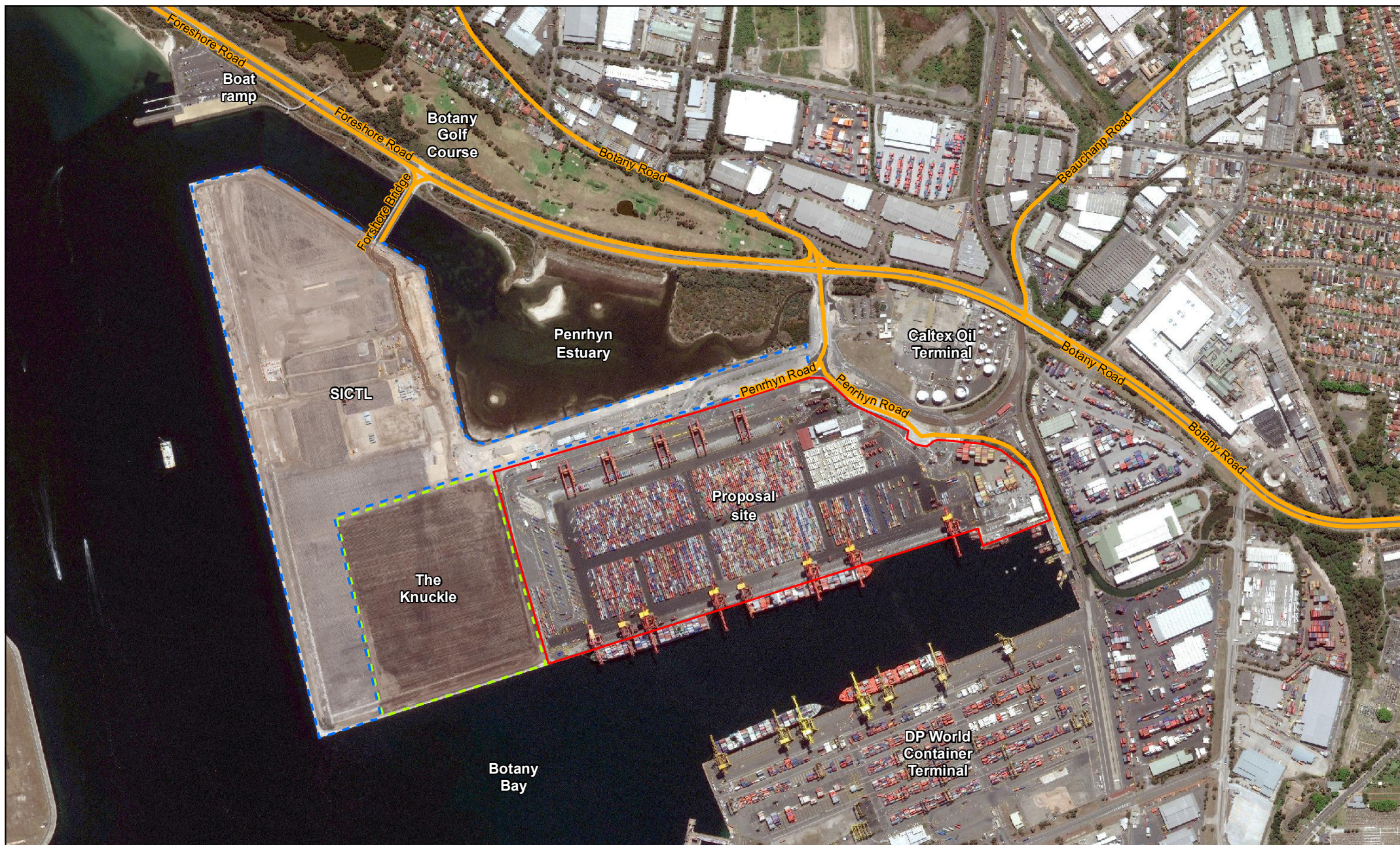


Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

Key roads for traffic analysis

Proposal site (Patrick Port Botany Container Terminal)

The Knuckle (Patrick)
SICTL



Patrick Stevedores Operations No 2
Section 75W Modification
- Port Botany Container Terminal Project
(DA-453-12-2002-i MOD 7)

Job Number 21-21961
Revision 0
21 Apr 2013

Site location

Figure 1

1.3 Study assumptions and limitations

This assessment has been based on information provided in the following reports:

- The Knuckle Construction Site Patrick Terminal, Port Botany – Parking and Traffic Consultants dated December 2012.
- Port Botany Patrick Facility Proposed Expansion Traffic Management Plan – Parking and Traffic Consultants dated June 2012.
- Patrick Terminal, Port Botany Adding a lane to the Existing Roundabout – Parking and Traffic Consultants dated December 2012.
- Port Botany Expansion EIS, URS November 2003.

This study has been limited by the following:

- Information provided in the above mentioned reports.
- Weekday AM and PM peak intersection traffic surveys undertaken by Roar Data Pty Ltd.
- 2012 intersection traffic survey data provided from the *Port Botany Patrick Facility Proposed Expansion Traffic Management Plan – Parking and Traffic Consultants* (June 2012).
- Construction traffic volumes and distribution provided by Patrick.
- Background traffic growth rates based on average annual daily traffic (AADT) count data provided by RMS.
- No strategic or micro-simulation traffic modeling has been undertaken for this study.

1.4 Disclaimer

This report has been prepared by GHD for Patrick Stevedore Operations No. 2 and may only be used and relied on by Patrick Stevedore Operations No. 2 for the purpose agreed as set out in Section 1.1 of this report.

GHD otherwise disclaims responsibility to any person other than Patrick Stevedore Operations No. 2 arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in Section 1.3 of this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Patrick Stevedore Operations No. 2 and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

1.5 Report structure

The remainder of this report is structured as follows:

- **Section 2 - Existing conditions** – a review of existing road features, adjacent developments, traffic volumes, intersection operation and crash data.
- **Section 3 - The proposal** – a review of proposed construction arrangements and the likely traffic generated by the site once operational.
- **Section 4 - Construction traffic assessment** – assessment of the performance of the existing intersections (queues, delays, level of service, safety) during construction of the proposal.
- **Section 5 - Operational traffic** – a review of the operational traffic post proposal.
- **Section 6 – Summary** – a summary of the findings of this study.

2. Existing conditions

2.1 Existing road network characteristics

The classification of roads on the existing road network can be used as an indication of the functional role each road plays with respect to the volume of traffic they should appropriately carry. The NSW Roads and Maritime Service (RMS) have developed a set of road hierarchy classifications detailed in Table 1 indicating typical nominal volumes expressed in terms of AADT serviced by various classes of roads.

Table 1 Functional classification of roads

Type of Road	Traffic Volume (vpd*)	Peak Hour Volume (vph**)
Arterial Road	>20,000	>2,000
Sub-Arterial Road	10,000 – 20,000	1,000 – 2,000
Collector Road	2,000 – 10,000	200 – 1,000
Local Road	<2,000	0 – 200

Note: * vpd – vehicles per day

** vph – vehicles per hour

2.1.1 Penrhyn Road

Access to the site is provided from Penrhyn Road, which forms the southern approach to the signalised intersection of Foreshore Road and Botany Road and functions as a collector road. Penrhyn Road splits at a three arm roundabout approximately 150 metres south of Foreshore Road and continues along both the northern and eastern sides of the site. Penrhyn Road adjacent to the site has a posted speed limit of 40 km/h and is sealed with generally one lane in both directions (refer to Figure 1 and Photos 1 and 2).



Photo 1 – Penrhyn Road looking westbound west of the roundabout



Photo 2 – Penrhyn Road looking southbound south of Foreshore Road

2.1.2 Foreshore Road

Foreshore Road provides arterial road and B-Double route access to the site from General Holmes Drive. In the vicinity of Penrhyn Road the carriageway is median divided with two lanes in each direction (refer to Photo 3). The posted speed limit is generally 80 km/h.



Photo 3 – Foreshore Road looking west, west of Penrhyn Road.

2.1.3 Botany Road

Botany Road functions as an arterial road providing access to Beauchamp Road, Bunnerong Road and Wentworth Road. To the east of Penrhyn Road the carriageway is median divided with two lanes in each direction, with a posted speed limit of 70 km/h (refer to Photo 4).

To the north of the intersection with Penrhyn Road, Botany Road has a posted speed limit of 50 km/h and generally provides one lane in each direction.



Photo 4 – Botany Road looking westbound to the east of Penrhyn Road

2.2 Site operation

The container terminal is owned by Sydney Ports Corporation (SPC) and is currently leased by Patrick, who is responsible for the day-to-day running of the terminal. Access to the Patrick Terminal is from Penrhyn Road.

2.2.1 Hours of operation

The site currently operates 24 hours a day, seven days a week with three shifts as follows:

- Day shift 6.00 AM – 2.00 PM.
- Evening shift 2.00 PM – 10.00 PM.
- Night shift 10.00 PM – 6.00 AM.

2.3 Existing traffic volumes

2.3.1 Existing daily and peak hour traffic

Existing intersection turning movement counts for the AM and PM peak hour have been obtained from the Patrick Terminals Division Port Botany Terminal Operational Environmental Plan Appendix E – Traffic Management Plan dated September 2012 for the following:

- Penrhyn Road / Patrick Terminal Entry (roundabout).
- Penrhyn Road / Foreshore Road (signalised).

GHD commissioned additional intersection traffic surveys on Tuesday the 4th December 2012 between 7.00–10.00 AM and 3:30–6:30 PM, at the following intersections:

- Botany Road / Beauchamp Road (signalised).
- Botany Road / Bunnerong Road (priority controlled).

Maximum peak hour and estimated daily traffic volumes are summarised in Table 2 with the full survey data provided in Appendix A.

Table 2 Summary of traffic volumes (two-way traffic flows) –2012

Location	AM Peak Hour (vph)	PM Peak Hour (vph)
Penrhyn Road south of Foreshore Road	229	179
Foreshore Road west of Penrhyn Road	2642	2107
Botany Road north of Foreshore Road	1052	838
Botany Road east of Penrhyn Road	2839	2354
Penrhyn Road adjacent to site	109	40
Beauchamp Road north of Botany Road	1640	1587
Bunnerong Road north of Botany Road	660	821
Bunnerong Road south of Botany Road	981	1,111

Based on the existing traffic volumes shown in Table 2, these roads are all within the expected functional classification as outlined in Table 1.

2.3.2 Heavy vehicle composition

From the traffic volume surveys undertaken in 2012, the heavy vehicle percentage is shown in Table 3. As shown, over 55% of vehicles on Penrhyn Road were found to be heavy commercial vehicles, with 15% of vehicles recorded to be heavy vehicles on Botany Road and Foreshore Road.

Table 3 Heavy vehicles –2012

Location	Vehicles per hour (vph)	HCV* (vph)	HCV* %
Penrhyn Road south of Foreshore Road	229	125	55%
Foreshore Road west of Penrhyn Road	2642	388	15%
Botany Road north of Foreshore Road	1052	150	15%
Botany Road east of Penrhyn Road	2839	407	15%
Penrhyn Road adjacent to site	109	68	62%
Beauchamp Road north of Botany Road	1640	98	6%
Bunnerong Road north of Botany Road	821	34	4%
Bunnerong Road south of Botany Road	1111	33	3%

Note: * HCV – heavy commercial vehicles

2.3.3 Traffic growth

AADT data has been obtained from the RMS for Foreshore Road to determine the historical growth rates on the surrounding road network. Table 4 provides the AADT for the years 2005 and 2008 for Foreshore Road.

Table 4 Historical traffic growth

Year	AADT
2005	33,454
2008	35,191

According to this data, traffic on Foreshore Road has increased between 2005 and 2008 by approximately 1.5% annually. This percentage has been incorporated into the existing background traffic volumes to provide an estimate for 2014 (year of construction), 2015 (the year operation would commence).

2.4 Existing intersection performance

The performance of the existing road network is largely dependent on the operating performance of key intersections, which are critical capacity control points on the road network. SIDRA intersection modelling software was used to assess the proposed peak hour operating performance of intersections on the surrounding road network. The criteria for evaluating the operational performance of intersections is provided by the *RMS Guide to Traffic Generating Developments (2002)* and reproduced in Table 5. The criteria for evaluating the operational performance of intersections is based on a qualitative measure (i.e. level of service), which is applied to each band of average vehicle delay.

Table 5 Performance criteria at intersections

Level of Service	Average Delay Per Vehicle (secs/vehicle)	Traffic Signals, Roundabout	Give-Way and Stop Signs
A	Less than 14	Good Operation	Good Operation
B	15 to 28	Good with acceptable delays and spare capacity	Acceptable delays and spare capacity
C	29 to 42	Satisfactory	Satisfactory but accident study required
D	43 to 56	Operating near capacity	Near capacity and other accident study required
E	57 to 70	At capacity; at signals incidents will cause excessive delays	At capacity and requires other control mode
F	Greater than 70	Roundabouts require other control mode	

Notes:

- The average delay for priority-controlled intersections is selected from the movement on the approach with the highest average delay.
- The level of service for priority-controlled intersections is based on the highest average delay per vehicle for the most critical movement.
- The degree of saturation is defined as the ratio of the arrival flow (demand) to the capacity of each approach.

Existing traffic flows were analysed using SIDRA to obtain the operation of key intersections in the study area. Table 6 presents the results.

Table 6 Existing intersection performance AM and PM peak hour - 2012

Intersection	Morning Peak			Evening Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Penrhyn Road Roundabout	8	A	0.16	7	A	0.11
Foreshore/Penrhyn/Botany	27	B	0.83	56	D	0.96
Botany Road/Beauchamp Road	19	B	0.76	19	B	0.74

Table 6 indicates that the existing intersections of Penrhyn Road roundabout and Botany Road/Beauchamp Road currently operate satisfactorily in both the AM and PM peaks in 2012.

The intersection of Foreshore Road/Penrhyn Road/Botany Road operates satisfactorily in the AM peak, however, is operating near to capacity in the PM peak under existing conditions.

Detailed performance of these intersections is included in Appendix B.

2.5 Crash statistics

The RMS Crash Analysis Department supplied GHD with crash statistics for a five-year period from July 2007 to June 2011 for the following locations:

- Penrhyn Road.
- Foreshore Road;.
- Botany Road – between Foreshore Road and Bunnerong Road.

The crash statistics for each location are summarised below.

2.5.1 Penrhyn Road

In total, 16 crashes occurred over this 5 year period. Of these recorded crashes:

- 10 crashes resulted in injury.
- 6 were rear-end crashes.
- 4 were opposing vehicles turning.
- 11 crashes occurred at an intersection.
- 7 crashes involved an articulated vehicle.
- Speed was a contributing factor in 3 of the crashes.

These crashes occurred prior to the construction of the improved grade separated roundabout (over the rail line).

2.5.2 Foreshore Road

In total, 72 crashes occurred over this 5 year period. Of these recorded crashes:

- 1 crash resulted in a fatality.
- 31 crashes resulted in injury.
- 35 were rear-end crashes.
- 8 were as a result of a lane change.
- 33 crashes occurred at an intersection.
- 18 crashes involved an articulated vehicle.

- Speed was a contributing factor in 8 of the crashes.

2.5.3 Botany Road – between Foreshore Road and Bunnerong Road

In total, 83 crashes occurred over this 5 year period. Of these recorded crashes:

- 1 crash resulted in a fatality.
- 42 crashes resulted in injury.
- 22 were opposing vehicles turning.
- 14 were rear-end crashes.
- 5 were as a result of a lane change.
- 61 crashes occurred at an intersection.
- 18 crashes involved an articulated vehicle.
- Speed was a contributing factor in 5 of the crashes.

Detailed crash reports are included in Appendix C.

These crashes are not out of character for these type of high volume roads with a higher than average percentage of heavy vehicles accessing the port. Improvements to the Penrhyn Road roundabout to grade separate the road and rail have been completed since the recorded crash data for Penrhyn Road.

3. The proposal

3.1 Proposal description

The demolition and construction activities (referred to as the proposal) would be located entirely within the existing terminal footprint while the proposal would not change the operational capacity of the terminal. Replacement of manually operated equipment with automated equipment would result in a reduction in the number of staff working on the site from 511 to 241. This would result in a decrease of light vehicle movements entering and exiting the site.

Other key aspects of the proposal include:

- Removal of the temporary demountable administration building in the south eastern corner of the site and replacement with a permanent administration and control building. The new building would include a single-storey administration building and a control tower which would be approximately 43 metres in height.
- Construction of a new undercover maintenance building and workshop designed to accommodate the new automated straddle carriers.
- Removal of the existing optical character recognition (OCR) building and construction of a new OCR structure and traffic lanes at the entrance to the terminal.
- Construction of a new, single-storey demountable Australian Quarantine Inspection Service (AQIS) building adjacent to the new OCR structure.
- Relocation of the existing truck grids and weighbridges.
- Removal of an existing substation building.
- Construction of new straddle carrier parking and fuelling bays.
- Construction of two new car parks for visitors and employees.
- Pavement improvement works.
- Modernisation of terminal lighting including re-positioning of existing lights and installation of more energy efficient lighting within the container stacking yard.
- Replacement of the existing manually-operated straddle carriers with automated straddle carriers.
- Other infrastructure and environmental improvements including installation of: gross pollutant traps, upgraded drainage and pumps, light poles, new water and sewage services, boundary fencing and walls, weighbridge and associated equipment and landscaping works in accordance with the relevant statutory and port code requirements.

3.2 Other works in the vicinity of the proposal

Construction of the 'Knuckle' (the land reclamation area to the west of the Patrick Terminal) and also the proposed construction of Ramp D (the fourth arm of the grade separated Penrhyn Road roundabout) in the vicinity of the site is being undertaken concurrently and would overlap with the construction of the proposal (refer to Figure 1).

Construction access to the Knuckle site will be through a dedicated lane along Penrhyn Road, running parallel to, and south of the current terminal access lanes. A Traffic Management Plan for the Knuckle has been prepared by Parking and Traffic Consultants, *The Knuckle Construction Site Report dated December 2012*.

The construction assessment of the proposal takes into account the worst case scenario over the period where construction of all three projects is occurring at the same time.

3.3 Proposed construction arrangements

3.3.1 Construction schedule

The construction of the proposal would occur over a period of approximately 16 months which, subject to approval, is likely to commence in the 4th quarter of 2013.

3.3.2 Construction hours

Hours of construction for the proposal would be in accordance with current consent conditions:

- 7:00 AM – 6:00 PM, Monday to Friday.
- 8:00 AM – 2:00 PM, Saturdays.
- No construction on Sundays and public holidays.

4. Construction traffic assessment

4.1 Traffic generation

The construction workforce is expected to be up to 150 workers in the peak periods. Construction workers would access a designated parking area within the construction site from Penrhyn Road.

Based on the characteristics of the site, it has been assumed for the worst case scenario that there would be a typical car driver rate of 100% (i.e. each worker driving a car). Application of this car driver rate to the assumed workforce yields a traffic generation in the order of 150 light vehicles per day.

It is expected that the arrival of workers would occur before the observed road network AM peak hour (7:45-8:45 AM) and depart after the PM peak hour (4:30-5:30 PM). However, in order to provide a robust assessment of the construction traffic impact, 20% of worker light vehicles have been assumed to arrive in the AM peak and depart in the PM peak.

Patrick has advised that during periods of peak construction, up to 60 trucks may be expected to access the site per day. In order to provide a peak hour traffic impact assessment, it has been assumed that 20% of these trips would occur during the peak periods. The duration of the peak construction period is expected to be approximately four months. On average, the site is expected to generate in the order of 20 construction trucks per day.

The construction traffic generation for the site is summarised in Table 7.

Table 7 Construction traffic generation (peak)

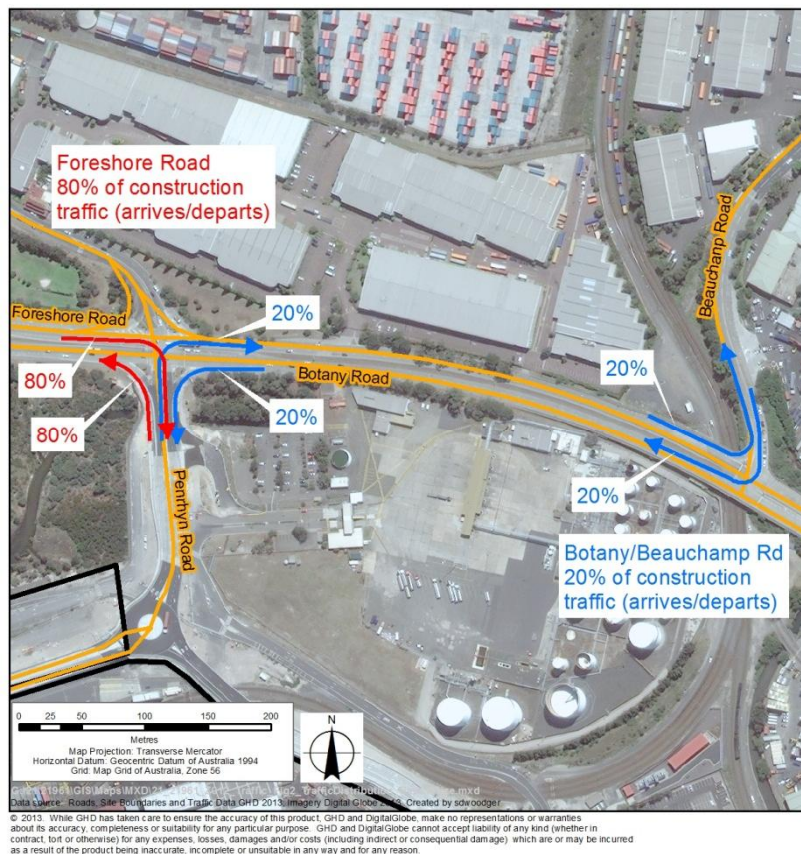
Proposed Construction Works	AM Peak hour traffic (vtph)*	PM Peak hour traffic (vtph)*
Heavy vehicles	12 (6 In / 6 Out)	12 (6 In / 6 Out)
Construction workers (light vehicles)	30 In	30 Out
Total	42 (36 In / 6 Out)	42 (6 In /36 Out)

Note: *(vtph) vehicle trips per hour

4.2 Proposed construction traffic routes

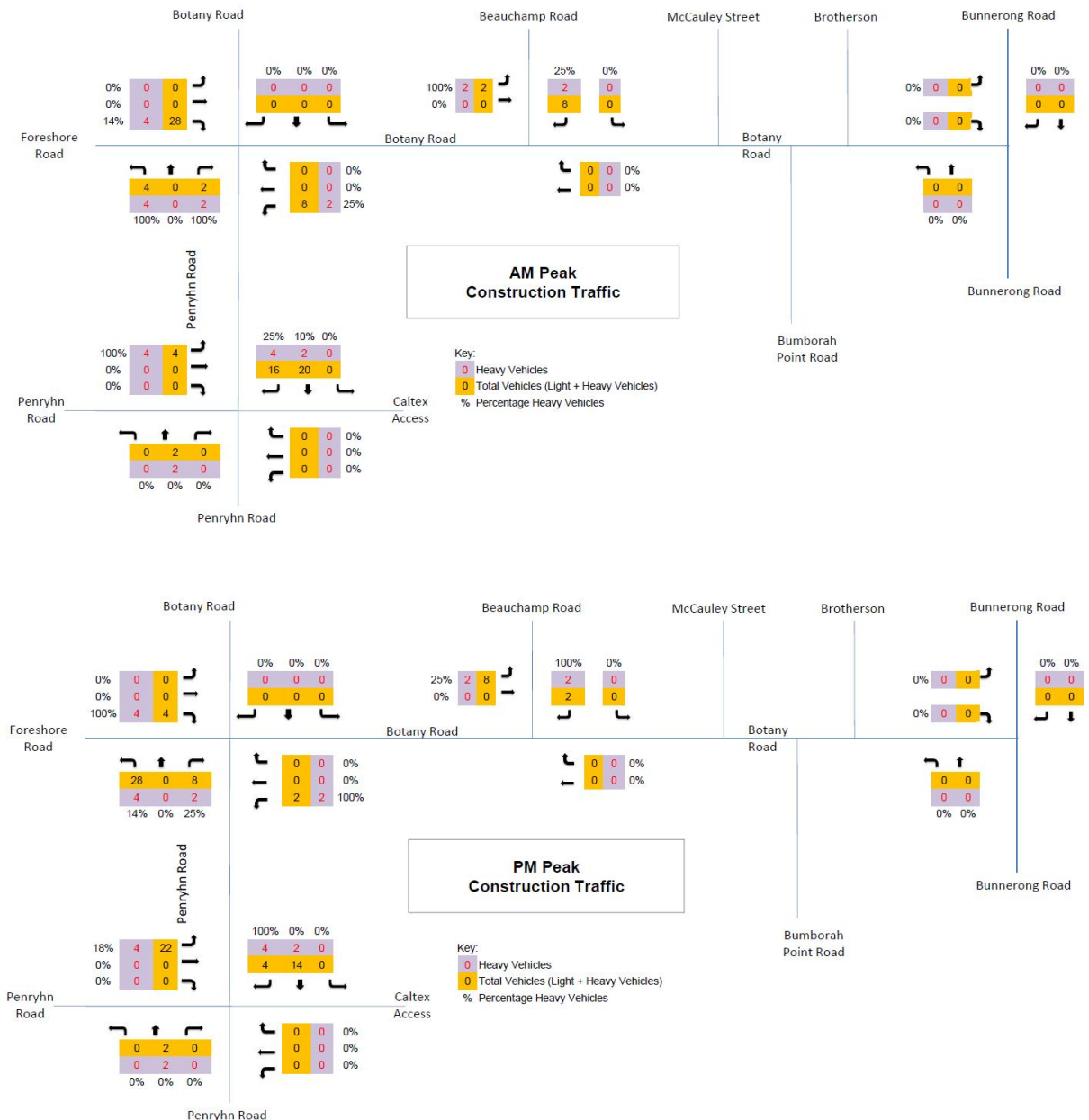
It is estimated that 80% of construction traffic would access the site from Foreshore Road. Therefore, it is assumed that the remaining 20% would access the site via Beauchamp Road and Botany Road, as shown in Figure 2.

Figure 2 – Traffic distribution



The construction traffic generated has been distributed onto the surrounding highway network based on the traffic distribution provided in Figure 2. The traffic associated with workers accessing the site shown in Table 7 has also been distributed onto the surrounding road network based on the traffic distribution shown in Figure 2. The resulting AM and PM peak hour construction traffic flows are provided in Figure 3.

Figure 3 – AM and PM peak hour construction traffic flows (peak)



4.3 Construction access

The various construction sites would be accessed by Penrhyn Road.

4.4 Road network and intersection performance during construction

Table 8 and Table 9 outline the potential traffic volume increases on the surrounding road network during the construction period.

Table 8 Summary of 2014 construction traffic volumes (vph) –AM peak

Location	2014 AM Peak Hour (vph)	AM Construction Traffic	2014 AM Peak (vph) with Construction	% Increase
Penrhyn Road south of Foreshore Road	236	42	278	18%
Foreshore Road west of Penrhyn Road	2722	32	2754	1%
Botany Road east of Penrhyn Road	2925	10	2935	0.3%

Table 9 Summary of 2014 construction traffic volumes (vph) –PM peak

Location	2014 PM Peak Hour (vph)	PM Construction Traffic	2014 PM Peak (vph) with Construction	% Increase
Penrhyn Road south of Foreshore Road	184	42	226	23%
Foreshore Road west of Penrhyn Road	2171	32	2203	2%
Botany Road east of Penrhyn Road	2425	10	2435	0.4%

Penrhyn Road provides direct access to the site and would be used by all construction vehicles. As indicated in Tables 8 and 9, there would be a significant increase in traffic on Penrhyn Road during the construction period.

Construction traffic from the proposal in addition to estimated 2014 baseline traffic volumes were analysed using SIDRA to identify the performance of key intersections. The results are presented in Table 10.

Table 10 Forecast intersection performance AM and PM peak hour – 2014

Intersection	AM Peak			PM Peak		
	Av Delay (s)	LoS	DoS	Av Delay (s)	LoS	DoS
Penrhyn Road Roundabout	9	A	0.18	7	A	0.12
Foreshore/Penrhyn/Botany	28	B	0.86	60	E	0.97
Botany Road/Beauchamp Road	20	B	0.79	19	B	0.77

Comparison between Table 6 and Table 10 indicates that the intersections of Penrhyn Road roundabout and Botany Road/Beauchamp Road would continue to operate satisfactorily in both the AM and PM peaks during the construction period.

The intersection of Foreshore Road/Penrhyn Road/Botany Road would continue to operate satisfactory in the AM peak, however during the PM peak the intersection would be operating at capacity for the duration of peak construction (LoS E). Tables 8 and 9 demonstrate that the proposal is only contributing an additional 1 or 2% during the AM and PM peak respectively. Therefore the primary cause of the reduced intersection performance during the PM peak is the background traffic growth.

Detailed performance of these intersections is provided in Appendix B.

4.5 Cumulative construction traffic

Based on the likely construction schedule, the worst case cumulative construction traffic scenario would occur during the period where construction of the proposal, Knuckle and Ramp D were being undertaken concurrently noting that the Knuckle works are already underway.

It is expected that the majority of the Knuckle site would be completed prior to the peak construction of the Patrick site and the cumulative effects of these two projects have already been considered in the above assessment as Knuckle construction vehicles were included in the traffic surveys conducted in December 2012.

Construction of Ramp D is expected to generate up to 15 vph additional during the construction period. As these works are comparatively minor, Patrick would commit to managing construction vehicles associated with this project outside of the AM and PM peak periods to avoid potential cumulative impacts.

5. Operational traffic assessment

5.1 Traffic generation during operation

The proposal would not result in changes to the operational capacity of the terminal and therefore heavy vehicles entering and exiting the site would not change as a result of the proposal. However the replacement of manually operated equipment with automated equipment would result in a reduction in the number of staff at the site by more than half; from 511 to 241. This would result in a decrease of light vehicle movements entering and exiting the site.

Therefore, there would be no traffic increase expected on the surrounding road network as a result of this proposal.

5.2 Cumulative operational traffic

Cumulative operational traffic impacts were investigated as part of the SPC Port Botany Expansion (2003). As approved, operational truck traffic from the new development would use a new road bridge to the west of the Penrhyn Road/ Botany Road/ Foreshore Road intersection. More recent discussions with SPC and Patrick, however, have resolved that container transport to and from the Knuckle development would be via the existing Patrick terminal and Penrhyn Road.

Figure 4 shows the existing terminal truck entries over a peak period of activity at the terminal (4 December 2012). The theoretical gate entry limit is also shown. As can be seen from the data, the current gate entry limit is reached only once during the 24-hour period shown while the average number of entries across the day is some 25 per cent lower than the gate limit. The data shown in Figure 4 represents a worst case scenario. At times of less activity at the terminal there would be further additional gate capacity available.

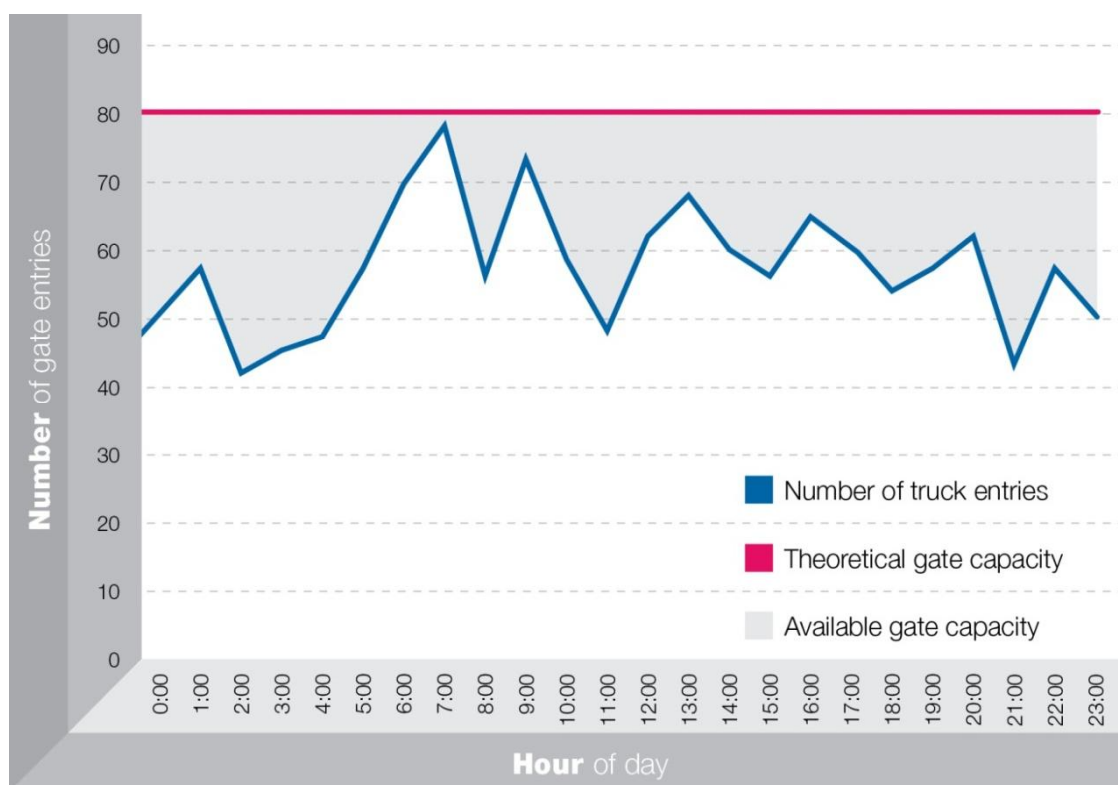
Rather than investing in additional infrastructure and technology to increase the theoretical gate limit during the peak hours, additional operational truck traffic arising from the Knuckle would instead be spread across the day during periods of available capacity to manage the additional truck traffic. This would also reduce impacts on the road network and key intersections.

SPC have implemented a range of capital work and traffic management regimes to better manage the expected growth in heavy vehicles from the port in response to increasing demand. These improvements include:

- Grade separation of the Penrhyn Road/Botany Road/Foreshore Road roundabout.
- Footbridge over Foreshore Road connected to Sir Joseph Banks Park.
- Right turn and road access bridge to SICTL terminal from Foreshore Road.
- Truck marshalling area on Foreshore Road.

Additionally, new proposals for the Governments WestConnex development and specifically, the proposed Sydney Airport Access Link may also stimulate changes to travelling patterns for the commercial and industrial area north of the airport and Foreshore Road as well as Port Botany.

Figure 4 – Existing truck entries during peak activity at terminal
(4 December 2012)



6. Summary and conclusion

6.1 Key findings

6.1.1 Existing conditions

The performance of intersections surrounding the site indicate that there is spare capacity to accommodate additional traffic during the construction stage of the proposal at the Penrhyn Road roundabout and Botany Road/Beauchamp Road.

The intersection of Foreshore Road/Penrhyn Road/Botany Road operates satisfactorily in the AM peak, however, is operating near to capacity in the PM peak under existing 2012 conditions.

6.1.2 Road safety

The construction and operation of the proposal is not expected to have any adverse impacts on crash trends on the surrounding road network.

6.1.3 Construction traffic

Intersection performance modelling was conducted based on a worst case assumption that the number of construction heavy vehicle movements would be uniformly distributed over the working day. In addition it has been assumed that approximately 20% of construction workers light vehicles would occur during the peak hours.

The forecast performance of key intersections indicates that during construction there continues to be spare capacity at the Penrhyn Road roundabout and Botany Road/Beauchamp Road during both the AM and PM peaks.

The intersection of Foreshore Road/Penrhyn Road/Botany Road would continue to operate satisfactorily in the AM peak, however would operate at capacity (LoS E) in the PM peak during the peak construction period. Analysis of this result indicates that the proposal would only add 2% additional traffic during the PM peak and therefore the primary cause is the natural growth of background traffic.

The construction workforce is expected to be up to 150 workers in the peak periods. Construction workers would access designated parking areas within the terminal from Penrhyn Road.

6.1.4 Operational traffic

The proposal would not result in changes to the operational capacity of the terminal and therefore heavy vehicles entering and exiting the site would not change from current 2012 volumes except in response to overall port demand. However, the replacement of manually operated equipment with automated equipment would result in a reduction in the number of staff at the site from approximately 511 to 241. This would result in a decrease of light vehicle movements entering and exiting the site.

6.1.5 Cumulative impacts

It is expected that the majority of the Knuckle site construction works would be completed prior to the peak construction within the existing Patrick site, and the cumulative effects of these two projects have already been considered in the assessment as Knuckle construction vehicles were included in the traffic surveys conducted in December 2012.

Construction of Ramp D is expected to generate approximately 15 vph additional during the construction period. As these works are comparatively minor, Patrick would commit to managing

construction vehicles associated with this project outside of the AM and PM peak periods to avoid potential cumulative impacts.

Cumulative operational traffic impacts were investigated as part of the SPC Port Botany Expansion (2003). Additional operational truck traffic arising from the Knuckle would be spread across the day during periods of available capacity to manage the additional truck traffic. This would also reduce impacts on the road network and key intersections. SPC have also implemented a range of capital work and traffic management regimes to better manage the expected growth in heavy vehicles from the port in response to increasing demand.

6.2 Conclusion

To manage potential construction impacts, particularly at Foreshore Road/Penrhyn Road/Botany Road intersection, a construction traffic management plan would be prepared for the proposal, which would ensure construction vehicles access the site outside of the peak hours.

As the proposal would not result in any changes to the terminal capacity or heavy vehicle entries or exits following the completion of construction, the proposal would have no unacceptable impacts on traffic flows on the surrounding road network.

7. References

The Knuckle Construction Site Patrick Terminal, Port Botany – Parking and Traffic Consultants dated December 2012

Port Botany Patrick Facility Proposed Expansion Traffic Management Plan – Parking and Traffic Consultants dated June 2012

Patrick Terminal, Port Botany Adding a lane to the Existing Roundabout – Parking and Traffic Consultants dated December 2012

Sydney Ports Corporation Port Botany Expansion Environmental Impact Statement – URS dated November 2003

Sydney Ports Corporation Traffic Management Plan Guidelines – Sydney Ports Corporation dated December 2007.

Weekday AM and PM peak intersection traffic surveys undertaken by Roar Data Pty Ltd

Appendices

Appendix A – Traffic surveys



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting
Job No/Name : 4008 PORT BOTANY Penryhn Rd
Day/Date : Friday 2nd March 2012

Lights

Lights	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period													TOT
0700 - 0715	51	9	9	53	286	9	3	2	3	5	122	31	583
0715 - 0730	35	2	18	52	267	10	3	4	0	4	138	39	572
0730 - 0745	60	5	11	56	253	9	0	5	0	4	174	61	638
0745 - 0800	53	5	14	65	269	6	1	3	2	4	195	55	672
0800 - 0815	74	3	9	75	296	9	1	6	1	9	149	49	681
0815 - 0830	83	5	18	86	289	6	0	5	3	10	177	53	735
0830 - 0845	88	3	15	69	307	6	2	2	1	11	190	64	758
0845 - 0900	85	2	14	50	241	5	1	5	2	11	121	66	603
0900 - 0915	70	3	7	38	183	7	2	6	2	6	116	52	492
0915 - 0930	65	4	14	50	181	10	0	4	5	6	105	44	488
Period End	664	41	129	594	2572	77	13	42	19	70	1487	514	6222

Lights

Lights	NORTH			WEST			SOUTH			EAST			TOTAL
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Peak Period													
0700 - 0800	199	21	52	226	1075	34	7	14	5	17	629	186	2465
0715 - 0815	222	15	52	248	1085	34	5	18	3	21	656	204	2563
0730 - 0830	270	18	52	282	1107	30	2	19	6	27	695	218	2726
0745 - 0845	298	16	56	295	1161	27	4	16	7	34	711	221	2846
0800 - 0900	330	13	56	280	1133	26	4	18	7	41	637	232	2777
0815 - 0915	326	13	54	243	1020	24	5	18	8	38	604	235	2588
0830 - 0930	308	12	50	207	912	28	5	17	10	34	532	226	2341

PEAK HOUR	298	16	56	295	1161	27	4	16	7	34	711	221	2846
-----------	-----	----	----	-----	------	----	---	----	---	----	-----	-----	------

Heavies Rigid

Heavies Rigid	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period												TOT	
0700 - 0715	8	0	2	5	4	1	0	1	0	1	8	5	35
0715 - 0730	7	0	3	3	6	0	0	0	0	0	7	7	33
0730 - 0745	6	1	7	1	12	0	0	1	0	0	12	8	48
0745 - 0800	6	0	3	1	4	0	0	0	0	0	19	8	41
0800 - 0815	3	2	1	3	2	0	0	1	1	3	13	9	38
0815 - 0830	4	0	2	1	2	0	0	2	0	0	11	11	33
0830 - 0845	5	0	3	4	7	1	0	0	0	0	12	5	37
0845 - 0900	5	1	5	2	9	0	1	0	0	0	12	1	36
0900 - 0915	8	1	1	2	9	0	0	0	0	2	18	9	50
0915 - 0930	5	0	5	3	9	0	3	0	1	3	21	3	53
Period End	57	5	32	25	64	2	4	5	2	9	133	66	404

Heavies Rigid

Heavies <u>Rigid</u>	NORTH			WEST			SOUTH			EAST			TOTAL
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Peak Period													
0700 - 0800	27	1	15	10	26	1	0	2	0	1	46	28	157
0715 - 0815	22	3	14	8	24	0	0	2	1	3	51	32	160
0730 - 0830	19	3	13	6	20	0	0	4	1	3	55	36	160
<u>0745 - 0845</u>	18	2	9	9	15	1	0	3	1	3	55	33	149
0800 - 0900	17	3	11	10	20	1	1	3	1	3	48	26	144
0815 - 0915	22	2	11	9	27	1	1	2	0	2	53	26	156
0830 - 0930	23	2	14	11	34	1	4	0	1	5	63	18	176

PEAK HOUR	18	2	9	9	15	1	0	3	1	3	55	33	149
-----------	----	---	---	---	----	---	---	---	---	---	----	----	-----



Articulated

Articulated	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period												TOT	
0700 - 0715	3	2	10	5	33	8	12	0	2	12	15	2	104
0715 - 0730	5	1	8	6	37	6	6	2	7	8	24	5	115
0730 - 0745	4	0	5	6	29	2	12	0	2	10	25	4	99
0745 - 0800	5	0	4	6	21	2	10	1	4	7	26	2	88
0800 - 0815	3	5	3	4	24	8	8	1	4	14	27	2	103
0815 - 0830	6	2	5	5	24	3	13	1	4	6	30	2	101
0830 - 0845	3	0	8	5	25	3	7	0	4	8	28	3	94
0845 - 0900	1	5	4	8	43	6	14	1	5	6	19	3	115
0900 - 0915	5	3	3	11	45	3	9	0	4	8	18	1	110
0915 - 0930	4	2	7	7	37	9	13	1	3	9	17	8	117
Period End	39	20	57	63	318	50	104	7	39	88	229	32	1046

Articulated

Articulated	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Peak Period													TOTAL
0700 - 0800	17	3	27	23	120	18	40	3	15	37	90	13	406
0715 - 0815	17	6	20	22	111	18	36	4	17	39	102	13	405
0730 - 0830	18	7	17	21	98	15	43	3	14	37	108	10	391
0745 - 0845	17	7	20	20	94	16	38	3	16	35	111	9	386
0800 - 0900	13	12	20	22	116	20	42	3	17	34	104	10	413
0815 - 0915	15	10	20	29	137	15	43	2	17	28	95	9	420
0830 - 0930	13	10	22	31	150	21	43	2	16	31	82	15	436

PEAK HOUR	17	7	20	20	94	16	38	3	16	35	111	9	386
-----------	----	---	----	----	----	----	----	---	----	----	-----	---	-----

COMBINED

COMBINED	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period													TOT
0700 - 0715	62	11	21	63	323	18	15	3	5	18	145	38	722
0715 - 0730	47	3	29	61	310	16	9	6	7	12	169	51	720
0730 - 0745	70	6	23	63	294	11	12	6	2	14	211	73	785
0745 - 0800	64	5	21	72	294	8	11	4	6	11	240	65	801
0800 - 0815	80	10	13	82	322	17	9	8	6	26	189	60	822
0815 - 0830	93	7	25	92	315	9	13	8	7	16	218	66	869
0830 - 0845	96	3	26	78	339	10	9	2	5	19	230	72	889
0845 - 0900	91	8	23	60	293	11	16	6	7	17	152	70	754
0900 - 0915	83	7	11	51	237	10	11	6	6	16	152	62	652
0915 - 0930	74	6	26	60	227	19	16	5	9	18	143	55	658
Period End	760	66	218	682	2954	129	121	54	60	167	1849	612	7672

COMBINED

COMBINED	NORTH			WEST			SOUTH			EAST			TOTAL
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Peak Period													
0700 - 0800	243	25	94	259	1221	53	47	19	20	55	765	227	3028
0715 - 0815	261	24	86	278	1220	52	41	24	21	63	809	249	3128
0730 - 0830	307	28	82	309	1225	45	45	26	21	67	858	264	3277
0745 - 0845	333	25	85	324	1270	44	42	22	24	72	877	263	3381
0800 - 0900	360	28	87	312	1269	47	47	24	25	78	789	268	3334
0815 - 0915	363	25	85	281	1184	40	49	22	25	68	752	270	3164
0830 - 0930	344	24	86	249	1096	50	52	19	27	70	677	259	2953

PEAK HOUR	333	25	85	324	1270	44	42	22	24	72	877	263	3381
-----------	-----	----	----	-----	------	----	----	----	----	----	-----	-----	------



R.O.A.R DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting

Job No/Name : 4008 PORT BOTANY Penryhn Rd

Day/Date : Friday 2nd March 2012



Botany Rd

TOTAL
VOLUMES
FOR COUNT
PERIOD

1348
1150
96
102

116
94
834
1044

431 91 3243 3765
2188 1629 169 390

Forshore Rd

Forshore Rd

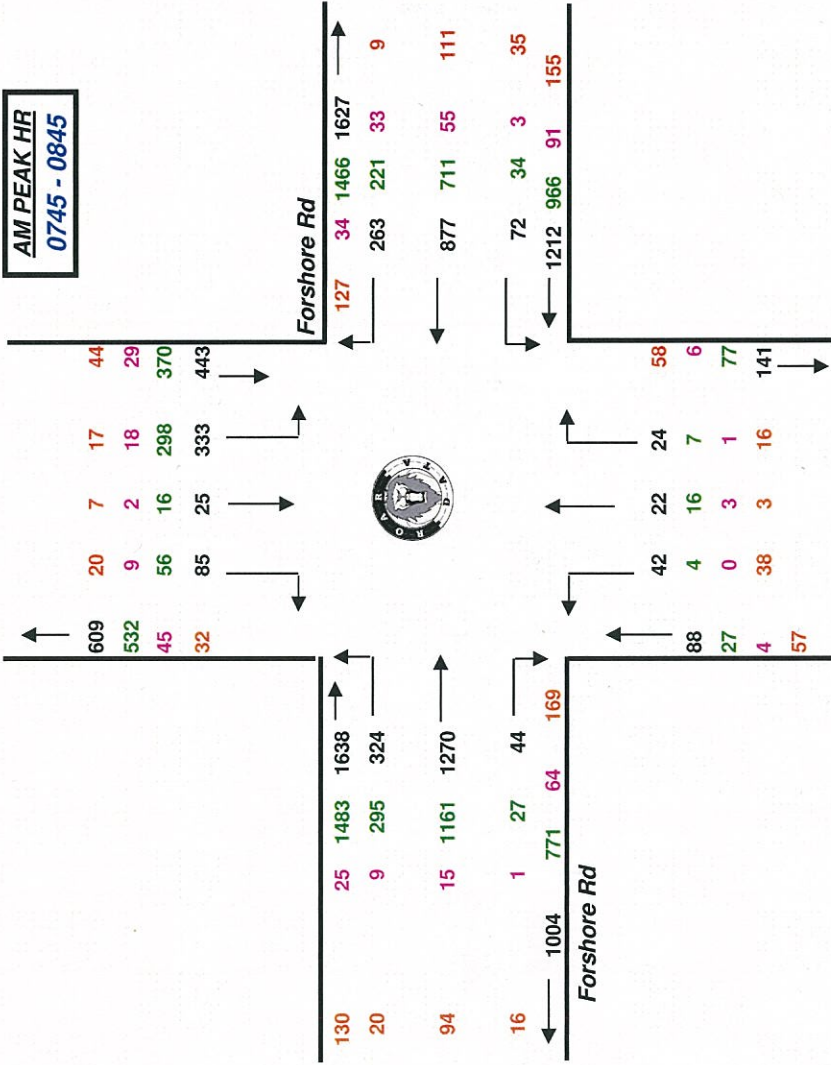
2628 2071 208 349

235
74
11
150

158
16
188
362

Penryhn Rd

Botany Rd





Lights

Lights	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period													TOT
1630 - 1645	66	5	37	5	161	3	12	4	6	2	226	50	577
1645 - 1700	71	1	40	11	168	2	9	3	4	1	229	49	588
1700 - 1715	67	0	84	10	163	2	9	5	10	2	251	67	670
1715 - 1730	65	0	36	9	170	3	6	3	7	0	255	57	611
1730 - 1745	47	3	42	13	165	5	3	6	3	5	225	49	566
1745 - 1800	60	0	29	6	154	3	7	5	1	2	186	38	491
1800 - 1815	49	1	28	7	130	0	7	2	1	3	217	42	487
1815 - 1830	51	3	28	1	150	0	4	0	4	3	160	33	437
Period End	476	13	324	62	1261	18	57	28	36	18	1749	385	4427

Lights

Lights	NORTH			WEST			SOUTH			EAST			TOTAL
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Peak Period													
	</												

PEAK HOUR	269	6	197	35	662	10	36	15	27	5	961	223	2446
-----------	-----	---	-----	----	-----	----	----	----	----	---	-----	-----	------

Heavies Rigid

Heavies <u>Rigid</u>	NORTH			WEST			SOUTH			EAST			
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period													TOT
1630 - 1645	2	0	0	1	2	0	0	0	0	0	1	3	9
1645 - 1700	4	1	3	1	0	0	1	1	0	0	2	5	18
1700 - 1715	4	0	1	1	2	0	0	0	0	0	4	3	15
1715 - 1730	2	0	2	1	1	0	0	0	0	0	5	7	18
1730 - 1745	3	0	4	0	0	0	0	0	0	0	4	2	13
1745 - 1800	1	0	1	1	0	0	0	0	0	1	4	2	10
1800 - 1815	2	0	1	2	0	0	0	0	0	0	0	0	5
1815 - 1830	2	0	0	0	4	0	0	0	0	0	1	1	8
Period End	20	1	12	7	9	0	1	1	0	1	21	23	96

Heavies Rigid

Heavies <u>Rigid</u>	NORTH			WEST			SOUTH			EAST			TOTAL
	Botany Rd			Forshore Rd			Penryhn Rd			Forshore Rd			
	L	I	R	L	I	R	L	I	R	L	I	R	
Peak Period													
1630 - 1730	12	1	6	4	5	0	1	1	0	0	12	18	60
1645 - 1745	13	1	10	3	3	0	1	1	0	0	15	17	64
1700 - 1800	10	0	8	3	3	0	0	0	0	1	17	14	56
1715 - 1815	8	0	8	4	1	0	0	0	0	1	13	11	46
1730 - 1830	8	0	6	3	4	0	0	0	0	1	9	5	36

PEAK HOUR	12	1	6	4	5	0	1	1	0	0	12	18	60
-----------	----	---	---	---	---	---	---	---	---	---	----	----	----



Articulated

Articulated	NORTH				WEST				SOUTH				EAST			
	Botany Rd				Forshore Rd				Penryhn Rd				Forshore Rd			
	L	I	R	TOT	L	I	R	TOT	L	I	R	TOT	L	I	R	TOT
Time Period																
1630 - 1645	1	2	8	6	16	3	4	0	4	0	12	3	59			
1645 - 1700	5	1	4	2	11	4	15	3	12	2	9	3	71			
1700 - 1715	1	0	2	1	20	4	6	3	3	1	12	0	53			
1715 - 1730	0	0	1	1	14	0	3	0	3	4	20	4	50			
1730 - 1745	2	0	4	3	8	0	5	0	1	1	25	3	52			
1745 - 1800	3	0	3	1	11	0	4	0	1	1	20	4	48			
1800 - 1815	2	0	2	1	11	0	3	1	1	0	14	0	35			
1815 - 1830	1	0	3	2	9	1	2	0	1	1	19	1	40			
Period End	15	3	27	17	100	12	42	7	26	10	131	18	408			

Articulated

Articulated	NORTH				WEST				SOUTH				EAST				TOTAL
	Botany Rd				Forshore Rd				Penryhn Rd				Forshore Rd				
	L	I	R	R	L	I	R	R	L	I	R	R	L	I	R	R	
Peak Period	7	3	15	10	61	11	28	6	22	7	53	10	233				
1630 - 1730	8	1	11	7	53	8	29	6	19	8	66	10	226				
1645 - 1745	6	0	10	6	53	4	18	3	8	7	77	11	203				
1700 - 1800	7	0	10	6	44	0	15	1	6	6	79	11	185				
1715 - 1815	8	0	12	7	39	1	14	1	4	3	78	8	175				
1730 - 1830																	
PEAK HOUR	7	3	15	10	61	11	28	6	22	7	53	10	233				

COMBINED

COMBINED	NORTH				WEST				SOUTH				EAST			
	Botany Rd				Forshore Rd				Penryhn Rd				Forshore Rd			
	L	I	R	R	L	I	R	R	L	I	R	R	L	I	R	R
Time Period																TOT
1630 - 1645	69	7	45	12	179	6	16	4	10	2	239	56	645			
1645 - 1700	80	3	47	14	179	6	25	7	16	3	240	57	677			
1700 - 1715	72	0	87	12	185	6	15	8	13	3	267	70	738			
1715 - 1730	67	0	39	11	185	3	9	3	10	4	280	68	679			
1730 - 1745	52	3	50	16	173	5	8	6	4	6	254	54	631			
1745 - 1800	64	0	33	8	165	3	11	5	2	4	210	44	549			
1800 - 1815	53	1	31	10	141	0	10	3	2	3	231	42	527			
1815 - 1830	54	3	31	3	163	1	6	0	5	4	180	35	485			
Period End	511	17	363	86	1370	30	100	36	62	29	1901	426	4931			

COMBINED

COMBINED	NORTH				WEST				SOUTH				EAST				TOTAL
	Botany Rd				Forshore Rd				Penryhn Rd				Forshore Rd				
	L	I	R	R	L	I	R	R	L	I	R	R	L	I	R	R	
Peak Period	288	10	218	49	728	21	65	22	49	12	1026	251	2739				
1630 - 1730	271	6	223	53	722	20	57	24	43	16	1041	249	2725				
1645 - 1745	255	3	209	47	708	17	43	22	29	17	1011	236	2597				
1700 - 1800	236	4	153	45	664	11	38	17	18	17	975	208	2386				
1715 - 1815	223	7	145	37	642	9	35	14	13	17	875	175	2192				
1730 - 1830																	
PEAK HOUR	288	10	218	49	728	21	65	22	49	12	1026	251	2739				



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

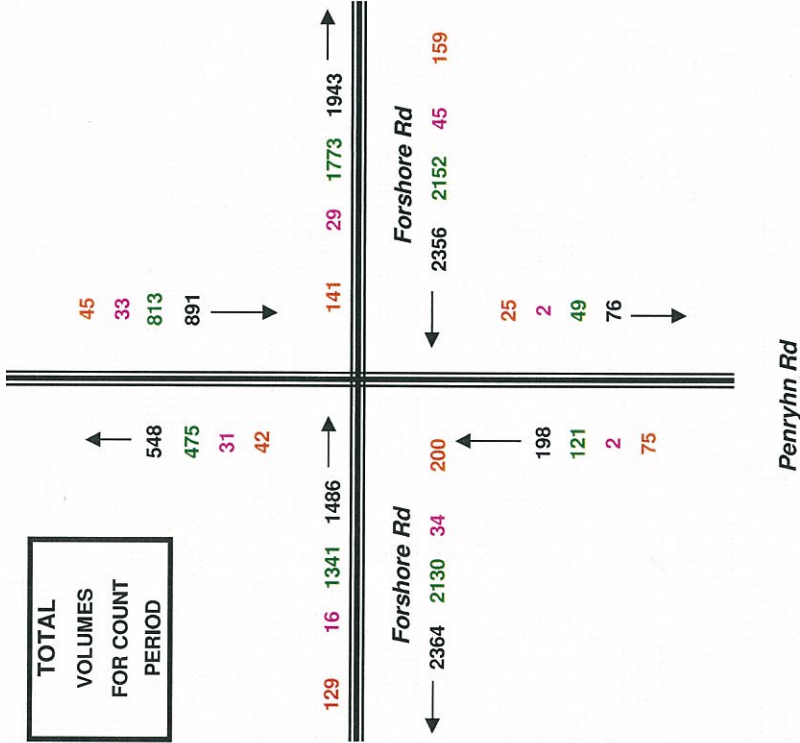
Client : Parking & Traffic Consulting

Job No/Name : 4008 PORT BOTANY Penryhn Rd

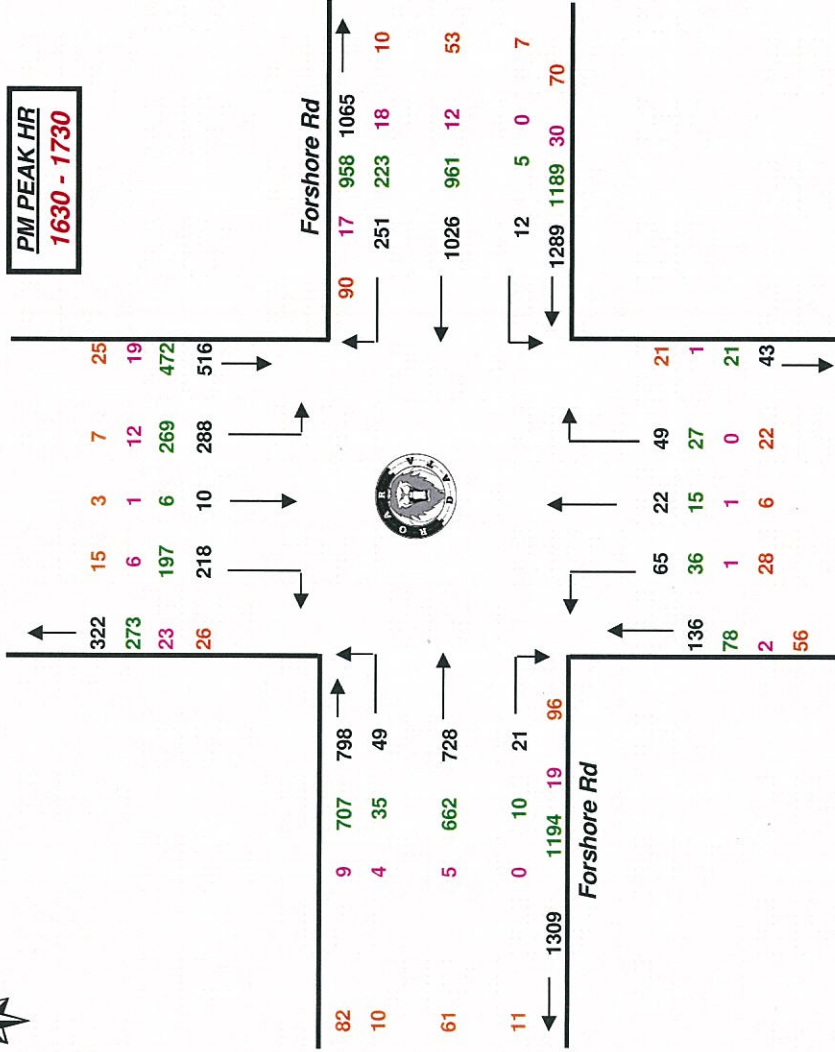
Day/Date : Friday 2nd March 2012



Botany Rd



Botany Rd



Penryhn Rd



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting
Job No/Name : 4008 PORT BOTANY Penryhn Rd
Day/Date : Friday 2nd March 2012

Lights

Time Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penrhyn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
0700 - 0715	2	12	10	0	0	0	0	0	0	4	0	0	0	0	1	29
0715 - 0730	4	5	8	1	0	0	0	0	1	6	0	0	0	0	1	26
0730 - 0745	4	7	7	2	0	0	0	0	1	6	0	0	0	0	0	27
0745 - 0800	2	12	5	1	0	3	2	4	0	0	0	0	0	0	3	32
0800 - 0815	1	18	4	1	0	2	4	7	0	0	0	0	0	0	0	37
0815 - 0830	6	9	7	0	0	5	0	4	0	4	0	0	0	0	1	32
0830 - 0845	4	11	4	0	0	6	1	4	0	4	0	0	0	0	1	31
0845 - 0900	6	6	5	0	0	3	2	5	0	0	0	0	0	0	2	29
0900 - 0915	2	9	5	0	0	2	6	7	0	0	0	0	0	0	2	33
0915 - 0930	4	11	1	1	0	1	3	5	0	1	0	1	1	0	0	28
Period End	35	100	56	6	0	22	20	52	0	1	1	1	1	1	11	304

Lights

Peak Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penrhyn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
0700 - 0800	12	36	30	4	0	3	4	20	0	0	0	5	114			
0715 - 0815	11	42	24	5	0	5	8	23	0	0	0	4	122			
0730 - 0830	13	46	23	4	0	10	7	21	0	0	0	4	128			
0745 - 0845	13	50	20	2	0	16	7	19	0	0	0	5	132			
0800 - 0900	17	44	20	1	0	16	7	20	0	0	0	4	129			
0815 - 0915	18	35	21	0	0	16	9	20	0	0	0	6	125			
0830 - 0930	16	37	15	1	0	12	12	21	0	1	1	5	121			

PEAK HOUR	16	37	15	1	0	12	12	21	0	1	1	5	121
-----------	----	----	----	---	---	----	----	----	---	---	---	---	-----

Heavies Rigid

Time Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penrhyn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
0700 - 0715	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	2
0715 - 0730	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0730 - 0745	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
0745 - 0800	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0800 - 0815	2	1	2	0	0	0	0	2	0	0	0	0	0	0	0	7
0815 - 0830	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	2
0830 - 0845	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1
0845 - 0900	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	3
0900 - 0915	0	0	3	0	0	0	0	3	0	0	0	0	0	0	0	6
0915 - 0930	0	0	3	0	0	0	0	1	0	0	0	0	0	0	0	4
Period End	2	2	11	0	0	1	0	9	0	0	0	1	0	0	1	26

Heavies Rigid

Peak Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penrhyn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
0700 - 0800	0	1	1	0	0	0	0	1	0	0	0	0	0	0	0	3
0715 - 0815	2	2	2	0	0	0	0	2	0	0	0	0	0	0	0	8
0730 - 0830	2	2	2	0	0	0	0	4	0	0	0	0	0	0	0	10
0745 - 0845	2	1	2	0	0	1	0	4	0	0	0	0	0	0	0	10
0800 - 0900	2	1	4	0	0	1	0	4	0	0	0	1	13			
0815 - 0915	0	0	5	0	0	1	0	5	0	0	0	1	12			
0830 - 0930	0	0	8	0	0	1	0	4	0	0	0	1	14			

PEAK HOUR	0	0	8	0	0	1	0	4	0	0	0	1	14
-----------	---	---	---	---	---	---	---	---	---	---	---	---	----



Articulated

Articulated	NORTH			WEST			SOUTH			EAST			
	Penryhn Rd			Penrhyn Rd			Terminal Access			Caltex Access			
	L	I	R	L	I	R	L	I	R	L	I	R	
	TOT												TOT
0700 - 0715	1	3	20	0	0	0	0	13	0	0	1	1	39
0715 - 0730	1	4	11	0	0	0	0	3	15	0	0	0	34
0730 - 0745	0	4	9	0	0	0	0	1	14	0	0	0	28
0745 - 0800	0	6	2	0	0	0	0	2	15	0	0	0	25
0800 - 0815	0	2	28	0	0	0	0	1	14	0	0	0	45
0815 - 0830	1	1	6	0	0	0	0	2	16	0	0	0	26
0830 - 0845	1	2	8	0	0	0	0	0	11	0	0	0	22
0845 - 0900	2	5	11	0	0	0	0	1	21	0	0	0	40
0900 - 0915	1	1	11	0	0	0	0	12	14	0	0	0	39
0915 - 0930	1	8	14	0	0	0	0	2	17	0	0	1	43
Period End	8	36	120	0	0	0	0	24	150	0	1	2	341

COMBINED

COMBINED	NORTH					WEST					SOUTH					EAST				
	Penryhn Rd					Penrhyn Rd					Terminal Access					Caltex Access				
	L	I	R	L	R	L	I	R	L	I	R	L	I	R	L	I	R	TOT		
Time Period	3	15	31	0	0	0	0	0	0	18	0	0	1	2				70		
0700 - 0715	5	9	19	1	0	0	0	0	0	21	0	0	0	1				60		
0715 - 0730	4	12	16	2	0	0	0	0	0	20	0	0	0	0				56		
0730 - 0745	2	18	7	1	0	0	0	3	4	19	0	0	0	3				57		
0745 - 0800	3	21	34	1	0	0	2	5	23	0	0	0	0	0				89		
0800 - 0815	7	10	13	0	0	0	5	2	22	0	0	0	0	1				60		
0815 - 0830	5	13	12	0	0	0	7	1	15	0	0	0	0	1				54		
0830 - 0845	8	11	18	0	0	0	3	3	26	0	0	0	0	3				72		
0845 - 0900	3	10	19	0	0	0	2	18	24	0	0	0	0	2				78		
0900 - 0915	5	19	18	1	0	0	1	5	23	0	1	1	1	1				75		
0915 - 0930																				
Period End	45	138	187	6	0	0	23	44	211	0	1	2	14	671						

Articulated

Articulated	NORTH			WEST			SOUTH			EAST			TOTAL	
	Penryhn Rd			Penrhyn Rd			Terminal Access			Caltex Access				
	L	I	R	L	I	R	L	I	R	L	I	R		
Peak Period														
0700 - 0800	2	17	42	0	0	0	6	57	0	0	1	1	1	126
0715 - 0815	1	16	50	0	0	0	7	58	0	0	0	0	0	132
0730 - 0830	1	13	45	0	0	0	6	59	0	0	0	0	0	124
0745 - 0845	2	11	44	0	0	0	5	56	0	0	0	0	0	118
0800 - 0900	4	10	53	0	0	0	4	62	0	0	0	0	0	133
0815 - 0915	5	9	36	0	0	0	15	62	0	0	0	0	0	127
0830 - 0930	5	16	44	0	0	0	15	63	0	0	0	0	1	144

PEAK HOUR	5	16	44	0	0	0	0	0	0	0	15	63	0	0	0	0	0	0	0	0	1	144
-----------	---	----	----	---	---	---	---	---	---	---	----	----	---	---	---	---	---	---	---	---	---	-----

COMBINED

COMBINED	NORTH					WEST					SOUTH					EAST					TOTAL
	Penryhn Rd					Penrhyn Rd					Terminal Access					Caltex Access					
	L	I	R	L	R	L	I	R	L	I	R	L	I	R	L	I	R				
Peak Period																					
0700 - 0800	14	54	73	4	0	3			10	78	0	0	1	6						243	
0715 - 0815	14	60	76	5	0	5			15	83	0	0	0	4						262	
0730 - 0830	16	61	70	4	0	10			13	84	0	0	0	4						262	
0745 - 0845	17	62	66	2	0	17			12	79	0	0	0	5						260	
0800 - 0900	23	55	77	1	0	17			11	86	0	0	0	5						275	
0815 - 0915	23	44	62	0	0	17			24	87	0	0	0	7						264	
0830 - 0930	21	53	67	1	0	13			27	88	0	1		7						279	

PEAK HOUR	21	53	67	1	0	13	27	88	0	0	1	1	7	279								
-----------	----	----	----	---	---	----	----	----	---	---	---	---	---	-----	--	--	--	--	--	--	--	--



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting

Job No/Name : 4008 PORT BOTANY Penryhn Rd

Day/Date : Friday 2nd March 2012



Penryhn Rd

TOTAL
VOLUMES
FOR COUNT
PERIOD

164
15
191
370

0 1 28 29 8 2 35 45

Penryhn Rd

233 77 11 145 255 72 9 174

Caltex Access

17 13 1 3 36 3 123 162

Terminal Access

Penryhn Rd

96 44 16 5 65
27 8 0 0 8
5 15 37 16 68
64 67 53 21 141

Caltex Access

5 0 16 21
7 5 1 1
1 1 0 0
1 1 0 0
9 7 1 1

Penryhn Rd

0 1 13 14 1
0 0 1 1
0 0 0 0 0
0 1 12 13 59
95 28 8

Terminal Access

115 27 88 0 16
33 12 21 0 1
4 0 4 0 50
78 15 63 0 67

AM PEAK HR
0830 - 0930



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting
Job No/Name : 4008 PORT BOTANY Penryhn Rd
Day/Date : Friday 2nd March 2012

Lights

Time Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penryhn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
1630 - 1645	2	6	2	3	0	0	0	1	16	0	0	0	0	0	0	3
1645 - 1700	1	3	1	5	0	0	0	0	6	0	0	0	0	0	6	22
1700 - 1715	0	4	3	10	0	1	0	13	0	0	0	2	0	0	2	33
1715 - 1730	0	3	1	1	0	0	0	10	0	0	0	6	0	0	6	21
1730 - 1745	1	9	0	1	0	0	0	9	0	0	0	3	0	0	3	23
1745 - 1800	0	6	0	1	0	0	1	8	0	0	0	2	0	0	2	18
1800 - 1815	0	2	1	1	0	0	1	7	0	0	0	3	0	0	3	15
1815 - 1830	0	6	0	1	0	0	0	5	0	0	0	1	0	0	1	13
Period End	4	39	8	23	0	1	3	74	0	0	0	26	0	0	0	178

Lights

Peak Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penryhn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
1630 - 1730	3	16	7	19	0	1	1	45	0	0	0	17	109			
1645 - 1745	2	19	5	17	0	1	0	38	0	0	0	17	99			
1700 - 1800	1	22	4	13	0	1	1	40	0	0	0	13	95			
1715 - 1815	1	20	2	4	0	0	2	34	0	0	0	14	77			
1730 - 1830	1	23	1	4	0	0	2	29	0	0	0	9	69			

PEAK HOUR	3	16	7	19	0	1	1	45	0	0	0	17	109			
-----------	---	----	---	----	---	---	---	----	---	---	---	----	-----	--	--	--

Heavies Rigid

Time Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penryhn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
1630 - 1645	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1645 - 1700	0	0	0	0	0	0	0	1	0	0	0	1	2			
1700 - 1715	0	0	0	0	0	0	0	0	0	0	0	0	0			
1715 - 1730	0	0	0	0	0	0	0	0	0	0	0	0	0			
1730 - 1745	0	0	0	0	0	0	0	0	0	0	0	0	0			
1745 - 1800	0	0	1	0	0	0	0	0	0	0	0	0	0			
1800 - 1815	0	0	0	0	0	0	0	0	0	0	0	0	0			
1815 - 1830	0	0	0	0	0	0	0	0	0	0	0	0	0			
Period End	1	0	1	0	0	0	0	1	0	0	0	1	4			

Heavies Rigid

Peak Period	NORTH				WEST				SOUTH				EAST			
	Penryhn Rd				Penryhn Rd				Terminal Access				Caltex Access			
	L	I	R	T	L	I	R	T	L	I	R	T	L	I	R	T
1630 - 1730	1	0	0	0	0	0	0	0	1	0	0	1	3			
1645 - 1745	0	0	0	0	0	0	0	1	0	0	0	1	2			
1700 - 1800	0	0	1	0	0	0	0	0	0	0	0	0	1			
1715 - 1815	0	0	1	0	0	0	0	0	0	0	0	0	1			
1730 - 1830	0	0	1	0	0	0	0	0	0	0	0	0	1			

PEAK HOUR	1	0	0	0	0	0	0	0	1	0	0	1	3			
-----------	---	---	---	---	---	---	---	---	---	---	---	---	---	--	--	--



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting
Job No/Name : 4008 PORT BOTANY Penryhn Rd
Day/Date : Friday 2nd March 2012

Articulated

Articulated	NORTH			WEST			SOUTH			EAST			
	Penryhn Rd			Penrhyn Rd			Terminal Access			Caltex Access			
	L	I	R	L	I	R	L	I	R	L	I	R	
Time Period												TOT	
1630 - 1645	3	0	3	0	0	0	0	10	0	0	0	1	17
1645 - 1700	2	0	4	0	0	0	0	27	0	0	0	0	33
1700 - 1715	0	2	2	0	0	0	0	11	0	0	0	1	16
1715 - 1730	0	0	3	0	0	0	0	5	0	0	0	2	10
1730 - 1745	0	0	2	0	0	0	0	5	0	0	0	2	9
1745 - 1800	0	0	1	0	0	0	0	3	0	0	0	1	5
1800 - 1815	0	0	0	0	0	0	1	3	0	0	0	2	6
1815 - 1830	0	1	1	0	0	0	0	1	0	0	0	2	5
Period End	5	3	16	0	0	0	1	65	0	0	0	11	101



R.O.A.R DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : Parking & Traffic Consulting

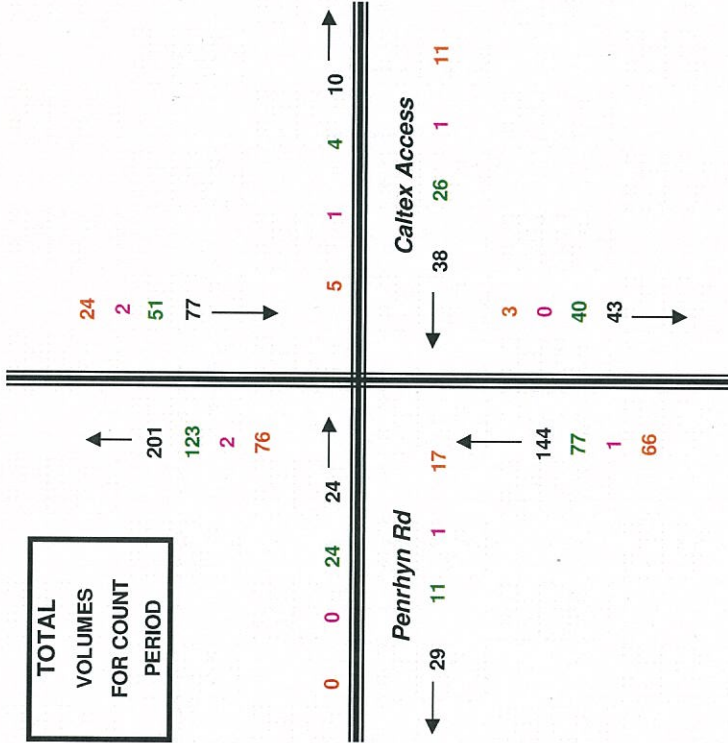
Job No/Name : 4008 PORT BOTANY Penryhn Rd

Day/Date : Friday 2nd March 2012



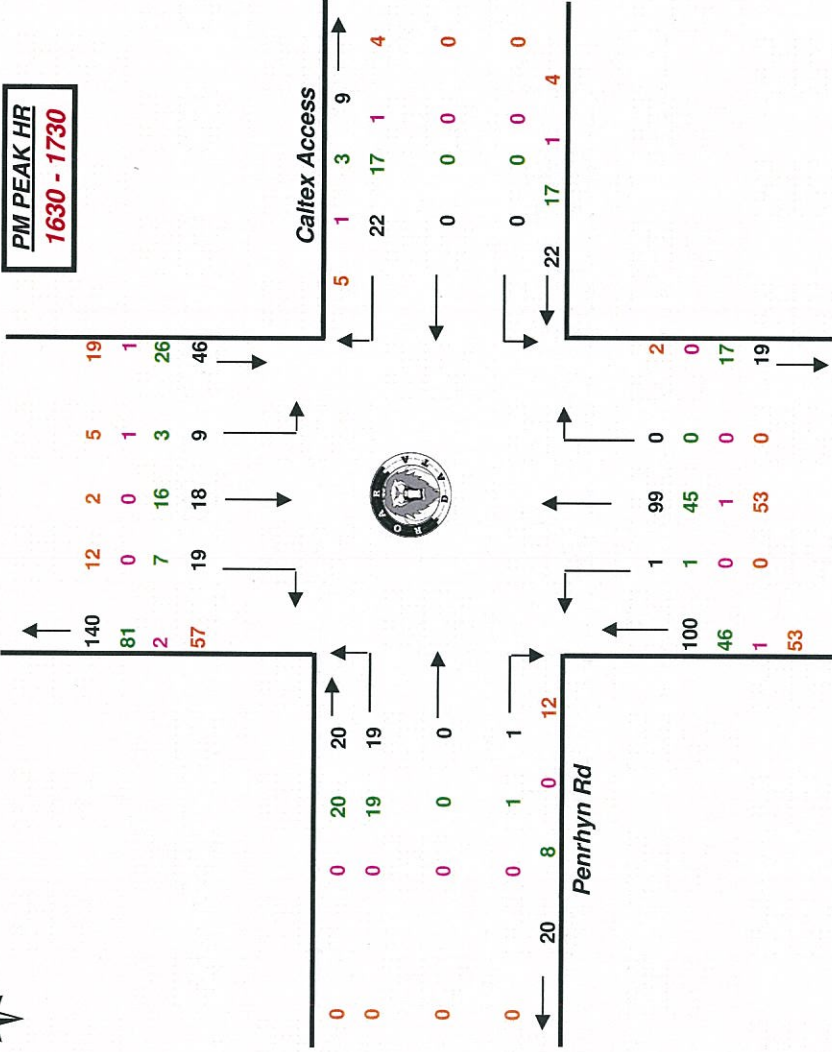
Penryhn Rd

TOTAL
VOLUMES
FOR COUNT
PERIOD



Terminal Access

Penryhn Rd



Terminal Access



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : G.H.D.
Job No/Name : 4415 Port Botany Botany Rd Counts
Day/Date : Tuesday 4th December 2012

<u>PEDS</u>	<u>WEST</u>	<u>NORTH</u>	<u>EAST</u>	
Time Per	Botany Rd	Beauchamp Rd	Botany Rd	TOT
0700 - 0715				0
0715 - 0730		NOT		0
0730 - 0745		REQUIRED		0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
0900 - 0915				0
0915 - 0930				0
0930 - 0945				0
0945 - 1000				0
Per End	0	0	0	0

<u>PEDS</u>	<u>WEST</u>	<u>NORTH</u>	<u>EAST</u>	
Peak Per	Botany Rd	Beauchamp Rd	Botany Rd	TOT
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0
0815 - 0915	0	0	0	0
0830 - 0930	0	0	0	0
0845 - 0945	0	0	0	0
0900 - 1000	0	0	0	0

PEAK HR	0	0	0	0
---------	---	---	---	---

<u>Lights</u>	<u>WEST</u>		<u>NORTH</u>		<u>EAST</u>		
	Botany Rd		Beauchamp Rd		Botany Rd		
Time Per	I	L	R	L	R	I	TOT
0700 - 0715	174	183	167	8	8	59	599
0715 - 0730	147	180	158	14	12	66	577
0730 - 0745	139	203	207	19	15	93	676
0745 - 0800	152	184	140	7	13	83	579
0800 - 0815	137	170	193	8	9	77	594
0815 - 0830	155	191	167	4	12	83	612
0830 - 0845	157	251	127	14	15	42	606
0845 - 0900	115	173	127	2	12	81	510
0900 - 0915	121	168	132	9	15	77	522
0915 - 0930	109	152	114	4	18	73	470
0930 - 0945	90	120	107	8	2	53	380
0945 - 1000	110	140	109	2	10	56	427
Per End	1606	2115	1748	99	141	843	6552

<u>Heavies</u>	<u>WEST</u>		<u>NORTH</u>		<u>EAST</u>		
	Botany Rd		Beauchamp Rd		Botany Rd		
Time Per	I	L	R	L	R	I	TOT
0700 - 0715	47	6	8	2	9	54	126
0715 - 0730	57	3	4	6	6	43	119
0730 - 0745	54	5	6	2	2	61	130
0745 - 0800	44	10	5	2	10	54	125
0800 - 0815	56	6	8	3	7	60	140
0815 - 0830	55	13	5	7	7	54	141
0830 - 0845	51	8	10	4	7	42	122
0845 - 0900	54	17	8	4	11	58	152
0900 - 0915	60	11	7	9	9	63	159
0915 - 0930	73	7	10	9	3	61	163
0930 - 0945	57	5	7	14	4	48	135
0945 - 1000	57	9	10	11	7	79	173
Per End	665	100	88	73	82	677	1685

<u>Combined</u>	<u>WEST</u>		<u>NORTH</u>		<u>EAST</u>		
	Botany Rd		Beauchamp Rd		Botany Rd		
Time Per	I	L	R	L	R	I	TOT
0700 - 0715	221	189	175	10	17	113	725
0715 - 0730	204	183	162	20	18	109	696
0730 - 0745	193	208	213	21	17	154	806
0745 - 0800	196	194	145	9	23	137	704
0800 - 0815	193	176	201	11	16	137	734
0815 - 0830	210	204	172	11	19	137	753
0830 - 0845	208	259	137	18	22	84	728
0845 - 0900	169	190	135	6	23	139	662
0900 - 0915	181	179	139	18	24	140	681
0915 - 0930	182	159	124	13	21	134	633
0930 - 0945	147	125	114	22	6	101	515
0945 - 1000	167	149	119	13	17	135	600
Per End	2271	2215	1836	172	223	1520	8237

<u>Lights</u>	<u>WEST</u>		<u>NORTH</u>		<u>EAST</u>		
	Botany Rd		Beauchamp Rd		Botany Rd		
Peak Per	I	L	R	L	R	I	TOT
0700 - 0800	612	750	672	48	48	301	2431
0715 - 0815	575	737	698	48	49	319	2426
0730 - 0830	583	748	707	38	49	336	2461
0745 - 0845	601	796	627	33	49	285	2391
0800 - 0900	564	785	614	28	48	283	2322
0815 - 0915	548	783	553	29	54	283	2250
0830 - 0930	502	744	500	29	60	273	2108
0845 - 0945	435	613	480	23	47	284	1882
0900 - 1000	430	580	462	23	45	259	1799

<u>Heavies</u>	<u>WEST</u>		<u>NORTH</u>		<u>EAST</u>		
	Botany Rd		Beauchamp Rd		Botany Rd		
Peak Per	I	L	R	L	R	I	TOT
0700 - 0800	202	24	23	12	27	212	500
0715 - 0815	211	24	23	13	25	218	514
0730 - 0830	209	34	24	14	26	229	536
0745 - 0845	206	37	28	16	31	210	528
0800 - 0900	216	44	31	18	32	214	555
0815 - 0915	220	49	30	24	34	217	574
0830 - 0930	238	43	35	26	30	224	596
0845 - 0945	244	40	32	36	27	230	609
0900 - 1000	247	32	34	43	23	251	630

<u>Combined</u>	<u>WEST</u>		<u>NORTH</u>		<u>EAST</u>		
	Botany Rd		Beauchamp Rd		Botany Rd		
Peak Per	I	L	R	L	R	I	TOT
0700 - 0800	814	774	695	60	75	513	2931
0715 - 0815	786	761	721	61	74	537	2940
0730 - 0830	792	782	731	52	75	565	2997
0745 - 0845	807	833	655	49	80	495	2919
0800 - 0900	780	829	645	46	80	497	2877
0815 - 0915	768	832	583	53	88	500	2824
0830 - 0930	740	787	535	55	90	497	2704
0845 - 0945	679	653	512	59	74	514	2491
0900 - 1000	677	612	496	66	68	510	2429

PEAK HR	583	748	707	38	49	336	2461
---------	-----	-----	-----	----	----	-----	------

PEAK HR	209	34	24	14	26	229	536
---------	-----	----	----	----	----	-----	-----

PEAK HR	792	782	731	52	75	565	2997
---------	-----	-----	-----	----	----	-----	------



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : G.H.D.

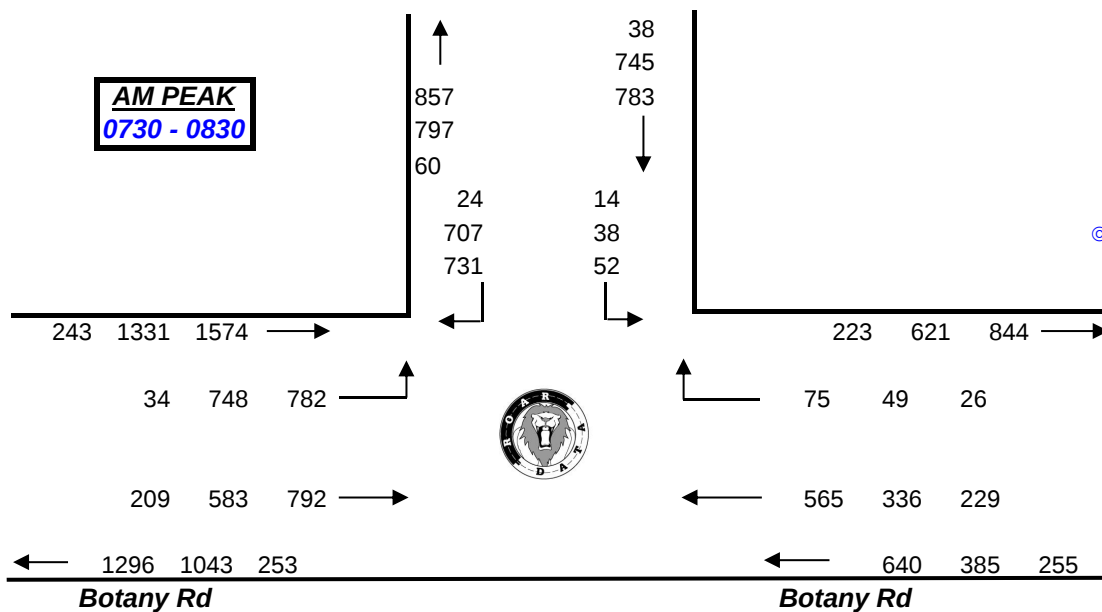
Job No/Name : 4415 Port Botany Botany Rd Counts

Day/Date : Tuesday 4th December 2012

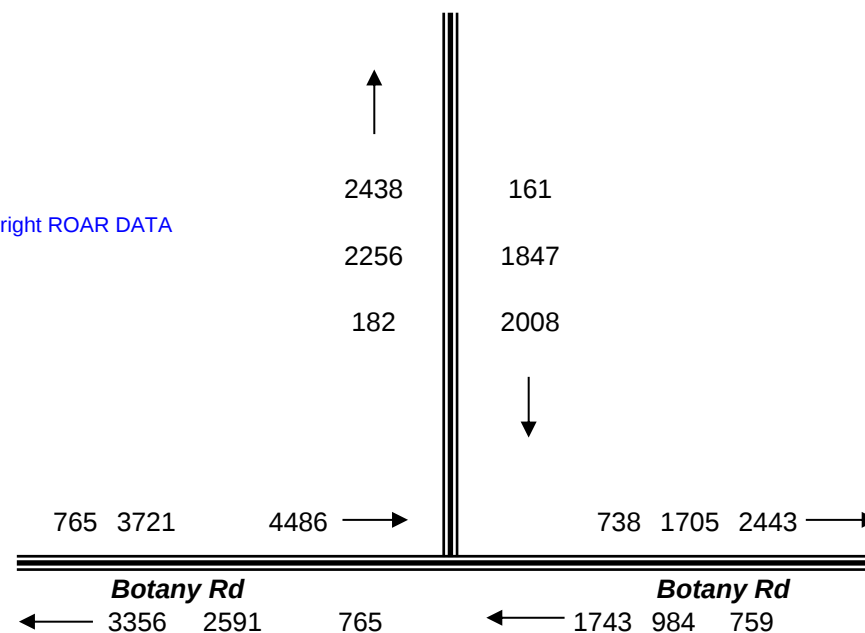
TOTAL VOLUMES
FOR COUNT
PERIOD



Beauchamp Rd



Beauchamp Rd





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : G.H.D.
Job No/Name : 4415 Port Botany Botany Rd Counts
Day/Date : Tuesday 4th December 2012

PEDS	WEST	NORTH	EAST	
Time Per	Botany Rd	Beauchamp Rd	Botany Rd	TOT
1530 - 1545				0
1545 - 1600		NOT		0
1600 - 1615		REQUIRED		0
1615 - 1630				0
1630 - 1645				0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
1800 - 1815				0
1815 - 1830				0
Per End	0	0	0	0

PEDS	WEST	NORTH	EAST	
Peak Per	Botany Rd	Beauchamp Rd	Botany Rd	TOT
1530 - 1630	0	0	0	0
1545 - 1645	0	0	0	0
1600 - 1700	0	0	0	0
1615 - 1715	0	0	0	0
1630 - 1730	0	0	0	0
1645 - 1745	0	0	0	0
1700 - 1800	0	0	0	0
1715 - 1815	0	0	0	0
1730 - 1830	0	0	0	0

PEAK HR	0	0	0	0
---------	---	---	---	---

Lights	WEST		NORTH		EAST		
Time Per	Botany Rd		Beauchamp Rd		Botany Rd		TOT
1530 - 1545	I	L	R	L	R	I	488
1545 - 1600	93	132	132	5	9	117	596
1600 - 1615	98	159	139	2	13	185	618
1615 - 1630	94	138	173	7	13	193	667
1630 - 1645	86	160	224	2	18	177	595
1645 - 1700	94	135	202	0	23	141	641
1700 - 1715	86	154	225	0	15	161	635
1715 - 1730	76	119	210	4	19	207	634
1730 - 1745	97	168	194	4	21	150	599
1745 - 1800	75	164	203	4	13	140	530
1800 - 1815	71	130	193	4	15	117	539
1815 - 1830	60	154	189	1	17	118	438
Per End	54	130	124	1	19	110	6980

Heavies	WEST		NORTH		EAST		
Time Per	Botany Rd		Beauchamp Rd		Botany Rd		TOT
1530 - 1545	I	L	R	L	R	I	111
1545 - 1600	61	7	6	4	3	30	148
1600 - 1615	70	7	10	1	6	54	151
1615 - 1630	62	8	9	3	8	61	135
1630 - 1645	48	5	9	0	9	64	99
1645 - 1700	33	3	6	1	11	45	114
1700 - 1715	39	5	7	0	14	49	105
1715 - 1730	35	1	7	2	6	54	117
1730 - 1745	40	8	7	1	14	47	98
1745 - 1800	30	5	6	7	9	41	66
1800 - 1815	22	3	4	2	6	29	78
1815 - 1830	31	0	3	1	3	40	77
Per End	30	3	5	2	2	35	1299

Combined	WEST		NORTH		EAST		
Time Per	Botany Rd		Beauchamp Rd		Botany Rd		TOT
1530 - 1545	I	L	R	L	R	I	599
1545 - 1600	154	139	138	9	12	147	744
1600 - 1615	168	166	149	3	19	239	769
1615 - 1630	156	146	182	10	21	254	802
1630 - 1645	134	165	233	2	27	241	694
1645 - 1700	127	138	208	1	34	186	755
1700 - 1715	125	159	232	0	29	210	740
1715 - 1730	111	120	217	6	25	261	751
1730 - 1745	137	176	201	5	35	197	697
1745 - 1800	105	169	209	11	22	181	596
1800 - 1815	93	133	197	6	21	146	617
1815 - 1830	91	154	192	2	20	158	515
Per End	84	133	129	3	21	145	8279

Lights	WEST		NORTH		EAST		
Peak Per	Botany Rd		Beauchamp Rd		Botany Rd		TOT
1530 - 1630	I	L	R	L	R	I	2369
1545 - 1645	371	589	668	16	53	672	2476
1600 - 1700	372	592	738	11	67	696	2521
1615 - 1715	360	587	824	9	69	672	2538
1630 - 1730	342	568	861	6	75	686	2505
1645 - 1745	353	576	831	8	78	659	2509
1700 - 1800	334	605	832	12	68	658	2398
1715 - 1815	319	581	800	16	68	614	2302
1730 - 1830	303	616	779	13	66	525	2106
Per End	260	578	709	10	64	485	

Heavies	WEST		NORTH		EAST		
Peak Per	Botany Rd		Beauchamp Rd		Botany Rd		TOT
1530 - 1630	I	L	R	L	R	I	545
1545 - 1645	241	27	34	8	26	209	533
1600 - 1700	213	23	34	5	34	224	499
1615 - 1715	182	21	31	4	42	219	453
1630 - 1730	155	14	29	3	40	212	435
1645 - 1745	147	17	27	4	45	195	434
1700 - 1800	144	19	27	10	43	191	386
1715 - 1815	127	17	24	12	35	171	359
1730 - 1830	123	16	20	11	32	157	319
Per End	113	11	18	12	20	145	

Combined	WEST		NORTH		EAST		
Peak Per	Botany Rd		Beauchamp Rd		Botany Rd		TOT
1530 - 1630	I	L	R	L	R	I	2914
1545 - 1645	612	616	702	24	79	881	3009
1600 - 1700	585	615	772	16	101	920	3020
1615 - 1715	542	608	855	13	111	891	2991
1630 - 1730	497	582	890	9	115	898	2940
1645 - 1745	500	593	858	12	123	854	2943
1700 - 1800	478	624	859	22	111	849	2784
1715 - 1815	446	598	824	28	103	785	2661
1730 - 1830	426	632	799	24	98	682	2425
Per End	373	589	727	22	84	630	



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

Client : G.H.D.

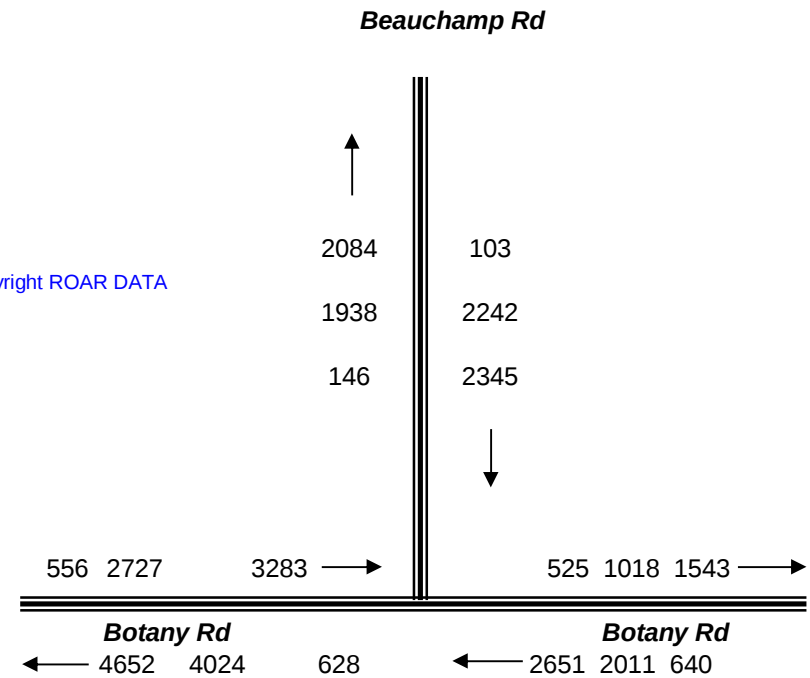
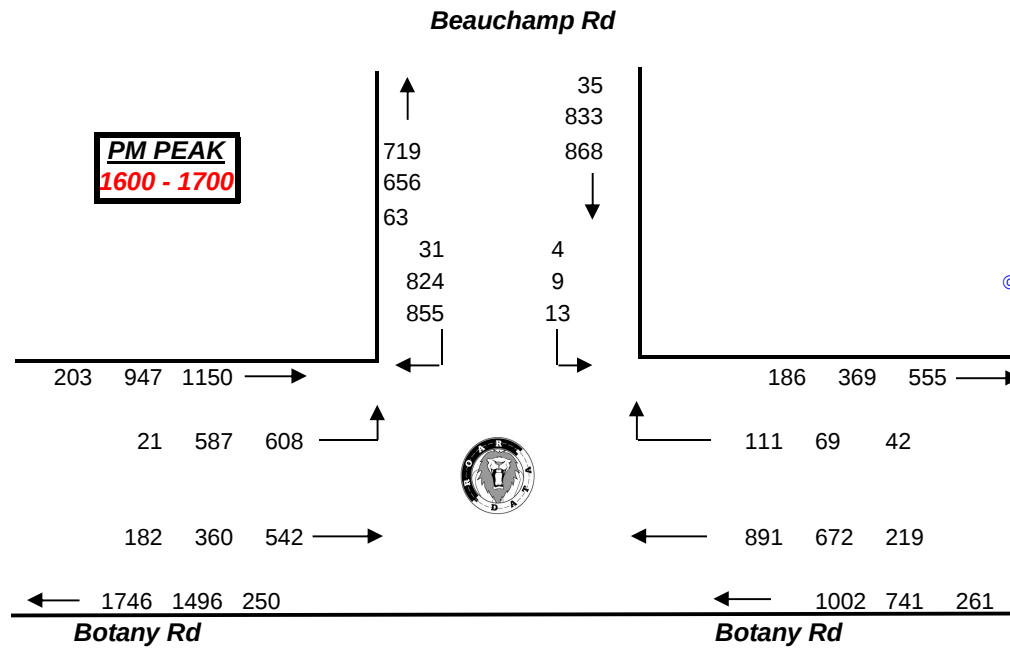
Job No/Name : 4415 Port Botany Botany Rd Counts

Day/Date : Tuesday 4th December 2012

**TOTAL VOLUMES
FOR COUNT
PERIOD**



© Copyright ROAR DATA





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : G.H.D.
Job No/Name : 4415 Port Botany Botany Rd Counts
Day/Date : Tuesday 4th December 2012

PEDS	NORTH Dunmerong Rd	WEST Botany Rd	SOUTH Dunmerong Rd	TOT
Time Per				
0700 - 0715				0
0715 - 0730		NOT		0
0730 - 0745		REQUIRED		0
0745 - 0800				0
0800 - 0815				0
0815 - 0830				0
0830 - 0845				0
0845 - 0900				0
0900 - 0915				0
0915 - 0930				0
0930 - 0945				0
0945 - 1000				0
Per End	0	0	0	0

PEDS	NORTH Dunmerong Rd	WEST Botany Rd	SOUTH Dunmerong Rd	TOT
Peak Per				
0700 - 0800	0	0	0	0
0715 - 0815	0	0	0	0
0730 - 0830	0	0	0	0
0745 - 0845	0	0	0	0
0800 - 0900	0	0	0	0
0815 - 0915	0	0	0	0
0830 - 0930	0	0	0	0
0845 - 0945	0	0	0	0
0900 - 1000	0	0	0	0

PEAK HR	0	0	0	0
---------	---	---	---	---

Lights	NORTH Dunmerong Rd		WEST Botany Rd		SOUTH Dunmerong Rd		TOT
Time Per	I	R	L	R	L	I	
0700 - 0715	50	24	16	84	43	50	267
0715 - 0730	32	28	24	71	42	65	262
0730 - 0745	47	26	14	59	68	55	269
0745 - 0800	51	29	17	59	53	51	260
0800 - 0815	55	23	23	72	50	59	282
0815 - 0830	49	27	19	78	53	68	294
0830 - 0845	48	18	18	63	34	53	234
0845 - 0900	62	21	29	63	55	67	297
0900 - 0915	44	24	23	38	36	61	226
0915 - 0930	50	21	16	68	47	56	258
0930 - 0945	52	16	17	49	23	42	199
0945 - 1000	43	11	20	56	27	72	229
Per End	583	268	236	760	531	699	3077

Heavies	NORTH Dunmerong Rd		WEST Botany Rd		SOUTH Dunmerong Rd		TOT
Time Per	I	R	L	R	L	I	
0700 - 0715	1	0	13	8	3	0	25
0715 - 0730	4	1	6	8	2	1	22
0730 - 0745	3	2	10	6	4	3	28
0745 - 0800	3	0	8	11	2	0	24
0800 - 0815	4	1	5	4	3	2	19
0815 - 0830	2	1	1	3	2	2	11
0830 - 0845	2	4	1	1	2	3	13
0845 - 0900	3	7	3	3	5	2	23
0900 - 0915	4	11	2	1	2	5	25
0915 - 0930	2	10	1	0	3	2	18
0930 - 0945	5	4	3	3	4	1	20
0945 - 1000	2	4	2	3	6	3	20
Per End	35	45	55	51	38	24	248

Combined	NORTH Dunmerong Rd		WEST Botany Rd		SOUTH Dunmerong Rd		TOT
Time Per	I	R	L	R	L	I	
0700 - 0715	51	24	29	92	46	50	292
0715 - 0730	36	29	30	79	44	66	284
0730 - 0745	50	28	24	65	72	58	297
0745 - 0800	54	29	25	70	55	51	284
0800 - 0815	59	24	28	76	53	61	301
0815 - 0830	51	28	20	81	55	70	305
0830 - 0845	50	22	19	64	36	56	247
0845 - 0900	65	28	32	66	60	69	320
0900 - 0915	48	35	25	39	38	66	251
0915 - 0930	52	31	17	68	50	58	276
0930 - 0945	57	20	20	52	27	43	219
0945 - 1000	45	15	22	59	33	75	249
Per End	618	313	291	811	569	723	3325

Lights	NORTH Dunmerong Rd		WEST Botany Rd		SOUTH Dunmerong Rd		TOT
Peak Per	I	R	L	R	L	I	
0700 - 0800	180	107	71	273	206	221	1058
0715 - 0815	185	106	78	261	213	230	1073
0730 - 0830	202	105	73	268	224	233	1105
0745 - 0845	203	97	77	272	190	231	1070
0800 - 0900	214	89	89	276	192	247	1107
0815 - 0915	203	90	89	242	178	249	1051
0830 - 0930	204	84	86	232	172	237	1015
0845 - 0945	208	82	85	218	161	226	980
0900 - 1000	189	72	76	211	133	231	912

Heavies	NORTH Dunmerong Rd		WEST Botany Rd		SOUTH Dunmerong Rd		TOT
Peak Per	I	R	L	R	L	I	
0700 - 0800	11	3	37	33	11	4	99
0715 - 0815	14	4	29	29	11	6	93
0730 - 0830	12	4	24	24	11	7	82
0745 - 0845	11	6	15	19	9	7	67
0800 - 0900	11	13	10	11	12	9	66
0815 - 0915	11	23	7	8	11	12	72
0830 - 0930	11	32	7	5	12	12	79
0845 - 0945	14	32	9	7	14	10	86
0900 - 1000	13	29	8	7	15	11	83

Combined	NORTH Dunmerong Rd		WEST Botany Rd		SOUTH Dunmerong Rd		TOT
Peak Per	I	R	L	R	L	I	
0700 - 0800	191	110	108	306	217	225	1157
0715 - 0815	199	110	107	290	224	236	1166
0730 - 0830	214	109	97	292	235	240	1187
0745 - 0845	214	103	92	291	199	238	1137
0800 - 0900	225	102	99	287	204	256	1173
0815 - 0915	214	113	96	250	189	261	1123
0830 - 0930	215	116	93	237	184	249	1094
0845 - 0945	222	114	94	225	175	236	1066
0900 - 1000	202	101	84	218	148	242	995

PEAK HR	202	105	73	268	224	233	1105
---------	-----	-----	----	-----	-----	-----	------

PEAK HR	12	4	24	24	11	7	82
---------	----	---	----	----	----	---	----

PEAK HR	214	109	97	292	235	240	1187
---------	-----	-----	----	-----	-----	-----	------



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

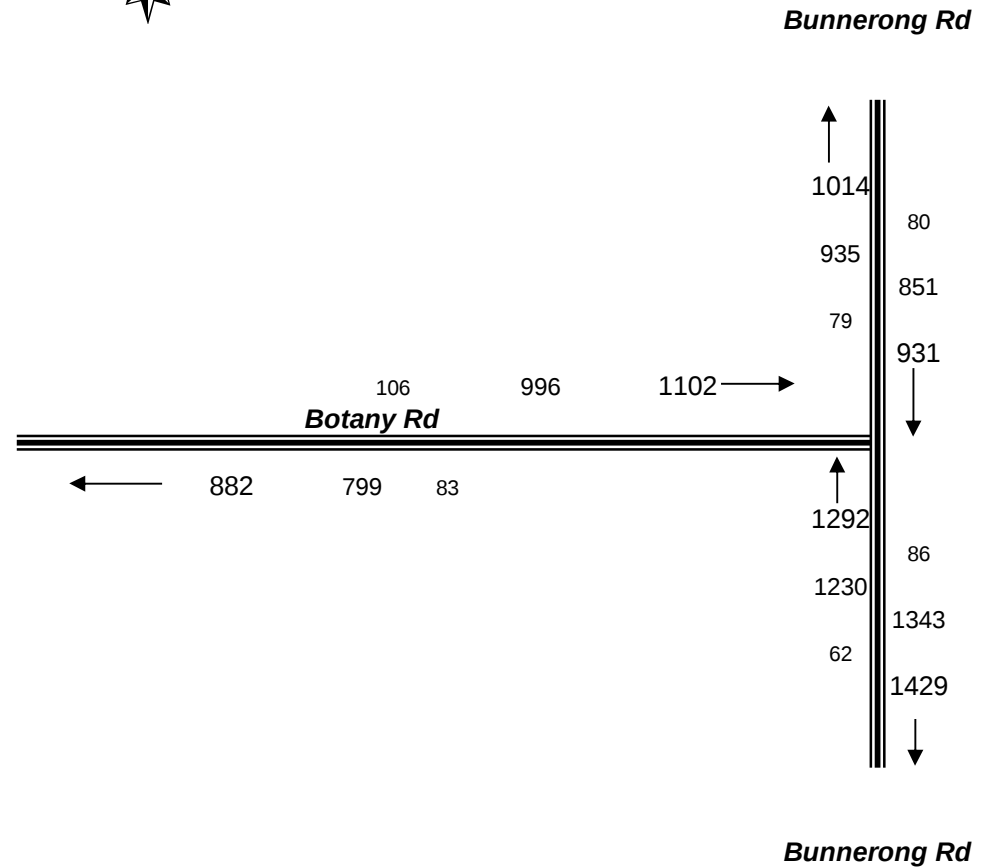
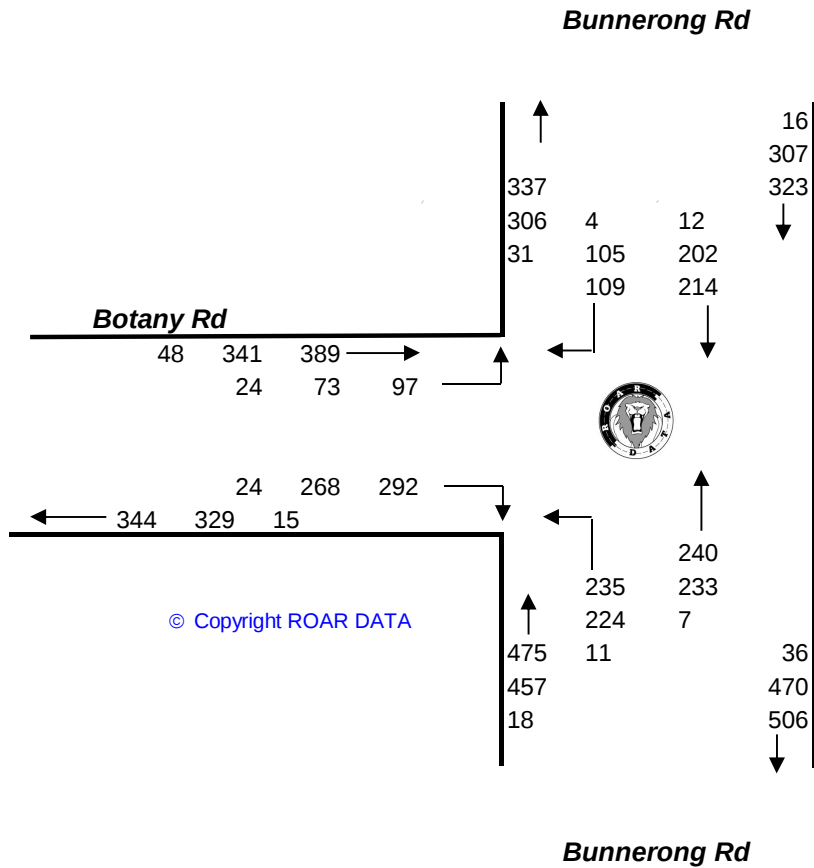
Client : G.H.D.

Job No/Name : 4415 Port Botany Botany Rd Counts

Day/Date : Tuesday 4th December 2012

AM PEAK
0730 - 0830

**TOTAL VOLUMES
FOR COUNT
PERIOD**





R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849.

Mobile.0418239019

Client : G.H.D.
 Job No/Name : 4415 Port Botany Botany Rd Counts
 Day/Date : Tuesday 4th December 2012

PEDS	NORTH Dumnerong Rd	WEST Botany Rd	SOUTH Dumnerong Rd	TOT
Time Per				
1530 - 1545				0
1545 - 1600		NOT		0
1600 - 1615		REQUIRED		0
1615 - 1630				0
1630 - 1645				0
1645 - 1700				0
1700 - 1715				0
1715 - 1730				0
1730 - 1745				0
1745 - 1800				0
1800 - 1815				0
1815 - 1830				0
Per End	0	0	0	0

PEDS	NORTH Dumnerong Rd	WEST Botany Rd	SOUTH Dumnerong Rd	TOT
Peak Per				
1530 - 1630	0	0	0	0
1545 - 1645	0	0	0	0
1600 - 1700	0	0	0	0
1615 - 1715	0	0	0	0
1630 - 1730	0	0	0	0
1645 - 1745	0	0	0	0
1700 - 1800	0	0	0	0
1715 - 1815	0	0	0	0
1730 - 1830	0	0	0	0
PEAK HR	0	0	0	0

Lights	NORTH Dumnerong Rd		WEST Botany Rd		SOUTH Dumnerong Rd		TOT
Time Per	I	R	L	R	L	I	
1530 - 1545	86	32	28	55	86	68	355
1545 - 1600	59	23	26	55	68	59	290
1600 - 1615	72	23	24	39	77	51	286
1615 - 1630	95	15	35	62	63	50	320
1630 - 1645	68	21	34	68	58	74	323
1645 - 1700	63	23	25	55	63	73	302
1700 - 1715	72	24	26	49	76	89	336
1715 - 1730	68	23	34	74	61	67	327
1730 - 1745	86	23	25	61	68	55	318
1745 - 1800	80	10	28	50	46	70	284
1800 - 1815	95	14	19	68	55	68	319
1815 - 1830	59	21	23	55	41	59	258
Per End	903	252	327	691	762	783	3718

Heavies	NORTH Dumnerong Rd		WEST Botany Rd		SOUTH Dumnerong Rd		TOT
Time Per	I	R	L	R	L	I	
1530 - 1545	2	6	1	3	6	2	20
1545 - 1600	2	6	5	4	4	1	22
1600 - 1615	4	8	6	0	4	2	24
1615 - 1630	0	2	2	1	4	4	13
1630 - 1645	0	6	2	0	3	2	13
1645 - 1700	2	3	3	3	0	1	12
1700 - 1715	0	3	2	1	10	2	18
1715 - 1730	0	2	4	0	6	5	17
1730 - 1745	2	6	4	1	5	0	18
1745 - 1800	0	6	2	1	3	1	13
1800 - 1815	1	5	3	0	8	0	17
1815 - 1830	0	13	3	0	7	1	24
Per End	13	66	37	14	60	21	211

Combined	NORTH Dumnerong Rd		WEST Botany Rd		SOUTH Dumnerong Rd		TOT
Time Per	I	R	L	R	L	I	
1530 - 1545	88	38	29	58	92	70	375
1545 - 1600	61	29	31	59	72	60	312
1600 - 1615	76	31	30	39	81	53	310
1615 - 1630	95	17	37	63	67	54	333
1630 - 1645	68	27	36	68	61	76	336
1645 - 1700	65	26	28	58	63	74	314
1700 - 1715	72	27	28	50	86	91	354
1715 - 1730	68	25	38	74	67	72	344
1730 - 1745	88	29	29	62	73	55	336
1745 - 1800	80	16	30	51	49	71	297
1800 - 1815	96	19	22	68	63	68	336
1815 - 1830	59	34	26	55	48	60	282
Per End	916	318	364	705	822	804	3929

Lights	NORTH Dumnerong Rd		WEST Botany Rd		SOUTH Dumnerong Rd		TOT
Peak Per	I	R	L	R	L	I	
1530 - 1630	312	93	113	211	294	228	1251
1545 - 1645	294	82	119	224	266	234	1219
1600 - 1700	298	82	118	224	261	248	1231
1615 - 1715	298	83	120	234	260	286	1281
1630 - 1730	271	91	119	246	258	303	1288
1645 - 1745	289	93	110	239	268	284	1283
1700 - 1800	306	80	113	234	251	281	1265
1715 - 1815	329	70	106	253	230	260	1248
1730 - 1830	320	68	95	234	210	252	1179
PEAK HR	298	83	120	234	260	286	1281

Heavies	NORTH Dumnerong Rd		WEST Botany Rd		SOUTH Dumnerong Rd		TOT
Peak Per	I	R	L	R	L	I	
1530 - 1630	8	22	14	8	18	9	79
1545 - 1645	6	22	15	5	15	9	72
1600 - 1700	6	19	13	4	11	9	62
1615 - 1715	2	14	9	5	17	9	56
1630 - 1730	2	14	11	4	19	10	60
1645 - 1745	4	14	13	5	21	8	65
1700 - 1800	2	17	12	3	24	8	66
1715 - 1815	3	19	13	2	22	6	65
1730 - 1830	3	30	12	2	23	2	72
PEAK HR	2	14	9	5	17	9	56

Combined	NORTH Dumnerong Rd		WEST Botany Rd		SOUTH Dumnerong Rd		TOT
Peak Per	I	R	L	R	L	I	
1530 - 1630	320	115	127	219	312	237	1330
1545 - 1645	300	104	134	229	281	243	1291
1600 - 1700	304	101	131	228	272	257	1293
1615 - 1715	300	97	129	239	277	295	1337
1630 - 1730	273	105	130	250	277	313	1348
1645 - 1745	293	107	123	244	289	292	1348
1700 - 1800	308	97	125	237	275	289	1331
1715 - 1815	332	89	119	255	252	266	1313
1730 - 1830	323	98	107	236	233	254	1251
PEAK HR	300	97	129	239	277	295	1337



R.O.A.R. DATA

Reliable, Original & Authentic Results

Ph.88196847, Fax 88196849, Mob.0418-239019

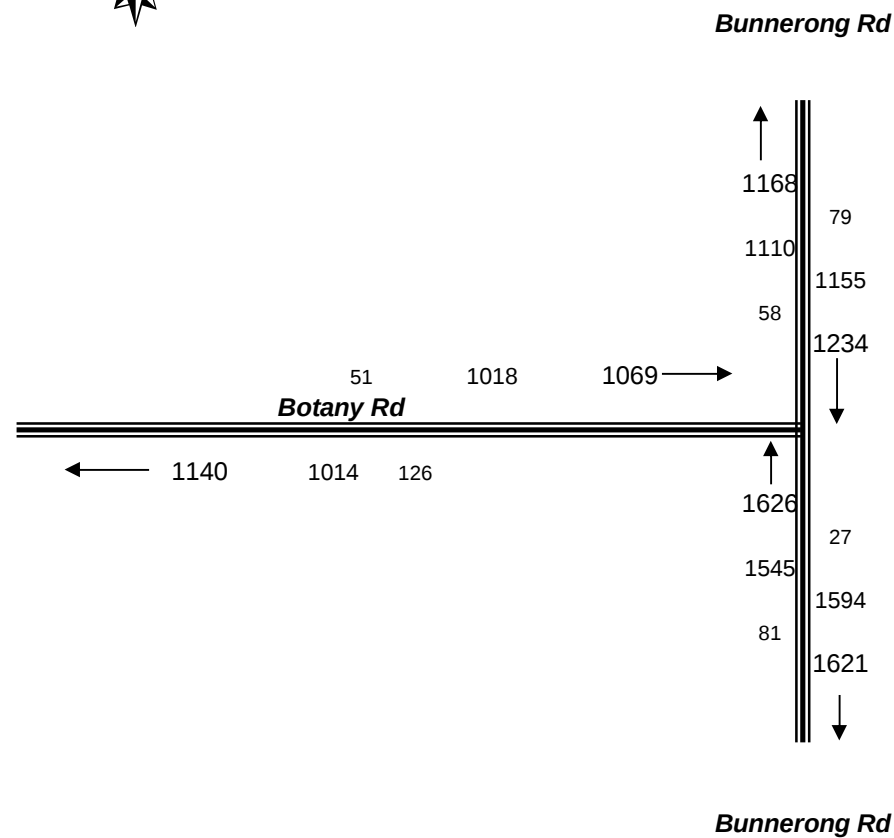
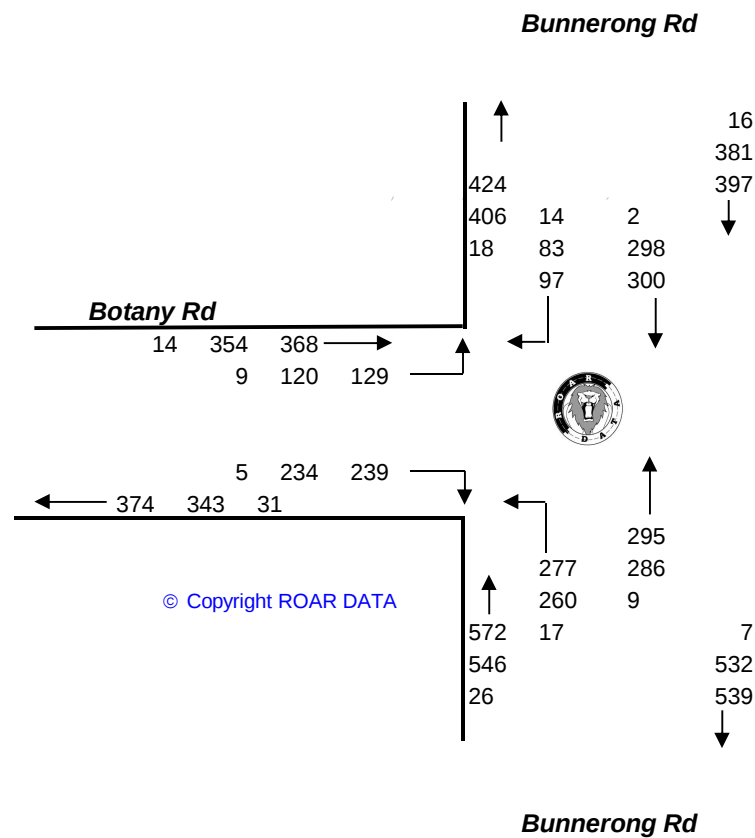
Client : G.H.D.

Job No/Name : 4415 Port Botany Botany Rd Counts

Day/Date : Tuesday 4th December 2012

PM PEAK
1615 - 1715

TOTAL VOLUMES
FOR COUNT
PERIOD



Appendix B – SIDRA analysis

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
AM Peak Existing

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	28	56.0	0.159	8.0	LOS A	0.8	8.9	0.37	0.53	50.1
2	T	93	76.0	0.159	7.1	LOS A	0.8	8.9	0.37	0.45	50.5
3	R	1	0.0	0.159	12.7	LOS A	0.8	8.9	0.37	0.80	46.1
Approach		122	70.7	0.159	7.4	LOS A	0.8	8.9	0.37	0.47	50.4
East: Caltex Access											
4	L	1	0.0	0.008	6.1	LOS A	0.0	0.3	0.34	0.43	49.6
5	T	1	0.0	0.008	5.2	LOS A	0.0	0.3	0.34	0.37	50.1
6	R	7	14.0	0.008	12.3	LOS A	0.0	0.3	0.34	0.64	45.6
Approach		9	10.9	0.008	10.8	LOS A	0.0	0.3	0.34	0.59	46.4
North: Penrhyn Road											
7	L	22	24.0	0.053	6.2	LOS A	0.3	2.3	0.09	0.50	51.5
8	T	56	30.0	0.053	4.9	LOS A	0.3	2.3	0.09	0.36	52.9
9	R	71	78.0	0.080	12.8	LOS A	0.4	4.6	0.11	0.61	46.2
Approach		148	51.9	0.080	8.8	LOS A	0.4	4.6	0.10	0.50	49.2
West: Penrhyn Road											
10	L	1	0.0	0.012	5.9	LOS A	0.1	0.5	0.31	0.43	49.7
11	T	1	0.0	0.012	5.0	LOS A	0.1	0.5	0.31	0.36	50.3
12	R	14	8.0	0.012	12.0	LOS A	0.1	0.5	0.31	0.63	45.5
Approach		16	6.9	0.012	11.1	LOS A	0.1	0.5	0.31	0.60	46.1
All Vehicles		296	56.0	0.159	8.4	LOS A	0.8	8.9	0.23	0.50	49.4

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
PM Peak Existing

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	1	0.0	0.109	5.8	LOS A	0.5	5.5	0.22	0.48	51.0
2	T	104	55.0	0.109	5.8	LOS A	0.5	5.5	0.22	0.38	51.8
3	R	1	0.0	0.109	11.7	LOS A	0.5	5.5	0.22	0.86	46.7
Approach		106	53.9	0.109	5.8	LOS A	0.5	5.5	0.22	0.39	51.7
East: Caltex Access											
4	L	1	0.0	0.021	5.6	LOS A	0.1	0.8	0.17	0.40	50.9
5	T	1	0.0	0.021	4.6	LOS A	0.1	0.8	0.17	0.32	51.8
6	R	23	23.0	0.021	11.9	LOS A	0.1	0.8	0.17	0.63	46.1
Approach		25	21.1	0.021	11.3	LOS A	0.1	0.8	0.17	0.61	46.4
North: Penrhyn Road											
7	L	9	67.0	0.019	7.1	LOS A	0.1	0.8	0.03	0.50	51.9
8	T	19	11.0	0.019	4.5	LOS A	0.1	0.8	0.03	0.37	53.4
9	R	20	63.0	0.021	12.4	LOS A	0.1	1.0	0.04	0.64	46.6
Approach		48	43.4	0.021	8.3	LOS A	0.1	1.0	0.03	0.50	49.9
West: Penrhyn Road											
10	L	20	0.0	0.017	6.0	LOS A	0.1	0.6	0.32	0.47	50.1
11	T	1	0.0	0.017	5.0	LOS A	0.1	0.6	0.32	0.39	50.7
12	R	1	0.0	0.017	11.9	LOS A	0.1	0.6	0.32	0.74	46.2
Approach		22	0.0	0.017	6.2	LOS A	0.1	0.6	0.32	0.47	49.9
All Vehicles		202	41.4	0.109	7.2	LOS A	0.5	5.5	0.18	0.45	50.3

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
AM Peak Existing

Foreshore Road/Penrhyn Road/Botany Road

Signals - Fixed Time Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	44	90.0	0.162	33.4	LOS C	1.7	20.9	0.57	0.71	35.3
2	T	23	27.0	0.092	57.2	LOS E	1.4	12.2	0.89	0.65	23.3
3	R	25	71.0	0.203	72.8	LOS F	1.7	18.7	0.92	0.74	21.4
Approach		93	69.1	0.203	50.1	LOS D	1.7	20.9	0.75	0.70	27.2
East: Botany Road											
4	L	76	53.0	0.088	14.9	LOS B	0.4	4.4	0.13	0.97	50.0
5	T	923	19.0	0.466	29.5	LOS C	17.5	142.4	0.74	0.64	36.4
6	R	277	16.0	0.831	47.9	LOS D	11.5	91.8	1.00	0.90	28.6
Approach		1276	20.4	0.831	32.7	LOS C	17.5	142.4	0.76	0.72	35.0
North: Botany Road											
7	L	351	11.0	0.204	9.7	X	X	X	X	0.65	54.6
8	T	26	36.0	0.697	68.7	LOS E	8.3	75.3	1.00	0.86	20.4
9	R	89	34.0	0.697	79.1	LOS F	8.3	75.3	1.00	0.86	22.0
Approach		466	16.8	0.697	26.3	LOS B	8.3	75.3	0.25	0.70	39.5
West: Foreshore Road											
10	L	341	9.0	0.195	11.4	X	X	X	X	0.69	58.8
11	T	1337	9.0	0.822	22.9	LOS B	28.9	218.0	0.94	0.86	34.8
12	R	46	39.0	0.132	38.4	LOS C	1.8	16.9	0.82	0.75	33.4
Approach		1724	9.8	0.822	21.1	LOS B	28.9	218.0	0.75	0.82	38.2
All Vehicles		3559	16.1	0.831	26.7	LOS B	28.9	218.0	0.69	0.76	36.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P7	Across W approach	53	66.6	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	66.6	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
PM Peak Existing

Foreshore Road/Penrhyn Road/Botany Road
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	68	45.0	0.332	71.6	LOS F	4.6	44.6	0.94	0.77	20.6
2	T	23	32.0	0.098	60.0	LOS E	1.5	13.2	0.90	0.66	21.9
3	R	52	45.0	0.250	71.0	LOS F	3.4	33.1	0.93	0.76	20.6
Approach		143	42.9	0.332	69.5	LOS E	4.6	44.6	0.93	0.75	20.8
East: Botany Road											
4	L	13	58.0	0.014	14.1	LOS A	0.0	0.5	0.09	0.98	46.1
5	T	1080	6.0	0.710	47.4	LOS D	26.8	197.2	0.92	0.80	25.1
6	R	264	11.0	0.928	64.0	LOS E	17.0	130.6	0.91	0.87	21.8
Approach		1357	7.5	0.928	50.4	LOS D	26.8	197.2	0.91	0.82	24.5
North: Botany Road											
7	L	303	7.0	0.171	7.7	X	X	X	X	0.60	49.8
8	T	11	40.0	0.870	77.1	LOS F	19.2	147.1	1.00	0.95	18.1
9	R	229	10.0	0.870	85.3	LOS F	19.2	147.1	1.00	0.95	18.0
Approach		543	8.9	0.870	41.8	LOS C	19.2	147.1	0.44	0.75	28.1
West: Foreshore Road											
10	L	52	29.0	0.034	8.1	X	X	X	X	0.59	49.8
11	T	766	3.0	0.911	77.0	LOS F	31.7	227.4	1.00	1.05	18.7
12	R	22	52.0	0.094	59.2	LOS E	1.3	13.0	0.82	0.72	23.2
Approach		840	5.9	0.911	72.3	LOS F	31.7	227.4	0.93	1.02	19.5
All Vehicles		2883	9.0	0.928	56.1	LOS D	31.7	227.4	0.83	0.86	23.1

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	44.9	LOS E	0.2	0.2	0.77	0.77
P3	Across E approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	51.3	LOS E	0.2	0.2	0.83	0.83
P7	Across W approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		212	58.6	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
2014 AM Peak Construction
+Existing

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	29	56.0	0.171	8.3	LOS A	0.9	9.6	0.40	0.55	49.8
2	T	96	76.0	0.171	7.5	LOS A	0.9	9.6	0.40	0.48	50.2
3	R	1	0.0	0.171	13.0	LOS A	0.9	9.6	0.40	0.80	45.9
Approach		126	70.7	0.171	7.7	LOS A	0.9	9.6	0.40	0.50	50.1
East: Caltex Access											
4	L	1	0.0	0.008	6.5	LOS A	0.0	0.3	0.40	0.45	49.1
5	T	1	0.0	0.008	5.5	LOS A	0.0	0.3	0.40	0.40	49.5
6	R	7	14.0	0.008	12.6	LOS A	0.0	0.3	0.40	0.64	45.4
Approach		9	10.9	0.008	11.1	LOS A	0.0	0.3	0.40	0.59	46.1
North: Penrhyn Road											
7	L	23	24.0	0.082	6.2	LOS A	0.4	3.6	0.09	0.50	51.5
8	T	111	16.0	0.082	4.7	LOS A	0.4	3.6	0.09	0.37	52.9
9	R	84	81.0	0.099	12.9	LOS A	0.5	6.1	0.12	0.60	46.2
Approach		218	42.0	0.099	8.0	LOS A	0.5	6.1	0.10	0.47	49.8
West: Penrhyn Road											
10	L	84	99.0	0.155	9.8	LOS A	0.8	9.5	0.45	0.56	49.1
11	T	1	0.0	0.155	6.7	LOS A	0.8	9.5	0.45	0.45	49.4
12	R	14	8.0	0.155	13.7	LOS A	0.8	9.5	0.45	0.71	45.1
Approach		99	85.4	0.155	10.3	LOS A	0.8	9.5	0.45	0.58	48.5
All Vehicles		453	58.8	0.171	8.5	LOS A	0.9	9.6	0.27	0.51	49.5

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

Processed: Tuesday, 19 February 2013 9:59:22 AM

SIDRA INTERSECTION 5.1.2.1953

Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip

8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd

www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
2014 PM Peak Construction
+Existing

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	1	0.0	0.241	6.5	LOS A	1.3	11.0	0.39	0.55	50.0
2	T	265	22.0	0.241	5.9	LOS A	1.3	11.0	0.39	0.48	50.5
3	R	1	0.0	0.241	12.4	LOS A	1.3	11.0	0.39	0.84	46.5
Approach		267	21.8	0.241	5.9	LOS A	1.3	11.0	0.39	0.48	50.4
East: Caltex Access											
4	L	1	0.0	0.024	6.2	LOS A	0.1	0.9	0.32	0.44	49.6
5	T	1	0.0	0.024	5.2	LOS A	0.1	0.9	0.32	0.37	50.1
6	R	24	23.0	0.024	12.5	LOS A	0.1	0.9	0.32	0.63	45.4
Approach		26	21.2	0.024	11.9	LOS A	0.1	0.9	0.32	0.61	45.7
North: Penrhyn Road											
7	L	9	67.0	0.025	7.1	LOS A	0.1	1.1	0.04	0.50	51.8
8	T	20	11.0	0.025	4.6	LOS A	0.1	1.1	0.04	0.37	53.3
9	R	84	91.0	0.083	12.9	LOS A	0.4	5.3	0.04	0.62	46.6
Approach		114	74.9	0.083	10.9	LOS A	0.4	5.3	0.04	0.57	48.0
West: Penrhyn Road											
10	L	84	76.0	0.150	10.8	LOS A	0.7	8.5	0.57	0.66	47.9
11	T	1	0.0	0.150	8.2	LOS A	0.7	8.5	0.57	0.55	48.4
12	R	1	0.0	0.150	15.1	LOS B	0.7	8.5	0.57	0.76	44.1
Approach		86	74.1	0.150	10.8	LOS A	0.7	8.5	0.57	0.66	47.9
All Vehicles		494	43.2	0.241	8.2	LOS A	1.3	11.0	0.34	0.54	49.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

Processed: Tuesday, 19 February 2013 10:04:03 AM

SIDRA INTERSECTION 5.1.2.1953

Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip

8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd

www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2014 AM Peak Construction
+Existing

Foreshore Road/Penrhyn Road/Botany Road
Signals - Fixed Time Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	112	96.0	0.435	36.3	LOS C	4.7	60.6	0.62	0.74	33.9
2	T	24	27.0	0.100	60.0	LOS E	1.5	13.3	0.90	0.66	22.7
3	R	43	82.0	0.389	78.4	LOS F	3.1	36.4	0.96	0.77	20.4
Approach		179	83.3	0.435	49.6	LOS D	4.7	60.6	0.74	0.74	27.8
East: Botany Road											
4	L	80	54.0	0.104	15.5	LOS B	0.7	6.9	0.17	0.97	49.6
5	T	952	19.0	0.474	30.2	LOS C	18.6	151.5	0.73	0.64	36.1
6	R	285	16.0	0.828	48.3	LOS D	12.1	96.0	1.00	0.89	28.5
Approach		1317	20.5	0.828	33.2	LOS C	18.6	151.5	0.76	0.72	34.7
North: Botany Road											
7	L	361	11.0	0.210	9.7	X	X	X	X	0.65	54.6
8	T	27	36.0	0.833	81.2	LOS F	9.8	88.7	1.00	0.96	18.3
9	R	93	34.0	0.833	91.5	LOS F	9.8	88.7	1.00	0.96	19.8
Approach		481	16.9	0.833	29.5	LOS C	9.8	88.7	0.25	0.73	37.5
West: Foreshore Road											
10	L	352	9.0	0.201	11.4	X	X	X	X	0.69	58.8
11	T	1377	9.0	0.837	24.2	LOS B	31.2	235.4	0.95	0.87	34.1
12	R	112	27.0	0.291	40.2	LOS C	4.7	40.9	0.85	0.78	32.4
Approach		1840	10.1	0.837	22.7	LOS B	31.2	235.4	0.76	0.83	37.3
All Vehicles		3817	18.0	0.837	28.5	LOS B	31.2	235.4	0.70	0.77	35.8

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P7	Across W approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	69.1	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2014 PM Peak Construction
+Existing

Foreshore Road/Penrhyn Road/Botany Road
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	248	33.0	0.987	74.3	LOS F	18.2	163.2	1.00	0.86	20.0
2	T	24	32.0	0.078	53.2	LOS D	1.4	12.9	0.85	0.63	23.6
3	R	100	39.0	0.411	65.7	LOS E	6.4	59.9	0.91	0.79	21.7
Approach		373	34.5	0.987	70.6	LOS F	18.2	163.2	0.97	0.82	20.6
East: Botany Road											
4	L	25	79.0	0.038	15.7	LOS B	0.2	2.1	0.14	0.97	45.7
5	T	1117	6.0	0.863	60.9	LOS E	32.8	241.3	0.98	0.93	21.7
6	R	268	11.0	1.000 ³	63.4	LOS E	17.0	130.6	0.99	0.84	21.9
Approach		1411	8.3	1.000	60.6	LOS E	32.8	241.3	0.97	0.91	21.9
North: Botany Road											
7	L	313	7.0	0.177	7.7	X	X	X	X	0.60	49.8
8	T	11	40.0	0.897	81.1	LOS F	20.4	156.5	1.00	0.97	17.5
9	R	237	10.0	0.897	89.3	LOS F	20.4	156.5	1.00	0.97	17.5
Approach		560	8.9	0.897	43.6	LOS D	20.4	156.5	0.44	0.76	27.5
West: Foreshore Road											
10	L	53	29.0	0.034	8.1	X	X	X	X	0.59	49.8
11	T	789	9.0	0.974	98.7	LOS F	37.4	281.9	1.00	1.19	15.7
12	R	75	85.0	0.386	63.5	LOS E	4.6	56.1	0.88	0.77	22.4
Approach		917	16.3	0.974	90.6	LOS F	37.4	281.9	0.93	1.12	16.8
All Vehicles		3260	13.7	1.000	67.3	LOS E	37.4	281.9	0.87	0.94	20.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

³ x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	50.4	LOS E	0.2	0.2	0.82	0.82
P3	Across E approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	51.3	LOS E	0.2	0.2	0.83	0.83
P7	Across W approach	53	62.6	LOS F	0.2	0.2	0.91	0.91
All Pedestrians		212	58.3	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Botany Road/Beauchamp Rd
2014 AM Peak Construction
+Existing

Botany Road / Beauchamp Road
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Botany Road East											
22	T	613	41.0	0.288	9.3	LOS A	3.2	30.1	0.66	0.55	51.4
23	R	81	35.0	0.455	33.2	LOS C	2.0	18.5	0.97	0.77	31.8
Approach		694	40.3	0.455	12.1	LOS A	3.2	30.1	0.70	0.58	48.1
North East: Beauchamp Road											
24	L	57	27.0	0.814	32.3	LOS C	11.9	88.8	0.98	0.98	33.5
26	R	819	5.0	0.814	31.6	LOS C	11.9	88.8	0.98	0.98	33.5
Approach		876	6.4	0.814	31.6	LOS C	11.9	88.8	0.98	0.98	33.5
North West: Botany Road West											
27	L	864	6.0	0.485	9.6	X	X	X	X	0.65	54.5
28	T	859	26.0	0.780	24.3	LOS B	7.7	65.8	1.00	0.95	37.7
Approach		1723	16.0	0.780	16.9	LOS B	7.7	65.8	0.50	0.80	44.6
All Vehicles		3293	18.6	0.814	19.8	LOS B	11.9	88.8	0.67	0.80	41.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 1:38:04 PM
SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd
www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Botany Road/Beauchamp Rd
2014 PM Peak Construction
+Existing

Botany Road / Beauchamp Road
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Botany Road East											
22	T	966	25.0	0.480	12.4	LOS A	6.0	51.2	0.79	0.67	47.6
23	R	120	38.0	0.685	35.4	LOS C	3.2	30.0	1.00	0.88	30.9
Approach		1086	26.4	0.685	14.9	LOS B	6.0	51.2	0.81	0.70	45.0
North East: Beauchamp Road											
24	L	14	31.0	0.739	26.9	LOS B	11.2	82.5	0.92	0.91	36.5
26	R	940	5.0	0.739	26.1	LOS B	11.3	82.6	0.93	0.91	36.4
Approach		954	5.4	0.739	26.1	LOS B	11.3	82.6	0.93	0.91	36.4
North West: Botany Road West											
27	L	703	5.0	0.392	9.6	X	X	X	X	0.65	54.5
28	T	587	34.0	0.766	26.2	LOS B	5.3	48.3	1.00	0.94	36.6
Approach		1291	18.2	0.766	17.1	LOS B	5.3	48.3	0.46	0.78	44.6
All Vehicles		3331	17.2	0.766	19.0	LOS B	11.3	82.6	0.71	0.79	42.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
2014 AM Peak Operation

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	29	56.0	0.171	8.3	LOS A	0.9	9.6	0.40	0.55	49.8
2	T	96	76.0	0.171	7.5	LOS A	0.9	9.6	0.40	0.48	50.3
3	R	1	0.0	0.171	13.0	LOS A	0.9	9.6	0.40	0.80	45.9
Approach		126	70.7	0.171	7.7	LOS A	0.9	9.6	0.40	0.50	50.1
East: Caltex Access											
4	L	1	0.0	0.008	6.3	LOS A	0.0	0.3	0.36	0.44	49.4
5	T	1	0.0	0.008	5.3	LOS A	0.0	0.3	0.36	0.38	49.9
6	R	7	14.0	0.008	12.4	LOS A	0.0	0.3	0.36	0.64	45.5
Approach		9	10.9	0.008	10.9	LOS A	0.0	0.3	0.36	0.59	46.3
North: Penrhyn Road											
7	L	23	24.0	0.065	6.2	LOS A	0.3	2.9	0.10	0.49	51.5
8	T	58	30.0	0.065	4.9	LOS A	0.3	2.9	0.10	0.36	52.8
9	R	84	81.0	0.082	12.8	LOS A	0.4	5.0	0.11	0.61	46.3
Approach		165	55.1	0.082	9.1	LOS A	0.4	5.0	0.10	0.50	49.0
West: Penrhyn Road											
10	L	84	99.0	0.155	9.8	LOS A	0.8	9.5	0.45	0.56	49.1
11	T	1	0.0	0.155	6.7	LOS A	0.8	9.5	0.45	0.45	49.4
12	R	14	8.0	0.155	13.7	LOS A	0.8	9.5	0.45	0.71	45.1
Approach		99	85.4	0.155	10.3	LOS A	0.8	9.5	0.45	0.58	48.5
All Vehicles		400	66.5	0.171	9.0	LOS A	0.9	9.6	0.29	0.52	49.1

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 3:40:08 PM

SIDRA INTERSECTION 5.1.2.1953

Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip

8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd

www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
2014 PM Peak Operation

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	1	0.0	0.134	7.0	LOS A	0.7	6.7	0.40	0.53	49.9
2	T	107	55.0	0.134	7.0	LOS A	0.7	6.7	0.40	0.49	50.4
3	R	1	0.0	0.134	12.9	LOS A	0.7	6.7	0.40	0.83	46.1
Approach		109	53.9	0.134	7.0	LOS A	0.7	6.7	0.40	0.49	50.3
East: Caltex Access											
4	L	1	0.0	0.024	6.2	LOS A	0.1	0.9	0.32	0.44	49.6
5	T	1	0.0	0.024	5.2	LOS A	0.1	0.9	0.32	0.37	50.1
6	R	24	23.0	0.024	12.5	LOS A	0.1	0.9	0.32	0.63	45.4
Approach		26	21.2	0.024	11.9	LOS A	0.1	0.9	0.32	0.61	45.7
North: Penrhyn Road											
7	L	9	67.0	0.025	7.1	LOS A	0.1	1.1	0.04	0.50	51.8
8	T	20	11.0	0.025	4.6	LOS A	0.1	1.1	0.04	0.37	53.3
9	R	84	91.0	0.083	12.9	LOS A	0.4	5.2	0.04	0.62	46.6
Approach		114	74.9	0.083	10.9	LOS A	0.4	5.2	0.04	0.57	48.0
West: Penrhyn Road											
10	L	84	76.0	0.126	9.1	LOS A	0.6	7.1	0.44	0.55	49.2
11	T	1	0.0	0.126	6.5	LOS A	0.6	7.1	0.44	0.45	49.6
12	R	1	0.0	0.126	13.4	LOS A	0.6	7.1	0.44	0.73	45.4
Approach		86	74.1	0.126	9.1	LOS A	0.6	7.1	0.44	0.55	49.2
All Vehicles		336	63.7	0.134	9.3	LOS A	0.7	7.1	0.28	0.54	48.8

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

Roundabout Capacity Model: SIDRA Standard.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 3:44:45 PM

SIDRA INTERSECTION 5.1.2.1953

Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip

8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd

www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2014 AM Peak Operation

Foreshore Road/Penrhyn Road/Botany Road

Signals - Fixed Time Cycle Time = 145 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	113	96.0	0.427	35.3	LOS C	4.6	59.0	0.62	0.74	34.4
2	T	24	27.0	0.096	57.3	LOS E	1.5	12.8	0.89	0.65	23.3
3	R	43	82.0	0.374	75.4	LOS F	2.9	35.0	0.95	0.77	20.9
Approach		180	83.4	0.427	47.8	LOS D	4.6	59.0	0.74	0.74	28.4
East: Botany Road											
4	L	80	54.0	0.097	15.1	LOS B	0.5	5.2	0.14	0.97	50.0
5	T	952	19.0	0.480	29.8	LOS C	18.2	148.0	0.74	0.65	36.3
6	R	285	16.0	0.856	50.5	LOS D	12.4	98.7	1.00	0.91	27.8
Approach		1317	20.5	0.856	33.4	LOS C	18.2	148.0	0.76	0.72	34.6
North: Botany Road											
7	L	361	11.0	0.210	9.7	X	X	X	X	0.65	54.6
8	T	27	36.0	0.805	75.6	LOS F	9.3	83.9	1.00	0.94	19.2
9	R	93	34.0	0.805	86.0	LOS F	9.3	83.9	1.00	0.94	20.8
Approach		481	16.9	0.805	28.1	LOS B	9.3	83.9	0.25	0.72	38.3
West: Foreshore Road											
10	L	352	9.0	0.201	11.4	X	X	X	X	0.69	58.8
11	T	1377	9.0	0.847	25.5	LOS B	31.6	238.1	0.96	0.89	33.4
12	R	60	51.0	0.183	39.3	LOS C	2.4	24.1	0.83	0.76	33.2
Approach		1788	10.4	0.847	23.2	LOS B	31.6	238.1	0.77	0.85	36.9
All Vehicles		3766	18.2	0.856	28.5	LOS C	31.6	238.1	0.70	0.78	35.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P7	Across W approach	53	66.6	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	66.6	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2014 PM Peak Operation

Foreshore Road/Penrhyn Road/Botany Road
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	122	68.0	0.666	77.3	LOS F	8.9	98.2	1.00	0.84	19.6
2	T	24	32.0	0.102	60.1	LOS E	1.5	13.8	0.90	0.66	21.9
3	R	66	55.0	0.339	72.4	LOS F	4.5	46.0	0.94	0.77	20.4
Approach		213	59.8	0.666	73.8	LOS F	8.9	98.2	0.97	0.80	20.1
East: Botany Road											
4	L	26	79.0	0.039	15.7	LOS B	0.2	2.2	0.14	0.97	45.7
5	T	1113	6.0	0.747	48.8	LOS D	28.1	207.1	0.94	0.82	24.7
6	R	273	11.0	0.966	62.6	LOS E	17.0	130.6	0.96	0.86	22.1
Approach		1412	8.3	0.966	50.8	LOS D	28.1	207.1	0.93	0.83	24.3
North: Botany Road											
7	L	313	7.0	0.177	7.7	X	X	X	X	0.60	49.8
8	T	11	40.0	0.897	81.1	LOS F	20.4	156.5	1.00	0.97	17.5
9	R	237	10.0	0.897	89.3	LOS F	20.4	156.5	1.00	0.97	17.5
Approach		560	8.9	0.897	43.6	LOS D	20.4	156.5	0.44	0.76	27.5
West: Foreshore Road											
10	L	54	29.0	0.035	8.1	X	X	X	X	0.59	49.8
11	T	789	9.0	0.945	86.7	LOS F	35.0	264.2	1.00	1.13	17.2
12	R	75	85.0	0.383	62.5	LOS E	4.6	55.5	0.87	0.77	22.6
Approach		918	16.4	0.945	80.1	LOS F	35.0	264.2	0.93	1.07	18.3
All Vehicles		3102	14.3	0.966	59.8	LOS E	35.0	264.2	0.84	0.89	22.3

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	45.6	LOS E	0.2	0.2	0.78	0.78
P3	Across E approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	50.4	LOS E	0.2	0.2	0.82	0.82
P7	Across W approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		212	58.6	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Botany Road/Beauchamp Rd
2014 AM Peak Operation

Botany Road / Beauchamp Road
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Botany Road East											
22	T	613	41.0	0.288	9.3	LOS A	3.2	30.1	0.66	0.55	51.4
23	R	81	35.0	0.455	33.2	LOS C	2.0	18.5	0.97	0.77	31.8
Approach		694	40.3	0.455	12.1	LOS A	3.2	30.1	0.70	0.58	48.1
North East: Beauchamp Road											
24	L	57	27.0	0.786	30.8	LOS C	11.1	82.2	0.97	0.95	34.3
26	R	795	4.0	0.786	30.1	LOS C	11.1	82.2	0.97	0.95	34.2
Approach		852	5.5	0.786	30.1	LOS C	11.1	82.2	0.97	0.95	34.2
North West: Botany Road West											
27	L	865	6.0	0.486	9.6	X	X	X	X	0.65	54.5
28	T	859	26.0	0.780	24.3	LOS B	7.7	65.8	1.00	0.95	37.7
Approach		1724	16.0	0.780	16.9	LOS B	7.7	65.8	0.50	0.80	44.6
All Vehicles		3269	18.4	0.786	19.3	LOS B	11.1	82.2	0.66	0.79	42.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 4:43:59 PM
SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd
www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Botany Road/Beauchamp Rd
2014 PM Peak Construction
+Existing

Botany Road / Beauchamp Road
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Botany Road East											
22	T	966	25.0	0.480	12.4	LOS A	6.0	51.2	0.79	0.67	47.6
23	R	120	38.0	0.685	35.4	LOS C	3.2	30.0	1.00	0.88	30.9
Approach		1086	26.4	0.685	14.9	LOS B	6.0	51.2	0.81	0.70	45.0
North East: Beauchamp Road											
24	L	14	31.0	0.742	27.0	LOS B	11.3	83.0	0.92	0.91	36.5
26	R	943	5.0	0.742	26.2	LOS B	11.4	83.1	0.93	0.91	36.3
Approach		957	5.4	0.742	26.2	LOS B	11.4	83.1	0.93	0.91	36.3
North West: Botany Road West											
27	L	672	5.0	0.375	9.6	X	X	X	X	0.65	54.6
28	T	587	34.0	0.766	26.2	LOS B	5.3	48.3	1.00	0.94	36.6
Approach		1259	18.5	0.766	17.3	LOS B	5.3	48.3	0.47	0.78	44.4
All Vehicles		3302	17.3	0.766	19.1	LOS B	11.4	83.1	0.71	0.79	41.9

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 4:46:00 PM
SIDRA INTERSECTION 5.1.2.1953

Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd
www.sidrasolutions.com

SIDRA
INTERSECTION

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	34	56.0	0.196	8.4	LOS A	1.0	11.3	0.41	0.55	49.8
2	T	111	76.0	0.196	7.5	LOS A	1.0	11.3	0.41	0.49	50.2
3	R	1	0.0	0.196	13.1	LOS A	1.0	11.3	0.41	0.80	45.9
Approach		145	70.8	0.196	7.7	LOS A	1.0	11.3	0.41	0.51	50.0
East: Caltex Access											
4	L	1	0.0	0.009	6.3	LOS A	0.0	0.3	0.37	0.45	49.3
5	T	1	0.0	0.009	5.4	LOS A	0.0	0.3	0.37	0.38	49.7
6	R	8	14.0	0.009	12.5	LOS A	0.0	0.3	0.37	0.64	45.4
Approach		11	11.2	0.009	11.1	LOS A	0.0	0.3	0.37	0.59	46.1
North: Penrhyn Road											
7	L	26	24.0	0.064	6.2	LOS A	0.3	2.9	0.10	0.49	51.4
8	T	66	30.0	0.064	4.9	LOS A	0.3	2.9	0.10	0.36	52.7
9	R	84	81.0	0.097	12.9	LOS A	0.5	6.0	0.13	0.60	46.1
Approach		177	53.4	0.097	8.9	LOS A	0.5	6.0	0.12	0.49	49.1
West: Penrhyn Road											
10	L	84	99.0	0.163	10.1	LOS A	0.8	9.9	0.48	0.58	48.9
11	T	1	0.0	0.163	7.0	LOS A	0.8	9.9	0.48	0.47	49.1
12	R	17	8.0	0.163	14.0	LOS A	0.8	9.9	0.48	0.72	44.9
Approach		102	83.0	0.163	10.7	LOS A	0.8	9.9	0.48	0.60	48.1
All Vehicles		435	65.1	0.196	9.0	LOS A	1.0	11.3	0.31	0.53	49.1

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Penrhyn Road Roundabout
2024 PM Peak Operation

Penrhyn Road Roundabout (including Caltex Access)
Roundabout

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Inter Terminal Road											
1	L	1	0.0	0.156	7.0	LOS A	0.8	7.9	0.41	0.54	49.9
2	T	124	55.0	0.156	7.0	LOS A	0.8	7.9	0.41	0.49	50.3
3	R	1	0.0	0.156	12.9	LOS A	0.8	7.9	0.41	0.83	46.0
Approach		126	54.1	0.156	7.1	LOS A	0.8	7.9	0.41	0.50	50.3
East: Caltex Access											
4	L	1	0.0	0.027	6.2	LOS A	0.1	1.0	0.33	0.44	49.6
5	T	1	0.0	0.027	5.2	LOS A	0.1	1.0	0.33	0.38	50.1
6	R	27	23.0	0.027	12.5	LOS A	0.1	1.0	0.33	0.63	45.4
Approach		29	21.4	0.027	12.0	LOS A	0.1	1.0	0.33	0.62	45.7
North: Penrhyn Road											
7	L	12	67.0	0.029	7.1	LOS A	0.1	1.2	0.04	0.50	51.8
8	T	23	11.0	0.029	4.6	LOS A	0.1	1.2	0.04	0.37	53.3
9	R	84	90.0	0.082	12.9	LOS A	0.4	5.1	0.04	0.62	46.6
Approach		119	72.4	0.082	10.7	LOS A	0.4	5.1	0.04	0.56	48.1
West: Penrhyn Road											
10	L	84	73.0	0.128	9.3	LOS A	0.6	7.1	0.47	0.57	49.1
11	T	1	0.0	0.128	6.8	LOS A	0.6	7.1	0.47	0.47	49.4
12	R	1	0.0	0.128	13.6	LOS A	0.6	7.1	0.47	0.74	45.2
Approach		86	71.2	0.128	9.3	LOS A	0.6	7.1	0.47	0.57	49.0
All Vehicles		361	61.5	0.156	9.2	LOS A	0.8	7.9	0.30	0.55	48.8

Level of Service (LOS) Method: Delay (RTA NSW).
Vehicle movement LOS values are based on average delay per movement
Intersection and Approach LOS values are based on average delay for all vehicle movements.
Roundabout Capacity Model: SIDRA Standard.
SIDRA Standard Delay Model used.

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2024 AM Peak Operation

Foreshore Road/Penrhyn Road/Botany Road

Signals - Fixed Time Cycle Time = 150 seconds (Optimum Cycle Time - Minimum Delay)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	120	96.0	0.440	32.8	LOS C	4.8	60.6	0.58	0.74	35.6
2	T	28	27.0	0.117	60.2	LOS E	1.8	15.7	0.90	0.67	22.6
3	R	47	81.0	0.425	78.7	LOS F	3.4	40.0	0.96	0.77	20.3
Approach		196	82.4	0.440	47.9	LOS D	4.8	60.6	0.72	0.74	28.4
East: Botany Road											
4	L	93	54.0	0.115	15.2	LOS B	0.6	6.6	0.15	0.97	49.9
5	T	1136	21.0	0.629	36.7	LOS C	25.3	209.2	0.83	0.73	32.7
6	R	331	16.0	0.992	60.9	LOS E	16.4	130.6	1.00	0.92	24.7
Approach		1559	21.9	0.992	40.5	LOS C	25.3	209.2	0.83	0.79	31.3
North: Botany Road											
7	L	419	11.0	0.243	9.7	X	X	X	X	0.65	54.6
8	T	32	36.0	0.987	121.3	LOS F	14.2	128.5	1.00	1.15	13.7
9	R	107	34.0	0.987	131.7	LOS F	14.2	128.5	1.00	1.15	14.9
Approach		558	16.8	0.987	39.5	LOS C	14.2	128.5	0.25	0.77	32.3
West: Foreshore Road											
10	L	407	9.0	0.233	11.4	X	X	X	X	0.69	58.8
11	T	1629	10.0	0.982	66.7	LOS E	58.6	445.3	1.00	1.17	20.5
12	R	67	49.0	0.197	36.5	LOS C	2.6	25.4	0.79	0.76	34.6
Approach		2104	11.1	0.982	55.0	LOS D	58.6	445.3	0.80	1.06	24.1
All Vehicles		4417	18.8	0.992	47.6	LOS D	58.6	445.3	0.74	0.92	27.5

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P7	Across W approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		53	69.1	LOS F			0.96	0.96

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2024 PM Peak Operation

Foreshore Road/Penrhyn Road/Botany Road
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	134	66.0	0.722	79.2	LOS F	9.9	108.8	1.00	0.87	19.3
2	T	27	32.0	0.116	60.3	LOS E	1.8	15.6	0.90	0.67	21.9
3	R	75	54.0	0.380	72.8	LOS F	5.1	52.0	0.95	0.78	20.3
Approach		236	58.3	0.722	75.0	LOS F	9.9	108.8	0.97	0.82	19.9
East: Botany Road											
4	L	28	77.0	0.043	15.7	LOS B	0.2	2.5	0.15	0.97	45.6
5	T	1366	9.0	1.026	107.3	LOS F	57.3	432.0	0.98	1.20	14.8
6	R	273	11.0	1.000 ³	62.4	LOS E	17.0	130.6	0.99	0.84	22.2
Approach		1667	10.5	1.026	98.4	LOS F	57.3	432.0	0.97	1.14	15.9
North: Botany Road											
7	L	362	7.0	0.205	7.7	X	X	X	X	0.60	49.8
8	T	13	40.0	1.042	142.4	LOS F	31.8	244.5	1.00	1.18	11.7
9	R	275	10.0	1.042	150.6	LOS F	31.8	244.5	1.00	1.18	11.7
Approach		649	8.9	1.042	70.8	LOS F	31.8	244.5	0.44	0.86	20.5
West: Foreshore Road											
10	L	62	29.0	0.040	8.1	X	X	X	X	0.59	49.8
11	T	947	12.0	1.034	131.6	LOS F	52.2	403.3	1.00	1.36	12.7
12	R	78	84.0	0.384	58.8	LOS E	4.6	55.5	0.84	0.77	23.5
Approach		1087	18.1	1.034	119.3	LOS F	52.2	403.3	0.93	1.27	13.8
All Vehicles		3640	15.6	1.042	98.2	LOS F	57.3	432.0	0.86	1.11	16.0

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

³ x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Queue Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	48.8	LOS E	0.2	0.2	0.81	0.81
P3	Across E approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
P5	Across N approach	53	47.2	LOS E	0.2	0.2	0.79	0.79
P7	Across W approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		212	58.6	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

MOVEMENT SUMMARY

Site: Botany Road/Beauchamp Rd
2024 AM Peak Operation

Botany Road / Beauchamp Road
Signals - Fixed Time Cycle Time = 60 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Botany Road East											
22	T	712	41.0	0.342	11.8	LOS A	4.6	43.6	0.69	0.58	48.6
23	R	95	35.0	0.638	40.5	LOS C	3.0	27.4	1.00	0.84	28.8
Approach		806	40.3	0.638	15.2	LOS B	4.6	43.6	0.73	0.61	45.1
North East: Beauchamp Road											
24	L	65	27.0	0.784	32.0	LOS C	14.6	108.2	0.95	0.93	33.7
26	R	922	4.0	0.784	31.3	LOS C	14.7	108.2	0.95	0.93	33.6
Approach		987	5.5	0.784	31.3	LOS C	14.7	108.2	0.95	0.93	33.6
North West: Botany Road West											
27	L	1022	8.0	0.582	9.7	X	X	X	X	0.65	54.5
28	T	997	26.0	0.797	27.8	LOS B	10.6	90.5	0.99	0.97	35.7
Approach		2019	16.9	0.797	18.7	LOS B	10.6	90.5	0.49	0.80	43.2
All Vehicles		3813	18.9	0.797	21.2	LOS B	14.7	108.2	0.66	0.80	40.6

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 3:52:57 PM
SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd
www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Botany Road/Beauchamp Rd
2024 PM Peak Operation

Botany Road / Beauchamp Road
Signals - Fixed Time Cycle Time = 50 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Queue Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South East: Botany Road East											
22	T	1121	25.0	0.557	12.9	LOS A	7.3	61.8	0.82	0.71	47.0
23	R	140	38.0	0.799	37.9	LOS C	4.0	37.2	1.00	0.98	29.8
Approach		1261	26.4	0.799	15.7	LOS B	7.3	61.8	0.84	0.74	44.3
North East: Beauchamp Road											
24	L	17	31.0	0.857	34.0	LOS C	16.1	118.2	0.98	1.03	32.8
26	R	1088	5.0	0.857	33.0	LOS C	16.1	118.2	0.99	1.03	32.8
Approach		1105	5.4	0.857	33.0	LOS C	16.1	118.2	0.99	1.03	32.8
North West: Botany Road West											
27	L	778	5.0	0.434	9.6	X	X	X	X	0.65	54.5
28	T	682	34.0	0.890	33.1	LOS C	7.2	64.7	1.00	1.10	33.0
Approach		1460	18.5	0.890	20.5	LOS B	7.2	64.7	0.47	0.86	41.8
All Vehicles		3826	17.4	0.890	22.5	LOS B	16.1	118.2	0.74	0.87	39.4

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

Processed: Monday, 18 February 2013 4:06:53 PM
SIDRA INTERSECTION 5.1.2.1953
Project: G:\21\21961\Tech\Traffic Assessment\SIDRA\Port Botany Development.sip
8000065, GHD SERVICES PTY LTD, ENTERPRISE

Copyright © 2000-2011 Akcelik and Associates Pty Ltd
www.sidrasolutions.com

SIDRA
INTERSECTION

MOVEMENT SUMMARY

Site: Foreshore/Penrhyn/Botany
2024 Background Traffic Growth
Only

Foreshore Road/Penrhyn Road/Botany Road
Signals - Fixed Time Cycle Time = 150 seconds (Practical Cycle Time)

Movement Performance - Vehicles											
Mov ID	Turn	Demand Flow veh/h	HV %	Deg. Satn v/c	Average Delay sec	Level of Service	95% Back of Vehicles veh	Queue Distance m	Prop. Queued	Effective Stop Rate per veh	Average Speed km/h
South: Penrhyn Road											
1	L	82	45.0	0.398	72.4	LOS F	5.6	54.1	0.95	0.78	20.4
2	T	28	32.0	0.120	60.3	LOS E	1.8	16.2	0.90	0.67	21.9
3	R	62	45.0	0.301	71.6	LOS F	4.1	40.2	0.93	0.77	20.5
Approach		173	42.9	0.398	70.1	LOS E	5.6	54.1	0.94	0.76	20.7
East: Botany Road											
4	L	15	58.0	0.017	14.2	LOS A	0.1	0.7	0.11	0.97	46.1
5	T	1335	6.0	0.984	87.8	LOS F	50.3	370.5	0.98	1.11	17.1
6	R	273	11.0	1.000 ³	62.4	LOS E	17.0	130.6	0.99	0.84	22.2
Approach		1622	7.4	1.000	82.8	LOS F	50.3	370.5	0.97	1.06	17.9
North: Botany Road											
7	L	362	7.0	0.205	7.7	X	X	X	X	0.60	49.8
8	T	13	40.0	1.000	116.3	LOS F	28.9	222.1	1.00	1.11	13.6
9	R	275	10.0	1.000	124.5	LOS F	28.9	222.1	1.00	1.11	13.6
Approach		649	8.9	1.000	59.2	LOS E	28.9	222.1	0.44	0.83	23.0
West: Foreshore Road											
10	L	62	29.0	0.040	8.1	X	X	X	X	0.59	49.8
11	T	916	9.0	1.008	115.0	LOS F	47.3	356.7	1.00	1.28	14.1
12	R	26	52.0	0.109	55.8	LOS D	1.5	14.9	0.80	0.72	24.0
Approach		1004	11.4	1.008	106.8	LOS F	47.3	356.7	0.93	1.23	14.9
All Vehicles		3448	10.6	1.008	84.7	LOS F	50.3	370.5	0.86	1.05	17.7

X: Not applicable for Continuous movement.

Level of Service (LOS) Method: Delay (RTA NSW).

Vehicle movement LOS values are based on average delay per movement

Intersection and Approach LOS values are based on average delay for all vehicle movements.

SIDRA Standard Delay Model used.

³ x = 1.00 due to short lane. Refer to the Lane Summary report for information about excess flow and related conditions.

Movement Performance - Pedestrians								
Mov ID	Description	Demand Flow ped/h	Average Delay sec	Level of Service	Average Back of Pedestrian ped	Queue Distance m	Prop. Queued	Effective Stop Rate per ped
P1	Across S approach	53	48.8	LOS E	0.2	0.2	0.81	0.81
P3	Across E approach	53	68.2	LOS F	0.2	0.2	0.95	0.95
P5	Across N approach	53	48.0	LOS E	0.2	0.2	0.80	0.80
P7	Across W approach	53	69.1	LOS F	0.2	0.2	0.96	0.96
All Pedestrians		212	58.5	LOS E			0.88	0.88

Level of Service (LOS) Method: SIDRA Pedestrian LOS Method (Based on Average Delay)

Pedestrian movement LOS values are based on average delay per pedestrian movement.

Intersection LOS value for Pedestrians is based on average delay for all pedestrian movements.

Appendix C – Crash data

Detailed Crash Report

NOTES: 5221 - Foreshore Rd inc 10m at intersections - July07 to June12

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
SF																				
Sydney Region																				
Botany Bay City LGA																				
Banksmeadow																				
Botany Rd																				
717607	02/07/2010	Fri	17:30		at FORESHORE RD	XJN	STR	Fine	Dry	60	2	CAR	F30	S in BOTANY RD		10 Turning right	N	0	0	
E43648283						RUM:	21	Right through				CAR	M39	N in BOTANY RD		10 Proceeding in lane				
724647	10/09/2010	Fri	07:50		at FORESHORE RD	XJN	STR	Fine	Dry	60	2	SEM	M33	W in FORESHORE RD		20 Turning right	N	0	0	
E42286407						RUM:	21	Right through				4WD	M31	E in FORESHORE RD		30 Proceeding in lane				
745893	02/02/2011	Wed	18:42		at PENRHYN RD	XJN	STR	Fine	Dry	70	2	CAR	M17	W in BOTANY RD		60 Turning right	I	0	1	
E43447905						RUM:	21	Right through				BDBL	M43	E in BOTANY RD		25 Proceeding in lane				
Foreshore Rd																				
596213	26/10/2007	Fri	06:45	5 m	W BOTANY RD	XJN	STR	Raining	Wet	60	2	OMV	U U	E in FORESHORE RD		Unk Proceeding in lane	I	0	1	
E31850164						RUM:	30	Rear end				CAR	M38	E in FORESHORE RD		Unk Proceeding in lane				
724969	20/04/2010	Tue	22:19	10 m	W BOTANY RD	TJN	STR	Fine	Dry	70	3	CAR	U U	E in FORESHORE RD		20 Proceeding in lane	I	0	7	
E42484485						RUM:	30	Rear end				CAR	M37	E in FORESHORE RD		0 Stationary				
												4WD	M46	E in FORESHORE RD		0 Stationary				
760819	09/07/2011	Sat	20:30	10 m	W BOTANY RD	XJN	STR	Fine	Dry	70	1	M/C	M17	W in FORESHORE RD		40 Proceeding in lane	I	0	1	
E45339779						RUM:	74	On road-out of cont.												
621306	08/02/2008	Fri	10:00	30 m	W BOTANY RD	DIV	STR	Fine	Wet	90	2	CAR	M17	E in FORESHORE RD		90 Proceeding in lane	I	0	3	
E33627465						RUM:	30	Rear end				SEM	U U	E in FORESHORE RD		0 Stationary				
586547	13/08/2007	Mon	17:00	200 m	W BOTANY RD	DIV	STR	Fine	Dry	90	2	CAR	M40	W in FORESHORE RD		80 Proceeding in lane	N	0	0	
E33074284						RUM:	30	Rear end				CAR	F28	W in FORESHORE RD		80 Proceeding in lane				
747516	17/02/2011	Thu	07:30	300 m	W BOTANY RD	DIV	CRV	Fine	Dry	70	2	SEM	M42	W in FORESHORE RD		50 Veering left	I	0	1	
E43285925						RUM:	35	Lane change left				CAR	F33	W in FORESHORE RD		Unk Proceeding in lane				
719750	29/07/2010	Thu	21:20	750 m	W BOTANY RD	DIV	CRV	Overcast	Wet	70	1	CAR	M18	W in FORESHORE RD		70 Proceeding in lane	N	0	0	S
E43472285						RUM:	81	Off left/rt bnd=>obj					Signal pole							
Botany																				
Botany Rd																				
649185	09/04/2008	Wed	13:50		at FORESHORE RD	XJN	STR	Fine	Dry	70	2	SEM	M45	E in BOTANY RD		10 Turning right	I	0	4	
E483268690						RUM:	21	Right through				CAR	M24	W in BOTANY RD		65 Proceeding in lane				
706599	08/04/2010	Thu	18:00	5 m	E FORESHORE RD	XJN	STR	Raining	Wet	80	2	CAR	M78	W in BOTANY RD		40 Proceeding in lane	I	0	1	
E40807549						RUM:	30	Rear end				OMV	M37	W in BOTANY RD		30 Proceeding in lane				

Detailed Crash Report

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors	
SF																					
741469 E42708414	14/12/2010	Tue	16:45	10 m	E FORESHORE RD	XJN RUM:	STR 30	Fine Rear end	Dry	60	3	CAR CAR CAR	F30 F66 M38	E in BOTANY RD E in BOTANY RD E in BOTANY RD	40 Proceeding in lane 0 Stationary 40 Proceeding in lane			N	0	0	
Foreshore Rd																					
728803 E136452498	27/09/2010	Mon	11:30	5 m	W BOTANY RD	XJN RUM:	STR 30	Fine Rear end	Dry	70	3	BDBL TRK SEM	M39 M43 M47	E in FORESHORE RD E in FORESHORE RD S in BOTANY RD	70 Proceeding in lane 0 Stationary 0 Wait turn right			I	0	1	
783026 E47223268	23/01/2012	Mon	13:40	5 m	W BOTANY RD	TJN RUM:	STR 30	Fine Rear end	Dry	70	2	BDBL CAR	M34 M20	E in FORESHORE RD E in FORESHORE RD	60 Proceeding in lane 0 Stationary			I	0	1	
639980 E35105429	22/08/2008	Fri	22:42	100 m	W BOTANY RD	DIV RUM:	STR 34	Raining Lane change right	Wet	70	2	CAR SEM	F24 M51	W in FORESHORE RD W in FORESHORE RD	70 Veering right 55 Proceeding in lane			I	0	2	
650388 E35510705	01/11/2008	Sat	18:05	400 m	W BOTANY RD	DIV RUM:	CRV 30	Fine Rear end	Dry	70	3	CAR CAR PAN	M21 M54 M48	E in FORESHORE RD E in FORESHORE RD W in FORESHORE RD	90 Veering right 70 Proceeding in lane 70 Proceeding in lane			I	0	2	S
588232 E31441938	01/09/2007	Sat	18:05	500 m	W BOTANY RD	DIV RUM:	CRV 30	Fine Rear end	Dry	90	2	CAR CAR	M60 M52	W in FORESHORE RD W in FORESHORE RD	60 Proceeding in lane 40 Proceeding in lane			I	0	1	
704832 E39013612	24/10/2009	Sat	10:45	500 m	W BOTANY RD	DIV RUM:	STR 60	Fine Parked	Dry	70	2	TRK TRK	M73	E in FORESHORE RD E in FORESHORE RD	70 Proceeding in lane 0 Parked			I	0	1	
605686 E32689262	06/01/2008	Sun	06:15	1 km	W BOTANY RD	DIV RUM:	STR 71	Overcast Off rd left => obj	Wet	90	2	CAR SEM	M32	E in FORESHORE RD E in FORESHORE RD	90 Proceeding in lane 0 Parked			I	0	1	F
709237 E76818001	19/01/2010	Tue	09:30	1.63 km	W BOTANY RD	DIV RUM:	STR 30	Fine Rear end	Dry	70	3	SEM LOR TRK	M44 M59 M37	E in FORESHORE RD W in FORESHORE RD E in FORESHORE RD	50 Proceeding in lane 70 Proceeding in lane 0 Stationary			I	0	1	
619282 E32148170	29/12/2007	Sat	00:25		at GATE 16 ENT	DIV RUM:	STR 21	Fine Right through	Dry	70	2	CAR CAR	M18 F17	S in FORESHORE RD N in FORESHORE RD	20 Turning right 20 Proceeding in lane			I	0	1	
586442 E30623775	19/07/2007	Thu	00:40	1 km	E GENERAL HOLMES DR	DIV RUM:	CRV 40	Fine U turn	Dry	90	2	BDBL CAR	M58 F55	E in FORESHORE RD E in FORESHORE RD	15 Perform U-turn 80 Proceeding in lane			I	0	1	
597698 E32491967	18/11/2007	Sun	07:10	1 km	E GENERAL HOLMES DR	DIV RUM:	STR 71	Fine Off rd left => obj	Dry	90	2	CAR DTR	M19	E in FORESHORE RD E in FORESHORE RD	110 Veering left Parked			F	1	0	S
685774 E39390078	11/10/2009	Sun	09:33	5 m	S GENERAL HOLMES DR	TJN RUM:	STR 30	Overcast Rear end	Dry	70	2	CAR TRK	M79 M54	N in FORESHORE RD N in FORESHORE RD	60 Proceeding in lane 0 Stationary			N	0	0	
753311 E85908101	13/05/2011	Fri	22:00	5 m	S GENERAL HOLMES DR	TJN RUM:	CRV 81	Fine Off left/rt bnd=>obj	Dry	70	1	CAR Bridge	M23	E in GENERAL HOLMES DR	65 Turning right			I	0	3	S

Detailed Crash Report

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
SF																				
654721	12/01/2009	Mon	17:00	60 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	70	2	CAR	F24	N in FORESHORE RD	70 Proceeding in lane		N	0	0
E35963322							RUM:	33	Lane sideswipe				SEM	M61	N in FORESHORE RD	70 Proceeding in lane				
627451	22/04/2008	Tue	07:25	100 m	S	GENERAL HOLMES DR	DIV	STR	Raining	Wet	90	2	TRK	M36	E in FORESHORE RD	90 Proceeding in lane		I	0	1
E140390194							RUM:	71	Off rd left => obj				DTR		E in FORESHORE RD	Parked				
693546	22/11/2009	Sun	23:35	200 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	70	1	TRK	M18	S in FORESHORE RD	70 Proceeding in lane		I	0	1
E39402062							RUM:	71	Off rd left => obj				Signpost							
778450	13/12/2011	Tue	16:35	265 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	80	2	4WD	F44	S in FORESHORE RD	70 Proceeding in lane		N	0	0
E46464212							RUM:	30	Rear end				OMV	M23	S in FORESHORE RD	70 Proceeding in lane				
707253	21/04/2010	Wed	19:15	300 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	70	2	CAR	F19	S in FORESHORE RD	69 Proceeding in lane		N	0	0
E40723861							RUM:	30	Rear end				CAR	M18	S in FORESHORE RD	70 Proceeding in lane				
640048	16/09/2008	Tue	13:15	400 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	70	2	SEM	M61	S in FORESHORE RD	50 Proceeding in lane		I	0	1
E34983027							RUM:	30	Rear end				4WD	M57	S in FORESHORE RD	70 Proceeding in lane				
582376	13/07/2007	Fri	12:34	500 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	90	2	TRK	U U	S in FORESHORE RD	10 Perform U-turn		N	0	0
E30897334							RUM:	40	U turn				TRK	M63	S in FORESHORE RD	80 Proceeding in lane				
595031	03/10/2007	Wed	15:40	500 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	90	2	CAR	M34	N in FORESHORE RD	80 Proceeding in lane		N	0	0
E31822871							RUM:	30	Rear end				OMV	M44	N in FORESHORE RD	20 Proceeding in lane				
639220	07/09/2008	Sun	17:21	500 m	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	90	1	CAR	F30	N in FORESHORE RD	90 Proceeding in lane		N	0	0
E67578201							RUM:	71	Off rd left => obj				Fence							
693268	29/11/2009	Sun	15:30	900 m	S	GENERAL HOLMES DR	DIV	CRV	Fine	Dry	70	1	CAR	U U	S in FORESHORE RD	Unk Perform U-turn		N	0	0
E127827698							RUM:	41	U turn into object				Fence							
801448	07/06/2012	Thu	12:20	1.745 km	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	80	2	CAR	M73	S in FORESHORE RD	20 Proceeding in lane		I	0	2
E47830252							RUM:	30	Rear end				CAR	M57	S in FORESHORE RD	0 Stationary				
720422	09/08/2010	Mon	21:50	2 km	S	GENERAL HOLMES DR	DIV	STR	Fine	Dry	70	3	CAR	M50	S in FORESHORE RD	60 Incorrect side		I	0	3
E41752148							RUM:	20	Head on				4WD	M56	N in FORESHORE RD	70 Proceeding in lane				
													CAR	M63	N in FORESHORE RD	70 Proceeding in lane				
793181	03/05/2012	Thu	04:20	1.775 km	S	GENERAL HOLMES OP	DIV	STR	Raining	Wet	80	2	CAR	F24	S in FORESHORE RD	10 Turning right		N	0	0
E47472035							RUM:	21	Right through				CAR	M31	N in FORESHORE RD	80 Proceeding in lane				
753205	10/05/2011	Tue	10:00	5 m	N	HALE ST	TJN	STR	Fine	Dry	60	3	CAR	M84	S in FORESHORE RD	40 Proceeding in lane		N	0	0
E44543046							RUM:	30	Rear end				CAR	F19	S in FORESHORE RD	0 Stationary				
													CAR	F63	S in FORESHORE RD	0 Stationary				
787284	12/03/2012	Mon	13:40	5 m	N	HALE ST	TJN	STR	Fine	Dry	80	2	BDBL	M38	S in FORESHORE RD	25 Proceeding in lane		N	0	0
E48084078							RUM:	30	Rear end				TRK	M33	S in FORESHORE RD	0 Stationary				

Detailed Crash Report

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
SF																				
795649	21/05/2012	Mon	05:58	100 m	N HALE ST	DIV	STR	Fine	Dry	80	2	CAR	M21	N in FORESHORE RD	80	Proceeding in lane	N	0	0	
E48891316						RUM:	30	Rear end				CAR	F44	N in FORESHORE RD	0	Stationary				
736619	31/12/2010	Fri	17:30	1.54 km	W PENRHYN RD	DIV	STR	Fine	Dry	70	2	CAR	M63	W in FORESHORE RD	50	Proceeding in lane	N	0	0	
E42941023						RUM:	30	Rear end				CAR	M32	W in FORESHORE RD	0	Stationary				
645020	24/10/2008	Fri	16:20	10 m	S ULM AVE	XJN	STR	Fine	Dry	70	2	CAR	F56	N in FORESHORE RD	20	Proceeding in lane	N	0	0	
E35339661						RUM:	30	Rear end				CAR	M62	N in FORESHORE RD	20	Proceeding in lane				
General Holmes Dr																				
603343	09/12/2007	Sun	19:30		at FORESHORE RD	TJN	STR	Fine	Dry	60	2	CAR	M51	N in GENERAL HOLMES DR	10	Perform U-turn	N	0	0	
E32123276						RUM:	40	U turn				SEM	M27	N in GENERAL HOLMES DR	10	Proceeding in lane				
657442	30/01/2009	Fri	21:55		at FORESHORE RD	TJN	STR	Fine	Dry	70	2	CAR	M22	E in GENERAL HOLMES DR	30	Turning right	N	0	0	
E36430257						RUM:	14	2 right turning				CAR	M29	N in FORESHORE RD	30	Turning right				
720527	25/07/2010	Sun	03:00		at FORESHORE RD	TJN	CRV	Fine	Dry	70	1	CAR	M17	E in GENERAL HOLMES DR	80	Turning right	I	0	4	S
E43477380						RUM:	81	Off left/rt bnd=>obj						Underpass						
738849	09/01/2011	Sun	07:20		at FORESHORE RD	TJN	CRV	Raining	Wet	60	1	CAR	M45	E in GENERAL HOLMES DR	70	Turning right	N	0	0	S
E43321257						RUM:	81	Off left/rt bnd=>obj						Utility pole						
699044	05/02/2010	Fri	08:15	5 m	N FORESHORE RD	TJN	STR	Overcast	Wet	70	2	CAR	M28	N in GENERAL HOLMES DR	70	Proceeding in lane	N	0	0	
E41188955						RUM:	30	Rear end				CAR	M79	N in GENERAL HOLMES DR	50	Proceeding in lane				
738797	05/01/2011	Wed	06:25	10 m	W FORESHORE RD	TJN	STR	Fine	Dry	70	2	CAR	M42	E in GENERAL HOLMES DR	25	Proceeding in lane	N	0	0	
E43616743						RUM:	32	Right rear				4WD	F48	E in GENERAL HOLMES DR	0	Wait turn right				
702651	15/03/2010	Mon	17:45	10 m	E FORESHORE ROAD OP	DIV	STR	Fine	Dry	70	3	CAR	M28	W in GENERAL HOLMES DR	25	Proceeding in lane	N	0	0	
E40900942						RUM:	30	Rear end				CAR	F33	W in GENERAL HOLMES DR	0	Stationary				
												CAR	M30	W in GENERAL HOLMES DR	0	Stationary				
Mascot																				
Foreshore Rd																				
615462	08/01/2008	Tue	08:50	200 m	S GENERAL HOLMES DR	DIV	STR	Overcast	Dry	90	2	CAR	F30	E in FORESHORE RD	90	Proceeding in lane	N	0	0	
E32364872						RUM:	33	Lane sideswipe				SEM	M45	E in FORESHORE RD	80	Veering right				
General Holmes Dr																				
588162	29/08/2007	Wed	15:13	235 m	E ARTHUR BUTLER RD	DIV	STR	Fine	Dry	70	4	CAR	M71	E in GENERAL HOLMES DR	70	Proceeding in lane	N	0	0	
E104856698						RUM:	30	Rear end				CAR	M21	E in GENERAL HOLMES DR	70	Proceeding in lane				
												TRK	M32	E in GENERAL HOLMES DR	0	Broken down				
												CAR	F46	E in GENERAL HOLMES DR	5	Proceeding in lane				

Detailed Crash Report

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
S F																				
785952 E47391121	10/03/2012	Sat	09:30	200 m	E BUTLER RD	DIV RUM:	STR 30	Fine Rear end	Dry	70	3	CAR CAR CAR	F36 F28 M22	E in GENERAL HOLMES DR E in GENERAL HOLMES DR E in GENERAL HOLMES DR	Unk Proceeding in lane 0 Stationary Unk Proceeding in lane		N	0	0	
588718 E31796007	08/09/2007	Sat	08:12	5 m	W FORESHORE DR	TJN RUM:	STR 30	Raining Rear end	Wet	70	3	CAR CAR CAR	M29 M21 F17	E in GENERAL HOLMES DR E in GENERAL HOLMES DR E in GENERAL HOLMES DR	60 Proceeding in lane 70 Proceeding in lane 70 Proceeding in lane		N	0	0	
607200 E32444952	31/01/2008	Thu	07:45		at FORESHORE RD	TJN RUM:	STR 33	Fine Lane sideswipe	Dry	70	2	TRK CAR	M39 F23	E in GENERAL HOLMES DR E in GENERAL HOLMES DR	50 Proceeding in lane 10 Proceeding in lane		N	0	0	
629903 E34106747	30/06/2008	Mon	06:30		at FORESHORE RD	TJN RUM:	STR 34	Fine Lane change right	Dry	70	2	TRK CAR	M45 M31	N in GENERAL HOLMES DR N in GENERAL HOLMES DR	Unk Veering right Unk Proceeding in lane		N	0	0	
648327 E36944383	20/08/2008	Wed	08:30		at FORESHORE RD	TJN RUM:	CRV 30	Fine Rear end	Dry	70	2	4WD CAR	F37 M28	E in GENERAL HOLMES DR E in GENERAL HOLMES DR	40 Proceeding in lane 0 Stationary		I	0	1	
690859 E39245206	02/12/2009	Wed	13:40		at FORESHORE RD	TJN RUM:	CRV 81	Fine Off left/rt bnd=>obj	Dry	70	1	CAR	M48	N in GENERAL HOLMES DR	60 Proceeding in lane		I	0	1	
716063 E41562649	23/06/2010	Wed	15:10		at FORESHORE RD	TJN RUM:	CRV 36	Overcast Right turn sideswipe	Wet	30	2	BDBL CAR	M56 F21	N in FORESHORE RD N in FORESHORE RD	35 Turning right Unk Turning right		N	0	0	S
771515 E45907745	25/09/2011	Sun	01:30		at FORESHORE RD	TJN RUM:	STR 74	Raining On road-out of cont.	Wet	70	1	CAR	M17	E in GENERAL HOLMES DR	20 Proceeding in lane		I	0	1	
772313 E45868475	22/10/2011	Sat	09:30	10 m	E FORESHORE RD	TJN RUM:	CRV 88	Fine Out of cont on bend	Dry	70	1	SEM	M36	N in FORESHORE RD	20 Turning right		I	0	1	S
588183 E32097465	30/08/2007	Thu	19:00	10 m	W FORESHORE RD	TJN RUM:	STR 30	Fine Rear end	Dry	50	3	CAR CAR CAR	M63 F64 M37	W in GENERAL HOLMES DR W in GENERAL HOLMES DR W in GENERAL HOLMES DR	50 Proceeding in lane 0 Stationary 0 Stationary		N	0	0	
636630 E35016674	05/08/2008	Tue	14:25	10 m	W FORESHORE RD	TJN RUM:	STR 34	Fine Lane change right	Dry	70	2	CAR CAR	M26 M23	E in GENERAL HOLMES DR E in GENERAL HOLMES DR	60 Veering right 65 Proceeding in lane		N	0	0	
799268 E48180504	12/06/2012	Tue	05:38	10 m	W FORESHORE RD	TJN RUM:	STR 30	Raining Rear end	Wet	60	4	CAR CAR CAR CAR	M48 M48 M U M31	E in GENERAL HOLMES DR E in GENERAL HOLMES DR E in GENERAL HOLMES DR E in GENERAL HOLMES DR	50 Proceeding in lane 0 Stationary 20 Proceeding in lane 0 Wait turn right		N	0	0	
654076 E36015405	22/12/2008	Mon	15:53		at FORESHORE ROAD OP	DIV RUM:	STR 30	Fine Rear end	Dry	70	3	TRK CAR CAR	M50 M U M26	W in GENERAL HOLMES DR W in GENERAL HOLMES DR W in GENERAL HOLMES DR	20 Proceeding in lane 0 Stationary 0 Stationary		N	0	0	
663739 E36072044	07/02/2009	Sat	06:36		at FORESHORE ROAD OP	DIV RUM:	CRV 34	Fine Lane change right	Dry	60	2	P/C CAR	M47 M22	S in GENERAL HOLMES DR S in GENERAL HOLMES DR	Veering right 60 Proceeding in lane		I	0	1	

Detailed Crash Report

Crash No.	Date	Day of Week	Time	Distance	ID Feature	Loc Type	Alignment	Weather	Surface Condition	Speed Limit	No. of Tus	Tu Type/Obj	Age/Sex	Street Travelling	Speed Travelling	Manoeuvre	Degree of Crash	Killed	Injured	Factors
SF																				
743303	28/02/2011	Mon	09:30		at FORESHORE ROAD OP	DIV	STR	Fine	Dry	70	2	CAR	M55	E in GENERAL HOLMES DR	20	Proceeding in lane	N	0	0	
E44677016						RUM:	30	Rear end				4WD	M56	E in GENERAL HOLMES DR	0	Stationary				
641905	16/10/2008	Thu	16:45	10 m	E FORESHORE ROAD OP	DIV	STR	Fine	Dry	80	1	M/C	M30	W in GENERAL HOLMES DR	30	Proceeding in lane	I	0	1	
E37154889						RUM:	74	On road-out of cont.												
652834	17/01/2009	Sat	13:45	10 m	E FORESHORE ROAD OP	DIV	STR	Fine	Dry	80	2	CAR	M56	W in GENERAL HOLMES DR	80	Proceeding in lane	N	0	0	
E36417419						RUM:	30	Rear end				CAR	M39	W in GENERAL HOLMES DR	Unk	Proceeding in lane				
740468	02/02/2011	Wed	13:08	5 m	W FORESHORE ROAD OP	DIV	STR	Fine	Dry	70	3	UTE	M31	W in GENERAL HOLMES DR	65	Proceeding in lane	N	0	0	
E43718062						RUM:	62	Accident				CAR		W in GENERAL HOLMES DR	0	Broken down				
608003	15/12/2007	Sat	13:15	10 m	W FORESHORE ROAD OP	DIV	STR	Fine	Dry	70	4	CAR	F30	W in GENERAL HOLMES DR	70	Proceeding in lane	N	0	0	
E62794301						RUM:	30	Rear end				CAR	F56	W in GENERAL HOLMES DR	50	Proceeding in lane				
												OMV	M34	W in GENERAL HOLMES DR	0	Stationary				
												CAR	M24	W in GENERAL HOLMES DR	0	Stationary				
												CAR	M38	W in GENERAL HOLMES DR	Unk	Proceeding in lane				
Report Totals:		Total Crashes: 72				Fatal Crashes: 1				Injury Crashes: 31				Killed: 1		Injured: 52				

Crashid dataset 5221 - Foreshore Rd inc 10m at intersections - July07 to June12

Summary Crash Report

# Crash Type			Contributing Factors			Crash Movement			CRASHES			CASUALTIES																	
Car Crash	62	86.1%	Speeding	8	11.1%	Intersection, adjacent approaches	1	1.4%	Fatal crash	1	1.4%	Killed	1	1.9%															
Light Truck Crash	13	18.1%	Fatigue	1	1.4%	Head-on (not overtaking)	1	1.4%	Injury crash	31	43.1%	Injured	52	98.1%															
Rigid Truck Crash	1	1.4%	Alcohol	2	2.8%	Opposing vehicles; turning	6	8.3%	Non-casualty crash	40	55.6%	^ Unrestrained	2	3.8%															
Articulated Truck Crash	18	25.0%	Weather			U-turn	3	4.2%	^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn																				
'Heavy Truck Crash	(18)	(25.0%)				Rear-end	35	48.6%	Time Group			% of Day																	
Bus Crash	0	0.0%				Lane change	8	11.1%																					
"Heavy Vehicle Crash	(18)	(25.0%)				Rain	9	12.5%	Parallel lanes; turning	1	1.4%																		
Emergency Vehicle Crash	0	0.0%	Overcast	6	8.3%	Vehicle leaving driveway	0	0.0%	00:01 - 02:59	3	4.2%12.5%	Crashes			Casualties														
Motorcycle Crash	2	2.8%	Fog or mist	0	0.0%	Overtaking; same direction	0	0.0%	03:00 - 04:59	2	2.8% 8.3%																		
Pedal Cycle Crash	1	1.4%	Other	0	0.0%	Hit parked vehicle	1	1.4%	05:00 - 05:59	2	2.8% 4.2%																		
Pedestrian Crash	0	0.0%	Road Surface Condition			Hit railway train	0	0.0%	06:00 - 06:59	5	6.9% 4.2%																		
' Rigid or Artic. Truck " Heavy Truck or Heavy Bus # These categories are NOT mutually exclusive						Hit pedestrian	0	0.0%	07:00 - 07:59	6	8.3% 4.2%																		
						Permanent obstruction on road	0	0.0%	08:00 - 08:59	4	5.6% 4.2%																		
						Hit animal	0	0.0%	09:00 - 09:59	5	6.9% 4.2%																		
			Off road, on straight	0	0.0%	10:00 - 10:59	3	4.2% 4.2%																					
Collision Type			Natural Lighting			Off road on straight, hit object	5	6.9%	11:00 - 11:59	1	1.4% 4.2%	~ School Travel Time																	
						Off road, on curve	0	0.0%	12:00 - 12:59	2	2.8% 4.2%																		
						Off road on curve, hit object	2	2.8%	13:00 - 13:59	8	11.1% 4.2%																		
						Out of control on straight	3	4.2%	14:00 - 14:59	1	1.4% 4.2%																		
Road Classification			Speed Limit			Off road, on curve, hit object	2	2.8%	15:00 - 15:59	5	6.9% 4.2%	McLean Periods			% Week														
						Out of control on curve	0	0.0%	16:00 - 16:59	4	5.6% 4.2%																		
						Other crash type	6	8.3%	17:00 - 17:59	6	8.3% 4.2%																		
						Day of the Week			# Holiday Periods									80 km/h or less	1	1.4%	18:00 - 18:59	4	5.6% 4.2%	A			13 18.1% 17.9%		
~ 40km/h or less			1 7.7%									Street Lighting Off/Nil			% of Dark														
																		40 km/h or less	1	1.4%	80 km/h zone	8	11.1%						
																		50 km/h zone	1	1.4%	90 km/h zone	11	15.3%						
Tuesday	10	13.9%	Friday	11	15.3%	WEEKDAY	51	70.8%	Easter	0	0.0%	Christmas	2	2.8%	Easter SH			2 2.8%											
Wednesday	10	13.9%	Saturday	11	15.3%	WEEKEND	21	29.2%	Anzac Day	0	0.0%	January SH	8	11.1%							June/July SH			4 5.6%					
																								</					

Summary Crash Report

# Crash Type			Contributing Factors			Crash Movement			CRASHES			CASUALTIES																	
Car Crash	12	75.0%	Speeding	3	18.8%	Intersection, adjacent approaches	0	0.0%	Fatal crash	0	0.0%	Killed	0	0.0%															
Light Truck Crash	3	18.8%	Fatigue	1	6.3%	Head-on (not overtaking)	1	6.3%	Injury crash	10	62.5%	Injured	19	100.0%															
Rigid Truck Crash	0	0.0%	Alcohol	0	0.0%	Opposing vehicles; turning	4	25.0%	Non-casualty crash	6	37.5%	^ Unrestrained	1	5.3%															
Articulated Truck Crash	7	43.8%	Weather			U-turn	0	0.0%	^ Belt fitted but not worn, No restraint fitted to position OR No helmet worn																				
'Heavy Truck Crash	(7)	(43.8%)				Rear-end	6	37.5%																					
Bus Crash	0	0.0%				Fine	11	68.8%	Lane change	0	0.0%																		
"Heavy Vehicle Crash	(7)	(43.8%)				Rain	3	18.8%	Parallel lanes; turning	0	0.0%																		
Emergency Vehicle Crash	0	0.0%	Overcast	2	12.5%	Vehicle leaving driveway	1	6.3%	Time Group	% of Day		Crashes			Casualties														
Motorcycle Crash	1	6.3%	Fog or mist	0	0.0%	Overtaking; same direction	0	0.0%	00:01 - 02:59	0	0.0%	12.5%	1	2012	1														
Pedal Cycle Crash	0	0.0%	Other	0	0.0%	Hit parked vehicle	0	0.0%	03:00 - 04:59	0	0.0%	8.3%	3	2011	3														
Pedestrian Crash	0	0.0%	Road Surface Condition			Hit railway train	0	0.0%	05:00 - 05:59	0	0.0%	4.2%	6	2010	9														
' Rigid or Artic. Truck " Heavy Truck or Heavy Bus # These categories are NOT mutually exclusive						Hit pedestrian	0	0.0%	06:00 - 06:59	1	6.3%	4.2%	3	2009	0														
						Permanent obstruction on road	0	0.0%	07:00 - 07:59	1	6.3%	4.2%	2	2008	5														
						Hit animal	0	0.0%	08:00 - 08:59	0	0.0%	4.2%	1	2007	1														
* Up to 10 metres from an intersection ~ 07:30-09:30 or 14:30-17:00 on school days			Snow or ice	0	0.0%	Off road, on straight	0	0.0%	09:00 - 09:59	0	0.0%	4.2%	~ School Travel Time																
			Natural Lighting			Off road on straight, hit object	0	0.0%	10:00 - 10:59	0	0.0%	4.2%				Involvement			2	12.5%									
						Out of control on straight	1	6.3%	11:00 - 11:59	1	6.3%	4.2%																	
						Off road, on curve	1	6.3%	12:00 - 12:59	0	0.0%	4.2%																	
Collision Type			Speed Limit			Off road on curve, hit object	0	0.0%	13:00 - 13:59	4	25.0%	4.2%	McLean Periods			% Week													
						Out of control on curve	2	12.5%	14:00 - 14:59	0	0.0%	4.2%				A	2	12.5%	17.9%										
						Other crash type	0	0.0%	15:00 - 15:59	0	0.0%	4.2%				B	0	0.0%	7.1%										
						Road Classification			40 km/h or less	0	0.0%	16:00 - 16:59				1	6.3%	4.2%	C	5	31.3%	17.9%							
50 km/h zone	4	25.0%	17:00 - 17:59	1	6.3%				4.2%	D	0	0.0%	3.5%																
60 km/h zone	5	31.3%	18:00 - 18:59	3	18.8%				4.2%	E	0	0.0%	3.6%																
70 km/h zone	6	37.5%	19:00 - 19:59	0	0.0%				4.2%	F	2	12.5%	10.7%																
Day of the Week			# Holiday Periods			80 km/h zone	1	6.3%	20:00 - 21:59	3	18.8%	8.3%	G	3	18.8%	7.1%													
						90 km/h zone	0	0.0%	22:00 - 24:00	1	6.3%	8.3%	H	1	6.3%	7.1%													
						100 km/h zone	0	0.0%	Street Lighting Off/Nil		% of Dark		I	1	6.3%	12.5%													
						110 km/h zone	0	0.0%					J	2	12.5%	10.7%													
New Year			Queen's BD			Labour Day			Easter SH			June/July SH																	
															Aust. Day			Christmas			Sept./Oct. SH								
																								Easter			December SH		

GHD

133 Castlereagh St Sydney NSW 2000

-

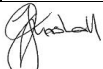
T: 2 9239 7100 F: 2 9239 7199 E: sydmail@ghd.com.au

© GHD 2013

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

G:\21\21961\WP\187060.docx

Document Status

Rev No.	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
1	K McNatty	O Peel		Greg Marshall		26/2/2013
2	K McNatty	O Peel		Greg Marshall		12/3/2013
3	K McNatty	O Peel		Greg Marshall		30/4/2013

www.ghd.com





Attachment F - Visual impact assessment



Patrick Stevedores Operation No 2
Section 75W Modification - Port Botany Container Terminal
Project (DA-453-12-2002-i MOD 7)
Landscape and Visual Impact Assessment

May 2013

Table of contents

1.	Introduction	3
1.1	Purpose of this report	3
1.2	The proposal	3
1.3	Limitations.....	4
2.	Methodology	7
2.1	Basis for the landscape and visual impact assessment.....	7
2.2	Assumptions.....	7
2.3	Assessment process	7
2.4	Desktop study	7
2.5	Site survey	8
2.6	Describing the existing visual environment.....	8
2.7	Assessment of landscape and visual impacts	9
2.8	Mitigation.....	14
3.	Existing visual environment.....	17
3.1	Overview.....	17
3.2	Landform.....	17
3.3	Land use	17
3.4	Landscaping and vegetation.....	17
3.5	Landscape character units.....	17
3.6	Sensitive visual receptors	23
4.	Landscape and visual impacts.....	33
4.1	Summary of impacts.....	33
4.2	Sensitive visual receptor 1: La Perouse	33
4.3	Sensitive visual receptor 2: Molineaux Point, Port Botany	36
4.4	Sensitive visual receptor 3: Botany Golf Course, Botany	36
4.5	Sensitive visual receptor 4: Mill Stream Lookout, Foreshore Beach, Botany	37
4.6	Sensitive visual receptor 5: Lady Robinsons Beach, Brighton-le-Sands	39
4.7	Sensitive visual receptor 6: Carruthers Drive, Dolls Point.....	39
4.8	Sensitive visual receptor 7: Silver Beach, Kurnell.....	42
4.9	Lighting Impacts.....	44
4.10	Protected airspace impacts.....	44
5.	Mitigation Measures	47
5.1	Overview.....	47
5.2	Construction Phase	47
5.3	Operational Phase.....	47
5.4	Sustainability elements.....	48
6.	Conclusion	49

7. References	51
---------------------	----

Table index

Table 2-1	Landscape sensitivity	9
Table 2-2	Landscape capacity to accommodate change.....	10
Table 2-3	Visual modification definitions.....	11
Table 2-4	Assessment of receptor sensitivity	12
Table 2-5	Duration of impacts.....	12
Table 2-6	Quality of the impact.....	13
Table 2-7	Significance of Impact	13
Table 2-8	Description of significance of impact	14
Table 3-1	LCU 1 Landscape Character Elements and Assessment	19
Table 3-2	LCU 2 Landscape Character Elements and Assessment	21
Table 3-3	LCU 3 Landscape Character Elements and Assessment	22
Table 3-4	Sensitive visual receptors.....	23
Table 3-5	Sensitive visual receptor 1: La Pouse	25
Table 3-6	Sensitive visual receptor 2: Molineaux Point, Port Botany	27
Table 3-7	Sensitive visual receptor 3: Botany Golf Course, Botany.....	28
Table 3-8	Sensitive visual receptor 4: Mill Stream Lookout, Foreshore Beach, Botany.....	29
Table 3-9	Sensitive visual receptor 5: Lady Robinsons Beach, Brighton-le-Sands.....	30
Table 3-10	Sensitive visual receptor 6: Carruthers Drive, Dolls Point.....	31
Table 3-11	Sensitive visual receptor 7: Silver Beach, Kurnell.....	32
Table 4-1	Sensitive visual receptor 1 Potential Impacts	34
Table 4-2	Sensitive visual receptor 2 Potential Impacts	36
Table 4-3	Sensitive visual receptor 3 Potential Impacts	36
Table 4-4	Sensitive visual receptor 4 Potential Impacts	37
Table 4-5	Sensitive visual receptor 5 Potential Impacts	39
Table 4-6	Sensitive visual receptor 6 Potential Impacts	40
Table 4-7	Sensitive visual receptor 7 Potential Impacts	42
Table 6-1	Summary of Landscape and Visual Impacts – Construction and Operational Phase.....	49

Figure index

Figure 2-1	Proposed construction activities.....	5
Figure 3-1	Landscape character units.....	20
Figure 3-2	Sensitive visual receptor locations	24
Figure 4-1	La Perouse Photomontage	35
Figure 4-2	Mill Stream Lookout, Foreshore Beach Photomontage.....	38
Figure 4-3	Dolls Point Photomontage	41
Figure 4-4	Silver Beach, Kurnell Photomontage.....	43

Glossary of terms

Term	Definition
Background view	Landscape visible in distance (6 km to 16 km) where textures are no longer visible, but mountain and valley forms, skylines and ridgelines are important.
Cumulative impact	An impact produced by the accumulation of successive additions of individual impacts, which may not themselves be significant.
Ecological community	An assemblage of populations of different species, interacting with one another.
Ecologically sustainable development (ESD)	Development that meets the needs of the present without compromising the ability of future generations to meet their own needs. It involves using, conserving and enhancing the community's resources so that ecological processes are maintained, and the total quality of life can be increased.
Ecosystem	A natural unit consisting of all organisms in an area functioning together with all the non-living physical factors of the environment.
Flora	The plant life occurring in an area.
Foreground	0 to 1 km is the visual zone where colour contrast and textural detail are most clearly perceived.
Footprint	An outline or indentation left by the Proposal on the surface.
Intervisibility	Two points in the landscape that are mutually visible.
Landscape	Landscape is defined as features (such as vegetation, built elements, topography, etc.) either within the Investigation Corridor or on land adjacent. The features of the landscape are considered as an integral part of the landscape and visual context of the route and important contributors to the overall character of the environment.
Landscape feature	A component, part or feature of the landscape that is prominent or eye-catching, for example hills, buildings, vegetation.
Landscape quality	Judgement of landscape value based on particular characteristics that influence the way in which the environment is experienced, including special interests such as cultural associations or heritage interests, the presence and/or type of elements and condition.
Landscape sensitivity	The extent to which landscape can accept a change of a particular type and scale without unacceptable adverse impacts on its character.
Landscape value	Areas of formally designated landscape that through national or local consensus, reflect the value placed by society on particular environments and/or their features.
Luminaires	Light fitting.
Middleground view	1 km to 6 km – different elements in the landscape are visually apparent.
National Environmental Significance (NES)	Matters of NES as listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 which include World/National Heritage properties, Ramsar wetlands, nationally threatened species and ecological communities, migratory species, Commonwealth marine areas, nuclear actions and national heritage places.

Term	Definition
PANS-Ops	PANS-OPS protection surfaces are imaginary surfaces in space that guarantee an aircraft a certain minimum obstacle clearance.
Power factor correction	Automatic tuning of electrical power supply to reduce wasted energy.
Sensitive visual receptor	Person and/or viewer group that would experience an impact.
Sensitive visual receptor locations	Are used in this report to typify the views experienced by sensitive visual receptors throughout the visual catchment of the Proposal. Viewing locations in this report often represent a viewing area, rather than one exact point.
Visual amenity	The value of a particular area or view in terms of what is seen.
Visual impact	Changes in the appearance of the landscape or in the composition of available views as a result of development, to people's responses to these changes, and to the overall impacts in regard to visual amenity. This can be positive (beneficial or an improvement) or negative (adverse or a detraction).
Visual catchment (study area)	Extent of potential visibility to or from a specific area, feature or proposal.

Abbreviations

AHD	Australian Height Datum
EIA	Environmental Impact Assessment
EPBC	Environment Protection and Biodiversity Conservation
GA	Geoscience Australia
GIS	Geographic Information Systems
km	Kilometres
LUC	Landscape Character Unit
LVIA	Landscape and visual impact assessment
m	Metres
NC	Nature Conservation
NP	National Park
NR	Nature Refuges
OLS	Obstacle Surface Limits
PANS-Ops	Procedures for Air Navigation Services – Aircraft Operations
SRTM	Shuttle Radar Topography Mission
ToR	Terms of Reference
VM	Vegetation Management

1. Introduction

1.1 Purpose of this report

Patrick Stevedores Operations No. 2 (Patrick) propose to modify its existing development consent by conducting a range of demolition and construction activities within its existing terminal site located on the northern side of Brotherson Dock in Port Botany, New South Wales (NSW).

This landscape and visual impact assessment has been prepared in accordance with the Director General's Requirements (DGRs) issued by the NSW Department of Planning and Infrastructure (DP&I) on 19 December, 2012. Items within the DGRs specifically relating to landscape and visual amenity and addressed within this report include:

"Design and Visual Amenity Impacts - a visual impact assessment of the proposed development on surrounding sensitive visual receivers. The assessment should consider:

- *viewsheds and identify potentially affected receivers;*
- *design elements of each component with a focus on highly visible elements;*
- *potential lighting impacts on affected receivers;*
- *landscaping and sustainability elements and measures; and*
- *flight path and obstacle surface limits. "*

This report provides an assessment of the landscape and visual impacts within the study area as a direct result of the proposal (defined below). Mitigation measures to minimise impacts are provided to reduce and/or manage potential adverse impacts during both the construction and operation stages of the proposal on the landscape character and visual amenity of the study area.

1.2 The proposal

The proposal would involve a range of demolition and construction works at the existing terminal as well as the replacement of manually-operated straddle carriers with automated straddle carriers. The key features of the proposal include:

- Removal of the temporary demountable administration building in the south eastern corner of the site and replacement with a permanent administration and control building. The new building would include a single-storey administration building and a control tower which would be approximately 43 metres in height.
- Construction of a new undercover maintenance building and workshop designed to accommodate the new automated straddle carriers.
- Removal of the existing optical character recognition (OCR) building and construction of a new OCR structure and traffic lanes at the entrance to the terminal.
- Construction of a new, single-storey demountable Australian Quarantine Inspection Service (AQIS) building adjacent to the new OCR structure.
- Relocation of the existing truck grids and weighbridges.
- Removal of an existing substation building.
- Construction of new straddle carrier parking and fuelling bays.
- Construction of two new car parks for visitors and employees.

- Pavement improvement works.
- Modernisation of terminal lighting including re-positioning of existing lights and installation of more energy efficient lighting within the container stacking yard.
- Replacement of the existing manually-operated straddle carriers with automated straddle carriers.

Other infrastructure and environmental improvements including installation of: gross pollutant traps, upgraded drainage and pumps, light poles, new water and sewerage services, boundary fencing and walls, weighbridge and associated equipment and landscaping works in accordance with the relevant statutory and port code requirements.

The proposed construction activities are shown in Figure 1-1.

1.3 Limitations

This report: has been prepared by GHD for Patrick Stevedores Operation No 2 and may only be used and relied on by Patrick Stevedores Operation No 2 for the purpose agreed between GHD and the Patrick Stevedores Operation No 2 as set out in Section 2 of this report.

GHD otherwise disclaims responsibility to any person other than Patrick Stevedores Operation No 2 arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report (refer Section) 2.2 of this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Patrick Stevedores Operation No 2 and others who provided information to GHD (including Government authorities)], which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

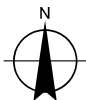
The opinions, conclusions and any recommendations in this report are based on information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this report are constrained by the particular site conditions, such as the location of buildings, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this report.

Site conditions (including the addition or removal of built and landscape features) may change after the date of this Report. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this report if the site conditions change.



0 25 50 100 150 200
Metres



LEGEND

- Constuction locations
- Proposal site
- Railway



Job Number 21-21961
Revision 1
Date 22 Apr 2013

Proposed construction works **Figure 1-1**

G:\21\21961\GIS\Maps\MXD\21_21961_2005_Fig2_2_PBRP_Construction_Plan_RevB.mxd

© 2010. While GHD has taken care to ensure the accuracy of this product, GHD and NSW DEPARTMENT OF LANDS, GEOSCIENCE AUSTRALIA, Quickbird Imagery make no representations or warranties about its accuracy, completeness or suitability for any particular purpose. GHD and NSW DEPARTMENT OF LANDS, GEOSCIENCE AUSTRALIA, Quickbird Imagery cannot accept liability of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred as a result of the product being inaccurate, incomplete or unsuitable in any way and for any reason.
Data Source: NSW Department of Lands: Cadastre - Jan 2011; Geoscience Australia: 250k Data - Jan 2011. Imagery: Quickbird Extracted Feb 2013; Created by: sdwoodger

Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmall@ghd.com.au W www.ghd.com.au

2. Methodology

2.1 Basis for the landscape and visual impact assessment

There is no guidance on the assessment of landscape and visual effects specific to Australia. However, the industry typically refers to guidance offered by the British Institute of Landscape Architects in the United Kingdom (UK). This assessment has, therefore, been conducted in accordance with the *Guidelines for Landscape and Visual Impact Assessment, Second Edition*, (2002) published by The Landscape Institute and The Institute for Environmental Management and Assessment in the UK.

Terminology, assessment methods and nomenclature have also been derived from *Visual Landscape Planning in Western Australia*, produced by the Western Australian Planning Commission (2007) and the Forest Practice Board of Tasmania's, *A Manual for Forest Landscape Management* (2006).

2.2 Assumptions

A number of assumptions have been made for this assessment:

- All construction areas would be rehabilitated post construction through vegetation planting appropriate to the local context and all applicable legislation.
- The assessment is based on the information provided to GHD at the time of writing; and Baseline conditions were assessed in the field on 11th November 2012.
- Mitigation measures are addressed on a site-wide basis Section 5.

2.3 Assessment process

In terms of structure, this report includes:

- A description of the existing visual environment.
- A assessment of the likely landscape and visual impacts.
- Mitigation measures to avoid, reduce, remedy or offset negative visual impacts resulting from the proposal.

2.4 Desktop study

A desktop study was undertaken to obtain relevant publically available data on visual impact and landscapes at a national, regional and local level for the study area. This included a comprehensive review of GIS data sets and an aerial photography based identification of potential sensitive visual receptors, later ground truthed by field teams.

The following data sets were reviewed for the landscape and visual impact assessment as part of the desktop study:

- Aerial photography.
- Topographical data.
- Hillshade (Shuttle Radar Topography Mission Shaded Relief).
- Road networks (Geoscience Australia 2007).
- Existing rail networks (Geoscience Australia 2007).
- Cadastre (NSW Department of Land 2011).

- Watercourses (Geoscience Australia 2007).
- Local government areas.
- Interim Biogeographic Regionalisation for Australia Version 6.1 regions and subregions (SEWPAC 2005).
- Relevant information from local planning schemes.

2.5 Site survey

A site survey was undertaken by a landscape architect to verify the desktop study, allow characterisation of the landscape, identify sensitive receptors and to observe how receptors might view the landscape. The site visit was conducted on the 22 November 2012 during conditions of good to hazy visibility.

During the site survey, the landscape architect traversed the study area and viewed the proposal site from both publicly accessible and private (where permission was granted) viewpoints. At each location a photographic record of landscape features, key views and receptors were obtained along with coordinates, bearings, field notes and sketches.

2.6 Describing the existing visual environment

The methodology for the identification of the existing environments landscape character of the area surrounding the proposal site and the identification of the viewing locations is detailed in Sections 2.6.1 to 2.6.3.

2.6.1 Defining the visual catchment

The study area for the landscape and visual impact assessment was established by identifying a worst case indicative visual catchment within which the proposal may be seen. This was determined through a desktop study examining aerial photographs, topographic maps, considering landform and land cover (screening) and the potential maximum visibility for the proposal.

This visual catchment was then used to identify sensitive visual receptors with potential views of the proposal.

2.6.2 Defining the landscape character units

The factors that were considered in categorising the landscape character areas include landform, vegetation and character of land. The categorising was informed through a review of the information assembled in the desktop study described in Section 2.4 and the site survey described in Section 2.5.

2.6.3 Selection of sensitive visual receptors

Representative viewpoints were identified in a range of locations. These were recorded and photographed. Sensitive visual receptors were selected in order to:

- Represent views of particular landscape and /or visual features of importance.
- Represent views from key visual sensitive visual receptors that spend extended amounts of time and other locations from which fixed or transient views would be possible, but where the time of stay is shorter. These include residents, road and recreational receptors.

2.7 Assessment of landscape and visual impacts

A qualitative assessment of landscape and visual impacts forms the second component of the assessment. The significance of impacts was evaluated using a combination of landscape impacts and visual impacts, as defined below.

2.7.1 Landscape impacts

Landscape impacts refer to the relative capacity of the landscape to accommodate changes to the physical landscape of the type and scale proposed that would occur as a direct result of the proposal. Impacts were assessed for the landscape character units and viewing locations (through professional judgement) in terms of the scale of visual change including:

- The extent to which the change of features altered the existing landscape character (refer to Table 2-3).
- The extent of area from which the effect was evident.
- The duration of the effect (refer to Table 2-5).
- The physical state (or condition) of the landscape and its intactness from a visual, functional, and ecological perspective. This included consideration of the condition of landscape elements such as roadside planting or landscaping or features such as a distinctive building, or significant mature trees, and their contribution to landscape character.
- The effectiveness of any proposed mitigation.

Landscape sensitivity levels are described in Table 2-1. The relative capacity of the landscape to accommodate changes as a direct result of the proposal is defined in Table 2-2.

Table 2-1 Landscape sensitivity

Landscape sensitivity	Definition
High	Landscapes of international designation that are highly valued, particularly near or distinctive and susceptible to small change
Medium	Landscape of regional designation that are valued more locally and tolerant of moderate levels of change
Low	Landscapes of local designation that are more commonplace and potentially tolerant of noticeable change or are undergoing substantial development, such that their character is one of change.

Table 2-2 Landscape capacity to accommodate change

Landscape capacity	Definition
Low potential capacity	The landscape has high sensitivity to the type of development proposed which could have a detrimental effect on the landscape character or value. Mitigation measures unlikely to reduce the impacts of the change.
Medium potential capacity	The landscape has medium sensitivity to the type of development proposed. Any change caused by the proposed development would be unlikely to have a significant adverse effect on the landscape character or value that could not be mitigated against.
High potential capacity	The landscape would have low sensitivity to this type of development and few constraints imposed by landscape elements. Development of this type is very unlikely to have an adverse effect on the landscapes character. Mitigation measures would be effective in neutralising adverse effects and / or may improve the landscape character.

2.7.2 Visual impacts

Visual impacts arise from changes in available views of the landscape that would occur as a result of the proposal. Visual impact was determined through the subjective assessment of sensitivity of the visual receptors and the magnitude (scale) of the change in view. Sensitivity was dependent upon a receptors' location; the importance of their view; their activity; expectations; available view; and the extent of screening of this view.

Factors that were considered in assessing the response to changes in the visual amenity include:

- Interest in the visual environment and the distance/angle of view to the source of the impact.
- The extent of screening/filtering of the view.
- Magnitude of change in the view (i.e. loss/addition of features that change the view's composition).
- Duration of the effect as detailed in Table 2-5.
- Quality of the impact as detailed in Table 2-6.
- Integration of changes within the existing view (form, mass, height, colour and texture).
- Effectiveness of the proposed mitigation.

Visual modification

Visual modification refers to the extent of change to the landscape, and therefore impact upon visual amenity, that would occur as a direct result of the proposal from a given viewpoint. Landscape is defined as features (such as vegetation, built elements, topography, etc.) either within the proposal site or on adjacent land. The features of the landscape are considered an integral part of the landscape and visual context of proposal site and important contributors to the overall character of the environment.

Assessment of changes to the landscape includes identification of:

- The nature of the change that is the degree of contrast, or integration of, any new features with existing features.
- Context and quality of the views including the extent to which the proposal would be visible in the wider landscape (with consideration of the presence of intervening vegetation or features).
- The scale or degree of change i.e. obvious/imperceptible with respect to loss or addition of features.
- The nature of the impact (adverse or beneficial).

For the purposes of this assessment, the definitions in Table 2-3 were used to describe visual modification.

Table 2-3 Visual modification definitions

Level of Modification	Definition
Large reduction or improvement	A substantial / obvious change to the landscape due to total loss of, or change to, elements, features or characteristics of the landscape. Would cause a landscape to be permanently changed and its quality diminished.
Moderate reduction or improvement	Discernible changes in the landscape due to partial loss of, or change to the elements, features or characteristics of the landscape. May be partly mitigated. The change would be out of scale with the landscape, and at odds with the local pattern and landform and would leave an adverse impact on the landscape.
Small reduction or improvement	Minor loss or alteration to one or more key landscape elements, features, or characteristics, or the introduction of elements that may be visible but may not be uncharacteristic within the existing landscape.
No perceivable reduction or improvement	Almost imperceptible or no change in the view as there was little or no loss of / or change to the elements, features or characteristics of the landscape.
Source: <i>Landscape Institute and Institute for Environmental Management and Assessment (2002)</i>	

Visual sensitivity

Visual sensitivity refers to visual receptors and their sensitivity to their visual environment. For the purposes of this assessment, key visual receptors comprise residents, users of transport routes (road and rail) as well as users of public recreation and all have differing sensitivities to their visual environment. Generally, sensitivity is derived from a combination of factors including:

- Receptors' interest in the visual environment (high, medium or low interest in their everyday visual environment, and the duration of the effect).
- Receptors' duration and viewing opportunity i.e. prolonged, regular viewing opportunities.
- Number of viewers and their distance / angle of view from the source of the effect, extent of screening / filtering of the view, where relevant.

For the purposes of this assessment, the terminology set out in Table 2-4 was used to describe visual sensitivity.

Table 2-4 Assessment of receptor sensitivity

Sensitivity	Definition
High	Occupiers of residential properties with long viewing periods, within close proximity to the proposed development Communities that place value upon the landscape and enjoyment of views of their landscape setting
Medium	Outdoor workers who have a key focus on their work who may also have intermittent views of the proposal Viewers at schools, or similar, when outdoor play and recreation areas are located within close proximity but viewing periods are limited Occupiers of residential properties with long viewing periods, at a distance from or screened from the proposal
Low	Road users in motor vehicles, trains or on transport routes that are passing through or adjacent to the study area and therefore have short term views Viewers indoor at their place of work, schools or similar
Negligible	Viewers from locations where there was screening by vegetation or structures where only occasional screened views are available and viewing times are short Road users in motor vehicles, trains or on transport routes that are passing through/adjacent to the study area and have partially screened views and short viewing times
Source: <i>Landscape Institute and Institute for Environmental Management and Assessment (2002)</i>	

Duration of impact

The definition of the duration of an impact as used in this assessment is outlined in Table 2-5 below.

Table 2-5 Duration of impacts

Duration	Definition
Temporary	Impacts lasting one year or less
Short Term	Impacts lasting one to seven years
Medium Term	Impacts lasting seven to fifteen years
Long Term	Impacts lasting fifteen to sixty years
Permanent	Impacts lasting over sixty years

Impact type

The definition of the quality of an impact as used in this assessment is outlined in Table 2-6 below.

Table 2-6 **Quality of the impact**

Quality	Definition
Neutral	A neutral impact would neither enhance nor detract from the landscape character or viewpoint.
Positive	A positive impact would improve or enhance the landscape character or viewpoint.
Negative	A negative impact would reduce or have an adverse effect on the existing landscape character or viewpoint.

Significance of impact

The significance (or severity) of impact was assessed according to the definitions outlined and described in Table 2-7 and Table 2-8.

Only impacts of major or high significance in the context of this assessment were considered. These impacts would require further refinement through mitigation.

The definition used to identify significance of impacts for this assessment is outlined in Table 2-7 with a definition of significance in Table 2-8.

Table 2-7 **Significance of Impact**

		Landscape Impact			
		Large	Moderate	Small	Negligible
Visual Sensitivity	High	Major Significance	High Significance	Moderate Significance	Minor Significance
	Medium	High Significance	Moderate Significance	Minor Significance	Not Significant
	Low	Moderate Significance	Minor Significance	Not Significant	Not Significant
	Negligible	Minor Significance	Not Significant	Not Significant	Not Significant

Source: *Landscape Institute and Institute for Environmental Management and Assessment (2002)*

Table 2-8 Description of significance of impact

Significance of impact	Description
Major	Large reduction (modification) in the amenity for receptors of high visual sensitivity
High	Large reduction (modification) in the amenity of a view for receptors of medium visual sensitivity
Moderate	Moderate reduction (modification) in the amenity of a view for viewers of a medium level visual sensitivity; or Large reduction (modification) in the amenity of a view for receptors of low visual sensitivity
Minor	Moderate reduction (modification) in the amenity of a view for receptors of low sensitivity; or Small reduction (modification) in the amenity of a view for receptors of moderate sensitivity
Not significant	Small reduction (modification) in the amenity of a view for receptors of low sensitivity

2.7.3 Photomontages

Four viewing locations were selected for the production of photomontage images. These photomontages were used to represent the views available from the selected locations following the completion of the proposal.

All photographic images were captured using a 50 mm fixed focal length lens on a 35mm format (digital equivalent) camera at a camera height of 1.6 m as recommended in the IEMA guidelines (IEMA 2002).

The software used for modelling and rendering the photomontages was Autodesk 3D Studio Max. In order to achieve an accurate photomontage of the structure and surrounding landscape, 10 m contours were used to model the surrounding landform.

Once the 3D model encapsulating both the landscape and new proposal elements was created, a virtual camera was placed in the software at the same location that the photographs had been taken from. The film (35 mm), focal lens (50 mm) and height (1.6 m) of the virtual camera matched the real camera utilised to take the photos.

The photos of the site were used in 3D Studio Max as a background to accurately match the 3D model with the proposal elements to the perspective of the photos.

From the camera view, rendered images of the proposal were produced to match the daylight exposure of the photographs. The rendered images were imported into Adobe Photoshop for post-production editing and collation of the photomontages. The final result was the 3D model of the proposal shown in the correct 3D location in the photographs. The final images were produced to a high resolution, suitable for printing.

2.8 Mitigation

Appropriate mitigation measures are an integral part of the design of the proposal to achieve best fit within the landscape.

Environmental constraints and opportunities were taken into consideration at each stage of the design of the proposal. This iterative approach assisted to avoid or minimise potential negative effects of the scheme while also helping to identify opportunities for enhancement.

Strategies for impact mitigation included:

- Avoidance - Avoid developments in sensitive or prominent landscapes, and avoid insensitive or visually intrusive designs. Prevention of adverse effects at source.
- Reduction – Reduction of adverse effects that cannot be eliminated by avoidance. The significance of adverse impacts is lessened. Seeks to limit the exposure of the receptor. Reduce the visual intrusiveness of the design and reduce the visibility of the proposal (for example by installing barriers between the location(s) of likely receptors and the source of the impact).
- Remedy – Remedy serves to improve adverse conditions by carrying out further works which seek to restore the environment (for example increased planting of trees/shrubs to offset unavoidable loss of vegetation).
- Offsetting - The provision of alternative or compensatory measures where appropriate and feasible (for example offset planting).
- If it is not possible or practical to mitigate an impact (for example felling mature trees), this is described as a residual impact.

3. Existing visual environment

3.1 Overview

This section provides an overview of the existing landform, land use, landscaping and vegetation, landscape character areas and viewpoints in the vicinity of the proposal.

3.2 Landform

The landform in the vicinity of the proposal is generally flat coastal landscape. The entrance to Botany Bay is defined by the elevated headlands at Kurnell and La Perouse. There are elevated vegetated dunes with medium to tall vegetation in Sir Joseph Banks Park and along Foreshore Road. There are a number of reclaimed areas of land in Botany Bay. These include the two airport runways and the two areas of land either side of Brotherson Dock. The area to the north of Brotherson Dock has just been expanded as part of the Sydney International Container Terminal Limited (SICTL) development which will operate a third container terminal from this location.

3.3 Land use

The proposal site is an existing international shipping container port. Other heavy industrial infrastructure within the area are Sydney Airport to the north east and Botany Bay to the immediate south. Other than this, there is a mixed land use within the surrounding area that consists of related buildings and structures for the ports, industrial buildings and residential areas made up of predominately detached housing. The main residential areas in the area are Botany, Banksmeadow, Matraville, Hillsdale, Le Perouse and Phillip Bay.

Other land uses in the area include recreational facilities throughout the study area that include a number of public and private golf courses, Botany Bay National Park, Yarra Bay Recreational Reserve and Sir. Joseph Banks Park.

3.4 Landscaping and vegetation

The study area has been developed and there are few natural features remaining except for some parks, golf courses, nature reserves and coastal dunes. Many of the residential streets and individual properties have mature vegetation which adds to the overall vegetated character of the area.

The vegetation in the vicinity of the study area is characterised by urban landscaping including trees and shrubs along the streets and the existing vegetation around coastal edges.

3.5 Landscape character units

The study area was divided into Landscape Character Units (LCUs) in order to identify those areas that share common landscape features and visual characteristics. Whilst in reality the landscape and views surrounding the proposal site vary continuously by way of land use, orientation and degree of visual exposure, this categorisation allows a number of general descriptions to be applied to these landscape types and subdivides the landscape into areas of differing sensitivity on which the proposal would have differing impacts.

The elements that contribute to the identification of LCUs include landform, vegetation, water form, land use, significant features and views of the area.

The LCUs recognised for this assessment are:

- LCU1 – Commercial, Industrial and Infrastructure.
- LCU2 – Residential.
- LCU3 – Natural, Vegetated and Recreational.

The LCUs that were identified are illustrated in Figure 3-1 and are described in detail in Sections 3.5.1 to 3.5.3.

3.5.1 LCU1 – Commercial, Industrial and Infrastructure

Commercial, Industrial and Infrastructure areas are predominately concentrated on the north and western sides of Botany Bay. These areas include Sydney Airport, Port Botany and large areas of Banksmeadow. Examples of the Commercial, Industrial and Infrastructure types are illustrated in Plate 3-1, 3-2 and 3-3. Landscape character elements and assessment is provided in Table 3-1.

Plate 3-1 View of Port Botany from Molineaux Point



Plate 3-2 View of Port Botany from Foreshore Beach

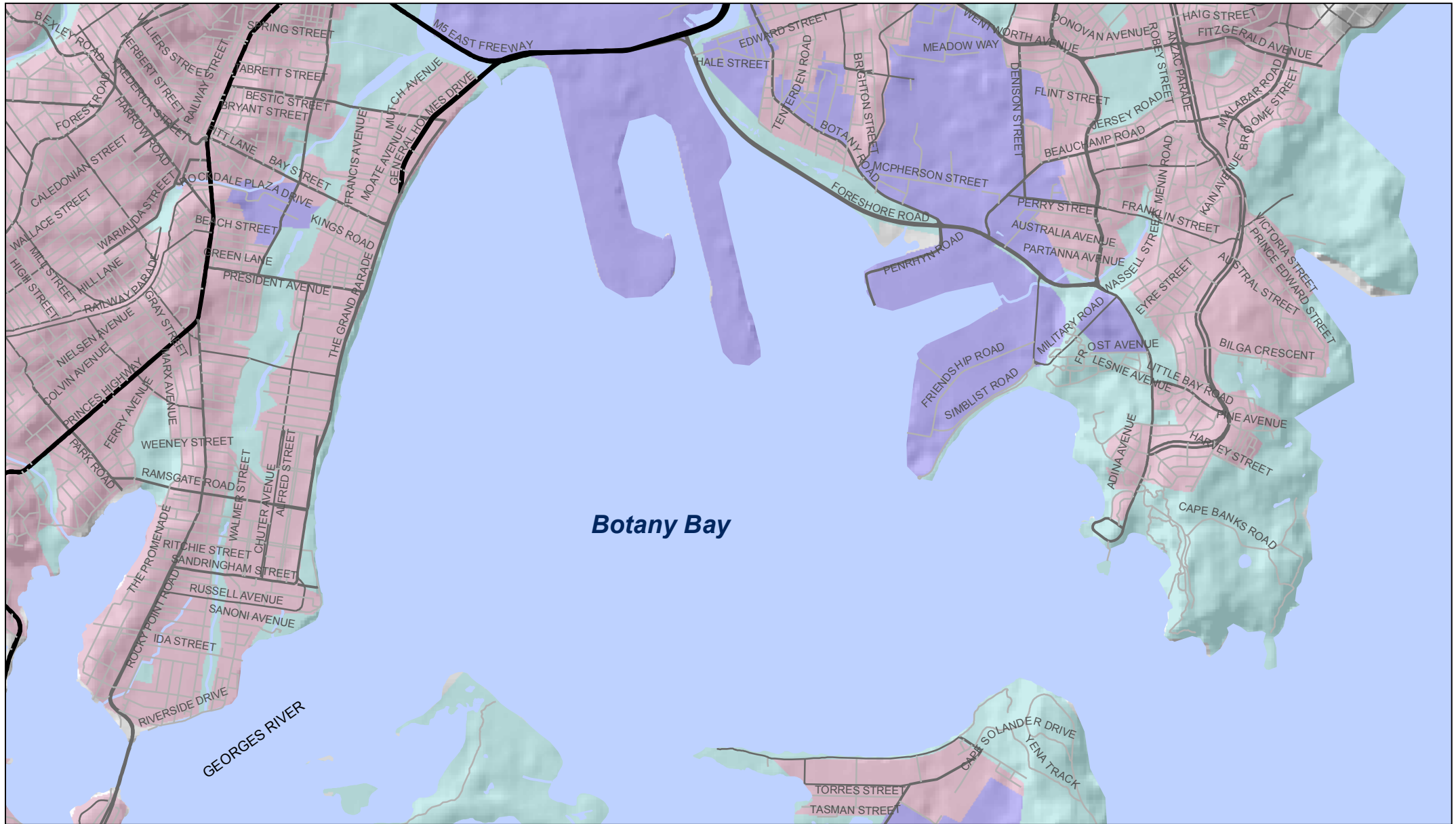


Plate 3-3 View of Sydney Airport runways from Brighton-le-Sands



Table 3-1LCU 1 Landscape Character Elements and Assessment

Landscape Character Element	Landscape Character Unit Assessment
Location	Primarily in the areas on the coast including in and around the airport and container ports. These areas are concentrated to the eastern side of Botany Bay.
Landform and Significant Landscape Features	The topography is a flat coastal landscape.
Vegetation	Vegetation is generally restricted to street trees and grass road side verges.
Waterform	Coastal area dominated by Botany Bay with rivers and creeks disbursed through the study area.
Land Use	International airport, container ports with associated commercial and industrial areas typified by medium to large size warehouse complexes. The port areas have large storage areas for stacks of multi coloured shipping containers with bulk liquid storage and cranes.
Visual context & Key Receptors	Views are composed of major transport infrastructure, (freight, trucks, cars, airplanes and ships) and their associated movements to, from and around the site. The majority of receptors have a low sensitivity and interest in their visual environment and include: • Airplane passengers (with passing views of the site from above). • Employees and customers accessing the airport, port and surrounding industry with an interest in their purpose/work. • Road users with low sensitivity who have passing views and interest in their visual environment.
Landscape sensitivity	Low.



1:50,000 (at A4)

0 0.25 0.5 1 1.5 2

Kilometers

Map Projection: Transverse Mercator
Horizontal Datum: Geocentric Datum of Australia (GDA)
Grid: Map Grid of Australia 1994, Zone 56

LEGEND

Highways	Waterways (lines)	Landscape character areas
Major Roads	Waterways	Commercial, Industrial and Infrastructure
Secondary Roads		Natural, Vegetated and Recreational
Other Roads		Residential

Patrick Stevedores Operations No 2
Section 75W Modification
- Port Botany Container Terminal Project
(DA-453-12-2002-1 MOD 7)

Job Number | 21-21961
Revision | A
Date | 28 Feb 2013

Landscape character areas **Figure 3-1**

G:\2121961\GIS\Maps\MXD\21_21961_2016_UrbanLiving_LandscapeCharacterAreas.mxd
 © 2013. While GHD has taken care to ensure the accuracy of this product, GHD and Geosciences Australia, NSW Department of Lands (LPMA) make no representations or warranties about its accuracy, completeness or suitability for any particular purpose.
 GHD and Geosciences Australia, NSW Department of Lands (LPMA) cannot accept liability of any kind (whether in contract, tort or otherwise) for any expenses, losses, damages and/or costs (including indirect or consequential damage) which are or may be incurred as a result of the product being inaccurate, incomplete or unsuitable in any way and for any reason.
 Data Source: NSW Department of Lands: Roads, Waterbodies - Jan 2011; Geoscience Australia: 250k Data - Jan 2011 1second DEM Elevation Created by: sdwoodger
 Level 15, 133 Castlereagh Street Sydney NSW 2000 T 61 2 9239 7100 F 61 2 9239 7199 E sydmail@ghd.com.au W www.ghd.com.au

3.5.2 LCU2 – Residential

Residential areas surround the entire study area but are predominately concentrated on the western side of Botany Bay. Examples of the residential types are illustrated in Plate 3-4 and 3-5. Landscape character elements and assessment is provided in Table 3-2.



Table 3-2 LCU 2 Landscape Character Elements and Assessment

Landscape Character Element	Landscape Character Unit Assessment
Location	Residential areas located in Botany, Banksmeadow, Matraville, Hillsdale, Le Perouse, Phillip Bay.
Landform and Significant Landscape Features	Typically flat coastal landscape.
Vegetation	Nature strips and street tree planting, private residential gardens and parks.
Waterform	Coastal area dominated by Botany Bay with rivers and creeks disbursed through the study area.
Land Use	Residential.
Visual Context & Key Receptors	Views vary between residential areas. Generally, those directly on the coast experience views composed of Botany Bay with elements of the existing heavy infrastructure (airport runways, port, shipping containers etc.). Key receptors include: - Residential receptors have a high sensitivity to their visual environment due to their prolonged viewing opportunities. - Local road users with low sensitivity who have passing views and interest in their visual environment.
Landscape sensitivity	Medium.