of terminal area to cater for 1.6 million TEUs per year would ensure that this is possible for the next 25 years and beyond.