Summary of key outcomes:

The high economic and environmental cost of transporting containers from alternative intrastate or interstate locations, together with the strong trend in international shipping to consolidate services to fewer ports of call with larger ships and larger exchanges per call, are significant factors that detract from the viability of more distant alternatives to meet the forecast growth in demand for container handling facilities to service the Sydney market.

As the State Government has announced that container trade is to be phased out within Sydney Harbour, it is evident that the existing status of Port Botany on global trade routes as well as the port's proximity to the Sydney market dictate that capacity to provide for future container trade growth would best be provided for by expanding the existing facilities at Port Botany.

In order to cater for future growth in container trade, there is a need for five additional berths and approximately 60 ha of land with good road and rail access. Opportunities for the development of alternatives to cater for this demand in Port Botany are limited by environmental considerations, land ownership, the operational buffer distances required by Sydney Airport and the operational requirements of the existing facilities at Port Botany. The preferred location between the Parallel Runway and Brotherson Dock is the most desirable alternative with distinct transport, shipping, infrastructure and environmental benefits.

5.1 Introduction

The analysis in **Chapter 4** *Need for the Project* shows that additional container handling capacity would be required by 2010 to ensure that significant congestion is avoided at Port Botany. The analysis also shows that at least 1.2 million TEUs per year of additional capacity would be required to provide sufficient capacity to meet the forecast growth in container trade at Port Botany to 2025.

To ensure that capacity always exceeds the forecast demand over the long term, the prudent planning approach would be to provide additional facilities to cater for 1.6 million TEUs per year. This would require a new container terminal with five berths and at least 60 ha of additional terminal area.

In developing the project scope and location, Sydney Ports Corporation has considered a range of alternatives for satisfying this need for additional container handling capacity. In this chapter, the assessment of alternatives has included the evaluation of other locations on a national, regional and local level. Alternatives that could not meet the required objectives have not been subjected to further assessment. Alternatives that have been evaluated include:

- interstate development of port facilities - Melbourne and Brisbane;
- development at other existing NSW port facilities - Port Kembla and Newcastle;
- development at greenfield sites in NSW – Jervis Bay, Port Stephens and Broken Bay/Pittwater;
- Sydney Harbour;
- Botany Bay;
- alternative layouts within Port Botany; and
- the “do nothing” scenario.

5.2 Site Selection Criteria and Requirements

In assessing the suitability of alternative locations to accommodate future container trade growth, a number of factors have been taken into consideration:

- availability of land for terminal facilities;
- availability and capacity of landside transport (road and rail) and proximity to trade markets;
- ship size and port infrastructure – ability to cater for future generations of larger ships;
- ability to compete in the global shipping market;
- availability of supporting services (customs services, quarantine, shipping agents, fuel supply, etc);
- environmental considerations; and
- capital cost of providing port and transport infrastructure.

5.2.1 Availability of Land

The criteria contained in the International Association of Ports and Harbours' 2001 *Port Planning and Design Guidelines* recommend a land area of between 10 and 15 ha per berth (IAPH 2001). Modern container terminal design requires that for optimal terminal efficiency the container storage area and road/rail exchange facilities be located directly behind the wharf structure. A rectangular shape enables internal travel distances to be minimised and to provide the required area of 10 to 15 ha per berth, it is necessary for the terminal to be between 330 and 500 m wide.

To accommodate the forecast growth in trade, there would be a requirement for an additional five berths and approximately 60 ha of additional terminal area (including area for rail sidings, truck exchange facilities and terminal access).

5.2.2 Landside Transport and Proximity to Markets

The efficiency of a port is not limited to its ability to receive and process ships, but is also very largely dependent upon its proximity and transport links to its primary markets. A container terminal is part of an integrated and complex logistical chain that includes the road and rail links (local and arterial), distribution centres, warehouses, empty container storage and handling depots, shipping agents/freight forwarders and the management and communication systems used to coordinate and link these facilities.

The complexity and cost of transport links increases with distance from market, but all ports require good local and regional/arterial road and rail links. The suitability of the road/rail mode share is important as rail is a cheaper more efficient means of transporting larger numbers of containers greater distances. Rail, however, lacks the flexibility of road and is unable to provide the "door to door" service necessary to transport containers to/from their ultimate destinations or sources. The following transport infrastructure criteria are important when assessing the suitability of future port sites:

- local road systems - road traffic must be able to access the port without undue delays due to congestion, queuing, curfews, restriction on truck sizes or movements, parking and related road services. These factors may favour the development of more remote sites that are unaffected by metropolitan traffic;
- arterial road links - a good arterial and regional road network is required to connect a local port road network with various markets. A site further from the market would require a more extensive regional and motorway system. A centrally located port facility would minimise the distance travelled on the transport network;
- rail links and intermodal facilities - due to the potential lower economic and environmental cost of transporting containers by rail, there is a desire to increase the percentage of containers transported by rail. The efficiency and capacity of a rail system is largely dependent upon:
  - the length and configuration of terminal rail sidings – multiple sidings of at least between 400 to 600 m in length would be required for a modern container terminal facility;
  - the capacity of local and regional rail networks available for transporting of freight: this would affect the frequency and reliability of rail services. Whilst longer trains require fewer movements or train paths to transport the same number of TEUs and regional/interstate trains may be up to 1,500 m in length, the operational and infrastructure constraints (length of signalling blocks, junction

spacings, etc.) of the Sydney network dictate that 600 to 750 m is the maximum length for freight trains travelling within the metropolitan rail network;

– the configuration and management of terminal facilities, marshalling yards and sidings; and

– the capacity and location (with respect to market centres) of intermodal facilities for further distribution of containers.

The distance of a port to its primary market is a key factor which affects its commercial, logistical and environmental viability. The following factors are affected by the proximity of a port to its market:

- transport costs – the increased costs resulting from greater distances can be partially offset by providing better and more efficient road and rail links (e.g. dedicated freight rail lines, high capacity freeways, increasing the number of TEUs per train/truck, etc.). However, a large proportion of transport costs are directly proportional to distance travelled. This cost is normally expressed as a cost per tonne/kilometre. Other transport costs, for example vehicle loading/unloading, scheduling costs, etc, are independent of distance travelled and would not be impacted upon by proximity to the market;
- reliability and frequency of service - shorter travel distances and times simplify the logistic chain and enable transport companies to provide more frequent, reliable and flexible services. This in turn allows industry to carry lower inventories and provide better services to their customers, thus lowering inventory costs; and
- environmental impacts **-** energy consumption and emissions are proportional to distance travelled as well as the efficiency of the network. In addition to these direct impacts, increased transport distances, and the resultant requirement for additional infrastructure, also have secondary environmental impacts. Increased travel distances would also increase safety risks.

5.2.3 Ship Size and Port Infrastructure

A report titled *Forecast Development of Container Ship Size in Main Australian Trades* (Drewry Shipping Consultants and Maunsell Australia 2002) predicts that ships in the 6,000 to 8,000 TEU range would begin to service Australian ports within the next 15 to 20 years. To remain a competitive port and retain the status as an important medium size/regional destination for shipping and international trade, new container terminal facilities would need to have the capacity to receive the larger 6,000 to 8,000 TEU ships.

In 2000, the average capacity of ships calling at Port Botany was approximately 2,000 TEUs. By 2010, when the new terminal capacity would be required, it is expected that over 45% of ships would have a capacity of between 3,000 and 5,000 TEUs. By 2020, 11% of ships are expected to be in the 6,000 to 8,000 TEU range.

A port that is to accommodate future 6,000 to 8,000 TEU range container ships would need to have a minimum channel and berthing depth of at least 16 m, a minimum air draft of 50 m and be able to provide berthing lengths of approximately 340 m.

5.2.4 Ability to Attract Shipping

The Drewry Shipping Consultants and Maunsell Australia report (2002) also notes that there is a trend driven by commercial imperatives for shipping companies to achieve economies of scale by operating larger ships,

visiting fewer ports and restricting services to only major trade routes. This trend has resulted in a consolidation of shipping lines and the emergence of shared services to Australian ports.

Drewry Shipping Consultants and Maunsell Australia (2002) set out the key impacts of this trend on the provision of port infrastructure in Australia as follows:

- services would involve increasing numbers of larger ships, with pressure to provide infrastructure to serve them. Ports that are not able to accommodate these larger ships would be at risk of losing their "must call" status and the benefits of good direct trade links to overseas markets;
- services would use larger ships with increased refrigeration capacity and if ports do not develop capacity to service these ships they may lose this trade; and
- landbridging by road or rail is not an economical option as long journeys by land have higher transport and environmental costs (e.g. increased air emissions). If significant landbridging were required, it is likely that the penalty would be a diversion of trade and business to alternative, more distant ports.

5.2.5 Supporting Services

Container terminals need to be serviced by supporting services which include:

- customs and security - due to heightened security requirements there are a number of international initiatives to improve the level of freight security (primarily involving cargo inspection and tracking). The recently commissioned container X-ray facilities in Melbourne and Port Botany are examples of measures being adopted to improve the level of control over Australian cargo movements;
- quarantine facilities - as an island environment with a high dependence upon the agricultural and tourism industries, Australian ports have stringent quarantine inspection requirements; and
- shipping agents, freight forwarders, towage, logistics management, fuel supply and ship servicing – these are examples of supporting infrastructure and services necessary for the functioning of a modern container port.

The requirements for the above supporting infrastructure favour the expansion of existing ports as it would be necessary for any greenfield site to incur significant additional costs to establish these services.

5.2.6 Environmental Considerations

The development of additional container handling infrastructure would inevitably result in some environmental impacts, regardless of the location. However, these impacts would generally be of a lesser nature in the expansion of existing facilities, as opposed to the development of greenfield sites.

All modern development in Australia would be subject to stringent environmental approvals, mitigation measures and controls and it is important to objectively assess the potential economic and commercial benefits of the development against the likely environmental impacts (e.g. the environmental sustainability of the development; terrestrial and aquatic ecology; impacts resulting from the requirement for additional transport and port services infrastructure; social and community issues; etc).

5.2.7 Cost of Infrastructure

The cost of providing the required infrastructure to meet the growth in trade would ultimately be carried by the consumers of imports and producers of exports. It should be noted that this would be the case whether the initial capital cost of developing the infrastructure is carried by industry or by Government.

In consideration of the cost of infrastructure, it is necessary to account for the total infrastructure cost necessary to service all aspects of the required port capacity. For expansion of existing port facilities, the cost of supporting infrastructure would generally be lower as it would only be necessary to carry the cost of increasing existing capacity as much of the supporting infrastructure would already be available at or close to the existing facilities.

5.3 Interstate Alternatives

In terms of competing for trade and industrial development on the eastern seaboard of Australia the other major interstate ports are Melbourne and Brisbane. Details of the Melbourne and Brisbane port facilities are included in **Chapter 3** *Existing Port Operations*.

5.3.1 Melbourne

The Port of Melbourne has two four-berth international container terminals which handled 1.4 million TEUs in 2001/02. Port container trade has been growing at about 7.5% per year since 1995/96 and significant future expansion would be needed to cater for Melbourne's own projected trade growth which is forecast to be 2.8 million TEUs per year by 2020.

Proposed expansion opportunities include the extension of Swanson Dock, which is expected to have capacity for a further 1.4 million TEUs per year by 2020. There is also the potential to extend Webb Dock and to develop Westgate Terminal. These improvements in capacity would cater for Melbourne's growth well past 2020.

The capacity of the Port of Melbourne to accommodate the predicted increase in Sydney's container trade, should the proposed Port Botany Expansion not proceed, is outlined below.

Availability of Land

The Port of Melbourne Land Use Plan (Melbourne Port Corporation web site, March 2003) notes that to accommodate container trade growth in Melbourne, a 2 ha increase in land area would be required by 2010, and a further three berths and 23 ha of terminal area by 2020.

The expansion of berth and land facilities could be achieved by:

- a corresponding reduction in available land within the port for other cargo related activities, although these activities would then need to be relocated to neighbouring areas;
- the northward extension of Swanson Dock, however, the environmental impacts and infrastructure costs of such work would require detailed assessment prior to this being adopted as a feasible option; and
- in the longer term, the extension of Webb Dock and development of the Westgate Terminal.

Landside Transport and Proximity to Markets

The port has road and rail linkages to the wider network, however, some local road improvements would be required to accommodate increased throughput in the immediate future. As the growth increases towards 2020, a significant number of other road and rail improvements would also be required including grade separation of rail lines at major road intersections in the proximity of the port. The potential areas for growth (Webb Dock and Westgate Terminal) are yet to be connected to the main rail hub and this would involve a costly tunnel or bridged river crossing.

A track audit by Australian Rail Track Corporation (ARTC) in 2001, found that freight trains between Melbourne, Sydney and Brisbane could no longer offer competitive services, mainly because of obsolete and poor quality track and signalling. Significant investment (approximately $400 million) would be required to upgrade this link to an acceptable standard to run a reliable interstate freight service. This includes a dedicated freight track between Macarthur and Chullora (estimates have indicated that the cost of this link alone could be as high as $150 million) which would be required to avoid delays due to interfaces with passenger trains.

If the forecast increase in container trade (approximately 1.2 million TEUs per year by 2025) generated by the Sydney basin is to be absorbed by Melbourne due to a failure to expand Port Botany, there would be a requirement to run an additional 15 trains, each 1,500 m in length, for 365 days a year. The landbridging costs associated with transporting containers this distance would be an additional $610 per TEU which translates into $730 million per year as shown in the analysis by Access Economics and Maunsell Australia in Appendix D. Additional intermodal container terminal capacity would also be required in Sydney to support the large cargo volumes and long trains which would be arriving from Melbourne.

Ship Size and Port Infrastructure

The Port of Melbourne has significant shipping capacity constrictions associated with the depth of its shipping channel which is currently maintained to a depth of only 13.1 m. This restricts ships to a maximum draft of 11.6 m (12.1m with tide assistance) which results in more than 10% of current container ships being unable to load to their full capacity. With the predicted increase in ship sizes, this would increase to approximately 25% by 2005 (Drewry Shipping Consultants and Maunsell Australia 2002).

Deepening of the channel has been recognised as a priority, but the cost of providing a channel depth of 16 m may prove prohibitive. A preliminary cost estimate to dredge to 14 m is $400 million. Additional cost would also be incurred in constructing new wharf infrastructure to facilitate the increased berthing depths. Several significant environmental challenges need to be overcome before dredging of the channel could commence.

In addition to the above depth restrictions, there is a limitation of 290 m for the overall length of ships utilising the existing container terminals, this is likely to preclude ships greater than 6,000 TEUs from using the port.

Conclusion

In terms of land availability and berth capacity, the Port of Melbourne could provide sufficient capacity for the forecast growth in container trade in Melbourne, but it is doubtful that it could cater for this growth plus any significant proportion of Sydney's forecast growth.

The Port of Melbourne would face significant challenge and cost in meeting the infrastructure demands necessary to provide for the larger ships that would be servicing the Australian routes in future years and this could constrain its future growth potential. The additional transport infrastructure (primarily rail) necessary for the 870 km landbridge to carry Sydney's projected growth could be provided, but this would again entail significant capital cost.

It is, however, the additional and ongoing landbridging costs that would prevent the Port of Melbourne from ever absorbing a significant proportion of Sydney's future container trade growth. The additional cost, estimated at $610 per TEU, would amount to $730 million per year by 2025. This would be an unacceptable cost burden to the people of NSW.

Should Melbourne be considered as an alternative to Sydney, then it is anticipated that the trade growth in Sydney would start being diverted only after capacity at Port Botany was exceeded (i.e. about 2010). Once trade began being diverted, it is expected that exporting industries would see lower cost opportunities in Melbourne and other centres (or perhaps even overseas) and be encouraged to relocate to these centres, rather than carry the increased landbridging and infrastructure costs. This would restrict Sydney's economic growth, detract from the competitiveness of the NSW economy and result in an increase in the cost of living.

For these reasons Melbourne is not seen as a viable alternative for handling Sydney's growth in container trade.

5.3.2 Brisbane

The Port of Brisbane is the third largest capital city port in Australia. The hub of the port's activity is the Fisherman Islands facility situated on reclaimed land at the mouth of the Brisbane River which handled 482,000 TEUs in 2001/02. Port container trade grew by 6% in 2001/02 and significant future expansion would be needed to cater for Brisbane's own projected trade growth which is forecast to reach 1.9 million TEUs per year by 2025.

A 25-year strategic plan for the future growth of the port was completed in January 2000 (Port of Brisbane web site, February 2003). A key outcome of the plan is a proposal to reclaim an additional 230 ha of land at Fisherman Islands to provide an additional 1,800 m of wharf frontage.

The capacity of the Port of Brisbane to accommodate the predicted increase in Sydney's container trade, should the proposed Port Botany Expansion not proceed, is outlined below.

Availability of Land

The port's proposal to reclaim 230 ha of additional land at Fisherman Islands and create a further 1,800 m of wharf frontage would satisfy Brisbane's forecast demand for increased berth and container terminal area until 2030. With respect to terminal capacity, it is possible that in the medium term the port could cater for part of Sydney's projected growth. It is, however, likely that without further large scale development, by about 2025 the port's anticipated own need for an additional wharf frontage would result in it being unable to provide the further capacity necessary to service trade diverted from Sydney.

Landside Transport and Proximity to Markets

Fisherman Islands has good rail and road links to the major centres in Queensland. Fisherman Islands is served by a single rail terminal (the Brisbane Multimodal Terminal) centrally located on the island. All containers are transferred between the stevedores' terminals to empty container depots or the rail terminal by truck.

Recent ARTC rail audits have shown that the Sydney/Brisbane rail corridor would require considerable capital investment to bring it up to an acceptable level to run a reliable freight service. Improving passenger and freight services including a priority rail freight track on the critical Newcastle/Sydney leg would require expenditure of approximately $1.2 billion. This is a particularly difficult corridor that would require extensive tunnelling and expensive environmental measures through the Ku-ring-gai Chase National Park north of Sydney.

The cost of landbridging the 980 km to Sydney by rail would be approximately $650 per TEU (in the order of 3% of the value of a container). By 2025, this would equate to an additional transport cost of $780 million per year which would need to be borne by NSW consumers and exporters. Should Brisbane be considered as an alternative to Sydney, then it is anticipated that the trade growth in Sydney would also start being diverted from about 2010. The additional landbridging costs would retard Sydney's growth, detract from the competitiveness of the NSW economy and result in an increase in the cost of living and result in the relocation of businesses.

Ship Size and Port Infrastructure

The existing berthing depths are between 13 m and 14 m. It is understood that the 90 km channel has been deepened to a minimum depth of 14 m and existing container berths are able to accommodate new generation 4,000 TEU ships. Ships with 6,000 to 8,000 TEU capacity require channel and berth depths of 16 m. The channel may be able to be deepened to 16 m, however, the cost of dredging would be significant as at least 15% of the channel would need to be dredged and there would be a risk of undermining adjacent wharf structures. Large scale channel dredging could also have environmental impacts.

Conclusion

In terms of land availability and berth length, the Port of Brisbane should be able to meet its projected growth and cater, at least in part, for some of Sydney's anticipated growth in the short to medium term. It would, however, face significant challenges and costs in meeting the infrastructure demands necessary to provide for the larger ships which would be servicing the Australian routes in future years.

As with Melbourne, it is the additional and ongoing landbridging costs that would prevent the Port of Brisbane from ever absorbing a significant proportion of Sydney's future container trade growth.

For these reasons Brisbane is not seen as a viable alternative for handling Sydney's growth in container trade.

5.3.3 Summary

In terms of meeting the Sydney and NSW demand for container trade, both Melbourne and Brisbane are too far away to reliably and economically service the Sydney market. Landbridging costs would be high and it is

likely that the cost of providing the necessary upgraded road, rail and channel infrastructure would be prohibitive. The final result may be not only a loss of NSW trade, but also a loss of industry itself.

5.4 NSW Alternatives

The two NSW port facilities that could possibly provide additional container port capacity to meet the anticipated trade growth are Port Kembla and Newcastle. Details of the Newcastle and Port Kembla port facilities are included in **Chapter 3** *Existing Port Operations*.

Figure 5.1 shows the relative distance of Port Kembla, Newcastle and Port Botany from the Sydney market. Distances shown are the approximate distance by road to the Chullora intermodal terminal in western Sydney. The Chullora intermodal terminal was selected as representative of the average distances containers are likely to travel from the various ports to the markets in metropolitan Sydney.

5.4.1 Port Kembla

Port Kembla's trade is dominated by the export of bulk commodities. Existing trade in containers is very limited (approximately 1,000 TEUs per year) and the port is geared to handle the specialised needs of its locality, such as the import of raw materials and equipment for heavy industry and the export of grain, coal and finished products. There are currently no dedicated container terminal facilities in Port Kembla.

The viability of Port Kembla to accommodate the predicted increase in Sydney's container trade is discussed below.

Availability of Land

The port is currently progressing a proposal to convert its existing Multi-Purpose Berth to a container terminal. The Multi-Purpose Berth is located in the Inner Harbour and comprises approximately 40 ha of vacant land and a berth length of approximately 300 m.

The proposed throughput of the Multi-Purpose Berth development would initially be 100,000 TEUs per year with an upper limit of 200,000 TEUs per year with land and berth improvements. The current berth has potential to be extended to 500 m, but this extension would require the closure or reconfiguration of existing BHP berths. In the absence of changes to BHP operations, there is no other area suitable for establishment of additional container terminal area.

An Outer Harbour development, involving the reclamation of around 30 ha of land using waste material such as slag, coal wash and excavated earth to provide up to two new berths, has also been proposed at Port Kembla. However, due to wave action in the Outer Harbour, this proposal would not be suitable for a container terminal as the continual movement of container ships would make it difficult to load and unload containers. This proposal would be more suited to general and bulk cargo types.

Landside Transport and Proximity to Markets

Port Kembla is currently served by the Hume and Princes Highways and the F6 Freeway which link it to Sydney, the southern regions of NSW and Canberra.

Distance to Sydney Market **Figure 5.1**

Rail connections to the Sydney market include the direct Illawarra line and the southern freight line via Moss Vale. The southern freight line is congested and the Illawarra line provides a shared service with passenger trains. Due to the priority given to passenger trains (including morning and afternoon peak curfews on freight trains), the existing coal and wheat traffic and the steep grade on the Illawarra Escarpment, there is no guarantee that the Illawarra rail corridor could provide a reliable container service of the required capacity to service Sydney's trade needs. It is likely that a large infrastructure investment would be required to upgrade the capacity of the existing Illawarra line from Port Kembla to Sydney.

Port Kembla is approximately 90 km by road and 100 km by rail from Sydney as shown on **Figure 5.1**. The Access Economics and Maunsell Australia report (**Appendix D**) shows that the additional distance and travel time from Port Kembla would add around $100 to the cost of transporting a TEU to the Sydney market by road when compared with Port Botany. The additional cost for transporting a container by rail would be approximately $50 per TEU.

The cumulative cost of transporting 200,000 TEUs per year to the Sydney market as proposed would equate to an additional $10 to $20 million per year. Even if it were possible to cater for Sydney's forecast increase in container trade at Port Kembla, the additional transport costs associated with this volume of trade would be more than $80 million per year. These additional and ongoing costs would have to be borne by NSW consumers and export industries.

Ship Size and Port Infrastructure

The Port Kembla Multi-Purpose Berth has the capacity to accommodate a large ship in the 6,000 to 8,000 TEU range. It would require some dredging of the channel to improve its existing depth of 15.25 m to 16 m, but this is not considered to be a significant obstacle. The existing navigation and berthing approaches are not ideal and larger ships could be constrained in certain wind, wave and current conditions.

Ability to Attract Shipping

Notwithstanding the physical ability of Port Kembla to accommodate large ships, the critical question is whether these ships are likely to call at Port Kembla to exchange containers to/from the Sydney market. As shipping lines are rationalising their services by using larger ships, reducing the number of ports of call and having larger exchanges per call, Port Kembla is unlikely to be able to attract major shipping lines as these lines could not be expected to call at both Port Botany and Port Kembla on the same voyage.

Conclusion

In terms of land availability and berth length Port Kembla could handle approximately 100,000 to 200,000 TEUs of growth from the Sydney market.

The scale and proximity of Port Kembla to the major ports in Sydney, would make it highly unlikely that Port Kembla would be able to attract major shipping lines as it would be contrary to the existing world-wide trend towards rationalisation of services. A further disadvantage is the lack of surplus capacity on the existing rail and road connections, as well as the additional transport costs to get products to or from the Sydney market.

However, it is expected that Port Kembla would continue to service a niche market for regional commodities and may attract small volumes of containers from smaller shipping lines and/or from parts of NSW closer to

Port Kembla than to Port Botany, but Port Kembla is not considered to be a viable alternative for any significant proportion of Sydney's future growth in container trade.

5.4.2 Newcastle

The Port of Newcastle is dominated by the export of coal and is the largest and most important coal export facility in Australia. It has the capacity to export 90 million tonnes of coal per year from its Kooragang and Carrington terminals.

At present, Newcastle handles between 10,000 and 15,000 TEUs per year. The port is currently running an Expression of Interest and tender process for redevelopment of the decommissioned BHP steelworks facilities to serve as a new Multi-Purpose Terminal (MPT). It is proposed that the MPT would be able to handle between 350,000 and 500,000 TEUs per year.

The viability of the Port of Newcastle to accommodate the predicted increase in Sydney's increase in container trade is discussed below.

Availability of Land

Other than the 4 ha area in the Eastern Basin that currently accepts containers, most of the existing port facilities do not have additional land that could be developed as container storage area. The proposed MPT site, however, has 45 ha available for development, 30 ha of which are designated for container handling and 5 ha for administration facilities and rail sidings. The container terminal would be serviced by two dedicated container berths on a 600 m straight wharf frontage.

It is estimated that the facility would commence operations in about 2006 with 100,000 TEUs per year. It has also been proposed that this would increase to 350,000 TEUs per year within five years and ultimately to as much as 500,000 TEUs per year.

Subject to State Government master planning, there is potentially a further 100 ha of adjacent undeveloped industrial land that could be utilised for expansion of the MPT. Construction of additional berths would require extensive dredging of contaminated sediments and the extension may have to be constructed at an angle to the original 600 m container wharf frontage which would impact on the terminal's flexibility. If the potential expansion was successfully completed, it could lift the capacity of the MPT to about 1 million TEUs per year.

Landside Transport and Proximity to Markets

The proposed MPT would have four 850 m long rail sidings which would be connected to the Port Waratah rail spur. The Port Waratah rail spur is a dedicated freight line that connects to the combined four track passenger and freight main line near Newcastle.

Newcastle Ports Corporation predict that 70% of the container trade at the MPT would have a source or destination within the Sydney metropolitan area and that 80% of this would be transported by rail. For a 350,000 TEU terminal, this equates to approximately 200,000 TEUs per year, or between four and five 900 m long trains per day. To transport a similar proportion of Sydney's forecast container trade would ultimately require more than 15 trains per day.

The current rail line between Sydney and Newcastle has serious limitations and has a restricted number of daily freight paths. Freight and passenger services share the same dual track and currently only about 18 freight trains per day use the Sydney to Newcastle rail line in each direction. With priority being given to passenger trains and curfews in place during morning and afternoon peaks, the rail line can only accommodate about one freight train per hour in each direction. This suggests that the rail link is already at or close to capacity in relation to freight train movements.

There is also an increasing need to provide additional passenger services on the rail line to accommodate commuter traffic, especially from the NSW Central Coast, which is experiencing rapid population growth. This may further increase the pressure to limit any expansion in freight rail services on the Sydney to Newcastle rail line.

Further limitations on capacity are imposed by the rugged terrain through which this corridor passes and as a result there are several bottlenecks, tight curves and sections of steep grade that restrict the speed and limit the permissible loads of freight trains.

The cost of eliminating bottlenecks and increasing capacity would be very high (estimated at $1.2 billion), and at present no significant capital works budget has been committed to undertake these works. There would also be serious environmental consequences associated with the upgrading of this line which may necessitate extensive tunnelling beneath National Parks.

The MPT has good local road access via Industrial Drive (two lanes each way) which feeds directly onto the Pacific Highway, which in turn feeds into the F3 Freeway connecting it to Sydney. The F3 is already highly utilised and congestion frequently causes lengthy delays during peak flows. As is the case with the Sydney to Newcastle rail corridor, the F3 traverses rugged terrain and serves the rapidly growing population centres on the Central Coast. It is currently being upgraded to three lanes each way, but is expected to reach capacity on completion in 2008. The cost of providing additional capacity would be extremely high and no publicly available plans exist to significantly increase the capacity of this link.

Newcastle is approximately 170 km by road and rail from Sydney as shown on **Figure 5.1**. The additional distance and travel time to Newcastle compared with Port Botany would add approximately $160 to the cost of transporting a TEU by road. The additional rail transport cost would be approximately $100 per TEU (**Appendix D**).

If 70% of the volume of containers handled through the MPT proposal have a source or destination within Sydney, as stated by Newcastle Ports Corporation, this would represent 245,000 TEUs per year for a 350,000 TEU terminal. If 80% of containers were transported by rail, the additional cost would be approximately $27.5 million per year. To cater for Sydney's forecast volume of containers in 2025, the additional transport costs to and from Newcastle would be more than $130 million per year. A cost which would be unacceptable to NSW consumers and export industries.

Ship Size and Port Infrastructure

The MPT proposal would be able to utilise the existing channel, which has a depth of 15.2 m. Berth depths at the proposed container terminal are between 7.9 and 12.8 m deep. To cater for 6,000 to 8,000 TEU ships the channel and berth depths would need to be deepened to 16 m. Dredging of the berthing box would be subject to the risk of mobilising contaminated sediments. Some difficulty is also likely to be experienced in navigating container ships with large surface areas through the winding navigation channel under moderate and unfavourable wind conditions.

Ability to Attract Shipping

The EIS for the MPT proposal included an analysis for the demand of container handling facilities in Newcastle. This analysis concluded that Newcastle was being bypassed due to inadequate container handling facilities and less competitive costs than Sydney (URS 2000). With a proportion of Sydney's container export commodities sourced from areas of NSW closer to Newcastle than to Port Botany, the analysis suggested that the container handling facilities associated with the MPT would be in a suitable geographical location for shipping companies to consider exporting commodities such as aluminium, cotton, meat and cereals from Newcastle.

Around 80% of Sydney's total container trade services the Sydney metropolitan area, with only 20% generated from rural NSW. The 20% generated from rural NSW consists mainly of exports, and of these, approximately one quarter (or around 50,000 TEUs in total) is generated from areas such as northern NSW. Therefore, as with Port Kembla, the current MPT proposal at Newcastle could service a niche market for selected regional commodities where transport costs are less than those to Port Botany, but is not likely to cater for the vast majority of containers which are loaded and unloaded in the Sydney metropolitan area.

This conclusion in relation to exports from markets closer to Newcastle than Port Botany is supported by the analysis in the EIS for the MPT proposal which states that:

"*as Newcastle is closer to export cargo than Sydney, it has the potential to develop into a niche port.…*"

As mentioned previously, shipping lines are rationalising their services by using larger ships, reducing the number of ports of call and having larger exchanges per call. Major shipping lines could not be expected to call at both Port Botany and Newcastle on the same voyage.

Conclusion

In terms of land availability and berth length Newcastle Port's proposed MPT is planned to handle approximately 350,000 to 500,000 TEUs per year with potential for further expansion.

A disadvantage of Newcastle is the lack of available capacity on the already congested rail and road connections providing the 170 km link to Sydney's markets. The cost of providing additional capacity is likely to be prohibitive. As no government funding has been allocated to any upgrading of road and rail infrastructure necessary to service Newcastle, these costs would have to be borne by the prospective developer of container handling facilities and would ultimately be passed on to exporters and consumers.

As there would also be the additional transport costs associated with Newcastle , major shipping lines would continue using Port Botany as the gateway to the Sydney market.

Newcastle is therefore not considered to be a viable alternative for any significant proportion of Sydney's existing or future container trade.

5.4.3 Greenfield Sites in NSW

Table 5.1 presents a summary of the potential greenfield sites in NSW that may be considered as alternatives to Port Botany. These alternatives are termed "greenfield" sites because they do not currently support significant commercial shipping infrastructure and would require considerable investment in port and associated land-based infrastructure to be viable.

Table 5.1 Greenfield Sites in NSW

SITE	CONSTRAINING FACTORS
Pittwater / Broken Bay	▪ no flat land available – the difficult topography would add to the cost and complexity of undertaking the required engineering work and providing general port infrastructure. ▪ difficult road and rail access – Pittwater and Broken Bay are only served by minor roads, there is currently no rail access east of the Pacific Highway. ▪ no supporting infrastructure and services. ▪ reasonable water depth, but would require dredging. ▪ major environmental issues – including National Parks.
Port Stephens	▪ difficult road and rail access - Port Stephens is not serviced by rail (services currently stop at Hexham). The road network along the south side of Port Stephens does not have capacity to accommodate port traffic. ▪ Port Stephens is a relatively shallow body of water with shifting sands that would require continuous dredging. Parts of the northern side of the bay would be available for development, but the southern side is heavily populated. ▪ distance (approx. 220 km) from the Sydney metropolitan area (similar, but more significant disadvantages than Newcastle). ▪ no supporting infrastructure and services. ▪ major environmental approval issues – the Myall Lakes and Karuah River system is used extensively for recreation and tourism and supports a large professional fishing and oyster industry.
Jervis Bay	▪ significant dredging required. ▪ difficult road and rail access - Jervis Bay is linked by the Princes Highway which is not a dual carriageway for its entire length and has significant environmental and heritage issues to overcome prior to widening. Local road linkages are limited and would not be suitable for the large numbers of port trucks. The rail link to Nowra does not extend through to Jervis Bay (rail line stops at Bomaderry north of the Shoalhaven River). ▪ distance (approx. 180 km) from the Sydney metropolitan area (similar, but more severe disadvantages to Port Kembla). ▪ the draft Jervis Bay Regional Environmental Plan has been introduced to guide future planning decisions in Jervis Bay. The plan has an objective of protecting the unique environmental values of the Bay. ▪ major environmental approval issues – the Jervis Bay Marine Park, Jervis Bay National Park and Booderee National Park are important marine and coastal environments which are protected and attract significant numbers of tourists.

As each of the above greenfield locations have significant constraints including environmental issues, incompatible land uses and the requirement for significant capital investment to establish basic port facilities (e.g. breakwaters, navigation channels, rail spurs and arterial road links etc), these sites are not considered suitable to accommodate the forecast growth in Sydney's container trade and have therefore not been assessed further.

5.4.4 Sydney Harbour

The existing facilities in Sydney Harbour are detailed in **Chapter 3** *Existing Port Operations*.

Due to its proximity to the Sydney CBD, and competing land uses, the port facilities and wharfage area in Sydney Harbour have been considerably reduced over the past 25 years. The remaining facilities in Glebe Island, White Bay and Darling Harbour currently handle 3 million tonnes of cargo per year valued at approximately $5 billion. These facilities currently provide the only non-containerised and general bulk and break-bulk facilities in Sydney. Trade commodities handled at these port facilities include motor vehicles, machinery, steel, vegetable oil, timber, gypsum, paper, sugar and cement. Glebe Island is the largest car-handling terminal in NSW. White Bay and Darling Harbour collectively also handled approximately 90,000 TEUs in 2001/02.

Following a recent State Government policy decision, container traffic through Sydney Harbour is to be phased out over time. However, Sydney Harbour will continue to perform an essential function in handling general bulk and break-bulk cargoes for Sydney.

Sydney Harbour is therefore not considered to be a viable alternative for any significant proportion of Sydney's existing or future container trade.

5.4.5 Botany Bay

The potential to develop alternative sites within Botany Bay is very limited due to environmental sensitivities, land availability and usage, community requirements and the cost of required transport linkages (predominately rail links).

Any alternative site to the south or west of the existing Kurnell facility would require extensive dredging to extend the main shipping channel and achieve the required berthing depths as the average depth of the Bay in these areas is only about 5 m.

Any development of additional port facilities on the southern shores of Botany Bay may also potentially impact on sensitive environmental areas including the Towra Point Nature Reserve, which provides habitat for endangered and migratory wading birds and is a wetland protected under international agreements.

Development to the east near Yarra Bay would not be suitable because these areas are subject to significant wave heights.

Therefore, the only viable alternatives for development of additional container handling capacity would be on the northern side of Botany Bay adjacent to the existing facilities at Port Botany.

5.4.6 Port Botany

In order to cater for future growth in container trade, there is a need for five additional berths and approximately 60 ha of land with good road and rail access. Opportunities for the development of alternatives to cater for this demand are limited by environmental considerations, land ownership, the operational buffer distances required by Sydney Airport and the operational requirements of the existing facilities at Port Botany. Alternatives which could be considered for development to provide some incremental increase in capacity within Port Botany are considered in **Table 5.2** and illustrated in **Figure 5.2**.

0 800m

Alternative Sites at Port Botany **Figure 5.2**

- A Eastward Extension of Brotherson Dock
- B Westward Extension of Brotherson Dock South
- C Westward Extension of Brotherson Dock North

Table 5.2 Alternatives at Port Botany

DESCRIPTION	CONSTRAINING FACTORS
Eastward extension of existing berths at Brotherson Dock (refer Option A in Figure 5.2) - could provide two additional berth faces of approximately 200 m in length.	▪ not able to provide capacity to meet future trade growth (five additional berths and 60 ha of land area) and would therefore still require future reclamation ▪ reduces available land for port operations - net reduction in port land would necessitate future reclamation ▪ Sydney Ports Corporation does not currently own the land that would be required to the east of Brotherson Dock ▪ requires additional facilities for relocation of tug berths ▪ requires relocation of existing rail sidings, drainage channel, Inter-Terminal Access Road and services ▪ would entail major disruption to existing port operations ▪ very high cost and only provides two additional berths ▪ maximum possible extension is 200 to 250 m ▪ does not allow for additional terminal rail sidings which would limit the ability of Port Botany to meet 40% rail mode share targets
Westward extension of existing berths at Brotherson Dock South (refer Option B in Figure 5.2) – could provide up to two berths and up to 15 ha of terminal area.	▪ not able to provide capacity to meet future trade growth (five additional berths and 60 ha of land area) and would therefore require future reclamation ▪ does not provide additional road and rail access or rail sidings to serve expanded facilities. This would limit ability of Port Botany to meet 40% rail mode share and cause traffic congestions within the port ▪ the Bulk Liquids Berth would need to be relocated. There are no practical alternative locations for the Bulk Liquids Berth which provides an essential service for Sydney ▪ very high cost (due to cost of relocating bulk liquid berth and associated infrastructure) ▪ still requires significant dredging and reclamation ▪ inefficient terminal operational area due to single berth at 90 degrees to other berths which would severely limit effective terminal area capacity ▪ extent of reclamation is fundamentally constrained by existing shipping channel ▪ significant disruption to existing port operations
Westward extension of existing berths at Brotherson Dock North (refer Option C in Figure 5.2) – could provide two berths and up to 20 ha of terminal area.	▪ not able to provide capacity to meet future trade growth (five additional berths and 60 ha of land area) and would therefore require future reclamation ▪ incremental reclamation would prolong environmental impacts and significantly increase the total public capital investment to adequately cater for Sydney's long term growth in container trade ▪ does not allow for additional road and rail access or rail sidings

DESCRIPTION	CONSTRAINING FACTORS
	to serve expanded facilities. This would limit ability of Port Botany to meet 40% rail mode share ▪ inefficient terminal operational area due to single berth at 90 degrees to other berths would severely limit effective terminal area capacity ▪ requires dredging and reclamation

The development of any of the above options would be fundamentally constrained by economic, operational and environmental considerations. Even if all these constraints were set aside, the development of any or all of these options would not be able to accommodate Sydney's forecast long term growth in the container trade. They would therefore provide a temporary solution and would not alleviate the need for further expansion in the long term. For these reasons, the alternative layouts within Port Botany have not been adopted by Sydney Ports Corporation.

5.4.7 Preferred Alternative

The preferred location for providing the required capacity to meet the long term growth in Sydney's container trade is between the Parallel Runway and the Patrick Stevedores container terminal at Brotherson Dock North. The proposal entails reclamation of approximately 60 ha of land to provide an additional 1,700 m of effective wharf frontage, sufficient for five berths. The proposed layout and operations of the preferred alternative are more fully described in **Chapters 6** to **8**.

The viability of the preferred alternative to accommodate the forecast growth in Sydney's container trade is discussed below.

Availability of Land

The area between the Parallel Runway and Brotherson Dock North has been earmarked for port development for more than 30 years as described in **Chapter 2** *Regional Context*. The reclamation footprint of the current proposal is located within this area, but takes up only a portion of the total area historically set aside for port development.

As mentioned above, there are various constraints on port development at Port Botany including environmental considerations, land ownership, the operational buffer distances required by Sydney Airport and the operational requirements of the existing facilities at Port Botany. Although these constraints do limit the available area which can be developed for port purposes at Port Botany, there is still sufficient area available to accommodate the required reclamation of approximately 60 ha without compromising the environmental values of areas such as Penrhyn Estuary or impinging on neighbouring land uses such as Sydney Airport and the existing port facilities.

Landside Transport

The proposal includes a dedicated road access onto Foreshore Road, which provides good arterial links onto the Eastern Distributor and M5 East Motorway. It also includes the extension of the existing Botany Freight Rail Line to provide additional terminal rail sidings. Due to its proximity to the Sydney market and its

good road and rail linkages, Port Botany represents the lowest possible transport cost alternative (**Appendix D**).

The Rail Infrastructure Corporation has already completed the first three stages of the Botany Freight Rail Line upgrade and the NSW Government has committed to provide sufficient capacity to meet the future container trade growth expected at Port Botany and increase the rail mode share to at least 40% . Rail transport would be facilitated by a number of existing and future intermodal facilities in west and southwest Sydney as described in **Chapter 21** *Traffic and Transportation*.

The preferred location is well positioned in respect to the major industrial centres and markets within the Sydney metropolitan area. It is forecast that the major sources of future growth in container trade would be generated by the industrial areas to the west and southwest of Sydney.

Ship Size and Port Infrastructure

The proposed terminal area and berthing structures would be designed to accommodate 8,000 TEU ships. As the existing navigation channel is over 15 m deep on average, only minimal dredging of isolated high spots would be required to achieve a 16 m depth to cater for 6,000 to 8,000 TEU ships as described in **Chapter 8** *Construction*. The anticipated 50 m air draft of an 8,000 TEU ship would also enable it to stay under Sydney Airport's Obstacle Limitation Surface (OLS) and the 1,700 m of effective wharf frontage would provide five new berths of approximately 340 m each. Port Botany also has a very short main channel and pilotage requirements are much shorter and less complex than Brisbane, Melbourne, Newcastle and Port Kembla.

Ability to Attract Shipping

Port Botany is already a significant port with "must call" status on Australasian shipping routes. The proposed expansion would reaffirm this status and would satisfy shipping line requirements for larger ships, fewer calls and larger exchanges per call.

Supporting Services

Port Botany is already well served by supporting infrastructure including customs facilities (e.g. new X-ray facility for containers), quarantine inspection services, towage, shipping agents, fuel supply and ship servicing. The proposed expansion could, however, necessitate an increase in the number or capacity of these services such as towage (e.g. more tugs would be required to service a greater number of ships).

Environmental Considerations

The potential environmental impacts and mitigation measures of the proposal have been analysed and addressed in depth in the relevant chapters of this EIS. The majority of the impacts are of a local nature and would to some extent be applicable to any community in close proximity to a major port development serving a major market base.

The proposal requires extensive dredging and reclamation, however, this would predominantly be carried out in the previously disturbed area between the Parallel Runway and Brotherson Dock. The preferred site is adjacent to the environmentally sensitive area of Penrhyn Estuary and to existing seagrass beds. Additional

works and investment would be required to protect the Penrhyn Estuary migratory bird habitat and to preserve or transplant existing seagrass beds.

Conclusion

The preferred location between the Parallel Runway and Brotherson Dock is the most desirable alternative with distinct transport, shipping and infrastructure benefits. The proposal provides essential and valuable economic benefits to the broader community, but does require significant capital expenditure and treatment of environmental and community issues as would be expected from a proposal of this magnitude.

5.4.8 Alternative Layouts

A number of alternative layouts for the preferred project location were reviewed before selecting the optimum layout as more fully described in **Chapters 6** to **8**. The alternative concepts are summarised below.

Port Land Use Strategy

The *Port Land Use Strategy for Botany Bay and Sydney Harbour* prepared by the MSB and endorsed by the State Government in 1995, adopted a strategy for port development not dissimilar to the original Port Botany concept plan of 1969. This strategy involved the reclamation of a significant portion of the area between the Parallel Runway and Brotherson Dock including Penrhyn Estuary as shown in **Figure 5.3**. This alternative included the development of an 87 ha container terminal as well as development of a multi-purpose terminal, bulk liquids terminal and 75 ha of port related development activities (e.g. container depots and warehouses). This alternative was not adopted by Sydney Ports Corporation because the area of reclamation required for such a large proposal would, due to its inclusion of Penrhyn Estuary and its larger footprint, have had serious environmental consequences and would not have been acceptable to the local and broader community. It may also have impinged on the operational needs of Sydney Airport.

Reclamation of Penrhyn Estuary

The next concept for the expansion of container handling facilities at Port Botany included the reclamation of a smaller area than the 1995 strategy and comprised a triangular area between Foreshore Road and the western extension of Brotherson Dock North as shown in **Figure 5.4**. This layout would have provided the necessary five berths and 60 ha of terminal area in a cost effective manner. However, this alternative was rejected for the following reasons:

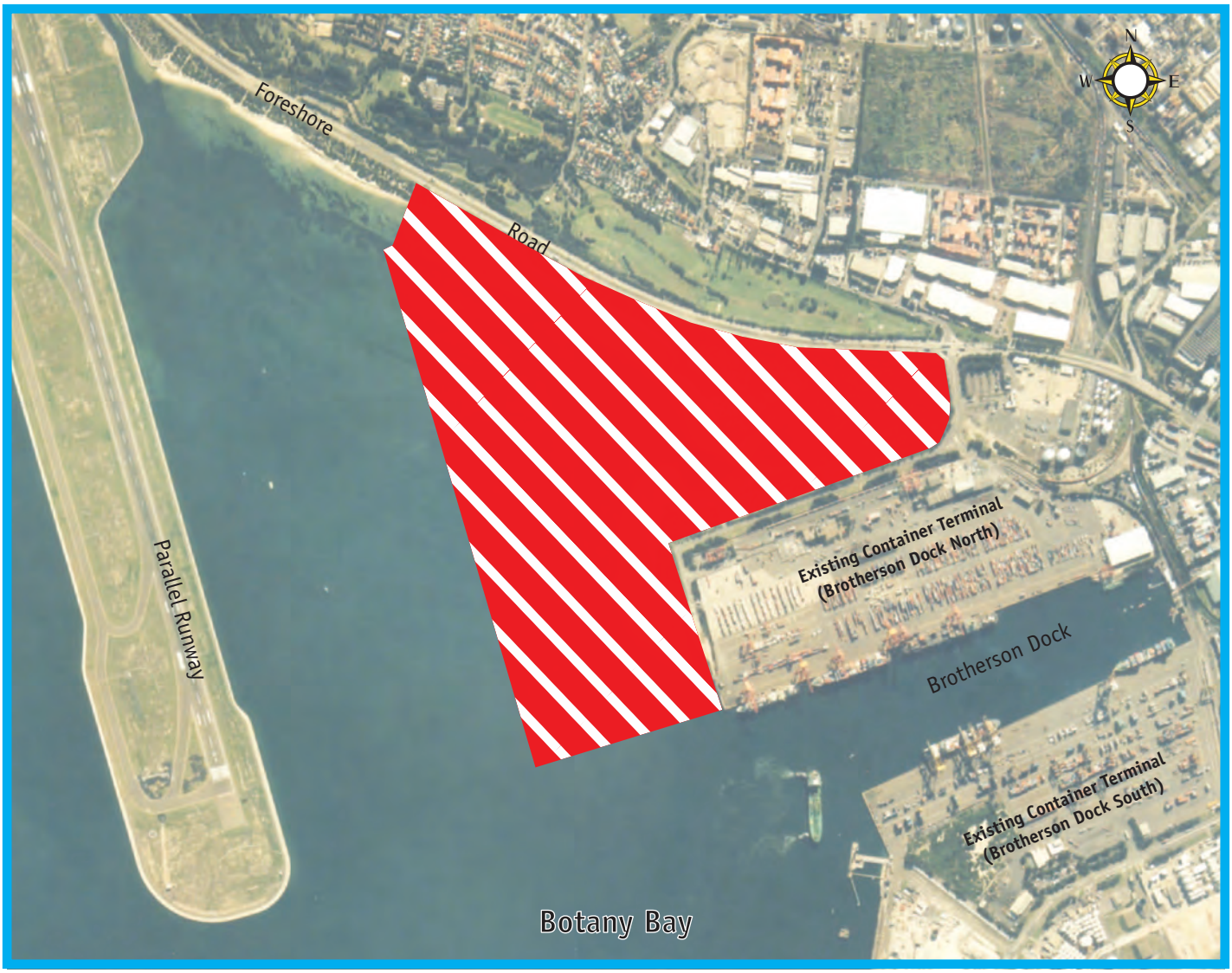
- reclamation of Penrhyn Estuary would have destroyed an important migratory bird habitat;
- the necessary extension of the Springvale and Floodvale Drains would have significantly altered the flow characteristics of these streams and may have created additional flooding risk;
- the significant southerly extension of the existing shoreline would have had a major impact on groundwater levels and the flow paths of the contaminated groundwater plumes as described in **Chapter 17** Groundwater;
- significant loss of beach area and public amenity;

0 500m

Alternative Reclamation Footprint

Alternative Layout - Port Land Use Strategy 1995

Figure 5.3



0 500m

Alternative Reclamation Footprint

Alternative Layout - Reclamation of Penrhyn Estuary and Foreshore Beach

Figure 5.4

- the triangular shape of the resultant terminal area would not have been optimal for terminal efficiency; and
- increased operation impacts (light, noise, visual, etc.) due to the closer proximity of this area to residential and public areas.

Rail Siding Layouts

An efficient rail transfer facility is very important to the operational efficiency of a modern container terminal and Sydney Ports Corporation's strategy of achieving a 40% rail mode share is very dependant upon the efficient use of rail by existing and future terminal operators.

Rail geometry is relatively inflexible and the requirements for a minimum radius of 180 m, grades of less than 3% and siding lengths of at least between 400 to 600 m restricted the number of possible alternatives for the proposed terminal layout. The alternatives in **Figure 5.5** and **Figure 5.6** both had the benefit of not requiring a rail loop around Penrhyn Estuary, the rail bridge over the tidal channel and crossings over Springvale and Floodvale Drains. However, these alternatives were not considered feasible for the following reasons:

Option A

This configuration would not be feasible for longer rail sidings as:

- the rail siding is not central to the berth and terminal operations which would increase the average travel distance for container transfers;
- the layout requires an expensive structure to span the Penrhyn Estuary tidal channel;
- there would be greater loss of beach and public open space; and
- there would be increased "boxing-in" of Penrhyn Estuary and less separation of recreational foreshore areas and operational areas.

Option B

- the rail siding is perpendicular and distant from the berth and terminal operations which would significantly increase the average travel distance for container transfers within the terminal; and
- increased reclamation in Penrhyn Estuary and operation impacts (light, noise, visual etc.) on the migratory bird habitat.

Two Channel Layout

This concept is similar to the preferred layout, but has a different tidal and drainage channel configuration as shown in **Figure 5.7**. This layout has two channels flushing Penrhyn Estuary and offers a marginal improvement in tidal circulation, but was considered sub-optimal and rejected for the following reasons:

- the second channel separating the existing Brotherson Dock North container terminal and the proposed extension could potentially create localised berthing problems due to tidal currents;

Alternative Rail Siding Layout - Option A

Figure 5.5

Alternative Rail Siding Layout - Option B

Figure 5.6

- loss of operational flexibility due to the location of the second channel;
- the high cost of construction of the second channel structure and providing bridging to cater for terminal operating wheel loads of up to 90 tonnes; and
- reduced separation of terminal operations and public open space areas along the foreshore.

Once the two channel layout was rejected, the optimum distance for the single channel flushing of Penrhyn Estuary needed to be determined. This distance needed to balance the operational needs of the proposed new terminal and the need to ensure that adequate flushing of Penrhyn Estuary was maintained. Investigations showed that a channel width of 130 m would be sufficient to provide adequate flushing for Penrhyn Estuary and would accommodate the operational needs of the new terminal. A wider single channel was rejected for the following reasons:

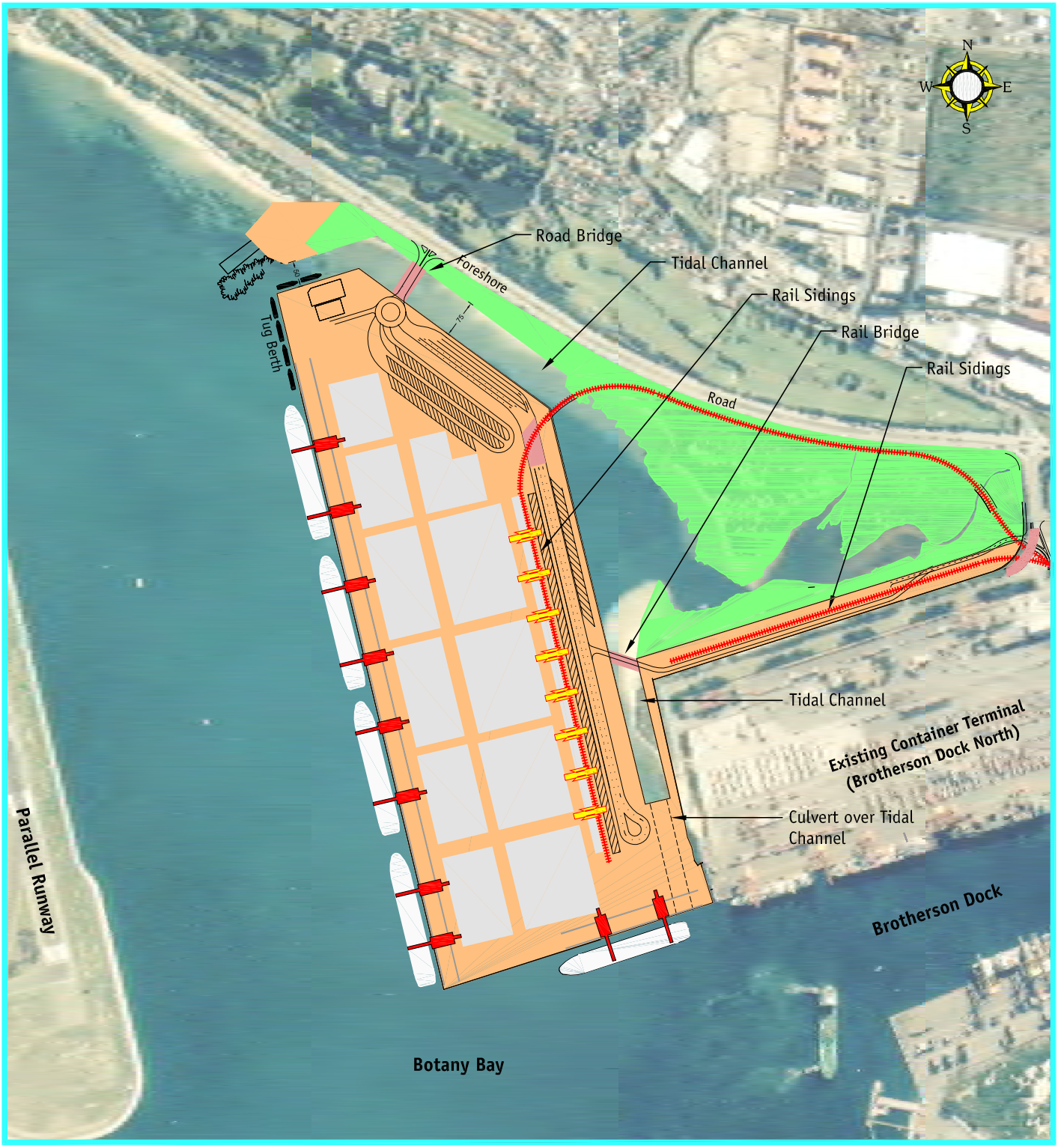
- the loss of operational area associated with a wider channel would compromise the ability of the new terminal to fulfil the development objective to accommodate long term growth in container trade;
- the high cost of constructing longer road and rail bridges; and
- studies have shown that adequate flushing would be maintained with a channel width of 130 m.

5.5 The Do Nothing Alternative

If the "do nothing" option is adopted there would be no other economically viable alternative (location or layout) that would provide the necessary capacity for long term growth in container trade in the Sydney basin and much of the State's regional hinterland. Without the proposed Port Botany Expansion, throughput of containers would be limited by the capacity of existing infrastructure at Port Botany and Sydney Harbour and any future improvements in productivity. Trade would therefore have to suffer the increasing costs of congestion or the transport penalties inherent with more distant ports.

Access Economics and Maunsell Australia estimate that the direct cost of berthing congestion would be between $98 and $106 per TEU by 2025. For a forecast trade of 3 million TEUs per year, assuming it could be catered for by the existing facilities, this would equate to an annual impost on the NSW economy of approximately $300 million. In the long term, this cost would be the tip of the iceberg as the real economic cost would be the loss of trade, relocation of industry, loss of employment and consequent drop in standard of living in NSW.

Sydney Ports Corporation as a State Owned Corporation, has as one of its key objectives, the responsibility of providing for existing and future shipping trade. It cannot therefore responsibly recommend that the do nothing approach be adopted.



Two Channel Layout **Figure 5.7**

5.6 Conclusion

No alternative is entirely without merit or insulated from constraints or impacts, be they environmental, community, shipping or commercial. However, the critical questions that need to be addressed in assessing the alternatives are:

- Can the proposed alternative cater for future generation ships and would shipping lines be attracted to service the location?
- Can the alternative provide the additional five berths and 60 ha of terminal area to satisfy capacity requirements for the next 25 to 30 years?
- Does the transport and logistical infrastructure provide a cost effective and reliable service between the proposed location and the Sydney market's importers and exporters?
- Can the alternative facilities be constructed at a reasonable cost?
- Do the environmental and community impacts outweigh the potential benefits of the alternative proposal?

The proposed Port Botany Expansion would be able to cater for future generation ships and would not be impeded by the significant navigational and infrastructure constraints that could limit the future capacity of Australia's other major east coast ports. Brisbane and Melbourne both have channel and berth depth constraints which would require significant capital investment to overcome, as well as significant environmental and technical issues which would need to be addressed. The ports of Newcastle and Port Kembla also have less than ideal channels and approaches that would detract from the all-weather capacity of these ports to handle large future generation ships.

The most significant disadvantage of any alternative location would be the distance from the Sydney market. The Sydney region currently accounts for approximately 80% of the sources/destinations of existing NSW container throughput and with the forecast strong growth of the Sydney basin this concentration of trade is likely to continue. The distance of interstate, and the proposed intrastate alternatives of Port Kembla and Newcastle, from this market would add significantly to ongoing transport costs. The key infrastructure links to the Sydney market, namely the F3 motorway, the Newcastle/Sydney rail link and the Sydney/Port Kembla road and rail links all have capacity constraints which, in the absence of further major capital investment, could detract from the reliability of transport services. Australian industry competes globally and NSW would not be able to afford the long term cost imposts that would be integral to any port development that is distant from the Sydney market.

Port Botany currently has "must call" status on Australasian shipping routes and will, with the existing facilities and proximity to markets, continue to attract the services of major international shipping lines. With the increasing rationalisation of the shipping industry (larger ships, fewer ports of call and larger exchanges per call) it is extremely unlikely that ships would call at both Port Botany and an additional regional NSW port. Newcastle and Port Kembla may therefore be able to attract the services of minor shipping lines and service specific niche markets, but at the present time would not be able to effectively compete for the services of major shipping lines serving major shipping routes.

The potential environmental and social impacts of the greenfield sites are generally considered to be of such significance that it is unlikely that they could be economically addressed. For this reason these alternatives

are not considered to be viable. All other alternatives which entail expansion of existing facilities will have some degree of environmental and social impacts. The impacts of the preferred Port Botany proposal have been assessed in detail and are considered to be manageable and are less than the other options within Port Botany. Where necessary, the design has been amended to minimise impacts and mitigation measures have been included to protect existing environments and reduce social impacts.

These measures include enhancement of Penrhyn Estuary as a habitat for migratory birds, a strategy to increase the rail modal share and minimise the percentage of containers transported by road, separation of the terminal from the existing shoreline to reduce impacts on community recreation areas and preservation and transplanting of seagrass beds. All potential impacts have been fully assessed and are discussed in the relevant chapters of this EIS.

The preferred Port Botany alternative does not require additional capital investment of a scale that would detract from its commercial viability. The fact that the need for future expansion, of a similar form and magnitude to the current proposal, was addressed in the original 1969 Port Botany concept plan and that the shipping channel, breakwater and road and rail links were developed to accommodate strategic growth, now means that the cost of expansion is limited to the incremental cost of expanding the terminal area and berth facilities. With the exception of Brisbane, none of the other alternatives considered in this chapter are able to benefit from a similar long term planning strategy. This adds significantly to the costs of these alternatives as they would require significantly more investment to provide a similar increase in capacity.

In addressing the above questions it is evident that the preferred Port Botany proposal is overwhelmingly more favourable than any of the possible alternatives.