Summary of key outcomes:

The key components of the Port Botany Expansion would include:

- a new container terminal with approximately 63 ha of land extending 550 m west and 1,300 m north of the existing Patrick Stevedores container terminal;
- approximately 1,850 m of additional wharf face with five new shipping berths;
- dedicated road access consisting of a signal-controlled junction on Foreshore Road and an entrance bridge across the channel separating the existing shoreline from the new terminal;
- rail access to the new terminal area by means of an extension of the existing Botany Freight Rail Line parallel to Foreshore Road including a rail bridge and culverts; and
- enhancement of the public and ecological areas adjacent to the new container terminal.

The key operations associated with the new terminal would be:

- marine transport operations, which involves the safe navigation of vessels to and from the port;
- terminal operations, which involves the loading, unloading and temporary storage of containerised seaborne cargo within the terminal itself; and
- landside transport operations, which deals with the distribution and collection of containerised cargo to and from consumer/exporters.

Sydney Ports Corporation would have overall responsibility for managing marine transport operations within the port, although the day to day running of the terminal would be the responsibility of the terminal operator(s). Land transport operations beyond the terminal gates would be the responsibility of respective rail and road transport operators.

6.1 Introduction

This chapter provides a description of the new terminal facilities and their operation. The operation of the new terminal and associated facilities would be similar, but not identical to, the existing container terminals at Port Botany.

The description of the elements to be provided by Sydney Ports Corporation within the public recreation area and Penrhyn Estuary adjacent to the new terminal (e.g. provision of a new boat ramp) is provided in **Chapter 7** *Public Recreation and Ecological Plan*.

The key operations associated with the new terminal would be:

- marine transport operations, which involve the safe navigation of vessels to and from the port;
- terminal operations, which involve the loading, unloading and temporary storage of containerised seaborne cargo within the terminal itself; and
- landside transport operations, which deals with the distribution and collection of containerised cargo to and from consumers/exporters.

Sydney Ports Corporation would have overall responsibility for management of marine transport operations within the port, although the day to day running of the terminal would be the responsibility of the terminal operator(s). Land transport operations beyond the terminal gates would be the responsibility of respective rail and road transport operators.

Terminal operations may be phased in over time and berths commissioned progressively to allow staging of infrastructure investments in line with the actual growth in trade.

The description of the construction of all elements of the Port Botany Expansion is provided in **Chapter 8** *Construction*.

6.2 Project Outline

The components of the Port Botany Expansion would include the following (refer to **Figure 1.2**):

- a new container terminal with approximately 63 ha of land extending approximately 550 m west and 1,300 m north of the existing Patrick Stevedores container terminal;
- approximately 1,850 m of additional wharf face with five new shipping berths;
- a paved container storage area within the new terminal with more than 8,000 container storage bays and container stacks up to 6 high;
- an interchange within the new terminal where containers would be transferred to or from trains and/or trucks;
- three rail sidings of between 400 m and 600 m in length within the new terminal parallel to the wharf face for loading and unloading of containers and for shunting operations;
- dedicated road access consisting of a signal-controlled junction on Foreshore Road and an entrance bridge across the channel separating the existing shoreline from the new terminal;

- rail access to the new terminal area by means of an extension of the existing Botany Freight Rail Line parallel to Foreshore Road including a rail bridge and culverts;
- a strip of existing land north of the existing Patrick Stevedores container terminal for an internal port road (referred to as an Inter-Terminal Access Road) and two additional rail sidings;
- construction of a road bridge over the rail line at the eastern end of Penrhyn Road;
- a tug facility capable of berthing up to six tugs;
- a dredged navigation channel providing access to the berths including the necessary aids to navigation;
- terminal equipment including quay cranes and rail mounted gantries;
- buildings including an administration and operations centre, equipment maintenance workshop and gatehouse;
- supporting services and facilities including a stormwater management system, water supply, sewerage connections, power supply, telecommunications and lighting; and
- enhancement of the public and ecological areas adjacent to the new container terminal (refer to **Chapter 7** *Public Recreation and Ecological Plan* for a description of these elements of the proposal).

A summary of the expected key components of the completed Port Botany Expansion in 2025 and a comparison with existing operations is provided in **Table 6.1.** The expanded port operations in **Table 6.1** include potential upgrades to the existing container handling facilities at Port Botany.

Table 6.1 Comparison of Current and Future Container Terminal Operations at Port Botany

Port Component	Current Operations (Year 2001-02)	Proposed Expansion (Year 2025)	Expanded Total Port Operations (Year 2025)*
Area	82 ha	63 ha	145 ha
Ship berths	8	5	13
Annual capacity	approximately 1.1 million TEUs	1.6 million TEUs	>3.0 million TEUs
Number of tug berths	3	6	9
Rail, Road and Ship servicing operations	24 hours; 7 days a week**	24 hours; 7 days a week	24 hours; 7 days a week
Average number of container ships per year***	810	706	1,765
Percentage of containers transported by truck	75%	60%	60%
Average truck movements per day	2,913	1,882	4,700
Rail siding length	3 x 350 m; 2 x 600 m	3 x 400 to 600 m	3 x 350 m; 2 x 600m; 3 x 400 to 600 m

Port Component	Current Operations (Year 2001-02)	Proposed Expansion (Year 2025)	Expanded Total Port Operations (Year 2025)*
Percentage of containers transported by rail	25%	40% minimum	40% minimum
Average number of train visits per day	15	Up to 18	Up to 54
Major plant and equipment****	12 Quay Cranes 26 Straddle Carriers 20 Rubber Tyred Gantries (RTGs) 6 Rail Mounted Gantries (RMGs)	Up to 10 Quay Cranes Up to 40 Straddle Carriers Up to 7 Rail Mounted Gantries	Up to 30 Quay Cranes Up to 77 Straddle Carriers 20 Rubber Tyred Gantries Up to 14 Rail Mounted Gantries
Number of employees	730	300	1,030

* *Includes estimates for possible Patrick and P&O Terminal upgrade and modest productivity improvements over time.*

** *Currently, container terminals are able to operate 24 hours per day 7 days a week, but typically operate only 16 hours per day 5.5. days per week on average*

*** *Number of ship calls would depend on ultimate distribution of ship sizes. It is expected that with larger ships arriving at Port Botany there will be grater exchanges of containers with each ship call*

**** *Assumes that the new terminal would use straddle carriers and rail mounted gantries.*

6.3 Operation of the New Terminal

Whilst the precise nature of the operation of the new terminal would ultimately be determined by the future operator(s), the operations described below are considered to be based on efficient port practices at this time and are achievable and feasible within environmental, social and other project constraints.

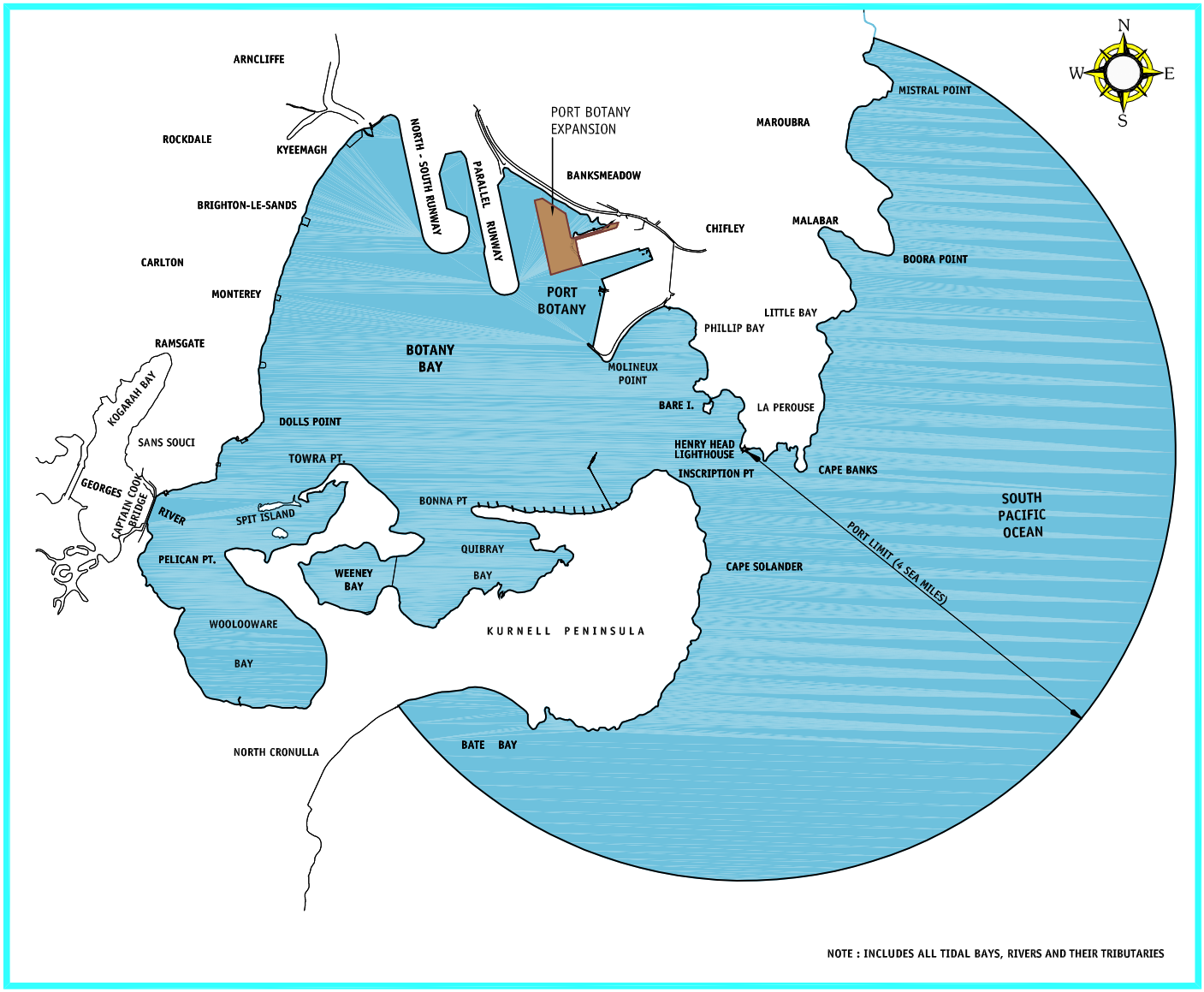
6.3.1 Marine Operations

Sydney Ports Corporation is responsible for operations and safety functions in respect of all commercial shipping activities within Botany Bay. Sydney Ports Corporation's jurisdiction extends seaward over a distance of four nautical miles from the navigation light at Henry Head, La Perouse, which is on the northern headland at the entrance to Botany Bay as shown in **Figure 6.1**.

Ships calling at Port Botany, upon arriving at these port limits, await clearance from Harbour Control to proceed to the allocated berth. Usually the ship is provided with tug and pilot assistance from entry to the Bay until it is secured at the allocated berth.

The path which would be taken by the ship from the entrance to the Bay to the new terminal is shown in **Figure 6.2**. This path includes an initial transition through the existing navigation channel and turning basin serving Brotherson Dock and then through a new navigation channel to proceed to the new berths.

The new terminal would be designed to accommodate container ships capable of carrying up to 8,000 TEUs. **Table 6.2** provides a comparative summary of the main attributes of this class of container ship and the 4,500 TEU class ships, which are the largest ships presently calling at Port Botany.



Extent of Sydney Ports Corporation's Responsibility for Commercial Shipping in Botany Bay

Extent of Sydney Ports Corporation's Responsibility in Botany Bay for Commercial Shipping

Figure 6.1

Proposed Navigation Channel to New Terminal

Figure 6.2

As part of the development six new tug berths would be provided. Three of these berths would be located at the northern end of the main container berths, while the other three berths would be located adjacent to the boat ramp as shown on **Figure 1.2**. Each berth would have a minimum depth of 6 m and would be capable of accommodating large tugs. Separate facilities would be provided for the berths alongside the boat ramp to support the tugs and would comprise an administration office and a small workshop. Facilities for the tug berths adjacent to the main berths would be incorporated within the administration office and workshop for the new terminal.

It would be necessary to delineate navigation channels for the various types of vessels which would use the area of Botany Bay between the port and airport during operation of the new terminal. Permanent channel navigation markers would be installed in this area to mark the following as shown on **Figure 6.3**:

- a 232 m wide commercial shipping channel;
- a 150 m wide channel for recreational vessels;
- the existing exclusion zone adjacent to the Parallel Runway which is approximately 100 m from the edge of the runway wall; and
- a recreational vessel exclusion zone between the commercial shipping channel and the channel for recreational vessels of 150 m.

The distance of 150 m between the recreational boating channel and the commercial shipping channel would provide sufficient separation for the safe operation of both types of vessels in this area. Explanation of the routes would be provided in notices displayed at the new boat ramp.

Approximately 10% of ships currently calling at Port Botany take on fuel. It is expected that the percentage of ships requiring refueling at the new terminal would be similar. Refueling would be undertaken by a barge which would source fuel from the existing fuel supply line in Brotherson Dock and transfer this via a short supply line to the ship. Management of the refueling process including emergency and incident management is described in **Chapter 32** *Emergency and Incident Management*.

Table 6.2 Comparative Attributes of Container Ships

ATTRIBUTE	4,500 TEU	8,000 TEU
Maximum Overall Length	300 m	347 m
Maximum Width	32.2 m	46 m
Maximum Draft	13 m	14.5 m
Maximum Dead Weight Tonnage	55,000 t	106,000 t
Gross Registered Tonnage	50,000 t	90,000 t

0 500m

Navigation Channels at the New Terminal **Figure 6.3**

Navigation Markers for Parallel Runway Exclusion Zone

6.3.2 Terminal Operations

The purpose of this section is to provide a description of operations within the new terminal.

Operations at the new terminal would involve stevedoring (i.e. ship, truck and train loading/unloading, container storage and equipment maintenance).

Terminal operations would consist of the following three main activities:

- wharf operations;
- yard operations; and
- road and rail interchange.

A schematic of the proposed new terminal operations is presented in **Figure 6.4**.

Wharf Operations

Quay Cranes

Wharf operations would consist mainly of loading and unloading of containers from ships using cranes.

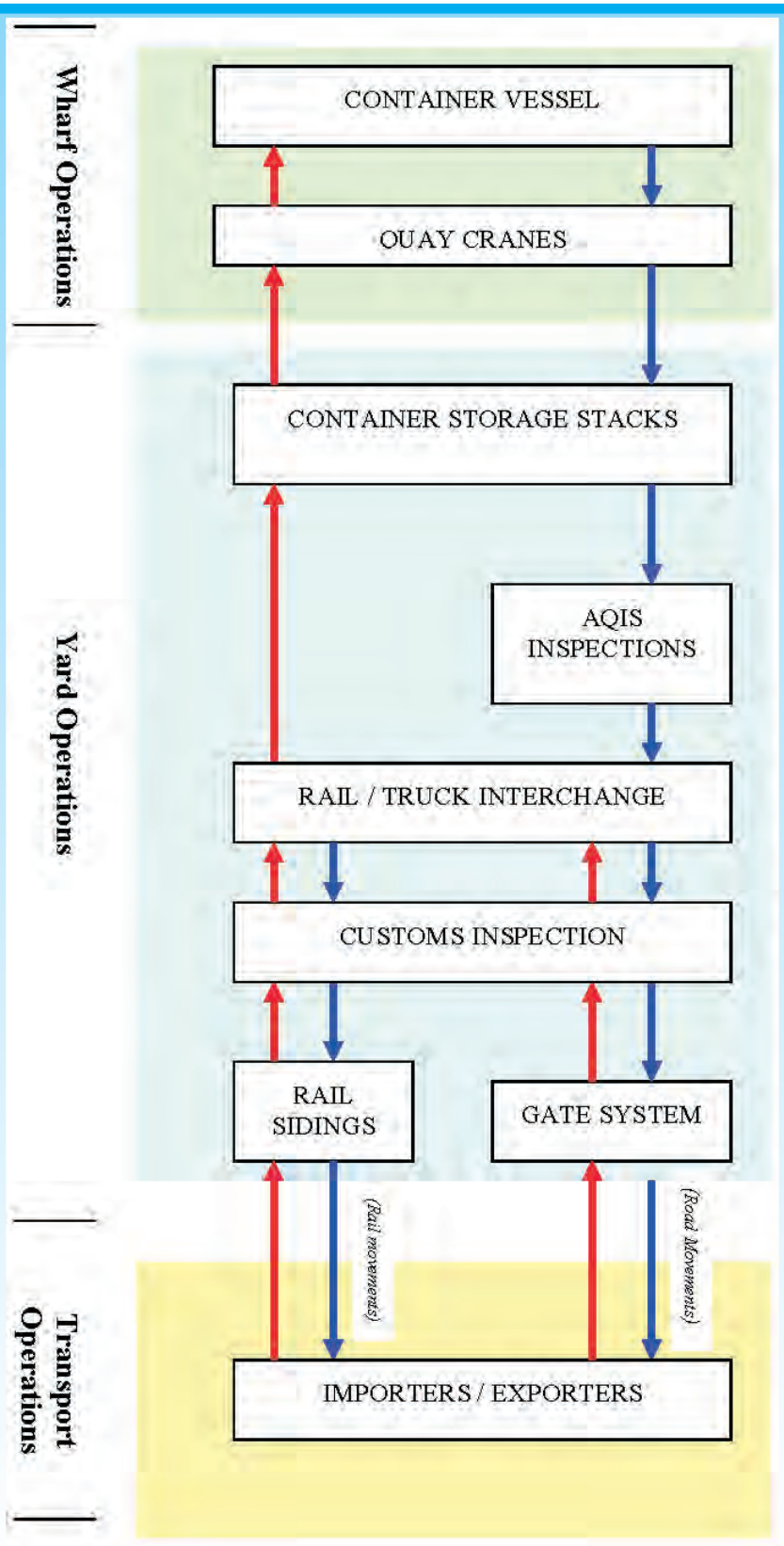
Quay cranes are large, electrically powered, rail mounted cranes capable of moving parallel to the ships along rail lines installed on the wharf. Power intake is through cable reels, which pay out or wind back the supply cable depending on the position of the crane relative to the power supply point on the wharf. The range of movement of each crane is governed by the practical limitations imposed by the length of supply cable that can be provided.

In view of the aviation Obstacle Limitation Surface (OLS) of 52 m Lowest Astronomical Tide (LAT) imposed on the site due to its proximity to Sydney Airport, sliding boom type cranes would be used. This type of crane differs from the standard container cranes installed at both the Patrick and P&O terminals, which are of the "luffing boom" type. Essentially, the boom when in its stowed position slides back instead of being raised up, allowing the cranes to remain under the OLS at all times. **Figure 6.5** shows an illustration of this type of crane and **Table 6.3** shows a comparative summary of key properties of the two types of cranes.

Table 6.3 Comparative Properties of Quay Cranes

PROPERTY	SLIDING BOOM TYPE	STANDARD CRANE*
Overall Height (Working)	47 m	64 m
Overall Height (Stowed)	47 m	86 m
Rail Gauge	30.48 m	25.3 m
Lift Height Above Wharf Level	35 m	30 m
Outreach from Seaside Rail	48 m	38 m
Lift Capacity	50 t	50 t

** Note: Based on a typical crane currently in operation at Port Botany*



Schematic of Terminal Operations **Figure 6.4**

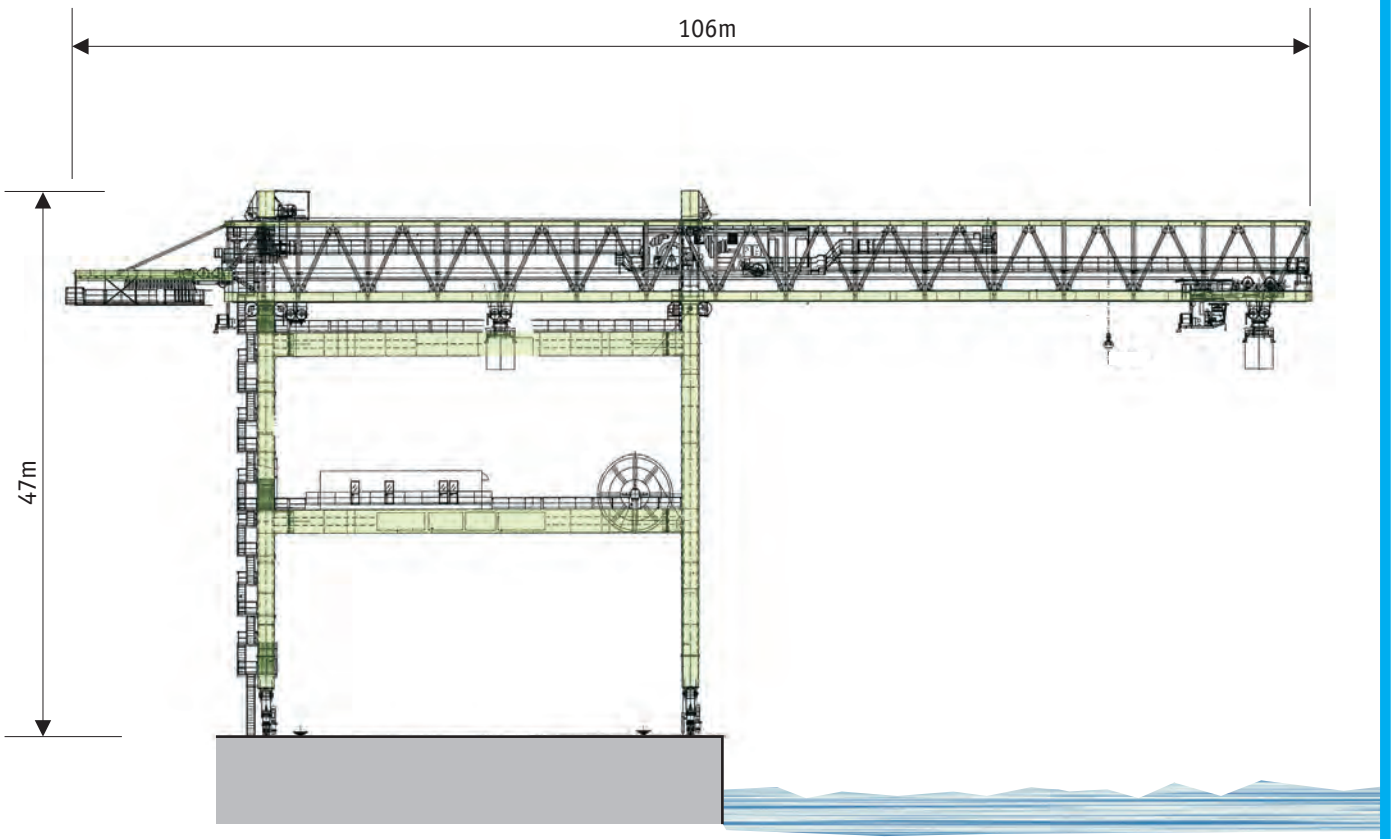


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Image Courtesy Fantuzzi Reggiane

Typical Sliding Boom Quay Crane **Figure 6.5**

Loading/Unloading of Containers

Usually, ships visiting Australia call at only a few of the major ports (e.g. Sydney, Melbourne and Brisbane) and only a portion of the total number of containers on board are exchanged at each port.

Prior to a ship's arrival, the terminal operator would receive a computerised stowage plan of the ship showing the positions and serial numbers of containers to be unloaded. They would also have particulars of the numbers and destinations of containers to be loaded. Based on this information and utilising specialised software, a "ship planning" process would be carried out whereby a sequence of loading and unloading of containers would be prepared. This process would take into consideration diverse factors such as container size, weight, stability of the ship and special containers, such as over height containers. It would also consider the ease of loading and unloading at the terminal as well as unloading at subsequent ports of call.

Terminal based crews would carry out operations associated with the loading/unloading of containers to and from ships.

The capacity of the terminal is expressed in terms of throughput per year (which is the number of containers loaded and unloaded to and from ships per year but excludes re-stows) in terms of TEUs.

The servicing of ships would occur 24 hours per day, 7 days per week, 365 days per year.

To achieve efficient container and cargo movement, the number of container cranes allocated to each ship would be optimised. Generally, each vessel would be allocated an average of two quay cranes.

Provision of ship services, such as supply of potable water (taken from supply points on the wharf), refueling (from the water by refueling barges) and other provisions, would take place whilst in port. Ship crews and visitors entering and leaving the terminal would be carried on dedicated internal transport along pre-determined routes within the terminal subject to security provisions.

Yard Operations

The container storage area would be a key component of the terminal. The purpose of the area would be to:

- receive import containers discharged from ships;
- receive export containers delivered to the terminal;
- provide a temporary storage (usually two to four days) function for both export and import containers as required; and
- provide a wharf side holding space where export containers can be stored in readiness for loading in the required order on board ships.

Yard operations are highly dependent on the type of equipment used. At the present time, there are two main container handling systems used in container terminals worldwide. One system uses RTGs as the principal piece of yard handling equipment, while the other uses Straddle Carriers. At Port Botany, the P&O terminal uses the former, while the Patrick Stevedores terminal has recently converted to the latter. The planning and design of the new terminal has taken into consideration the possibility that either of the above systems, a combination of the above systems or another system may be utilised by the terminal operator(s).

It is expected, however, that the new terminal would utilise straddle carriers as its main piece of yard equipment because straddle carriers are:

- gaining popularity at many medium sized terminals due to their versatility and economy in view of lower staffing requirements;
- capable of stacking containers four high and provide a high degree of selectivity, which is desirable for managing containers stored at stack blocks awaiting export; and
- reliable due to recent improvements accruing from new technology.

The straddle carrier operated yard would also have the potential to be automated.

Straddle Carriers, though large pieces of equipment in their own right, weighing about 60 tonnes each, are comparatively smaller than RTGs. They are fast, extremely mobile and are operated by a single operator. They straddle a single row of containers and can stack up to four high. It is expected that up to 40 straddle carriers would be used at the new terminal. An illustration of a straddle carrier is shown in **Figure 6.6**.

Straddle carriers transport containers between the stack blocks and the quay face or rail interchange and vice versa. They can also be used to load and unload containers directly to or from trucks.

Container stacks utilising straddle carriers are usually aligned perpendicular to the wharf and consist of rectangular blocks of containers placed in rows. Typically, each block may be of the order of 150 m in length, 150 m in width and up to 12 m in height. Although, one stack block could extend over the full extent of the wharf, practical necessities dictate that intermediate roadways of about 20 m width be provided between adjacent stack blocks to allow circulation of straddle carriers.

In recent times, many aspects of terminal operations have been automated including capturing and storage of data relating to identification and tracking of containers and processing of documentation. Of greater interest, however, is the automation of the physical processes involved in handling, storage and retrieval of containers resulting in reduction of manpower needed to run the operation.

With Patrick Stevedores' recent successful trials of unmanned straddle carriers it is now feasible to automate yard operations for straddle carrier operated terminals. It is expected that this technology will continue to evolve and will be widely utilised in the future.

Road and Rail Interchange

Containers arriving or departing the terminal would do so either by road or rail. Trucks would enter or depart the terminal only through the terminal gatehouse, either from Foreshore Road or the Inter-Terminal Access Road, while containers utilising rail would proceed to the rail sidings provided within the terminal.

Presently, about 25% of all containers handled at Port Botany arrive or depart by rail with the balance of 75% utilising road transport. With the expected increases in throughput a key Sydney Ports Corporation strategy is to increase the rail share to a minimum of 40% by 2011.

The proposed road/rail servicing operations shown in Figure 6.7 provide for maximum operational flexibility. Should the entire new terminal be operated by a single terminal operator then the 600 m long road/rail servicing operations would most likely provide the optimal terminal efficiency for servicing the five new berths. However, should there be more than one operator, it is possible that the southern portion of the new terminal could be operated by one operator with the remaining area to the north being operated by a different operator.

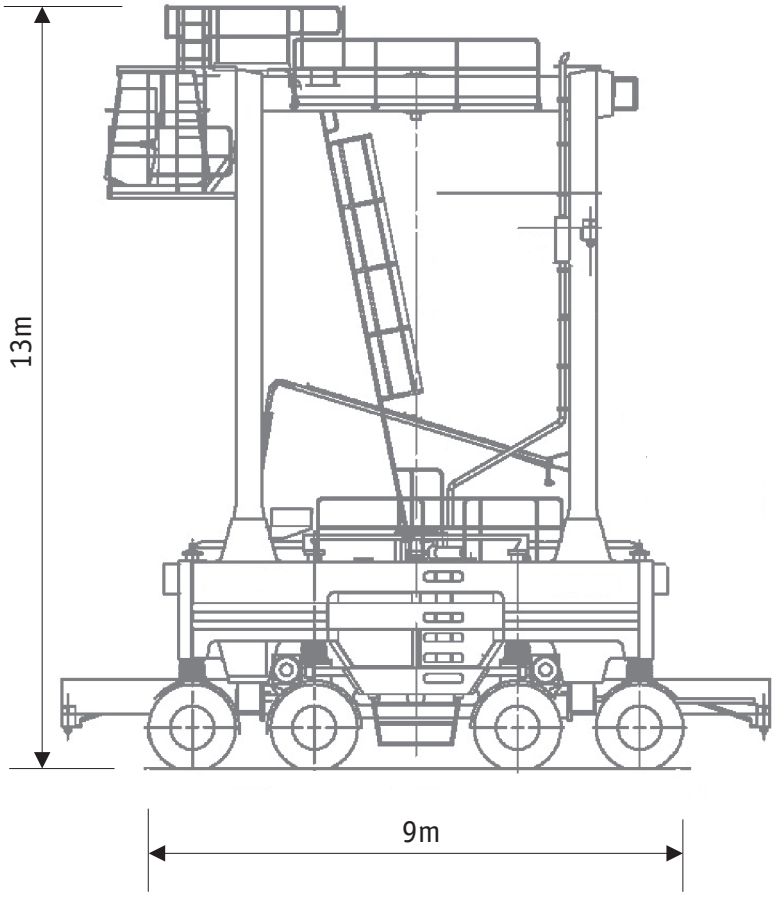

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Image Courtesy Kalmar Industries

Typical Straddle Carrier **Figure 6.6**

In this configuration, the northern portion of the terminal would be serviced by 400 m long road/rail servicing operations. All truck movements to/from the entire new terminal would be via the new Foreshore Road intersection.

The environmental assessment in the EIS has been based on 600 m rail/road servicing operations. However, assessment of 400 m servicing operations has been undertaken where the impact of these operations could potentially be worse than for the 600 m servicing operations.

Road Operations

The terminal would be served by a new signal-controlled intersection along Foreshore Road located approximately 920 m to the northwest of the existing Foreshore Road/Botany Road/Penrhyn Road intersection. In addition, the existing Inter-Terminal Access Road, which links the P&O and Patrick terminals would be extended to the new terminal to cater for local port traffic. **Figure 6.7** shows the layout of the proposed road servicing operations at the new terminal using straddle carriers.

Typically, a container truck arriving at the new terminal would:

- enter via the proposed new intersection on Foreshore Road (item 1);
- obtain the necessary clearance to enter the terminal at the gatehouse (item 2), (outside the gatehouse would be a truck parking area with capacity for approximately 50 trucks) (item 3) ;
- drive to the temporary holding area to await allocation of unloading equipment (this is generally a short wait of up to 15 minutes and up to 70 parking bays would be provided for this purpose) (item 4);
- in the instance of straddle carrier operations, proceed to the allocated bay at the interchange where the containers would be unloaded. If there are import containers to be collected ("backloading") such containers would be loaded on to the truck which would then proceed directly to the exit gate (up to 80 parking bays would be provided for this purpose) (item 5);
- in the instance of RTG operations, the truck would proceed directly to the stack block, traversing through the yard, where it would be unloaded and, if there are import containers to be collected, it would be loaded on the vehicle from where it would proceed to the exit gate (item 6);
- pass through the Australian Quarantine and Inspection Service checkpoint;
- present the necessary documents at the exit gate and obtain authority to leave the terminal;
- rejoin Foreshore Road at the proposed new intersection where there would be options to turn left or right onto Foreshore Road; and
- transport the containers directly to customers or to inland distribution centres.

Sydney Ports Corporation is not in a position to directly control the route selection for trucks travelling to or from Port Botany. However, as a State Owned Corporation, it would work with both State and Local Governments to bring a "whole of government" approach to addressing potential impact of truck traffic on local amenity.

Road/Rail Servicing Operations **Figure 6.7**

① Main Road Access to Terminal

② Gatehouse

③ Truck Parking Area

④ Truck Holding Area

⑤ Truck Interchange

⑥ AQIS Checkpoint

⑦ 3 x 600m Rail Sidings

At peak times there could be up to 75 truck arrivals per hour. The truck holding bay and queuing facilities within the new terminal would be able to hold up to 200 trucks at any time and would provide sufficient capacity to avoid restricting the movements of other vehicles and truck queuing on Foreshore Road and other public roads.

The anticipated road exchange facilities and statistics at the new terminal are summarised in **Table 6.4**

Table 6.4 Details of Road Exchange Facilities at the New Terminal

INFRASTRUCTURE	CURRENT PROPOSAL (YEAR 2025)
Truck holding capacity	200 trucks
Percentage of containers transported by road	60%
Number of TEUs per annum transported by road*	approximately 900,000
Average number of TEUs transported by road per day*	2,465
Average number of trucks per day*	1,882
Operating hours	24 hours per day; 7 days a week

**truck numbers based on the proposed new terminal obtaining 40% market share at Port Botany with total throughput at Port Botany of 3.2 million TEUs per year.*

All truck drivers new to the site would be briefed by the terminal operator(s) through inductions regarding the conduct expected at the terminal, preferred routes to and from the terminal, the designated truck access and roadways, emergency procedures and marshalling provisions. Appropriate line marking, signage and terminal layout would be provided across the new terminal to ensure that trucks are restricted to the designated truck loading and unloading areas. A truck isolation area would be provided which would be used to attend to any problems or investigation of truck loads as required.

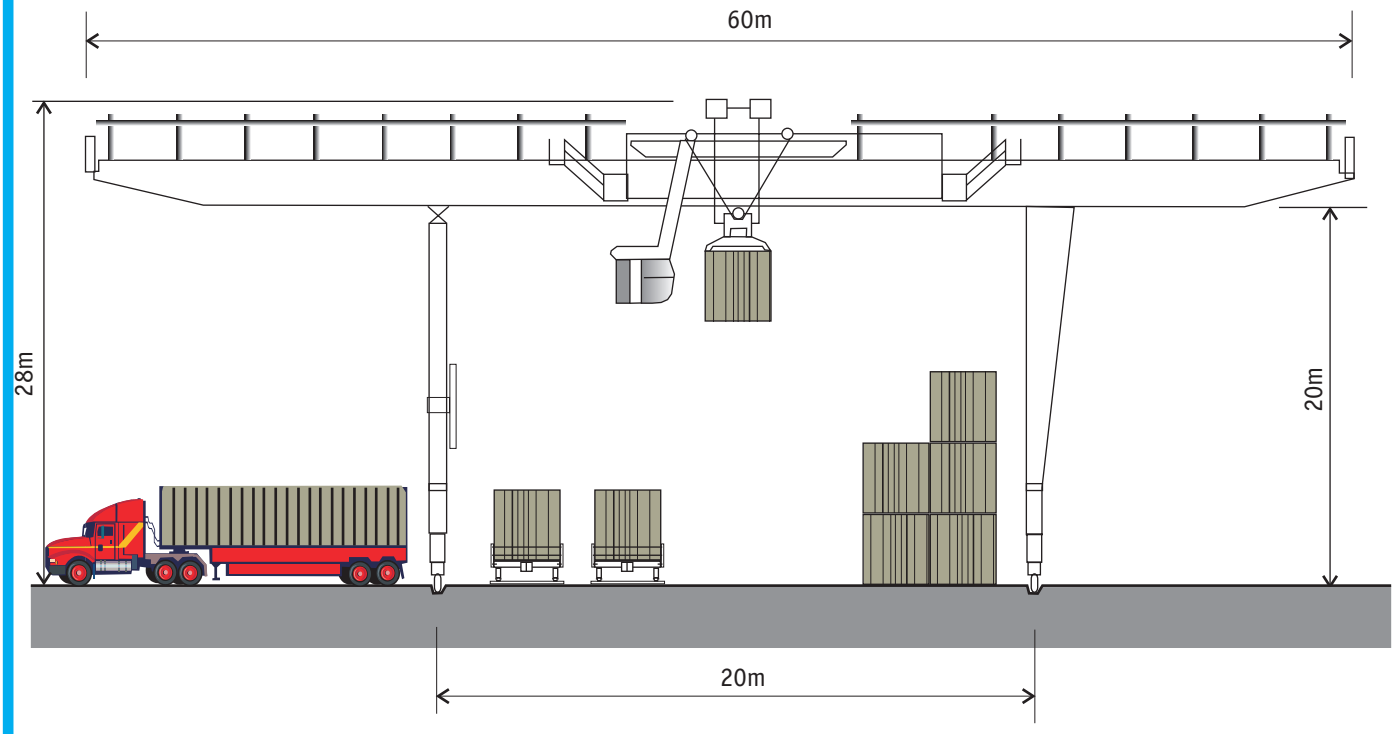
Rail Operations

As stated earlier, it is the intention of Sydney Ports Corporation to increase the percentage of containers handled by rail to a minimum of 40% from the current level of 25%. Rail sidings at the terminal would accommodate trains between 400 m and 600 m in length, depending on the number of operators.

The new terminal would handle up to 19 trains per day and would have three sidings. The rail sidings would be parallel to the wharf and would be located behind the stack blocks. To facilitate the movement of trains in and out of the new terminal, a rail passing loop would also be required. This passing loop would be located parallel to Foreshore Road along the northern side of Penrhyn Estuary. In addition, two rail sidings of approximately 600 m in length would be located parallel to Penrhyn Road.

RMGs may be used to load and unload containers at the rail terminal. A RMG is a heavy piece of equipment, similar to but larger than an RTG, which operates on straight rail tracks, which straddle the rail sidings. They are electrically powered with power supplied through a cable reel arrangement. The machines evaluated for this terminal would have an overall width of approximately 50 m and a height of approximately 28 m. The lifting capacity is approximately 65 tonnes, which is the equivalent of approximately two fully loaded forty-foot containers. A typical RMG is illustrated in **Figure 6.8**.

The RMGs would be computer operated with work instructions provided by the main operations centre. RMGs are capable of servicing rail mounted containers at a rate of 60 containers per hour.



All Dimensions are Indicative Only

Image Courtesy Kalmar Industries

Typical Rail Mounted Gantry **Figure 6.8**

The likely requirements needed at the new terminal to support the RMGs would be:

- heavy steel rails fixed to supporting structures;
- heavy reinforced concrete support beam; and
- pile supports for the concrete support beam, (if necessary).

The rail loading and unloading process would be as follows:

- rail container information would be received electronically prior to arrival of the train and data would be downloaded to the operational computer system;
- containers would be moved on and off trains using RMGs to the rail interchange area; and
- straddle carriers would transfer containers to and from the rail interchange area and the main yard.

The anticipated rail exchange facilities and statistics at the new terminal are summarised in **Table 6.5.**

Table 6.5 Details of Rail Exchange Facilities at the New Terminal

INFRASTRUCTURE	CURRENT PROPOSAL (YEAR 2025)
Rail sidings	3 x 600 m
Rail passing loop	1 x 600 m
Rail storage sidings	2 x 600 m
Percentage of containers transported by rail	40% minimum
Number of TEUs per annum transported by rail	approximately 600,000
Average number of TEUs transported by rail per day	1,644
Average number of trains per day*	up to 19
Operating hours	24 hours per day; 7 days a week

**train numbers based on the proposed new terminal obtaining 40% market share at Port Botany with total throughput at Port Botany of 3.2 million TEUs per year.*

It is also feasible to operate the rail loading facility with other equipment such as forklifts and reach stackers.

Heavy forklifts are large diesel powered machines suitable for carrying containers over short distances and stacking them up to three high. They can be used to load and unload containers off trucks and trains.

Reach stackers are relatively new and have been designed specifically to handle containers. They have gained popularity in a number of ports overseas. They are diesel powered vehicles equipped with a telescopic arm with a top lift arrangement for handling containers. It is quite similar in function to a forklift, but has the ability to reach over a front rows) of containers to a second or third row of containers, depending on the design. It is also particularly useful in rail loading operations since it can reach over to a second or third siding, unlike the forklift, which can handle only the nearest siding.

The handling capacities of heavy forklifts or reach stackers are generally lower than RMGs. RMGs are also capable of loading/unloading both trains and trucks. The terminal would be planned and designed to accommodate forklifts and reach stackers should they be required

6.3.3 Landside Transport

Landside transport involves the transfer of containers between the terminal and the importers and exporters. All landside transport would be carried out by either road or rail. However, some containers transhipped at the terminal would be exchanged from one vessel to another, possibly with a short storage period in the yard, without ever leaving the terminal.

Beyond the terminal gates transport activities would not be under the direct control of either Sydney Ports Corporation or the terminal operator(s). However, the terminal operator(s) would formulate and implement strategies to minimise traffic impacts as outlined below.

Road Transport

Road transport outside the terminal would be carried out by third party operators who would comply with all RTA and road transport requirements.

In order to manage the overall truck numbers travelling to and from the terminal and to ensure that trucks do not queue along public roads, a comprehensive Vehicle Booking System (VBS) would be implemented. The VBS would be an internet based system and would require transport operators who wish to use this system to be registered with the terminal operator. The VBS would:

- provide time slots, preferably of short duration (of the order of one hour), for vehicles to arrive at the terminal;
- encourage backloading, which encourages trucks entering and leaving the terminal to carry containers on each leg of the journey;
- reduce the time required to notify changes that may be occasioned by changing requirements of the customers, such as switching of an import time slot to an export time slot, changing vessel particulars and container particulars, and so on;
- encourage increased use of transponders to capture vehicle data; and
- provide the ability to exchange time slots.

It is also intended to encourage greater use of B-Doubles, which have the ability to carry three TEUs at a time, to reduce overall numbers of trucks using the roads and to operate road transport operations over a 24-hour period to avoid congestion during peak traffic periods.

Further details of road transport operations are provided in **Chapter 21** *Traffic and Transportation*.

Rail Transport

Following the sale of FreightCorp and National Rail Corporation, all rail operations are now carried out by private sector operators. The rail tracks are owned by the State Government through the RIC. The rail network includes a section of dedicated freight track between Port Botany and Chullora, beyond which freight trains have to share the tracks with passenger trains. As priority is given to passenger trains, freight trains are not permitted on the shared sections of the metropolitan network during peak hours. This imposes restrictions on the freight carrying capacity of the rail network.

Presently the majority of containers moved by rail are taken to intermodal facilities around Sydney where they are unloaded and the cargo distributed by road. These intermodal facilities are mainly located (with the exception of Chullora) outside the dedicated freight portion of the rail network.

Further details of the rail freight network are provided in **Chapter 2** *Regional Context* and **Chapter 21** *Traffic and Transportation*.

6.4 Ancillary Facilities

The necessary ancillary facilities required by any terminal operator(s) would include:

- buildings including an administration and operations centre, equipment maintenance workshop, tug berth administration office, gatehouse and other minor site buildings;
- reticulation of services within the new terminal area;
- lighting;
- waste management;
- fuel supply;
- fire fighting system;
- storage for containers carrying dangerous goods;
- storage for refrigerated containers;
- chemicals storage; and
- security.

These facilities are described below.

6.4.1 Buildings

The new terminal would be provided with an administration and operations centre and an equipment maintenance workshop. These buildings would most likely be located at the northern end of the new terminal.

The administration and operations centre would most likely be constructed by the new terminal operator(s). It is expected that the centre would be a conventional reinforced concrete or steel framed two or three storey structure with a height in the order of 12 m. Access to the building would be via the road access bridge from Foreshore Road. The administration and operations centre would contain the following:

- office areas;
- meeting rooms;
- reception area;
- canteen;
- bathrooms and change facilities;

- control room;
- plant room;
- Customs office;
- security office; and
- a first aid room.

Sufficient carparking would be provided to accommodate personnel and visitors in accordance with the City of Botany Bay Council Off-street Parking Development Control Plan (Botany Bay City Council 2000). It is expected that approximately 250 parking spaces would be required. Provision would also be made for disabled drivers, deliveries and an internal terminal bus pick-up and set-down point. Detailed design of the car parking area(s) would be in accordance with sound engineering practice and *Australian Standard AS 2890.1-1993 Off-Street Car Parking* and the provisions of City of Botany Bay Off-street Parking Development Control Plan, as relevant.

The equipment maintenance workshop at the new terminal would be fully equipped to maintain all plant and equipment used at the terminal. The building would comprise a steel structure with metal cladding and would be about 18 m high. Surrounding areas would be paved with provision for all stormwater to be passed through a treatment system prior to discharge or recycling.

The gatehouse and other minor site buildings (e.g. electricity sub-station and sewerage pump house) would probably be of masonry construction with appropriate security fencing.

In addition to these buildings on the new terminal, an administration office and workshop would also be required to be constructed for the tug berths located on the new boat ramp reclamation area to the north of the new terminal.

All buildings would be constructed in accordance with relevant Development Control Plans, Australian Standards and the Building Code of Australia.

The most likely locations for the various buildings are shown on **Figure 1.2**.

6.4.2 Provision of Services

Services which would be provided for the operation of the new terminal would include:

- water supply;
- sewage connections including trade waste discharge;
- stormwater management;
- power supply; and
- telecommunications.

Potable Water

Currently, there is a 450 mm diameter water main operated by Sydney Water Corporation running along Penrhyn Road. This main feeds from a single larger water main (500 mm) at the intersection of Foreshore Road, Botany Road and Penrhyn Road.

To provide water for the new terminal it is proposed to extend the existing water supply system. The extension would connect the new terminal with the 450 mm existing main in Penrhyn Road. The new 450 mm main would be extended from Penrhyn Road along the eastern edge of the new terminal and out onto Foreshore Road over the proposed road access bridge. The main would then be placed on the southern side of the Foreshore Road reserve and connected to the 500 mm main at the intersection of Foreshore Road, Botany Road and Penrhyn Road. This would provide a dual feed point for the water supply into the new terminal in case of damage to the mains or in case of fire.

An extension would also be connected to the amenities at the proposed new boat ramp and tug berths to the west along Foreshore Road.

During operations, activities at the new terminal that would require water include:

- maintenance activities;
- ship supply;
- equipment wash down (in wash bay area);
- fire fighting; and
- potable water for domestic use.

Sydney Water advises that sufficient capacity exists in the water supply mains to provide the volumes of water required for the operation of the new terminal.

Provision would be made to collect and reuse clean stormwater for washdown and irrigation purposes to supplement the potable water supply as described in **Chapter 16** *Hydrology and Water Quality*.

Water use at the new terminal would be subject to a Water Resources Management Plan (WRMP), which would form part of the site Operational Environmental Management Plan (EMP).

Further details on the water supply services are presented in **Chapter 33** *Water and Wastewater*.

Sewerage and Wastewater (Trade Waste)

The existing port facilities are serviced by the Sydney Water Corporation sewerage system. The port area itself is serviced by the Sydney Water Corporation sewerage pumping station No. 570 (SPS-570) near Penrhyn Road.

SPS-570 would have sufficient capacity for the operation of the new terminal as confirmed by Sydney Water Corporation in **Appendix G**.

It is proposed to serve the new terminal via a 100 mm common rising main connecting on the western side of SPS-570. This common rising main would be connected to other rising mains from various points within the new terminal. The sewer main would run in a services easement along Penrhyn Road and along the eastern and northern boundaries of the new terminal to service the terminal. A branch would be attached under the new road bridge and extend along Foreshore Road which would service the amenities at the new boat ramp area and tug berths. In addition, a small sewerage pumping station would be required on the new terminal and at the new boat ramp area.

Domestic sewerage would be generated at the new terminal from the following activities:

- employee facilities such as showers, toilets and wash basins; and
- tea rooms and canteens.

Trade waste discharge from the new terminal would arise from:

- maintenance and washing activities undertaken in the maintenance and washdown facilities at the new terminal;
- runoff from bunded storage areas such as the fuel storage and refuelling areas; and
- waste from the stormwater first flush treatment system.

All trade waste would discharge to the Sydney Water Corporation sewer under a Trade Waste Agreement. The Trade Waste Agreement would determine the level of treatment required prior to discharge. All areas where washdown or maintenance activities are to be undertaken would be bunded and provided with sumps, oil/water separators and grit traps to ensure that potentially contaminated waters do not leave the site. This would also be the case for any additional bunded storage areas, such as those used for refuelling and fuel storage. Water collected in these areas would be tested and disposed to sewer or offsite by a licensed waste disposal contractor, if it was not suitable for disposal to sewer.

Sydney Water Corporation advises that sufficient capacity exists in the sewage system to accept the volumes of wastewater expected to be generated during the operation of the new terminal.

Further details on the water and wastewater are presented in **Chapter 33** *Water and Wastewater*.

Stormwater

A stormwater management and drainage system would be installed to manage the collection and disposal of stormwater runoff from the proposed new terminal. The objective of the system would be to minimise the impacts of the proposed new terminal on the existing environment of Botany Bay.

The objective of the stormwater management system implemented at the new terminal would be to:

- remove gross suspended solid pollutants from the system through settlement;
- remove gross hydrocarbon pollutants through materials management and use of an oil separation system; and
- prevent off site discharge of potentially polluting materials via the stormwater system, through monitoring and testing, and implementation of emergency management procedures.

All stormwater runoff would be collected by surface inlet pits and would drain via box culverts and pipes with the capacity to convey the 20 year Annual Recurrence Interval (ARI) storm event.

A first flush system would be integrated into the stormwater collection and disposal system. Stormwater treatment devices such as sump pits and oil and grit separators would provide treatment of the first flush prior to discharge into Botany Bay or Penrhyn Estuary. The first flush collection system would also act as a backup containment for any accidental spills and/or collection of firewater and would incorporate isolation valves to allow this containment.

A full description of the stormwater management system is contained in the **Chapter 16** *Hydrology and Water Quality*.

Power Supply

It is anticipated that dual 33 kV feeders would supply the new terminal from Energy Australia's network in Botany Road. The feeders would be installed underground along the road reserve of the Inter-Terminal Access Road. The total distance of this new connection would be approximately 1,200 m.

A 11 kV switchroom would be constructed on site at the new terminal and 11 kV cables would be installed under the hardstand to connect each container crane. The cranes would have an on-board 11 kV/415 V transformer. All transformers located on the site would be of modern design and meet appropriate standards. The total estimated connected electricity load for the new terminal would be 18,000 kVA. Energy conservation measures would be employed during the operation of the new terminal.

Details of the energy usage and energy saving measures for the new terminal in all stages of development and operation are outlined in **Chapter 35** *Energy*.

Telecommunications

Communications would be provided to the administration area and other buildings on the site. Underground fibre optic cables would be used on the site to limit the potential risk of collision with overhead communications poles. The main communications network would link into the local Telstra communications network located adjacent to the site to the north of the new terminal on Foreshore Road.

6.4.3 Lighting

Operational areas on the new terminal would be lit with 2,000 Watt metal hallide lamps mounted on 30 m towers. Each tower would have an average of 10 lamps. A total of approximately 20 towers would be required to provide the required illumination for operational areas. The lighting of the new terminal would be designed and installed in accordance with the requirements of the Civil Aviation Safety Authority to minimise light spill due to the proximity of the new terminal to Sydney Airport.

All lights would be fitted with the most appropriate energy efficient bulbs and light intensity would be varied across the site according to the level of illumination required. For example, perimeter lighting would be of a low light intensity, whereas operational areas would require brighter illumination. Lighting at the site would also be designed to ensure minimal light spill for local residents, businesses and the adjacent ecological habitat within Penrhyn Estuary.

Further details of lighting arrangements at the new terminal are provided in **Chapter 30** *Operational Aviation Issues*. Potential impacts of light spill on residents are discussed in **Chapter 25** *Visual Impact Assessment* and impacts on ecological habitats are discussed in **Chapter 20** *Terrestrial Ecology*.

6.4.4 Waste

Waste materials that would be expected to be generated during the operation of the new terminal would include paper and office wastes, food wastes, maintenance materials, human waste, wastewater (trade waste), quarantine waste and ship waste.

Waste management arrangements would be put in place during operation of the new terminal to maximise the reduction, recycling and reuse of waste materials. This would be achieved through the implementation of

a Waste Management Plan(WMP), although specific waste management practices for the operation of the new terminal would be the duty of the operator(s) of the new terminal.

Further details of the types and quantities of waste and waste management measures are provided in **Chapter 34** *Waste*.

6.4.5 Fuel Supply

New terminal equipment, not powered by the site electricity network, would require a fuel supply. Fuel types required on the new terminal would include:

- diesel; and
- LPG.

An onsite refueling area would be developed, which would contain a 150 tonne aboveground tank for storage of diesel. A separate LPG store would be provided in the refuelling area for storage of minor quantities of LPG in cylinders.

The refueling area would be constructed in accordance with the *Australian Standard AS 1940 (1993): The Storage and Handling of Flammable and Combustible Liquids*. A Dangerous Goods Licence may need to be obtained from NSW WorkCover by the terminal operator(s) for the storage and handling of these fuels.

The refueling area would include full containment to cater for accidental spills or equipment failure. The containment are would drain to a sump, connected to an oil/water separator, with cut-off devices equipped with a manual override to cater for spills in this area.

Bulk fuel would be delivered to the refueling area by road tanker as required. Management protocols and procedures for the storage and handling of materials in the refueling area would be included in the Operational EMP for the site and would incorporate product reconciliation and emergency and incident response procedures to be adopted in the event of a spill or other incident.

Further details of fuel supply are provided in **Chapter 35** *Energy* and details of emergency and incident response are provided in **Chapter 32** *Emergency and Incident Management*. Risks associated with fuel supply are assessed in **Chapter 28** *Preliminary Hazard Analysis*.

6.4.6 Fire Fighting System

The fire fighting system would be designed to meet the requirements of the NSW Fire Brigade, Australian Standards and the Building Code of Australia. A Fire Management Plan would be developed and implemented at the site, which would incorporate signage and training requirements for all personnel at the new terminal.

The principal fire fighting system would be linked to the Sydney Water Corporation water supply mains at Penrhyn Road and at Foreshore Road which would provide dual feed points for fire fighting purposes. Clear access to all fire fighting equipment would be maintained on the site as a requirement of the site's Fire Management Plan. All new terminal buildings would be fitted with heat or smoke detection equipment at appropriate locations, which would be connected to the fire alarm system. All buildings would be fitted with a sprinkler system and fire extinguishers as per the appropriate standards.

Further details of the fire fighting system are provided in **Chapter 32** *Emergency and Incident Management*. Containment of firewater is discussed in **Chapter 16** *Hydrology and Water Quality*.

6.4.7 Dangerous Goods Container Storage

Some containers would be classified as "dangerous goods" regardless of whether the containers contain small or large volumes of dangerous goods. Historical container handling statistics from Sydney Ports Corporation show that approximately 4% of containers contain goods classified under the *Dangerous Goods Act* 1975.

The handling of containers carrying dangerous goods in ports in NSW is regulated by the Dangerous Goods (General) Regulation 1999 under the *Dangerous Goods Act* 1975. An Environment Protection Licence issued by the NSW EPA may be required for the operation of the new terminal and would be obtained by the terminal operator(s).

Containers carrying dangerous goods would be handled and transported in accordance with *Australian Standard AS 3846 (1998): The Handling and Transport of Dangerous Goods in Port Areas*, which stipulates segregation requirements.

A Safety Management System would be developed by the terminal operator(s) to address the handling and transport of dangerous goods during the operation of the new terminal.

The potential hazards associated with the handling and transport of containers containing dangerous goods is addressed in **Chapter 28** *Preliminary Hazard Analysis*.

6.4.8 Refrigerated Container Storage

Refrigerated containers, known as "Reefers", are used to carry foodstuffs that need to be kept refrigerated at all times. During storage at the yard, they need to be connected to power sources to keep the refrigeration system working. Reefers are normally stacked in a less dense configuration to allow access for monitoring and maintenance if required. The terminal would be provided with a separate area to hold reefers and would have the capacity to store approximately 800 containers at any time.

6.4.9 Chemical Storage

In addition to the dangerous goods described above, there would be a variety of other chemicals used and stored at the new terminal by the terminal operator(s). These chemicals would include lubricating oils, solvents, paints, batteries and other general cleaning/maintenance chemicals.

Chemicals would be housed in locations that are roofed and bunded where required. All chemicals would be stored and handled in accordance with the instructions provided by the manufacturer, relevant Australian Standards and legislation including:

- *Australian Standard AS 1940 (1993): The Storage and Handling of Flammable and Combustible Liquids;*
- *Australian Standard AS 3780 (1994): The Storage and Handling of Corrosive Substances*;
- *Dangerous Goods Act* 1975 and associated Regulations; and

- *Occupational Health and Safety Act 2000 and associated Regulations*.

6.4.10 Security

Security measures would be put in place by the terminal operator(s) to minimise crime, the risk or terrorist attack and to ensure the new terminal is secured as a Customs controlled area.

The new terminal would be equipped with security features consistent with the requirements of the *International Maritime Organisation's International Ship and Port Facility Security Code*.

The new terminal would be secured from unauthorised access from adjoining lands using security fences at least 2 m high. Along the north and eastern side of the new terminal the security fence would consist of a 4 m high noise barrier. Site security would be monitored using strategically placed video cameras or closed circuit television.

Trucks using the main access from Foreshore Road and the Inter-Terminal Access Road would be required to pass through the truck waiting area and to stop at the gatehouse for processing before being allowed to proceed into the terminal. Trucks would also be required to exit via an Australian Quarantine Inspection Service and Customs inspection point.

Gates across the rail line would be provided within the security fence and would be monitored 24 hours a day as part of normal port operations. The rail line would normally be gated off and all movements would be monitored from the gatehouse. An audible and/or visual warning system would be installed to indicate when the rail line gate is open. The section of the rail line through Penrhyn Estuary would be fenced on both sides for safety and access control.

The terminal would be separated from the replacement boat ramp and Foreshore Beach by a 130 m wide channel. Pedestrian access to Penrhyn Estuary would be restricted to a boardwalk and bird viewing platform on the northwest corner during daylight hours only.

Waterways adjacent to the terminal would be monitored by both Customs and the Australian Federal Police, similar to the existing arrangement within Brotherson Dock. Channel markers would be provided for recreational vessels, with the channel leading to Penrhyn Estuary considered as a restricted area. A floating oil boom under the road bridge would provide a physical barrier to water craft.

The proposed facility would have access to the recently established container X-ray facility on Bumborah Point Road where random inspection of containers can be undertaken.

Persons from berthed container ships would not be allowed to come onshore without permission of the Australian Customs Office.

Visitors would be required to access the terminal via the gatehouse, where they would be required to sign in and sign out at a security office. Car parking would be provided outside the security fencing, but within close proximity to the office buildings.

Further details of security measures for the new terminal are provided in **Chapter 32** *Emergency and Incident Management.*

6.5 Operational Licences

Licences or permits that may be required to be obtained by the terminal operator(s) for the operation of the new terminal are shown in **Table 6.6**.

Table 6.6 Operational Licences

LICENCE/ PERMIT	ISSUING AUTHORITY	ACTIVITIES	RELEVANT ACT
Environment Protection Licence	NSW Environment Protection Authority	Scheduled Activities: - Chemical storage facilities - Waste activities Other requirements: - Discharges and emissions from the site - Maintenance of plant and equipment - Reporting requirements - Pollution reduction programs - Emergency response	*Protection of the Environment Operations Act* 1997
Dangerous Goods Notification	NSW WorkCover	Storage of dangerous goods on site (e.g. fuel)	*Dangerous Goods Act* 1975
Trade Waste Agreement	Sydney Water	For discharge of wastewater to sewer	*Sydney Water Act* 1994

6.6 Hours of Operation

The new terminal would operate 24 hours a day, 7 days a week for 365 days per year.

6.7 Workforce

Once the new terminal is fully developed, the total number of employees would be approximately 300, including permanent staff, casual staff and contractors. Of the 300, approximately 250 would be operational staff, 25 administrative staff and up to 25 would be maintenance personnel. The number of employees would be dependent on terminal operator(s) needs.

6.8 Emergency and Incident Management

An Emergency Response and Incident Management Plan (ERIMP) would be developed for the site by the operator(s), which would detail all potential emergencies that could be expected at the site, this would include:

- fire and explosion;
- material release to land, air and water;
- incidents with shipping at the dock; and
- security breaches, bomb threat and terrorist activity.

The ERIMP would be developed in conjunction with the NSW Fire Brigade, State Emergency Services and Police. It would also be prepared in accordance with the existing Port Botany Emergency Plan (Sydney Ports Corporation 1996) and the Botany Bay Local Disaster Plan (Botany Bay Local Emergency Management Committee 2000). The Disaster Plan has been prepared by the Botany Bay Local Emergency Management Committee to comply with PlanningNSW's requirements for Botany Bay and the *State Emergency and Rescue Management Act* 1989. The Botany Bay Local Emergency Management Committee would be consulted during the preparation of the ERIMP for the new terminal.

Emergency and incident response is described further in **Chapter 32** *Emergency and Incident Management*.