Vopak Site B Expansion, Port Botany

Traffic Impact Assessment

15 July 2016 (FINAL REPORT – Revision 4)

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Contents

1. Introduction

1.1 Background

Vopak Terminals Australia Pty Ltd (Vopak) operate the hydrocarbon fuel terminal located within the NSW Ports Port Botany precinct. Vopak seeks to increase the current approved throughput of petroleum product at their existing Site B facility in response to growth in the petroleum market.

The Site B Terminal has the space to accommodate the minor changes necessary to receive and supply the projected additional throughput and contains infrastructure and services to support its operation.

Vopak propose to increase the hydrocarbon throughput at Site B from 3,950 ML/year to 7,800 ML/year, and the associated road tanker export capacity from 1,897 ML/year to 3,700 ML/year.

This report, prepared by *Samsa Consulting Pty Ltd – Transport Planning and Traffic Engineering Consultants*, provides a traffic impact assessment of the proposed expansion.

1.2 Assessment Scope & Methodology

The Secretary's Environmental Assessment Requirements (SEARs) were issued for the Project by the NSW Department of Planning and Environment (DPE). The SEARs included the following conditions related to traffic and access (with reference to where the conditions are addressed in this report):

- Accurate predictions of the traffic volumes likely to be generated during construction and operation (refer to *Sections 3.4* and *3.7* of this report).
- A detailed traffic impact study of the project (this report).
- Detailed plans of the proposed layout of the internal road network and parking on site in accordance with the relevant Australian Standards (including swept path diagrams and details to demonstrate that the facility will not result in queuing off-site). Refer to *Sections 3.2*, *3.5* and *3.6* and specifically *Figures 3.1* and *3.2* in this report.

NSW Ports requested that a traffic impact assessment should be prepared for the proposed expansion and include the following requirements (with reference to where the requirements are addressed in this report):

- An assessment of traffic impacts from the construction of the gantry, pipelines and road modifications including numbers of vehicles required during construction, ie. maximum vehicle numbers / movements per day and hour (refer to *Section 3.7* of this report).
- An assessment of traffic impacts from the operation of the facility given proposed new throughputs and new gantry (refer to *Section 3.4.2* of this report).
- An assessment of the crane to be used in the installation of the pipeline and gantry including the height of the crane (to be covered separately by a Construction Safety Study).

Randwick City Council provided the following issues for consideration in the traffic impact assessment (with reference to where the conditions are addressed in this report):

- Assessment of the proposed trucks processing procedures, terminal management system to avoid truck queuing and delays (queuing facilities described in *Section 3.2* and *Figure 3.1*, procedures and terminal management covered elsewhere).
- On-site construction vehicle queuing capacity to prevent off-site impacts from construction vehicles (refer to *Section 3.7* of this report).
- On-site vehicle parking capacity during operation to prevent off-site queuing or circling of trucks within residential areas prior to allocated time slots (refer to *Sections 3.2* and *3.6* of this report).
- Construction vehicle routes to and from the site along Foreshore Road are strongly supported (noted and confirmed in *Section 3.7* of this report).
- How operational fuel transport heavy vehicles will adhere to Dangerous Goods routes and be prevented from using local roads (refer to *Section 3.4.1* of this report).

The assessment included the following tasks:

- Review of relevant background information including existing land use and traffic operations in the Port Botany area.
- Consultation with client (Vopak), NSW Ports, NSW Roads & Maritime Services (RMS), Randwick City Council and City of Botany Bay Council.
- Site visits of the Project site and the surrounding road network.
- Identification of future traffic generation and trip distribution.
- Assessment of existing and future road network conditions including operations at critical intersections on the surrounding road network.
- Site parking and site access assessment.
- Development of mitigation measures to address potential impacts identified during construction and operations.
- Preparation of this Traffic Impact Assessment Report.

1.3 Report Structure

The remainder of this assessment report is presented as follows:

Chapter 2 describes the existing transport conditions including traffic operations, parking availability, site access and public transport services.

Chapter 3 assesses traffic, road safety, parking and site access impacts of proposed construction activities and operations.

Chapter 4 details potential mitigation measures.

Chapter 5 provides a summary and conclusions to the assessment.

2. Existing Transport Conditions

2.1 Site Characteristics

The Vopak site is located within the Port Botany precinct, which is part of the Randwick City local government area. It is bounded by Friendship Road to the east and south and Fishburn Road to the west – refer to *Figure 2.1* below.

Land uses adjacent to the site include the Elgas & LPG Cavern Facility, bounding the Vopak site to the north, Australian Container Freight Services located across Friendship Road to the east, Port's Bulk Liquids Berth 2 and future Berth 3 to the west, and the Austate site located across Friendship Road to the south.

Figure 2.1: Site Location

2.2 Road Network Conditions

The Vopak site is custom-served by the existing port road network, which provides access to the Sydney's major road network and is subject to significant volumes of heavy vehicle traffic on a daily basis.

Vehicular access between the site and the surrounding major road network is via the one-way loop of Simblist Road / Friendship Road. This connects to Bumborah Point Road at priority controlled T-junctions.

Bumborah Point Road connects to Botany Road at a signalised junction. Botany Road extends east to Bunnerong Road and west to Foreshore Road, past Beauchamp Road. Foreshore Road provides the main route to Sydney's arterial road network at General Holmes Drive / Southern Cross Drive (part of the major M1 route serving Sydney) while the Beauchamp Road / Denison Street route (north off Botany Road) provides a secondary route for travel to/from the north.

Bumborah Point Road, Simblist Road and Friendship Road are purpose-built roads serving heavy vehicles accessing the port area. They all have wide carriageways to allow multiple heavy vehicle movements and allow for adequate swept turning paths. They all have a 60 km/h speed limit and suitable street lighting.

Botany Road distributes port traffic to the east and west. Eastbound travel towards Bunnerong Road is restricted for Vopak road tanker traffic unless there is a local destination in the eastern suburbs. Between Bunnerong Road and the Penrhyn Road / Foreshore Road intersection, Botany Road is a six-lane divided road with additional turning lanes at the signalised intersections with Bumborah Point Road, Gate 2 container holding yard, McCauley Street, Beauchamp Road, and Penrhyn Road / Foreshore Road.

Although Botany Road continues to the north from the Penrhyn Road / Foreshore Road intersection, this section has vehicle restrictions necessitating Vopak road tanker traffic to continue west into Foreshore Road.

Foreshore Road is a controlled access route functioning primarily as a high-volume and dedicated heavy vehicle link between the Port Botany precinct and General Holmes Drive / Southern Cross Drive (part of Sydney's M1 arterial route). Foreshore Road is a four-lane divided road with limited access points. The most significant access is the signalised intersection to the recently constructed third container terminal.

From the General Holmes Drive / Southern Cross Drive junction, road tankers carrying bulk liquids are restricted from travelling via the Airport and M5 tunnels due to dangerous goods (DG) restrictions. Therefore, they need to turn north and travel around the northern airport perimeter to access areas to the west and south of Sydney.

The section of Botany Road / Foreshore Road between Bunnerong Road and Penrhyn Road has a 70 km/h speed limit, which increases to 80 km/h west to General Holmes Drive.

Average annual daily traffic (AADT – from 2005 RMS traffic counts) and daily traffic volumes (2016 projections[1]) for the surrounding major road network are shown below.

Road	Location	AADT (RMS 2005)	Projected (2016)[1]
Botany Road	West of Beauchamp Road	39,342	45,080
Botany Road	East of Beauchamp Road	24,266	28,500
Foreshore Road	East of General Holmes Drive	33,454	40,420
Beauchamp Road	North of Botany Road	20,848	23,840
Southern Cross Drive	North of General Holmes Drive	78,383	89,370

2.3 Traffic Operations

NSW RMS has intersection traffic data available for all their signalised intersections controlled by the SCATS (Sydney Coordinated Adaptive Traffic Signal) system. SCATS vehicle detections were obtained from RMS for the following pertinent signalised intersections during the week starting 1st September 2014:

- TCS 1528: Signalised intersection of Bumborah Point Road / Botany Road
- TCS 1526: Signalised intersection of Botany Road / Beauchamp Road
- TCS 1525: Signalised intersection of Botany Road / Penrhyn Road / Foreshore Road

The peak turn movements were determined as follows:

- AM and PM peak periods were determined by identifying the hour of day (for the highest average weekday between 1st September and 7th September 2014) that exhibited the highest total volume of traffic entering each intersection.
- Where detectors on turn movements to the intersection were not available (eg. at left-turn slip lanes) or were combined (eg. dual left-turn and through movements), manual intersection counts were undertaken to determine the turn movement.

The above SCATS data was corroborated by manual intersection turn counts undertaken at the three intersections during the week of 15th September 2014. The turn movements for the morning and afternoon peak periods at each of these intersections were adjusted for 2016 volumes[2] and are shown in *Figure 2.2* below.

Total intersection and two-way traffic volumes along the various road sections indicate a general increase from the port area (Bumborah Point Road), to west along Botany Road and continuing along Foreshore Road. The sections of Botany Road to the east of Bumborah Point Road and to the north of Foreshore Road / Penrhyn Road have significantly less traffic than the main route between the port and Foreshore Road.

1 From Hyder "*Banksmeadow Waste Transfer Terminal: Traffic and Transport Impact Assessment*", November 2013, and adjusted for 2016 assuming 1.2% compound annual growth adopted from *Bureau of Transport Statistics' Sydney Transport Model*

2 Assuming 1.2% compound annual growth adopted from *Bureau of Transport Statistics' Sydney Transport Model*

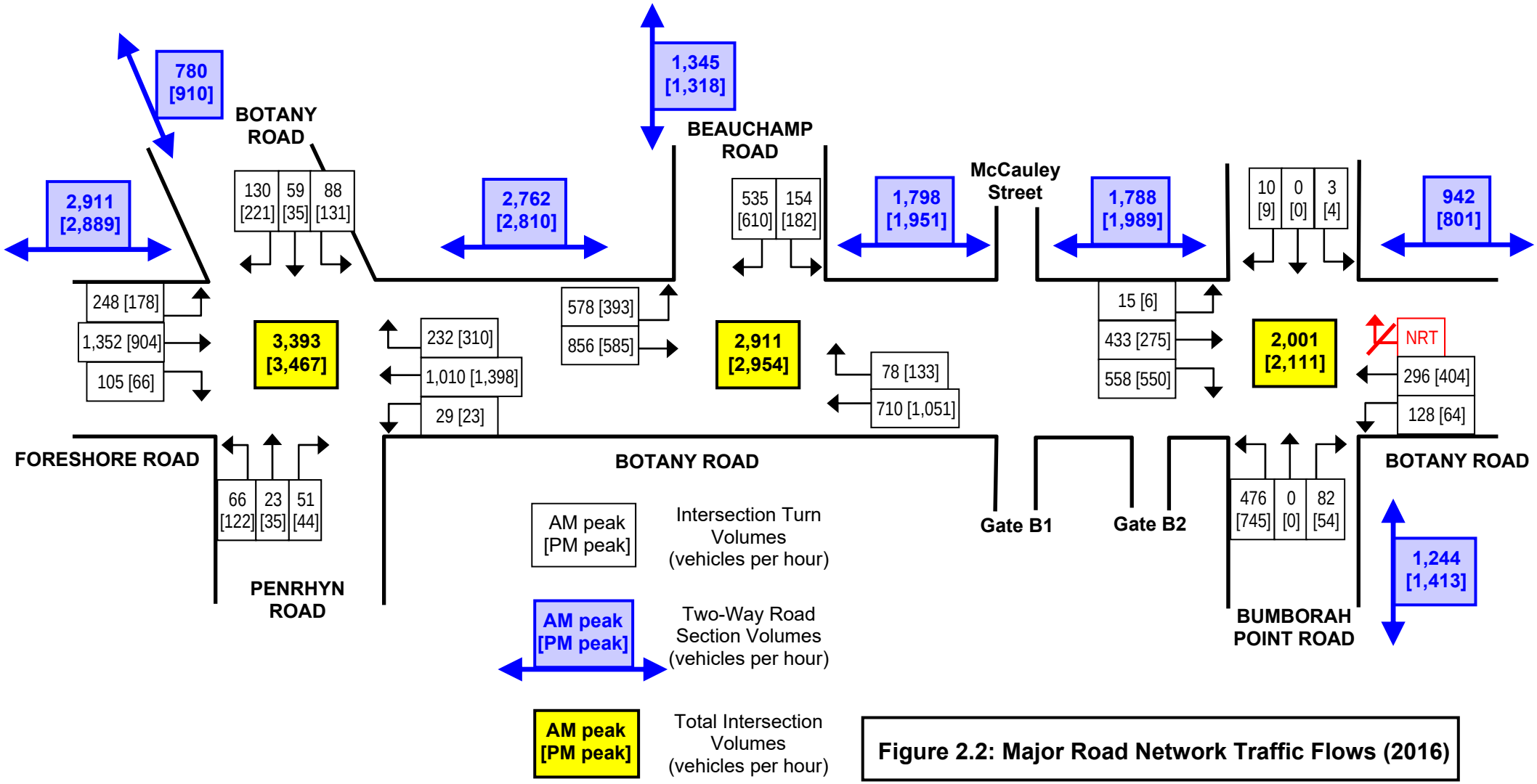


Figure 2.2: Major Road Network Traffic Flows (2016)

From observations during several site visits, it is acknowledged that traffic operations for the routes to/from the port area deteriorate somewhat during peak periods with significant queuing and congestion resulting in an increase in delay and consequent reduction in level of service. Of particular note are the following:

- Foreshore Road westbound queues accessing General Holmes Drive / Southern Cross Drive – significant queues in PM peak
- Foreshore Road eastbound queues at Botany Road / Penrhyn Road – moderate queues in PM peak
- Botany Road southbound queues at Foreshore Road / Penrhyn Road – moderate queues at various times
- Botany Road eastbound queues turning right at Bumborah Point Road – moderate queues at various times

Typically, the congestion tends to fluctuate and dissipate relatively quickly (within half an hour) and is confined to the background commuter peak periods. The Foreshore Road westbound queuing is an exception, which can last for lengthy periods during the afternoon. This is partly attributable to the congestion on General Holmes Drive / Southern Cross Drive and M5 East as well as from traffic generated by the port area and associated land uses.

2.4 Road Safety

In general, based on site observations and anecdotal evidence, road safety is considered to be adequate under current operating conditions. As discussed previously the road system caters specifically for heavy vehicles / port traffic.

The current approach to the Vopak site from Simblist Road requires vehicles to turn left southbound into the Friendship Road extension and immediately turn right into the site entry driveway. There is ample sight distance available along Friendship Road to undertake this movement and traffic volumes are relatively light.

For through (right-turn) movements between Simblist Road and Friendship Road northbound, a section of concrete safety barrier has been installed to provide physical separation from northbound Friendship Road movements from the south (such as exiting Vopak road tankers). Site observations indicate some excessive vehicle speeds by heavy vehicles undertaking this right-turn but the physical separation improves road safety and delineation guidance.

2.5 Parking

2.5.1 On-Site Parking

There are some 49 parking spaces for the Vopak site in four areas as follows:

- Five (5) parking spaces, including an accessible parking space, are available in front of the site office building with direct access off the western side of Friendship Road.
- 13 parking spaces are available in a triangular area off the southern side of the entry driveway (prior to the security gates).
- 21 perpendicular parking spaces are available off the western side of Friendship Road, south of the site access driveways.

- Ten (10) parking spaces within the terminal area, which are restricted for maintenance vehicles only due to operational policy.

2.5.2 Off-Site Parking

Limited on-street parking is available with some feral (informal) parking observed on the verge areas along Friendship Road. In general, there are 'No Stopping' restrictions that prevent on-street parking along both Friendship Road and Simblist Road.

There are no available off-street public parking facilities in the nearby area that would benefit the subject site.

2.6 Site Access

Existing vehicular access to the subject site is via two separate driveways off the western side of Friendship Road. The driveways are separated by the site offices and provide entering and exiting vehicle movements dedicated for road tanker vehicles, contractor and minor maintenance traffic.

Light vehicle access to the parking areas is via the site entry driveway (for parking beyond the security gates) or off the western side of Friendship Road for access to the site office parking areas.

Access to/from Friendship Road is right-in / left-out due to the origin-destination of vehicles accessing the Vopak site via the port's one-way road system, ie. arrival from Simblist Road to the east and departure north via Friendship Road. There is on-site road tanker queuing (storage) for approximately twelve B-double size vehicles.

Pedestrian and cyclist access to the subject site is restricted beyond the security gates. Access to the site offices is informal and via the aforementioned driveways or off the western side of Friendship Road. There are dedicated footpaths linking the site to the Vopak parking areas.

2.7 Public Transport

There is no public transport that directly serves the subject site.

Nearby public bus transport is available along Bumborah Point Road and Military Road with bus stops located approximately 1.5 km to the east via Friendship Road and/or Simblist Road. These bus stops provide services between Redfern and Port Botany (route L09) and Sydney CBD and Port Botany (routes 309 and 391).

2.8 Pedestrian and Bicycle Facilities

There are no formal pedestrian paths along Friendship Road or Simblist Road in the vicinity of the Vopak site. Any pedestrians need to walk along the grassed road verge areas.

There are no on-road cycle facilities along the restricted roads within the port area, ie. Simblist Road and Friendship Road. If required, cyclists need to travel on-road amongst general traffic with the inherent risks that this results in due to the high numbers of heavy vehicles. There are approximately eight formal bicycle parking spaces on site, adjacent to the site offices.

3. Traffic Assessment

3.1 Current Site Operations

Vopak's existing Site B facility is located in Friendship Road and is adjacent to the Bulk Liquids Berths (No's 1 and 2) so that petroleum products can be imported by sea tankers. The approved Site B facility operates as an integrated bulk liquids storage and supply facility.

There are range of ancillary services that complement the facility, including control rooms, workshops, road tanker loading gantry, waste water treatment plant, connections to NSW Ports Bulk Liquid Berths and petroleum industry pipeline infrastructure and staff amenities.

At present (2016 projected) the total annual product throughput is some 3,900,000 m^3 (3,900 ML) from an approved annual product throughput of 3,950,000 m^3 (3,950 ML). Of the total existing throughput, road tanker transport is used for almost two-thirds with approximately 2,400 ML currently being transported by road.

Vopak have 45 full-time office staff who typically work from 8:30 am to 5:00 pm, Monday to Friday. Staff generally travel to/from work during background peak traffic periods.

In addition there are operations staff who work on a two-shift basis over a 24-hour period. The 6:00 am to 6:00 pm shift has three operators, while the 6:00 pm to 6:00 am shift has two operators. There are an additional two to three casual operations staff deployed (on the same shift arrangements as above) when there are shipping discharges, which occur approximately 150 days per year (say, every second day).

Total peak staff traffic generation is approximately 110 trips per day or up to 50 trips per hour during each peak period (assuming some overlap between office staff and operations staff). In addition there is up to 10 additional trips per day from visitors to the facility, eg. deliveries, meetings, etc. These are generally spread out over the course of a day and as a worst case will generate some four vehicle trips in any given hour.

3.2 Proposed Expansion Works

A Road Tanker Bay options study was prepared for Vopak to assist in the master planning of the Site B terminal and to confirm the location and establish the quantity of new road tanker loading bays that would be able to be installed. Five options were considered:

- Eastern entry option from Friendship Road
- Four western entry options from Fishburn Road (two northern approach options and two southern approach options).

While all five options are feasible, the lease boundary for the internal access options does not provide enough room for road tankers to manoeuvre. Therefore, the western entry option with the northern approach from Fishburn Road is the preferred design for the following reasons:

- Road tanker loading bay 7 located on the southern end of the existing road tanker loading bays 1 to 6 is feasible for this option;
- Two new island road tanker loading bays (8 and 9) positioned obliquely between the control room and the existing road tanker loading bays are feasible for this option;

- This option has the benefit of more off-site queuing to the north and west of the site on a dedicated access / queuing roadway lease;
- This option does not require crossing to the right-hand side of Fishburn Road for queuing; and
- The traffic flow enables a new unloading bay to be situated south-east of the transformer building up against the south-west tank bund.

The work is proposed to be staged as follows:

Stage 1 Bays 8 & 9 constructed

Eastern entry unloading bay constructed

Existing eastern access off Friendship Road maintained

Stage 2 Modification of Simblist road / Friendship Road intersection

New one-way link road constructed from Friendship Road to Fishburn Road via new lease excised from Elgas lease along the northern side of the Vopak site

New left-turn western entry constructed off Fishburn Road

Bay 7 constructed

Unloading bay modified for western entry

The table below details the key operational features of the preferred option upon completion of Stage 2 works.

Loading bays	9
Unloading bays	1
On-site queuing	4
On-site holding	4
Off-site queuing (on dedicated road lease)	18

Refer to *Figure 3.1* below for the proposed ultimate (Stage 2) site layout.

To cater for the proposed expansion, there are a number of changes required to be implemented at the existing Site B facility.

West Entry Northern Approach

New 'Link' Road north of Vopak Terminal

Construction of a new 'link' road through an approximate 9 m wide roadway easement adjacent to the Elgas site (to the north of the Vopak Site B terminal) is proposed. This new road will allow road tankers to approach the western entry from the north allowing queuing on the left (eastern) side of Fishburn Road and along the new 'link' road.

The proposed new 'link' road will be one-way westbound and be restricted to Vopak traffic only. The road will have a 3.5 m queuing lane separated from the adjacent 3.5 m traffic lane by line marking. Appropriate drainage and street lighting will be provided.

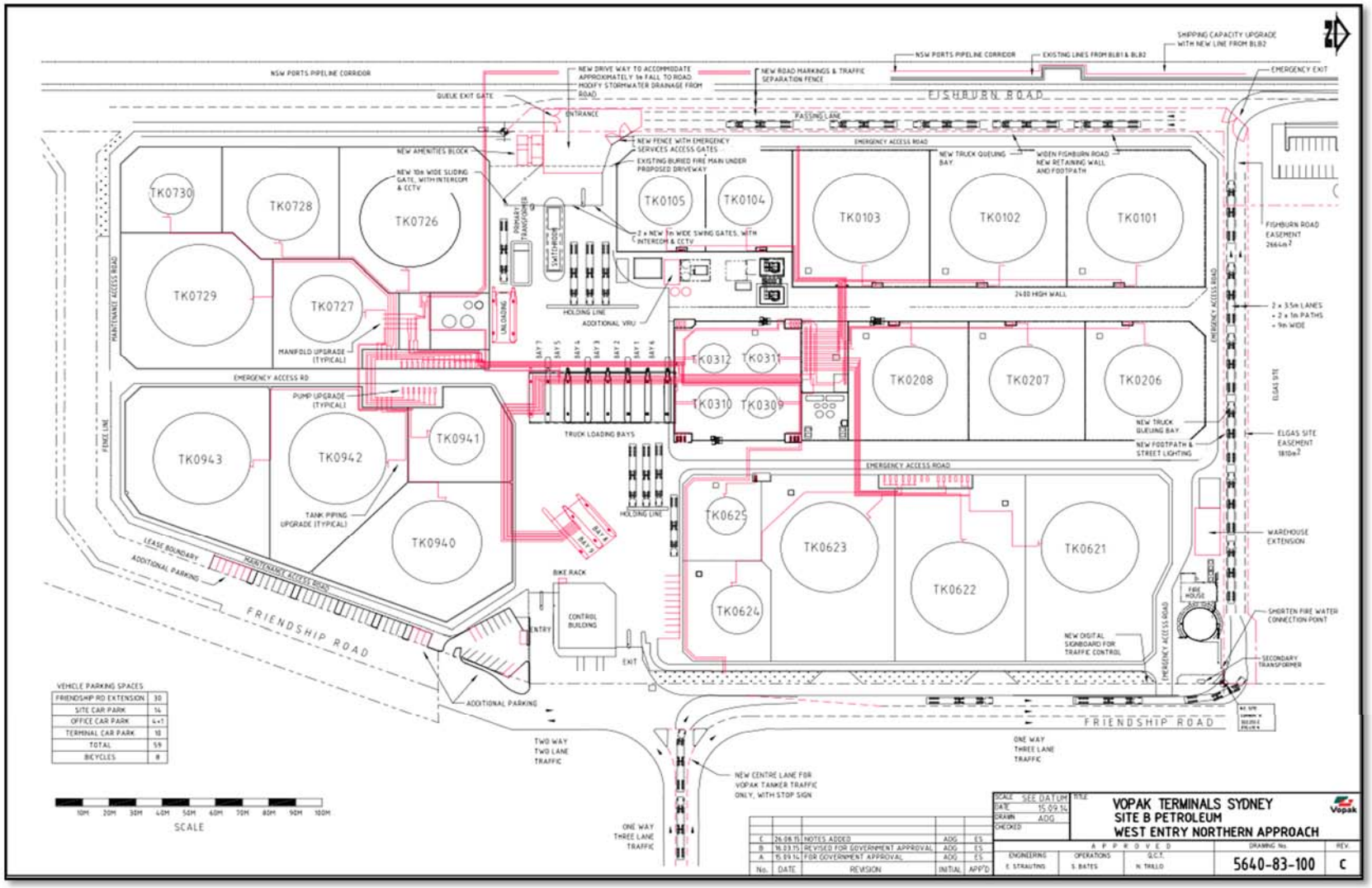


Figure 3.1: Proposed Site Layout

Fishburn Road Upgrade

To permit the addition of a queuing and passing lane along Fishburn Road, it is necessary to widen the road carriageway into the landscaping on the eastern side of the road corridor. This will allow two 3.5 m port traffic lanes, a 0.5 m wide divider (median) island with fence, and Vopak dedicated 3.5 m wide passing lane and 3.5 m wide queuing lane.

The Fishburn Road (port) traffic and Vopak queuing lanes will be separated by a 0.5 m wide concrete island with a 2.2 m fence on it. A security gate (or similar) will be required at the end of the queuing / passing lanes to enable tankers to exit onto Fishburn Road if required, eg. in the event of an emergency.

A new footpath is proposed along the outside of the Vopak site fence for tanker drivers to access the amenities building near the entry when their truck is parked in the queue. This will require a retaining wall to be installed under the fence from Friendship Road to the new driveway entrance.

All of these upgrade requirements are applicable to the section of Fishburn Road between the new driveway and the north-west corner of the site.

Fishburn Road / Friendship Road Emergency Only Route

During emergency situations, road tankers queuing within the Vopak lane along Fishburn Road and other vehicles may need to exit the area via the southern end of Fishburn Road. The intersection of Fishburn Road and Friendship Road as well as the the curve on Friendship Road near the south-east corner of the terminal is too sharp for tankers to manoeuvre through and stay wholly within their travel lane. However, this is considered tolerable because emergency situations will be rare and any of these movements will occur under a controlled emergency scenario.

Traffic Control

Due to the poor visibility from the queue on the link road from Friendship Road to Fishburn Road, a signal system (traffic lights or electronic signboard) is proposed to inform drivers when there is space available in the Fishburn Road queue.

New Loading Bays

Multiple locations have been considered for the new loading bays as outlined following:

- Bay 7 (immediately south of Bay 5) – this location is suitable for a single new loading bay with the Stage 2 western entry in operation.
- Bays 8 and 9 (located obliquely in front of the control room) – the proposed location for the new two bay island loading gantry (Bays 8 and 9) is between the existing tanker loading bays and the control building. The new loading gantry will be oriented on a 40° angle to the rest of the terminal to provide suitable entry and exit to the bays and minimise the effect on traffic from Bays 1 to 7. The position of Bays 8 and 9 will reduce the number of tanker holding positions to four. This arrangement is suitable for both the current (and Stage 1) eastern entry as well as the proposed Stage 2 western entry operation. All internal (on-site) road tanker movements would have adequate manoeuvring space (swept paths) to enable travel in a forward direction only with no need for multi-point turn manoeuvres.

The existing Friendship Road entrance will remain unaltered and be used for delivery vehicles, maintenance vehicles and emergency services vehicles. Moreover, there will be no changes required to access the existing parking in front of the control building or the triangular car park to the south of the control building.

As previously mentioned, Bays 8 and 9 will be constructed in Stage 1, prior to Bay 7 (Stage 2), whilst still utilising the existing Friendship Road access (eastern entry).

Unloading Bay

A new unloading bay for trucks unloading fuel ethanol, biodiesel, other additives, product returns, etc. to bulk tanks will be required for increasing capacity for blending into fuel, eg. E10 petrol or B20 bio-diesel.

The proposed new unloading bay is to be positioned south-east of the transformer bay where it will not conflict with tanker paths bypassing Bays 1 to 7. A 6 m hazardous zone from the tanker is created by loading and extends to the transformer building.

Refer to *Figure 3.2* following for internal layout and internal / external traffic circulation including vehicle swept paths.

3.3 Future Site Operations

Product Throughput

It is proposed to increase the total approved product throughput to 7,800,000 m^3 (7,800 ML) from the current approved throughput of 3,950,000 m^3 (3,950 ML). The total current (2016 projected) throughput is approximately 3,900,000 m^3 (2,710 ML). The breakdown of throughput by transport type is shown in *Table 3.1* below.

Table 3.1: Throughput Breakdown

	Road Tanker (m^3)	Pipeline (m^3)	Sea (m^3)	Total Throughput (m^3)
Total Approved Site B Output	1,897,500	1,867,500	185,000	3,950,000
Total Current (2016*) Site B Output	2,400,000	1,440,000	60,000	3,900,000
Expanded Site B Output	3,700,000	2,100,000	2,000,000	7,800,000

* *Projected yearly throughput based on throughput data between January 2016 to May 2016.*

With respect to the increase in throughput, the main changes can be summarised as follows:

- An increase in output by truck for all products. The main change would come from a planned increase of the terminal capacity in ground fuels. However, there is also expected to be a substantial increase of jet fuel trucks as pipeline availability to Kingsford Smith Airport is limited and jet fuel output by truck to supply to the future Badgerys Creek Airport may also be required.
- An increase in output by sea for all products as Sydney is increasingly becoming a fuel hub and with refineries closing in Australia, fuel product flows are expected to change considerably. This means large vessels will discharge fuels at Port Botany, which will be

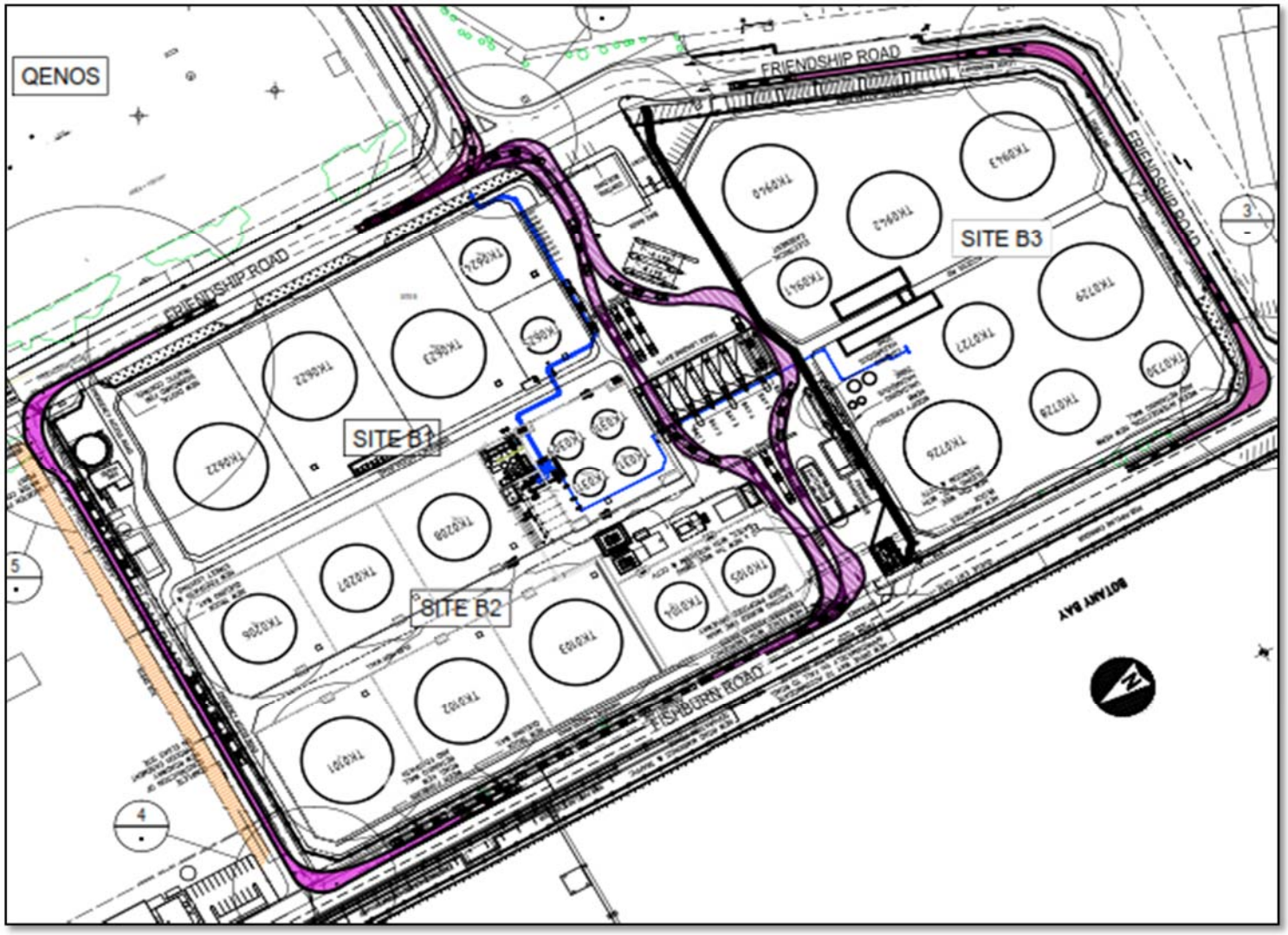


Figure 3.2: Internal Site Layout and Traffic Circulation

redistributed to smaller vessels for smaller ports along the Australian East Coast or into New Zealand. While this product throughput across all petroleum product grades will have no impact on road traffic, there could be an increase of vessel movements at Port Botany.

Road Tanker Bay Utilisation / Arrival Frequencies / Loading Times

The existing road tanker loading systems can operate at up to 2,400 L per minute per truck compartment with up to three compartments per truck simultaneously. Generally, loading (of a five-compartment road tanker) takes less than 20 minutes for an average size tanker volume (33,300 L). The proposed new loading bays will have the same operating capabilities.

Vopak anticipates that the current maximum practical gantry capacity (six bays) could be achieved in 2015. A significant volume change is expected in 2016 (refer to table below) whereby the existing gantry capacity may potentially be exceeded (3,200 ML forecasted lifting in comparison to only 2,400 ML maximum practical lifting capacity) – refer to *Table 3.2* below.

Table 3.2: Vopak Forecasted Export and Limits

Vopak Sydney forecasted export and limits	unit	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
-Total Site B Exports - Truck	BL	1.9	2.3	2.4	3.2	3.2	3.2	3.2	3.3	3.3	3.3	3.3
Exports Site B - Truck - GOVT limit	**BL**	**1.9**	**3.7**	**3.7**	**3.7**	**3.7**	**3.7**	**3.7**	**3.7**	**3.7**	**3.7**	**3.7**
-Total Site B Exports - Pipe	BL	0.8	0.8	0.8	1.3	1.3	1.3	1.3	1.4	1.4	1.5	1.5
Exports Site B - Pipe - GOVT limit	**BL**	**1.9**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**	**2.1**
-Total Site B Exports - Ship	BL				0.5	1.0	1.0	1.0	1.5	1.5	1.5	1.5
Exports Site B - Ship - GOVT limit	**BL**	**0.2**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**	**2.0**
	BL											
Total Site B Export - GOVT limit	**BL**	**4.0**	**7.8**	**7.8**	**7.8**	**7.8**	**7.8**	**7.8**	**7.8**	**7.8**	**7.8**	**7.8**

3.4 Traffic Operations

3.4.1 Traffic Generation & Trip Distribution

Staff Traffic

The future operations will be the same as existing with continuous 24-hour operations.

Future staff numbers (after the Stage 1 and Stage 2 expansion) are anticipated to increase marginally from the current 45 office staff to some 50 office staff. Operations staff and visitor numbers to the Vopak site will remain similar to current numbers.

Total future peak staff traffic generation is approximately 120 trips per day or up to 55 trips per hour during each peak period (assuming some overlap between office staff and operations staff). This amounts to some 10 additional light vehicle trips per day or 5 additional light vehicle trips per hour.

In the absence of any origin data or information for where staff may live, the staff trip distribution is expected to be similar to current distribution patterns. This can reasonably be expected to be 50% along the Foreshore Road route, 20% along the Botany Road (north) route, 20% along the Beauchamp Road route and the remaining 10% along the Botany Road (east) route.

Road Tanker Traffic

Vopak expects that the trend of trucks arriving at Site B will continue to show two peaks throughout the day (as shown in *Figure 3.3* below). It shows that the maximum truck peak is on Friday morning between 5:00 am and 6.00 am with an average of 13 trucks arriving within one hour.

Furthermore, it can be seen that there are effectively two peak road tanker arrival periods each day:

- 03:00 to 11:00 hours (maximum at approximately 06:00 hours)
- 14:00 to 22:00 hours (maximum at approximately 20:00 hours)

Vopak expects the peak pattern to flatten out in time as customers become aware of the benefits of lifting during off-peak hours, ie. reduced waiting times to load.

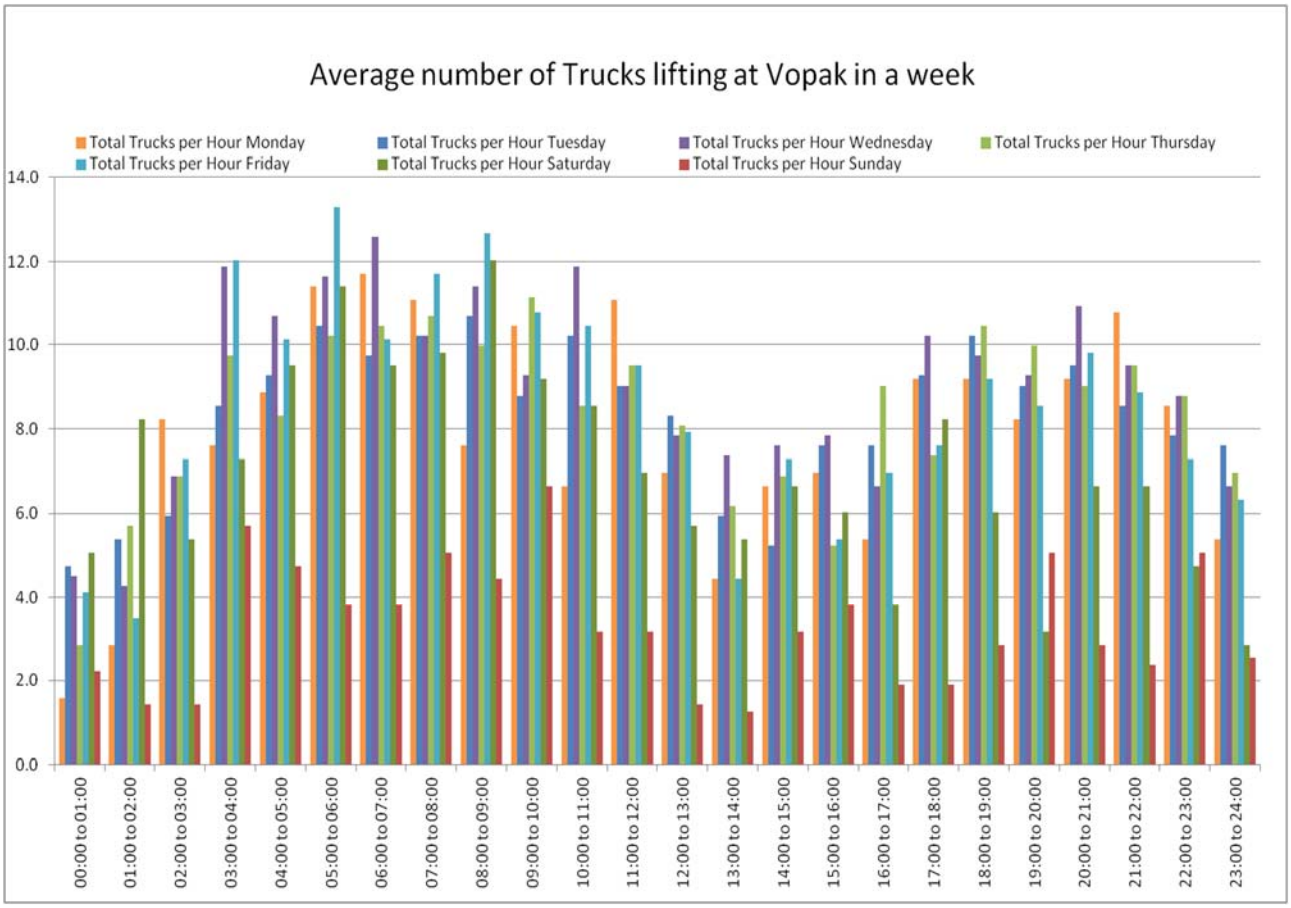


Figure 3.3: Road Tanker Lifting (Daily / Hourly)

Another factor affecting road traffic is the growing tendency of transport companies / customers to improve their delivery logistics by better utilisation of their truck fleets, specifically the increasing usage of B-doubles where practicable. This increases the average road tanker volume and consequently decreases the number of road tanker vehicles (for a given throughput).

To date the average B-double use at Vopak Site B is in the order of 25%, ie. one B-double vehicle for every three rigid road tankers. This ratio is anticipated to steadily increase over the next decade from 25% to 50% B-double vehicles. Consequently, this change would be reflected in the gradual increase in the average road tanker volume, which will in turn reduce

the total number of road tanker vehicle trips for a given throughput volume. However, for the purposes of a conservative assessment, it has been assumed that the proportion of B-double road tankers will remain at the current 25%.

Based on historical road tanker data from Site B (current 2016 year), the average volume load per road tanker is approximately 36.3 kL. This volume has been adopted as a 'worst case' scenario for future road tanker generation (ie. low tanker capacity generating more road tanker traffic), shown in *Table 3.3* below.

It should be noted that the average loaded volume adopted for the assessment (36.3 kL) is less than the approximate 43 kL average capacity that is potentially available[3]. This is because a proportion of road tankers at Site B are not fully loaded. Therefore, the 36.3 kL average load used in the assessment is potentially conservative when future strategies to improve efficiency are implemented, eg. utilisation of a greater proportion of B-double vehicles and improvement of logistics planning to reduce the 'dead' capacity (almost 10 kL) per trip.

Table 3.3: Road Tanker Transport

Year	Projected Throughput (ML/year)	Average Road Tanker Volume (kL)	Road Tanker Loads per year	Road Tanker Loads per day (average)	Road Tanker Loads per hour (average)
2013	2,200	35.1	62,678	172	7.2
2014	2,230	37.5	59,467	163	6.8
2015	2,000*	38.4	52,084	143	6.0
2016	2,400	36.3	66,116	182	7.6
2017	3,200	36.3	88,155	242	10.1
2018	3,200	36.3	88,155	242	10.1
2019	3,200	36.3	88,155	242	10.1
2020	3,300	36.3	90,909	249	10.4
2021	3,300	36.3	90,909	249	10.4
2022	3,300	36.3	90,909	249	10.4
2023	3,700	36.3	101,928	280	11.7

* *2015 yearly throughput decreased from the previous year (2014) due to a customer leaving Vopak, who has since re-joined in 2016.*

The above table shows the historical average road tanker traffic generation up to the present of 182 per day and 7.6 per hour (2016) as well as the future forecast product throughput and traffic generation. In reality, there is some peaking that typically occurs for the hourly traffic generation. Conservatively, this has been approximately 1.7 times the average hourly volume, which results in peak traffic generation of some 13 road tanker loads per hour (as shown in *Figure 3.3* above).

3 Based on the current proportion of one B-double road tanker (57.4 kL capacity) and three single road tankers (38.2 kL capacity each)

Assuming a similar peaking for future hourly traffic generation, results in some 20 road tankers per hour during future operations in 2023. This equates to an additional 7 road tanker loads or 14 road tanker trips per hour over and above current traffic generation – this is considered to be conservative (high) as most road tankers will not arrive at the Vopak site, fill and then depart the site within an hour.

The daily traffic generation peaks at 280 road tankers per day in 2023, once full throughput is reached. This equates to an additional 98 road tankers or 196 road tanker trips per day over and above the current (2016) average daily road tanker traffic.

Road tanker routes to/from the Vopak site will follow a similar distribution to that which currently occurs. This is estimated to be 85% to/from the west, south and north via Foreshore Road, 10% to/from the north and east via Beauchamp Road and 5% to/from the east via Botany Road / Bunnerong Road.

As per existing operations, road tanker routes will adhere to Dangerous Goods routes and avoid restricted routes such as the Airport Tunnel and M5 East tunnel. They will be prevented from using local roads as per existing operations, eg. via toolbox talks, professional driver conduct codes or similar strategies / policies.

3.4.2 Traffic Impacts

In assessing potential traffic impacts, the additional Vopak expansion generated traffic was compared with existing traffic volumes along the adjacent road network routes and at the major intersections. Existing traffic volumes (from volumes in *Section 2.2* and *Figure 2.2* above), additional Vopak expansion generated traffic volumes (staff and road tankers) and future combined total traffic volumes are summarised in *Table 3.4* below and shown graphically in *Figure 3.4* following.

Table 3.4: Additional Vopak Traffic Generation

Road Section / Intersection		Existing Traffic	Additional Staff Trips	Additional Road Tanker Trips	Total Future Traffic	% Increase
Botany Road (east)	Hourly	942 vph [1]	1 vph	1 vph	944 vph	0.2 %
	Daily	10,220 vpd [2]	2 vpd	10 vpd	10,232 vpd	0.1 %
Bumborah Point Rd	Hourly	1,413 vph [1]	5 vph	14 vph	1,432 vph	1.3 %
	Daily	15,320 vpd [2]	10 vpd	196 vpd	15,516 vpd	1.3 %
Bumborah Point Rd / Botany Rd intersection	Hourly	2,111 vph [1]	5 vph	14 vph	2,130 vph	0.9 %
	Daily	-	10 vpd	196 vpd	-	NA
Botany Road (central)	Hourly	1,989 vph [1]	4 vph	13 vph	2,006 vph	0.9 %
	Daily	28,500 vpd [3]	8 vpd	186 vpd	28,694 vpd	0.7 %
Beauchamp Road	Hourly	1,345 vph [1]	1 vph	2 vph	1,348 vph	0.2 %
	Daily	23,840 vpd [3]	2 vpd	20 vpd	23,862 vpd	0.1 %
Beauchamp Rd / Botany Rd intersection	Hourly	2,954 vph [1]	4 vph	13 vph	2,971 vph	0.6 %
	Daily	-	8 vpd	186 vpd	-	NA
Botany Road (west)	Hourly	2,810 vph [1]	3 vph	11 vph	2,824 vph	0.5 %
	Daily	45,080 vpd [3]	8 vpd	166 vpd	45,254 vpd	0.4 %

Road Section / Intersection		Existing Traffic	Additional Staff Trips	Additional Road Tanker Trips	Total Future Traffic	% Increase
Foreshore Rd /	Hourly	3,467 vph [1]	3 vph	11 vph	3,481 vph	0.4 %
Botany Rd intersection	Daily	-	8 vpd	166 vpd	-	NA
Botany Road (north)	Hourly	910 vph [1]	1 vph	0 vph	911 vph	0.1 %
	Daily	9,620 vpd [2]	2 vpd	0 vpd	9,622 vpd	< 0.1 %
Foreshore Road	Hourly	2,911 vph [1]	2 vph	11 vph	2,924 vph	0.4 %
	Daily	40,420 vpd [3]	6 vpd	166 vpd	40,592 vpd	0.4 %

1 *Greater of AM or PM peak period*
2 *Estimated from hourly traffic being between 8% and 10% of daily traffic*
3 *Projected 2016 AADT (refer to Section 2.2 above)*

Existing traffic and intersection operations on the surrounding road network are constrained at certain periods of the day with significant queuing / delays and consequent reduced levels of service. However, it is considered that the addition of a maximum of 5 light vehicle and 14 heavy vehicle trips per hour (or 10 light vehicle and 196 heavy vehicle trips per day) will be readily absorbed into the existing traffic flows on the surrounding road network.

While any additional traffic may result in cumulative impacts by potentially increasing queuing / delay and reducing levels of service on the surrounding road network, it is considered that the additional traffic generation attributable to Vopak's expanded operations will at most contribute to a maximum of one to two heavy vehicles (at any one time) to any queues during any particular signal cycle. Even with the potential utilisation of additional B-double vehicles, which have lower acceleration and higher intersection clearance times than single road tankers, the impact on intersection and road network operations is not considered to be significant.

Significantly, the level of traffic increase attributable to Vopak's expanded operations will be well within any daily variations that currently exist along the surrounding road network, eg. there is a maximum of approximately 1.3% of daily and peak hourly traffic along Bumborah Point Road and less than 1% of daily or peak hourly traffic along the remainder of the surrounding road network. Therefore, traffic impacts from Vopak's future expanded operations are considered to be minimal and will have an insignificant effect on road network and intersection operations.

In addition to the utilisation of a greater proportion of B-double vehicles and the improvement of logistics planning to reduce 'dead' capacity (discussed previously in *Section 3.4.1*), the following points should also be noted, which will further reduce any road tanker impacts:

- Vopak pipeline transfer volumes will increase proportionately, thus having the effect of reducing the average road tanker numbers per day.
- With the partial consolidation of fuel delivery operations to Vopak's site from other sites around Sydney (in the longer term), there will likely be the positive impact of a reduction in traffic at other sites less suited to heavy vehicle transport.

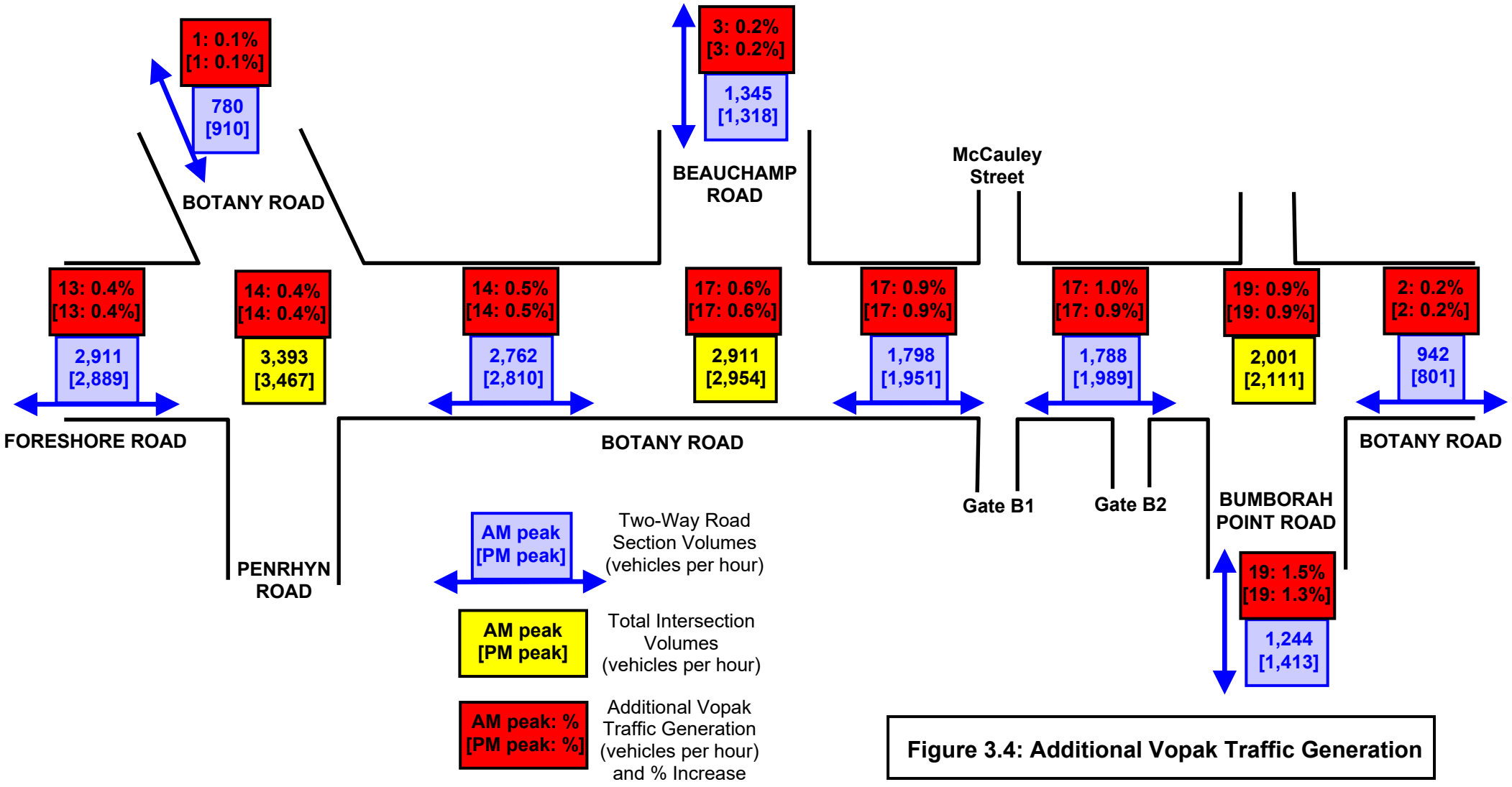


Figure 3.4: Additional Vopak Traffic Generation

3.4.3 Denison Street Usage

The use of Denison Street as a heavy vehicle and dangerous goods route for Vopak road tanker traffic (as part of the overall Port Botany generated traffic that uses Denison Street) has been investigated due to concerns with respect to traffic generation from future land use development on Denison Street, specifically a proposed Bunnings store.

The Beauchamp Road / Denison Street / Wentworth Avenue route is an authorised B-Double and dangerous goods route for heavy vehicles. It is identified as a 'secondary freight road' under the *NSW Freight & Port Strategy 2013* and is utilised by Port Botany generated heavy vehicles, including Vopak road tankers, as a preferred access route when accessing Port Botany to / from the north.

Denison Street is also used as an alternative route to bypass the General Holmes Drive airport tunnel and travel around the airport precinct via Qantas Drive / Airport Drive / Marsh Street to access the south-western / southern areas of Sydney.

Vopak Traffic Generation

Current Vopak traffic generation along Denison Street varies considerably depending largely on the operations of Foreshore Road and the ability to exit the Port Botany area onto General Holmes Drive. Peak usage of the Beauchamp Road / Denison Street / Wentworth Avenue route is during the afternoon between approximately 2 pm to 6 pm, which coincides with the peak afternoon traffic period along Southern Cross Drive / General Holmes Drive. During this peak period, there is often congestion for Port Botany traffic to efficiently exit the port precinct via Foreshore Road.

Current peak traffic generation (from *Section 3.4.1* above) could be up to 13 Vopak road tanker loads per hour using Denison Street. This assumes the worst-case scenario of all Vopak road tanker traffic utilising the Denison Street route.

Based on future traffic generation when Vopak's Site B Expansion project is operational, it is estimated that up to seven additional Vopak road tanker loads per hour could potentially use Denison Street. Again, this is a worst-case (conservative) scenario in that it assumes that all additional Vopak traffic generation uses the route via Denison Street in any given hour.

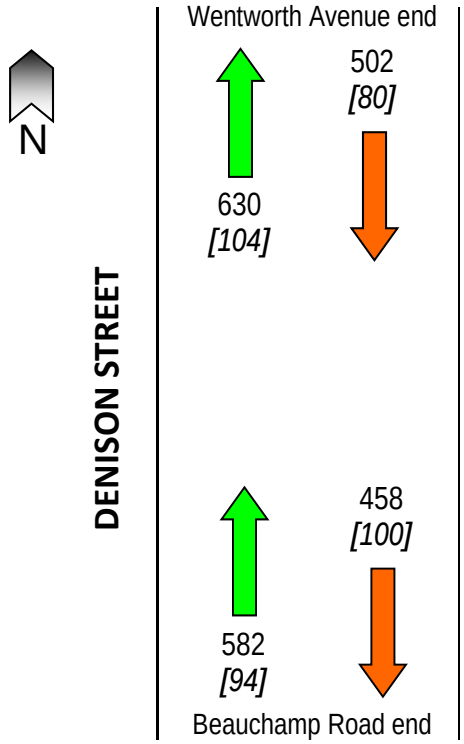
Traffic Impact Assessment

Existing traffic along the Beauchamp Road / Denison Street / Wentworth Avenue route ranges from approximately 23,840 vehicles per day (vpd) along Beauchamp Road to 37,300 vpd along Wentworth Avenue[4].

In order to obtain specific traffic volumes along Denision Street, traffic count surveys were undertaken at mid-block locations towards both ends of Denison Street (near Wentworth Avenue and Beauchamp Road) during weekday afternoon periods (Tuesday 31st March and Wednesday 1st April 2015 from 3 pm to 5 pm). The surveys included heavy vehicle volumes and have been adjusted to 2016 afternoon peak hourly results[5] and summarised in the figure following.

4 2016 projected AADTs from *Table 2* in Hyder "*Banksmeadow Waste Transfer Terminal: Traffic and Transport Impact Assessment*", November 2013, and adjusted for 2016 assuming 1.2% compound annual growth adopted from *Bureau of Transport Statistics' Sydney Transport Model*

5 Assuming 1.2% compound annual growth adopted from *Bureau of Transport Statistics' Sydney Transport Model*



CURRENT 2016 PM PEAK HOURLY MOVEMENTS

light vehicles
[heavy vehicles]

From the summarised traffic count survey results above, the total number of heavy vehicles travelling northbound along Dension Street constitutes over 16% of the total traffic volumes, which is a significant proportion. The southbound travel route has an even higher proportion of heavy vehicle traffic (almost 19%).

It is evident however, that Vopak road tankers only account for approximately 14% of heavy vehicles travelling northbound along Denison Street during the afternoon peak period (assuming that there were the maximum 13 Vopak road tanker loads per hour using Denison Street during the survey period). It is unclear where the majority of the other heavy vehicles originate from but it is surmised that most would come from the Port Botany precinct and its surrounding industrial land uses.

While the Vopak road tankers constitute a not insignificant proportion of the heavy vehicles using Denison Street, their impact on road capacity and operations is considered to be minimal. This is because they are less than 2% of the total traffic volumes, which would be within any daily or seasonal variation that currently exists along the surrounding road network.

For future year traffic impacts, it is assumed that the background light and heavy vehicle traffic would increase due to various proposed developments in the area including the Bunnings, Qenos and Orica developments nearby as well as future developments within the Port Botany precinct to the south. Therefore, it is considered reasonable to assume that any increase in Vopak traffic would be commensurate with other heavy vehicle increases.

Similarly, it is considered that the proportion of Vopak traffic would remain low in comparison to total traffic volumes and this proportion would likely fall within any daily or seasonal traffic variation that would exist in future along the surrounding road network.

In conclusion, it is evident that Vopak road tankers only account for a minority of heavy vehicles travelling along Denison Street with the majority of heavy vehicles originating from other land uses in the Port Botany precinct and its surrounding industrial land uses. Moreover,

the impact of Vopak road tankers on road capacity and operations along Denison Street is considered to be minimal. This is anticipated to continue during future year operations.

3.5 Parking

3.5.1 Parking Provision Guidelines

General guidelines for the provision of parking are provided in NSW Ports "*Port Botany Development Code*", October 2013.

Of most relevance to parking, the above document stipulates that all employee and visitor parking is to be accommodated on site. Guideline rates are provided as follows:

- Provide a minimum of one (1) parking space per staff member and contractor plus 10% contingency.
- Provide for at least two (2) visitor parking spaces.
- Provide for at least one (1) mobility impaired parking space, to be located adjacent to building entries and clearly delineated.
- Provide bicycle parking at a rate of at least two (2) bicycle parking spaces plus 5% of the total number of required car parking spaces.

3.5.2 Parking Assessment

The future site layout proposes parking for some 59 cars (refer to *Figure 3.1* above), which is an additional 10 spaces over and above the existing 49 parking spaces. The additional 10 parking spaces proposed for the site consist of the following:

- Nine (9) additional perpendicular spaces off the western side of Friendship Road, south of the site access driveways; and
- One (1) additional space in the triangular area off the southern side of the entry driveway.

It is noted that reinstatement of the ten (10) parking spaces within the original / approved internal car park adjacent to the TK0624 tank near the site offices forms part of the total 59 parking spaces – refer to *Figure 3.1* above. Therefore, the proposed 59 car parking spaces comply with the guideline requirements of the "*Port Botany Development Code*", which requires 58 parking spaces.

The approximate eight bicycle parking spaces currently on site satisfy the requirements of the *"Port Botany Development Code*".

3.6 Site Access

Vehicular access to the subject site will remain unchanged during Stage 1 operations with access to/from Friendship Road at the current access location for all vehicles. During this interim stage, on-site road tanker queuing (storage) will be available for approximately seven B-double size vehicles.

During Stage 2 operations, the vehicular access will be via Fishburn Road for road tanker entries and Friendship Road for road tanker exits. All internal (on-site) road tanker movements would have adequate manoeuvring space (swept paths) to enable travel in a forward direction only with no need for multi-point turn manoeuvres.

Once the new western access is operational (Stage 2), on-site road tanker queuing (storage) will be available for approximately 18 B-double size vehicles. This storage will predominantly be located within the dedicated lanes along the New 'Link' Road and along Fishburn Road.

Light vehicle access will remain unchanged from current operations. Refer to *Figure 3.2* above for site access arrangements including internal (on-site) vehicle swept paths.

In order to separate Vopak road tanker movements from through vehicle movements travelling along Simblist Road and turning right into Friendship Road, it is proposed that an additional central right-turn lane be provided on the Simblist Road approach to Friendship Road. The through movements (Simblist Road into Friendship Road) will be prevented from veering right across Friendship Road by maintaining the existing length of concrete safety barrier thus eliminating conflicts with northbound vehicles travelling along Friendship Road.

Appropriate advance warning / guidance signage and delineation will be provided on the Simblist Road approach to Friendship Road to provide suitable guidance for all vehicle movements.

Pedestrian access will be maintained as per current arrangements. Although traffic volumes will increase into the Vopak site and there will be amendments to the road tanker access during Stage 2, it is considered that there will be no significant increase in impacts to any existing pedestrian and cyclist access.

3.7 Construction Impacts

3.7.1 Construction Methodology

The project is proposed to be constructed in two stages.

A six-month construction period is proposed for Stage 1 comprising road tanker loading Bays 8 and 9, the road tanker unloading bay and the warehouse extension. Construction is scheduled to start in 2017.

The main construction activities envisaged include:

- Site preparation;
- Excavation;
- Road works;
- Concrete placement;
- Erection of road tanker loading bays 8 and 9, road tanker unloading bay, pipe support structures, product delivery pipework, additive injection systems, instrumentation, control systems, fire protection systems; and
- Commissioning.

The bulk of the construction works are proposed to occur during daytime hours (nominally 7 am to 6 pm, Monday to Friday, and 8 am to 1 pm on Saturday). Vehicular access to the site will be provided via Fishburn Road and Friendship Road.

Stage 2 of the project comprises the construction of road tanker Bay 7 together with the new entry off Fishburn Road (via the Elgas easement road), a new amenities building at the Fishburn Road entry and the new VRU installed.

Construction of Stage 2 is scheduled to commence when the road tanker throughput reaches 3,300 ML per year in 2020. The construction period will be approximately 12 months.

The main construction activities envisaged include:

- Site preparation;
- Excavation;
- Road works;
- Concrete placement;
- Erection of road tanker loading Bay 7, amenities building, VRU and pipe support structures; and
- Commissioning.

Similar to Stage 1 works, the bulk of the construction works for Stage 2 will be conducted during daytime hours (nominally 7 am to 6 pm, Monday to Friday, and 8 am to 1 pm on Saturday) and construction vehicle access to the site will be provided via Fishburn Road and Friendship Road as required.

Heavy Vehicles and Construction Plant

Heavy vehicles and larger construction plant will be required during construction including cranes, dump-trucks (for spoil removal), delivery trucks (concrete trucks / semi-trailers) and back-hoes (for excavation works).

The number of vehicles and daily traffic movements will vary during the construction stages. The estimated average traffic volume is up to ten heavy vehicle movements (cranes and semi-trailer delivery trucks) per day. This is anticipated to approximately double during initial spoil transport off-site and for concrete pours when concrete trucks make their deliveries.

The proposed increase in traffic in the road network during construction is considered relatively minor for the temporary nature of the construction activities. Importantly, the additional construction-related volumes will be within any daily variations along the surrounding road network.

All heavy vehicles and construction plant will be able to be parked on site or, with Ports agreement, on port roads including Fishburn Road.

No road closures or traffic detours will be required during the construction phases.

With respect to potential traffic impacts related to any construction activities, a detailed Construction Traffic Management Plan (CTMP) will be prepared and approved prior to the commencement of construction in order to ensure that any construction traffic is appropriately managed.

Contractor Vehicles

The number of Contractors on site during the construction phase is anticipated to be some 20 contractors per day during the early stages. This will approximately double during peak construction periods with some 40 light vehicles (cars, utility vehicles) accessing the site resulting in 80 light vehicle trips per day. Contractor vehicle parking will be made available, with Ports agreement, on Fishburn Road so that impacts to traffic flows and on-street parking are minimised.

3.7.2 Terminal Operations During Construction

Stage 1 Construction will maintain normal road tanker movements through the terminal. Construction work areas will be fenced off from road tanker traffic lanes within the terminal and construction personnel access will be tightly controlled.

Normal shipping operations are expected to continue during the construction period without any significant interference.

During the construction of the Stage 2 western entry driveway off Fishburn Road, road tankers will still be able to turn within the remaining area between the switch room and the driveway construction, enabling road tankers to use the existing eastern entry path.

The upgrades to Friendship Road and Fishburn Road, as well as the installation of the western driveway, will need to be completed prior to installing the new entry gates to enable tanker access to the gantries. Access to the terminal will then come from the west (Fishburn Road) and traffic will be appropriately managed during the installation of the gates and fencing. Stage 2 construction of the new loading Bay 7 will need to occur after the commissioning of the western entry in order to prevent interruption of tanker traffic paths and to minimise impact on the operation of the terminal.

4. Potential Mitigation Measures

In order to mitigate the potential impacts of the proposal, the following measures are recommended:

- Appropriate signage / delineation and linemarking should be provided for the proposed central right-turn lane from Simblist Road into Friendship Road, prior to Stage 2 operations. This is required to reinforce the route / travel path for road tankers approaching the site, separate unrelated traffic movements (ie. Vopak traffic from through traffic) and reduce lane changes.
- Provide a warning sign to be located on the bend at the southern end of Friendship Road to advise northbound vehicles travelling around the corner to be aware of cars reversing out of the proposed southern end parking spaces.
- It is recommended that a road safety audit be undertaken on any proposed road amendments and site access arrangements.
- Preparation of a detailed CTMP will be undertaken by the chosen contractor. This will be developed in consultation with NSW Ports and approved prior to the commencement of construction. The CTMP will cover all temporary warning, guidance and information signage as well as appropriate traffic control devices.

5. Conclusions

The following pertinent issues have been concluded from the traffic impact assessment for the proposed Vopak Site B expansion:

- Vopak propose to increase the hydrocarbon throughput at their existing Site B facility at Port Botany in response to growth in the petroleum market. The total proposed increase is from 3,950 ML/year to 7,800 ML/year, with the associated road tanker increase from 2,400 ML/year to 3,700 ML/year.
- The Vopak site is custom-served by the existing port road network, which provides access to the Sydney's major road network and is subject to significant volumes of heavy vehicle traffic on a daily basis. Vehicular access between the site and the surrounding major road network is via the one-way loop of Simblist Road / Friendship Road and Bumborah Point Road.
- Traffic operations for the routes to/from the port area can deteriorate somewhat during peak periods with significant queuing / congestion resulting in an increase in delay and consequent reduction in level of service at the major intersections in the port area.
- Current on-site parking is available but on-street parking is restricted.
- There is no public transport that directly serves the site but there are nearby bus services along Bumborah Point Road and Military Road. There are no formal pedestrian or cycle routes serving the site.
- The proposed expansion is to be constructed in two stages as follows:
  - Stage 1: construction of Bays 8 & 9 and eastern entry unloading bay with existing eastern access off Friendship Road maintained.
  - Stage 2: construction of new one-way link road from Friendship Road to Fishburn Road, new left-turn western entry off Fishburn Road, Bay 7 and unloading bay modified for western entry.
- Current staff numbers are a maximum of approximately 45 employees. An approximate increase of 5 additional staff will result from the proposed expansion resulting in some 10 additional light vehicle trips per day or 5 additional light vehicle trips per hour.
- The current maximum road tanker peak is an average of 13 trucks per hour and 182 trucks per day. The proposed expansion will result in some 20 road tankers per hour during future operations, which equates to an additional seven road tankers or 14 road tanker trips per hour. Additional daily traffic generation peaks at around 280 road tankers per day in 2023, which equates to an additional 98 road tankers or 196 road tanker trips per day.
- The addition of a maximum of 5 light vehicle and 14 heavy vehicle trips per hour (or 10 light vehicle and 196 heavy vehicle trips per day) will be readily absorbed into the existing traffic flows on the surrounding road network. While any additional traffic may result in cumulative impacts, it is considered that the additional traffic generation attributable to Vopak's expanded operations will at most contribute to a maximum of one to two heavy vehicles (at any one time) to any queues on the surrounding intersections, which will have minimal impact on intersection and road network operations even with the potential utilisation of additional B-double vehicles and their lower acceleration and higher intersection clearance times. Significantly, the level of

traffic increase attributable to Vopak's expanded operations will be well within any daily variations that currently exist along the surrounding road network.

- Vopak road tankers only account for a minority of heavy vehicles travelling along Denison Street. Their current and future impact on road capacity and operations along Denison Street is considered to be minimal.
- The future site layout proposes parking for some 59 cars, which satisfies the guideline requirements of the "*Port Botany Development Code*".
- Vehicular access to the subject site will remain unchanged during Stage 1 operations. During Stage 2 operations, road tanker access will be via Fishburn Road (entry) and Friendship Road (exit). Light vehicle access will remain unchanged from current operations.
- On-site queuing (storage) for road tankers will range from some seven B-double size vehicles during Stage 1 to approximately 18 B-double size vehicles during the ultimate stage.
- In order to separate Vopak road tanker movements from through vehicle movements travelling along Simblist Road and turning right into Friendship Road, it is proposed that an additional central right-turn lane be provided on the Simblist Road approach to Friendship Road. Appropriate advance warning / guidance signage and delineation will be provided on the Simblist Road approach to Friendship Road to provide suitable guidance for all vehicle movements
- There are no significant construction-related issues or impacts that would not be mitigated by an appropriate CTMP.
- A number of mitigation measures to address site access and construction issues are recommended to be adopted as follows:
  - Appropriate signage / delineation and linemarking for the proposed central right-turn lane from Simblist Road into Friendship Road.
  - Provide a warning sign for northbound Friendship Road vehicles to advise of cars reversing out of the proposed southern end parking spaces.
  - A road safety audit be undertaken on any proposed road amendments and site access arrangements.
  - Parking on Fishburn Road (to be agreed by NSW Ports).
  - Preparation of a detailed CTMP to be undertaken by the chosen contractor.

In conclusion, it is considered that the proposed expansion of Vopak operations at its Port Botany site will not result in any significant impacts subject to the above mitigation measures being adopted.