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Project: Sydney Port Botany Terminal No. 3

PKG-17.1 Planning Section 75W Modification to Stormwater First Flush System

Prepared for:
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Contents

1 Executive Summary

On 13 October, 2005 the Minister for Planning granted consent to development application number DA-494-11-2003i for “the construction and operation of a new container terminal and associated infrastructure” at Port Botany. The land reclamation works of the Port Botany Expansion began in July 2008. The development of the Port Botany Expansion now called Sydney Port Botany Expansion Container Terminal 3 (T3) will be undertaken by Sydney International Container Terminals Pty Limited (SICTL), who will also be the operator of T3.

SICTL, the operator of T3, is seeking a further modification under Section 75W of the Environmental Planning and Assessment Act 1979 to alter the approved stormwater first flush systems. The modification involves the construction of Stormwater Quality Improvement Devices (SQID) which is required by the operators of T3 in order to better accommodate the operational and maintenance requirements of the approved development, to address safety risks due to confined space entry requirement and to avoid periodic cleaning of the tanks which would require terminal operations to be locally suspended for several hours while tanks are cleaned.

This modification provides an alternative to the first flush system which provides an optimum environmental protection system for this Project. The proposed modification applies to 46 hectares of the site in the SICTL lease area shown in the figure 1 below. The stormwater from the remaining 17 hectares will be treated by the previously approved first flush system and be the responsibility of Sydney Port Corporation (SPC).

As a result of the modification there will be an improvement to the water quality discharging into Penrhyn Estuary due to the SQID being able to treat total suspended solids (TSS), free and floating oils, grease and hydrocarbons (Humes Water Solutions 2007and SPEL Environmental) which are not treated by the approved first flush system.

This modification was prepared with consultation with the relevant authorities including the NSW Department of Planning and Infrastructure; NSW Office of Environment and Heritage; Department of Sustainability, Environment, Water, Population and Communities; Department of Primary Industries, NSW Maritime and Community Consultative Committee. Issues raised during this consultation have been included in the proposed modification.

The assessment demonstrates that the proposed modified first flush system would involve minimal environmental impact and the development for which the consent as modified relates will remain substantially the same development as the development for which consent was originally granted.

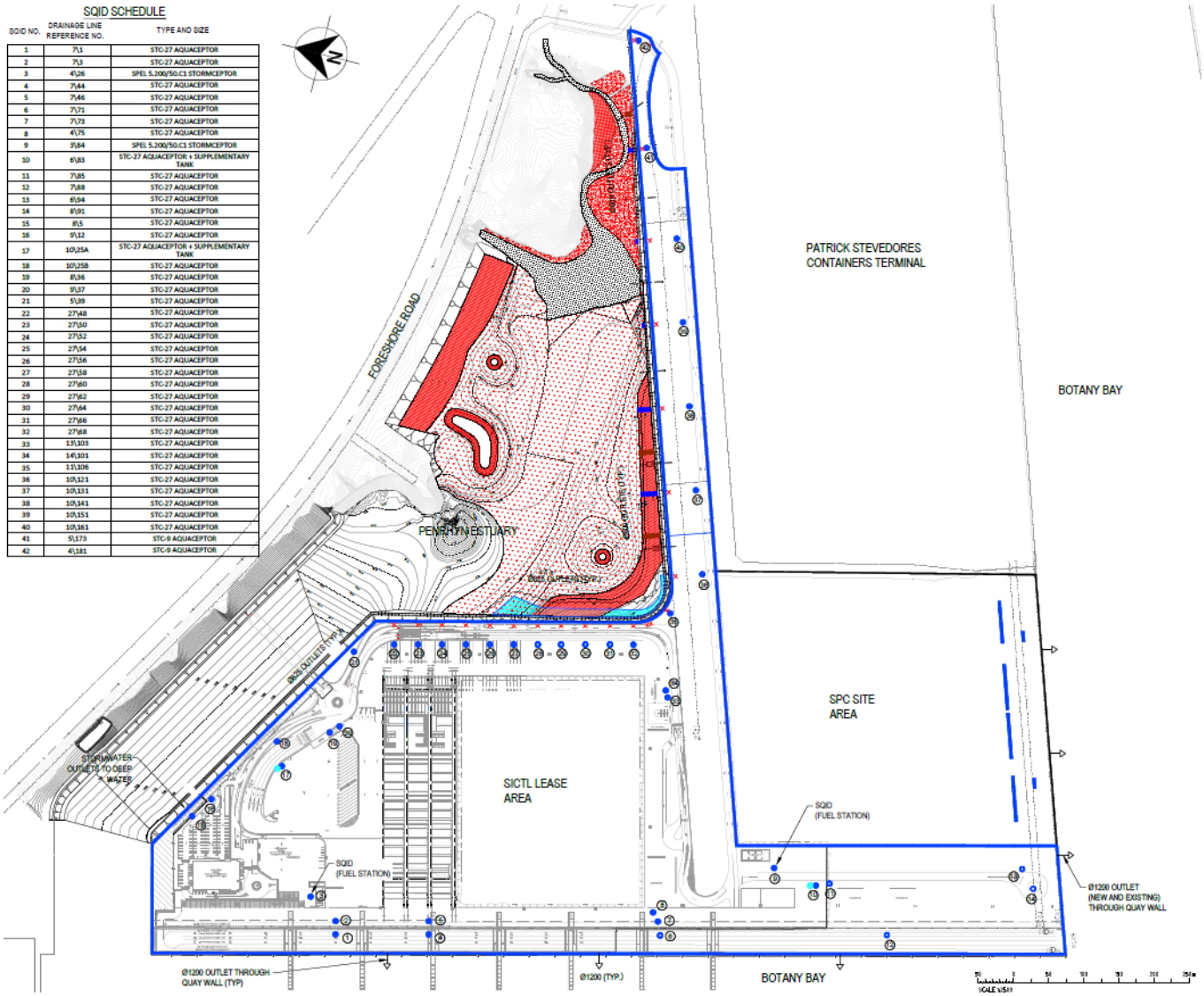

Figure 1 | SICTL Lease Area

2 Introduction

2.1 Purpose of this Modification

Sydney International Container Terminals Pty Limited (SICTL) is undertaking the development of the T3 project in Sydney. Reclamation works at the future terminal site, including all marine works, have been undertaken by Sydney Ports Corporation (SPC) as well as the design and construction of the wharf (approximately 1,300 m long). All infrastructure above the final reclamation level and connections to the services as provided by Sydney Ports Corporation will be developed by SICTL.

Aurecon have been appointed as the civil design consultant by SICTL and are undertaking a range of tasks including concept design, pre-final design and final design, as well as the preparation of tender documentation and contract management on their behalf.

The purpose of this modification is to make provision for the use of an alternative stormwater management system to the currently approved first flush system for the SITCL lease area shown in Figure 1. This document argues that the use of stormwater quality improvement devices (SQID) is better suited for this project than the currently approved first flush system and provides justification through sound reasoning contained within a legislative framework. It is believed that the use of SQIDs is more appropriate to the site given its properties and outcomes as well as for viability reasons.

2.2 Project Consent Background

On 26 November 2003 the Sydney Ports Corporation lodged development application number DA-494-11-2003i for "*the construction and operation of a new container terminal and associated infrastructure*" at Port Botany, referred T3.

The then Minister for Urban Affairs and Planning was the consent authority for the project by virtue of a declaration of State significance made under the Environmental Planning and Assessment Act 1979 (EP&A Act). Furthermore the development is 'designated development' and was accompanied by an Environmental Impact Statement (EIS). On 13 October, 2005 the Minister for Planning granted consent to Sydney Port Corporation for the proposal.

Since the initial consent was granted, various modifications have been sought. These are as detailed in Table 1 below.

Modification	Description
MOD 1 – MOD-107-9-2006-i approved 11 September 2007	The floating boom and silt curtain system shall be retained after the completion of dredging operations until the turbidity of water within the system returns to background levels. Dredged soils shall not be disposed of outside the construction area in Botany Bay. No dredging activities are proposed for the construction or operation of the terminal. The Applicant shall prepare a Construction Safety Study and a Fire Safety Study prior to the commencement of construction of the terminal operations infrastructure.
MOD 2 – MOD-134-11-2006-i approved 11 September 2007	Implements the condition that wave action at Foreshore Beach will be monitored and if it is found to intensify in a way that adversely impacts seagrasses in the area, the proponent is required to propose and implement additional protection measures.
MOD 3 – MOD-149-12-2006-i approved 11 September 2007	Sediment disposition in the Penrhyn Estuary area shall not exceed an average of 2 centimetres per year. Required noise specifications for dredging activities to be adhered to. No dredging activities are proposed for the construction or operation of the terminal.
MOD 4 – MOD-78-9-2007-i approved 17 September 2007	Specifies the details to be included in the Emergency Response and Incident Management Plan
MOD 5 – MOD-60-9-2008 approved 21 September 2008	Specifies the work times allowable for construction activities that would result in audible noise at any residential premise. Construction outside the specified hours needs to be approved on a case by case basis.
MOD 6 – MOD-68-12-2008 approved 12 December 2008	Repeals the conditions contained in Modification 5 provided the construction activities are subject to an environment protection licence issued by the EPA under the POEO Act and the EPA has approved activities to be conducted outside the permitted hours.
MOD 7 – 08-03-2009 approved 20 March 2009	This Modification alters the location of the operational rail sidings to 600m length on the Inter-terminal Access Road Corridor for the unloading/ loading of containers to/ from rail, as an option. A 3m high noise barrier will be constructed north of the rail sidings, with the top 1 m being made from transparent material. In addition, allowance has been made to upgrade the stormwater collection and treatment process to the same level approved for the new terminal. Stormwater management for operation includes applying the first flush system for the Inter-terminal Access Road Corridor as for the rest of the site for the operation of the terminal.
MOD 8 – 494-11-2003-i MOD 8 approved 30 May 2009	Modification to allow additional dredging activities to be undertaken within the ship turning area outside the primary silt curtain within Botany Bay. The total volume of material to be dredged would remain unchanged from that stated in the EIS. However, an additional 300,000m^3 is proposed to be dredged within the ship turning area with a corresponding reduced volume of dredging required between the airport runway and the new terminal.

Modification	Description
MOD 9 – DA-494-11-2003-i MOD 9 approved 18 June 2009	Modification to allow additional dredging activities to be undertaken at the high spot off Molineux Point outside the primary silt curtain within Botany Bay. The total volume of material to be dredged would remain unchanged from that stated in the EIS. However, an additional 100,000m^3 is proposed to be dredged off the high spot at Molineux Point with a corresponding reduced volume of dredging required between the airport runway and the new terminal.
MOD 10 – DA-494-11-2003-i MOD 10 approved 13 July 2009	Modification to allow additional dredging activities to be undertaken within the ship turning area outside the primary silt curtain within Botany Bay. The total volume of material to be dredged would remain unchanged from that stated in the EIS. However, an additional 600,000m^3 is proposed to be dredged within the ship turning area with a corresponding reduced volume of dredging required between the airport runway and the new terminal.
201467-P-EN-REPT-08 Modification 11 Revision 5 approved 21 November 2011	Modification to alter the approved location, footprint and height of both the Operations Building and the Maintenance building. This modification is required by the operators of T3 in order to better accommodate the operational and maintenance requirements of the approved development.

Table 1 | Modifications granted on the original approval

2.3 Project Background

The port facilities at Port Botany were first constructed over thirty years ago in the 1970's. Since then container trade has steadily expanded both in Australia and worldwide. Over this period Port Botany has faced the challenges of increasing demand and an ever growing port operation, improving the productivity of the facilities through new or upgraded technologies. This strategy has seen Sydney's container throughput grow from roughly 175,000 TEUs in 1970 to 1.62 million TEUs in 2007. Conservative forecasts suggest that by 2020 the facilities at Port Botany will be moving over 3 million TEU's per annum.

About 98% of Australia's international trade is undertaken by sea and provision of adequate port facilities and associated landside logistics is vital for the continued growth of the NSW economy. Port Botany is Australia's second largest container port and generates over $1.5 billion per annum in economic activity for the Australian economy. Despite the global economic downturn, Port Botany has recorded nine consecutive years of record growth. Currently there are around 400 workers on site at Port Botany, every day. The stevedoring terminals operate 24 hours per day, seven days per week.

Eighty-five percent of the containers arriving at Port Botany are distributed within a 40 km radius of the port. As Sydney's demand for goods manufactured offshore increases, the port's ability to satisfy this demand becomes more constrained.

Multiple factors affect the ability of the current facilities at Port Botany to cope with this increase in demand. Limited available land, ageing infrastructure, insufficient berth numbers, and a congested land and seaside transport network are beginning to have significant financial effect on the port, and the shipping industries services.

In 2005 to address these issues and ensure that Port Botany continues to operate efficiently over the forecast period, Sydney Ports Corporation obtained government approval to reclaim and develop an additional 63 hectares of land for the construction of additional container handling facilities.

The expansion of the existing port facilities through the reclamation of land adjacent to the existing berths is currently under construction. Once operational, T3 will provide significant additional capacity to meet projected long-term trade growth.

An efficient port is advantageous in attracting new and long-term trade. The new SICTL facilities will provide significant economic benefits for both Sydney, and the state of NSW, through improved supply chains, additional employment opportunities, less congested trade networks and a more competitive industry.

The new T3 site includes:

- 1300 metres of additional wharf face for 4 new berths
- 46 hectares of reclaimed terminal land
- Deep water berths with depths of 16.5 metres
- Dedicated access roads for the new terminal
- Rail access

Noting trends and shifts in industry patterns and practices, the terminal is designed to cater for larger, more modern vessels than have served Sydney in the past, each carrying up to 8,000 TEUs.

2.3.1 Project Timeline to Date

The project timeline of major events relating to this project to date are presented in the table below.

Date	Task
2005	Sydney Ports Corporation obtained government approval to reclaim and develop an additional 63 hectares of land for the construction of additional container handling facilities.
2007	Reclamation of the terminal land and enhancement of the publicly sensitive Foreshore Beach and Penrhyn Estuary areas began.
2008	SICTL won the right to construct and operate the stevedoring facilities on the newly reclaimed land.
2010	Sydney International Container Terminals Pty Limited (SICTL) contracted Aurecon as their Engineering Consultant to design and supervise the construction of the new terminal facilities and associated yard infrastructure works. These works include the design of buildings, pavements, HV reticulation, drainage, and the integration of environmental requirements, as well as Contract administration during the construction period.

Table 2 | Project timeline to date (Source: Aurecon 2011 (2))

2.3.2 Sydney T3 Description

Located on the north eastern edge of Botany Bay, approximately 12 km south of Sydney's Central Business District (CBD) in the suburb of Banksmeadow, the site for the new terminal is situated between the existing port and the parallel runway at Sydney Airport. The new terminal extends approximately 550 m west and 1,300 m north of the existing Patrick Stevedores container terminal and adopts an appearance similar in nature to that of the existing container terminals at Port Botany.

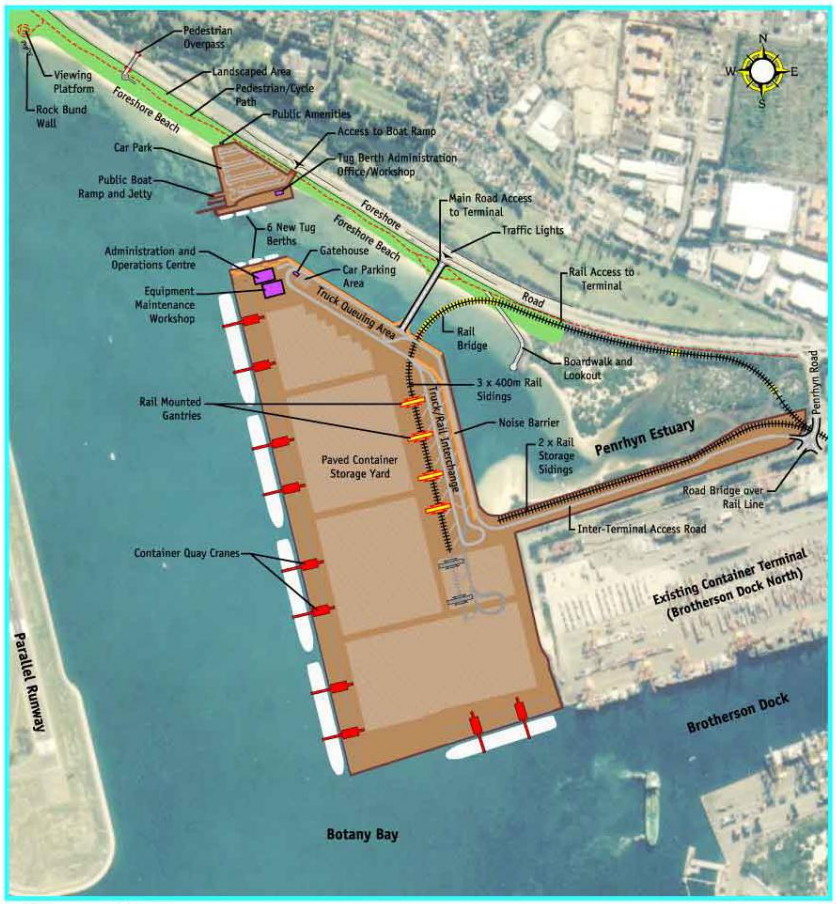

Figure 2 | Extract from the EIS Figure 1.2 'Site Layout' showing the T3 in context of the existing port

The key operations associated with the new terminal are:

- Marine transport operations; involving the safe navigation of ships to and from the terminal;
- Terminal operations; involving the loading, unloading and temporary storage of containerised cargo within the terminal itself; and
- Landside transport operations; dealing with the distribution of containerised cargo to consumers.

Sydney Ports Corporation (SPC) will retain overall responsibility for facilitating marine transport operations within the port; however, responsibility for the day-to-day running of the terminal falls to the terminal operator (SICTL). Land transport operations beyond the terminal gates are the responsibility of separate rail and road transport operators.

Constructed with a 100 year design life for critical structural elements, the new terminal is expected to service the growing demands of Sydney well into the future.

3 Modification Description

3.1 EIS and Modification 7 Approved First Flush System

The Port Botany Expansion EIS nominated the first flush system for the collection and treatment of stormwater. Modification 7 dated 08-03-2009 applies to the first flush system for the Inter-terminal Access Road Corridor as for the rest of the site for the operation of the terminal. The first flush system is designed to capture the initial 10mm of stormwater runoff and treat it to remove contaminants prior to testing and discharge into Botany Bay. The total first flush storage volume for the site would be 4600m^3 across 46 hectares. The approximate location of the first flush storage channels in addition to several separate storage tanks located elsewhere throughout the site is shown in Figure 3. Storage channels / tanks would typically be about 4 m wide with a 1.5 m storage depth below the piped drainage system. Additional headroom would be provided in the tanks to facilitate periodic cleaning. Storages would be compartmentalised to maximum lengths of about 70 m with a sump pump in each compartment. The individual sump pumps would be connected to a common rising main to convey stored water to a treatment plant.

The first flush system involves the following steps:

1. Collection of first flush water and spills
2. Surface water collected from the first flush would be pumped to a coalescing plate separator
3. Cleaner water would flow into a small monitoring tank for sampling.
4. If clean the water would be reused for irrigation, wash-down purposes and toilet flushing. Clean water would be stored in two 10,000L storage tanks.
5. Appropriate disposal of excess clean water (into Botany Bay) and contaminated water (into the Sewer)

It is expected that floodgates or penstocks would be required on the drainage outlets to guard against surging of the stormwater lines during high tides that would otherwise backfill the first flush storages.

Areas of potential high pollution such as the fuel station would be fully sealed and bunded to completely isolate all discharge (stormwater or otherwise) from the area. Discharge lines would be fitted with isolating valves and operated to contain any spill for local removal.

The first flush system would serve a dual purpose, also acting as a spill containment to prevent the discharge of any contaminated spillage on the site from entering the surrounding waters.

Specific requirements of the first flush system include:

- The first flush storage would be located below the level of the piped drainage system. With a storage depth of 1.1 m this would place the underside of the storage tanks at approx. RL 0.0 CD, i.e. 0.9 m below mean sea level.
- 29 separate first flush storage tanks would be required. On average these would be sized 27 m long x 4 m wide with a minimum clear height of 1.8 m to facilitate cleaning. The stormwater drainage arrangement for the site and hydraulic constraints precludes the provision of a single tank or only a small number of tanks.
- Two pumps would be required in each storage tank; an upper pump to drain off the top storage layer containing hydrocarbon contaminants (petrol, diesel, grease); and a lower pump to drain off particulate contaminants (sands and silts, sediments, metal and paint flakes, tyre particles, heavy metals, etc). The pumps would remove the contaminated water over a 96 hour period, passing through a water treatment plant before discharging as clean water to Botany Bay or contaminated water to sewer. Collection pipelines would link up all storage tanks and the treatment plant.

- Tidal flap valves would be required on the drainage outlets to prevent back-flooding of the first flush tanks during high tides. These would require regular maintenance to remove blockage and marine fouling.
- Clean-out of the tanks would be periodically required to remove accumulated sediments.

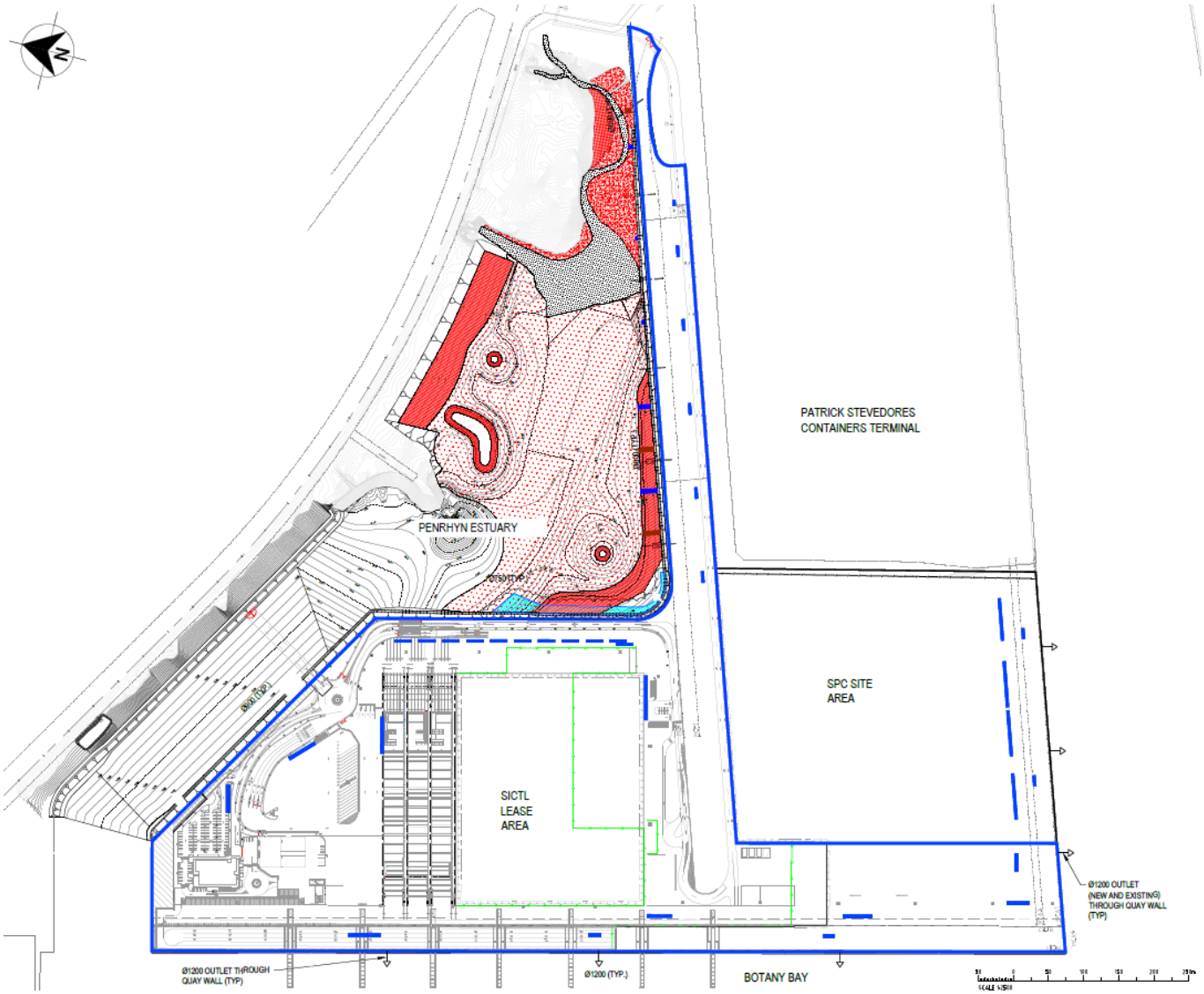

Figure 3 | Stormwater treatment with first flush system site layout

3.2 Modification to the Stormwater Treatment System

It is proposed that, as an alternative to the first flush system, stormwater treatment be provided by the installation of stormwater quality improvement devices (SQIDs) shown in Figure 4 for the SICTL lease area, inclusive of the Inter-terminal Access Road Corridor. The SQIDs have been developed to target the type of pollutants found at container terminals and similar industrial sites, primarily comprising suspended solids and petroleum hydrocarbons. The proprietary products included in this category are those by Humes (Humeceptor variant known as the Aquaceptor), Rocla (Downstream Defender), Ecosol (Ecosol RSF 5000) and SPEL Stormceptor. The SQID system of choice is the Aquaceptor for the major part in the lease area and the SPEL Stormceptor in areas where there is a higher risk of oil spills. This is a source control product focussed on removing the most ecologically damaging stormwater contaminants. This system is capable of retaining fine material between 10-60 µm, amounting to 75-95% of the total suspended solids load. Additionally, this system removes hydrocarbons and petroleum products and absorbed materials such as heavy metals. Reference to SQID systems throughout this document refer to the Aquaceptor and the SPEL Stormceptor. The general requirements for using these devices at the T3 would be as follows:

- A SQID would be located towards the end of each drainage line discharging from the site.
- SQIDs would be installed on-line with all flow passing through. Treatment flows would be directed through the containment compartments to separate pollutants, and excess flows would be bypassed through the units.
- 39 SQIDs would be required to service the terminal area. An additional 2 SQIDs (SPEL Stormceptor) with higher fuel capture efficiency are proposed to service potential fuel spill areas at the fuel station near the workshop building and the parking / refuel area near the end of the rail stabling lines.
- No pumping, pipelines, power supply or treatment plant would be required with the SQIDs. All pollutants are collected and contained within the SQID.
- The SQIDs would be supplied in a style that accommodates higher downstream tailwater levels that occur during high tides, thereby eliminating the need for tidal flap valves on the discharge lines.
- The SQIDs are cleaned out with vacuum trucks by a waste disposal contractor. Normally no entry into the unit is required for maintenance. Clean-out typically occurs on a yearly basis; however they would be inspected regularly, particularly after heavy storm events.
- The efficiency of the SQIDs would be targeted at greater than 80% TSS removal. Performance of hydrocarbon removal would be in the order of 97% for high concentration flows (greater than 1000 ppm) and better than 90% for concentrations greater than 10 ppm.
- Each SQID would provide a storage capacity of 3000 to 4000 litres for hydrocarbon spill containment. That capacity will be increased to 20,000 litres with additional storage tanks in two areas identified as higher risk, namely the fuel station, and the “tanktainer” area near the end of the rail stabling lines.
- The new outlets finish at the rock armour.

The only difference between the Aquaceptor and the Humeceptor is the internal bypass configuration, as the Aquaceptor allows for higher tide levels. Both the Aquaceptor and the Humeceptor performance is the same, including the operation.

3.3 SPC site area

The SPC site area (refer Figure 4), officially lot 2 DP 1165618, will adopt the original stormwater system. The SPC site area stormwater outlets will discharge through the quay wall on the southern side of the site into Botany Bay. The environmental standards to be adopted will be the same standards as detailed in the original EIS.

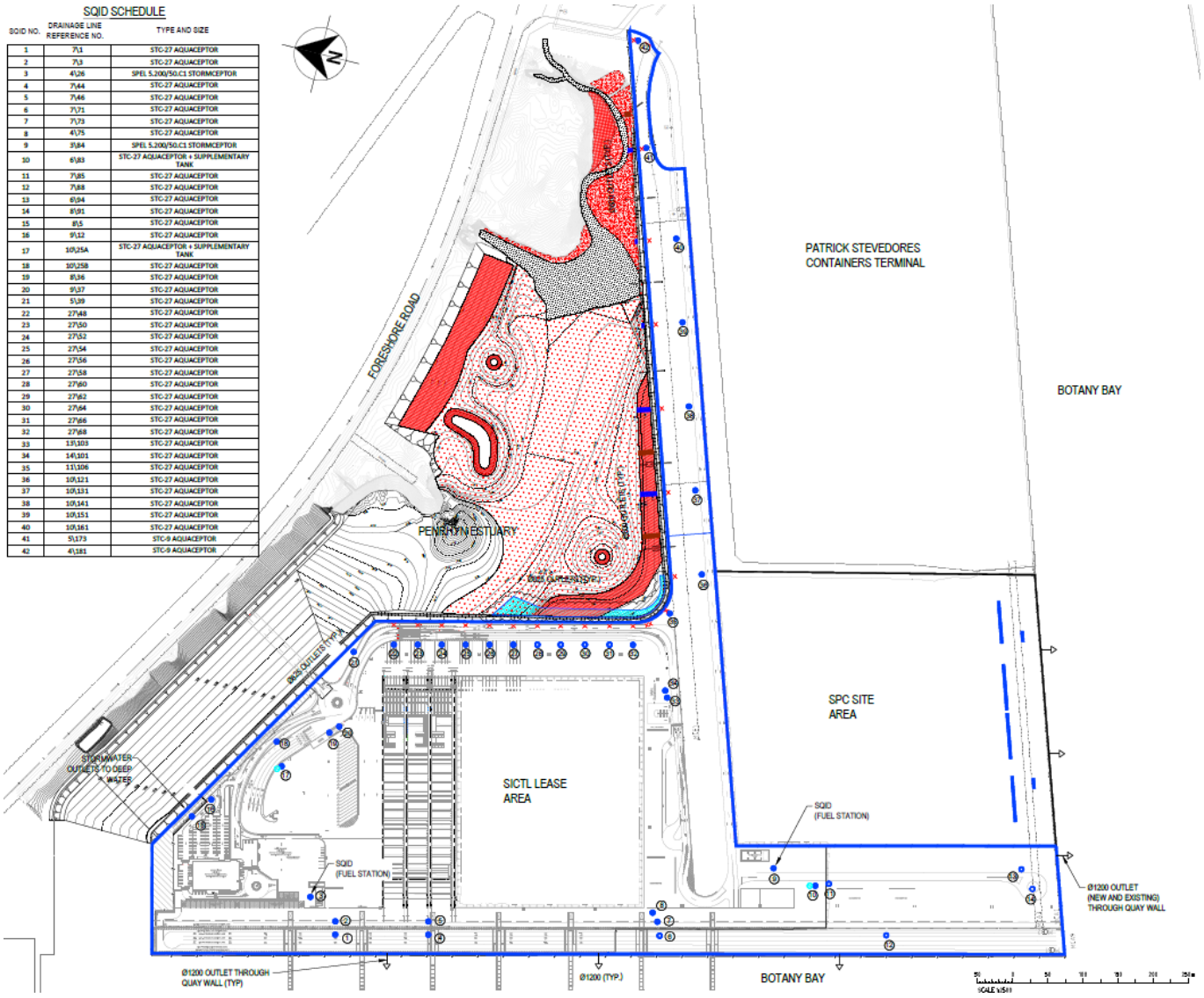

Figure 4 | Stormwater treatment with SQIDs site layout

3.4 Need for the Modification

First flush tanks impose significant safety risks and operational constraints on the terminal. Periodic cleaning of the tanks would require terminal operations to be locally suspended for several hours while tanks are cleaned. Any open first flush tanks would limit the use of the site, limit trafficable areas and conflict with the noise wall and landscaping adjacent to Penrhyn Estuary. Any closed trafficable first flush tank would also affect the operation due to entry to confined space.

The first flush system is designed to minimise impacts to the environment, however, it becomes evident, when comparing to other systems, that the first flush system is not the optimum system for this Project.

3.4.1 Limitations of the First Flush System

The efficiency of first flush systems in removing pollutants is difficult to assess because of uncertainties associated with the amount of pollutants carried by the first flush compared to subsequent flows that bypass the storage and discharge without treatment. A common estimate is that the first flush will contain a higher concentration of total suspended solids (TSS) when compared to subsequent flows following the first 10mm of stormwater. The efficiency of the SQIDs would be targeted at a minimum 80% TSS removal compared to 64% for the first flush system.

There are some limitations of first flush systems as recognised by the Office of Environment and Heritage (2011) including:

- Some areas have drainage characteristics that prevent the 'first flush' phenomenon from occurring. In other words, the site inhibits stormwater from collecting the vast majority of pollutants in the first 10mm. This usually occurs over large areas where initial runoff from the most distant parts of the catchment may not reach the catchment outlet for some time after a storm starts. This would be an issue for T3 due to its flat nature and obstacles placed along drainage paths preventing the rapid evacuation of water from the site.
- The existence of pollutants with low mobility can cause the first flush system to be ineffective. Rainfall does not remove some pollutants such as oils and greases as easily or quickly as soluble materials and fine dusts. As identified above, the large proportion of contaminants generated at T3 will be made up of suspended solids, oil and grit. Suspended solids, as the name suggests, will not dissolve in water and hydrocarbons are also insoluble due to their hydrophobic, non-polar nature. As generally known, oil and grit are insoluble. In short, the large majority of expected contaminants are not readily dissolved in water, therefore causing them to have a lower level of mobility when compared to other substances. This low level of mobility would prevent the first flush phenomenon from occurring, with these contaminants being integrated into the stormwater after some time of the water acting on them rather than in the first 10mm. The proportion of landscaped areas on site are relatively low, however the first flush system would not sufficiently accommodate these areas in terms of containing contaminants.

Additional limitations include tidal flap valves would be incorporated into the design to prevent back-washing of the first flush tanks during high tides. These would require regular maintenance to remove blockage and marine fouling.

In addition, only the initial stormwater runoff is captured and treated using this system, allowing any water after the initial 10mm to pass directly into the drainage system. This does not guarantee that the maximum amount of contaminants possible has been captured and presents the risk of the spill containment function being unavailable during wet weather events.

3.4.2 Safety Issues

First flush tanks impose significant safety risks and operational constraints on the terminal. Servicing of the tanks will involve regular inspection and maintenance of pumps and valving, and the periodic clean-out of the tanks to remove accumulated sediments. The latter is expected to be required on a three to five year frequency but this will vary across the site because of the different pollution load from the various service areas. Cleanout for the closed trafficable first flush tank would need to be carried out under confined space requirements and would require terminal operations to be locally suspended for several hours while tanks are cleaned.

3.4.3 Indirect Impacts

The operation of the first flush system requires significant supporting infrastructure including two pumps and additional treatment to the stormwater quality (Aurecon 2011(2), p.6). Compared to the SQID system, these items are highly energy intensive thereby creating indirect environmental impacts from manufacturing, operation and electricity generation. Moveable parts and consumable items within the system will create continual demand on the environment on a whole life cycle basis.

3.4.4 Risk from Spills

The risk to the environment from spills occurring at the terminal are elevated as a result of the first flush system use. The storage tanks for the first flush system can only cater for 10mm of liquid in their catchment area. Should a spill exceeding this size occur, the surrounding environment could become contaminated, causing extensive impacts to the ecosystems. Additionally, the efficiency of the spill containment system is reduced during wet weather events for the same reason of tank capacity.

3.4.5 Alternative to first flush system

During initial design development an alternative to the nominated first flush system for stormwater treatment was considered to improve water treatment whilst also providing operational efficiency and safety on site.

The stormwater quality improvement devices (SQID) is better suited for the purpose of this site as it is designed for heavy industrial areas thus making it better able to manage high volumes of water runoff and high levels of industrial contaminants. SQID proves to be a more viable option to the operator as it eliminates the need to shut down operational activities during maintenance, preventing costly delays as well as improving safety of personnel working with the system. The need for maintenance within confined spaces does not exist for the SQID system.

In summary as well as increasing operational viability and safety for the operator, the SQID system has the ability to improve water quality when comparing outflows with the first flush system. This results in cleaner water entering the waterway, healthy environments and ecosystems and a more sustainable approach to environmental management from terminal operations through best practice.

A direct comparison of the two systems, demonstrating the level of this improved efficiency and the benefits of the SQID System is provided in subsequent sections.

3.4.7 Comparison of the Two Stormwater Systems

The first flush system and the Aquaceptor are compared in the summary table below using themes that influence environmental impacts. This table clearly shows the differences between the two systems, highlighting their advantages and disadvantages. From this table, one can conclude that the SQID provides greater benefits to the project and confidence in the environmental management of stormwater quality being released into the environment.

Comparison of the First Flush System and the SQID System		
Environmental Impact Themes	**First Flush System**	**SQID System**
Treatment Characteristics	Only the first 10mm of stormwater is treated with the remainder discharging directly into Botany Bay.	All stormwater is treated up to the SQIDs maximum capacity which is designed for ARI 20 years. Beyond this point, only excess water is bypassed into Botany Bay.
Supporting Infrastructure	Two pumps and tidal flap valves.	None.
Efficiency	Uncertain but estimated at about 64% of TSS.	Targeted at a minimum of 80% TSS removal. Retains 98% of free oil and limit hydrocarbon concentrations to 10ppm.
Spill Containment	Acts as a spill containment system during dry weather events. Once storage tanks are full this function is inhibited.	Acts as a spill containment system with a larger storage capacity at areas with a high risk, such as the fuel storage tanks and parking/refuelling area.
Maintenance	Intensive regular maintenance. Internal access to tanks is required, terminal operations are to cease during maintenance.	Periodic maintenance via vacuum tanks. No internal access is required; terminal operations can continue throughout maintenance, no contact with contaminants is experienced.
Water reuse	Reuse of clean water for irrigation, wash-down purposes and toilet facilities	Rainwater captured from the building roofs would be collected for reuse, such as toilet flushing. For the wash-down facilities the wastewater will be recycled.
Safety Risks	Closed trafficable first flush tank result working in confined spaces in close contact with contaminants creating a safety risk during maintenance. Terminal is required to cease operation due to safety risk.	Virtually no safety risks.
Saltmarsh	Same impact to saltmarsh.	Same impact to saltmarsh.

Table 3 | Comparison of stormwater treatment systems proposed for the Project

3.5 Addressing the Design requirements of the EIS

It is important that the environmental values of the receiving waters are recognised and considered in the design, construction and operation of the Project. Contaminants washed into the water as a result of the terminal can cause many impacts to the natural ecosystem. Physically, sediment interferes with the respiration, feeding and habitat of aquatic plants and animals. Chemically, nutrients and organic substances can accumulate in the sediments, leading to accelerated growth of aquatic plants, eutrophication and reduction of dissolved oxygen levels in the aquatic ecosystems.

As a result of these impacts there is a requirement for a stormwater system to be installed that is aimed at reducing environmental risk from contaminants carried in stormwater. The objective of the stormwater treatment is to minimise the impacts on the existing environment, particularly the receiving waters of Penrhyn Estuary and Botany Bay, from numerous pollutants through the containment and treatment of the initial stormwater that is believed to transport these contaminants.

There are several features required of the stormwater system set out in the Port Botany Expansion EIS included in the following table. Compliance with these requirements by the SQID system will ensure that this alternative will provide equal to or better stormwater quality than the originally proposed first flush system. The table below indicates that the SQID system complies with all of the requirements and has several advantages over the first flush system as previously detailed in section 3.2.

Item to comply with	How the SQID complies
The stormwater drainage system must cover the whole site (EIS requirements) and be composed of grated pits and trenches, pipes and outlets designed to efficiently collect rainfall from paved surfaces, buildings and other areas and transport it to safe discharge into Botany Bay or the Penrhyn Estuary (design development requirements).	The SQID will service the entire area leased by SICTL and will treat all stormwater prior to discharge in normal storm events.
The first 10mm of stormwater must be intercepted, held in storage for testing and treatment prior to discharge of clean water to Botany Bay and contaminants to sewer (EIS requirements).	The total annual pollutant load for the SQID will target 80% TSS removal, retain 98% of free oil and limit hydrocarbon concentrations to 10ppm
The system will have a dual purpose and act as a spill containment to prevent the discharge of any contaminated spillage of site from entering the surrounding waters.	The SQID system has the ability to act as a spill containment area in wet weather events as well as dry weather.
The site drainage will be designed in compliance with the following documents: • Consultancy Agreement dated 15/09/2010, including the Deed of Agreement for Lease (DAL), Sydney Ports Corporation • Sydney PBT3, Employer's Design Requirements • Port Botany Expansion – Environmental Impact Statement (EIS) • NSW Minister for Planning Conditions of Approval for Port Botany Expansion Project – Updated 13 July 2009	These documents have been referred to throughout the design development for the SQID.

Item to comply with	How the SQID complies
• Port Botany Development Code (PBDC), Sydney Ports Corporation, June 2009 • Green Port Guidelines. Sydney Ports Corporation, May 2006 • Applicable Australian Standards, in particular AS 3500, AS 3600, AS 3725 & AS 4058 • ARR87 Australian rainfall and runoff: A guide to flood estimation, Volumes 1 & 2. Revised edition 1998, published by Institution of Engineers Australia	
Stormwater system to ensure that the relevant EPA standards for discharge are met.	The SQID meets the Office of Environment and heritage requirements.
Stormwater system to be designed for at least a 20 year storm event.	A maximum sub-catchment size of 0.25 hectares has been adopted where a single drainage pit is provided in order to limit flow depth around the pit inlet to 100mm during the 20 year design storm.
Minimum design life for inaccessible stormwater elements (including beneath pavements and buildings) to be 100 years. Minimum design life for accessible elements to be 50 years.	This requirement is met by the SQID
Buried stormwater pipes to be at least 450 mm diameter	This is met by the stormwater system
Stormwater system to include provision for re-use as clean, treated water within the terminal (e.g. irrigation, wash-down and toilet flushing)	Rainwater captured from the building roofs would be collected for reuse, such as toilet flushing. For the wash-down facilities the wastewater will be recycled.
Stormwater management to include treatment of surface water runoff from potential pollutant areas by a wastewater treatment system with discharge of pollutants to sewer.	The SQID system captures and retains contaminants in the stormwater. Contaminants are not diverted to the sewer but rather retained in the system until a vacuum truck removes it.
The first flush from impervious areas is to be captured and treated to prevent pollutants from entering Botany Bay. Pollutants to be removed must include sediments, litter, rubbish, oils, greases and other hydrocarbons.	The SQID will treat all stormwater, not just the first flush. The SQID is efficient in removing TSS, oils, greases and hydrocarbons.
Minimum pavement gradient of 1.0%.	This is generally met by the pavement areas
Design shall provide for a 400mm sea level rise over 100 years as defined in AS4997.	The SQIDS does not require the use of tidal flaps and is thereby unaffected by the sea level.

Table 4 | Items with which the stormwater system must comply

4 Relevant Statutory Requirements and Approval Processes

4.1 Environment Protection & Biodiversity Conservation Act 1999 (Commonwealth)

The then Commonwealth Minister for the Environment and Heritage accredited the NSW environmental impact assessment process for the proposed Port Botany Expansion. The assessment was undertaken in accordance with provision of Part 4 of the Environmental Planning & Assessment Act 1979 (EP&A Act), with the single EIS for the project satisfying the assessment requirements of both the Commonwealth and NSW Legislation.

The modification provides an optimum environmental protection system for the port expansion project. The proposed modification applies to the SICTL lease area, as the stormwater quality improvement devices (SQIDs) are located towards the end of each drainage line discharging from the site.

As a result of the modification there will be an improvement to the water quality discharging into Penrhyn Estuary. The assessment demonstrates that the proposed modification would involve minimum environmental impact, as it will remain substantially the same development as that granted consent in October 2005 by the Minister for Planning.

This assessment demonstrates that the proposed modification would have no negative impact on shorebirds and other waterbirds, the saltmarsh communities on benthic organisms in Penrhyn Estuary. The modification would in fact provide improved environmental conditions compared with the previous proposal to install a first flush system.

There is no need to update the SPC Port Botany Expansion Penrhyn Estuary Habitat Enhancement (PEHE) Plan, because of this modification.

4.2 Protection of the Environment Operations Act 1997 (POEO Act)

The Protection of the Environment Operations Act 1997 (the POEO Act) establishes the NSW environmental regulatory framework and determines the need for an environment protection licence. The Office of Environment and Heritage have advised that no environment protection licence will be required for the operational discharge of the SQID system.

The contractor during construction will need to ensure that pollution of waters does not occur during the construction of the SQID system and meet the requirements of the POEO Act.

The modification would be a distinct advantage in safeguarding the ecology of the Estuary including migratory shorebirds, saltmarsh and seagrass habitat and benthic fauna. The ecology is addressed in greater depth in the SPC Penrhyn Estuary Habitat Enhancement Plan and the impacts assessed in a 7 part test.

4.3 Environmental Planning and Assessment Act

Section 75W of the EP&A Act, relating to 'Modifications involving minimal environmental impact', provides that:

The Port Botany Expansion now known as T3 is a State significant development to be assessed under section 75W of the Act, as the Transitional provisions in the EP&A Regulation clause 8J(8)(c) applies to T3. Section 75W of the Act applies to any modification of a development consent granted by the Minister under Part 4 of the EP&A Act (relating to a State significant development) under clause 89 of schedule 6 of the EP&A Act.

The NSW Department of Planning and Infrastructure was consulted as part of this modification assessment and their needs are described in subsequent sections of this report. The NSW Department of Planning and Infrastructure advised on 13th September 2011 that the modification would need to be undertaken under section 75W of the Act.

5 Consultation

Consultation regarding the stormwater system has been ongoing between Aurecon and SPC. During initial design development that proposed the use of stormwater quality improvement devices (SQIDS) instead of the nominated first flush system for stormwater treatment. The use of SQIDs would result in improved water treatment whilst also providing operational efficiency and safety on site. The proposed change to the nominated first flush system has been accepted by SPC.

The following stakeholder consultation was undertaken for this modification application.

5.1 NSW Department of Planning and Infrastructure

Aurecon, on behalf of SPC and SICTL, has commenced discussions with the NSW Department of Planning and Infrastructure to explore the opportunity to install SQIDs as an alternative to the first flush system.

Summary of Concerns Raised	How the concerns have been addressed
NSW Department of Planning and Infrastructure	
Department of Planning and Infrastructure advised that a modification would be required for the alternative to the first flush system. The Department considers that the proposed changes are not consistent with the development consent and would require consideration as part of a formal modification request in accordance with Section 75W of the Environmental Planning and Assessment Act 1979. Specific issues to be addressed include: • Reasons for change • Potential operational and environmental impacts, including but not limited to the potential improvements to water quality The whole site area should be addressed, including how the stormwater management systems of each lease area will operate and meet appropriate environmental standards.	This modification has been prepared to address the Department of Planning and Infrastructure request. Section 3.3 SPC site area adopts the first flush system from the original EIS. Section 3.4 Need for the Modification addresses both the reasons for the change and the potential impacts. Section 6 Provides the environmental assessment for the modification.

Table 5 | DoPI Consultation Summary

5.2 NSW Office of Environment and Heritage

On the 8th August 2011, the Office of Environment and Heritage confirmed that they are focussed on achieving the best environmental outcomes and as such have no concerns relating the use of the Aquaceptor SQID with the anticipation of achieving better stormwater quality outcomes.

Summary of Concerns Raised	How the concerns have been addressed
NSW Office of Environment and Heritage (8 August 2011)	
OEH has no concerns regarding the proposed SQIDs	Correspondence with the Office of Environment and Heritage has confirmed that they are focussed on achieving the best environmental outcomes and as such have no concerns relating to the use of the SQID system instead of the first flush system.

Table 6 | OEH Consultation Summary

5.3 Department of Sustainability, Environment, Water, Population and Communities

Summary of Concerns Raised	How the concerns have been addressed
Department of Sustainability, Environment, Water, Population and Communities	
Department of Sustainability, Environment, Water, Population and Communities reviewed the modification and provided a response on 8th February 2012 and advised that the modification to the stormwater first flush system does not necessitate any variations to the conditions of approval for the Port Botany Expansion under the Environment Protection and Biodiversity Conservation Act 1999 (EPBC 2002/543).	This modification does not change the PEHEP and as such an update of the PEHEP is not required. Further, Condition 6 of the Department's approval requires the PEHEPP to be reviewed and resubmitted to the Minister for approval every 5 years or as otherwise agreed by the Minister. The first review is therefore required by Sydney Ports on March 2012. Sydney Ports would incorporate this modification as part of the first review.

Table 7 | DSEWPC Consultation Summary

5.4 Department of Primary Industries

Summary of Concerns Raised	How the concerns have been addressed
Department of Primary Industries	
The DPI-Fisheries commends the use of the SQID system as they are used by the majority of local councils in the area and would complement this effort to maintain water quality. Additionally DPI-Fisheries recognise that SQID systems produce significantly better water quality outcomes than first flush systems.	Correspondence with the Department of Primary Industries has confirmed that they are focussed on achieving the best environmental outcomes and as such have no concerns relating to the use of a SQID system instead of the first flush system.

Table 8 | DPI-Fisheries Consultation Summary

5.5 NSW Maritime

Summary of Concerns Raised	How the concerns have been addressed
NSW Maritime	
NSW raise no objections regarding the proposed SQIDs	There are no specific concerns to address as part of this consultation

Table 9 | NSW Maritime

5.6 Community Consultative Committee

In addition to the above stakeholders identified by the NSW Department of Planning and Infrastructure, the proponent also notified the Community Consultative Committee (CCC). The results of this consultation is summarised below.

Summary of Concerns Raised	How the concerns have been addressed
Community Consultative Committee (CCC) (23 August, 2011)	
A presentation was provided to the CCC about the modification and they will be provided with a copy plus an opportunity to raise any issues on the modification.	Any comments raised in the future by the CCC will be adequately addressed.

Table 10 | Summary of response received from Community Consultative Committee

6 Environmental Assessment

6.1 Existing Environment

Located in Port Botany, within the Botany Bay City Council area, the construction of the Port Botany Expansion land reclamation was completed in August 2011. The next stage of the Port Botany Expansion known as the T3 will commence in 2012 on reclaimed land and connects with the existing terminal 'Brotherson Dock' along its western side. The Sydney Kingsford Smith Airport is located approximately one kilometre to the west of T3.

6.2 Environmental Impacts of the Proposal

Impacts that may occur as a result of this modification have been considered early in the design phase and mitigation measures have been implemented where possible. It is expected that this modification will result in fewer impacts during the operational phase of the Project given the expected improved water quality of stormwater draining into the Bay.

6.2.2 Hydrology and Water Quality Impacts

Current Hydrology and Water Quality Environment

The EIS considered the existing water quality of Botany Bay and Penrhyn Estuary during which four catchments were identified draining to the north eastern portion of Botany Bay, between Sydney Airport and the existing port. These catchments and the areas they cover are as follows:

- Mill Pond – 1,773ha
- Springvale – 241ha
- Floodvale – 118ha
- Foreshore Beach – 339ha

These catchments cover a total area of 24.7km^2 and incorporate vast areas of the suburbs of Botany, Mascot, Banksmeadow, Daceyville, Eastlakes, Pagewood, Maroubra Junction, Kingsford, Randwick, Kensington, Bondi Junction, Waverley, Paddington and Centennial Park as shown in the map below. These areas are highly urbanised, containing a mix of residential and industrial uses and supporting a major road network with high traffic volumes. Due to the nature of development in this area, these catchments are the major source of stormwater and pollutants that impact on the water quality of Botany Bay and surrounding waters.

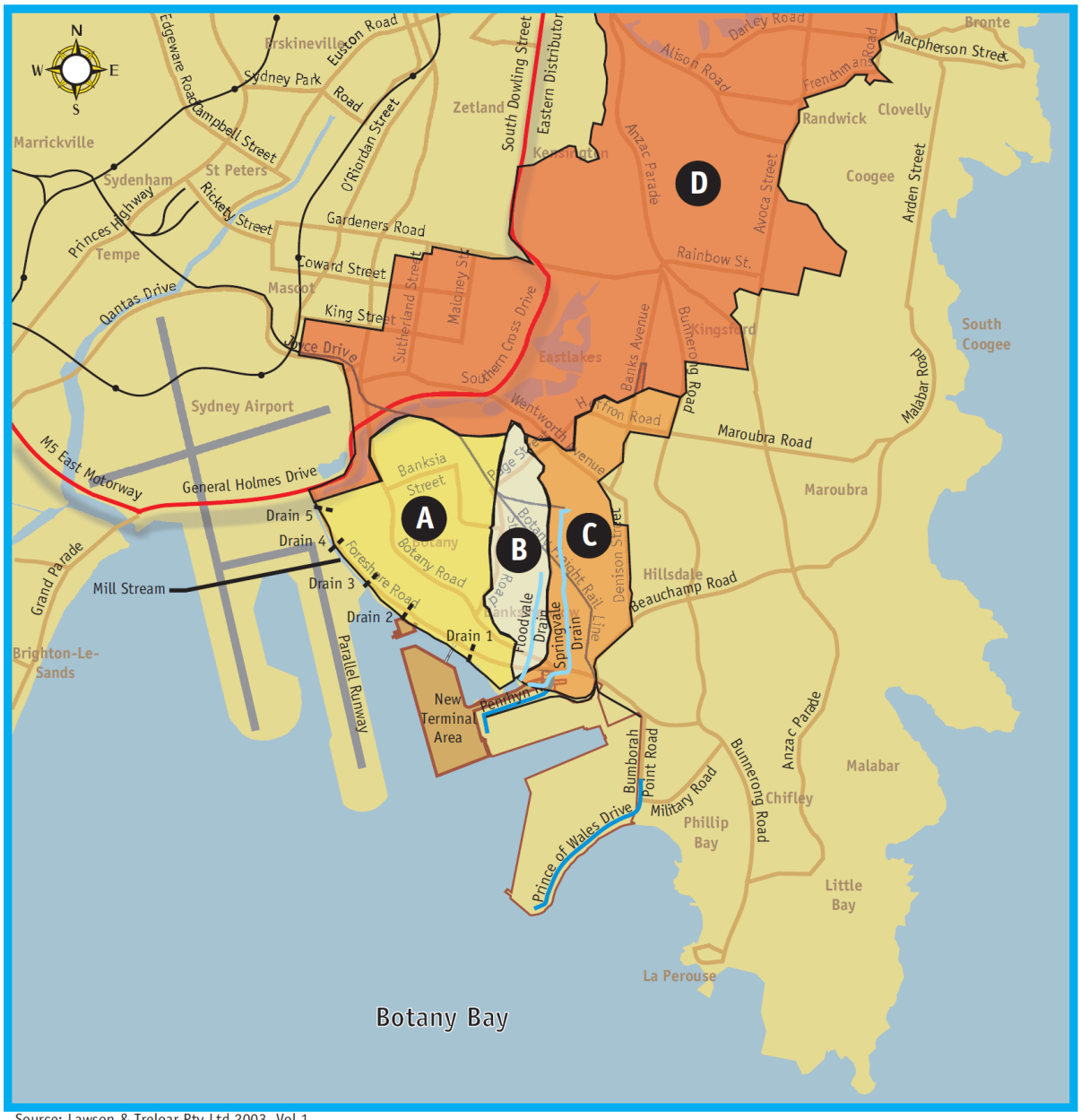

Figure 5 | Catchments draining to Port Botany (Source: Port Botany Expansion EIS 2003)

The Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan has identified that Springvale and Floodvale Drains have the most significant stormwater impact as they input stormwater from large catchments, 241 ha and 118 ha respectively. The table below has been extracted from section 2.2.7 Stormwater Drainage of the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan.

Stormwater Source/Entry Point	Status	Stormwater Treatment	
		Current	Post Development
Springvale Drain	Existing	No treatment	No change
Floodvale Drain	Existing	Trash Rack McPherson St	No change*
New operational land along southern edge of Estuary	Existing land for boat ramp access and parking	None. Overland flow into Estuary	First flush collected and treated. Overflows, beyond the first flush, will discharge to Estuary.
Foreshore Road	Existing	Existing Infiltration, with overland flow into Estuary	No change
Patrick's Terminal	Existing. Seven pipes enter southern side of Estuary	Stormtec system	No change to level of stormwater treatment.
New Terminal	New	n/a	First flush collected and treated. Overflows, beyond the first flush, will discharge to Estuary.
Foreshore Beach catchment discharging via pipe into Estuary channel	Existing. Two discharge points enter the northern side of channel	None	No change

* Contingency installation of stormwater quality improvement device if shown to be required by water quality monitoring

Table 11 | Stormwater sources and treatment

Sydney Ports have provided updated water quality results in the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan. These results were obtained between December 2003 and October 2004 during a water quality monitoring programme to better characterise wet weather catchment inputs and dry weather receiving water quality. A copy of this water quality information follows:

> *Automatic samplers were installed in Floodvale and Springvale Drains, upstream of the tidal limit, to collect samples from the Drains during storm events. Samples were taken from the rising limb, peak and falling limb of each event and continuous water level data was recorded. Approximately six to eight wet weather events were sampled in each Drain.*
>
> *The Total Nitrogen (TN) and Total Phosphorus (TP) wet weather loads for the sampled events were found to be significantly higher than the loads estimated during the EIS investigations. The increase in annual TN and TP loads was calculated to be approximately 65% and 10% respectively.*
>
> *In addition, monthly dry weather water quality sampling was conducted in Penrhyn Estuary, along Foreshore Beach and in the area between the Parallel Runway and the existing port. Eights sites were sampled at low and high tide.*

The collected data identified that:

- *In the inner Estuary the median concentrations of TP and TN exceed the ANZECC trigger value for ecological protection. The TP guideline is exceeded for 80% of the samples and TN in over 90% of samples.*
- *In the outer Estuary, the median TP and TN concentrations meet the ANZECC (2000) trigger values although there are individual sampling times when the guideline is exceeded at these locations.*
- *The TN concentration, representative of ambient concentrations in Botany Bay, used in the EIS of 0.08mg/l remains appropriate.*
- *The TP concentration representative of ambient concentrations in Botany Bay, may be higher than that used in the EIS, 0.02mg/l instead of 0.01mg/l.*

The Appendix K Flushing Protocol for the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan was prepared in response to the Conditions of Approval for Stage 2 of Port Botany Expansion, issued on 22 August 2006 by the NSW Department of Planning (DoP 2006). It also met the requirements of Condition B2.30 of the Stage 1 approval, relating to achievement of predicted water quality outcomes in Penrhyn Estuary (DoP 2005). The report compared concentrations from catchment flows (Floodvale and Springvale Drains) into Penrhyn Estuary. A sensitivity analysis was undertaken on the basis of the quality of groundwater that will continue to discharge into Penrhyn Estuary following the Orica groundwater clean-up project. The first flush system from the Port Botany Expansion was not included in the predictions for the pollutant loading to the estuary.

Assessment of Hydrology and Water Quality Impacts

The T3 covers an area of approximately 46 hectares, is nominally flat and, apart from minor landscaping along the rock wall adjacent to Penrhyn Estuary, will be fully paved resulting in a high stormwater runoff. Peak discharge from high intensity short duration (5 minute) storms would be in the order of 35 m^3/s for a 20-year ARI storm to 45 m^3/s for a 50-year ARI storm, with intensities of about 210 mm/hr and 269 mm/hr respectively.

The levels of pollutants present on site would depend on how well plant and equipment is maintained and the level of operation. In addition, higher levels of pollutants could accumulate due to long periods between rain events. It is expected that concentrations of hydrocarbons would be between 0.1 to 3.0 mg/L and concentrations of suspended solids would be between 5 and 100 mg/L in the first flush. Discharge of contaminated water offsite could result from incidents during operations at the new terminal, including:

- Suspended solids from the site;
- chemical spills (from damage to containers or loss of containment);
- fuel or oil leaks or spills from port equipment;
- spill or leak from onsite diesel aboveground storage tank; and
- firewater runoff.

The efficiency of the SQIDs for the total annual pollutant load would be targeted at a minimum 80% TSS removal compared to 64% for the first flush system. Additionally, the SQID system has a high performance of hydrocarbon removal with results in the order of 98% for free floating oil and better than 90% during rainfall events with concentrations greater than 10 ppm. The Aquaceptor has been proven to retain 98% of the free (floating) oil concentration and has been shown under field conditions to achieve 99.6% removal and limit outlet hydrocarbon concentrations to 10ppm (depending on input concentrations) during rainfall events. The SPEL Stormceptor is able to achieve similar results to the Aquaceptor and can be more efficient at removing hydrocarbon concentrations.

In 85% of all storm events, the SQID system is capable of handling the volume of stormwater, however, for a small portion of the time, the SQID may use a bypass system in order to better handle flows and ensure that trapped sediments do not escape. During infrequent peak stormwater flows will pass over the diverting weir and continue through the by-pass chamber into the downstream stormwater system. This will only occur in less than 15% of all storm events. Only the excess amount of water will travel through the bypass system, thus ensuring that the majority of stormwater is still treated prior to discharge in these situations. The SQID also has back up pumps and level monitors connected to the control room.

The SQID system has been developed to capture contaminants whilst allowing water flow to continue unimpeded. The environmental impacts related to this stormwater system are minimal, with all stormwater channelled to the SQID for stormwater quality treatment. There are no proposed changes to the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan, as there are no changes to the nutrient loads from the T3 catchment. The SQID will result in improved water quality discharging into the Penrhyn Estuary.

Stormwater Source/Entry Point	Status	Stormwater Treatment	
		Current	Post Development
Springvale Drain	Existing	No treatment	No change
Floodvale Drain	Existing	Trash Rack McPherson St	No change*
New operational land along southern edge of Estuary	Existing land for boat ramp access and parking	None. Overland flow into Estuary	SQID to treat all flows from T3, resulting in an improvement in the stormwater quality discharging into the estuary.
Foreshore Road	Existing	Existing Infiltration, with overland flow into Estuary	No change
Patrick's Terminal	Existing. Seven pipes enter southern side of Estuary	Stormtec system	No change to level of stormwater treatment.
New Terminal knows as T3	New	n/a	SQID to treat all flows from T3, resulting in an improvement in the stormwater quality discharging into the estuary.
Foreshore Beach catchment discharging via pipe into Estuary channel	Existing. Two discharge points enter the northern side of channel	None	No change

* Contingency installation of stormwater quality improvement device if shown to be required by water quality monitoring

Table 12 | Stormwater sources and treatment

6.2.3 Ecology

Current Ecology Environment

Penrhyn Estuary is an important site for 16 species of migratory shorebirds, and six species of non-migratory shorebirds including six species listed as Threatened under the TSC Act. In addition one species of migratory tern that is listed as threatened (Little Tern) also occurs at the site.

The estuary consists of a sensitive environment of saltmarsh, seagrass, inter-tidal and three roosting islands. The Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan design features allowed for existing and proposed stormwater outlets and drainage corridor detailed in the table below. The figure below details the areas of habitat that were approved in the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan.

Habitat type	Design levels (LAT)	Existing habitat area (ha)	Habitat area lost (ha)	New habitat area (ha)	Total habitat area (ha)
Saltmarsh	1.4 to 2.0m	1.4	0.4	2.4	3.4
Seagrass	-1.0 - 2.0m	1.1*	0.9	6.3	6.5
Inter-tidal	0.3 to 1.4m	3.4	1.7 to be reshaped	10.4	13.8
Roosting Islands (3)	2.0m	0	0	0.2	0.2

*There is an additional existing area of 3.6 ha of seagrass outside the Estuary, to the west of the new boat ramp.

Table 13 | Design features of the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan

Figure 6 | Penrhyn Estuary Management Plan diagram

SPC constructed all the habitat types detailed in the table below. Additional saltmarsh was provided during the construction works of the saltmarsh, as the saltmarsh habitat was constructed to the toe of the rock armour in the drainage corridor plus there were some additional saltmarsh habitat provided in other areas of the estuary. The as built drawings details of habitat constructed are provided in the table below.

Habitat type	Design levels (LAT)	Total habitat area (ha)
Saltmarsh	1.4 to 2.0m	4.082
Seagrass	-1.0 - 2.0m	6.5
Inter-tidal	0.3 to 1.4m	12
Roosting Islands (3)	2.0m	0.2

Table 14 | As Built Drawing features of the Port Botany Expansion Penrhyn Estuary Habitat

Assessment of Ecology Impacts

This assessment considers the changes to water quality on shorebirds using Penrhyn Estuary, the saltmarsh community and the intertidal flats habitat within the Estuary. No marine species or mammals are assessed because no habitat exists on Terminal 3.

Figure 7 | Penrhyn Estuary Management Plan exclusion zones

All works will be undertaken as per the Port Botany Penrhyn Estuary Habitat Enhancement Plan to prevent impacting on the habitats of shorebirds as shown in the plan. The seasonal exclusion zone limits the majority of works within the zone to the period between 31 March and 1 August when most

migratory shorebirds are on migration or at their northern hemisphere breeding grounds. Both intertidal flats habitat removal and saltmarsh removal for the drainage corridor will occur during the seasonal exclusion zone.

An assessment of ten species of birds, listed as Threatened under the TSC Act, are included here. These are Black-tailed Godwit, Terek Sandpiper, Great Knot, Sanderling, Broad-billed Sandpiper, Lesser Sand Plover, Pied Oystercatcher, Sooty Oystercatcher and Little Tern. All except Black-tailed Godwit and Broad-billed Sandpiper have been observed at Penrhyn Estuary within the past ten years. The results of the 7-part test for each of these species are summarised below.

Black-tailed Godwit Limosa limosa

The Black-tailed Godwit is associated with tidal mudflats or inland wetlands. There are very few records of this species in Botany Bay. However, using the precautionary principle it should be considered possible for the species to occur there based on records in similar habitat in other parts of coastal NSW and past rare sightings in Botany Bay.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Black-tailed Godwit in vicinity of Port Botany.

Terek Sandpiper

The Terek Sandpiper is associated with tidal mudflats of the central to northern coasts of Australia down as far as Sydney on the east coast. Numbers decline further south in NSW and few birds are recorded south of Sydney. Numbers have declined in recent years in Botany Bay. At Penrhyn Estuary a single sighting of one bird was made during the study.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Terek Sandpiper in vicinity of Port Botany.

Great Knot

The Great Knot is associated with tidal mudflats of the central to northern coasts of Australia down as far as Sydney on the east coast. Numbers decline further south and few birds are recorded south of Sydney. Numbers have declined in recent years in Botany Bay with one or two birds recorded most years. At Penrhyn Estuary a single sighting of one bird was made during the study.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Great Knot in vicinity of Port Botany.

Sanderling

The Sanderling is associated with tidal mudflats and especially ocean beaches along the coast of Australia. Usually occur in small numbers at sites along the NSW coast. They occur in Botany Bay, usually at Penrhyn Estuary with records of up to three birds for short periods most years.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Sanderling in vicinity of Port Botany.

Broad-billed Sandpiper

The Broad-billed Sandpiper is associated with the coasts of Australia generally, but very scarce and irregular. No recent records in Botany Bay. However, using the precautionary principle it should be considered likely for the species to occur there based on previous records. Predicted key impacts from the proposal on this species comprise marginal changes to feeding but no changes to roosting habitat.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Broad-billed Sandpiper in vicinity of Port Botany.

Lesser Sand Plover

The Lesser Sand Plover is associated with tidal mudflats of the coasts of Australia but more numerous in central and northern coasts. This species used to be a relatively common bird in Sydney but is now a rare visitor, usually single birds. Up to eight birds were observed at Penrhyn Estuary and two birds at Quibray Bay during the construction phase of the PEHE Shorebird Monitoring Program, the first observations in Botany Bay for many years.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Lesser Sand Plover in vicinity of Port Botany.

Pied Oystercatcher

The Pied Oystercatcher is associated with tidal mudflats of Australia including Botany Bay. Numbers have increased in recent years in the Bay. However the species has recently been listed as Endangered in NSW, previously listed as Vulnerable. Prior works associated with the PEHE Project the Pied Oyster was rarely observed in the Estuary. However the Pied Oystercatcher has been observed on a regular basis since the commencement of the Port Expansion and has commenced nesting in the Estuary.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Pied Oystercatcher in vicinity of Port Botany.

Sooty Oystercatcher

The Sooty Oystercatcher is listed as part of the Taren Point Endangered Ecological Community and is also listed as a threatened species under the TSC Act.

The Sooty Oystercatcher is associated with rocky coasts and occasionally tidal round Australia. Commonly recorded at Boat Harbour, on the ocean side of Kurnell, it is rarely observed inside Botany. Observed at Penrhyn Estuary during the pre-construction monitoring period of the PEHE 2006-2008.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Sooty Oystercatcher in vicinity of Port Botany.

Little Tern

The Little Tern is listed as Endangered under the TSC Act. The Little Tern breeds in Botany Bay as well as having a non-breeding population. They are frequently observed at Penrhyn Estuary in small numbers throughout the PEHE Monitoring Project, occasionally nesting within the Estuary.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Little Tern in vicinity of Port Botany.

Conclusion for Birds

Predicted key impacts from the proposed changes on all of these species comprise potential marginal changes to the water quality of stormwater draining from the surface area of Sydney Port Botany Expansion Container Terminal (T3) in that there will be an improvement in the water quality.

The result of the development is not likely to have an adverse effect on the life cycle of any of these bird species such that a viable local population is likely to be placed at risk of extinction.

Coastal Saltmarsh in the NSW Coast – South East Corner Bioregion

Coastal Saltmarsh in Botany Bay is an Endangered Ecological Community that occurs in the intertidal zone on the shores of estuaries and lagoons that are permanently or intermittently open to the sea (DEC 2005). Characteristic plants include Baumea juncea, Juncus krausii, Sarcocornia quinqueflora, Sporobolus virginucus, Triglochin striata, Isolepis nodosa, Samolus repens, Selliera radicans, Suaeda

australis and Zoysia macrantha (DEC 2005). Occasionally mangroves are scattered through the saltmarsh.

The extent of saltmarsh at Penrhyn Estuary has been greatly enlarged as a result of the Penrhyn Estuary Habitat Enhancement Project. However saltmarsh habitat constructed to the toe of the rock armour in the drainage corridor will be impacted as the drainage corridor is required to allow the stormwater outlets to drain to prevent flooding of the project site. The table below details that approximately 0.168ha of saltmarsh only will be impacted from either the first flush stormwater system or the SQID to allow construction of the drainage corridor and the stormwater outlets, including rip rap to prevent erosion in the floor of the saltmarsh.

Habitat type	Design levels (LAT)	Existing habitat area (ha)	Habitat area lost (ha)	Total habitat area (ha)
Saltmarsh	1.4 to 2.0m	3.868*	0.168	3.72
Seagrass	-1.0 - 2.0m	6.5		6.5
Inter-tidal	0.3 to 1.4m	11.93	0.11	11.82
Roosting Islands (3)	2.0m	0.2		0.2

Note: The actual amount of existing habitat area is 3.868ha only, as 0.214ha of saltmarsh did not grow, so the total area of saltmarsh is less than shown in Table 14 as built drawings. The existing area of saltmarsh was confirmed by site inspection undertaken with avian ecologist on 20th January 2012.

Table 15 | Modification to the Port Botany Expansion Penrhyn Estuary Habitat

The floor of the coastal saltmarsh was constructed at higher levels than the original EIS. The stormwater outlets have been raised as much as possible to reduce the impact on the saltmarsh, resulting in low grades for the drainage system on the project site.

The amount of Coastal Saltmarsh habitat lost will be less than ten percent of existing habitat area from either the planned stormwater first flush system or the modification of the first flush stormwater system the SQID to allow construction of the drainage corridor and the stormwater outlets, including rip rap to prevent erosion in the floor of the saltmarsh.

There is not likely to be an adverse effect on the extent of the Coastal Saltmarsh community or its composition. To ensure the integrity of the saltmarsh community and prevent unconsolidated erosion and dislodgement of the saltmash plants, rip rap drainage rock needs to be installed immediately adjacent to the stormwater outlets and to convey stormwater to the drainage corridor. A small amount of saltmarsh installed as part of the initial Estuary enhancement works will be removed (0.168ha). However the integrity of the expanded saltmarsh community established as part of the Estuary enhancement works will not be impacted. The need for the rock rip rap drains was considered and allowed for in the Penrhyn Estuary Enhancement Plan. On this basis, the proposed development is not likely to place the Coastal Saltmarsh community at risk of extinction.

The stormwater first flush system or its modification to improve water quality is not listed as a key threatening process or is likely to increase the impact of any other key threatening processes. Alteration to the natural flow regimes of rivers, streams, floodplains and wetlands is listed as a key threatening process.

Based on the investigation, we do not consider it necessary to conduct further impact assessment on the impacts of the proposed development on the Coastal Saltmarsh in the Botany Bay ecological community.

As concluded in the 7-part test conducted for each of the species, the proposed modification for the stormwater system will result in minimal disturbance to the Penrhyn Estuary. There are no changes proposed to the SPC Penrhyn Estuary Habitat Enhancement Plan.

6.2.4 Other Impact Considerations

Safety

The SQIDs are cleaned out by a waste disposal contractor using vacuum trucks. Normally no entry into the unit is required for maintenance, avoiding the need for confined space entry. There is no handling of the captured contaminants, thereby further reducing the risk to the environment and personnel. Clean-out typically occurs on a yearly basis, however they would be inspected regularly, particularly after heavy storm events. Terminal activities can continue during maintenance due to the lower level of risk presented by the SQID.

Indirect Impacts

There are no indirect impacts as a result of this system. After manufacture, this product does not produce any wastes or by-products nor leach into the water. No additional infrastructure associated with the stormwater treatment is required. No pumping, pipelines, power supply or treatment plant is required with the SQID as all pollutants are collected and contained within the unit.

No power is required in the operation of the SQID thereby ensuring that this product does not further contribute to the greenhouse gas emissions through electricity generation.

Risk of Spills

The Aquaceptor system is a proven spill control device for industrial properties, refuelling areas and gas/petroleum facilities. The design can be specifically tailored to take into consideration the actual specific gravity of the primary spill of concern.

The SQID system would target areas of high risk regarding spill containment in order to efficiently provide this dual function. All storage tanks would be able to contain accidental spills. The greatest contamination risk at the fuel station is from fuel spillage when a tanker truck is filling the storage tanks. To contain such spillage, the truck fill area will be bunded and the drainage outlet fitted with a shut-off valve to be closed whenever filling takes place. The drainage outlet pit within the truck fill area will be constructed as a flame trap with a submerged inlet to the drainage line.

A separate bunded area will be provided to stack liquid and powder containers with appropriate bunding, shut off valves and SQIDs with the 20kL storage.

To provide greater security against hydrocarbon spillage it is proposed that the SPEL stormceptor be installed to treat total petroleum hydrocarbons on the drainage line from this area.

The parking / refuel area is located at the end of the rail stabling lines, on the southern side. It is arranged to provide four parking bays for reach stackers and empty box handlers. Refuelling of these vehicles will be carried out while parked using a small fuel truck. To account for any spillage in this area during refuelling it is proposed that a high efficiency SQID the SPEL stormceptor would be installed on the drainage line from this area.

The proposed SQID system is capable of retaining hydrocarbons during both dry weather emergency spills and wet weather rainfall events with the ability to be configured to capture up to 60,000 litres of petroleum products from emergency spill events.

As required by the Ministers Condition of Approval no. 2.20 SICTL will prepare an Emergency Response and Incident Management Plan prior to operation. Management procedures will be incorporated into the operating procedures to deal with spills within the bunded areas as well as locations outside the bunded areas such as rail loading areas. Additionally procedures will incorporate on how to deal with fire fighting material.

Inflatable bungs ' pollu-plug stopper' will also be provided to close off the stormwater lines at the downstream end in case of an emergency (details of the bungs, its locations, how and where it will be fitted within the stormwater lines are shown in Appendix B and E). The pollu-plug stopper has been designed to remain permanently inside pipes without disturbing the natural flow of the water. In the event of accidental pollution the stopper will be inflated. Made from elastomer-coated fabric which is hot vulcanized in an autoclave, the inflated device takes on the shape of the pipe blocking water flow. The device can be triggered manually from the surface.

Spill and fire management procedures	Outline of procedure
The Handling and Transport of Dangerous Cargoes in Port Areas	This procedure will address the following issues: • what is considered a dangerous or prohibited good • time periods permitted for dangerous goods to remain on a terminal • threshold quantities • how to lodge/notify Sydney Ports of dangerous goods.
Spill Management Containment Area - Spillage Intercept Trench	This procedure with address the following issues: • the operation of the spill management containment area • the maintenance of the spill management containment area
POLLU-PLUG The Anti-Pollution Stopper	This procedure with address the following issues: • Pollu-plug Installation • control box installation • operation of the manual inflation box; wire remote control box; and GSM remote control box • maintenance
Working in Confined Spaces	This procedure with address the following issues: • what is a confined space • who has health and safety duties in relation to a confined space • what is required in managing risks • how to determine whether a space is a confined space • responsibilities and roles • how to identify hazards • how to assess and control the risks • emergency procedures • how to review control measures
Accident Reporting and Investigation	This procedure with address the following issues: • relevant regulatory instruments • operator responsibilities

Spill and fire management procedures	Outline of procedure
	• notification of major accidents • investigation of major accidents and near misses • recommendations and corrective actions
Training and Education	This procedure with address the following issues: • training and education program • development of a training and education program • implementation of the training and education program
Safety Assurance	This procedure with address the following issues: • the safety assurance system • development and implementation of a safety assurance system
Hazard Identification, Risk Assessment and Risk Control	This procedure with address the following issues: • relevant regulatory instruments • planning and preparation • hazard identification • risk analysis • control measures • risk assessment and communication
Interface with Stakeholders	This procedure with address the following issues: • management of key stakeholders • interface with ARTC, Fire & Rescue NSW and SPC

Table 16 | Spill and fire management procedures

Maintenance

Periodic maintenance is required to ensure that sediment traps do not become blocked. Maintenance is simple for both the Aquaceptor and SPEL Stormceptor and is conducted via a vacuum tanker sucking up the trapped pollutants. Entry into the system is not required, thereby minimising a large safety issue. Additionally, maintenance can occur whilst the terminal is in operation.

Generally maintenance is only required annually, however the frequency of maintenance may need to be increased or reduced based on local conditions. Once the site has been stabilised the Aquaceptor maintenance may only be needed once every two or three years. If there is a spill the Aquaceptor will need to be cleaned immediately after a spill occurs by a licensed waste management facility.

The SPEL Stormceptor maintenance is shown in the figure below.

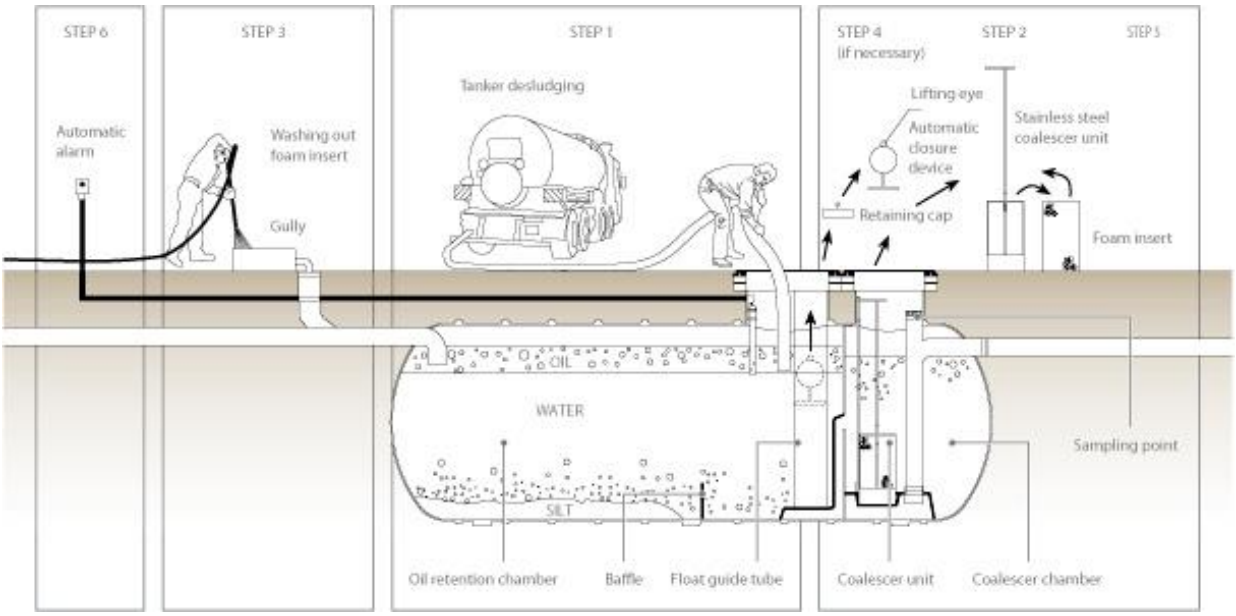

Figure 8 | Maintenance of a SPEL Stormceptor (copyright SPEL Environmental)

7 Conclusion and Recommendation

It is considered that this proposed Section 75W modification would result in substantially the same development as the approved development and would be of minimal environmental impact.

It is also considered that approval of the proposal would result in improved environmental outcomes for the site with:

- Improved flow and water quality discharging into the estuary;
- No changes to the Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan for the construction of the SQID; and
- Improved safety and reduction of risks for the maintenance of the SQID.

The NSW Department of Planning and Infrastructure and all other relevant stakeholders have been consulted in the preparation of this modification application. Copies of all stakeholder correspondence have been provided in Appendix A and a summary of any issues raised and the proponent's responses has been provided in Section 5.

It is recommended, therefore, that the proposed Section 75W modification application be supported.

8 References

Aurecon 2011 (1), Package 4.1 Water Design Criteria Report, Report Reference: 201467-C-REPT-101, Aurecon, Neutral Bay.

Aurecon 2011 (2), Package 5.1 – Drainage Concept Design Report, Report Reference: 201467-C-REPT-101, Aurecon, Neutral Bay.

Humes Water Solutions 2007, *Hume*ceptor™ *Hydrodynamic Separator Hydrocarbons and Fine Sediment*, Humes, Qld.

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The Office of Environment and Heritage 2011, *Stormwater first flush pollution*, NSW Government, accessed on 4 July 2011, <http://www.environment.nsw.gov.au/mao/stormwater.htm>.

Sydney Ports, Port Botany Expansion Penrhyn Estuary Habitat Enhancement Plan