SITE B PROPOSED THROUGHPUT INCREASE

S75W APPLICATION

DANGEROUS GOODS ROAD TRANSPORT RISK ASSESSMENT

PORT BOTANY

VOPAK TERMINALS AUSTRALIA

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ABBREVIATIONS

BIP	Botany Industrial Park
DG	Dangerous Goods
DPE	NSW Department of Planning and Environment
EA	Environmental Assessment
EP&A	Environmental Planning and Assessment
HIPAP	NSW Hazardous Industry Planning Advisory Paper
ML	Million litres
QRA	Quantitative Risk Assessment
TIA	Traffic Impact Assessment
ULP	Unleaded Petrol

TERMINOLOGY

Term	Definition
Combustible liquid	Any liquid, other than a flammable liquid, that has a flash point, and has a fire point that is less than its boiling point (AS 1940–2004).
Consequence	Outcome or impact of a hazardous incident, including the potential for escalation.
Flammable liquid	Liquids which give off a flammable vapour at temperatures of not more than 60.5°C, closed cup test, or not more than 65.6°C, open cup test, normally referred to as the flash point (AS 1940–2004). Class 3 under the Australian Dangerous Goods code.
Flash fire	The combustion of a flammable vapour and air mixture in which flame passes through that mixture at less than sonic velocity, such that negligible damaging overpressure is generated.
Risk	The likelihood of a specified undesired event occurring within a specified period or in specified circumstances, It may be either a frequency (the number of specified events occurring in unit time) or a probability (the probability of a specified event following a prior event), depending on the circumstances.

1. SUMMARY

1.1. Overview

Vopak Terminals Australia Pty Ltd (Vopak) operates the Sydney Site B petroleum fuel terminal located within the NSW Ports Port Botany precinct. Vopak is proposing to increase the hydrocarbon throughput at Site B from 3,950 ML/year to 7,800 ML/year, and the associated total road tanker export capacity from 1,897ML/year (Site B approved output) to 3,700 ML/year (predicted 2023 volume), with the balance exported via ship or pipeline.

An Environmental Assessment (EA) (Ref 2) was provided in 2015, as required for modifications to current/approved development consents under Section 75W of the Environmental Planning and Assessment (EP&A) Act. The EA included a Traffic Impact Assessment (TIA, Ref 5). The TIA focused on capacity issues in the road network surrounding Port Botany associated with increased heavy vehicles. The scope did not include assessment of risks specific to Dangerous Goods (DG) traffic.

After submission of the S75W EA for adequacy review, the DPE requested that a Transport Risk Assessment be prepared to assess the potential impact of increased road transport of Dangerous Goods (DG) associated with the project. The TIA was also updated in 2016 (Ref 1) to address Department of Planning and Environment (DPE) adequacy review comments.

The majority of road tanker traffic associated with Vopak Site B would travel on Foreshore Rd. This is a dedicated heavy vehicle link with no residential or sensitive[1] land uses within least 200m of the road. As agreed with DPE, the main area of interest with respect to risk from DG transport is the northern route from Port Botany which runs via Beauchamp Rd and Denison St. This is an authorised B double route and it is also immediately adjacent to residential and commercial areas. Denison St is also exposed to risk from facilities at the Botany Industry Park (BIP) located in Denison St.

The scope of the Transport Risk Assessment included:

- Provision of additional information regarding the estimated DG road traffic generated from the proposal and the likely route leaving the Port Botany area. This is based on the predicted overall road tanker numbers in the updated 2016 Traffic Impact Assessment (Ref 1) from the EA, together with estimates from Vopak operational data relating to the quantities of different fuel types likely to be exported via the road tanker export facilities for the future growth case, and distribution of full tankers to the different routes leaving the Port Botany area.
- A quantitative assessment of the effect of the potential increase in Class 3 DG traffic along Denison St on risk levels to the residential and commercial land

[1] "Sensitive land use" in the land use planning context refers to vulnerable or difficult to evacuate populations such as schools, hospitals, aged care facilities, not environmentally sensitive receptors.

uses. As an existing transport QRA covering Denison St is available (*Addendum To Dangerous Goods Transport QRA, Denison St, Hillsdale,* prepared by consultants Scott Lister in 2015, Ref 7), Scott Lister was retained to prepare an update to the Denison Transport QRA study covering the potential increase in Class 3 traffic from the Vopak proposal.

1.2. Increase in DG Traffic

The total number of road tankers exporting fuels from Site B is predicted to increase from approximately 182 per day (2016 volume) to 280 per day (2023 volume) at an average tanker load size of 36.3 m^3 (assumed to be unchanged over the entire period).

Approximately 70% of road tanker exports from Site B are Class 3 Dangerous Goods (primarily gasoline, and some jet fuel), the balance are combustible products (diesel, biodiesel). This ratio is not expected to change substantially for the future growth case.

From Site B and after leaving the Port Botany area, the updated 2016 TIA estimated that 85% of road tanker exports head west along Foreshore Rd, a further 10% north along Beauchamp Rd and Denison St, with the remaining 5% heading east to Bunnerong Rd (Ref 1).

This corresponds to an increase in predicted Class 3 full road tanker traffic heading north along Denison St from Vopak Site B to around 6,600 Class 3 road tankers per year in 2023, from an estimated 2016 volume of approximately 4,300 tankers per year.

1.3. Effect on Risk

The purpose of the existing Scott Lister Denison St Transport QRAs (Refs 6, 7) was specifically to assess the risk to a proposed Bunnings development in the northern part of Denison St, hence they do not contain analysis of the risk contributors in other parts of Denison St. However the input data and results in the published reports are sufficient to assess the impact on risk results of additional Class 3 traffic along Denison St hence it was decided to retain Scott Lister to update the Denison St study to assess the effect of the proposed Vopak 75W development. The results are reported in Scott Lister's report *Vopak Port Botany Expansion – Denison St Transport QRA – July 2016 Update* (Ref 8).

The following conclusions have been drawn from the Transport Risk Assessment and the Scott Lister *Vopak Port Botany Expansion - Denison St Transport QRA* study:

1. The basis for total full Class 3 tanker traffic in the southern portion of Denison St in the Scott Lister Transport QRAs prepared in relation to the Bunnings development is approximately 4,400 per year (based on 2012 traffic count data). Not all Class 3 tankers heading north along Denison St are from Vopak Site B, although the majority are likely to be as Vopak is the highest Class 3 throughput site in the Port area.

2. The operational data for 2016 from Vopak Site B suggests that there has been a 40% increase in total Site B road tanker export throughput since 2012, most likely

due to external factors such as refinery closures in Sydney and an increase in imported finished fuel products imported via Port Botany. Therefore the Class 3 road tanker numbers included in the existing Scott Lister transport DG QRA for Denison St (Ref 7) are likely to be an underestimate of the 2016 Class 3 tanker numbers. A future growth case was not included in the original Scott Lister Transport QRAs.

3. The Class 3 tanker numbers heading north from Vopak Site B were estimated to be approximately 4,300 (2016 basis) increasing to approximately 6,600 (2023 basis). This assumes 10% of all tankers travel north up Denison St from Site B and an average tanker volume of 36.3 m^3.

4. The Scott Lister Denison St Transport QRA Addendum (Ref 7) and associated 75W update accounting for increase in Class 3 tankers associated with the Vopak 75W proposal (Ref 8) show clearly that the risks from Class 3 tanker transport for both the current (2016) case and future growth (2023) case are small compared to the total cumulative risk in Denison St from existing road tanker transport of all relevant DG classes.

Overall, DG road transport risk levels will necessarily increase with an increase in DG traffic. However, the available information regarding the Vopak Site B Class 3 road traffic increase, put into context of the existing quantitative Denison St DG Transport risk assessments, indicates that the additional Class 3 traffic would have a very small effect on the existing predicted individual fatality risk levels in Denison St.

As the effect areas for accidents involving Class 3 tankers are relatively small, the contribution to cumulative societal risk in the area due to Class 3 tanker accidents is also extremely small, falling below the negligible societal risk criteria for the Site B Class 3 contribution for both the 2016 and future growth 2023 Case, and the increase is not perceptible in the cumulative societal risk profile for DG road transport in the Denison St area.

There is no information publicly available regarding the amount of DG traffic in areas apart from Denison St. However the change in risk to surrounding land uses due to DG transport on other routes is not likely to be significant as Foreshore Rd (which will take most of the traffic increase) is a heavy vehicle route with no surrounding residential or sensitive land uses for at least 200m from the road, and the tanker numbers heading east to Bunnerong Rd from Site B are likely to be very small.

Overall it is concluded that the 75W proposal will have a very small impact on existing DG transport risk levels in the area when compared to previously published risk estimates.

2. INTRODUCTION

2.1. Project Background

Vopak Terminals Australia Pty Ltd (Vopak) operates the Sydney Site B ('Site B') petroleum fuel terminal located within the NSW Ports Port Botany precinct. The majority of products are imported from the Port Botany Bulk Liquid Berth (BLB), stored at Site B, then exported offsite by road tanker or pipeline.

Vopak is proposing to increase the Site B total throughput from 3,950 ML/year to 7,800 ML/year. This proposal includes an increase in the road tanker export throughput from the currently approved road tanker export volume of 1,897ML/year to 3,700 ML/year.

The project is a modification to the existing Site B Project Approval MP 06_0089 under Section 75W Part 3A of the Environmental Planning and Assessment Act. The NSW Department of Environment (DPE) issued Secretary's Environmental Assessment Requirements (SEARs) for the project in November 2014 and the Environmental Assessment (EA) was submitted to the DPE for adequacy review in June 2015 (Ref 2).

The DPE identified additional issues to be assessed in relation to the potential impact of increased road transport of Dangerous Goods (as per the extract from the SEARS - Additional Requirements letter below, Ref 3)

Vopak Terminals Site B3, Port Botany (MP 06_0089 MOD 2)
Secretary's Environmental Assessment Requirements (SEARs) – Additional Requirements

I refer to the SEARs issued on the 7 November 2014 regarding a proposed modification to the above project approval. The Department has identified additional issues that will need to be addressed in the Environmental Assessment for the proposed modification.

In addition to the key issues set out in the SEARs for hazards and risks, the Department requests that you prepare a Transport Risk Assessment to evaluate the potential impacts of the transport of dangerous goods from the Vopak Terminals site.

Vopak had previously retained Sherpa Consulting Pty Ltd (Sherpa) to prepare the quantitative risk assessment (the 75W QRA, Ref 4) for the project that was included in Appendix E of the EA.

Vopak also requested that Sherpa prepare a transport risk assessment covering the proposed increase in Dangerous Goods (DG) transport to respond to the DPE's additional requirement.

2.2. Background to Traffic Assessment

2.2.1. Traffic Impact Assessment, Site B 75W Modification

The EA for the project included a Traffic Impact Assessment (Appendix D of the EA, Ref 5) which defined the increase in vehicle traffic (primarily road tankers with a very small numbers of cars) associated with the proposal, and assessed the overall impact of the increased traffic on the surrounding road network. This TIA was then updated in 2016 to address Department of Planning and Environment (DPE) comments (Ref 1).

The 2016 updated traffic study indicated that the majority of traffic associated with Site B would follow a distribution of approximately 85% to/from the west, south and north via Botany Rd to Foreshore Road which is a dedicated heavy vehicle link with no residential or sensitive land uses within the immediate vicinity of the road.

A further 10% were estimated to travel to/from the north and east via Beauchamp Road/ Denison St, Hillsdale. This is an authorised B double route, which is adjacent to residential and commercial areas, and runs immediately adjacent to the eastern boundary of the Botany Industrial Park (BIP). The BIP also generates significant volumes of DG traffic. The traffic distribution to/from Site B is expected to remain similar for the future case.

The TIA focused on capacity issues in the road network surrounding Port Botany. The scope did not include assessment of risks specific to DG traffic.

2.2.2. DG Traffic

There is minimal information publically available regarding the overall volume of DG traffic in the Port Botany precinct and surrounding industrial areas. There are a number of other Major Hazard Facilities (MHF) in the Port Botany area close to Vopak Site B which also generate DG traffic in the Port Botany area, as well as DGs imported in containers (including ISOs) in the Container Handling area of the Port.

The most recent information relating to the amount of DG traffic specifically along Denison St is from the City of Botany Bay Council DG traffic counts undertaken in this area in 2012, and used in a quantitative risk assessment (QRA) of DG transport along Denison St (Ref 6) released in February 2015. An update to the Dangerous Goods Transport QRA in the form of an Addendum (Ref 7) was released in July 2015. The DG transport QRA studies were commissioned jointly by a Joint Regional Planning Panel (which included the DPE and City of Botany Bay Council) to assess the risk to a proposed Bunnings development in Denison St.

2.3. Scope

The scope of the Vopak Site B 75W Transport Risk Assessment was clarified with DPE. It was agreed that:

- additional information regarding the amount of Dangerous Goods traffic generated by the Vopak proposal was to be provided
- the main area of concern in relation to transport of DGs was the potential increase in DG traffic along Denison St and any associated increase in risk to the residential and commercial land uses.

This report provides:

- A general description of the overall increase in DG traffic from the Vopak Site B 75W proposal and likely distribution of this traffic into the surrounding areas. This is based on the predicted overall road tanker numbers in the 2016 Traffic Impact

Assessment, together with the estimates from current operations relating to the quantities of different fuel types to be exported via the road tanker export facilities for the future growth (2023) case.

- An assessment of the likely increase along Denison St in DG traffic associated with the Vopak Site B 75W proposal against the DG traffic baseline adopted in the Scott Lister *Denison St DG Transport Dangerous Goods Transport QRA* and associated *DG Transport QRA Addendum* (Refs 6, 7).
- A review of the implications of a quantitative assessment of the effect of the potential increase in Class 3 DG traffic along Denison St on risk levels to the residential and commercial land uses. Scott Lister were retained to prepare an update to the 2015 Transport Denison St QRA studies covering the potential increase in Class 3 traffic, reported in *Vopak Port Botany Expansion – Denison St Transport QRA – July 2016 Update.* (Ref 8)

2.4. Objective

The overall objective of the study is to evaluate the significance of the potential increase in DG transport risk along Denison St associated with proposed throughout increase at Vopak Site B.

2.5. Exclusions

Quantification of consequences or any impacts from road DG transport accident scenarios or transport risks due to the increase in DG road tanker traffic associated with the proposal has been undertaken by Scott Lister using the same methodology as the previously accepted Denison St Transport QRAs.

A review of assumptions and inputs unrelated to the Class 3 tanker numbers was not undertaken as the Denison St Transport study is in the public domain and has previously been accepted by stakeholders such as DPE and Botany Council.

Other forms of transport (eg pipelines, shipping) are not part of the scope of the study.

3. TRAFFIC VOLUMES

3.1. Traffic Impact Assessment Basis

Table 3.1 summarises the expected increase in the total number of road tanker movements adopted in the 2016 Traffic Impact Assessment (TIA) from 2013 to 2023. (Refer to Table 3.3 page 17, Ref 1). Data for 2011 and 2012 was obtained by Sherpa from Vopak and is also shown in Table 3.1 to allow a comparison to be made against the DG Denison St traffic count numbers from 2012 used in the Scott Lister 2015 DG Transport QRAs (Refs 6, 7).

TABLE 3.1: TOTAL ROAD TANKER GROWTH

Year	Road Tanker Export (kL/year)	Average Road Tanker Volume (kL)	Road Tankers per year	Road Tankers per day (average)	Comments
2011	1,410,000	32.3	43,653	120	Vopak actual throughput data
2012	1,762,000	34.5	51,072	140	Vopak actual throughput data
2013	2,200,000	35.1	62,678	172	Vopak actual throughput data, as per Table 3.3 page 17 Traffic Impact Assessment (Ref 1)
2014	2,230,000	37.5	59,467	163	
2015	2,000,000	38.4	52,083	143	
2016	2,400,000	36.3	66,116	182	Vopak actual throughput data projected from Jan – May 2016 figures. As per Table 3.3 page 17 Traffic Impact Assessment (Ref 1)
2023	3,700,000	36.3	10,1928	280	Vopak projected. As per Table 3.3 page 17 Traffic Impact Assessment (Ref 1)

As per the TIA, after leaving the Port Botany area via Bumborah Point Rd, road tankers are estimated to head in three directions:

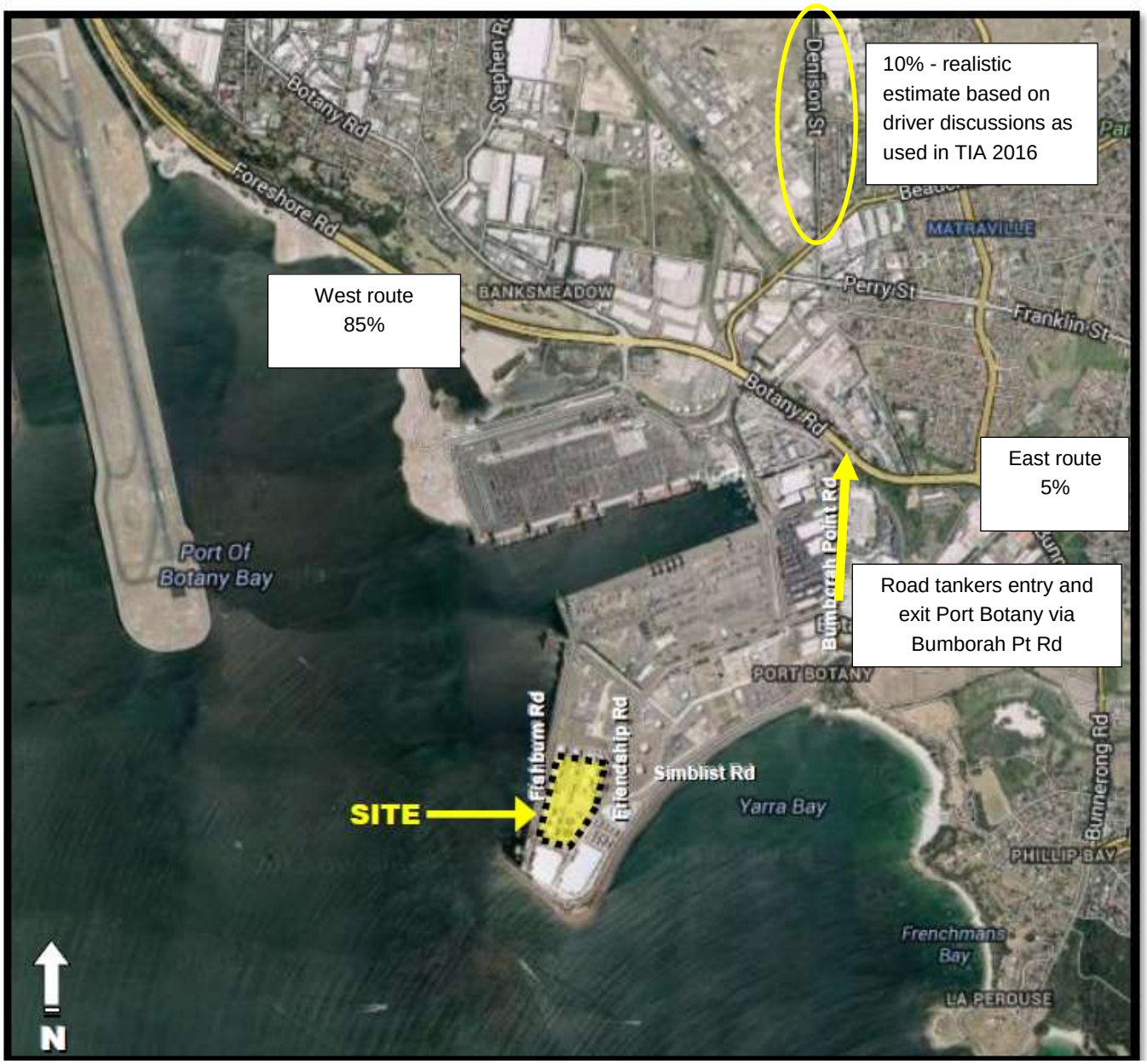
- The majority (around 85% annual average) of road tankers take the route to the west (Botany Rd and onto Foreshore Drive). This route is a high-volume, dedicated heavy vehicle link between the Port Botany precinct and General Holmes Drive / Southern Cross Drive (part of Sydney's M1 arterial route) with limited traffic access points and no immediately adjacent residential or sensitive land uses.
- Around 10% of road tankers take the route to the north (Beauchamp Rd and onto Denison St). Beauchamp Road / Denison Street / Wentworth Avenue route is an authorised B-Double route for heavy vehicle adjacent to the BIP on west side of the road, and a residential and commercial area on the eastern

side of road. This is consistent with discussions with drivers loading tankers at Site B (various transporters) over a number of weeks in early 2016.

- Small volumes of road tanker traffic head east (around 5% annual average).

These areas are highlighted in Figure 3.1.

FIGURE 3.1: OVERVIEW OF AREA



3.2. Increase in DG Traffic

3.2.1. Total Volume

Road tankers arriving at Site B are generally empty fuel tankers. A small number of road tankers may deliver flammable materials to the site however import via road tanker is a very small proportion of the throughput. Imports by road tankers are well below 1% of total import for current case and less than 2% for proposed case. Hence road tanker exports are the dominant contributor to DG traffic movements.

The 75W QRA (Ref 4, Appendix A) provided a summary of the expected proportion of fuel products for the current and proposed throughput cases.

Fuels exported are gasoline, jet fuel and diesel. Gasoline and jet fuel are Class 3 flammable liquids and diesel is a combustible liquid.

As per the 75W QRA, around 68% of the current fuel exported via road tanker is a Class 3 product (jet fuel and gasoline) and this is expected to stay at similar proportions in the future case. Jet fuel road tankers will all go west towards the airport, there is no reason for full jet fuel tankers to head north up Denison St. Removing the jet fuel proportion leaves about 65% as gasoline as a proportion of the total tanker numbers.

3.2.2. Route Distribution

To estimate the likely increase in Class 3 traffic in Denison St it was assumed that 10% of all tankers head north as per the 2016 TIA and that 65% of these are gasoline (Class 3 DG).

A comparison against Roar 2012 traffic count data from the original Scott Lister Transport QRAs using 2012 Vopak operational data was also made to ensure that this is a realistic assumption as per Section 3.2.4.

3.2.3. DG Traffic Basis from Scott Lister DG Transport QRA Results

The Scott Lister Denison St DG Transport QRA and Addendum basis is summarised in Table 3.2. The Addendum was prepared as a sensitivity case to cover a concern relating to a far higher number of Class 2.1 (flammable gases such as LPG) heading north from Port Botany than was covered in the original DG Transport QRA. The data shown in Table 3.2 is only for the part of Denison St south of the BIP Gate 3 (main tanker entry / exit point for BIP).

Similar data is available for the portion of Denison St north of Gate 3 which includes BIP traffic, however as the overall tanker numbers are greater in this area of Denison St, and the land use is less sensitive in land use safety planning terms (commercial and recreational, rather than residential), the risk effects due to increase in Class 3 tankers will be less significant than in the southern part of Denison St.

Note that the data shown as an extract from the Denison St Transport QRA does not include data for tankers travelling south along Denison St as these are assumed to be mostly empty tankers heading back to Port Botany. Empty tankers will have minimal effect on the risk profile.

TABLE 3.2: DENISON ST (SOUTH OF BIP GATE 3) TRANSPORT STUDY BASIS, TANKERS HEADING NORTH

DG Class	DG Transport QRA (Ref 6)	DG Transport QRA Addendum (Ref 7)	Notes
	From: Appendix A page 35 Table 9	From: Page 2 , Section 1	
3	4,794	4,794	Total Class 3 tanker numbers assumed to remain unchanged in Addendum sensitivity case. This includes all Class 3 tankers, including BIP traffic
2	521	4,521	Original basis appears to include Class 2.1 and Class 2.3. Addendum adds 4000 Class 2.1 tankers

3.2.4. DG Traffic counts Denison St

The traffic counts used in the DG Transport QRA for Denison St for Class 3 were based on DG traffic count data collected in 2012 adjusted using information supplied by the BIP in 2014. Note that the traffic counts included a total heavy vehicle count and also a count for DG placard types, but did not include an explicit category for combustibles.

The DG Transport QRA shows total Class 3 tanker traffic of 4,406 per year heading north in the southern portion of Denison St (2012 traffic count ROAR data basis). This includes all Class 3 tankers (except Class 3 movements from the BIP) of which others could be coming from other operators in the Port Botany area, not just tankers from Vopak Site B.

An estimated future growth case was not included in the DG Transport QRA.

There has been some growth in fuel road tanker numbers due to external drivers such as refinery closures in Sydney and an increase in imported finished fuel products via Port Botany. Vopak's throughput figures as shown in Table 3.3 suggest that average annual road tanker numbers have increased by around 30% in 2016 since 2012.

As a crosscheck, if the known Class 3 traffic count data in Denison St 2012 extrapolated to an annual basis (4,406 tankers per year) is assumed to be all Vopak traffic, this would mean that around 13% of all Vopak Class 3 tankers in 2012 used Denison St. This implies that the 10% estimate of traffic heading north from Site B is likely to be realistic as Vopak has the highest throughputs of the Class 3 products at Port Botany. .

TABLE 3.3: VOPAK OPERATIONAL THROUGHPUT INCREASE

Year	Road Tanker Export (kL/year)	Average Road Tanker Volume (kL)	Total Road Tankers per year	Gasoline Road Tankers per year (65% of total)	Estimated Vopak Gasoline north up Denison St (per year) (Note 1)	Known data Class 3 tankers Denison St
2011	1410000	32.3	43653	28375	2837	n/a
2012	1762000	34.5	51072	33197	3320	4,406 (ROAR data)
2013	2200000	35.1	62678	40741	4074	n/a
2014	2230000	37.5	59467	38653	3865	n/a
2015	2000000	38.4	52083	33854	3385	n/a
2016	2400000	36.3	66116	42975	4298	n/a
2023	3700000	36.3	101928	66253	6625	n/a
Note 1: assumes 10% of total tankers head north and 65% of total tankers are gasoline						

3.3. Growth in non-Vopak traffic

Vopak also consulted with NSW Ports and the LPG operators at Port Botany to determine whether any significant changes have occurred in throughput of non-Vopak DG tankers from 2013 to 2015. This information was then used to determine whether to adjust the other Denison St DG tanker numbers (which were also based on 2012 Denison St ROAR traffic count data) used in the DG Transport QRA Addendum to arrive at a new basis reflecting changes in 2016 DG tanker traffic.

The data from the LPG operators and NSW Ports is summarised in Table 3.4. These figures suggest little change in non-Vopak volumes, in fact they suggest a small contraction rather than increase in road tanker numbers.

The DG Transport QRA road tanker number data inputs for Denison St were then updated to form the 2016 Case for the DG Transport QRA as follows:

- Vopak Class 3 tanker traffic estimate in Denison St from 2013 was increased proportionally to the Site B road tanker throughput increase to reflect estimated 2016 levels (ie around 30%).
- Non-Vopak Class 3 tanker numbers were not changed from 2012 levels as the overall NSW Ports throughput data over the last few years indicates that there has been some contraction in overall DG throughput not associated with the Vopak site. There is no information available about the proportion of tankers in the different DG classes, hence the numbers of non-Vopak Class 3 tankers using

Denison St were assumed to remain the same, ie no increase from the 2012 data.

- No changes were made to LPG (Class 2.1) tanker numbers as there has been no overall growth in throughput at the Port from 2013 to 2015 hence the Class 2.1 tanker numbers using Denison St were assumed to remain the same as that in the DG Transport QRA Addendum.

The Vopak Class 3 tanker numbers in Denison St for 2023 will have then been increased by a factor based on the predicted truck numbers in the updated project traffic study.

No changes in other DG truck numbers are made for the 2023 Case as the purpose of the assessment is to assess the effect of the Vopak project only compared to the existing (2016) case. Vopak has no knowledge of possible DG traffic increases in other operators or Port operations for this timescale.

TABLE 3.4: OPERATIONAL THROUGHPUT INCREASES 2013 TO 2015 ALL OPERATORS

	Estimated Road tankers per year					**Factor compared to 2013**	**Basis**
	2012	**2013**	**2014**	**2015**	**2016**		
Class 2.1 total truck numbers	No data	20306	18127	19597	not known	97%	These numbers were based on data advised by (LPG operators) Origin and Elgas.
Vopak Site B (total C1 and Class 3)	51072	62678	59467	52083	66116	129% (2012 base) 105% (2013 base)	Vopak actual truck data 2012 – 2015
Other chemicals NSW Ports (includes Combustibles, DG class 3, 6, 8)	No data	19507	7100	16427	not known	84%	NSW Ports data Average tanker load 32kL from 2013 - 2015. This data includes Vopak Site A (which stopped operations at end of 2013) and Terminals site. The split in the various DG classes is not known. NOTE: Bitumen (Class 9) is excluded from these figures

3.4. Class 3 Traffic numbers for Update to Denison St Transport QRA.

The resulting Class 3 tanker data for use by Scott Lister in the updated Denison St Transport QRA is summarised in Table 3.5 which also shows the unchanged Class 2 data.

TABLE 3.5: DG TANKER NUMBERS, DENISON ST FOR USE IN UPDATED DG TRANSPORT QRA

Case	Operator	Road tankers heading north up Denison St (per year)	
		Class 3	**Class 2**
Base Case (2015 Addendum QRA results based on 2012 ROAR traffic count data)	Vopak	3320	-
	Others	1086	4,521
	Total	**4406**	**4,521**
Vopak 2016 Case (Current)	Vopak	4298	-
	Others	1086	4,521
	Total	**5384**	**4,521**
Vopak 2023 Case (Future)	Vopak	6625	-
	Others	1086	4,521
	Total	**7712**	**4,521**

4. CONCLUSIONS FROM UPDATED DG TRANSPORT QRA

4.1. Effect on Risk

The Class 3 tanker numbers given in Table 3.5 were used by Scott Lister to update the Denison St Transport QRA. The updated results are reported in *Vopak Port Botany Expansion – Denison St Transport QRA* (Ref 8).

Figures 2 to 4 in Ref 8 show the individual fatality risk results for the three cases for Class 3 tanker movements given in Table 3.5. As concluded in the QRA, the increased number of tanker movements results in very small increases in individual risk, but only very close to the road. Around the road intersections, the risk in the existing Denison St QRA reports is noted to already exceed 1×10^{-5} per year and this contour increases very slightly with the increased Class 3 tanker movements. The individual fatality risk contours for the Base Case (from the 2015 DG Transport QRA) and the 2023 Case are reproduced in Figure 4.1. These show that the change in risk due to increases in Class 3 tankers is barely perceptible

Scott Lister also updated the population data to account for new or approved development in the vicinity of Denison St since the original Transport QRAs were prepared in 2015. The societal risk results (Figures 5 to 7 in Ref 8) show that the risk from Class 3 tanker movements only for all cases is in the negligible region and that the increase in Class 3 tankers associated with the Vopak Site B increased throughput does not significantly change the overall cumulative societal risk from all classes of DG tanker movements in the Denison St area. It can also be seen in Figure 7 of Ref 8 (as reproduced in Figure 4.2) that the effect of the identified population increases in the vicinity of Denison St since 2015 has a more significant effect on increasing the cumulative societal risk compared to the original 2015 QRA Addendum results than any changes in Class 3 tanker numbers.

4.2. Risk Reduction Potential

DG road transport in Australia is subject to a number of specific design codes for tankers and DG licensing for vehicles and drivers. Whilst Vopak do not directly employ DG drivers or own DG road tankers, Vopak impose contractual obligations on customers to use compliant DG transporters, and undertake site audits of road tanker compliance. Vopak is also currently undertaking a project to ensure that obligations related to Vopak's position in the chain of responsibility under the Heavy Vehicle National Law (NSW) in relation to fatigue management, speeding compliance, mass, dimension and loading for heavy vehicles are fully met.

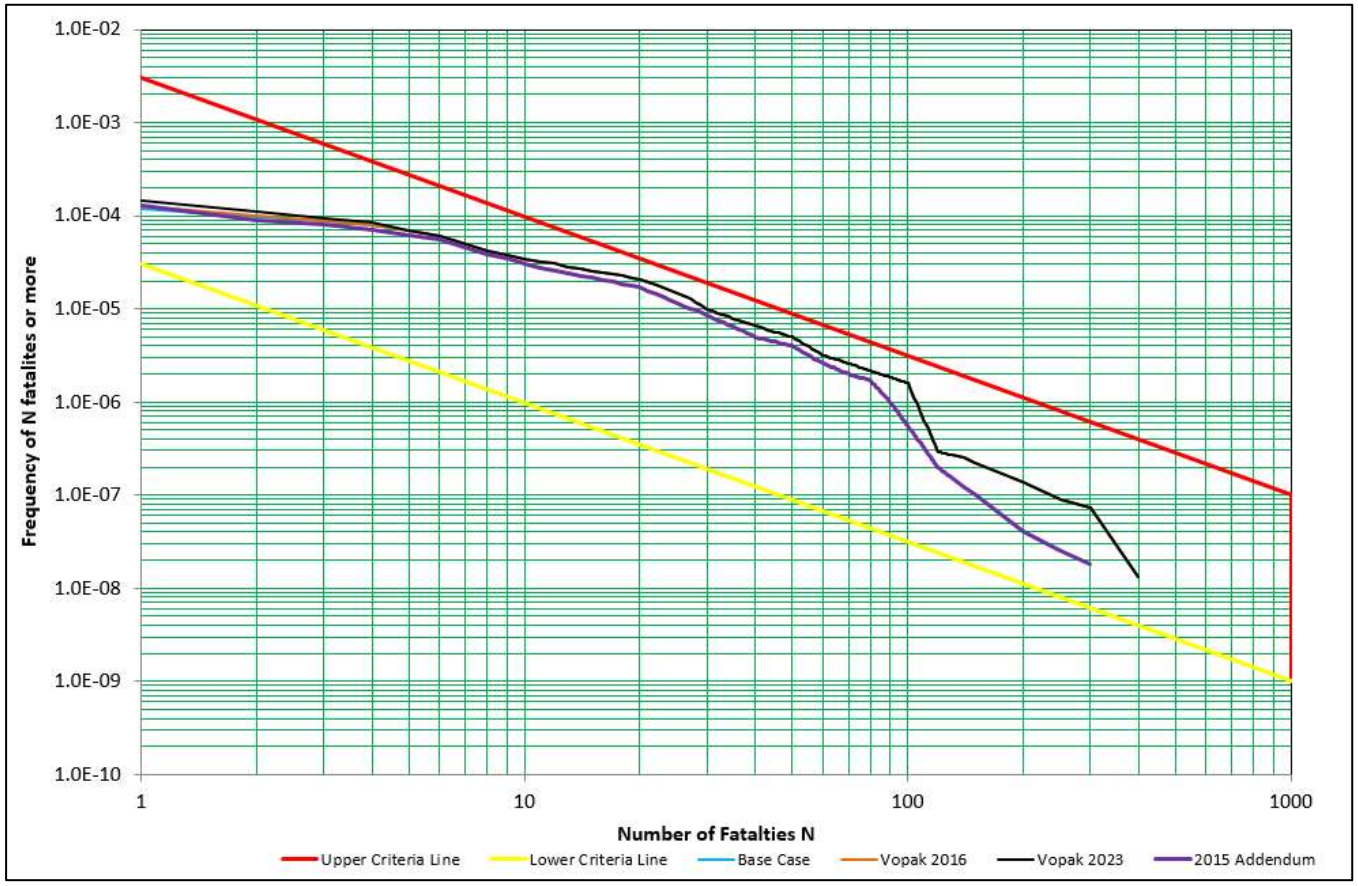
These types of measures have a qualitative risk reduction effect, however as noted in the Scott Lister QRA report (Section 2), the effect of any changes to DG transport codes, standards or licensing cannot be modelled quantitatively for a specific project as the application and impact of these would need to be considered across the industry, not in relation to a specific project or route.

As is evident from the Denison St DG Transport QRA results, Class 3 road tankers are not the dominant risk contributor in Denison St so any risk reduction measures aimed solely at Class 3 tankers would not have a significant risk reduction effect. Significant risk reduction would require improved area-wide road infrastructure measures that reduce the overall numbers of all types of DG road tankers using Denison St or reduce proximity to populations.

FIGURE 4.1: RISK RESULTS FROM DENISON ST TRANSPORT QRA

Original Base Case (2015) as per Denison St Transport QRA Addendum, reproduced from Figure 2 (Ref 8)	Vopak 2023 Case Denison St Transport QRA, reproduced from Figure 4 (Ref 8)
	

FIGURE 4.2: SOCIETAL RISK COMPARISON FROM DENISON ST TRANSPORT QRA, REPRODUCED FROM FIGURE 7, (REF 8)



NOTE: Black 2023 line hides 2016 and Base Case results except in N less than 4 region of curve

APPENDIX A. REFERENCES

1 Samsa Consulting, *Vopak Site B Expansion, Port Botany, Traffic Impact Assessment (FINAL REPORT – Revision 3* 17 June 2016

2 Plancom Consulting, *Section 75 W Modification MP 06_0089 - Modification 2, Environmental Assessment, Vopak Terminals Sydney Pty Ltd Site B Bulk Liquids Storage Terminal 1-9 and 20 Friendship Rd Port Botany* 20 May 2015

3 NSW DPE, letter from DPE to N Trillo Vopak, dated 6/7/2015

4 Sherpa Consulting Pty Ltd *Site B Proposed Throughput Increase S75W Application For Expansion, Quantitative Risk Assessment, Port Botany Vopak Terminals Australia, Doc No*: 20940-RP-001, Rev 2, 11 June 2015 (APPENDIX E of EA)

5 Samsa Consulting, *Vopak Site B Expansion, Port Botany, Traffic Impact Assessment (FINAL REPORT*) 21 April 2015 (APPENDIX D of EA)

6 Scott Lister, *Dangerous Goods Transport QRA, Denison St, Hillsdale* Rev 3 Issued: 12 February, 2015 see: http://www.botanybay.nsw.gov.au/files/sharedassets/public/documents/council-amp-committees/business-papers/development-agenda/attachment-4-5-17-development-agenda-04-march-2015.pdf

7 Scott Lister, *Addendum To Dangerous Goods Transport QRA, Denison St, Hillsdale* see: http://www.botanybay.nsw.gov.au/files/sharedassets/public/documents/council-amp-committees/business-papers/development-agenda/attachment-3-development-agenda-01-july-2015.pdf

8 Systra Scott Lister, *Vopak Port Botany Expansion – Denison St Transport QRA – July 2016 Update. Rev 3* Issued 28 July 2016 doc ref: MC20160715