Summary of key outcomes:

The Port Botany Expansion would not present any additional cumulative impacts other than those already identified in this EIS. However, the Port Botany Expansion and the future predicted growth of Sydney Airport would result in a competing demand for available industrial, commercial and residential land uses in the Botany Bay region. Similarly, the Green Square redevelopment would also place pressure on residential land use in the region.

Cumulative benefits of the Port Botany Expansion would include employment and economic benefits, a reduction in greenhouse gas emissions and habitat enhancement of aquatic and terrestrial habitats. These benefits would be lost if the proposed Port Botany Expansion did not proceed.

36.1 Introduction

This chapter describes the cumulative impacts and benefits likely to arise from the interaction of the construction and operation of the Port Botany Expansion with other significant projects and activities planned for the Botany Bay region.

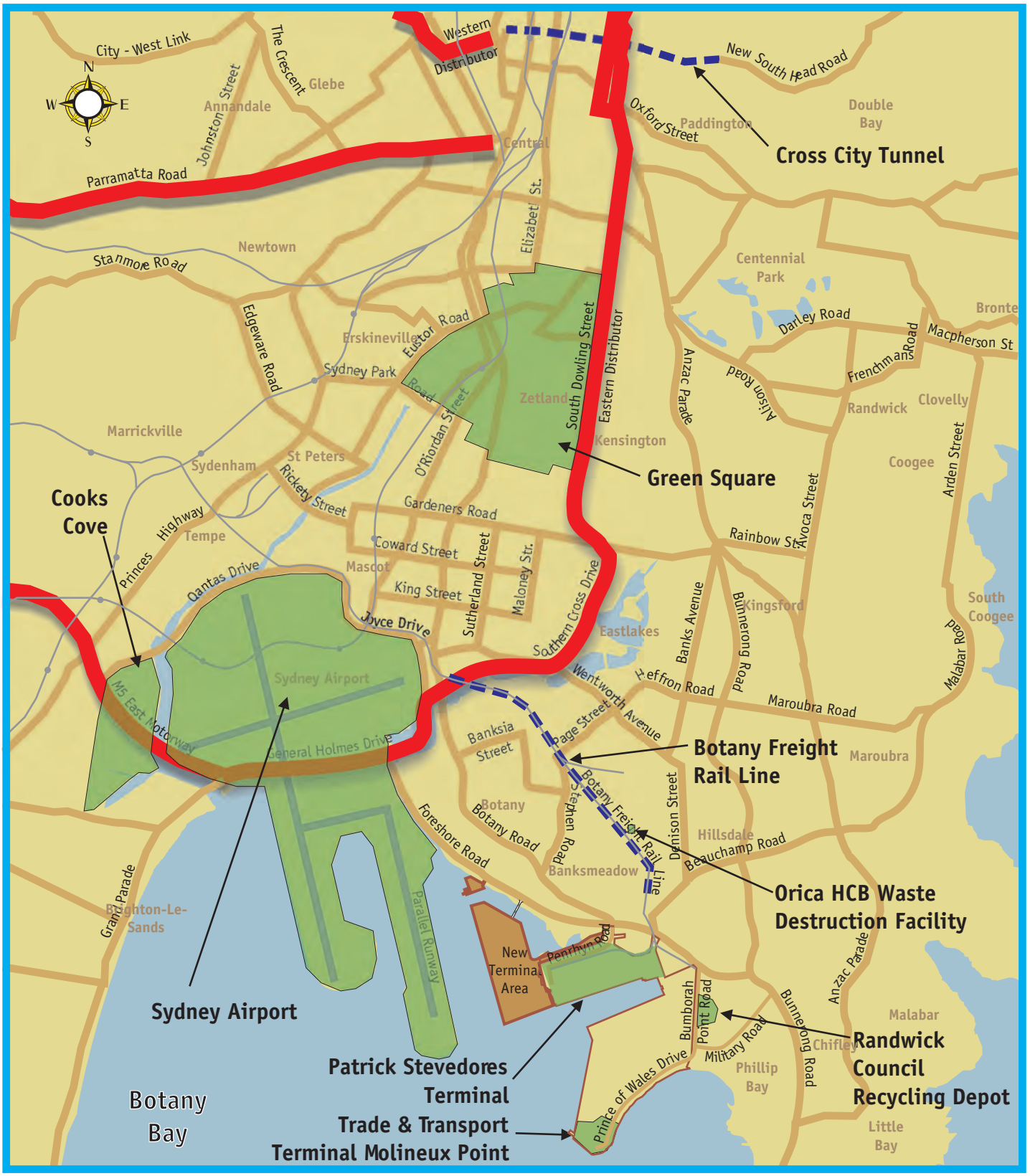
The definition of cumulative impact adopted for the purposes of this EIS encompasses those impacts which may result from a number of activities with similar impacts interacting with the environment in a region. In accordance with this definition, this chapter focuses on identifying cumulative impacts at both the local and regional level where these impacts could potentially be significant.

36.2 Potential Cumulative Impacts

36.2.1 Listing of Interacting Projects

A brief description of those developments that could potentially contribute to the cumulative impacts in the Botany Bay region are provided below and are shown in **Figure 36.1**. Only developments with the potential to result in cumulative impacts with the proposal are included.

- *Patrick Stevedores Port Botany Container Terminal Upgrade*. A development application and EIS was lodged with PlanningNSW in February 2003, for the upgrade of this facility. This will involve modification to the layout of the existing terminal to improve access between container storage and loading areas, installation of additional gantries and cranes and increasing the terminal area used for truck queuing.
- *Botany Freight Rail Line*. This project involves duplication of the Botany Freight Rail Line (managed by RIC) and is part of a long term strategy to upgrade freight rail facilities. The project includes construction of approximately 5 km of duplicated track, in conjunction with associated signalling, civil and structural works. The first three stages of the upgrade were completed in 2002. The approvals and environmental assessment process has commenced for stage four, the final component of work for the project, which involves total duplication of the freight line between the Botany Yard and the Cooks River Yard.
- *Sydney Airport*. The airport currently accepts approximately 25 million domestic and international passengers per annum. This is expected to grow substantially (up to 63 million passengers per annum by 2020) and a master plan process has been commenced to determine land and infrastructure requirements to meet this growth. A draft of the master plan is expected to be completed by July/August 2003.
- *Green Square*. Redevelopment of Green Square in Alexandria, a 14 ha redevelopment incorporating a mix of commercial, retail and residential land uses. It is predicted that by 2020, the redevelopment would provide for an estimated 20 000 new residents and 20 000 new workers.
- *Cooks Cove Development*. Proposed redevelopment of Cooks Cove, located west of the airport, at Arncliffe. The site currently includes a diverse range of recreational facilities, including a golf course, golf range, soccer fields, baseball diamonds and a temporary cycleway. The proposed redevelopment includes a "gateway commerce and advanced technology" centre, comprising 20% of the 100 ha site.



Developments with the Potential to Result in Cumulative Impact with the Port Botany Expansion

Figure 36.1

Passive and recreational open space is proposed for the remaining land area, with a redesigned golf course and extended cycleway.

- *Cross City Tunnel*. Major works commenced in January 2003 on the $680 million Cross City Tunnel designed to improve east-west travel across the Sydney CBD. The development will reduce congestion on city streets by removing as much as 90,000 vehicles per day. The Cross City Tunnel is expected to open for traffic in 2004/early 2005.
- *Trade and Transport Terminal, Molineux Point*. A trade and transport facility at Molineux Point, which includes warehousing and container packing and unpacking facilities, is being constructed.
- *Orica HCB Waste Destruction Facility*. A proposal has been submitted by Orica Australia for approval to establish a hexachlorine benzene waste destruction plant within the Botany Industrial Park. A Commission of Inquiry has been undertaken and the outcome of the ministerial review is being awaited.
- *Randwick Council Recycling Depot - Lot 103* (the former Bunnerong Power Station site, Matraville). This site is currently vacant, but Randwick City Council will construct a Recycling Depot on part of the vacant land.

36.2.2 Cumulative Impacts from Other Projects

The cumulative effects of the above listed development proposals and activities with the proposed Port Botany Expansion have been identified under the following headings:

- traffic and transportation (including accessibility, congestion and transport efficiency);
- social environment (including noise, visual impact, land use planning, hazards and risks, social impacts and equity and economic impacts); and
- biophysical environment (including air quality, water quality and aquatic and terrestrial ecology).

These categories are not mutually exclusive. The description of the cumulative impacts provides a broad overview and is qualitative, as the level of information available for these developments and activities is variable.

A qualitative analysis of the potential cumulative impacts of the proposed Port Botany Expansion with other major developments and activities is provided in **Table 36.1.**

Table 36.1 Cumulative Impacts of the Port Botany Expansion with Other Major Projects in the Botany Bay Region.

ACTIVITY	CUMULATIVE IMPACT		
	Traffic and Transport	**Social Environment**	**Biophysical Environment**
Proposed Patrick Stevedores Container Terminal Upgrade	The proposed upgrade of the Patrick Stevedores terminal, combined with the proposed Port Botany Expansion would have a cumulative impact on traffic and transport systems in the region as increased rail and road movements would result from both developments. Increased road and rail movements resulting from the proposed upgrade of the Patrick Stevedores terminal are included in the traffic and transportation assessment in this EIS (refer to **Chapter 21** *Traffic and Transportation*). No additional cumulative impacts, other than those identified in this EIS, would therefore be expected.	The upgrade of the Patrick Stevedores terminal would not significantly change the existing visual amenity of the Botany Bay region, therefore, there would be no visual cumulative effects in association with the Port Botany Expansion. Noise emissions from the upgrade of the Patrick Stevedores terminal are included in the noise impact assessment in this EIS (refer to **Chapter 22** *Noise*).No additional cumulative impacts, other than those identified in this EIS, would therefore be expected. The Preliminary Hazard Analysis undertaken for this EIS considered the cumulative impacts of the proposed Patrick Stevedores terminal upgrade, based on the Port Botany Land Use Safety Study (refer to **Chapter 28** *Preliminary Hazard Analysis*). No additional cumulative impacts, other than those identified in this EIS, would therefore be expected.	The upgrade of the Patrick Stevedores terminal would have limited impacts on the biophysical environment. Air emissions from the Patrick Stevedores terminal are included in the air assessments in this EIS (refer to **Chapter 23** *Air Quality*). The potential for adverse air quality impacts from the operation of the proposed new terminal, combined with existing container terminals (Patrick Stevedores and P&O Ports) at capacity, would be minimal. No additional cumulative impacts would therefore be expected. The construction and operation of the Patrick Stevedores terminal has the potential to impact on the water quality of Botany Bay. The proposal includes mitigation measures to ensure that surface water quality is maintained and that water discharged to Botany Bay complies with legislative requirements. Therefore, potential cumulative water quality impacts from the upgrade of the Patrick Stevedore terminal, in association with the Port Botany Expansion, would be minimal.
Duplication of Botany Freight Rail Line	The proposal would provide additional rail capacity for the movement of containers by train. This would support expansion of port facilities and assist in achieving the objective of a higher percentage of inland transfers of containers by	Additional rail movements could result in community impacts arising from the operation of the rail corridor in the form of noise impacts. These impacts have been assessed by RIC and are considered in the noise impact assessment in this EIS (refer to **Chapter**	Potential reduction in air quality impacts, including greenhouse gas emissions, arising from increased rail movements and decreased truck movements associated

ACTIVITY	CUMULATIVE IMPACT		
	Traffic and Transport	Social Environment	Biophysical Environment
	rail.	**22** *Noise*). The increase in the percentage of containers moved by rail would reduce the environmental impacts associated with additional truck trips generated from the expansion of port activities addressed in this EIS.	with the expansion of port activities.
Sydney Airport	Airport passenger volumes are expected to increase from 24 million to 63 million by 2020. As no substantial additional public transport infrastructure is proposed, this is likely to add to passenger vehicle traffic and congestion in the Botany Bay region. The cumulative impact assessment contained in **Chapter 21** *Traffic and Transportation* shows that the predicted increase in traffic from Sydney Airport would account for approximately 30% of additional traffic generated by major developments in the Botany Bay region, whereas port generated traffic would represent less than 2% of the total peak hourly traffic flows by 2021.	Given that Sydney Airport intends to accommodate its forecasted growth in demand with no changes proposed to existing curfew, scheduled aircraft movements per hour, or number of runways, no additional cumulative noise impacts with the Port Botany Expansion would be expected to arise. The Port Botany Expansion and the increase in passenger numbers and freight volumes through Sydney Airport would create a significant cumulative benefit to the NSW economy and employment levels in the Botany Bay region, and would maintain the area's status as the economic and trade gateway of NSW. Spin-off developments would likely arise from increased port and airport related activities and may therefore result in competing demand for available land. There would likely be increased demand for commercial and industrial space for port and airport related business, and for other businesses which may be encouraged by increased trade to establish in the area. Residential land for increased port and airport related employment would also be in demand.	Potential regional air quality impacts, including greenhouse gas emissions, arising from increased vehicle traffic associated with increased passenger volumes.
Green Square	Potential for significant road movements and congestion in the Botany Bay region. The cumulative traffic assessment contained in **Chapter 21** *Traffic and Transportation* shows that the predicted increase in traffic from the Green	The development of Green Square is predicted to provide for an estimated 20,000 new workers which may increase the demand for residential housing in the Botany Bay region. With 20,000 new workers and 20,000 residents the	Potential regional air quality impacts arising from increased vehicle traffic associated with the redevelopment.

ACTIVITY	CUMULATIVE IMPACT		
	Traffic and Transport	**Social Environment**	**Biophysical Environment**
	Square development accounts for approximately 50% of additional traffic generated by major developments, whereas port generated traffic would represent less than 2% of the total peak hourly traffic flows by 2021. The Green Square development would be the most significant contributor to cumulative traffic generation in the region. In addition, the Green Square development may increase congestion of public transport, including the Airport Rail Link which may further increase demand for the road network.	Green Square development would promote economic growth in the region.	
Cooks Cove Development	Potential for additional road movements. This proposal is included in the cumulative traffic impact assessment in **Chapter 21** *Traffic and Transportation*.	The Cooks Cove development would result in an increase in employment and, potentially, and increase in demand for residential housing in the Botany Bay region.	No significant cumulative impacts.
Cross City Tunnel	Improved cross-regional traffic flows leading to reduced congestion and improved overall traffic efficiency. Improved traffic movements to and from the Port Botany area.	Promotion of economic growth of Central and Botany Industrial areas through improvement of east-west travel.	Improved regional air quality due to reduced traffic congestion and reduction in the number of cars using streets in the city.
Trade and Transport Facility at Molineux Point	Potential for additional road movements. Marginally adds to the capacity of Port Botany operations. Increased road movements resulting from the proposal are included in the traffic and transportation assessment in this EIS (refer to **Chapter 21** *Traffic and Transportation*). No additional cumulative impacts, other than those identified in this EIS, would therefore be expected.	No significant cumulative impacts.	No significant cumulative impacts.

ACTIVITY	CUMULATIVE IMPACT		
	Traffic and Transport	Social Environment	Biophysical Environment
Orica HCB Destruction Facility	No significant cumulative impacts.	There are a number of industrial sites in the vicinity of the Port Botany Expansion site, including the Orica HCB Destruction Facility. The potential for escalation from incidents at the Orica HCB Destruction Facility is considered unlikely given the distances physically separating the two sites.	No significant cumulative impacts. The EIS for the Orica HCB Waste Destruction Facility showed no significant air quality impacts associated with the development.
Randwick City Council Recycling Depot	Potential for additional road movements.	No significant cumulative impacts.	No significant cumulative impacts.

36.3 Potential Cumulative Benefits

36.3.1 Economic and Employment Opportunities

The Port Botany Expansion would create a significant cumulative benefit to the NSW economy, employment levels and household income of those employed directly and indirectly in port related activities (refer to **Chapter 27** *Economic Impact Assessment*). Over the life of the project, up to 2024/25, the operation of the proposed Port Botany Expansion would generate over $12 billion in output, for the NSW economy and add $3.6 billion to household income. This would contribute to improved living standards in the area and strengthen NSW's position as the State making the greatest contribution to the Australian economy.

36.3.2 Reduction in Greenhouse Gas Emissions

A cumulative benefit from the Port Botany Expansion would be the overall reduction in greenhouse gas emissions by approximately 500,000 tonnes per annum in the future (about 2020 / 2025) when compared to the "Do Nothing" scenario. These reductions are largely a result of the decrease in the total kilometres travelled by trucks and trains which would otherwise have to travel from other locations within NSW or from interstate, in the absence of the Port Botany Expansion (refer to **Chapter 23** *Air Quality*).

36.3.3 Habitat Enhancement

Direct cumulative benefits of the Port Botany Expansion include habitat enhancement of Penrhyn Estuary and the enhancement of aquatic habitats associated with hard surfaces.

Penrhyn Estuary is essentially the only habitat remaining for migratory shorebirds formerly abundant in the northwestern part of Botany Bay. Existing shorebird habitat at Penrhyn Estuary comprises small areas in the outer portion of the mudflats for feeding (about 1.5 ha) and two small sandflats for roosting.

Extensive restoration works are proposed for Penrhyn Estuary as part of the Port Botany Expansion, as discussed in **Chapter 20** *Terrestrial Ecology*. Habitat enhancement of Penrhyn Estuary would significantly improve shorebird habitat so as to continue to provide habitat for the existing shorebirds that use the Estuary, and increase the number of shorebirds using the area following the proposed port expansion works. The proposed enhancement works would significantly open up the area to shorebirds through the creation of an estuary area that would include up to 6 ha of saltmarsh habitat, 12.5 ha of intertidal sand and mudflats, and up to 8 ha of seagrass habitat.

Estimates by Larkum and West (1990) suggest that up to 761 ha of seagrass habitat exist in Botany Bay. Furthermore, it has been estimated that seagrass present along the northern shoreline of Botany Bay range between 7.5 ha (Watford and Williams 1998) and 16 ha (MPR 1998). The proposed Port Botany Expansion would result in the loss of about 4 ha of seagrass habitat in the study area, however, an additional 8 ha of habitat would be created in Penrhyn Estuary as part of the habitat enhancement works. This additional seagrass habitat would contribute to a significant increase in seagrass habitat along the northern shoreline of Botany Bay.

As part of the Port Botany Expansion, hard, artificial surfaces would be created along the edges of the new terminal and the new boat ramp. The use of rock to create these hard, artificial surfaces would provide

habitat for a variety of invertebrates and vertebrate animals. By providing additional structural complexity to these hard surfaces, the value of this habitat could be significantly enhanced (refer to **Chapter 19** *Aquatic Ecology*).

36.4 Conclusion

The various developments discussed in this chapter would contribute to the cumulative increase in traffic in the Botany Bay region, however, port generated traffic would represent less than 2% of total peak hourly traffic flows by 2021, with Green Square and Sydney Airport developments projected to account for the greater part of the increase in cumulative traffic volumes, although the Port trucks would be a significant proportion of the total trucks. The Port Botany Expansion, therefore, would not significantly contribute to cumulative traffic increases in the Botany Bay region.

Developments aimed at increasing the capacity of operations at Port Botany, such as the proposed upgrade of the Patrick Stevedores terminal and the container warehouse facility at Molineux Point would generally result in increased traffic in the local Port Botany area. These developments are, however, included in the Port Botany Expansion impact assessment and would therefore not present any additional cumulative impacts beyond those already identified in this EIS.

Noise impacts from the proposed Patrick Stevedores container terminal upgrade are included in the noise impact assessment in this EIS. No additional cumulative impacts from this development, other than those identified in this EIS, would be expected to occur. Noise impacts from the duplication of the Botany Freight Rail Line have been assessed by, and are the responsibility of, RIC but have been addressed in this EIS.

The Preliminary Hazard Analysis undertaken for this EIS considered the cumulative impacts of the proposed Patrick Stevedores terminal upgrade and of industrial sites in the vicinity of the new terminal. No additional cumulative impacts, other than those identified in this EIS, would be expected to occur. In addition, the potential for escalation from incidents at the Orica HCB Destruction Facility is considered unlikely given the distances physically separating the two sites.

The Port Botany Expansion and the future growth of Sydney Airport would result in a competing demand for available industrial, commercial and residential land uses in the Botany Bay region. Similarly, the Green Square redevelopment would also place pressure on residential land use in the region.

Future Sydney Airport operations and the redevelopment of Green Square would contribute to cumulative air quality impacts in the Botany Bay region, however, the upgrade of the Botany Freight Rail Line and the continuing development of the arterial road network (Cross City Tunnel) would assist in reducing potential regional cumulative air quality impacts.

Cumulative benefits of the Port Botany Expansion would include employment and economic benefits, a reduction in greenhouse gas emissions and habitat enhancement of aquatic and terrestrial habitats. These benefits would be lost if the proposed Port Botany Expansion did not proceed.

Contents

Summary of key outcomes:

A wide range of mitigation measures to prevent or minimise environmental impacts which may be generated by the Port Botany Expansion have been detailed throughout this EIS. Implementation of these measures would be necessary to minimise impacts and maximise positive outcomes on the physical, social and economic environments of the local area and wider region due to the proposed development.

37.1 Introduction

A wide range of mitigation measures to prevent or minimise environmental impacts which may be generated by the Port Botany Expansion have been detailed throughout this EIS. Implementation of these measures would be necessary to minimise impacts and maximise positive outcomes on the physical, social and economic environments of the local area and wider region due to the proposed development.

37.2 Mitigation Measures

Table 37.1 summarises the mitigation measures identified in this EIS to ameliorate impacts and safeguard the environment so that the desired environmental outcomes are achieved for the various components of the project for both construction and operation. Monitoring required to test the efficacy of the mitigation measures and the potential impacts of the proposal are described separately in **Chapter 38** *Environmental Management and Monitoring*.

Table 37.1 Compilation of Mitigation Measures

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
General		
Establish environmental management procedures for the protection of the environment.	Prepare and implement a Construction EMP and Operational EMP. (This is described in more detail in **Chapter 38** *Environmental Management and Monitoring*)	1, 2
Hydrodynamics and Coastal Processes		
Minimise potential impacts on the hydrodynamics and coastal processes of Botany Bay.	Minimise reflection and propagation of waves through a sloping rock revetment design for the new terminal.	1
	Align the dredging profile to minimise potential increases in swell waves along the Parallel Runway.	1
	Ensure adequate flushing and tidal exchange of Penrhyn Estuary through inclusion of a 130 m wide channel.	1
	Reduce sediments accumulating in the mouth of the Mill Stream through construction of a rock groyne at the northwestern end of Foreshore Beach.	1
Hydrology and Water Quality		
Minimise impacts on water quality to protect natural ecosystems.	Prepare and implement a SWMP for construction and incorporate into the Construction EMP. Management measures would include: ▪ temporary structures to prevent offsite movement of sediment such as sedimentation ponds and silt fences surrounding stockpiles; ▪ control of drainage from areas adjacent to construction areas using earth bunds and diverting structures such as earth drains;	

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	▪ minimisation of traffic in construction zones and provision of dedicated parking areas; ▪ removal of soil from vehicle wheels and undercarriages before departing the site to reduce soil carried off site; ▪ sealing and vegetation of all surfaces as soon as practical to prevent extended exposure to erosion; • storage and handling of all dangerous goods in accordance with Australian Standards, NSW Dangerous Goods (General) Regulations 1999 and NSW EPA guidelines; • an emergency response plan to control fuel, oil and chemical spills; • regular inspection of machinery to identify any leaks; • provision of spill containment equipment (e.g. spill kits) located around the construction site; and • training of staff in spill clean-up procedures and use of spill kits. Erosion and sediment control planning and implementation would apply to all areas which may be disturbed. Regular inspection would occur after heavy rain and during periods of prolonged rainfall.	1
	Install a silt curtain around the dredge deposition area to minimise the extent of the turbidity plume.	1
	Ensure adequate flushing of Penrhyn Estuary through the inclusion of a 130 m wide channel	1
	Ensure public recreation areas are equipped with appropriate amenities, drainage, and waste management facilities.	1
	Prepare and implement a Stormwater Management Plan for operations and incorporate into the Operational EMP. Management measures would include: ▪ a first flush system to capture and treat sediment and contaminants from surface water runoff; and ▪ treatment of surface water runoff from potential pollutant areas by a wastewater treatment system prior to discharge to sewer.	2
	Subject to detailed assessment of upstream flooding impacts, construct Stormwater Quality Improvement Devices at the outlets of Floodvale and Springvale Drains to remove litter and sediment prior to discharging into Penrhyn Estuary.	1
Manage risk of water quality impacts from spills.	Ensure construction activities are conducted in a manner that minimises the potential for spills or leaks, including the regular inspection and maintenance of plant and equipment, providing bunding or similar spill containment structures for onsite fuel and oil storage. Contain and clean up any spills or leaks as quickly as possible.	1
	Control and manage spills at the new terminal through the first flush system and by spill response procedures	2
	Ensure onsite diesel storage facilities are protected with spill containment structures and warning systems.	2
	Control and manage spills from ships through spill response procedures.	2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Install a floating oil boom across the 130 m channel to prevent any spills from entering Penrhyn Estuary.	2
Groundwater		
Protect groundwater quality.	Develop a SWMP, as part of the Construction EMP, to ensure an adequate standard is applied to control of contaminants which could impact groundwater quality during the construction of the Port Botany Expansion.	1
Geology, Soils and Geotechnical		
Manage Acid Sulphate Soils.	Ensure that any PASS deposits are thoroughly mixed with sandy sediments during dredging and distributed within the sandy matrix of the reclamation.	1
	Ensure that if large areas of PASS are identified they are retained below water level under stable anoxic conditions.	1
	Undertake a preliminary assessment of the risks associated with the disturbance of PASS and AASS within Penrhyn Estuary prior to the habitat enhancement works and the works associated with the construction of the rail line. Prepare an ASSMP for these works as part of the Construction EMP.	1
Erosion and sediment control.	Prepare and implement a SWMP as part of the Construction EMP to control erosion and sedimentation (as described above).	1
Reduce the potential for dispersion of existing sediment-bound contaminants in Penrhyn Estuary.	Limit disturbance of contaminated sediment in Penrhyn Estuary. Erosion control measures would be implemented to control dispersion of sediment in disturbed areas. Some contaminated sediments would be capped with clean material.	1
Aquatic Ecology		
Protect aquatic habitats.	Delineate all areas of habitat that are to be retained as part of the port expansion with markers, buoys etc to ensure that no dredging, reclamation, boat movement or other mechanical damage occurs.	1
Protect seagrass.	Re-map distribution of seagrasses prior to construction of the new terminal to identify any changes in the distribution of seagrass including any additional areas of *Posidonia*.	1
Compensate for loss of seagrass habitat.	Compensate for loss of seagrass by: • creating up to 8 ha of seagrass habitat within the access channel and Penrhyn Estuary; • relocating some seagrass to the terrace adjacent to the Parallel Runway and the majority of seagrass into the main tidal channel and in Penrhyn Estuary; and • establishing or facilitating the establishment of seagrasses (primarily *Zostera capricorni*) in these areas by a combination of transplanting and natural colonisation.	1
Increase habitat associated with hard surfaces.	Use a rock embankment design for the new terminal to provide habitat for a variety of invertebrates, fish and other marine organisms.	1

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
Prevent mangrove proliferation in saltmarsh habitat.	Remove mangrove seedlings periodically in Penrhyn Estuary.	1, 2
Control marine pest species.	Record the occurrence and extent of *Caulerpa taxifolia*. Small areas of *C. taxifolia* would be treated by application of salt. Larger areas would be removed mechanically or buried within the reclamation.	1
Protect marine mammals.	Develop a Marine Mammal Management Plan to manage vessel movements during operation and construction activities if marine mammals, particularly Southern Right Whales and Humpback whales, are present in the Bay.	1, 2
Terrestrial Ecology		
Enhance shorebird habitat at Penrhyn Estuary and minimise disturbance to shorebirds.	Create an area of about 27 ha for shorebird feeding and roosting habitat (including up to 6 ha of saltmarsh habitat, 12.5 ha of intertidal sand/mudflats, and seagrass habitat) in Penrhyn Estuary. The aim would be to attract as many, and potentially a greater number of, migratory shorebird species than use the Estuary at present.	1
	Carry out habitat enhancement works at Penrhyn Estuary at the earliest possible time in the construction program so as to allow sufficient time for shorebirds to habituate to the newly–reconfigured Estuary and to allow for the colonisation of benthic fauna on the newly created tidal flats.	1
	Carry out habitat enhancement in stages. The first stage comprising the removal/excision of the sand dunes to the north of the Estuary and the filling of deep water areas behind the new terminal at the mouth of the Estuary. Works would be carried out between late March and early August to correspond with the period when most migratory shorebirds are on migration or at their northern hemisphere breeding grounds. Screening and/or temporary sand embankments could be used to shield noise and movement of heavy machinery during other times. The upper reaches of the Estuary, including the existing mudflats, would be left relatively undisturbed, providing a feeding area for shorebirds.	1
	Ensure construction of culverts at Springvale and Floodvale Drains, and the stabilisation of the main channel through the Estuary is undertaken in winter months to avoid impacts on the majority of migratory birds that feed and roost in Penrhyn Estuary over summer.	1
	Prepare a VMP detailing methodologies for saltmarsh excavation, storage and re-establishment and mangrove removal and control, and incorporate as part of the Construction EMP for the project.	1
	Fence Penrhyn Estuary and provide a boardwalk and observation platform for the general public.	1
	Restrict access to Penrhyn Estuary from Foreshore Beach to prevent swimmers and boats from entering the Estuary.	1, 2
	Screen moving lights such as vehicle headlights (especially of vehicles shining headlights over Penrhyn Estuary while turning) through the use of solid barriers or screening vegetation along the edges of the port adjacent to Penrhyn Estuary intertidal flats to obscure lights shining onto the Estuary.	2
	Avoid use of high mast lighting immediately adjacent to shorebird habitat.	2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Erect a 4 m high noise barrier along the northern and eastern boundaries of the new terminal. The upper 2 m of the barrier would be constructed from a translucent material with a printed design to minimise "enclosure" of the Estuary but prevent birds from flying into it.	2
	Create a visual buffer for shorebirds in Penrhyn Estuary. This buffer, consist of native vegetation approximately 1-2 m wide along the southern and western side of the Estuary and along the rail line in the northern section of the Estuary.	2
Minimise "boxing in effect" of shorebirds.	Ensure structures such as buildings and container stacks are set back from the edge of the new terminal where it adjoins Penrhyn Estuary.	2
Control of feral animals.	Prepare a Feral Management Plan (FMP) as part of the Construction and Operational EMP for the Port Botany Expansion. The FAMP would address fencing and the management of garbage, particularly in the habitat enhancement areas, and the need for further management actions.	1, 2
Enhance the native vegetation along the foreshore corridor.	Native vegetation would be planted and weed management undertaken along the foreshore corridor.	1
	Protective fencing would be established around dune restoration areas and ecologically sensitive areas.	1
Traffic and Transportation		
Minimise traffic impacts.	Develop a Construction Traffic Management Plan that would consider: • identification of preferred haulage routes; • access routes and signage, and access arrangements at the site; • measures to ensure that Foreshore Road would not be affected by loading/unloading from the carriageway, queuing and reversing manoeuvres; • the need for restrictions on delivery hours and/or routes; and • the need for measures to protect pedestrians, cyclists and other motorists in the vicinity of the site.	1
	Increase truck utilisation by improving port turnaround time, promoting backloading, and encouraging the use of high productivity vehicles such as B-Doubles.	2
	Spread container traffic evenly throughout the proposed 24-hour operating period.	2
	Operate road and rail servicing evenly over the 7-day week.	2
Minimise disruption to existing rail services.	Schedule rail construction work around rail operations as necessary to avoid disruption to existing port operations.	1
Noise		
Minimise noise impacts.	Reduce noise levels from piling hammers by placing resilient dollies in between pile and hammer, where practical. The hammer would be shrouded to provide acoustic attenuation.	1
	Reduce noise levels from diesel powered machinery by fitting noise control kits to machinery, where practical.	1
	Conduct training to ensure construction workers are aware of noise issues and act to minimise noise where possible.	1

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Erect a 4 m high noise barrier along the northern and eastern boundaries of the site.	2
	Consider noise emissions during selection of machinery for terminal operations.	2
	Turn off audible safety alarms on terminal equipment, where practical and safe, between 10.00 pm and 6.00 am and replace with visual alarms.	2
	Conduct operator awareness and training to reduce noise associated with cargo handling.	2
Air Quality		
Control dust emissions.	Keep the working face and areas of open excavation to a minimum.	1
	Apply water, through the use of water trucks, to active earthwork areas, stockpiles, gravel roads and loads of soil being transported to reduce wind blown dust emissions.	1
	Ensure site roads consist of coarse gravel and are kept wet to minimise wheel generated dust emissions.	1
	Vegetate stockpiles where material is to remain on site for a long period of time.	1
	Construct wind breaks along an appropriate work zone on Foreshore Road during beach enhancement to reduce wind erosion from the work area.	1
	Place a thin bituminous membrane or other sealing layer to sections of the reclaimed area not being used for considerable periods of time, but where subsequent construction activities are to take place on site, to stabilise and reduce wind blown dust emissions.	1
	Cease or phase down work if excess fugitive dust is observed while the source is being actively investigated and suppression measures are implemented.	1
	Restrict traffic to defined roads and implement a speed limit.	1
	Remove soil adhering to the wheels and undercarriage of vehicles prior to departure from the site.	1
	Progressively landscape and vegetate areas as the construction activities proceed.	1
Cultural Heritage		
Preserve cultural heritage.	Conserve the remains of the Government Pier, above and below water, and associated cultural deposits.	1, 2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
Visual Impact Assessment		
Minimise visual impact.	Implement the Public Recreation and Ecological Plan including: • Landscaping the Foreshore Road/Foreshore Beach interface to provide partial screening of the new terminal from Foreshore Road. Planting would reinforce the visual and environmental qualities of the proposed public recreation areas. • Installation of low profile, low intensity lighting, with lighting projecting landward and groundward to reduce visual impact when viewed from Botany Bay and the distant western shoreline. • Designing the pedestrian bridge linking Foreshore Beach with Sir Joseph Banks Park to be low in height and of horizontal form to minimise its visual impact. • Landscaping the median strip of Foreshore Road.	1
	Quay crane specification - Quay cranes for the new terminal to be approximately 50 m high. These would be considerably lower than the existing container cranes at the port, which are about 64 m high when working and 86 m when stowed. The quay cranes in the new terminal would therefore be less visible from distant foreshores across Botany Bay.	2
	Container stacking height - Containers would to be stacked no more than six high (18 m) and would typically be three high (9 m). This would limit the vertical elements of the new terminal and allow it to blend with the horizontal form of the natural landscape, airport runways and existing terminals.	2
	Terminal Lighting – Lighting is to be focused on the terminal and designed to minimise light spill.	1
	Materials and colours – Select materials and colours for the terminal deck, administration buildings, cranes and other vertically prominent equipment to minimise contrast and reflectivity.	2
	Noise wall – The proposed noise wall near the edge of the new terminal to be approximately 4 m in height. The noise wall would partially screen the operations of the new terminal when viewed from foreshore areas near the port.	2
	Landscape buffer strip – Establish a strip of native vegetation along the southern side of Penrhyn Estuary, adjacent to the new rail spur into the terminal, and along the eastern perimeter of the new terminal (outside the proposed noise wall). The landscape buffer strip would soften the hard edges of the proposed new terminal infrastructure.	2
Preliminary Hazard Analysis		
Reduce hazards and risks to people and the environment.	Develop a Construction Safety Plan in accordance with PlanningNSW's *HIPAP 7 – Construction Safety Study Guidelines*.	1
	Handle containers carrying dangerous goods in accordance with the NSW Dangerous Goods (General) Regulations 1999 and Australian Standard 3846 (1998): *The Handling and Transport of Dangerous Goods in Port Areas*.	2
	Develop an Occupational Health and Safety Plan to address the handling and transport of dangerous goods during the operation of the new terminal.	2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Implement a notification system for the arrival or delivery of dangerous goods.	2
	Apply restrictions on the time dangerous goods are allowed to be held within the port.	2
	Separate various classes of dangerous goods by safe distances on the berth.	2
	Minimise risk of dropped containers through appropriate container handling equipment.	2
	Employ suitable container loading/unloading, handling and stacking systems to minimise double handling and attendant risk of damaging containers.	2
	Ensure the facility is fitted with adequate yard signage and warning systems for mobile equipment.	2
	Install and maintain a first flush drainage system to contain spills and contaminated runoff.	2
	Provide fire fighting equipment and ensure personnel are trained in fire fighting and evacuation procedures.	2
	Develop emergency and incident management procedures.	2
	Construct bunds around diesel storage tanks.	2
Bird Hazard		
Minimise attraction of birds species which may pose a risk to aircraft.	Develop a Bird Hazard Management Plan that would consider: • measures to minimise the attraction of birds, especially high risk species such as Silver Gulls, Australian Pelicans and Australian White Ibises; • use of deterrents to prevent the build up of birds; • exclusion of activities that attract birds in certain areas; • measures to minimise disturbance of birds at Penrhyn Estuary; • education about bird hazards; and • monitoring.	1, 2
	Ensure construction areas are drained properly and any depressions retaining freshwater after rainfall are filled and levelled, where possible. Ensure any permanent pools of water have netting over the top.	1
	Implement strict litter control in all areas including the use of adequate litter bins, signage and enforcement to ensure that food items or fish remains are not left at the site to attract birds. Litter bins would be designed to be bird and vermin proof and be emptied on a regular basis.	1, 2
	Design lighting of public areas to minimise the attraction of insects on which birds are likely to feed.	1
	Minimise landscape planting that provides habitat for problem bird species. Dense shrubs around the car parking areas would be provided to reduce the amount of litter blowing onto the site from Foreshore Road.	1
	Install pollution traps and swales to minimise fish remains, oils and other pollutants from entering the Bay from the boat ramp area.	1

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Prevent the build up of birds in the new terminal and public recreation areas through use of appropriate deterrent methods.	1, 2
Exclusion of activities likely to attract birds to the site.	Discourage bird feeding at the proposed boat ramp and in the public recreation areas.	2
	Restrict fish cleaning to a facility to be provided which would be enclosed to exclude the entry of birds.	2
	Maintain a fishing exclusion zone between the Parallel Runway and Foreshore Beach. Fishing would not be allowed in Penrhyn Estuary.	2
	Do not provide boat washing facilities at the proposed boat ramp.	1, 2
	Restrict visitor access to Penrhyn Estuary to the proposed boardwalk and observation platform which would allow viewing of the birds without disturbing them.	2
Education of the public about bird hazard.	Erect signs in public recreation areas and the new terminal to educate people about the problems associated with feeding birds close to the airport as well as ecological issues relating to bird health.	2
	Erect signs to encourage people to place litter in the bins provided or take litter home for disposal.	2
Operational Aviation Hazards		
Minimise impacts on radar and navigation systems at Sydney Airport.	Ensure design of the navigation channel and ship turning areas considers the required lateral separation distances to minimise interference to Sydney Airport radar and navigation systems.	1
	Work with CASA to undertake appropriate tuning and modifications to radar and navigation systems.	2
No intrusion into the OLS.	All construction and operation equipment to be below the OLS.	1, 2
No light spill causing distraction, confusion or glare to pilots.	Design specifications of terminal lighting would conform to the requirements of Regulation 94 of the Civil Aviation Regulations 1988.	1, 2
	Light spill from ships to be minimised, if required, by: • using ship board lighting as supplementary lighting where necessary whilst berthed; • orientating ships in a specific direction and only using the floodlights mounted on the bridge; or • providing temporary shielding on the ship mounted floodlights whilst docked.	2
Ecotoxicology and Human Health Risk		
Minimise human health and ecological risks.	Restrict public access and recreational activities in Penrhyn Estuary through use of barriers and signage.	2
	Prohibit swimming in the channel separating the new terminal from Foreshore Beach.	2
Emergency and Incident Management		
Effective emergency response and incident management.	Develop an ERIMP prior to the commencement of operation of the proposed development that would address onsite and offsite incident strategies. The ERIMP would be developed in the context of the existing Port Botany Emergency Plan which provides a coordinated response and mutual aid to any facility in the Port Botany area. The plan would	2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	include an incident reporting system for internal recording and for compliance with any regulatory requirements.	
Effective spill containment and management.	Equip the new terminal with emergency response equipment, typically comprising absorbent materials, absorbent pads to block drainage points and protective equipment consisting of gloves, rubber boots, eye protection etc.	2
	Contain oil spills through the new terminals' first flush system. Following containment, the spill would be disposed of in an appropriate manner	2
Effective fire fighting capabilities.	Develop and implement a Fire Management Plan at the site, which would incorporate signage and training requirements for all personnel at the new terminal. The fire fighting system would be designed to meet with the requirements of the NSW Fire Brigade, Australian Standards and the Building Code of Australia.	2
Terminal security and public safety.	Equip the new terminal with security features consistent with the requirements of the *International Maritime Organisation International Ship and Port Facility Security Code*. The proposed new terminal would be a Customs controlled area.	2
	All vehicles would be required to pass through the truck waiting area and to stop at the gatehouse for processing and to obtain the necessary clearances before being allowed to proceed.	2
	Trucks carrying import containers to pass through the AQIS checkpoint prior to exiting the site.	2
	Provide a gate and security fence for the rail bridge and monitor 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. The section of the rail line through Penrhyn Estuary would be fenced on both sides for safety and access control.	2
	Visitors would be required to access the new terminal via the gatehouse and 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.	2
	Restrict pedestrian access to the Penrhyn Estuary boardwalk and viewing platform.	2
	Prohibit swimming in the channel separating the new terminal from Foreshore Beach.	2
	Access by persons from berthed container ships would require permission of the Australian Customs Office.	2
	Secure the new terminal from unauthorised access from adjoining lands using security fences at least 2 m high. A noise barrier approximately 4 m high would replace the security fencing along the eastern perimeter of the new terminal area.	2
	Monitor site security using strategically placed video cameras and wired and wireless communication links with appropriate back-up systems.	2
	Monitor waterways adjacent to the new terminal by both Customs and State Police, similar to the existing arrangement within Brotherson Dock. Provide channel markers for recreational craft, with the channel leading to Penrhyn Estuary to be considered a restricted area.	2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Incorporate appropriate security lighting at the new terminal and in public recreations areas.	2
Water and Wastewater		
Establish management plan to conserve and manage water resources.	Prepare and implement a WRMP, which would form part of the Construction and Operational EMPs. This plan would include water minimisation strategies as well as monitoring and testing schedules for wastewater as required.	1, 2
Reduce and/or reuse water.	Collect treated stormwater in two 10,000 L water storage tanks to allow reuse for maintenance, washdown and irrigation purposes.	2
	Install dual flushing toilets, minimal flow shower heads and regular maintenance to identify leaking or dripping taps and pipes.	2
Comply with wastewater disposal requirements and guidelines.	Empty portable toilet facilities on a regular basis by an appropriately licensed waste management contractor.	1
	Discharge all sewerage and wastewater (trade waste) to the Sydney Water Corporation sewage system in accordance with a Trade Waste Agreement with Sydney Water Corporation.	2
Waste		
Establish management plan for waste.	Develop and implement a WMP for the construction and operational phase in accordance with the requirements of the *Waste Avoidance and Resource Recovery Act* 2001, the *Protection of the Environment Operations Act* 1997, the EPA's *Environmental Guidelines: Assessment, Classification & Management of Liquid & Non-Liquid Wastes* (1999), the Botany Bay DCP 29 and the *National Minimisation and Recycling Strategy.* This would form part of the Construction and Operation EMP.	1, 2
Implement resource management hierarchy – avoid, recover, dispose of waste.	Minimise construction waste that requires disposal by accurately calculating materials brought to the site and limiting materials packaging.	1
	Return excess construction materials which are suitable for reuse to the supplier or store for future use.	1
	Store construction wastes which are not suitable for reuse, but are able to be recycled, in dedicated and secure skips prior to recycling.	1
	Store, in separate skips, construction wastes which cannot be recycled. The skips would be collected by a licensed waste contractor on a regular basis and transported for disposal to a licensed landfill or recycling facility.	1
	Process or shred vegetation waste (trees and shrubs) into wood chip or mulch, which would then be used in the rehabilitation of areas disturbed during construction and for landscaping.	1
	Stockpile excavated soil generated during site preparation activities for reuse in landscaping activities surrounding the new terminal area. Any soil which cannot be disposed of in this manner would be transported off site to a licensed landfill, after appropriate classification for the material is carried out in accordance with NSW EPA requirements.	1

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Provide recycling facilities to maximise recycling of waste materials such as plastic and glass bottles/containers, aluminium cans and paper/cardboard. Separate bins would be provided for food waste. All domestic waste would be collected on a regular basis and transported off site for disposal to a licensed landfill or recycling facility.	1, 2
	Recycle scrap metal, used parts, components and machinery where practicable.	1, 2
Comply with waste disposal requirements and guidelines.	Waste oils and fluids from maintenance activities would be collected and stored and would either be reused on site or removed by a licensed waste contractor.	1, 2
	Dispose quarantine waste in accordance with the requirements of Sydney Ports Corporation, EPA and AQIS.	2
Energy		
Energy conservation.	Develop an Energy Management Action Plan consistent with the energy conservation measures for commercial and industrial buildings as outlined in the City of Botany Bay Energy Efficiency Development Control Plan, July 2000. This would form part of the Construction and Operation EMPs.	1, 2
	Design energy efficient buildings and a terminal layout that would aim to achieve: • reduction of heating, cooling and lighting loads; • employing renewable energy sources; specifying efficient heating, ventilation air conditioning and lighting systems; • optimising building performance and system control strategies; • considering the reduction of heating and cooling requirements in choice of building design, location and building materials; • designing and configuring lighting in accordance with energy efficiency in office and industrial buildings; • maximising the use of solar power for signage, navigation aids and pedestrian lighting; • designing buildings to make best use of natural light and shade; and • designing roads and railway lines on the site to reduce transportation distances.	1, 2
	Use of energy efficient equipment. This would include: • where able, fitting energy intensive equipment with energy saving devices such as power factor regulators, harmonic filters, voltage regulators, and drive controls; • using energy efficient electrical appliances; • installing lighting control devices where appropriate and linking to photo electric dimming; and • providing sufficient energy metering and switching for energy management.	2

DESIRED OUTCOME	MITIGATION MEASURES	IMPLEMENTATION STAGE 1. Construction 2. Operation
	Conserve energy through efficiency in work schedules and practice. This would include: • use of modern container yard management systems for the efficient stacking and retrieval of containers and to minimise ship waiting times; • road and rail transport scheduling to minimise energy use and wastage; • promoting the increase in rail mode share of container freight movement; • setting energy use and reduction targets for site operations; • switching off truck engines while these are waiting to access the site and while these are waiting to be loaded and unloaded; • switch off site office equipment and lights and use optimum lighting intensity for security and safety purposes; • Minimise equipment idle time and double handling of material; • throttling down and switching off idle equipment; • regular maintenance of all powered equipment to ensure optimum fuel consumption rates; • use energy efficient equipment where practical; • communication and education of energy conservation measures to port users and employees; and • monitoring energy conservation performance.	1, 2

Summary of key outcomes:

The inclusion of appropriate environmental management measures into the detailed design and construction of the project would minimise adverse impacts on the environment. Adoption of an appropriate site Environmental Management and Monitoring Plan (EMMP) would therefore be an important component of the proposal which outlines the commitment of Sydney Ports Corporation and contractors to mitigation measures identified in this EIS. Implementation of the environmental management and monitoring tools identified in the preparation of this EIS would be necessary to ensure the project has minimal impact on the physical, social and economic environments.

38.1 Introduction

The inclusion of appropriate environmental management measures into the detailed design and construction of the project would minimise adverse impacts on the environment. Adoption of an appropriate site EMMP would therefore be an important component of the proposal which outlines the commitment of Sydney Ports Corporation and contractors to mitigation measures identified in this EIS.

38.2 Environmental Management and Monitoring Plan

An EMMP is a procedural document which outlines the environmental goals of the project, the safeguard measures to be implemented, the timing of the implementation in relation to the progress of the project, responsibilities for implementation and management, and a review process. An EMMP would be prepared to address both the construction and operation stages of the proposal.

The key objectives of the EMMP would include:

- ensuring that works are carried out in accordance with appropriate environmental statutory requirements and relevant non-statutory policy, as detailed throughout this EIS;
- ensuring that works are carried out in accordance with the goals and requirements presented in this EIS;
- ensuring that works are carried out in such a way as to minimise the likelihood of environmental degradation occurring;
- ensuring that works are carried out in such a way as to manage the impact of the works on neighbouring land uses and Botany Bay;
- ensuring that all employees engaged in the works comply with the terms and conditions of the EMMP;
- providing clear procedures for management of environmental impact including corrective actions; and
- identifying management responsibilities and reporting requirements to demonstrate compliance with the EMMP.

A Construction EMP and Operational EMP would form an integral part of the EMMP for the project and would be prepared in accordance with the requirements of ISO 9001:2000 and ISO 14001:1996.

The contractor(s) engaged for the construction of the proposal would be required to provide an outline of an activity-specific EMP as part of the tender for the works. A complete Construction EMP from the contractor(s) would be required prior to any construction activities commencing. Preparation of the Operational EMP would be a condition of a contractual agreement between Sydney Ports Corporation and the ultimate terminal operator(s).

The EMPs would be prepared following assessment of the project and would serve as a working document to be used during the detailed design of the new terminal.

The Construction EMP and Operational EMP would typically include:

- establishment of environmental goals and objectives;
- conditions of project approval;
- lists of actions, timing and responsibilities;

- supervision protocols fully identifying areas of responsibility for environmental management of the project;
- statutory requirements – licences and approvals required;
- a structured reporting system detailing all relevant matters on a regular basis;
- procedures and forms for documentation and reporting of issues;
- standard specifications incorporating environmental safeguards;
- training of personnel in environmental awareness and best practice EMSs;
- guidelines for emergencies, contact names and corrective actions for non-conformance and notifications to appropriate authorities and affected parties;
- calibration and measuring of testing equipment;
- process surveillance and auditing procedures;
- review procedures and protocols for modification of the Construction or Operational EMPs;
- complaint handling procedure;
- site management and control procedures;
- monitoring procedures; and
- quality assurance procedures.

As a guide to establishing an EMP, the general structure would be similar to that shown in **Table 38.1**.

Table 38.1 EMP Structure

ITEM	DESCRIPTION
Introduction and purpose	Details the objectives of the Plan. Chain of command structure (including relevant environmental delegate). Responsibility and authority for implementation.
Statutory requirements and integration with other plans	Details the statutory requirements, if any, and other obligations required to be met as part of the licences or approvals.
Environmental management procedures	Describes the operational procedures for preventing environmental impacts, nominates responsibility to individuals, establishes reporting protocols and procedures, nominates corrective and preventative action procedures.
Monitoring requirements	Details the monitoring program for checking environmental performance and/or the project, nominates responsibilities to individuals, establishes reporting protocols and procedures, nominates corrective and preventative action procedures.
Emergency response	Contains emergency response plans.

A key component of the Construction and Operational EMPs would be the environmental safeguards developed in **Part F** of this EIS, and summarised in **Chapter 37** *Compilation of Mitigation Measures*. Further, monitoring procedures associated with the management strategies are key elements to measure the

performance of the project against set criteria. A monitoring program would be an integral part of the site Construction and Operational EMPs and is discussed further in Sections 38.5 and 38.6.

38.3 Environmental Reporting

Environmental performance reporting is a key decision making tool that provides management with the information to make meaningful and positive change. It is also an integral part of ISO 14001. To ensure that relevant authorities are appropriately informed of how Sydney Ports Corporation is managing its environmental performance, periodic reports would be prepared by the contractor during the construction phase. Terminal operator(s) would be responsible for monitoring environmental performance during the operational phase.

If the reports identify any shortcomings in the way the construction activities or the operations are being conducted or in the performance of environmental control structures, the necessary changes would be made and the Construction or Operational EMPs would be updated to reflect those changes.

38.4 Emergency Response

Emergency response is among the port safety functions mandated by statute for Sydney Ports Corporation. Sydney Ports Corporation, in conjunction with the future operator of the new terminal, would prepare an ERIMP prior to the commencement of terminal operations. Emergency Response and Incident Management is discussed in more detail in **Chapter 32** *Emergency Incident Management*.

The ERIMP would be considered in the context of the existing PBEP. The PBEP provides a coordinated response and mutual aid to any facility in the Port Botany area.

The ERIMP would ensure that an organised and practised response is provided to incidents and emergency situations which might affect the provision of port services at the new terminal.

The ERIMP would:

- ensure that the appropriate emergency response equipment would be provided;
- ensure staff understand their roles and responsibilities and undergo training as required;
- put specific procedures in motion to manage an incident or emergency;
- establish an emergency response team;
- ensure that an emergency or incident would be managed in a systematic way;
- deal with enquiries from the public and staff;
- allow the continued delivery of essential services during an incident or emergency situation without increasing risk;
- establish procedures for interaction with other agencies and neighbouring facilities throughout an incident or emergency situation;
- clearly define responsibility for emergency and incident management, including clear lines of accountability throughout the organisation;
- validate emergency preparedness through exercises and testing of emergency procedures;

- allow for monitoring and review to continually update and improve the system; and
- allow for independent auditing.

The ERIMP would differentiate between minor and major incidents, with a nominated Terminal Emergency Management Officer (TEMO) making the decision on the magnitude of the incident.

For minor incidents with no offsite impacts, not requiring emergency services, the incident would be handled by personnel onsite. For major incidents, such as a significant fire or toxic gas release, the incident would be managed by emergency services. The TEMO would liaise with emergency services to provide assistance by way of providing information on the type and quantity of the material involved, moving containers and equipment as required, and providing access to the spill control, fire fighting and other emergency equipment and supplies available on site as required. In the case of major incidents, the TEMO would activate the PBEP. Management of all offsite incidents, both minor and major, would be the responsibility of emergency services.

The ERIMP would be incorporated into the Operational EMP for the project.

38.5 Construction Monitoring Requirements

The environmental safeguards which relate to the key components of the Construction EMP have been set out previously in **Chapter 37** *Compilation of Mitigation Measures*. The monitoring procedures associated with the environmental strategies which would be implemented during construction of the new terminal, foreshore works and associated port infrastructure (i.e. excluding the infrastructure and facilities to be built on the new terminal itself) are outlined in **Table 38.2.**

Table 38.2 Monitoring Requirements – Construction

MONITORING REQUIREMENT	FREQUENCY
General	
Monitor compliance of the construction activities with the Construction EMP, including EPA requirements and PlanningNSW Conditions of Consent, on an ongoing basis.	
Hydrodynamics and Coastal Processes	
Monitoring to measure and compare hydrodynamic and coastal processes against predicted impacts of the proposal. Monitoring during dredging and reclamation would include:	
▪ continuous recording of wind and wave climate in Botany Bay and offshore; and	Ongoing
▪ beach profiling surveys or aerial photographic record/photogrammetric analysis of Silver Beach, Towra Beach and Spit Island, Lady Robinsons Beach and Foreshore Beach to assess any significant changes in sandy beaches and nearshore shoals.	Yearly

MONITORING REQUIREMENT	FREQUENCY
Hydrology and Water Quality	
Monitor turbidity during dredging operations based on the following criteria (or as advised by the EPA): • a limit of 20 mg/L in normal dry weather conditions measured by 0.75 m secchi depth for the outermost zone (i.e. approximately 500 m to 1 km from discharge point); and • a limit of 50 mg/L outside the silt curtain for the middle zone (i.e. approximately up to 500m from discharge point). The innermost zone would be the turbidity containment area with no limit set.	Weekly or within 24 hours after rain
Monitor water quality at various locations within the project area during dredging and reclamation, and the quality of drainage water from reclamation and construction sites in accordance with NSW EPA requirements including the Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales (EPA 1998). The ANZECC (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality would be adopted as the appropriate criteria for water quality within the Bay (note that the ANZECC (2000) ambient water quality guidelines do not set discharge criteria, but provide ambient water quality goals for receiving water such as Botany Bay). Indicators measured would include turbidity, dissolved oxygen, temperature, salinity, pH and suspended solids. Sampling would be undertaken at sites of sensitivity, particularly areas where seagrass occurs, and at reference locations. Light (PAR) would be measured at the seabed at several positions where seagrass beds occur.	Monthly
Monitor erosion and sediment control structures in accordance with the Soil and Water Management Plan which would be prepared in accordance with the guidelines contained in Managing Urban Stormwater - Soils and Construction Manual (Department of Housing 1998) and incorporated into the Construction EMP for the project	Ongoing
Groundwater	
Monitor groundwater levels during reclamation works including the three new groundwater monitoring bore holes, which have been installed to augment the existing groundwater bore hole network.	Monthly
Geology, Soils and Geotechnical	
Monitor construction activities in accordance with the ASSMP.	As required
Aquatic Ecology	
Monitor the extent of construction areas to ensure they do not extend beyond the defined construction zone.	Weekly
Monitor potential changes to seagrass that is not within the direct footprint of the proposed expansion.	Half-yearly
Monitor survival and condition of seagrass from the footprint of the proposed expansion before removal, following transplanting and during any stage of "storage".	As required
Monitor the occurrence and persistence of nuisance algae within Penrhyn Estuary as a result of nutrients from the catchments of Floodvale and Springvale drains to enable an appropriate management feedback response.	Monthly
Terrestrial Ecology	
Monitor the extent of construction areas to ensure they do not extend beyond the defined construction zone.	Weekly
Monitor the diversity, abundance and behaviour of migratory shorebirds in Penrhyn Estuary.	Weekly from 1 August to 30 April each year and monthly at other times

MONITORING REQUIREMENT	FREQUENCY
Manage and monitor disturbance, damage, invasive species such as mangroves and predators such as foxes, cats and dogs in Penrhyn Estuary.	Monthly
Traffic Management	
Visual inspection of construction zones to ensure construction vehicles are using defined roads and access points.	Ongoing
Check that on site trucks are not overloaded, that they adhere to speed limits, that their trays are covered and that materials are loaded and unloaded carefully.	Ongoing
Check that trucks arriving at the site before it opens are parked in designated holding areas and not on adjacent streets.	Randomly
Noise	
Conduct investigative noise monitoring in response to specific complaints.	As required
Conduct noise monitoring in the vicinity of residential areas and sensitive receiver locations for each stage of construction prior to construction of infrastructure and facilities on the new terminal itself	Monthly
Air Quality	
Visually monitor dust generation from work zones to ensure that excessive dust is not being produced.	Ongoing
Inspect sites to ensure that adequate dust controls are being used such as regularly watering unsealed areas.	Ongoing
Monitor dust impacts through use of a high-volume air sampler, dust deposition gauges and onsite meteorological station in accordance with the EPA Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales (2001). All monitoring devices would be located in accordance with *AS 2922-1987 – Ambient Air - Guide for Siting of Sampling Units*.	Ongoing (for the duration of reclamation and major foreshore works)
Heritage	
A program of archaeological monitoring would be implemented for any excavation activities in the vicinity of the Sir Joseph Banks Hotel Jetty and the Dent's Boatyard jetty.	During construction in relevant locations
Report any heritage relics discovered during construction activities to the NPWS for Aboriginal relics or the NSW Heritage Office for items of European heritage. Cease works pending their consideration.	As required
Preliminary Hazard Analysis	
Monitor construction activities in accordance with the Construction Safety Study to be prepared for the construction phase in accordance with PlanningNSW's HIPAP 7 – Construction Safety Study Guidelines.	Ongoing
Bird Hazard	
All areas would be patrolled during construction and routinely after nightfall to determine whether birds are attracted to the site to roost. Immediate bird deterrent action would be implemented if roosting of birds were observed onsite.	Ongoing
Waste	
Inspect waste receptacles to ensure that they are not being overfilled and are being collected on a regular basis.	Weekly
Inspect construction zones to monitor for any unauthorised waste disposal activity.	Weekly
Inspect the construction site to evaluate the effectiveness of waste storage and collection practices.	Weekly
Inspect any portable toilet facilities to ensure they are being emptied on a regular basis.	Weekly
Monitor waste recycling and disposal procedures to ensure they are being complied with.	Weekly

38.6 Operational Monitoring Requirements

The monitoring procedures associated with the management strategies which would be implemented during operation are outlined in **Table 38.3**.

Table 38.3 Monitoring Requirements – Operation

MONITORING REQUIREMENT	FREQUENCY
General	
Monitor compliance of operational activities with the Operational EMP, including EPA requirements and PlanningNSW Conditions of Consent, on an ongoing basis.	
Hydrodynamics and Coastal Processes	
Monitoring to measure and compare hydrodynamic and coastal processes against predicted impacts of the proposal. Monitoring would include:	
• continuous recording of wind and wave climate in Botany Bay and offshore;	Ongoing (for five years after completion of reclamation)
• beach profiling surveys or aerial photographic record/photogrammetric analysis of Silver Beach, Towra Beach and Spit Island, Lady Robinsons Beach and Foreshore Beach to assess any significant changes in sandy beaches and nearshore shoals;	Yearly (for five years after completion of reclamation)
• ongoing assessment of the need for removal of accumulated sand at the groyne and any replenishment required at the new boat ramp.	Four yearly
Hydrology and Water Quality	
Monitor water quality from the on-site stormwater management system in accordance with the NSW EPA requirements and the *Approved Methods for the Sampling and Analysis of Water Pollutants in New South Wales* (EPA 1998).	As required
Monitor water quality within Penrhyn Estuary to ensure viability of aquatic habitats (e.g. seagrass) in accordance with the ANZECC (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality.* Indicators measured would include turbidity, dissolved oxygen, temperature, salinity and pH. In addition to the above indicators, samples of water would be obtained to measure suspended solids, nutrients, heavy metals and organic contaminants. Light (PAR) would be measured at the sea bed at several positions where seagrass beds occur.	Quarterly (for three years after completion of reclamation)
Inspect the various stormwater devices including, the first flush system at the new terminal, and stormwater management devices at the new boat ramp, along Penrhyn Road and along the foreshore corridor.	Monthly or as recommended by supplier.
Groundwater	
Monitor groundwater levels.	Monthly (for one year after completion of reclamation)
Aquatic Ecology	
Monitor the condition of compensatory seagrass, including those transplanted to the designated areas, as well as any natural colonisation.	Annually (for three years after completion of reclamation and transplantation of seagrass)
Monitor organisms inhabiting soft sediments including recolonisation of the dredged shipping berth and changes (if any) in adjacent shallow habitats; recolonisation and success of habitat enhancement within Penrhyn Estuary; and the impacts of the arrival of VHCs in groundwater.	Annually (for three years after dredging and initial habitat enhancement works)

MONITORING REQUIREMENT	FREQUENCY
Monitor organisms utilising the compensatory seagrass beds to evaluate diversity and abundance.	Annually (for three years after completion of reclamation and transplantation of seagrass)
Monitor the occurrence and persistence of nuisance algae within Penrhyn Estuary as a result of nutrients from the catchments of Floodvale and Springvale Drains to enable an appropriate management feedback response.	Monthly
Terrestrial Ecology	
Monitor the diversity, abundance and behaviour of migratory shorebirds in Penrhyn Estuary.	Monthly (for five years after commencement of terminal operations)
Manage and monitor disturbance, damage, invasive species such as mangroves and predators such as foxes, cats and dogs in Penrhyn Estuary.	Half-yearly
Traffic	
Report documenting the proportion of cargo transported to/from Port Botany by road and rail and the average daily truck trips to Port Botany to be provided to the RTA and City of Botany Bay Council.	2011,2016 and 2021
Noise	
Undertake noise monitoring of terminal operations and liaise with the EPA and PlanningNSW on the outcomes to identify appropriate response mechanisms, if required.	Annually
Conduct investigative noise monitoring in response to specific complaints.	As required
Preliminary Hazard Analysis	
Monitor compliance with the NSW Dangerous Goods Regulations 1999 and Australian Standard 3846 (1998): *The Handling and Transport of Dangerous Goods in Port Areas*.	Ongoing
Monitor compliance with the Occupational Health and Safety Plan for the site.	Ongoing
Monitor compliance with the ERIMP for the site.	Ongoing
Bird Hazard	
All areas of the new terminal would be monitored to determine whether birds are attracted to the site to roost. Immediate bird deterrent action would be implemented if roosting of birds were observed on site.	Weekly
Inspect public recreation areas to make sure they are kept clean and that birds are not attracted to the site as a result of people feeding them or leaving food scraps or fish remains in the area.	Weekly initially and then monthly
Waste	
Collect waste receptacles on a regular basis.	Weekly or as required
Inspect sites to evaluate the effectiveness of waste storage and collection practices.	Weekly initially and then monthly
Monitor waste recycling and disposal procedures to ensure they are being complied with.	Monthly

Summary of key outcomes:

The proposed Port Botany Expansion has been developed in accordance with the key principles of Ecologically Sustainable Development (ESD): the precautionary principle; inter-generational equity; conservation of biological diversity and ecological integrity; improved valuation, pricing and incentive mechanisms; and the integration of long term and short term economic, environmental, social and equitable considerations.

With appropriate mitigation measures as identified throughout the EIS, undertaking the proposal in the manner proposed is justifiable taking into consideration the biophysical, economic and social impacts and the principles of ESD. Consideration of the proposal against a wide range of criteria demonstrates that the project is environmentally sustainable and justifiable.

39.1 Introduction

The EP&A Act 1979 requires ESD principles to be considered in the environmental impact assessment and decision making process.

Schedule 2 of the EP&A Regulation 2000 requires the justification of the development or activity to be carried out in the manner proposed, having regard to biophysical, economic and social considerations, including the principles of ESD.

Justification for the development from a biophysical, economic and social perspective has been considered in Part B and Part F of the EIS.

This chapter describes the application of ESD principles to project design and development and environmental impact assessment. Project construction and operational outcomes are considered in respect of their support for, or consistency with, ESD principles.

39.2 Ecologically Sustainable Development

In June 1990, the Commonwealth Government released the document *Ecologically Sustainable Development: A Commonwealth Discussion Paper* which introduced the term "ecologically sustainable development" and aimed to institute a process of discussion on what Australians need to do to embrace ESD. The Commonwealth Government defined ESD as:

> *"using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased."*

As part of the process of discussion instigated by the Commonwealth Discussion Paper, nine sectoral ESD Working Groups comprising government officials, industry, environment, union, welfare and consumer groups were set up to provide advice on future ESD policy directions and to develop practical proposals for their implementation. The policy directions and recommendations made by the ESD Working Groups provided the foundation on which the *National Strategy for Ecologically Sustainable Development* was developed.

In December 1992, the Council of Australian Governments endorsed the Strategy as a response to the need to implement a coordinated national approach to ensure that Australia's future development is ecologically sustainable. The Council of Australian Governments agreed that the future development of all relevant policies and programs, particularly those which are national in character, should take place within the framework of the *National Strategy for Ecologically Sustainable Development* and the *Intergovernmental Agreement on the Environment* (IGAE). The IGAE is an initiative which attempts to devise a national environmental strategy for Australia through intergovernmental cooperation.

The principles which would assist in the achievement of ESD have been clearly set out in Schedule 2 of the EP&A Regulation 2000. These principles are:

a) *The precautionary principle* - namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

b) *Inter-generational equity* - namely, that the present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations.

c) *Conservation of biological diversity and ecological integrity* – namely, that a full and diverse range of plant and animal species should be maintained.

d) *Improved valuation, pricing and incentive mechanisms* – these mechanisms would enable environmental factors to be included in the valuation of assets and services.

The four principles are interrelated. For instance, inter-generational equity can only be achieved in many instances if biodiversity is conserved for the use and enrichment of future generations. The linkage of the four principles means that they must be considered both individually and collectively when assessing whether a proposed project would contribute to ESD in Australia.

The EPBC Act 1999 adopted the definition of ESD above, adding a fifth principle namely:

> *"decision making processes should effectively integrate both long-term and short-term economic, environmental, social and equitable considerations."*

Sustainability now has a broader meaning with a strong focus on the integration of environmental, social and economic goals through society and economic development activity.

The fifth principle set out in the EPBC Act together with those defined by the EP&A Regulation 2000, form the basis of sustainability against which the Port Botany Expansion is assessed.

39.3 Application of ESD to Project Design and Development

The provision of adequate international trade infrastructure substantially contributes to the quality of life experienced by Australians. By improving the efficiency and reducing the cost of transporting cargo, it makes exports more competitive and reduces the price of imported products. This essentially improves the terms in which we trade on the world market. This improved competitiveness generates employment in export industries and reduces the cost of living.

However, construction of port infrastructure, particularly in a large, modern city, necessarily requires activities involving a degree of environmental and social disturbance. The environmental and social disturbance posed by the proposed Port Botany Expansion must be balanced against likely detrimental effects from congestion and container handling delays resulting in cost increases to NSW businesses and consumers.

An iterative approach to project development and conceptual design, involving stakeholder and community consultation, was adopted to ensure that measures to protect the environment and social amenity were adequately incorporated. The project design was developed in accordance with a precautionary approach to minimise uncertainty and to avoid, minimise or mitigate potential environmental and social impacts. The concepts of inter-generational equity and conservation of ecological integrity were also incorporated into project design and development.

The five key principles of ESD and their relationship to the proposed Port Botany Expansion are outlined below.

39.3.1 Precautionary Principle

The EP&A Regulation 2000 provides a definition of the precautionary principle which is as follows;

> *"Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*
>
> *In the application of the precautionary principle, public and private decisions should be guided by: careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment; and an assessment of the risk-weighted consequences of various options".*

To satisfy the precautionary principle, emphasis must be placed on anticipation and prevention of environmental damage (being proactive rather than reactive). The environmental impact assessment process itself is precautionary in nature as it provides a public procedure to assess and evaluate uncertainty about the environmental consequences of a development prior to a project proceeding.

Throughout the development of the Port Botany Expansion proposal, Sydney Ports Corporation has adopted an anticipatory approach to the identification and mitigation of the risk of serious or irreversible ecological damage, by proactive design solutions and undertaking an appropriate level of environmental research and assessment. Reliance has also been placed upon the experience gained by Sydney Ports Corporation staff in the administration of Sydney's ports and advice from a variety of engineering and environmental specialists in respect of project design and impact assessment modelling. Examples of how the precautionary principle has been used to influence the project design and development include:

- sloping rock embankment design for the new terminal to minimise reflection and propagation of waves and maximise ecological habitat (provides increased rocky reef habitat compared with flat wharf face design);
- alignment of the dredging profile to minimise potential increases in waves heights along the Parallel Runway and in other areas around the Bay;
- re-design of terminal layout to retain Penrhyn Estuary as an ecological habitat and inclusion of a 130 m wide channel to ensure adequate flushing of Penrhyn Estuary;
- rock bund wall at the northwestern end of Foreshore Beach to reduce sediments accumulating in the mouth of the Mill Stream;
- design of the dredging profile and the terminal footprint to minimise impacts on seagrass together with a commitment to seagrass transplanting;
- re-design of the terminal layout to ensure that any groundwater increases would be negligible; and
- re-design of the terminal layout to ensure that any water level increases within Penrhyn Estuary would be negligible.

Examples where the precautionary approach has been applied to impact assessment and design and development of impact mitigation measures include:

- modelling of a flat hard-faced wharf structure as a worst case scenario for potential wave reflection and propagation;

- modelling of a worst case scenario to assess traffic impacts (i.e. 20% rail mode share which is less than the current rail mode share);
- modelling of worst case scenario for noise and design of noise mitigation measures including installation of a permanent 4 m high noise barrier along the north and northeastern edge of the new terminal;
- modelling of worst case scenario for air quality emissions;
- modelling of a worst case sediment plume dispersion scenario (i.e. without the use of a silt curtain) together with a commitment to the use of a silt curtain to contain sediment dispersion and minimise potential impacts on seagrass beds in the area during dredging;
- recognition of the uncertainty relating to impacts of the proposed development on shorebirds by substantially increasing the amount of suitable roosting and feeding habitat in Penrhyn Estuary to encourage shorebirds to continue to use the area and potentially increase the number of shorebirds using the area;
- initiation of the habitat enhancement works within Penrhyn Estuary at the earliest opportunity in the construction programme to allow the maximum time for invertebrate activity to establish in the sand/mudflats to provide feeding habitat for shorebirds; and
- adoption of a staged approach to the creation of shorebird habitat to allow monitoring to be undertaken to provide more certainty about the potential impacts of the proposed developments on shorebirds in Penrhyn Estuary.

The EIS identifies mitigation measures and environmental management procedures that would be implemented to minimise and monitor impacts which may occur as a result of uncertainties in the impact assessment. Such uncertainties would not pose a risk of serious or irreversible damage as they have been considered in the context of worst case scenarios which conservatively anticipate environmental impacts and would be managed and monitored during the construction and operation of the Port Botany Expansion.

39.3.2 Inter-generational Equity

Inter-generational equity has been defined in the IGAE as a concept which states that:

> *"The present generation should ensure that the health, diversity and productivity of the environment is maintained or enhanced for the benefit of future generations."*

The principle includes both intra-generational equity (within generations) and inter-generational equity (between generations).

Intra-generational equity requires that the economic and social benefits of development be distributed appropriately among all members of the community. Inter-generational equity requires that the development be managed so that the environment is maintained or enhanced and future generations are not disadvantaged by long term impacts of the development. The most significant aspect of this concept is that future generations should not inherit a degraded environment.

Various environmental mitigation measures would be implemented to ensure that the environment is not unnecessarily degraded and in some cases would be enhanced by the proposal. Examples of how the Port Botany Expansion addresses the principles of intra-generational and inter-generational equity include:

- the Port Botany Expansion represents a long term investment in NSW's and Australia's international trade infrastructure with economic and social benefits for present and future generations such as increased employment, lower container transport costs and ultimately lower prices for consumers;
- long term environmental benefits associated with an increase in the use of rail for container transport including an overall reduction in total greenhouse gas emissions of approximately 500,000 tonnes of CO_2. An opportunity which would be lost if the proposed development did not proceed;
- retention of Penrhyn Estuary as an area of ecological significance together with creation of additional shorebird habitat in Penrhyn Estuary (e.g. intertidal flats, saltmarshes and seagrass beds) to ensure preservation and enhancement of the area for present and future generations;
- preservation and enhancement of as much of Foreshore Beach as possible to allow the continuity of public recreational activities in this area;
- relocation of the boat ramp to ensure that the community has continuing access to boat launching facilities in a similar location;
- provision of additional public recreation facilities along foreshore areas adjacent to the new terminal including amenities, cycle path, pedestrian footbridge over Foreshore Road and additional areas of open space. The provision of these facilities would improve community access and enhance public safety in this area; and
- preservation of the remains of the old Government Pier as an item of intra-and inter-generational heritage significance.

As the proposed Port Botany Expansion would deliver long term economic and social benefits without degradation of the broader environment it is consistent with the principles of inter- and intra-generational equity. Whilst the proposal would have long term environmental benefits, it is recognised that it would also have unavoidable environmental impacts. To minimise these impacts a range of management and monitoring measures would be implemented to ensure that degradation of the environment is minimised. The management and monitoring measures are summarised in **Chapter 37** *Compilation of Mitigation Measures* and **Chapter 38** *Environmental Management and Monitoring*.

39.3.3 Conservation of Biological Diversity and Ecological Integrity

Preserving biological diversity and ecological integrity requires that ecosystems, species and genetic diversity within species be maintained.

Although some impacts would occur to local ecosystems as a result of the construction of the Port Botany Expansion, overall, the biological diversity and ecological integrity of Botany Bay and Penrhyn Estuary would be maintained.

The environmental assessment in **Part F** highlights the potential for activities or processes to impact on the surrounding environment. Baseline studies provided feedback to the project design team, to enable the best

possible solution to be developed having regard to biological diversity and ecological integrity. Examples of measures which maintain or enhance biological diversity and ecological integrity include:

- retention of Penrhyn Estuary as an area of ecological significance;
- creation of additional shorebird feeding and roosting habitat (including saltmarsh habitat, intertidal sand/mud flats and seagrass habitat) to continue to provide habitat for shorebirds that use the area and potentially increase the number of shorebirds using the area;
- creation of habitat for additional seagrass that would double the amount of seagrass lost as a result of the proposal;
- creation of additional saltmarsh habitat that would increase the area of saltmarsh in Botany Bay by about 4%;
- rock embankment design for the new terminal to provide a hard artificial surface that would be valuable habitat for fish and other marine organisms;
- treatment of stormwater during operations through a first flush and wastewater capture and treatment system to minimise the impact on aquatic ecosystems in the Bay;
- stringent erosion and sediment control measures during construction and operation to assist in the conservation of ecosystems and habitats in adjoining areas suitable for maintenance of biological diversity including the use of a silt curtain during the dredging operations;
- implementation of a landscaping plan designed to restore, enhance and reinstate existing native vegetation communities; and
- maintenance of landscaped areas to address control of litter and dumped rubbish, and implementation of an integrated weed and feral animal management program.

In summary, whilst the proposed Port Botany Expansion would affect the aquatic and terrestrial environment of the area, it has been designed with the aim of minimising damage to habitats and in several cases, enhancing habitats. Apart from the loss of mangroves, the same habitats would be present in the area following construction, but the relative amounts of these habitats would change. On balance, the proposal would help to maintain biological diversity and ecological integrity.

Environmental management and monitoring programs throughout all stages of the proposed works would provide the best possible outcome for the immediate and wider environment. Safeguards to be implemented are listed in **Chapter 37** *Compilation of Mitigation Measures* and **Chapter 38** *Environmental Management and Monitoring* which include the measures listed above.

Monitoring would be undertaken to ensure the environmental control measures are operating effectively. Use of proven operating systems and pollution control structures, training of personnel, environmental auditing, environmental monitoring, and the development of contingency plans in the event that a situation arises which may have a negative impact on the environment, as integral parts of the site EMPs, would guard against environmental degradation.

39.3.4 Improved Valuation and Pricing of Environmental Resources

The IGAE and the *Protection of the Environment Administration Act* 1991 both call for improved valuation, pricing and incentive mechanisms which should form an element of policy making and program implementation. In other words, environmental factors should be included in the valuation of assets and services.

Cost-benefit analysis can be applied to assist in deciding which way to proceed towards sustainable development. It is a means of helping decisions to be made in an objective and rational manner, by allowing the costs of proceeding with a proposal to be measured against the benefits arising from the proposal.

It is difficult, however, to assign a monetary value to the environment of a locality, given the lack of precedence and guidelines in the valuation of environmental resources not considered for commercial use. A monetary value could not be placed against the greatest proportion of environmental attributes which may be affected. The approach taken on this project was to manage environmental impacts by identifying appropriate safeguards to mitigate adverse environmental effects and take up environmental enhancement opportunities and include the cost of implementing these safeguards in the total proposal cost.

39.3.5 Decision Making Processes

The Port Botany Expansion requires planning approval under both Commonwealth and NSW legislation. Additionally, as part of the approval process under NSW legislation, the proposal requires a number of approvals and licences in addition to planning approval.

The integration of all these approvals into a single whole of government process has been achieved in the preparation of this EIS. The requirements of both Commonwealth and NSW legislation will be satisfied by a single EIS and assessment report. Similarly, the assessment of the proposal by various NSW Statutory Authorities will be undertaken through a single process (i.e. the Integrated Development process) as described in **Chapter 9** *Statutory Planning*.

A whole-of-government approach has been adopted by Sydney Ports Corporation for the project design and development which included involvement from a wide range of government stakeholders. These stakeholders assisted in the development of project design outcomes and provided their requirements for the nature and extent of the environmental impact assessment in this EIS (refer to **Chapter 11** *Government Consultation*).

Based on these government requirements, this EIS provides an examination of short, medium and long term impacts and outcomes, taking into account sustainable development, economic, environmental and social considerations as described in this chapter and in Part F of this EIS.

Accordingly, this framework ensures that decision making at all levels is properly integrated and is based on a full understanding of considerations within a temporal context.

39.4 Conclusion

The proposed Port Botany Expansion has been designed to maximise the benefits associated with the provision of additional capacity for import and export of containerised cargo in NSW while minimising the long term environmental and social impacts.

It is a major long term public investment in NSW's and Australia's international trade infrastructure which represents a significant step towards an ecologically sustainable future for metropolitan Sydney and NSW. It has been developed and designed in accordance with the five key principles of ESD and appropriate mitigation measures have been identified where necessary.

With appropriate mitigation measures as identified throughout this EIS, undertaking the proposal in the manner proposed is justifiable taking into consideration the principles of ESD.

Summary of key outcomes:

The proposed Port Botany Expansion meets the need to provide container handling capacity to cater for long term forecast growth in container trade in NSW. The proposal also addresses the need to provide additional container handling capacity at Port Botany by 2010 to prevent significant congestion occurring at the existing port.

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 trade growth would be best served by expanding the existing facilities at Port Botany. There are no other viable alternative locations which would allow Sydney Ports Corporation to provide the necessary capacity for long term growth in container trade.

The development of the proposed Port Botany Expansion would have substantial benefits for the economy of NSW and is consistent with key government planning, transport, urban development and environmental policy objectives and the principles of ESD.

Development of significant infrastructure will necessarily involve activities which have some degree of environmental and social impact. The impacts of the preferred Port Botany proposal have been assessed in detail in this EIS and are considered to be manageable. Where necessary, the concept design has been amended to minimise impacts and incorporate environmental enhancement opportunities. Mitigation measures have been included to protect the existing environment and reduce social impacts, these measures include enhancement of Penrhyn Estuary as a habitat for migratory birds, improvements to public access to Foreshore Beach, separation of the new terminal from the foreshore to minimise loss of beach, a strategy to increase the proportion of containers moved by rail and the preservation and transplanting of seagrass.

Long term adverse environmental impacts would be limited to those associated with the loss of part of Botany Bay from public use as a result of the reclamation for the new terminal and associated infrastructure, loss of visual amenity and increased noise in areas close to the proposed site, additional traffic on roads around the port, and some decline in water quality within Penrhyn Estuary due to alterations in the flushing characteristics of the Estuary.

Based on these conclusions, undertaking the proposal in the manner proposed is justifiable taking into consideration potential environmental, economic and social impacts and the principles of ESD. Consideration of the proposal against a wide range of criteria demonstrates that the project is environmentally sustainable and justifiable

40.1 Introduction

Assessment of whether the proposed Port Botany Expansion is justified requires consideration of the proposal's:

- ability to meet the identified needs and objectives for the project;
- consistency with key government planning, transport, urban development and environmental policy objectives;
- environmental benefits and impacts;
- social benefits and impacts;
- economic benefits and impacts; and
- consistency with the principles of Ecologically Sustainable Development (ESD).

The consequences of not proceeding should also be examined. These issues are discussed throughout this EIS and summarised below.

40.2 Ability to Meet the Needs and Objectives for the Project

This EIS has considered various alternatives to meet the need for the project identified in **Chapter 4** *Need for the Project*. The preferred alternative has been described in detail and the potential impacts of the preferred alternative on the environment have been assessed. In doing so, the EIS has demonstrated that the proposal meets the need for the project identified in **Chapter 4** *Need for the Project* and the objectives identified in **Chapter 1** *Introduction*.

The means by which the proposed Port Botany Expansion would meet these needs and objectives is summarised in **Table 40.1**.

Table 40.1 Ability to Meet Identified Project Needs and Objectives

NEED/OBJECTIVE	WAYS IN WHICH NEED/OBJECTIVE IS MET
Provide sufficient port capacity to meet long term forecast growth in NSW container trade	▪ provides additional capacity of approximately 1.6 million TEUs per year at Port Botany which would meet the projected container trade demand over the next 25 years and beyond ▪ provides port capacity in close proximity to the Sydney market, thereby minimising transport distances and associated costs
Provide additional capacity at Port Botany no later than 2010 to prevent significant congestion occurring	▪ estimated seven year development schedule would allow operations at the first berth of the proposed new terminal to commence by 2010 ▪ additional capacity would be available at Port Botany prior to significant congestion occurring
Provide a port basin deep enough to cater for ships with a capacity of up to 8,000 TEUs	▪ the proposed terminal and berthing areas would be designed to accommodate an 8,000 TEU ship ▪ the existing shipping channels are at least 16 m deep, therefore, they will be able to cater for 8,000 TEU ships without further dredging

NEED/OBJECTIVE	WAYS IN WHICH NEED/OBJECTIVE IS MET
Provide dedicated and efficient road access to the new terminal	▪ a new road bridge and intersection on Foreshore Road would provide dedicated road access to the new terminal ▪ sufficient truck queuing capacity would be provided at the new terminal to prevent queuing on public roads
Provide dedicated and efficient rail access to the new terminal to facilitate an increase in the percentage of containers moved by rail to a minimum of 40%	▪ dedicated rail access to the new terminal area would be provided by means of an extension of the existing Botany Freight Rail Line parallel to Foreshore Road ▪ three rail sidings of between 400 m and 600 m would be provided at the new terminal to cater for the use of high capacity freight trains. The sidings would be located parallel to the wharf face and behind the container stack blocks to allow efficient loading/unloading of containers from trains ▪ two additional rail sidings would also be provided north of the Patrick Stevedores terminal to allow trains to wait and avoid congestion of the Botany Freight Rail Line
Minimise the impact on the environment and community	▪ an iterative approach to project development and conceptual design, involving stakeholder and community consultation, was adopted to ensure that measures to protect the environment and the community were adequately incorporated. The project design was developed in accordance with a precautionary approach to minimise uncertainty and to avoid, minimise or mitigate potential environmental or community impacts ▪ implementation of mitigation measures during the construction and operation of the proposed Port Botany Expansion would provide the best possible outcome for the environment and the community ▪ monitoring would be undertaken to ensure the environmental control measures are operating effectively and would guard against environmental degradation and potential impacts on the community
Maintain and enhance the ecological integrity of Penrhyn Estuary	▪ the existing shorebird habitat at Penrhyn Estuary would be expanded to provide a larger area of habitat, with intertidal flats for feeding and saltmarsh for roosting. The aim would be to attract as many, and potentially a greater number of, migratory shorebird species to use the Estuary ▪ limit pedestrian access to Penrhyn Estuary to a boardwalk and viewing platform to protect the ecological integrity in this area
Improve public access and enhance recreation areas surrounding Port Botany including the creation of a new boat ramp and car park, and enhancement of Foreshore Beach and adjoining landscaped areas	▪ public access would be promoted through improved land-based linkages and facilities to access water-based activities. Facilities would include a new boat ramp, car park, jetty, amenities, pedestrian/cycle path, pedestrian footbridge over Foreshore Road and additional areas of open space to improve community access and enhance public safety in this area ▪ landscaping would enhance the recreational amenity of the public recreation areas through an appropriately balanced landscape strategy including enhancement of the existing native vegetation buffer along the foreshore corridor between the Mill Stream and Penrhyn Road, roadside and median strip planting/screening along Foreshore Road and maintenance of view corridors to Botany Bay from Foreshore Road

40.3 Consistency with Key Government Policy Objectives

The analysis provided in **Chapter 10** *Strategic Policy Considerations* demonstrates how the proposed Port Botany Expansion is consistent with the objectives set out in key State and Local Government policies including:

- *Shaping Our Cities* (DUAP 1998);
- *Action for Air* (EPA 1998);
- *Action for Transport 2010* (DoT 1998); and
- the recommendations of the *Independent Inquiry into the Georges River – Botany Bay System* (HRC 2001).

Table 40.2 summarises how the proposed Port Botany Expansion is consistent with the main objectives of key government policies.

Table 40.2 Consistency with Key Government Policies

POLICY OBJECTIVES	CONSISTENCY WITH POLICY
Shaping Our Cities	
Timely and coordinated infrastructure for economic development	▪ provide additional sea port capacity by 2010 to accommodate significant anticipated growth in container trade to avert congestion in port infrastructure
Building on the region's strengths to attract international business	▪ enhance the ability of business in Sydney to efficiently access import and export markets, thereby boosting Sydney's economic competitiveness and ability to attract international business
A robust economy that can provide employment and a high quality of life for all people	▪ create opportunities for employment and business growth by consolidating the majority of Sydney's container trade in a central location which is close to markets and is compatible with existing land uses
Linking environmental sustainability to economic development	▪ incorporate environmental sustainability objectives in the design and operation of the new terminal across a number of areas, including the provision of additional port facilities close to the Sydney market to reduce environmental impacts associated with additional travel distances, and the preservation and enhancement of Penrhyn Estuary as an ecological habitat
Action for Air	
Reduced length of trips travelled by vehicles to reduce air emissions	▪ assisting in reducing the growth in vehicle kilometres travelled by creating a container terminal close to the Sydney market which is the main destination for import cargo received at Port Botany (more than 80% of containers have origins or destinations within the greater Sydney area) ▪ long term environmental benefits associated with an increase in the use of rail for container transport including reduced greenhouse gas emissions of approximately 500,000 tonnes of CO_2 per year compared with the "do nothing" scenario

POLICY OBJECTIVES	CONSISTENCY WITH POLICY
Better planning and management of freight movement across all transport modes	▪ facilitating more efficient use of roads through increased truck utilisation and better transport planning, such as use of B-doubles and backloading of trucks
Smoother flows of traffic and reduced congestion	▪ avoid contributing to road congestion by distributing port traffic over the day and more evenly through the week to avoid concentrating traffic during peak periods
Action for Transport 2010	
Increase the percentage of freight transported by rail significantly over the next 10 years	▪ significantly increasing the percentage of freight transported by rail to and from Port Botany from the current 25% to at least 40% by 2011
Upgrading of Port Botany rail freight facilities	▪ provision of additional rail infrastructure at the port including dedicated rail access to the new terminal and additional rail sidings for waiting trains to allow efficient transport of freight by rail and to cater for container trade growth
Increasing the use of high capacity freight trains	▪ providing rail exchange facilities at the new terminal with sidings of between 400 m and 600 m in length
Healthy Rivers Commission Inquiry	
Include stakeholder participation from all interest sectors: environmental, transport, commercial and recreational	▪ a broad-ranging stakeholder involvement plan was implemented during the preparation of the EIS. The plan included consultation with government agencies, businesses, transport interests, environmental and recreational groups, indigenous communities and the wider community. Various mechanisms were provided to gather the issues and concerns of stakeholders and these have been addressed in the EIS.
Comprehensive assessment of the impact of specific proposals on the whole of Botany Bay system	▪ a marine and coastal processes study is included in the EIS. The study includes a predictive scientific hydrodynamic model, which treats Botany Bay as a whole, and assesses impacts of the Port Botany Expansion on a Bay-wide basis. The secondary impacts of any changes to marine and coastal processes on aquatic flora and fauna, cultural heritage, and migratory shorebird habitat has also been assessed on a Bay-wide basis.

40.4 Environmental Benefits and Impacts

The proposed Port Botany Expansion would deliver the following environmental benefits:

- long term environmental benefits associated with an increase in the use of rail for container transport including reduced greenhouse gas emissions of approximately 500,000 tonnes of CO_2 per year compared with the "do nothing" scenario;
- restoration, enhancement and reinstatement of foreshore dune areas, intertidal sand/mudflats, saltmarsh and seagrass habitat within Penrhyn Estuary; and
- provision of hard artificial surfaces in this part of the Bay which would provide valuable habitat for fish and other marine organisms.

Construction of port infrastructure, particularly in a large, modern city, necessarily requires activities involving a degree of environmental and social disturbance. The environmental disturbance posed by the Port Botany

Expansion must be balanced against likely detrimental effects from congestion and container handling delays resulting in cost increases to NSW businesses and consumers.

Potentially adverse environmental impacts would include:

- construction impacts (e.g. noise, dust, traffic and turbidity);
- increase in traffic volumes;
- loss of part of Botany Bay from public use;
- significant visual impact in the immediate vicinity of the proposed development;
- an increase in noise levels; and
- some reduction in the flushing of Penrhyn Estuary with resultant increases in nutrient and contaminant levels.

Construction impacts would be temporary and be minimised through the selection of appropriate construction methodologies and implementation of environmental management plans developed in consultation with, and subject to approvals from, relevant government agencies. These plans would include environmental management and monitoring measures as described in **Chapter 37** *Compilation of Mitigation Measures* and **Chapter 38** *Environmental Management and Monitoring*.

Adverse environmental impacts during operations would be minimised through:

- an increase in rail mode share to a minimum of 40%;
- improved truck utilisation and spreading traffic more evenly across the day and throughout the week;
- enhancement of the environmental and visual qualities of the foreshore corridor with the provision of public recreation facilities and appropriate landscaping; and
- installation of a permanent 4 m high noise barrier along the northern and eastern edge of the new terminal and implementation of other operational noise mitigation measures.

Long term impacts would thus be limited to:

- permanent loss of the area to be reclaimed from Botany Bay;
- permanent loss of visual amenity, particularly in the immediate vicinity of the proposal; and
- some decline in water quality within Penrhyn Estuary due to alterations in the flushing characteristics of the Estuary.

40.5 Social Benefits and Impacts

The proposed expansion of Port Botany would have a range of social impacts. At the Sydney metropolitan level, the proposal would result in social benefits such as an increase in economic growth and employment opportunities.

However, at a local level, community consultation has indicated that the community is concerned about several aspects of the proposal. The main concerns are about loss of public open space and recreational

facilities, the impact of increased traffic on the local area, and the cumulative environmental impact of industrial facilities in the Botany Bay region.

It is important to recognise, however, that a broad range of issues currently adversely affect the environmental quality and recreational use of the public open space in this area, including polluted runoff from the catchment, poor water quality, contaminated estuarine sediments, degraded vegetation, poor visual quality, road-side litter, rubbish dumping and poor public safety and security.

The proposed Port Botany Expansion would provide the impetus to address some of these social and environmental issues, which currently detract from the recreational amenity of the foreshore corridor, in an integrated way. The proposed public open space plan would provide a range of opportunities to revitalise and enhance the public foreshore corridor for appropriate public recreation. Public access would be promoted with improved land-based linkages and access for water-based activities such as boating and fishing. These public areas would be designed and maintained in a way which would significantly enhance environmental and visual qualities, engage the public and encourage a greater sense of public ownership.

Moreover, the quality of the broader foreshore and estuarine areas would be dramatically transformed by environmental initiatives including extensive restoration, enhancement and reinstatement of foreshore dune areas, intertidal sand/mudflats, saltmarsh and seagrass habitat. This transformation of environmental, landscape and visual qualities would establish the basis for improving recreational opportunities.

Traffic modelling has shown that the forecast increase in traffic generated by the new terminal and existing container terminals at capacity would not cause deterioration to unacceptable levels of intersection performance in the area. A sensitivity analysis, using a “worst case” scenario of rail mode share of freight traffic at 20%, which is lower than at present, showed that a deterioration in the level of service to unacceptable levels would only occur at the Foreshore Road/Botany Road/Penrhyn Road intersection. All other intersections examined under this scenario would maintain an acceptable level of service. Therefore, the performance of the road network would be considerably better than the worst case scenario modelled in this EIS with a minimum 40% rail mode share.

It is recognised that various developments in the Botany Bay region would contribute to an increase in cumulative traffic volumes over time. However, an analysis of the contribution of port related traffic to cumulative traffic volumes in the region shows that port related traffic would represent only 1% of total peak hourly traffic flows by 2021. The Port Botany Expansion, therefore, would not significantly contribute to cumulative traffic increases in the Botany Bay region.

It is also recognised that the construction and operation of the new terminal would result in visual impacts from the air, water and immediate vicinity of the proposed development (e.g. Foreshore Beach). However, the proposed Port Botany Expansion would be located in an area whose landscape and visual character is already dominated by the existing facilities at Port Botany and Sydney Airport. In other words, it would be compatible with the existing land use and visual character of the area.

The social benefits and impacts of the proposal are discussed further in **Chapter 26** *Social Impact Assessment*.

40.6 Economic Benefits and Impacts

The provision of adequate international trade infrastructure substantially contributes to the quality of life experienced by Australians. By improving the efficiency and reducing the cost of transporting cargo, it makes exporters more competitive and reduces the price of imported products. This essentially improves the terms in which we trade on the world market. This improved competitiveness generates employment in export industries and reduces the cost of living.

This assessment has shown that the development of the proposed Port Botany Expansion would have a substantial benefit to the NSW Gross State Product, employment levels and household income of those employed directly and indirectly in port related activities. The cumulative economic benefit of the project (up to 2024/25) would provide more than $16 billion in output for the NSW economy and add $4.8 billion to household income. Once fully developed, the proposed new terminal would employ over 9,000 people, either directly or indirectly. This would contribute to improved living standards in the area and strengthen NSW's economic position in the Australian economy.

The proposed Port Botany Expansion 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 but of greater magnitude to the current proposal, was addressed in the original 1969 Port Botany master 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.

The economic benefits and impacts of the proposal are discussed further in **Chapter 27** *Economic Impact Assessment*.

40.7 Consistency with Ecologically Sustainable Development

Consideration and incorporation of the principles of ESD in the design and development of the proposed Port Botany Expansion are discussed in **Chapter 39** *Ecologically Sustainable Development*. As shown in the chapter, with appropriate mitigation measures as identified throughout this EIS, undertaking the Port Botany Expansion in the manner proposed is justifiable taking into consideration the principles of ESD.

40.8 Consequences of Not Proceeding

The need to provide additional container handling capacity has been discussed in **Chapter 4** *Need for the Project*. This chapter demonstrates that with the forecast growth in container trade additional capacity at Port Botany would be required no later than 2010. If adequate capacity is not provided in time, the additional costs of congestion would be increasingly borne by consumers and business in the form of higher transport costs and delays in deliveries, all of which affect the price of goods and the competitiveness of exports.

If this need is disregarded and the "do nothing" option is pursued, there are no other viable alternative locations or layouts which would allow Sydney Ports Corporation to provide the necessary capacity for long term growth in container trade as shown in **Chapter 5** *Alternatives*. The existing status of Port Botany on global trade routes as well as the port's proximity to the market of future trade growth dictate that capacity to provide for future trade growth would be best served by expanding the existing facilities at Port Botany.

Without the proposed Port Botany Expansion, throughput of containers would be dictated by the capacity of the existing infrastructure at Port Botany together with any future improvements in productivity over time. Trade would therefore either have to suffer the increasing costs of congestion or go elsewhere. Access Economics and Maunsell Australia (**Appendix D**) estimate that the direct cost of congestion would be $300 million (based on a throughput of 3 million TEUs by 2025). Ultimately, this cost would result in the loss of trade, relocation of industry and loss of employment.

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

40.9 Conclusion

The proposed Port Botany Expansion meets the need to provide container handling capacity to cater for long term forecast growth in container trade in NSW. The additional 1.6 million TEUs per year of container handling capacity at Port Botany provided by the new terminal would be sufficient to accommodate the expected increases in container trade over the next 25 years and beyond. The proposal also addresses the need to provide additional container handling capacity at Port Botany by 2010 to prevent significant congestion occurring.

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 trade growth would be best served by expanding the existing facilities at Port Botany. There are no other viable alternative locations which would allow Sydney Ports Corporation to provide the necessary capacity for long term growth in NSW container trade.

Without the proposed Port Botany Expansion, throughput of containers would be dictated by the capacity of the existing infrastructure at Port Botany together with any future improvements in productivity over time. Ultimately, the cost of this congestion would result in the loss of trade, relocation of industry and loss of employment.

The proposal meets the identified project objectives including the need to minimise the impact on the environment and the community. This has been achieved through the adoption of an iterative approach to project development and conceptual design which involved extensive stakeholder and community consultation. Where necessary, the concept design has been amended to minimise impacts and incorporate improvement opportunities. 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, improvements to public access to Foreshore Beach, a strategy to increase the proportion of containers transported by rail and minimise the proportion of containers transported by road and the preservation and transplanting of seagrass.

The proposal is consistent with key government planning, transport, urban development and environmental policy objectives and the principles of ESD.

This assessment has shown that the development of the proposed Port Botany Expansion would have a substantial benefit to the NSW Gross State Product, employment levels and household income of those employed directly and indirectly in port related activities.

Long term adverse environmental impacts would be limited to those associated with the loss of part of Botany Bay from public use as a result of the reclamation for the new terminal and associated infrastructure, loss of visual amenity and increased noise in areas close to the proposed site, additional traffic on roads around the port, and some decline in water quality within Penrhyn Estuary due to alterations in the flushing characteristics of the Estuary.

Based on these conclusions, undertaking the proposal in the manner proposed is justifiable taking into consideration potential environmental, economic and social impacts and the principles of ESD. Consideration of the proposal against a wide range of criteria demonstrates that the project is environmentally sustainable and justifiable.

Summary of key outcomes:

It is considered that the construction and operation of the proposed Port Botany Expansion is justified on the basis of its environmental acceptability taking into account biophysical, economic and social considerations and is in accordance with the five principles of ESD.

41.1 The Proposal

The proposed Port Botany Expansion involves the construction and operation of a new container terminal at Port Botany. The new terminal would extend approximately 550 m west and 1,300 m north of the existing Patrick Stevedores' container terminal at Port Botany and would create a new container terminal of approximately 63 ha in area.

The fully developed new terminal area would create an additional five container ship berths with a capacity of about 1.6 million TEUs per year. This would provide a total capacity at Port Botany in excess of 3 million TEUs per year, which would be sufficient to accommodate the expected increases in container trade over the next 25 years.

Development of the proposed Port Botany Expansion would involve two principal stages:

- construction of the new terminal and associated port infrastructure; and
- progressive development of terminal facilities for the operation of the new terminal.

The construction activities and works to create the new terminal would be managed by Sydney Ports Corporation. Development of terminal facilities would be the responsibility of the ultimate operator(s) of the new terminal.

Development of port infrastructure necessarily involves activities which have some degree of environmental and social impact. The impacts of the preferred Port Botany proposal have been assessed in detail in this EIS and are considered to be manageable. Where necessary, the concept design has been amended to minimise impacts and mitigation measures have been included to protect existing environments and reduce social impacts.

Some existing ports could satisfy the navigation and infrastructure requirements necessary to cater for some of the forecast growth in Sydney container trade. However, the high economic and environmental cost of transporting containers from the more remote 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, are significant factors which detract from the viability of these more distant locations. The existing status of Port Botany on global trade routes as well as the port's proximity to the market of future trade growth dictate that capacity to provide for future trade growth would be best served by expanding the existing facilities at Port Botany.

41.2 Justification for the Proposal

Based on the conclusions in **Chapter 40** *Project Justification*, undertaking the proposal in the manner proposed efficiently meets the identified project needs and objectives and is justifiable taking into consideration potential biophysical, economic and social impacts.

41.3 Sustainability of the Proposal

The proposal is sustainable in terms of:

- efficiently meeting the project needs and objectives;

- a precautionary approach to analysis, assessment and management of impacts and risks to the environment;
- social and inter-generational equity considerations;
- conservation and protection of biodiversity and ecological integrity;
- reflecting the value of environmental resources through the inclusion of environmental protection activities, initiatives and mitigation measures in the total project cost; and
- a whole-of-government approach to the development of project design outcomes and the nature and extent of the environmental impact assessment.

41.4 Conclusion

The proposal meets Sydney Ports Corporation's legislated responsibility to develop port facilities and services to cater for the future trade needs of Sydney. The proposal also represents the completion of the State Government's long term vision for the provision of sufficient port capacity at Port Botany.

The proposal would deliver long term economic and social benefits and would improve the environmental qualities of Penrhyn Estuary and the recreational amenity of Foreshore Beach.

Whilst the proposal would have environmental benefits, it is recognised that it would also have unavoidable environmental impacts. A range of mitigation measures have been identified to minimise the impact on the environment. The environmental performance of the proposal would be monitored to ensure the adopted environmental standards are met and maintained.

It is considered that the construction and operation of the proposed Port Botany Expansion is justified on the basis of its environmental acceptability taking into account biophysical, economic and social considerations and is in accordance with the five principles of sustainability.