SYDNEY PORTS
FIRST PORT, FUTURE PORT

SPC Ref: OG-13043

11 April 2013

Mrs Felicity Greenway
A/Director
Major Infrastructure Assessment
NSW Department of Planning & Infrastructure
GPO Box 39
SYDNEY NSW 2001

Dear Felicity,

Re Port Botany Expansion (PBE) Terminal Operations Infrastructure Cumulative Construction Traffic (Changes to Maximum Daily Truck Numbers) Addition to Project Modification Application No. 14

I refer to a telephone discussion on 10 April 2013 with Ms Ingrid Illias - Department Planning & Infrastructure (DPI) and the Sydney Port Corporation (Sydney Ports) letter dated 2 April 2013 (OG-13041) submitting construction management documentation for the Director General's approval.

The construction management documentation issued for approval included a Construction Traffic Management Plan and a supporting traffic impact assessment demonstrating that the cumulative construction traffic numbers (145 trucks / day) for both the Patrick and Sydney Container Terminal Limited (SICTL) construction works will have no notable impact on the operation of the road network. While Sydney Ports Corporation (SPC) does not consider a project modification is required for the increased maximum daily truck numbers (103 – 145 / day) it is referring the construction traffic increase for modification approval at the request of the DPI.

Supporting the increase in the maximum daily truck traffic numbers is a traffic impact assessment report titled: *Port Botany Expansion Cumulative Traffic Impact Assessment – Terminal Operations Infrastructure (March 2013 – March 2014) dated April 2013 Ref. No. T2-777 prepared by Parking & Traffic Consultants.*

The proposed increase to the cumulative maximum daily construction truck numbers has resulted from an acceleration in the SICTL construction work program requiring an increase to the number of truck deliveries for certain periods during 2013 and Patrick preparing to start construction activities in April 2013. The resulting cumulative construction traffic generated may exceed the assumed maximum daily truck deliveries stated in the original project Environmental Impact Statement.

Both the Roads & Maritime Services and Botany City Council were consulted during the preparation and final review of the traffic Impact assessment and both organisations have indicated there are no issues with the potential increase (see email correspondence attached to the report).

SYDNEY PORTS CORPORATION
ABN 95 784 452 933
L4, 20 Windmill Street, Walsh Bay NSW 2000 Australia
PO Box 25, Millers Point NSW 2000 Australia
T +61 2 9296 4999
F +61 2 9296 4742
www.sydneyports.com.au

SYDNEY PORTS
FIRST PORT, FUTURE PORT

Please do not hesitate to contact the undersigned (9237 5793) should you require any further information.

Yours sincerely,

Paul Jerogin

Att.

SYDNEY PORTS CORPORATION
ABN 95 784 452 933

L4, 20 Windmill Street, Walsh Bay NSW 2000 Australia
PO Box 25, Millers Point NSW 2000 Australia

T: +61 2 9296 4999
F: +61 2 9296 4742

www.sydneyports.com.au

PARKING & TRAFFIC
CONSULTANTS

Driving success through valuable advice

Client

Patrick and
Sydney International Container Terminal Limited

Project

Port Botany Expansion
Cumulative Construction Traffic Impact Assessment
Terminal Operations Infrastructure (March 2013 – March 2014)

(Ref. No. T2-777)

PATRICK

HPH

Date
April 2013

Contact
Andrew Morse
02-99681844
0414 618002
andrew.morse@parkingconsultants.com

TABLE OF CONTENTS

Attachments:

Attachment 1 - EIS, Section 8.7.1
Attachment 2 - EIS, Figure 8.8
Attachment 3 - EIS, Section 8.7.7
Attachment 4 - EIS, Figure 8.13
Attachment 5 - EIS, Section 21.6.1
Attachment 6 - EIS, Table 21.5
Attachment 7 - EIS, Section 8.6.4
Attachment 8 - EIS, Table 8.1
Attachment 9 - EIS, Section 21.7.1

1 Introduction

On 13 October 2005 the Minister for Planning granted consent to Sydney Ports Corporation for the development (DA-494-11-2003i) of "the construction and operation of a new container terminal and associated infrastructure" at Port Botany, referred to as the Port Botany Expansion (PBE). The development was accompanied by an Environmental Impact Statement (EIS) that contained, amongst other matters, an assessment of the impact of construction traffic on the local road system.

With respect to the construction works of the PBE project, the following stages can be distinguished:

1. The construction of the terminal footprint infrastructure; comprising dredged fill, counterfort walls and rock embankment to reclaim land for the new terminal. These works were commissioned by Sydney Ports Corporation (Sydney Ports) between mid 2008 and June 2011; and,

2. The construction of the terminal operations infrastructure; comprising buildings, concrete pavements and installation of services and equipment. These works are commissioned by the operators Patrick and Sydney International Container Terminal Limited (SICTL). The works commenced in September 2012 and are forecast to be completed in March 2014.

The EIS sets out certain assumptions in relation to the number of construction truck deliveries expected during the PBE works and the timing of the PBE works. The EIS states that the impact of the construction traffic on the performance of the road system would likely be very minor.

By late 2012 SICTL's works accelerated requiring an increase to the number of truck deliveries for parts of 2013 while Patrick was preparing to start construction activities in March 2013 resulting in a further increase in the forecast number of truck deliveries in 2013.

Due to the concurrent development of the terminal operations infrastructure by the two operators SICTL and Patrick, the cumulative construction traffic generated may exceed the assumed maximum daily truck deliveries in the EIS.

The purpose of this report is to present a traffic impact assessment of the cumulative construction traffic on the road system during the terminal operations infrastructure works for the period March 2013 to March 2014.

This report has been prepared by Parking and Traffic Consultants (PTC) for Patrick, SICTL and Sydney Ports.

This report should be read in conjunction with the Construction Traffic Management Plans that have been prepared for the SICTL and Patrick terminal operations infrastructure construction works, which provide more detail with regard to the management of vehicles, parking and general traffic safety.

2 Background from EIS

2.1 General

The Port Botany Expansion project was approved in 2005 by the NSW Government and the application was accompanied by an Environment Impact Statement (EIS) prepared by URS for Sydney Ports Corporation. The EIS outlined the objectives and justification for the project as well as providing an assessment of the environmental considerations, including the effect of traffic activity associated with both the construction and operation of the completed terminals. The traffic analysis relies on previous assessment and intersection modelling undertaken by Maunsell, which was published in November 2002.

2.2 Construction sequence and timing

The EIS sets out the construction sequence and timing of the principal construction activities in Section 8.7.1 **(Attachment 1)** and Figure 8.8 **(Attachment 2)**. Figure 8.8 shows that the construction of the terminal footprint infrastructure will take approximately four (4) years followed by at least two (2) years of construction of the terminal operations infrastructure ('Terminal Operator Works (ongoing)').

2.3 Construction traffic footprint infrastructure

The EIS sets out the construction traffic for the terminal footprint infrastructure in Section 8.7.7 **(Attachment 3)**, Figure 8.13**(Attachment 4)**, Section 21.6.1**(Attachment 5)** and Table 21.5**(Attachment 6)**. Table 21.5 presents the average number of daily truck deliveries per quarter for four (4) years of construction of the terminal footprint infrastructure, as follows, with the maximum of 103 trucks per day.

Table 1 – EIS Table 21.5 Forecast Average Number of Truck Deliveries per Working Day

	Average Number of Truck Deliveries per Working Day															
	Year 1				Year 2				Year 3				Year 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Rock Embankment		60	60	60	45											
Piling			5	6	6	6	6	6								
Rock Armouring					42	44	44	44	44	42						
Concrete Works						20	20	20	20	20	20	20	10			
Miscellaneous	5	8	8	10	10	10	10	10	10	10	10	10	8	5	4	3
Total	**5**	**68**	**73**	**76**	**103**	**80**	**80**	**80**	**74**	**72**	**30**	**30**	**18**	**5**	**4**	**3**

2.4 Construction traffic operations infrastructure

The EIS sets out the construction traffic for the terminal operations infrastructure in Section 8.6.4 **(Attachment 7)** and Table 8.1 **(Attachment 8)**. Table 8.1 sets out that the construction of the terminal facilities over 24 months will see the delivery of construction materials of 80 trucks per day and an additional 5 trucks per day for concrete works for buildings. On the basis of an average of 25 working days per month, this equates to 48,000 construction trucks in total for the terminal operations infrastructure.

2.5 Impact of construction traffic

Section 21.7.1 (**Attachment 9**) concludes that the estimated 103 truck deliveries per day in the second year, which is the maximum during the construction period, represents a very small proportion of peak traffic volumes and that the impact on the performance of the road system would be very minor.

3 Terminal Operations Infrastructure by SICTL and Patrick

3.1 General road access

Figure 1 shows the development areas of the respective operators SICTL (46 hectares) and Patrick (17 hectares) a total of about 63 hectares. The terminal operations infrastructure works are being developed simultaneously by Patrick on the southern part of the expansion (17 hectares) and by SICTL on the northern section in the first phase (30 hectares).

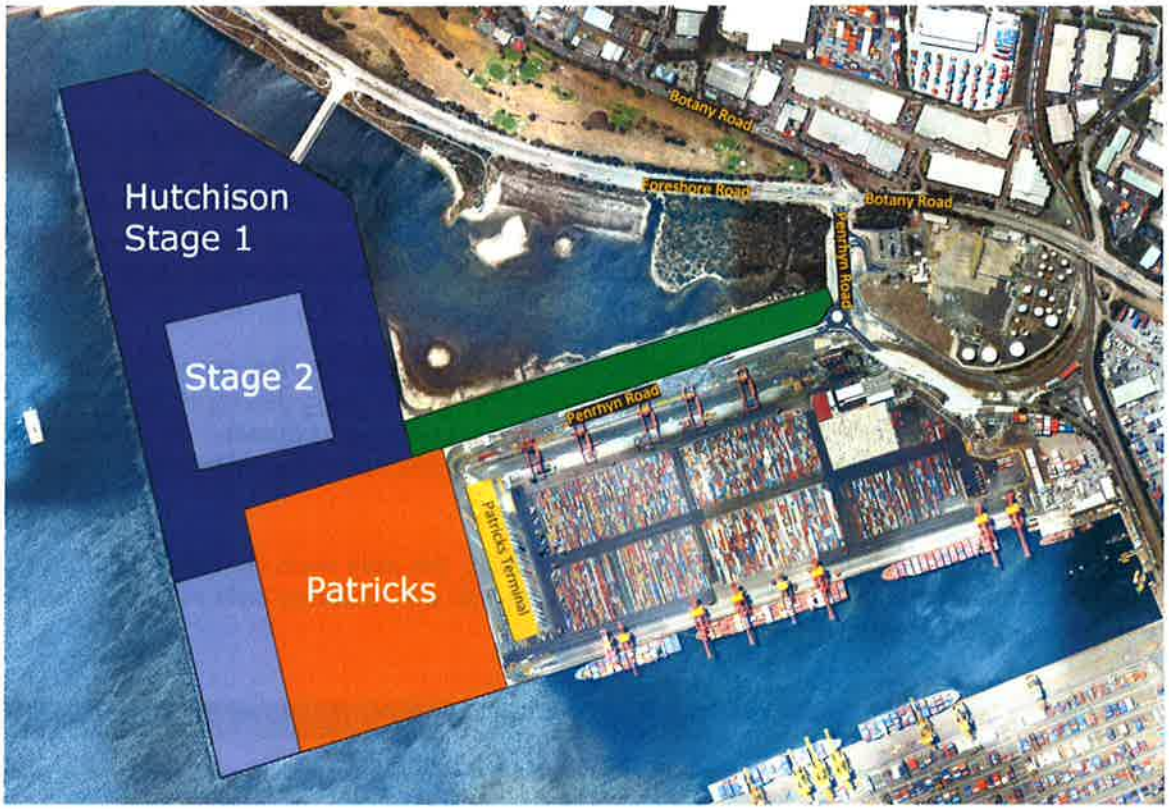


Figure 1 – Site Identification

The terminal operations infrastructure works have not changed from those described in the EIS; the terminal operations infrastructure is no larger or smaller and the same quantity of materials is being brought to and from the site. In this regard the project is consistent with that described in the EIS.

Construction traffic to the Patrick development area will utilise the Penrhyn Road port access, while construction traffic to the SICTL portion will use the new access bridge from to Foreshore Road. The construction traffic distribution will therefore differ from that assumed in the EIS and the impact of the construction traffic shared between the two intersections.

The completion of the grade separation works in late 2012 has significantly improved the road system near Penrhyn Road. Further improvements to the port precinct road systems were established throughout 2012 with the completion of the truck marshalling infrastructure in Port Botany.

3.2 Construction sequence and timing

Construction of the terminal operations infrastructure for the Patrick and SICTL areas is occurring to some extent concurrently. The first phase of the SICTL terminal operations infrastructure consists of about 30 hectares of paving, which commenced in September 2012 and is forecast to be complete by December 2013. The timing of subsequent phases of the SICTL site will depend on demand for additional stacking areas in line with demand and throughput on the terminal.

The construction of the terminal operations infrastructure by Patrick will commence in March 2013 and are forecast to be completed in March 2014, but could extend up to May 2014.

3.3 Construction traffic for the terminal operations infrastructure

Construction truck numbers have been provided by SICTL and Patrick based on the projected quantities of materials required for both sites. The first phase of the SICTL works requires approximately 17,300 trucks, while the Patrick site will require approximately 16,400 truck deliveries. The total number of truck deliveries for the SICTL (Phase 1) and Patrick works equals about 33,700 trucks. . The current combined works represent 47 hectares, which is 75% of the overall terminal operations work area.

The EIS had assumed about 48,000 construction trucks in total for the terminal operations infrastructure (refer section 2.3 of this report). With 75% of the area being developed by Patrick and SICTL at this time, a traffic allocation of about 36,000 trucks may be assumed. This shows that, proportional to the developed area, the total volume of construction traffic by Patrick and SICTL is consistent with the EIS.

In order to provide consistency with Table 21.5 in the EIS, the daily truck numbers based on the quarterly averages are presented in Table 2. This shows that the maximum daily truck numbers for the Patrick and SICTL works combined is 145.

Table 2 - Average Number of Truck Deliveries per Working Day

	Average Number of Truck Deliveries per Working Day			
	Year 1			
	Q1	Q2	Q3	Q4
Patrick	32	73	76	20
SICTL	96	72	26	12
Total	**128**	**145**	**102**	**32**

3.4 Impact of construction traffic

A traffic study has been undertaken and is presented in the following sections of this report to investigate the impact of the cumulative construction traffic by SCITL and Patrick on the road system.

The study incorporates updated traffic survey information for Foreshore Road, Botany Road and Penrhyn Road, with projected traffic volumes (for the period March 2013 – March 2014) provided by the operators and their respective contractors for the terminal operations infrastructure. In order to provide a sensitivity test and to incorporate fluctuations in daily activity, the model adopted a higher volume of construction vehicles than expressed in Table 2. Details of the volumes are described in the following section.

4 Commuter Microsimulation Modelling

Parking and Traffic Consultants had previously developed a calibrated microsimulation model using the Commuter® modelling software in relation to intersection of Foreshore Road and Penrhyn Road and the access arrangement of the Patrick Terminal at Port Botany. To undertake cumulative assessment of the construction traffic associated with the concurrent development of the SICTL and Patrick sites, the Commuter® model was extended to include the new intersection of Foreshore Road and the access bridge to the SICTL site.

Figure 2 – Traffic Modelling Extents

In order to further develop the Commuter® model, Traffic and Parking replicated the layout of the access bridge and Foreshore Road intersection by superimposing the road layout over an aerial photograph to ensure the correct lane widths and geometry are used. A screenshot of the commuter mode is presented overleaf.

The model adopts a peak activity volume of 60 trucks per hour (30 trucks per site), which provides a robust assessment and demonstrates that there is minimal impact on the road network as described in the following section.

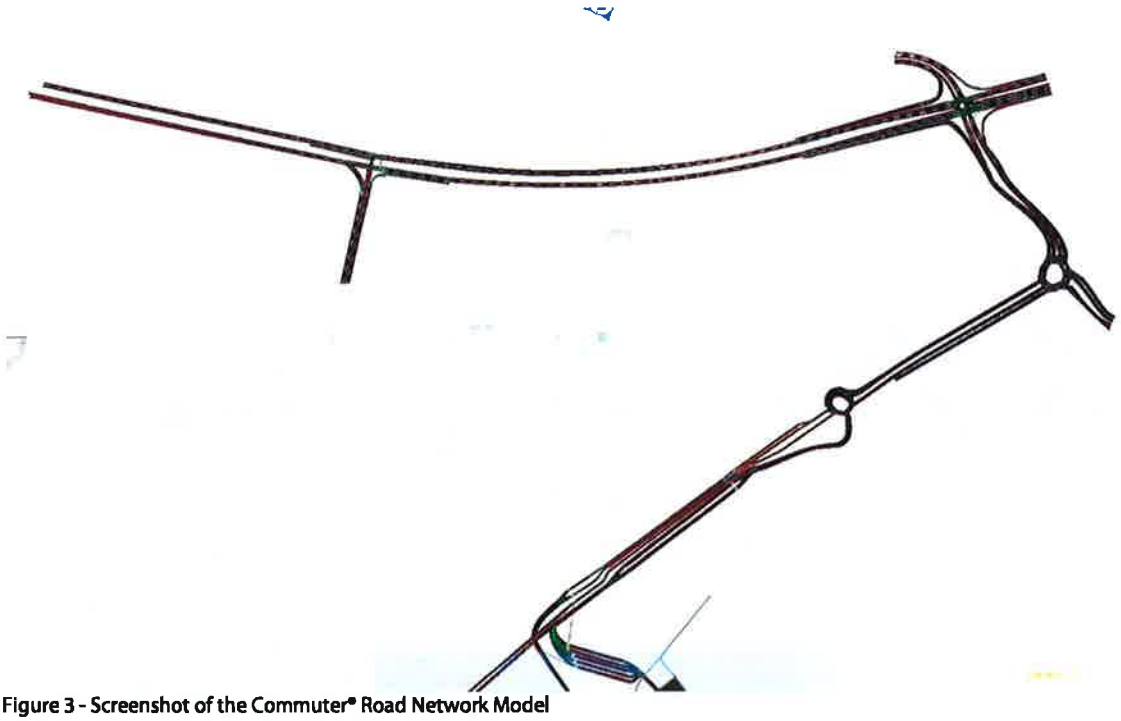


Figure 3 - Screenshot of the Commuter® Road Network Model

Standard traffic signal phasing arrangement associated with a "T-intersection", have been adopted including a dedicated right turn phase for the vehicles accessing the SICTL site from Foreshore Road. The phase arrangement is shown in the following figure.

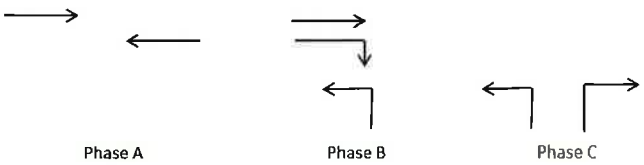


Figure 4 – Traffic Signal Phasing Sequence (Foreshore Road / SICTL Access)

The traffic signal cycle time for this intersection was input as being similar to the existing intersection of Penrhyn Road and Foreshore Road. A minimum green time of 12 seconds was assigned for Phase B and C, while Phase A operates for the remaining cycle time, being the dominant movement.

Adopting the peak traffic volumes, the Commuter® model indicates a maximum queue length of 5 trucks within the right turn lane at Penrhyn Road and 2 trucks at the right turn lane at the SICTL site access. The queue at the Penrhyn Road intersection is consistent with the maximum queue associated with terminal traffic. The method of managing the arrival times of vehicle means that the construction traffic queue only develops after the terminal traffic volume has reduced following the first quarter of each hour. The following screenshots of the Commuter® model illustrate the maximum queue lengths recorded in Commuter®.

Figure 5 – AM Peak Queue Observation at SICTL Access

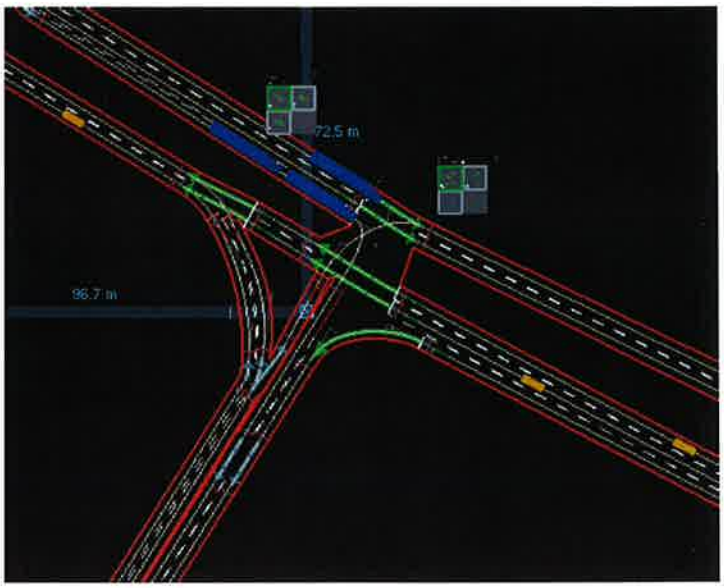


Figure 6 – PM Peak Queue Observation at SICTL Access

Figure 7 – AM Peak Queue Observation at Penrhyn Road

Figure 8 – PM Peak Queue Observation at Penrhyn Road

5 Traffic Impact Assessment

5.1 Methodology

The detailed traffic assessment has been prepared to determine the impact of the combined construction traffic generated from Patrick and SICTL development sites on the surrounding road network.

In order to present a cumulative assessment of the construction traffic associated with the SICTL site and the Patrick site, commuter microsimulation modelling was undertaken for the road network serving the sites. In order to determine the actual impact of the two sites operating concurrently, it is necessary to model the situation as planned in the EIS (ie the entire project, via the bridge access) and a separate model adding the traffic associated with the Patrick site with no change to the bridge access volumes. Therefore, the modelling represents the following scenarios;

- Background traffic and construction traffic associated with the entire project using the bridge access only (which replicates the project as a single site, albeit with the revised daily truck numbers described in Section 3).
- Background traffic with construction traffic associated with the SICTL and Patrick sites,

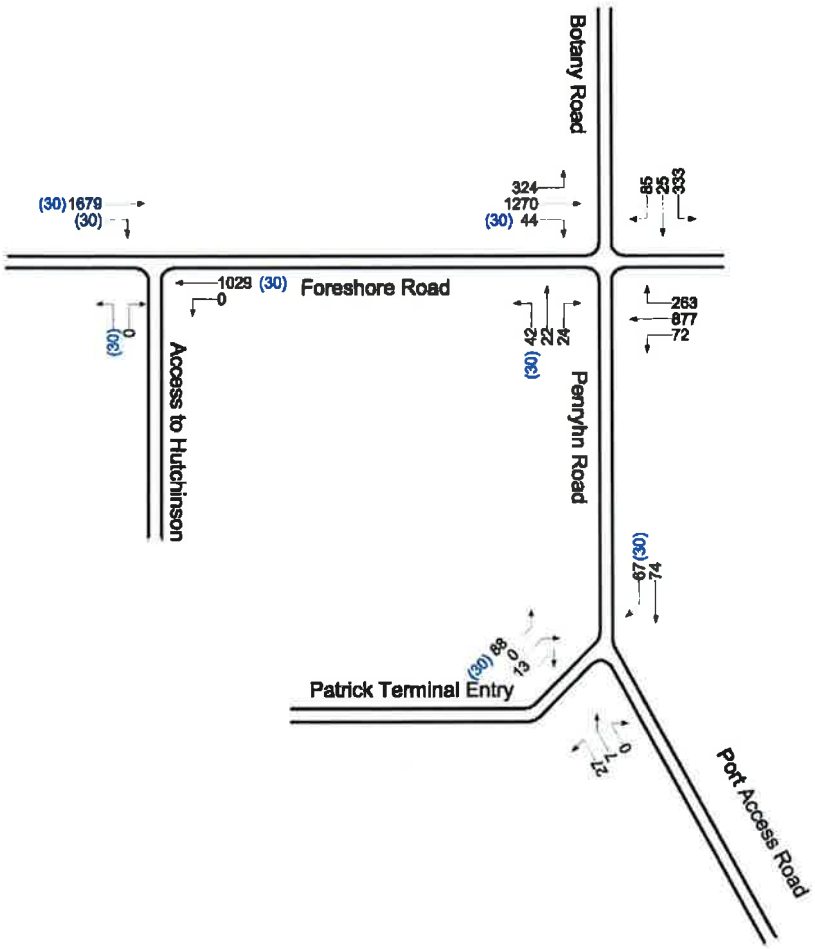
The daily traffic construction activity was provided by Patrick's and SITCL's contractors, which has enabled us to calculate the monthly and quarterly figures as shown in Table 3 below. This in turn allowed us to calculate the quarterly average figures shown in Table 2, which presents the data consistently with the method adopted in the EIS (ie quarterly average daily traffic).

Table 3 – Monthly and Quarterly Truck Volumes

	Truck Deliveries											
	Q1			Q2			Q3			Q4		
Patrick	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Daily (monthly average)	0	0	32	21	73	127	130	71	28	35	25	0
Daily (quarterly average)	32			73			76			20		
Per month (M)	0	0	104	761	2332	4123	4110	2233	917	1112	746	5
Per quarter (Q)	104			7216			7260			1863		
Per year	**16443**											
	Q1			Q2			Q3			Q4		
SICTL	M1	M2	M3	M4	M5	M6	M7	M8	M9	M10	M11	M12
Daily (monthly average)	117	92	80	93	58	64	42	20	17	17	17	0
Daily (quarterly average)	96			72			26			12		
Per month (M)	3270	2589	2235	2592	1621	1794	1175	556	484	484	484	
Per quarter (Q)	8094			6007			2216			968		
Per year	**17285**											

The microsimulation model for both the scenarios was run for a period of 1 hour for the morning and evening peak periods. The assessment included for fluctuation in daily and hourly volumes. Averaging the average daily volumes over a 10 hour working day would result in 15 trucks per hour; however this figure was increased to 30 trucks per hour for both sites to allow for fluctuations in

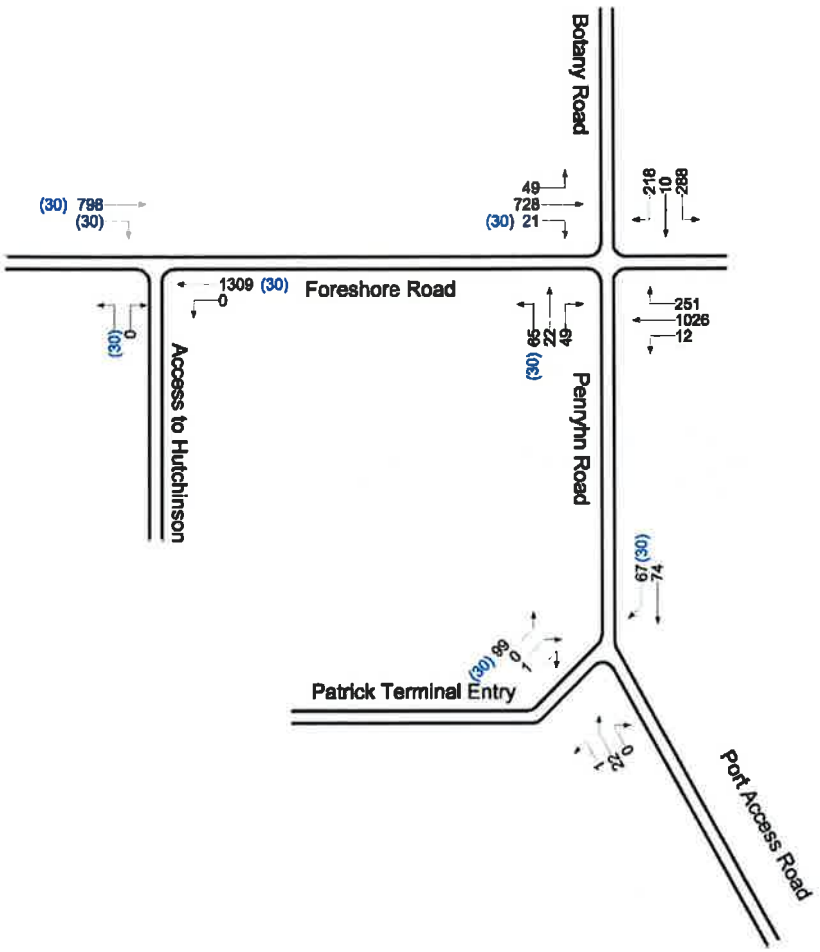
activity and to provide a sensitivity test. The additional loading was also applied to the Patrick's volumes to ensure that the Patrick Terminal would continue to operate without impact. The projected traffic volumes are illustrated on the following diagrams:



Future Morning Peak Hour

= Existing Background Traffic Volume
(##) = Projected Peak Construction Volume + Sensitivity Test

Figure 5 – Morning Peak Hour with Construction Traffic Volumes



Future Evening Peak Hour

= Existing Background Traffic Volume
(##) = Projected Peak Construction Volume + Sensitivity Test

Figure 6 – Evening Peak Hour with Construction Traffic Volumes

5.2 Intersection Performance

Typically, the following performance indicators are used to summarise the performance of an intersection:

- Average Delay - The average delay encountered by all vehicles passing through the intersection. It is often important to review the average delay of each approach as a side road could have a long delay time, while the large free-flowing major road traffic will provide overall low average delay.
- Level of Service (LoS) - This is a categorisation of average delay, intended for simple reference. The Roads and Maritime Services (RMS) adopts the following bands:

Table 4 – Summary of Intersection Performance Indicators

LOS	Ave. Del. in Seconds		Definition
A	0.00	14.50	Good Operation
B	14.50	28.50	Good with acceptable delays and spare capacity
C	28.50	42.50	Satisfactory
D	42.50	56.50	Operating near capacity
E	56.50	70.50	At capacity; at signal, incidents will cause excessive delays. Roundabouts require other control mode
F	70.50	Infinity	Operating beyond capacity

The commuter models were run for both the scenarios and for the morning and evening peak periods, and Level of Service information was collected. The table below presents the summary of LoS information:

Table 5 – Summary of Intersection Performance Results

Scenario	Peak Period	Intersection	Level of Service	Average Delay (secs)
Entire Project Traffic via Bridge Access (ie without Patrick's construction traffic)	Morning Peak	Foreshore Road / Botany Road/Penrhyn Road	C	34
		Penrhyn Road / Bridge Access	B	15
	Evening Peak	Foreshore Road / Botany Road/Penrhyn Road	C	31
		Penrhyn Road / Bridge Access	B	16
SICTL and Patrick Construction Traffic via Bridge Access and Patrick	Morning Peak	Foreshore Road / Botany Road/Penrhyn Road	C	34
		Penrhyn Road / Bridge Access	B	15
	Evening Peak	Foreshore Road / Botany Road/Penrhyn Road	C	31
		Penrhyn Road / Bridge Access	B	17

The commuter model results indicate that both the intersections of Foreshore Road with Botany Road/Penrhyn Road and Foreshore Road with SICTL access road are operating at Level of Service C and B respectively both with and without the construction traffic associated with the development of the Patrick development site. A comparison of the two scenarios presented in Table 5 indicates that the construction traffic will have a very minor impact on the overall operation of the road network, which is consistent with the findings of the EIS. There will be no notable difference for

traffic on Foreshore Road including the intersection of the Foreshore Road and the SICTL access bridge.

6 Stakeholder

During the preparation of this report, discussions were held with representatives of RMS, Botany Bay City Council and Randwick City Council to determine any issues that these stakeholders could foresee in relation to the concurrent traffic activity. No major issues were raised in relation to traffic volumes, given the context of the ultimate operation of the Terminals.

Botany Bay City Council reinforced the request that construction vehicles should only use Foreshore Road to avoid undue impact on Botany Road and the associated commercial strips and residential areas. It is noted that the Traffic Management Plans for both sites identify Foreshore Road as the sole access route, which is entirely consistent with Council's request.

The traffic assessment and modelling presented in this report has not identified any other traffic management or road capacity issues (e.g. amending traffic signal phasing, prohibiting turning movements etc) that require approval or comment from these stakeholders. The road network provides sufficient capacity to accommodate the construction traffic movements with no amendments to existing infrastructure.

7 Conclusion

This Traffic Impact Assessment has considered the cumulative construction traffic impact during the terminal operations infrastructure construction works by SICTL and Patrick for the period of March 2013 – March 2014.

The assessment has adopted detailed projected construction traffic volumes from all contractors undertaking the development works on behalf of Patrick and SICTL and has applied these figures to the road network, based on background traffic modelling by PTC.

The impact assessment concluded that:

- The total number of construction truck deliveries during the construction of the terminal operations infrastructure has not increased.
- The development of SICTL and Patrick sites concurrently results in a higher maximum number of construction trucks per day average over the quarter (increase from 103 to 145 trucks per day).
- According to the Commuter® modeling, which was undertaken based on the worst case of 30 trucks entering and exiting both sites during a peak hour, the construction traffic volume associated with the two sites occurring concurrently will have no notable impact on the operation of the road network, which is consistent with the findings of the EIS that "the impact of construction vehicles on the performance of the road system would likely be very minor".
- New road infrastructure (new terminal bridge, grade separation works and truck marshalling area) has been completed and is operational, which is an improvement compared to the assumed road network in the EIS.

Attachment 1 - EIS, Section 8.7.1

gatehouse, substation and other minor site buildings (e g sewerage pump house) would probably be of masonry construction.

All of these structures would be of a standard form and would probably be built over a 12-month period and would involve truck deliveries of materials at a rate of approximately eight trucks per day.

8.6.4 Roads and Pavements

Internal roads and paved areas would need to be constructed by the terminal operator. It is expected that these would be built progressively over a 6 to 12-month period as other elements are completed.

Construction would involve levelling work, importation and compaction of sub-base material and the placing and compaction of asphaltic concrete. Truck traffic of about eight arrivals per day would be expected for this operation.

8.7 Construction Implementation

8.7.1 Construction Sequence and Timing

The timing of commencement of construction of the Port Botany Expansion would depend on approval of the DA by the NSW Minister for Infrastructure and Planning and the Commonwealth Minister for the Environment and Heritage. In addition, a number of other approvals and agreements are required from other agencies as specified in **Chapter 9** *Statutory Planning*.

Subject to approval being granted for the project, there would be a period of further design development and documentation, tendering, assessment of submissions and award of the construction contract(s).

Staging and durations of the principal construction activities are summarised in **Figure 8.8**. The lead time to commence operations for the first berth at the new terminal would be approximately seven years. The subsequent roll-out of terminal equipment and capacity by terminal operator(s) would have lead times of no greater than 12 to 18 months for each new berth. The existing facilities at Port Botany would continue operations throughout construction of the new terminal.

8.7.2 Capital Investment

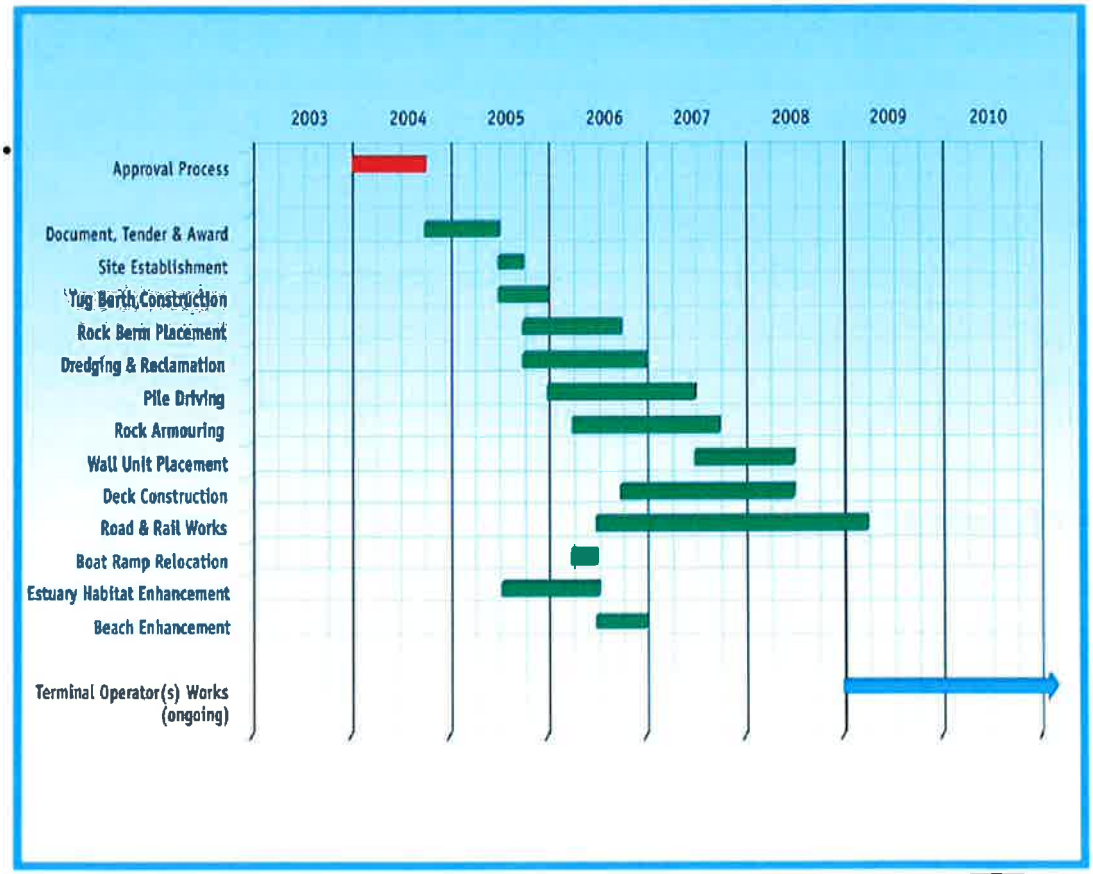
The total capital investment for the proposed Port Botany Expansion (including terminal facilities) has been estimated at $576 million.

8.7.3 Construction Hours

The dredging and reclamation work would be conducted 24 hours a day, seven days a week. Other construction activities would generally be limited to daylight hours (7 am to 6 pm) six days per week with the exception of some rail and road construction activities which could take place at night for a limited period.

Construction activities would not normally be undertaken on Sundays or public holidays, although equipment maintenance and some environmental protection works may be undertaken on these days.

Attachment 2 - EIS, Figure 8.8



Indicative Construction Programme **Figure 8.8**

Attachment 3 - EIS, Section 8.7.7

8.7.5 Refueling

Marine fuel oil required for construction vessels would be provided from existing refueling facilities in Port Botany. Small road tankers would fuel onsite land-based plant and equipment. Onsite storage of fuel for construction equipment would generally not be necessary, except for minor quantities for small equipment like generators. Some earthmoving contractors, however, may require aboveground fuel storage tanks of up to 20,000 L capacity to provide "standby" fuel supply for their equipment.

Storage and handling of fuel would be conducted in accordance with *Australian Standard AS 1940 (1993) The Storage and Handling of Flammable and Combustible Liquids* including the installation of bunding around fuel storage tanks.

8.7.6 Construction Workforce

The average number of employees and contractors onsite during construction would be approximately 60 people. The maximum number of employees and contractors onsite at any one time is expected to be in the order of 160 people. This maximum would occur during periods of intensive construction activity during the second year of construction.

8.7.7 Construction Traffic

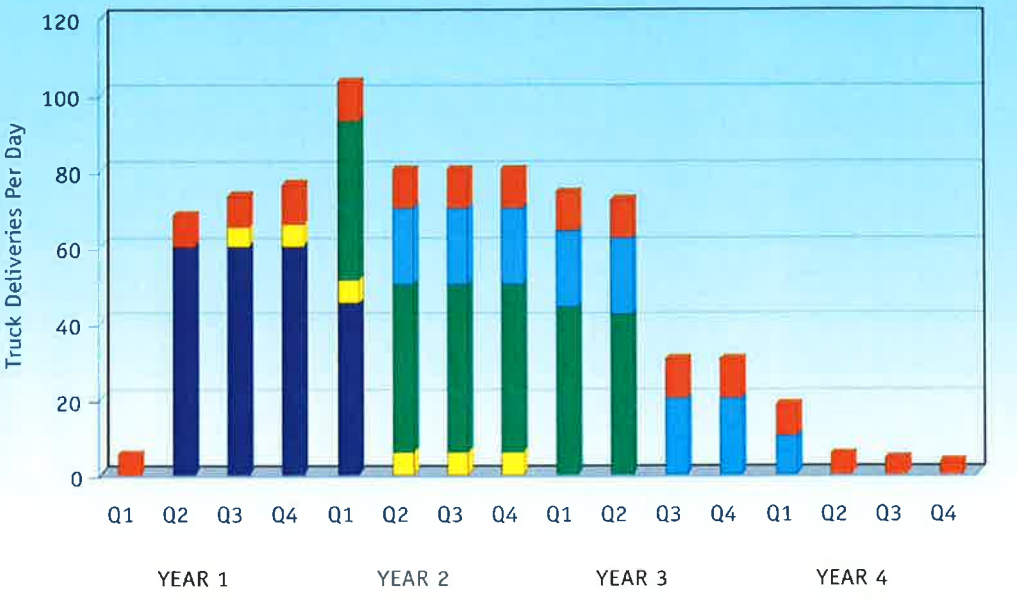
Considerable construction traffic would be generated in the first three years of construction of the new terminal. **Figure 8.13** shows the traffic likely to be generated by the main construction operations, but does not include general deliveries or private vehicle traffic. In general, most construction traffic would be generated during the dredging and reclamation and the armouring of the reclamation embankment with rock. These activities would primarily occur during the first two to three years of construction. The maximum number of construction truck deliveries would be approximately 103 per day during the first quarter of the second year of construction.

8.7.8 Environmental Management Plan

A detailed Construction EMP would be prepared for the works to be managed by Sydney Ports Corporation prior to any construction activities being commenced at the site. This plan would include the following sub-plans:

- traffic management;
- erosion and sediment control;
- flora and fauna;
- construction noise impact statements;
- waste management;
- emergency and incident response; and
- stakeholder consultation.

Attachment 4 - EIS, Figure 8.13



	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Rock Embankment Supply		60	60	60	45											
Pile Supply			5	6	6	6	6	6								
Rock Armouring					42	44	44	44	44	42						
Concrete Works						20	20	20	20	20	20	20	10			
Miscellaneous	5	8	8	10	10	10	10	10	10	10	10	10	8	5	4	3
Truck Deliveries Per Day	**5**	**68**	**73**	**76**	**103**	**80**	**80**	**80**	**74**	**72**	**30**	**30**	**18**	**5**	**4**	**3**

Traffic Generation During Construction **Figure 8.13**

Attachment 5 - EIS, Section 21.6.1

- new sidings in the proposed Port Botany Expansion which would provide increased rail capacity and flexibility;
- planned upgrade of the Patrick Stevedores and P&O container terminals to increase rail handling capacity;
- proposed dedicated freight rail line from Macarthur to Chullora which would provide the main link from Port Botany to southern NSW and Melbourne,
- proposed duplication of the Cooks River to Port Botany section of the Enfield-Botany dedicated rail freight line which is expected to provide sufficient capacity to meet the forecast increase in container rail freight to and from Port Botany;

- continued State and Federal government policy support expressed in
  - a recently released five-point plan to manage Port Botany truck traffic, which sets a new target of 50% rail mode share for container freight by 2010;
  - the Milton Morris Report (*Independent Review of the Proposed Enfield Intermodal Terminal*, Feb 2003) recommending the investigation of future intermodal terminal capacity needs of western Sydney;
  - a national interstate rail track access policy overseen by the Australian Rail Track Corporation;
- environmental considerations such as the need to reduce road congestion and vehicle emissions, and
- commercial drivers such as:
  - joint ventures by container terminal and rail freight operators which are expected to promote rail freight over long hauls backed by local truck distribution,
  - expected doubling of freight over the next 20 years (BTRE Report *Greenhouse Emissions from Australian Transport: Trends to 2020*, 2002); and
  - opening of new industrial areas around the Western orbital in western and southwestern Sydney, which increases opportunities for rail freight volumes to existing and planned intermodal terminals.

21.6 Traffic Forecast

21.6.1 Construction

Road

The main road transport task during construction of the new terminal would be the delivery of rock, piling equipment and concrete to the site. Based on projected material volumes, sequence and rate of construction, the average number of truck deliveries related to major construction traffic has been projected as shown in **Table 21.5**.

Attachment 6 - EIS, Table 21.5

CHAPTER 21 Traffic and Transportation

Table 21.5 Major Construction Traffic

	AVERAGE NUMBER OF TRUCK DELIVERIES PER WORKING DAY															
	YEAR 1				YEAR 2				YEAR 3				YEAR 4			
Rock Embankment		60	60	60	45											
Piling			5	6	6	6	6	6								
Rock Armouring					42	44	44	44	44	42						
Concrete Works						20	20	20	20	20	20	20	10			
Miscellaneous	5	8	8	10	10	10	10	10	10	10	10	10	8	5	4	3
TOTAL	**5**	**68**	**73**	**76**	**103**	**80**	**80**	**80**	**74**	**72**	**30**	**30**	**18**	**5**	**4**	**3**

The exact sources of supply for the various types of construction materials are not known at this stage, but it is expected that the majority of construction traffic would access the site from the south. The probable route would therefore be via General Holmes Drive and Foreshore Road. Construction traffic would arrive at the site via the major arterial roads (i.e. using the same routes as those already used by port trucks). It is expected that there would be little, if any, use of local residential streets by construction generated traffic.

Rail

It is not anticipated that there would be rail borne construction traffic. However, there may be opportunities to deliver specific materials by rail.

21.6.2 Operation

Road

To forecast road traffic, the assumed growth in Port Botany container trade to be transported by road was converted into truck numbers using the following assumptions:

- 1.35 TEUs per container, increasing to 1.6 TEUs per container by 2021, reflecting the increasing use of forty-foot containers;
- 1.19 containers per truck, based on data from container terminals and consistent with traffic counts conducted as part of the traffic and transport study. This has been scaled up to 1.33 containers per truck by 2021, in recognition of the increased use of more efficient B-double trucks (3 TEU capacity); and
- 8% rate of backloading increasing to 27% in 2021.

On the assumption that the rail mode share would increase in accordance with the strategy of Sydney Ports Corporation, the stevedores and Government to a minimum of 30% by 2006 and a minimum of 40% by 2011, and assuming that the new terminal would handle a minimum of 40% of the total trade, the forecast truck movements during morning and afternoon peak hours would be as shown in **Table 21.6.** Forecasts for an average day are also shown and compared to the daily forecast for the "worst case" scenario of 20% rail mode share (noting that the current rail mode share is already 25%).

Attachment 7 - EIS, Section 8.6.4

gatehouse, substation and other minor site buildings (e.g. sewerage pump house) would probably be of masonry construction.

All of these structures would be of a standard form and would probably be built over a 12-month period and would involve truck deliveries of materials at a rate of approximately eight trucks per day.

8.6.4 Roads and Pavements

Internal roads and paved areas would need to be constructed by the terminal operator. It is expected that these would be built progressively over a 6 to 12-month period as other elements are completed.

Construction would involve levelling work, importation and compaction of sub-base material and the placing and compaction of asphaltic concrete. Truck traffic of about eight arrivals per day would be expected for this operation.

8.7 Construction Implementation

8.7.1 Construction Sequence and Timing

The timing of commencement of construction of the Port Botany Expansion would depend on approval of the DA by the NSW Minister for Infrastructure and Planning and the Commonwealth Minister for the Environment and Heritage. In addition, a number of other approvals and agreements are required from other agencies as specified in **Chapter 9** *Statutory Planning*.

Subject to approval being granted for the project, there would be a period of further design development and documentation, tendering, assessment of submissions and award of the construction contract(s).

Staging and durations of the principal construction activities are summarised in **Figure 8.8**. The lead time to commence operations for the first berth at the new terminal would be approximately seven years. The subsequent roll-out of terminal equipment and capacity by terminal operator(s) would have lead times of no greater than 12 to 18 months for each new berth. The existing facilities at Port Botany would continue operations throughout construction of the new terminal.

8.7.2 Capital Investment

The total capital investment for the proposed Port Botany Expansion (including terminal facilities) has been estimated at $576 million.

8.7.3 Construction Hours

The dredging and reclamation work would be conducted 24 hours a day, seven days a week. Other construction activities would generally be limited to daylight hours (7 am to 6 pm) six days per week with the exception of some rail and road construction activities which could take place at night for a limited period.

Construction activities would not normally be undertaken on Sundays or public holidays, although equipment maintenance and some environmental protection works may be undertaken on these days.

Attachment 8 - EIS, Table 8.1

Where the project requires construction work outside these hours, the regulatory authorities and affected stakeholders would be notified.

8.7.4 Construction Equipment

The actual number and types of equipment used would depend on availability and the construction contractor's preferred working method. An indicative list of the major construction equipment to be used, based on the documented methodology is summarised in **Table 8.1**, although alternative equipment may be used if required.

Table 8.1 Major Construction Equipment

PHASE OF WORKS	EQUIPMENT LIST	NUMBER	ACTIVITY
Dredging & Reclamation – construction of embankment *(15 months)*	Trucks	100 / day	Delivery of rock embankment material
	Front End Loader	2	Loading of rock embankment materials onto shuttle barge
	Cutter-suction Dredge Rig	1	Dredging
	Bobcat / Front End Loader	2	Moving rock embankment materials into chute on fixed barges
	Tugs	4	Towing rock transport barges
	Work Boats	2	Servicing dredging operation and general duties
	Barges	4	Rock transport
	Hopper Barges	2	Placing embankment material
Dredging & Reclamation – site trimming and stabilisation *(15 months)*	Dozer	1-2	Level finished (bulk fill) surface
	Water Truck	2	Aid in compaction and also for dust control
	Grader	1	Level finished (bulk fill) surface
	Rollers (Sheepsfoot & Steel Drum)	1-2	Compaction / Completion of finished surface
	Excavator	1-2	Trenching, trimming of embankments and placing temporary armour
Dredging & Reclamation – preloading *(12 months)*	Scraper	6	Profile finished surface
	Water Truck	2	Aid in compaction and also for dust control
	Grader	1	Levelling finished surface
	Dozer / Compactor	1	Level finished surface and compaction
	Roller (Sheepsfoot)	1	Compaction / Completion of finished surface
Wharf Construction (39 months)	Trucks	Up to 60 / day	Delivery of piles and hard rock armouring material
	Piling Rig / Diesel Hammers	2-3	Install steel piles
	Large Crane	1-2	Placement of precast units during wharf construction

CHAPTER 8 Construction

PHASE OF WORKS	EQUIPMENT LIST	NUMBER	ACTIVITY
	Dozer	1-2	Moving stockpiled sand to fill behind precast retaining wall
	Grader	1	Level finished infilling area behind retaining wall
	Roller (vibratory)	1-2	Compaction / Completion of finished surface
	Road making equipment – Bitumen Spray Truck Rollers Trucks	1 2 3	Temporary Sealing
	Concrete trucks	20 / day	Construction of wharf, bridges, drainage works, buildings etc
	Barges	3-4	Pile transport and driving
	Mobile Crane	1-2	Moving piles and pile sections for joining
Beach, Recreational Area and Penrhyn Estuary Enhancement (9 months)	Trucks	Up to 30 / day	Delivery of hardrock for revetment and boat ramp, and later for extra beach sand and material as required
	Excavator	1	Placing and forming of rock revetment
	Dozer	1	Landscaping and spreading material for beach and estuary enhancement
	Front End Loader	1	Landscaping and spreading material for beach and estuary enhancement
	Dozer / Compactor	1	Profile finished beach area
Terminal Facilities (24 months)	Trucks	80 / day	Delivery of construction materials
	Heavy Compacting Roller	2	Initial compaction of sub-grade
	Roller (Sheepsfoot)	2	Compaction of sub-grade/base/sub-base materials
	Dozer	2	Grading, profiling and spreading cement
	Asphalt Paving Machine	2	Laying asphalt
	Bitumen Spray Truck	1	Spraying asphalt over surface
	Roller (Steel Drum)	2	Compaction / Completion of finished surface
	Grader	1	Levelling surface
	Water Truck	2	Dust control
	Excavator	1-2	Excavation to install building foundations
	Backhoe	1	Excavation to install services, fencing and lighting
	Crane	1	Erecting lights, building assemblage and terminal equipment
	Concrete Truck	5 / day	Pouring of concrete for building foundations
	Piling Rig / Diesel Hammers	1	Installation of piles
Delivery of Terminal Facilities	Crane Transport Vessel	1	Delivery of fully assembled quay cranes
	Large Trucks	5	Delivery of partially assembled RMG sections
	Mobile Cranes	2 - 3	Erection of RMGs
	Transport Vessel	1	Delivery of Straddle Carriers/RTGs

Attachment 9 - EIS, Section 21.7.1

CHAPTER 21 Traffic and Transportation

- wagon space utilisation, which could be limited by heavy container freight and rolling stock capabilities, would increase from the current 75% to 80% in 2006 and 85% in 2011 onwards

The forecast number of train movements for each container terminal, assuming that rail has a modal share of 40% by 2011, is shown in **Table 21.7**.

Table 21.7 Forecast Daily Train Movements to Port Botany

	EXISTING*		2006*		2011		2016		2021	
TERMINAL	All	New	All	New	All	New	All	New	All	New
600m#1 Long Sidings at New Terminal	30	0	46	0	62	16	80	26	94	30
400m#2 Long Sidings at New Terminal	30	0	46	0	66	18	92	32	108	38

Note: Two train movements (inbound and outbound) are equivalent to one train visit. Also translates to movements through Botany Yard.
* New Terminal not yet operational
#1 (2x22m locos + 38 - 14.6 wagons – 598.8m)
#2 (2x22m locos + 25 - 14.6m wagons – 409m)
Source: Maunsell Australia, 2002 and 2003.

21.7 Assessment of Impacts

21.7.1 Construction

Road

Construction generated truck traffic volumes would be significantly lower than the existing volume generated by the port. The estimated 103 truck deliveries per day in the second year, which is the maximum during the construction period, represents about 7% of the existing 1,450 port trucks on an average day). Construction traffic would also represent a very small proportion of peak traffic volumes. As a result, the impact of construction vehicles on the performance of the road system would likely be very minor.

The materials to be delivered to the site (rocks, piling equipment and concrete) would generally be transported by standard articulated and rigid trucks, although depending on the sources, some rock materials may also be delivered by barge. The use of restricted access oversize/overmass vehicles would be unlikely, except possibly for transport of some plant and equipment to and from the construction site (e.g. loaders, dozers, rollers, cranes and graders).

Normal construction working hours would generally apply for landside activities (7 am to 6 pm Monday to Friday; 7 am to 1 pm Saturday). These are generally considered as "daytime" working hours and are in line with EPA guidelines and working hours of other construction projects around Sydney. Some works may be undertaken outside of these hours (e.g. maintenance or road and rail works) to minimise impact on other users. Where the project requires construction work outside these hours, the regulatory authorities and affected stakeholders would be notified.

As pedestrian and cyclist activity on Foreshore Road is currently very low, the construction traffic is expected to have a negligible impact on these road users.

Traffic and Transportation CHAPTER 21

Road and water access would be maintained to a public boat ramp at all times during construction until the new boat ramp becomes available for public use. A new road is to be constructed to the existing boat ramp as part of the current expansion of the Patrick Stevedores terminal and this road would remain available to the public until an alternative boat launching facility has been provided.

An early requirement would be construction of the unsignalised intersection from Foreshore Road to the tug berth/new boat ramp area. This would be required for trucks transporting material for construction of the tug berths and traffic bringing rock embankment material for loading onto barges moored at the berth. Construction of the intersection would cause some minor and temporary disruption to traffic using Foreshore Road. A Traffic Management Plan would be implemented with RTA's concurrence for the duration of the works.

Installation of traffic signals, construction of the right hand turn lane and construction of the acceleration/merge lanes at the main terminal access point would also involve some minor disruption to traffic as would construction of the right hand turn lane. Speed restrictions would need to be applied on Foreshore Road while construction is being undertaken.

The inter-terminal access road would pass through the back of the parking area of the existing boat ramp and therefore construction would not be undertaken until the new boat ramp was opened to the public or additional parking provided at the western side of the existing boat ramp. Construction work would involve some excavation and placing of rock for road foundations. An asphaltic concrete surface would then be placed and compacted. These operations would not add significantly to construction traffic on the southern side of Penrhyn Estuary.

Construction of the grade separation (road over rail) at the Penrhyn Road entry point to Port Botany is expected to result in a number of trucks and construction plant entering and leaving the site. Public roads would be kept open at all times, however, short duration delays to port traffic would be expected throughout this period.

The installation/connection of services would not add significantly to construction traffic.

Rail

The construction of rail infrastructure for the new terminal would have minimal impact at the interface with the existing line.

An additional spur line would be constructed to join the existing rail line prior to it entering the Patrick Stevedores terminal. The extension of the rail line would also include two sidings to the north of the existing Penrhyn Road which would provide an additional train holding/waiting area.

A disruption to the existing service is anticipated during the installation of new turnouts from the existing tracks. The turnouts would connect the rail line extension to the new terminal. The installation could be undertaken at night to minimise operational impact and it is estimated that the work could be completed over a 12-hour period.