

Response to Submissions Report

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

TQ Reference: PJ-PK-0001-REPT-020

8201510305/Report 001 Ver 5



Prepared for
TQ Holdings Australia Pty Ltd

7 April 2016



Contact Information

**Cardno South Coast
Trading as Cardno (NSW/ACT) Pty Ltd**
ABN 95 001 145 035

Level 1, 47 Burelli Street
PO Box 1285
Wollongong NSW 2500

Telephone: 02 4228 4133
Facsimile: 02 4228 6811
International: +61 2 4228 4133

southcoast@cardno.com.au
www.cardno.com.au

Document Information

Prepared for	TQ Holdings Australia Pty Ltd
Project Name	Proposed Port Kembla Bulk Liquids Terminal (SSD 7264)
File Reference	Report 001 Ver 5 TQ BLT Response to Submissions Report.docx
Job Reference	8201510305/Report 001 Ver 5
TQ Reference	PJ-PK-0001-REPT-020
Date	7 April 2016

Version Number	Ver 5
----------------	-------

Author(s):



Rhiannon Hughes
Environmental Scientist

Effective Date	7 April 2016
----------------	--------------



Cassy Baxter
Environmental Scientist

Date Approved:	7 April 2016
----------------	--------------

Approved By:



Alex Larance
Senior Environmental Engineer

Document History

Version	Effective Date	Description of Revision	Prepared by:	Reviewed by:
Ver 1	15-3-2016	Draft for Client Review	RMH/CNB/TS	AJL
Ver 2	22-3-2016	Final Issue	RMH/CNB/TS	AJL
Ver 3	30-3-2016	Inclusion of Additional Responses	CNB	DJT
Ver 4	6-3-2016	Inclusion of NSW Ports Comments	CNB	AJL
Ver 5	7-3-2016	Final Issue for Submission	CNB	AJL

© Cardno. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Cardno.

This document is produced by Cardno solely for the benefit and use by the client in accordance with the terms of the engagement. Cardno does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.

Table of Contents

Glossary of Terms	1
1 Introduction and Background	3
1.1 The Project	3
1.1.2 Site Description	3
1.1.3 Existing Land Use	3
1.2 Assessment and Approval Process	6
1.3 Purpose and Structure of this Report	6
1.4 Need for the Project	9
1.4.1 How would the project satisfy this need?	9
1.5 Key Findings of the Environmental Impact Statement	9
1.5.1 Benefits of the project	9
1.5.2 Impacts of the project	10
2 Consultation	11
2.1 Consultation Overview	11
2.2 Environmental Impact Statement Exhibition	12
2.3 Future Consultation	13
3 Response to Agency Submissions	14
3.1 Overview of Agency Issues Raised	14
3.2 Environmental Protection Authority	15
3.2.1 Secretary's Environment Assessment Requirements	15
3.2.2 EPA Licencing	15
3.2.3 Approved Project MP08_0083 as Modified	15
3.2.4 Air Quality and Odour Management	16
3.2.5 Noise and Vibration	22
3.2.6 Water Quality	24
3.2.7 Traffic and Transport	28
3.3 NSW Department of Planning and Environment	31
3.3.1 Stage 1A	31
3.3.2 Hazard and Risk	31
3.4 Department of Primary Industries	35
3.4.1 Groundwater Encounters	35
3.5 Office of Environment and Heritage	36
3.5.1 Flood Risk	36
3.5.2 Biodiversity Assessment Offsetting	36
3.5.3 Aboriginal Cultural Heritage	36
3.6 Roads and Maritime Services	38
3.7 SafeWork NSW	39
3.8 Illawarra Shoalhaven Local Health District – Public Health Unit	42
3.8.1 Human Health Risk Assessment	42
3.8.2 Air Quality	42
3.8.3 Noise and Vibration	43
3.8.4 General Hazard	43
3.9 Fire and Rescue NSW	45
3.10 Wollongong City Council	46
3.10.1 Traffic matters	46
3.10.2 Environmental Matters	47

3.10.3	Stormwater/flooding matters	47
3.10.4	Conclusion	49
4	Response to Stakeholder Submissions	50
4.1	Overview of Stakeholder Issues Raised	50
4.2	GrainCorp	50
4.2.1	General	50
4.2.2	Staging Approval	50
4.2.3	Business Impact	51
4.2.4	Proximity of Flammable Tanks and Bunds to Other GrainCorp Assets	52
4.2.5	Lease	53
4.2.6	Traffic	54
4.2.7	Construction	55
4.2.8	Concluding Remarks	56
4.3	Port Kembla Coal Terminal	57
5	Minor Project Changes and Confirmation of Scope	59
5.1	Minor Project Changes	59
5.2	Development Stages	59
5.2.1	Stage 1A	59
5.2.2	Stages 1, 2 and 3	59
5.3	Proposed Site Construction	61
5.3.1	Proposed Construction Activities	61
5.3.2	Construction Staging	61
5.4	Proposed Site Operations	61
5.4.1	Hours of Operation	61
5.4.2	Proposed Throughput	61
5.4.3	Maintenance and Other Minor Works	62
6	Revised Environmental Mitigation Measures	63
7	References	70

Appendices

Appendix A	Consultation
Appendix B	Air Quality and Greenhouse Gas Response
Appendix C	Noise and Vibration Response
Appendix D	Human Health Risk Response
Appendix E	Preliminary Hazard Assessment Response
Appendix F	Best Practice Review – Diesel Vehicles

Tables

Table 1-1	Key features of the project	3
Table 1-2	Site Allotments	3
Table 2-1	Environmental impact statement public display locations	12
Table 3-1	Estimated Daily Throughputs for Petroleum Products	28
Table 3-2	SafeWork NSW Comments within the SEARs	39

Table 5-1	Estimated Annual Throughputs for Petroleum Products	62
Table 6-1	Summary of Mitigation and Management Measures	64

Figures

Figure 1-1	Site Plan	4
Figure 1-2	Location Plan	5
Figure 1-3	State Significant Development Approval Process	8
Figure 4-1	Peak Traffic Generation for the Port Kembla Grain Terminal (GrainCorp, 2016).	55

Glossary of Terms

The table below provides a glossary of key terms and acronyms used within this document

Term or Acronym	Definition
ARI	Average Recurrence Interval
ASS	Acid Sulphate Soil
AQGGA	Air Quality and Greenhouse Gas Assessment
BoM	Bureau of Meteorology
CEMP	Construction Environmental Management Plan
Combustible Fuel	Any liquid, other than a flammable liquid, that has a flash point, and has a fire point that is less than its boiling point. e.g. diesel
DOI	Department of Primary Industries
DP&E	Department of Planning and Environment
DPF	Diesel Particulate Filters
DPI	NSW Department of Primary Industries (Fisheries)
EIS	Environmental Impact Statement
EP&A Act	Environmental Planning and Assessment Act 1979
EP&A Regulation	Environmental Planning and Assessment Regulation 2000
EPA	Environment Protection Agency (NSW)
EPBC Act	Environmental Protection and Biodiversity Conservation Act 1999 (Commonwealth)
EPL	Environment Protection Licence
ESCP	Erosion and Sediment Control Plan
ESD	Ecologically Sustainable Development
Flammable Fuel	Fuels, which give off a flammable vapour at temperatures of not more than 60.5°C or not more than 65.6°C, open cup test, normally referred to as the flash point. e.g. unleaded petrol. Class 3 flammable fuels are divided into 3 Packing Groups: - PG I—high danger; initial boiling point ≤35°C. - PG II— medium danger; flash point (closed cup) <23°C; initial boiling point >35°C. - PG III—low danger; flash point (closed cup) ≥23°C–≤60.5°C; initial boiling point >35°C.
FRNSW	Fire and Rescue NSW
GGBF	Green and Golden Bell Frog
GHG	Greenhouse Gas
HAZID	Hazard Identification
HAZOP	Hazard and Operability Study
HHRA	Human Health Risk Assessment
HRA	Health Risk Assessment
HSE	Health and Safety Executive
HSL	Health Screening Level
ICNG	Interim Construction Noise Guideline
ISLHD PHU	Illawarra Shoalhaven Local Health District – Public Health Unit
IFR	Internal Floating Roof
INP	Industrial Noise Policy
LFL	Lowest Flammability Level
LGA	Local Government Area

Term or Acronym	Definition
LoS	Level of Service
Manifold	Piped network allowing multiple inlet pipelines to interconnect with multiple outlet pipelines through a valved connection.
mAHD	Metres Australian height datum
MLA	Marine Loading Arm
NCA	Noise Catchment Area
NEPM	National Environment Protection Measure
NGA	National Greenhouse Accounts
NOW	NSW Office of Water
NP&W Act	<i>National Parks and Wildlife Act 1974</i>
OEH	Office of Environment and Heritage
OEMP	Operation Environmental Management Plan
OSD	On-site detention
PAC	Planning Assessment Commission
PFOA	Perfluorooctanoic acid (as related to firefighting foams)
PFOS	Perfluorooctane sulfonate (as related to firefighting foams)
PHA	Preliminary Hazard Analysis
PIRMP	Pollution Incident Response Management Plan
PK BLT	The proposed Port Kembla Bulk Liquids Terminal
PKCT	Port Kembla Coal Terminal
PKGT	Port Kembla Grain Terminal
PM	Particulate matter
POEO Act	Protection of the Environment Operations Act 1997
Port Authority	Port Authority of NSW
PPE	Personal protective equipment
PUC	Port Kembla User Council
QRA	Quantitative Risk Assessment
RMS	Roads and Maritime Services
SEAR's	Secretary's Environmental Assessment Requirements
Shore line	Shore line is the term used to refer to the shore pipelines from Berth 104 area to both Site 1 and Site 2. The three MLAs connect to three individual shore lines. Provision has been made for installation of a future fourth shore line between B104 and Site 2 in conjunction with a fourth MLA.
SSD	State Significant Development
SWMP	Soil and Water Management Plan
TEC	Threatened Ecological Community
TIA	Traffic Impact Assessment
TQ	TQ Holdings Australia Pty Ltd
VOCs	Volatile organic compounds
VRU	Vapour Recovery Unit
WHS Act	Work Health and Safety Act 2011

1 Introduction and Background

1.1 The Project

TQ Holdings Australia Pty Ltd (TQ) propose to establish the Port Kembla Bulk Liquids Terminal (PK BLT) (the Site) at the Inner Harbour of Port Kembla, within the Wollongong local government area in NSW. This will comprise a bulk liquids terminal for the importation and distribution of finished fuel products. The key features of the project is presented in **Table 1-1**.

Table 1-1 Key features of the project

Feature	Description
Site 1 - Combustible and flammable bulk liquids storage and pump bay.	Capacity to store product in storage tanks pumped to Site 1 via Site 2 manifold.
Site 2 - Combustible and flammable bulk liquids, pump bay and truck loading facilities.	Location of product storage tanks connected to B104 via shoreline pipes. Single, rigid and B-double tankers will be filled with a variety of liquids and will exit via Tom Thumb Road security gatehouse to the road network external to the port precinct.
Site 3 - Site control room & office block, maintenance workshop and utilities.	Facilities to monitor and control the status of all terminal operations, including tank levels, product receipts and transfers, and truck out loading operations.
Berth 104 – Bulk liquids unloading facilities.	Berth utilised by both TQ and GrainCorp. Bulk liquids will be received and transferred via four Marine Loading Arms (MLA's) from ships. Shoreline pipes will transfer bulk liquids to Site 2 storage tanks. All required fixed ship unloading equipment will be located within the existing operating envelope of Berth 104.

1.1.2 Site Description

The site, comprising four lots, is located in the Inner Harbour of Port Kembla, within the Wollongong LGA. TQ has a long-term lease over the land from NSW Ports, which includes non-exclusive access and use of Berth 104. Refer to **Figure 1-1** for a locality plan.

The land allotments and zoning is shown in **Table 1-2**, with the site descriptions identified below.

Table 1-2 Site Allotments

Description	Part Lot No.	Deposited Plan (DP)	Zoning (Three Ports SEPP, 2013)	Approximate Area (ha)
Site 1	2	1125445	SP1 – Special Activities	1.8
Site 2	301	1148391	SP1 – Special Activities	4.139
Site 3	11	1182111	SP1 – Special Activities	0.367
Berth 104	70	1182824	SP1 – Special Activities	0.91

1.1.3 Existing Land Use

Sites 1, 2 and 3 are undeveloped, although earthworks comprising grading have been undertaken previously, which will minimise bulk earthworks required. Berth 104 services grain facilities and bulk liquids storage facilities that are owned and operated by GrainCorp. The proposed development site is situated amongst a range of existing heavy industry, port and associated logistical operations.



Legend

Project Site (7.22 ha)

Cadastre (LPI, 2015)

Site #	Lot / DP	Area (ha)
Site 1	2 / 1125445	1.80
Site 2	301 / 1148391	4.14
Site 3	11 / 1182111	0.37
Berth 104	70 / 1182824	0.91
		7.22



FIGURE 1-1

1:2,500 Scale at A3

Metres

0255075100

Site Plan

PORT KEMBLA



Cardno

Map Produced by Cardno NSW/ACT Pty Ltd (WOL)

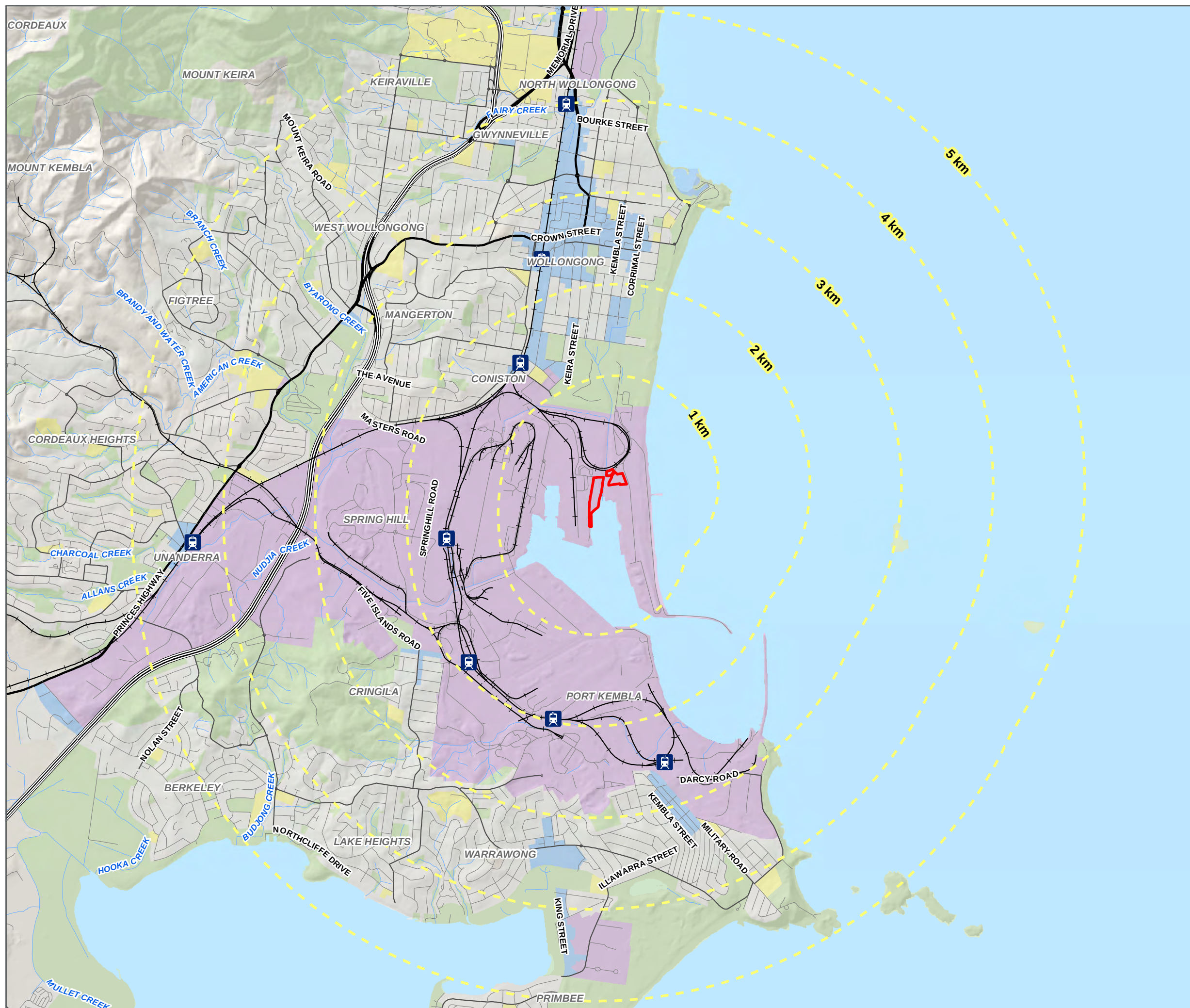
Date: 2016-02-29

Coordinate System: GDA 1994 MGA Zone 56

Project: 82015103-01

Map: 8201510305-GS-001-SitePlan.mxd 01

Aerial imagery supplied by nearmap (January, 2015)



Location Plan

PORT KEMBLA

Legend

- Project Site
- Railway Stations
- Railway
- Motorway
- Primary Road
- Distributor Road
- Local Road
- Watercourses
- Land Use (ABS, 2011)**
- Commercial
- Education
- Industrial
- Parkland
- Residential
- Water

FIGURE 1-2

1:40,000 Scale at A3



Map Produced by Cardno NSW/ACT Pty Ltd (WOL)
Date: 2016-03-01
Coordinate System: GDA 1994 MGA Zone 56
Project: 82015103
Map: 8201510305-GS-002-LocationPlan.mxd 01

1.2 Assessment and Approval Process

TQ is seeking project approval for the PK BLT under Part 4 (State Significant Development (SSD)) of the *Environmental Planning and Assessment Act 1979* (EP&A Act).

Section 89C of the EP&A Act identifies SSD, which due to their size or level of impact are potentially of State significant. Subject to Section 89C(2):

“A State environmental planning policy may declare any development, or any class or description of development, to be State significant development”.

The Project is defined as a SSD as it meets the requirements of *State Environmental Planning Policy (Three Ports) 2013* (Port SEPP), Clause 27. Furthermore, the Project also satisfies the criteria for SSD under Schedule 1, Clause of *State Environmental Planning Policy (State and Regional Development) 2011* (State and Regional SEPP).

Section 78(A) (8A) of the EP&A Act requires an SSD application to be accompanied by an EIS, with Schedule 2 of the EP&A Regulation identifying the EIS requirements.

The approval process under part 5.2 of the *Environmental Planning and Assessment Act 1979* is illustrated in **Figure 1-3**. Further information on the assessment process is available on the Department of Planning and Environment (DP&E) webpage (<http://www.planning.nsw.gov.au/>).

The process to date has included the following

1. Environmental Scoping Assessment submitted as part of request for SEARs 8 September 2015.
2. SEARs for the Port Kembla Bulk Liquids Terminal (SSD 7264) were provided 10 October 2015
3. Completion of the EIS and Stakeholder consultation
4. EIS submitted on 7 December 2015
5. The EIS was on public exhibition from 11 December 2015 to 29 January 2016
6. Submissions were received from the key stakeholders and various agencies
7. Due to the receipt and consideration of a late submission by Wollongong City Council and required submission response reviews by NSW Ports who also need to provide endorsement to lodge, DP&E were advised that this report could not be submitted within the standard 21-day response timeframe.

The purpose of this report is to provide a consolidated response to all submissions to allow DP&E to complete their final assessments for the proposal.

1.3 Purpose and Structure of this Report

During the exhibition of the environmental impact statement, 12 submissions were made from a range of agency and operational stakeholders. The Secretary of the Department of Planning and Environment provided copies of the submissions to TQ. This document comprises the Response to Submissions Report for the project. It has been prepared in accordance with the requirements for state significant development under Part 4.1 and section 115Z (6) of the *Environmental Planning and Assessment Act 1979*. Section 115Z (6) provides that:

The Director-General may require the proponent to submit to the Director-General:

- a) a response to the issues raised in those submissions, and*
- b) a preferred infrastructure report that outlines any proposed changes to the State significant infrastructure to minimise its environmental impact or to deal with any other issue raised during the assessment of the application concerned.*

TQ, as the proponent of the project, has prepared this Response to Submissions Report, as requested by the Director Industry Assessments in a letter to TQ dated 10th February 2016, to respond to issues raised in submissions received during the exhibition of the environmental impact statement.

This Response to Submissions Report has the following structure:

- > **Section 1** provides a background to the project, reiterates why the project is needed, describes the planning approval process, reviews the key findings of the environmental impacts statement and outlines the purpose of the response to submissions report
- > **Section 2** outlines the consultation activities carried out after the public exhibition of the environmental impact statement
- > **Section 3** set out the issues raised in agency submissions to the environmental impact statement and presents responses to those issues
- > **Section 4** sets out the issues raised in the stakeholder submissions to the environmental impact statement and presents responses to those issues
- > **Section 5** identifies other minor project changes and confirmation of scope
- > **Section 6** presents safeguards and mitigation measures for the project, revised to address issues raised during public exhibition of the environmental impact statement.

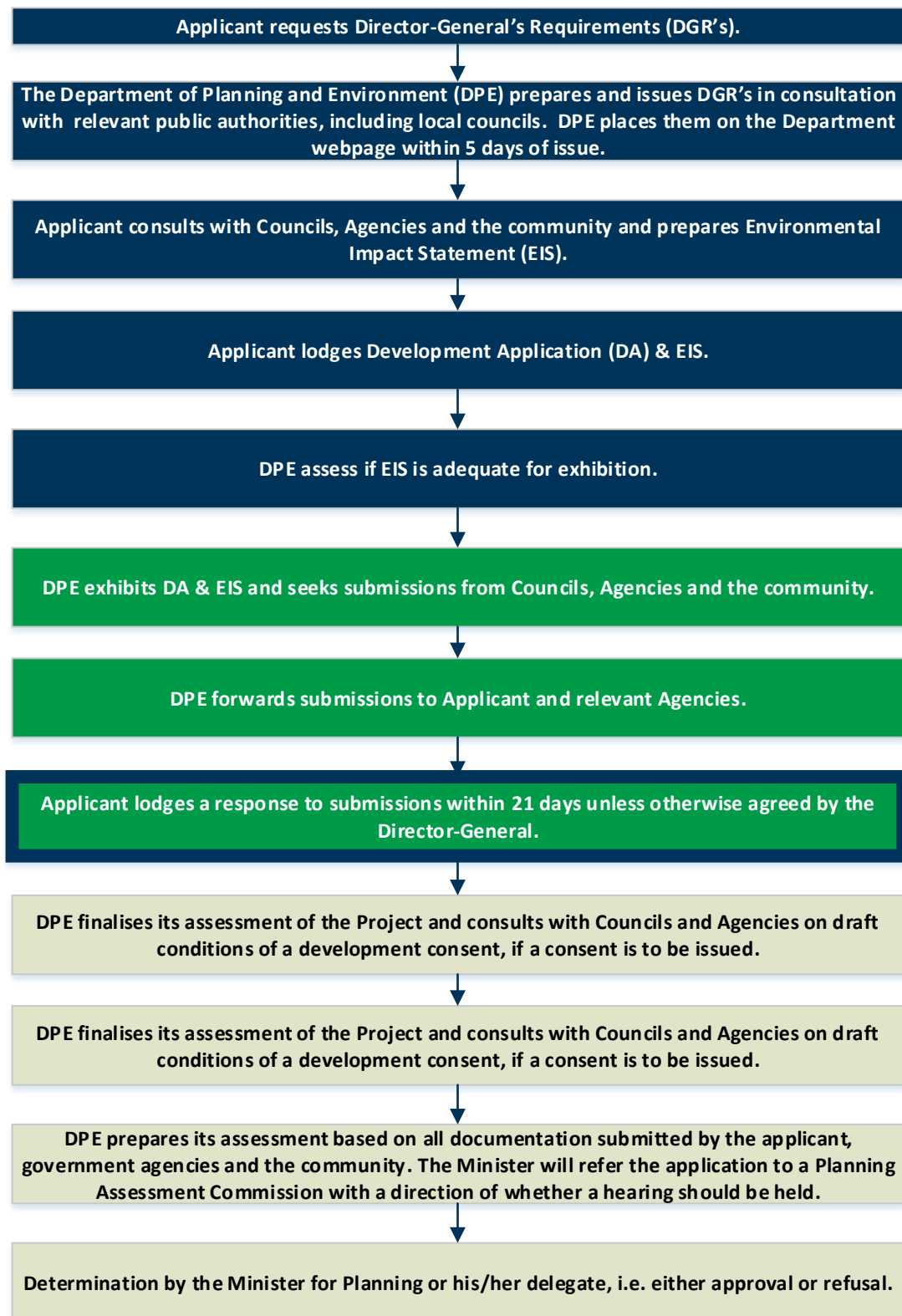


Figure 1-3 State Significant Development Approval Process.
The current stage of lodgment is outlined in blue.

1.4 Need for the Project

TQ has determined that the previously approved development (MP 08_0083) is no longer viable having regard to the changing long-term market conditions for soybean crushing and biodiesel production. The recent decline and cessation of fuel refining in NSW and the ongoing need for the State to have a secure and diverse fuel supply network has created a strong market demand for fuel storage facilities for both conventional petroleum and renewable fuel products (URS, 2014).

Australia as a member of the International Energy Agency is required to maintain petroleum reserves equivalent to 90 days of the previous year's imports. Australia has not met this obligation for some time, which has increased its vulnerability to oil supply shocks.

1.4.1 How would the project satisfy this need?

The now proposed PK BLT facility would allow TQ to contribute to meeting the growing demand for fuel products in the Illawarra, central and southern NSW. It will also provide a new petroleum storage capacity to assist Australia to help meet its international obligations. The TQ site is located in close proximity to port infrastructure and key growth areas, reducing truck journey lengths and associated costs, as well as the environmental impact of transporting fuel to end users. The existing road network provides for the rapid transfer of materials to and from the site and nearby port facilities, with minimal disruption to local roads.

The location of the PK BLT on portside land, adjacent to existing terminal facilities ensures that the proposal is compatible with other developments in the immediate area. The proposed development is also consistent with approved development in terms of the storage and handling of bulk quantities of flammable and combustible liquids (biodiesel, methanol, hexane, NM30), and the unloading of bulk liquids from berth 104, as previously approval was granted, to bring in methanol and biodiesel via incoming vessels. Furthermore, the process would not likely create any environmental impacts that cannot be appropriately managed through on site mitigation measures.

The Illawarra Regional Strategy (DoP, 2006) and the *NSW Freight and Ports Strategy* (TfNSW, 2013) highlights the changing nature of Port Kembla by suggesting:

- > Port Kembla as the site of a future biodiesel terminal
- > Freight tasks are being relocated from Sydney to Port Kembla including car imports
- > A number of long-term fuel refineries and terminals based in Sydney are in the process of closing due to their age and international competition.

The proposed PK BLT facility meets a number of key strategic objectives for the region and the Wollongong LGA and is consistent with the projected role of Port Kembla as identified in the *The Illawarra Regional Strategy* (DoP, 2006), *NSW Freight and Ports Strategy* (TfNSW, 2013) and *Navigating the Future: NSW Ports 30 Year Master Plan* (NSW Ports, 2015).

1.5 Key Findings of the Environmental Impact Statement

1.5.1 Benefits of the project

The main beneficial outcomes of the project include:

- > Meeting the growing energy needs of both NSW and Australia through the provision of bulk liquids import capacity and storage
- > Providing local employment opportunities without affecting the amenity of the surrounding area
- > Reduced truck journey lengths, transport emissions and associated costs due to the close proximity of the proposal to existing port infrastructure and a known customer base in the Illawarra region
- > Provision of a higher level of land use for the underutilised site as identified by the *Navigating the Future: NSW Ports 30 Year Master Plan* (NSW Ports, 2015)
- > Delivering a PK BLT facility on land that is suitable for the proposed activity be developed and managed to ensure appropriate environmental outcomes.

1.5.2 Impacts of the project

The EIS has identified and thoroughly assessed the expected impacts of the PK BLT project. A number of potential environmental impacts from the project have been avoided or reduced during the assessment of alternatives and development of the concept design for the project. The residual impacts identified during construction and operation will be managed through the application of appropriate environmental mitigation measures outlined below in **Section 6**.

Potential impacts include:

- > Hazards associated with bulk storage and transportation of flammable and combustible material, including spills, fires and explosions
- > Generation of dust during construction
- > Emissions during operation from tanks resulting in odour impacts and reduced local air quality
- > Noise and vibration impacts to sensitive receptors during construction that exceed background levels
- > Damage to surrounding buildings and infrastructure, as well as disturbance of sensitive residential receivers from vibration during construction
- > Safety issues arising from existing road conditions
- > Construction related traffic delays to road users and impacts to local transport operations
- > Operational related traffic delays to road users and impacts to local transport operations
- > Release of sediment laden and contaminated run-off with the potential to impact on surrounding water quality during construction
- > Release of sediment laden and contaminated run-off with the potential to impact on surrounding water quality during operation
- > Spills and leaks to surface waters
- > Release of contaminated material or sediments to the environment during construction earthworks
- > Exposure of construction personnel to contaminated material
- > Waste generated during construction and operations
- > Potential impacts on the Green and Golden Bell Frog (GGBF), and any other threatened species listed under State and Commonwealth Legislation. The GGBF was previously recorded near the site and can occupy highly modified environments
- > Potential impacts from construction on Coastal Salt marsh, a threatened ecological community listed under State legislation. Impacts on this Threatened Ecological Community (TEC) may be associated with the release of sediment laden/contaminated runoff
- > Impacts to Aboriginal heritage items and areas during construction
- > Greenhouse Gas emissions during construction associated with construction activities on site and transport to and from site
- > Greenhouse Gas emissions during operations associated with electricity consumption and transport for staff and bulk liquid product
- > Reduction in the quality of the surrounding landscape character as a result of construction and operation.

2 Consultation

2.1 Consultation Overview

The Secretary's Environmental Assessment Requirements (SEARs) issued by the NSW Department of Planning and Environment requested TQ consult with various project stakeholders (See Table 9-1 of the EIS for a list of requested stakeholders).

TQ developed a stakeholder consultation strategy to enable transparent, open and honest communications with key stakeholders. TQ also committed to ongoing consultation to ensure any issues or concerns are adequately addressed through the planning, approvals, detailed design, certification, construction and operational phases of the proposed PK BLT development.

Extensive consultation was carried out during the preparation of the EIS. Key consultation activities included:

- > **Consultation with agency stakeholders:** Meetings were held with key industry stakeholders as well as state and local government agencies. The key agency consultation was the planning focus meeting held on 29 January 2015.
- > **Direct phone liaison with NSW Health:** The NSW Deputy Director, Public Health Unit was contacted by phone to inform NSW Health of the PK BLT proposal and to obtain relevant contacts for future liaison in relation to the project. The initial contact occurred on 27 October 2015. NSW Health was later provided a briefing letter explaining how to access detailed information relating to the project.
- > **Consultation with NSW Ports:** NSW Ports was consulted during at all stages of the PK BLT project and TQ will continue to consult with them as the land manager and key operational stakeholder. The initial consultation occurred on 28 November 2014.
- > **Presentation at Port Kembla User Council (PUC):** TQ attended PUC where TQ gave a PK BLT project presentation to the general PUC audience. This meeting was held on 22 October 2015.
- > **Consultation with Port Authority of NSW (Port Authority):** Meetings were held with the Port Authority to discuss berthing and unloading arrangements for Berth 104. The key consultation occurred on 9 March 2015.
- > **Consultation with Port Kembla Coal Terminal (PKCT):** Meetings were held with Port Kembla Coal Terminal with the key consultation meeting held on 14 August 2015. TQ has committed to continue discussions with PKCT to ensure risks at the PKCT site are acceptable.
- > **Consultation with GrainCorp:** A brief teleconference was held with GrainCorp followed by their attendance at PUC held on 22 October 2015 where TQ gave a presentation on the PK BLT project.
- > **Consultation with Port Kembla Pollution Group:** A meeting was held with representatives of the Port Kembla Pollution Group on 5 November 2015 where TQ provided an overview of the project. The group raised concerns relating to potential vapour emissions however, the group was satisfied with the mitigation measures outlined by TQ.
- > **Briefing documents:** An introductory letter providing a brief outline of TQ Holdings Australia and the PK BLT project was provided to WCC, NSW Member of the Legislative Assembly, Member for Wollongong (Ms Noreen Hay), Senator Concetta Fierravanti-Wells and Federal Member of Parliament for Cunningham (Hon. Sharon Bird) on 25 August 2015. A subsequent meeting was held with Lord Mayor of Wollongong (Hon. Gordon Bradbery OAM) and the General Manager of Wollongong on 28 September 2015 to provide an overview of the project.

Summaries of the issues raised during the consultation process for the project by government agencies, local government, the community, and special interest groups are detailed in Section 9 of the EIS.

2.2 Environmental Impact Statement Exhibition

The EIS was publicly exhibited by the Department of Planning and Environment between 11 December 2015 and 29 January 2016. The EIS was made available on the Department's webpage and at three locations as listed in **Table 2-1**.

Table 2-1 Environmental impact statement public display locations

Location	Address
Department of Planning and Environment	23-33 Bridge Street, Sydney
Department of Planning and Environment, Wollongong Regional Office	Level 2, 84 Crown Street, Wollongong
Wollongong City Council, Customer Service Centre	41 Burelli Street, Wollongong

TQ undertook a range of additional consultation activities during and after the exhibition period, which included:

- > Port Kembla Coal Terminal – Meeting held on 18 December 2015 to discuss potential hazard affectation.
- > SafeWork NSW – Meeting held on 12 January 2016 with the Illawarra representatives to introduce project and discuss future requirements from SafeWork NSW.
- > EPA – Meeting held on 14 January 2016 to provide a PK BLT project overview.
- > SafeWork NSW – Meeting held on 19 January 2016 with the MHF group to introduce project and discuss future requirements from SafeWork NSW.
- > NSW Ports – A number of meetings held to discuss leasing and various detailed design requirements on utilities, stormwater and other infrastructure requirements.
- > Port Kembla Harbour Environment Group – attended the regular Port Kembla Harbour Environment Group meeting on 3 February 2016 and provided a PK BLT project presentation to the general audience.
- > FRNSW – Meeting 10 February 2016 to provide a project background and discuss the Fire Safety Study requirements.
- > EPA – Meeting held on 23 February 2016 to review the EIS submission items in order to prepare the RTS report.
- > EPA – Meeting held on 25 February 2016 to present the TQ investigation into VRU standards and proposal for the TQ VRU emission limit.
- > GrainCorp – Meeting held on 1 March 2016 to discuss potential hazard affectation and review all items raised in the EIS submission.
- > SafeWork NSW – Meeting held on 16 March 2016 with the MHF group to introduce project and discuss future requirements from SafeWork NSW.
- > Port Kembla Coal Terminal – Meeting held on 17 March 2016 to discuss EIS submission response and potential hazard affectation.

Letters from additional consultation with PKCT and GrainCorp undertaken during the post-exhibition period are included within **Appendix A**.

2.3 Future Consultation

TQ is committed to ensuring direct engagement with key stakeholders to ensure compliance with relevant legislation and to inform the detailed design, planning and future management phases of the project. TQ will continue to liaise with the following key stakeholders as minimum, with other stakeholders involved as required:

- > Department of Planning and Environment
- > Department of Primary Industries (as required in event of groundwater encounters)
- > NSW Ports
- > Port Authority of NSW
- > GrainCorp
- > Port Kembla Coal Terminal
- > Environmental Protection Authority
- > Office of Environment and Heritage
- > Roads and Maritime Service (as required for any oversize or over-mass vehicle permitting)
- > SafeWork NSW; and
- > Fire and Rescue NSW.

3 Response to Agency Submissions

Submissions were received from eight government agencies (or advisory bodies), including the following agencies:

- > Environmental Protection Authority
- > NSW Department of Planning and Environment
- > Department of Primary Industries
- > Office of Environmental and Heritage
- > Roads and Maritime Services
- > SafeWork NSW
- > Illawarra Shoalhaven Local Health District – Public Health Unit
- > Fire and Rescue NSW
- > Wollongong City Council.

3.1 Overview of Agency Issues Raised

Responses to government agency submissions are provided in **Section 3**. Issues raised by the government agencies generally relate to their respective statutory responsibilities such as:

- > Department of Planning and Environment: Statutory, planning and environmental assessment requirements.
- > Environmental Protection Authority: Issues primarily relate to management of air quality, water quality, traffic and transport, and noise and vibration impacts.
- > Department of Primary Industries: Ground water management.
- > Office of Environment and Heritage: Biodiversity, and aboriginal heritage impacts.
- > Roads and Maritime Services: Traffic and related community impacts and permit requirements.
- > Illawarra Shoalhaven Local Health District – Public Health Unit: Human health risk, air quality, noise and vibration and general hazards.
- > SafeWork: Fire safety, major hazardous facility (MHF) and general work health and safety requirements.
- > Wollongong City Council: Flooding, traffic, environment and infrastructure.

3.2 Environmental Protection Authority

3.2.1 Secretary's Environment Assessment Requirements

Issue

The EPA provided its Secretary's Environmental Assessment Requirements (SEARs) for the preparation of an EIS in a letter to the DPE dated 30 September 2015. The EIS does not appear to have fully addressed all of its requirements. Some but not all of the following comments relate to the EPA's key assessment requirements. The EPA recommends that the requirements of this letter should be fully addressed. A copy of this letter can be provided on request.

Response

The EPA submission within the SEARs has been reviewed. Outstanding issues identified in this letter are detailed in the sections below and are addressed in these subsequent sections.

3.2.2 EPA Licencing

Issue

TQ does not currently hold a licence under the Protection of the Environment Operations Act 1997 (POEO Act) for the premises. Schedule 1 of the POEO Act contains a full list of activities that require a licence. Scheduled activities that that could be accommodated under this proposal include, but are not limited to, chemical storage and shipping in bulk.

Should development approval be granted, TQ Holdings will need to apply for a licence for work that is designed to enable a scheduled activity to be carried on (scheduled development work). Once scheduled development work is completed, TQ Holdings will then need to apply for a licence variation to authorise scheduled activities to be carried out.

Response

TQ recognise the need to obtain an Environmental Protection Licence (EPL) under the Protection of the Environment Operations Act 1997 (POEO Act) for both the construction and operational stages of the project. Following formal approval of this project TQ will begin consultation with the Environmental Protection Authority (EPA) to begin the process of obtaining an EPL for the project.

3.2.3 Approved Project MP08_0083 as Modified

Issue

The EPA requests that DPE provide a consolidated consent of MP08_0083 (as modified) which clearly details only those conditions of consent and statement of commitments, which relate to the storage and distribution component.

The EIS states that TQ obtained endorsement from DPE on 21 January 2015 for its staging plan. The EPA also requests a copy of this staging plan and endorsement from DPE to inform any future licensing requirements.

Response

TQ no longer proposes to commence construction under the existing planning approval MP08_0083. The entire project will now be developed under the new SSD-7264 consent conditions.

TQ assumes the Staging Report and subsequent endorsement from DPE have been provided to EPA by DPE as requested.

3.2.4 Air Quality and Odour Management

3.2.4.1 *Construction*

Issue

Dust emissions from the construction phase of the proposed Project have the potential to cause environmental impact. The EIS states that dust management will be addressed and incorporated into the Proponent's Construction Environmental Management Plan (CEMP). Dust mitigation measures must be incorporated into the proposed CEMP to ensure effective measures are implemented during all construction activities. If approved, the CEMP should support any application for a scheduled development work licence.

Response

This comment is noted. The Air Quality Management Plan which will be developed as part of the project CEMP will be utilised as part of the EPL process as well as for on site management of construction activities.

3.2.4.2 *Assessment of Additional Emissions Sources*

Issue

The Air Quality and Greenhouse Gas Assessment (AQGGA) estimates VOC emissions from tank venting and breathing losses and emissions from the Vapour Recovery Unit (VRU) servicing road tanker load out. The AQGGA does not include emission estimates for other sources. It is stated that 'fugitive emissions associated with filling the shorelines and transfer lines, initial filling of volatile storage tanks up to the internal floating roof working level, and leakages and spills are expected to be minor and temporary. Thus, these potential emission sources are not considered further in the modelling.'

The EPA notes that VOCs emissions from tank breathing losses and from truck loading activities have been modelled and presented separately rather than for the project site as a whole.

In addition, the proposed Project throughput has not been contextualised with other major industrial sources of VOCs in close proximity.

The AQGGA states that 'in view of the adjacent land uses, it is not anticipated that there will be significant concentrations of VOCs that should be considered on a cumulative basis. In any event, the EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales (EPA. 2005) (EPA's Approved Methods) does not require the evaluation of cumulative impacts (that is, addition of existing ambient concentrations) for the assessment of VOCs and air toxics. Rather, these parameters are evaluated in terms of their incremental contribution. For this reason, it has not been deemed necessary to conduct background monitoring of ambient concentrations of VOCs/air toxics.'

The EPA advises that incremental assessment (project contributions only) are applicable where it can be reasonably demonstrated that existing ambient levels are low and there are no other significant emission sources in close proximity to the proposed Project which emit the same substances. Based on other sites and activities undertaken between the proposed Project and nearby receptors, there are likely to be other emission sources that also contribute to potential localised air quality impacts.

No comprehensive assessment characterising the potential impacts from all emissions associated with other major VOC sources in the locality of the proposed Project is available for the EPA's review.

The AQGGA should be revised to comprehensively characterise and assess emissions associated with the proposed Project as a whole, in conjunction with other emission sources located in close proximity to the proposed Project. Where toxic air pollutants are emitted from other sites, in significant quantities and in close proximity to the proposed Project, these additional emissions should be assessed on a cumulative basis.

Sources of information on emissions in the Illawarra include, but may not be limited to:

- Air Quality Trends in the Illawarra (OEH, 2015), available at: www.epa.nsw.gov.au/esd/smoky/illawarraair-quality.htm
- The NSW Air Emissions Inventory - information on natural and human-made sources of air emissions, available at: www.epa.nsw.gov.au/air/airinventory.htm
- The NSW air quality monitoring network - continuous, high quality measurements of air pollutant concentrations at Wollongong, Kembla Grange and Albion Park South, available at: www.environment.nsw.gov.au/laqmslaqi.htm
- National Pollutant Inventory - information on emissions reported annually by industrial facilities, available at: www.npi.gov.au
- Particle speciation and source apportionment studies - sampling of particles and analysis of their composition by ANSTO at Warrawong, available at: www.research-data.ansto.gov.au/collection/401
- National shipping air emissions inventory - an inventory of ship engine exhaust emissions and fuel consumption in Australian ports, available at: www.epa.nsw.gov.au/resources/epa/presnexhaustemissions.pdf; and
- Industry air quality monitoring - the EPA requires a number of industries in the Illawarra to conduct air quality monitoring as a condition of their environment protection licence. Each licence is available on the EPA's public register at: www.epa.nsw.gov.au/prpoeoapp/, with monitoring requirements generally contained in Condition 'M2'. As well as monitoring their emissions, an EPA licence holder may be required to monitor the surrounding ambient air, to measure the pollutant concentration in the existing environment plus pollutants emitted from their activity. Across the Illawarra, there are approximately 110 industry ambient air quality monitoring stations operating as a result of a licence condition. Licence holders who undertake ambient air quality monitoring under a licence condition must make pollution monitoring data available in response to a specific request.

Response

An additional review of existing background air quality in the region of Wollongong / Port Kembla has been completed by Pacific Environment Limited and has been included in **Appendix B**. The review identified that the predicted Project emissions make up less than 1 percent of the existing industrial emissions of the air quality metrics evaluated (excluding toluene which is below 3 percent). Based on this result, the proposed increase in atmospheric emissions resulting from the project is not expected to significantly impact on the regional atmospheric environment.

The BlueScope Steel facility adjacent to the site is identified as relevant in response to this issue as it is a significant industrial source of NO_x, VOC and SO₂ emissions. As stated in the *Air Quality Trends in the Illawarra* publication (EPA, 2015), the BlueScope Steel facility is the only industrial facility with a significant ambient air quality monitoring network evaluating parameters relevant to the Project. This facility contributed 52% (121 tonnes/year) of VOC emissions to the National Pollutant Inventory reported industrial emissions in the Illawarra (as opposed to the predicted contribution of the proposed PK BLT of 2.6 tonnes per year).

Due to this contribution, data from the Blue Scope Steel's December 2015 monthly air quality report was utilised in **Appendix B** to determine that based on existing emission levels the OEH air quality impact assessment criteria or the NEPM air toxic investigation levels for these compounds are not exceeded. These levels account for less than 5% of the relevant EPA criteria and as such adding 5% of each criteria stated for each VOC presented will conservatively account for existing background air quality in the region.

3.2.4.3 Specification of Fuel

Issue

The US EPA TANKS software program has been used to estimate total VOCs emissions from the storage tanks for each fuel type to be stored at the proposed Project. Storage tank emissions have been speciated into hydrocarbons of interest using the US EPA's SPECIATE software.

Where possible, tank emissions should be characterised based on measured vapour phase speciation data for each product (mixture) as products can vary between refiners/markets. The speciation profile used must also reasonably reflect Australian fuel characteristics and standards. For example, the speciation profile used for unleaded petrol in the assessment assumes 0.755% benzene whereas it could be as high as 1% as per Australian fuel standards.

The Proponent should obtain speciation profiles for the proposed products where possible and revise the AQGGA accordingly. If product specific profiles are not available, the Proponent must demonstrate that the US speciation profiles used in the assessment reasonably reflect products to be handled at the proposed Project.

Response

Section 1.4 of **Appendix B** identifies that the speciation profiles utilised in the Air Quality and Greenhouse Gas Assessment (Appendix E of the Project EIS) were from the US EPA SPECIATE database (US EPA, 2004). TANKS modelling selection utilised are represented in Table 3 of **Appendix B** with the 'PULP' fuel classification utilised as it is the worst case VOC/air toxics emissions profile for all the petroleum products expected to be imported to the terminal. The same approach was also taken for the ethanol fuel to be imported, where the conservative assumption to reference the 'PULP' emission profile was taken. The selection of 'PULP' within TANKS was made following an analysis of the Safety Data Sheets provided to Pacific Environment from TQ during the AQGHG Assessment. A similar approach was applied to the diesel products, where selection was based on the comparisons to the expected diesel fuel products and comparable speciation profiles. Based on this, the approach taken to select the US EPA's SPECIATE databases to represent all petrol and diesel fuel products is conventional.

Obtaining actual speciation profiles for the vapour components of the finished fuel products was not possible for the purposes of the assessment.

3.2.4.4 Assessment of Peak Impacts

Issue

Section 5.4 of the AQGGA indicates that the assessment was conducted on the assumption that emissions occur 24 hours per day, 365 days per year. Appendix A of the AQGGA provides a summary output of the emissions model (TANKS), which indicates emissions were estimated on an annual basis. Emissions rates applied to the dispersion model were grams per second. As such it is likely that annual emissions were smoothed evenly across the model year.

The EPA advises that smoothing emissions throughout the model year is not an appropriate assessment methodology when assessing peak 1-hour impacts from emissions that will vary temporally.

The AQGGA should be revised to ensure that peak emissions are assessed for the proposed Project and neighbouring emission sources, without smoothing based on annualised variables.

Response

Appendix B provides the response by Pacific Environment Limited in regards to the assumptions behind the emissions model. It is correct that the Air Quality and Greenhouse Gas Assessment (Appendix E of the Project EIS) assumed constant tank breathing emissions across the modelling year. To account for seasonal changes to emission rates the TANKS emission estimation software was utilised as described in **Appendix B**. Higher projected emissions occurring in the summer season were utilised in the dispersion model.

The impact of tank breathing and road tanker loadout occurring has been evaluated within a revised modelling exercise carried out as part of **Appendix B**. The revised modelling indicates that the road tank loader emissions result in maximum off-site impacts greater than those due to tank breathing based on tank loading occurring 24 hours a day (which is a highly conservative assumption). Including this assumption is still anticipated that there will not be any exceedances of the air quality criteria.

3.2.4.5 Representativeness of Model Meteorology is Not Adequately Demonstrated

Issue

The meteorological data used in dispersion modelling is of fundamental importance as it drives the transport and dispersion of the air pollutants in the atmosphere. For a detailed assessment, the EPA's Approved Methods requires site representative data to be correlated against a longer duration meteorological data set. Analysis of wind speed data between 2005 and 2009 at Bellambi and Wollongong Airport is provided.

The dispersion modelling was undertaken for the year 2009. It is stated that:- 'Long term wind speed analysis of Bellambi monitoring site shows that wind speeds from the years 2008 and 2009 fitted best with the long term averages;' and- 'It is noted that the Port Kembla Harbour automatic weather station (Site Number 68253) was commissioned post- 2009 and as such, this data was not able to be incorporated within the meteorological modelling. However, annual wind roses for this location compare well with the CALMET generated wind roses presented in Figure 6.4.'

The statistics as presented, do not confirm 2009 as a representative year for dispersion modelling. The EPA notes that the Port Kembla wind roses referred to in the report have not been provided. In addition, the statement that the 2008/2009 wind data best fits with long term averages is based on qualitative assessment alone.

The AQGGA should be revised to include the results of the analysis demonstrating year 2009 is a representative year.

Response

Pacific Environment Limited have provided justification for the meteorological data utilised in **Appendix B**. The year utilised for the assessment was chosen through a comprehensive review of five years of meteorological data. The year of data selected (2009) was chosen not because it was considered to be representative but more so it was no less representative than any other year which may have been selected. A comparison of wind-roses from the data in conjunction with observations from the Port Kembla NTC AWS site indicated that the data used is generally representative as demonstrated in **Appendix B**.

3.2.4.6 CALMET Model Evaluation Not Adequate

Issue

It is important to undertake an evaluation of the CALMET modelling results as the CALMET module requires careful consideration of input data, modelling domain, grid resolution, and the seven critical parameters (TERRAD, RMAX1, RMAX2, R1, R2, IEXTRP and BIAS).

The AQGGA presents a summary of the 2009 CALMET data extracted for Port Kembla.

Observed wind fields for Wollongong Airport are provided in the AQGGA as Appendix C. Observed wind fields for Port Kembla are not provided. Appendix C shows some potentially significant differences between modelled and observed wind fields. The AQGGA does not demonstrate the suitability of the CALMET generated data.

An adequate evaluation of the CALMET generated data is always important but particularly necessary where observational data assimilation requires the user to make 'several critical choices which can significantly affect the final outcome of the model runs.'

The AQGGA should be revised to include an evaluation of the CALMET generated meteorology data to demonstrate it is suitable for use in CALPUFF.

Response

Pacific Environment has provided further discussion on the basis of CALMET generated meteorology data in Section 1.10 and Table 6 of the AQGGA (see **Appendix B**). The recommended values provided have also been compared against those adopted in the AQGGA, in reference to the NSW Office of Environment and Heritage's publication *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia* (NSW OEH, 2011).

The additional assessment of the selected 2009 meteorological year (as provided in **Appendix B**) is considered to be generally representative of the metrological conditions at Port Kembla and hence the Project area.

3.2.4.7 **Assessment of Impacts at and Beyond Boundary of the Facility for Combined Project Emission Sources**

Issue

Stage three has been modelled to represent maximum throughput and emissions from the proposed Project. Results have been presented for Xylene, which had the highest emission rate of the VOCs entered into the model. The EPA notes:

- Predicted impacts from the storage tanks and truck loading operations have been presented separately- Total predicted impacts from the project have not been provided; and- Predicted impacts have been presented at the nearest non-industrial sensitive receptors and not at and beyond the boundary of the project premises as is required for air toxics and individual odorous pollutants such as xylene in the EPA's Approved Methods.

The EPA notes that one of the designated receptors is the entry/exit to the site and notes that predicted impacts at this receptor are at a minimum one order of magnitude above predicted impacts for the other non-industrial receptors for both the storage tanks and truck unloading operations. As such, a clearer indication of total combined tanks and VRU predicted impacts at and beyond the boundary of the proposed Project is required.

The AQGGA should be revised to include a summary of total predicted impacts for each of the modelled air toxics and individual odorous pollutants at and beyond the boundary of the premises in tabular format.

Response

As discussed in **Section 3.2.4.4** and Section 1.6 of **Appendix B**, the addition of conservative sources such as tank breathing and road tanker loadout is unlikely to result in any exceedances of the air quality criteria.

3.2.4.8 **Assessment of Odour Impacts at Nearest Sensitive Receptors**

Issue

As for air toxics, the predicted odour impacts have been provided at the nearest non industrial receptors to the Port Kembla port complex. Predicted impacts of 20U at the entrance to the proposed Project are anticipated. It is stated that it is considered valid to inspect the dispersion modelling contours presented to assess potential occupational exposures for those working outside the wider port complex, providing the maximum predictions presented are compared with occupational exposure criteria.

The EPA notes the EPA's Approved Methods defines sensitive receptors as 'a location where people are likely to work or reside' (underlined for emphasis). In addition, offensive odour provisions under Section 129 of the POEO Act apply at and beyond the boundary of scheduled premises. It is recommended that the assessment is revised to assess potential for impacts at and beyond the boundary to determine if management and mitigation options are required.

The Proponent should consider predicted odour impacts at and beyond the boundary of the facility, and, if required proposed odour mitigation measures.

Response

Appendix B details that additional receptor locations were added to the revised dispersion model to evaluate predicted impacts at and beyond the project boundary. The results indicate that the maximum odour concentrations will be greatest at the project boundary, though these results do not exceed the odour assessment criteria. Notwithstanding these results, an operational odour management plan has been included within the revised mitigation measures detailed in **Table 6-1**.

3.2.4.9 Justification for the Control Efficiency of the Proposed Vapour Recovery Unit

Issue

Under the Protection of the Environment Operations (Clean Air) Regulation 2010 (Clean Air Regulation) a vapour recovery or disposal system is required for large storage tanks in the Sydney, Newcastle or Wollongong Metropolitan Area where the volatile organic liquid to be stored has a vapour pressure of or below 75 kilopascals.

In section 5.6 of the AQGGA, it is stated that 'potential emissions from the VRU servicing the RTL were estimated using an assumption that the VRU will operate at all times during truck loading and will have a control efficiency adequate adsorb [sic] 99.5% of potential VOC emissions from this process.'

Emission parameters for the proposed VRU are claimed to be based on those provided in a prior AQGGA for a bitumen storage facility in Sydney, the SPECIATE based speciation profile and a recent journal article although specific calculations are not provided. The EPA notes that:

- Justification for the proposed control efficiency has not been provided. The EPA notes that the low predicted impacts from tank unloading operations are predicated on the VRU achieving high control efficiencies
- No supporting information such as performance specifications has been provided to demonstrate that the proposed VRU will meet the requirements of the Clean Air Regulation. Note, that the EPA considers that a contemporary VRU operating in a proper and efficient manner should be able to achieve significantly lower emissions than required under the regulation, and this level of performance is expected for a new facility; and
- No information is provided regarding how the VRU is proposed to be monitored to ensure high control efficiencies and compliance with Clean Air Regulation design and regulatory requirements.

The AQGGA should be revised to include additional information about the performance of the proposed VRU including, but not limited to, manufacturer's performance specifications and proposed monitoring regime

Response

Pacific Environment Limited has considered these comments in regards to the Air Quality and Greenhouse Gas Assessment (Appendix E of the Project EIS) and has provided responses to these comments accordingly in **Appendix B**. At the time in which the Assessment was written performance specifications for the vapour recovery unit (VRU) were not available. Since this time specifications have been provided for a VRU with carbon adsorption pressure swing technology and are detailed in **Appendix B**. This technology is used by all operating bulk fuel terminals within Australia and New Zealand (where an emissions control device is required). This is considered best practice for the project and will be designed to meet industry accepted emission limits as defined in **Appendix B**. These industry standards are 11 times lower than the *NSW Protection of the Environment (Clean Air) regulation 2010* (Regulation 63(6b)).

The VRU unit will be monitored through a prescribed regime consistent with test methods as per the *NSW Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* (EPA, 2005). The revised mitigation measures detailed in **Table 6-1** include the addition of these monitoring requirements.

3.2.4.10 Assessment of All Relevant Pollutants

Issue

Tables 4.1 and 4.2 of the AQGGA specify the impact assessment criteria for the pollutants assessed, including NO₂, SO₂, PM₁₀, Benzene, Toluene, Xylenes, Ethylbenzene and PAHs. The EPA notes:

- The annual criteria for NO₂, and the ten minute average and annual average criteria for SO₂ were not included in the table. It is unclear whether assessments were conducted for these averaging periods
- PM_{2.5} has not been included in the assessment. The EPA notes that while the NEPM reporting standard for PM_{2.5} was recently adopted in December 2015 an advisory reporting standard was in place at the time of preparation of the AQGGA; and
- There is no discussion as to whether an ozone impact assessment was required or not required utilising the EPA's tiered assessment framework guidance.

The Proponent should confirm whether NO₂ and SO₂ were assessed for all averaging periods. Justification needs to be provided regarding assessment of ozone and PM_{2.5}.

Response

Table 8 in **Appendix B** details the results of the combustion emissions from ship emissions for all averaging periods. The results indicate that there are not predicted to be any exceedances of the air quality criteria for the assessed combustion emissions from ships while they are at berth (unloading finished fuel products), for PM₁₀, PM_{2.5}, NO₂ or SO₂.

To evaluate the potential for regional ozone impact, the annual NO_x load was applied against the EPA's tier 1 screening tool (**Appendix B**). The results indicate that the impact of the project on potential increases on ozone is minor and well below the accepted criteria. Based on this, it is concluded that no further ozone assessment (Tier 2) is required.

3.2.4.11 Human Health Risk Assessment

Issue

The Human Health Risk Assessment accompanying the EIS relies upon information in the AQGGA. The Human Health Risk Assessment should be revised following the revision of the AQGGA.

Response

Based in the revised air quality modelling undertaken in **Appendix B**, the acute health risks associated with the peak 1-hour average concentrations have been revised and are included in **Appendix D**. The revised risk calculations indicate that all individual and cumulative exposures associated with the maximum 1-hour average increase in air concentrations surrounding the site are below the relevant acute health based guidelines.

3.2.5 Noise and Vibration

3.2.5.1 Construction Noise

Issue

The EIS states that construction may include piling of pre-cast driven concrete piles for tanks. The EIS does not contain any further information on any proposed piling. The EIS states that noise and vibration management will be addressed and incorporated into the Proponent's CEMP through the development of a Noise Management Plan. It is therefore important that additional information on any proposed piling be incorporated into the proposed CEMP.

Additional information to be addressed in the CEMP includes:

- Selection of the piling method

- Sufficient justification for the method selected
- Assess the feasibility of alternative quieter methods or equipment
- An assessment of piling noise in accordance with the Interim Construction Noise Guideline (DECC, 2009) available at <http://www.epa.nsw.gov.au/noise/constructnoise.htm>. If any high noise activities are to be undertaken, they should be factored into the quantitative assessment by adding 5 dB to the predicted levels
- An assessment of vibration in accordance with the Assessing Vibration: A Technical Guideline (DEC, 2006) available at <http://www.epa.nsw.gov.au/noise/vibrationguide.htm>
- A description of all feasible and reasonable measures to minimise noise and vibration impacts.

Past piling activities have proven to be annoying to occupants of nearby industrial premises in Port Kembla. The Proponent should consult with occupants of industrial premises prior to finalising the proposed CEMP. During construction, the Proponent should also regularly update the occupants of industrial premises regarding noise levels and hours of work. If approved, the CEMP should support any application for a scheduled development work licence.

Response

Noise and vibration issues raised have been addressed by Pacific Environment Limited and are included in **Appendix C**. At the time in which the EIS was written limited information existed on the proposed piling. This has now been provided and is included in **Appendix C**. The proposed piling method includes impact piling due to the ground conditions, however as the piles are reinforced concrete noise impacts will be reduced in comparison to steel piles.

An additional construction noise and vibration assessment has been undertaken for the piling stage (foundations) and is included in **Appendix C**. All industrial receivers were found to meet the construction noise criteria for industrial and commercial receiver. The predicted vibration levels were estimated based on a theoretical scenario and are expected to be conservative. Based on the results of the vibration assessment the risk of annoyance would be minimal at distances greater than 80m. As these results are indicative only these results should be validated through vibration trials during the initial piling works. **Table 6-1** includes the amended mitigation measures for the project including the use of vibration trials.

TQ are currently consulting with neighbouring industrial premises on a number of construction and operational issues and will continue to consult with these neighbours and NSW Ports during the development of the Construction Environmental Management Plan (CEMP).

3.2.5.2 Operation Noise

Issue

Considering the proposed Project location, the EPA presents the Proponent with two options in addressing the key issues where either clarification and/or additional information is required. These options include but are not necessarily limited to the following:

Option 1

That the Proponent commit to the project being designed, built and operated to not exceed an operational noise level of $LA_{eq(15min)}$ 36 dB at the nearest residential receiver during F class stability category conditions. TQ must also commit for the life of the project to not exceed maximum L_{eq} sound pressure levels, at one metre from each piece of equipment, of:

- 87 dBA for each of the four marine loading arms
- 94 dBA for the air compressor
- 92 dBA for each of the loading and product pumps; and
- BA for the vapour recovery unit pump.

Option 2

That the Proponent:

- Provides more detail to support noise monitoring results, such as:
 - noise logger model and date of last calibration
 - photographs of monitoring equipment in place
 - detailed descriptions of monitoring locations
 - plots of weather data on the noise monitoring graphs; and
 - an assessment background levels.
- Further explains the method used to estimate existing industrial noise levels
- Provides third octave sound power levels for each modelled source
- Provides the number and speed of vehicle movements modelled in each 15 minutes to explain how the sound power levels were used
- Specifies which source type from the DEFRA database was used for idling trucks
- Explains the source heights used in modelling, describing the actual equipment which will be used
- Explains why additional sources such as pumps on the berthed ship and the other three marine loading arms were not modelled, or provides model results including all significant noise sources
- Explains why F class stability category conditions were not modelled based on local data, or provides model results including F class stability category conditions
- Provides operational noise results including all applicable modifying factor adjustments, and an assessment of low frequency noise in accordance with the INP; and
- Provides result tables referring to the correct noise catchment areas and criteria. In the result tables provided, noise catchment areas A and C appear to have been confused.

Response

The options provided by the EPA have been considered by Pacific Environment Limited in **Appendix C**.

With regards to option one presented, it is identified in Section 5 of the Industrial Noise Policy (INP) (EPA, 2000) weather conditions can vary noise propagation significantly and it is preferred to set the noise limits at the project specific noise level rather than reduce it further based on theoretical modelling results. With regard to establishing noise limits on individual items of plant, groupings and variations in size of sources (such as pumps) will prevent a suitable correction of these sources. As such direct measurement of the noise source at 1 metre is not suitable for comparison to sound power levels utilised for modelling and would be a misleading representation of appropriate noise limits for the site.

Option 2 is the preferred approach and as such the various requested detail has been proved in **Appendix C** where available.

3.2.6 Water Quality**3.2.6.1 *Erosion and Sediment Control*****Issue**

The proposed Project has the potential to impact surface water, groundwater and soils during the construction phase. The EIS states that soil and water management will be addressed and incorporated into the Proponent's CEMP through the development of an Erosion and Sediment Control Plan. The Proponent should ensure that any sediment and erosion control measures to be implemented are designed, constructed and maintained in accordance with guideline document Managing Urban Stormwater - Soils and

Construction (Landcom, 2004) available at:

www.environment.nsw.gov.au/resources/water/BlueBookVol1.pdf.

The Erosion and Sediment Control Plan should also address the risks associated with disturbance of any Acid Sulfate Soil encountered during the construction phase. If approved, the CEMP should support any application for a scheduled development work licence.

Response

A summary of the detailed Surface Water Assessment is provided in Section 7.7 of the EIS with the associated detailed assessment located in Appendix J of the same document. The assessment considers the Proposal from a hydrological, stormwater management, flooding and wastewater standpoint. As noted in Section 7.7.5 of the EIS the Erosion and Sediment Control Plan (ESCP) will be prepared as part of the CEMP in accordance with the *Managing Urban Stormwater, Soils & Construction, Volume 1* (Landcom, 2004). The ESCP would be maintained for the duration of construction, to prevent any polluted water and sediment entering receiving waterbodies.

Section 7.13 of the EIS considers the soil and groundwater environment and potential impacts to this environment. Mitigation measures outlined in Section 7.13.5 of the EIS state the disturbance of any Acid Sulphate Soils (ASS) encountered during construction would be managed through an expected finds protocol outlined in the CEMP with risks managed in accordance with the *Acid Sulfate Soils Assessment Guidelines* (Ahern et al., 1998) and *Acid Sulphate Soil Manual* (Stone et al., 1998).

Table 6-1 details the revised mitigation measures for the project and includes the addition managing acid sulfate soils risk within the ESCP.

3.2.6.2 Water Quality Objectives

Issue

The EIS has identified three Water Quality Objectives for Port Kembla harbour, specifically primary contact recreation, secondary contact recreation and visual recreational use. The Illawarra Water Quality Objectives (DECCW, 2006) available at: <https://www.environment.nsw.gov.au/ieo/Lakellawarra/report-02.htm> identify two objectives for Port Kembla harbour, specifically aquatic ecosystems and visual amenity.

The Proponent should detail the relevant Water Quality Objectives for Port Kembla harbour and demonstrate how the proposed Project will be designed and operated to restore or maintain these requirements.

Response

The Illawarra Water Quality Objectives (DECCW, 2006) identifies the water quality objectives for Port Kembla Harbour to be:

"Maintaining or improving the ecological condition of waterbodies and their riparian zones over the long term"

And

"Aesthetic qualities of waters".

The Surface Water Assessment (Appendix J of the EIS), undertaken to support Section 7.7 of the EIS, identifies the relevant water quality characteristics and thresholds for visual recreational use as defined in the Australian and New Zealand Environment and Conservation Council (ANZECC) 2000 guidelines which would be upheld by the project through stormwater design. These threshold levels are consistent with maintaining the aesthetic quality objective for Port Kembla.

The Surface Water Assessment also details pollutant loads and concentration limits which would be adhered to during the operational phase of the project. These limits are defined by the mean pollutant concentrations adopted for industrial areas in New South Wales and were utilised as the assessment criteria for stormwater outflows from the modelled stormwater and wastewater treatment facility. The use of these criteria will ensure the maintenance of the existing ecological condition of the harbour in accordance with the DECCW objectives described above.

3.2.6.3 Discharges to Water

Issue

The EIS has identified hydrocarbons, total suspended solids and pH as typical pollutants which may be discharged from the proposed Project via an oil water separator. Where a discharge to waters is proposed, the Proponent should provide a justification for any discharge. This should include a description of best management practices to be used, and an assessment of what wastewater can be beneficially reused (for example, in fire water tanks) in preference to being discharged to waters.

If a discharge is unavoidable, the Proponent should undertake a wastewater characterisation to identify pollutants likely to be present in the water discharge at levels that are not trivial. Trivial relates to both the concentration of the pollutant as well as its risk to the environment. An assessment of the likely impacts of discharges on the waters and the proposed mitigation, monitoring and management measures that will be installed, operated and maintained should also be provided. Treatment in addition to an oil water separator may be required to remove pollutants likely to be present in the water discharge at levels that are not trivial.

The existing sediment basin on Site 3 currently discharges treated stormwater from the neighbouring GrainCorp Terminal. The EIS states that this will be replaced with an underground gross pollutant trap and an oil and grease treatment system. The Proponent should outline the measures that will be installed, operated and maintained to ensure continued access to this discharge point.

The EIS states that the proposed Project is separated from Tom Thumb Lagoon by the Gurungaty Waterway causeway. The causeway includes culverts, which allow the incoming tide to enter Tom Thumb Lagoon and the outgoing tide to enter Port Kembla Harbour. Tom Thumb Lagoon is a sensitive estuarine environment, which features a remnant Coastal Saltmarsh endangered ecological community and tidal mudflats. It is therefore vital that any discharge to waters be designed and operated to protect the relevant Water Quality Objectives for Port Kembla harbour and its sensitive environments.

Response

Section 7.7 and Appendix J (Surface Water Assessment) of the EIS discuss discharges from the site and the projected quality of the outflow water. An Oil Water Separator combined with a multi-staged containment unit incorporating bunds and slops tanks are proposed for treating stormwater runoff for the site. As detailed in the Surface Water Assessment discharge concentrations and limits will be defined through the future environmental protection licence for the project. This will define the measured quality and quantity of the discharge and will ensure ongoing monitoring of discharge points. Potential methods of reuse for the water to be discharged will be investigated during the detailed design phase however, use in fire water tanks is not feasible as the fire water tank must remain full at all times and so does not allow additional volume for surface flows.

Initial consultation with neighbouring land users regarding the reuse of stormwater has indicated that due to both human health requirements and existing reuse of water on their sites, therefore there is limited opportunity to reuse stormwater at neighbouring facilities

Section 6.1.5.2 of the Surface Water Assessment (Appendix J of the EIS) details the proposed Gross Pollutant Trap (GPT) and the use of devices such as a boom to capture hydrocarbons prior to discharge. Design refinements of the GPT will be developed during the design phase. It is noted that the GPT only receives flows from the Tom Thumb Road (catchment size of 3.3ha) and does not receive flows from the PK BLT site.

As discussed in **Section 3.2.6.2** above, the relevant Water Quality objectives for Port Kembla would be upheld by the project through stormwater design to ensure the protection of neighbouring waterbodies.

3.2.6.4 Spill Containment

Issue

The Proponent should identify all measures to address the potential for spills and leaks and any spill management contingency measures that may need to be implemented, including but not limited to:

- Information to demonstrate that any pipes, pipe fittings and pumps will be arranged in such a way that no spills or leaks can escape the containment bund and that all pumps will still operate if the bund is full. Any pipes connected to the storage tanks should be located over the containment bund and sited above ground and properly supported to make inspection and repair easier
- Information to demonstrate that the shoreline pipeline across Gurungaty Waterway will be arranged in such a way that no spills or leaks can escape the pipeline. The pipeline should be located over the containment bund and properly supported to make inspection and repair easier
- Details on the proposed routine inspection and maintenance program for any bunds, sumps, pipes, pipe fittings and pumps; and
- Information to demonstrate that the net capacity of gantry containment provides sufficient containment to hold tanker contents

Response

TQ has confirmed that the terminal layout and piping routes have only been developed to a concept level at this stage. As the terminal design progresses through the preliminary design phase and into the detailed design phase the piping and pumping configurations will be confirmed. The terminal design includes all flanged piping connections to the tanks and product pumping equipment being located within the bunded area. Where flanged valves on the shorelines are located outside the main bunds a sump with level detection has been provided where possible to collect any leaks. Sump drainage pumps within the bund will be used to collect and transfer both rainwater and liquids spills. These pumps are submersible style pumps and are designed to operate if the bund is full of liquid. The pipe bridge across the Gurungaty waterway will house fully welded product pipelines to minimise the possibility of leaks from flanged joints. A drip tray will be designed under the pipes on this pipe bridge to catch any leaks from the pipes and convey the liquid to a sump at the end of the bridge. This sump will include level detection.

During ship unloading and product transfer operations there will be an operator checklist that includes walking the pipeline at regular intervals to inspect for leaks. Normal operator rounds will also include regular hydrocarbon checks in the sumps and pump bays.

The truck loading gantry area will be designed in accordance with the requirements of AS1940 in regards to containment volume. Each truck loading bay will include a roll over bund that is separate from adjacent truck loading bay bunds. Each bund will contain the largest truck compartment.

3.2.6.5 Firefighting Foams

Issue

The EIS states that a detailed Fire Safety Study and fire system design will be undertaken to determine optimal type and methods for collection and dewatering of foams within bunded areas. It is therefore important that additional information on any proposed firefighting foams be incorporated into the proposed Fire Safety Study. Additional information to be addressed should include:

- Selection of the firefighting foams to be handled, stored or used
- Justification for the foams selected
- Characterisation of any potential discharges to surface or groundwater waters
- An assessment of the likely impacts in the event of any discharge of contaminated fire water; and

- A description of all feasible and reasonable measures to minimise any discharge of contaminated fire water.

The proposed firefighting foam should not contain perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

Response

TQ understands the environmental consequences of the use of firefighting foams such as PFOS and PFOA and will not be specifying such chemicals in any firefighting foams used on site. TQ will select an appropriate foam for use in their firefighting systems which will not introduce unacceptable ecological or human health risks.

The mitigation measures identified in the EIS have been revised in **Table 6-1** to include the additional details of the Fire Safety Study as identified by the EPA.

3.2.7 Traffic and Transport

3.2.7.1 *Delivery of Ethanol and Biodiesel*

Issue

The EIS states that the proposed Project will import bulk liquids by ship, store the liquids at the premises and distribute the liquids by road. The EIS also states that biodiesel and ethanol will be delivered by road. It appears that the TIA has not made predictions of the traffic volumes likely to be generated by the delivery of biodiesel and ethanol by road. The Proponent should clarify if accurate predictions of the traffic volumes likely to be generated by the proposed Project have been made in the TIA.

Response

Traffic volumes representing the proposed delivery of biodiesel by road were modelled as part of the Traffic Impact Assessment undertaken to support the EIS (Appendix H of the EIS). This modelling was undertaken using the best projected traffic volumes available at the time. Since the submission of the EIS these numbers have been revised based on refinements in the project design. In addition to the traffic volumes identified in the Assessment for petroleum transportation, current estimates of the truck deliveries per day for ethanol and biodiesel are now available. These deliveries are minor in number comparison to the traffic volumes identified in the EIS as demonstrated in the **Table 3-1** below.

Table 3-1 Estimated Daily Throughputs for Petroleum Products

Stage	Traffic Volumes Identified in the EIS	Projected Ethanol and Biodiesel Traffic Additional Movements	Percentage Increase
Stage 1	188	8	4%
Stage 2	280	12	4%
Stage 3	412	18	4%

In addition to the limited volume of the ethanol and biodiesel deliveries, TQ has confirmed that these deliveries are able to be scheduled so as to arrive during low peak periods as identified in Figure 4-5 of the Traffic Impact Assessment (Appendix H of the EIS). Based on the minor levels in increased traffic volume associated with ethanol and biodiesel deliveries, the addition of these traffic movements will not result in significant changes to the projected traffic volumes or the need to revise the mitigation measures provided.

The heavy vehicles associated with ethanol and biodiesel deliveries to the PK BLT are considered in an updated calculation of traffic noise impacts in the Noise and Vibration Assessment technical note by Pacific Environment Limited (see Section 1.6 of **Appendix C**). The predicted traffic noise increase has been calculated to be less than 1 dB during both the day and night time period, which is within the 2dB(A) increase criteria.

3.2.7.2 *Best Management Practices for Ships*

Issue

The EIS makes predictions about expected noise levels from ships at Berth 104. The best way to manage noise from ships at berth is to engage operators with quieter ships and exclude poorly performing ships. The Proponent should include the development and implementation of a shipping noise auditing program to confirm vessels at berth achieve noise standards for shipping activities.

The Proponent should also include a feasibility assessment of best management practices for vessels at berth, including but not limited to:

- The provision of shore power; or
- The use of low sulphur content fuel.

Response

TQ has limitations on the control of ship operators, however they will endeavour to select operators whom operate safe and quiet vessels to ensure noise and other emission impacts from visiting vessels are kept to a minimum. A noise management plan as identified in **Table 6-1** will be developed for the site, which will include the management of acoustic impacts from vessels.

TQ has also liaised with NSW Ports about the possible future provision of shore power for vessels at Berth 104, and can confirm there is no plan for providing shore power to vessels at Berth 104. The fuel used in all vessels at Berth 104 will be in the control of the shipping. TQ acknowledge the processes already exist to ensure low sulphur content fuel in accordance with MARPOL Annex 6 is utilised where possible and that the EPA are currently reviewing sulphur content levels for all ships calling at ports in NSW (EPA, 2015).

3.2.7.3 *Best Practice Management for Diesel Vehicles*

Issue

In its SEARs, the EPA required the EIS to include a feasibility assessment of best management practices for all on-road diesel trucks associated with the proposed Project. It appears that such an assessment has not been made. The Proponent should include the development and implementation of a truck noise auditing program to confirm trucks achieve noise standards for engine brake noise.

All on-road diesel trucks associated with the project should:

- Conform with relevant and current emission standards as prescribed in Australian Design Rules for heavy-duty engines and vehicles (EURO IV); or
- Where the vehicle is older than the 2006 model year (that is, EURO I, EURO II or EURO III standards), the vehicle should be fitted with a diesel exhaust treatment device.
- Consider emission reduction options in the diesel NEPM.

Response

A Best Practice Management review document for Diesel Vehicles has been prepared in support of this RTS and is included in **Appendix F**. TQ shall implement the commitments and measures outlined in this document with additional mitigation measures for the project included in **Table 6-1** of this RTS.

TQ will aim to manage contractors and operational vehicle noise in line with industry practices. The *Protection of the Environment Operations (Noise Control) Regulation 2008* (the Regulation) aims to prevent high noise levels from vehicles caused by lack of maintenance, deliberate tampering or inappropriate use. This inappropriate use could include excessive use of exhaust braking in areas where such truck equipment application are not required, such as in areas of low road grades, lower speeds or residential areas. The EPA, police officers and, in some instances, local council officers have the power to enforce the Regulation. The vehicle noise standard (ADR83/00) defines the limits on external noise generated by all light and heavy vehicles

As discussed in the Best Practice Management Review for Diesel Vehicles (see **Appendix F**), TQ have limitations in the level of control of heavy vehicle standards for transport operators likely to utilise their site. TQ will however seek to manage engine braking noise through the communication of transport fleet and driver behavioural expectations, such as maintaining exhaust equipment (i.e. mufflers) and avoiding or limiting exhaust braking in residential areas (where it is safe to do so) into the site delivery vehicle inductions and Driver Policy. TQ also feels they will have limitation in the effectiveness of auditing for exhaust braking as this is not likely to occur in or around the Port Kembla port precinct, where there are many other transport operators using heavy vehicles.

The development of the Traffic Management Plan sections of the CEMP and OEMP should consider any feasible and practical measures to monitor and audit truck noise, as part of any required noise monitoring activities, in consideration of the *Noise Test Procedures for In-Service Motor Vehicles* (NTC Australia 2006), which can be found here: [http://www.ntc.gov.au/Media/Reports/\(9745A524-E60D-9B7C-835B-CDAF7DC19D8B\).pdf](http://www.ntc.gov.au/Media/Reports/(9745A524-E60D-9B7C-835B-CDAF7DC19D8B).pdf)

TQ shall commit to the following initiatives:

- > Utilise freight companies that commit to sourcing vehicles with Compliance Plate Approval. This ensures trucks meet the national standards covering safety and emission requirements known as the Australian Design Rules (ADRs). TQ will seek to utilise companies that have a commitment to operational and environmental improvements.
- > Develop and implement a noise monitoring and/or auditing program within the Traffic Management Plan to confirm trucks achieve noise standards during the construction and operational phases.

3.3 NSW Department of Planning and Environment

3.3.1 Stage 1A

Issue

The EIS for the current proposal states that the proposed development strategy will utilise the existing project approval (08_0083) to install berth infrastructure and ship unloading equipment on Berth 104 (Stage 1A). All other stages (Stages 1 B, 2 and 3) rely on the current proposal being approved (SSD 7264) prior to construction commencing.

Please note that the approved project (08_0083) lapses on 5 May 2016 if construction has not physically commenced on site by this date. If TQ Holdings intends to rely on the existing project approval to undertake Stage 1 A, a number of conditions of approval (including the Environmental Management Strategy) must be approved by the Secretary prior to the commencement of construction.

The Department understands that the berth is a common user berth that will be appropriately managed by NSW Ports to ensure efficient use by all users. Please note that the utilisation of Berth 104 during Stage 1 A is subject to consultation with NSW Ports and GrainCorp, as per the existing Statement of Commitments. Please ensure that details on this consultation is included in the RTS.

It is noted that bund walls around tanks on Site 1 are not proposed to be constructed until Stage 1 B. Please confirm that no combustible or flammable liquid is proposed to be stored until the completion of Stage 1 B.

Response

It is noted that the existing planning approval MP08_0083 will lapse on 5 May 2016 if construction works have not physically commenced on the site by the 5 May 2016. As previously stated, TQ no longer proposes to commence construction under the existing planning approval MP08_0083. The entire project will now be developed under the new SSD-7264 consent conditions including new project commitments. Therefore conditions of approval issued under MP08_0083, including Statement of Commitments, will no longer need to be satisfied. Notwithstanding this, **Section 2** of this RTS details both current and future consultation which has been/will be undertaken by TQ as part of the project. No combustible or flammable liquids are proposed to be stored until the completion of Stage 1.

3.3.2 Hazard and Risk

Issue 1

For the risk analysis undertaken for the event of a flash fire due to evaporating pool and tank overfill, have all wind conditions (i.e. wind rose probabilities) been considered? If so, please justify.

Response 1

As indicated in **Appendix E**, flash fire consequences due to the creation of an evaporating pool from a storage tank bund and operational releases were modelled at B3, D5 and F2 weather conditions. The analysis found a flammable cloud reaching Lower Flammability Limit (LFL) levels is only formed under F2 conditions. Results suggest in higher wind speeds and unstable atmospheric conditions (i.e. B3 and D5) the flammable gas cloud does not reach LFL levels. It should be noted that in the PHA in Appendix D of the EIS, tank overfill was considered to lead to gasoline pooling in the bund as ducted piping directs flow into the bund sump. Wind rose probabilities accounted for in the risk model are identified in Appendix D of the EIS. The approach used was considered sufficient as it adjusted for the wind directional probability and allowed for the incorporation of site-specific environmental factors.

Issue 2

In the event of a jet and pool fire, has only high wind speed (05) been considered? If so, please justify.

Response 2

TQ acknowledges in the event of jet and pool fire, only high wind speed (5 m/s rather than 2 or 3 m/s) was considered in the PHA (Appendix D of the EIS). A higher wind speed was used to assess the consequence of a pool fire as the greater speed elongates and can increase the surface area of the flame (see Figure 1 of **Appendix E**). A higher wind speed produces a more conservative result as it results in a higher thermal radiation heat flux at the receptor.

Modelling outcomes for the consequences of a jet fire suggest heat radiation distances are slightly greater for a 2 m/s wind speed, however, based on meteorological data this wind speed is likely to occur less than 20% of the time with wind speeds of between 3 and 5 m/s are more likely (60%) to occur for the PK BLT area. Therefore, a wind speed of 5 m/s was chosen for consistency across jet fire and pool fires. See **Appendix E** of this RTS for a detailed explanation relating to this response.

Issue 3

It is noted in Appendix F the weather data is based on readings from the automatic weather station at Port Kembla. Please clarify the duration of time over which weather data was collected (on which the analysis was based).

Response 3

The weather data reported in the PHA (see Appendix D of the EIS), was based on readings from July 2012 to June 2015 for a total of three years. Readings prior to July 2012 were not available for the weather station.

Issue 4

In the last paragraph of Section E7.1, it is noted that the tank roof fire frequencies for combustible bulk and slop tanks are based on escalation from a flammable tank roof fire. What is the escalation probability, and the probability of spray water cooling failure?

Response 4

The escalation probability utilised in Section E7.1 of the PHA (Appendix D of the EIS) was taken to be 50% based on the likelihood that the wind will direct the flame towards the combustible tank leading to escalation and the probability of spray water cooling failure was taken to be 10% based on fixed systems.

Issue 5

In Section 2.5, it is noted that ship tanker transport is outside the scope of the PHA. The Department considers that loss of containment when the ship is close to shore before connecting to the shoreline may pose a risk to the terminal operations. Please note and confirm that hazards arising from ship tankers are to be considered in the Emergency Plan.

Response 5

Consultation between TQ, the Port Authority and NSW Ports confirmed the management of hazards within the port is the responsibility of the Port Authority. TQ acknowledges the loss of containment when the ship is close to shore before connecting to the shoreline may pose a risk to the terminal operations. An Emergency Plan will be developed for the PK BLT. The Emergency Plan will cover hazards arising from ships close to shore and this mitigation measure has been updated in **Table 6-1** to include the additional details identified by NSW Planning and Environment (DPE).

Issue 6

In Section 10.2, the individual risk fatality extends into the Gurungaty waterway up to 2m from the site boundary. It is also stated that the affected area is a shallow waterway which precludes ship or boat access. Please clarify and describe if any controls are in place to ensure public access is restricted.

Response 6

TQ has consulted with NSW Ports regarding the controls that are in place to ensure public access is restricted. The TQ facility including Berth 104 are not accessible to the public. Whilst a ship is at Berth 104, it is deemed a maritime security zone and access is only permitted by authorised personnel. NSW Ports advised that the waterways are patrolled by the Port Authority. The Harbour Master of the Port Authority authorises the movement and berthing of vessels within the Port. The width and depths of Gurungaty waterway would not permit a bulk liquid vessel to access this area.

Issue 7

In Section 10.3, the risk of property damage and propagation extends into the land north of Site 1 up to 5m from the site boundary. The land is zoned to accommodate hazardous installations. Who is the land owner of this land? Please provide detail on your consultation with the land owner, particularly with regards to:

- exclusion of occupancy in the area;
- moving the site boundary to keep the risk on site; and
- management of potential risks.

Response 7

The land north of Site 1 is owned by NSW Ports and is currently leased to Port Kembla Coal Terminal (PKCT). The risk of property damage and propagation extending into the land north of Site 1 was discussed at a meeting with PKCT held on 18 December 2015. TQ advised that as the detailed design of the terminal progresses the risk contour may change and that their intention would be to bring the contour back onto the TQ site where possible. The meeting also discussed the request to avoid placing occupied buildings and dangerous goods storage in this location. In addition, TQ met again with PKCT on 17 March 2016 (as noted in **Section 2.2**) to discuss responses to all of their submission comments. The discussion between TQ and PKCT covered each submission point noted and a letter of submission responses (see **Appendix A**), based on the PHA technical note prepared by Sherpa Consulting (see **Appendix E**), was provided to PKCT for their reference.

TQ have not had discussions with PKCT in regards to movement of boundaries as the terminal design has not progressed beyond a concept stage. TQ believes there is opportunity to optimise the design in this area to further reduce the risk contours. TQ understands that they do not have agreement from NSW Ports or PKCT to impose development or operational restrictions on the PKCT lease area, as a result of the propagation and risk contours extending into the PKCT lease area. As indicated by Sherpa (refer to **Appendix E**), there is an opportunity during the detailed design stage to reduce or eliminate the risk contour extending into the PKCT lease area. TQ will continue to liaise with NSW Ports and PKCT regarding this matter. NSW Ports has advised that landlord approval may be granted to commence part of the Stage 1 construction works before the final propagation and risk contours are known for this stage. As indicated by Sherpa, the final propagation and risk contours will be determined once the detailed design work has been completed. Notwithstanding this, TQ may seek an early agreement with NSW Ports and PKCT to allow for the risk contours to extend into the PKCT lease area.

Issue 8

In Section 10.5, it is stated that escalation from a coal stockpile fire at the PKCT is unlikely - as the separation distance between coal stockpiled at the PKCT to the nearest bulk fuel tank is approximately 90 metres. However, as the stockpiling of coal can result in coal dust explosions, confirm whether there is any potential for objects on the PKCT site to hit a tank on the development site during explosions. If such a risk exists, has this risk been considered in the risk analysis and what are the proposed control measures?

Response 8

The following information is provided after consultation with PKCT regarding the potential risk of coal dust explosions resulting in objects potentially striking the proposed bulk liquid storage tanks.

The risk is considered extremely low at PKCT due to:

- > PKCT have never experienced a coal dust explosion on their site

- > There are control measures in place to prevent such events, including:
- PKCT site assessment in accordance with AS60079.10.2-2011 Explosive Atmospheres - Classification of Area - Combustible Dust Atmospheres
 - The use of appropriately rated equipment within the classified areas at PKCT, and
 - PKCT's housekeeping regimes further reduce the likelihood of combustible dust atmospheres being generated.
 - The PKCT stockpile area is not confined and any dust explosions in a large unconfined area are unlikely to generate sufficiently high overpressures required for objects to strike the proposed bulk liquid storage tanks on the TQ Holdings site
 - The closest distance from combustible dusts hazardous areas in the PKCT facility being over 180 m from the TQ Holdings closest bulk storage tank.

3.4 Department of Primary Industries

3.4.1 Groundwater Encounters

Issue

The Department of Primary Industries, Water (DPI Water) has reviewed the subject Environmental Impact Statement (EIS). DPI Water considers that issues of interest to the Department have been adequately addressed in the EIS and has no objection to the project as proposed. The following comments however are provided for your attention and consideration.

Sections 7.13.4 and 7.13.5 of the EIS indicate that whilst unlikely, groundwater may be encountered during site excavations. If groundwater is encountered during excavation, a groundwater assessment will be undertaken to determine the volume and quality of the water to determine if appropriate permits are required. This procedure is also detailed in the Draft Statement of Commitments for Soils and Groundwater in Table 10-1. DPI Water concurs with this approach.

DPI Water should be consulted where any volume of groundwater is proposed to be extracted to determine any licensing requirements under the *Water Management Act 2000* prior to undertaking that extraction.

Section 5.2.11 notes that under section 89J of the *Environmental Planning & Assessment Act 1979*, SSD projects are exempt from requiring works and use approvals and controlled activity approvals. However there are no exemptions for volumetric licensing. As such, a Water Access Licence may be required prior to undertaking any site dewatering.

Response

TQ understands if groundwater is encountered during excavation, a groundwater assessment needs to be undertaken to determine the volume and quality of the water to determine if appropriate permits are required (see Table 11-1 of the EIS). If groundwater is to be extracted, consultation between DPI Water and TQ is required to take place prior to any extraction.

TQ acknowledges there are no exemptions relating to volumetric licensing and a Water Access License may be required. The mitigation measures identified in the EIS have been revised in **Table 6-1** to include the additional details identified by the DPI Water.

3.5 Office of Environment and Heritage

3.5.1 Flood Risk

Issue

With regard to flood risk management, we are satisfied that this matter has been satisfactorily addressed and no further comments are provided.

Response

It is understood that the Office of Environment and Heritage is satisfied with the flood risk management analysis and measures provided in the EIS.

3.5.2 Biodiversity Assessment Offsetting

Issue

As per the submitted Biodiversity Assessment Report (Ecoplaning, 2016) the development will remove approximately 0.02ha of Green & Golden Bell Frog (*Litoria aurea*) habitat which requires one (1) species credit to offset the impacts of the development. In accordance with the NSW Biodiversity Offsets Policy for Major Projects (Major Projects Policy), species listed under the Commonwealth Environment Protection and Biodiversity Conservation Act 1999 (EPBC 1999) are required to be offset in a “like for like” manner. In addition, where appropriate credits are available on the Biobanking market, these must be utilised to secure any offsets required under the FBA.

The Biodiversity Offset Strategy (BOS) identifies the purchase and retirement of the required species credit as the preferred mechanism to meet the projects offset requirement. In order to meet the requirements of the Major Projects Policy, an appropriate condition will need to be imposed on the development consent requiring the purchase and retirement of the required credit prior to works commencing on the site.

Response

TQ acknowledges the requirement to purchase a species credit as per the BOS, which will be obtained prior to works commencing, and the proponent accepts that this requirement will be a condition of consent.

3.5.3 Aboriginal Cultural Heritage

Issue

To address intangible heritage values, Cardno refers to consultation with the Illawarra Local Aboriginal Land Council (ILALC) for the proposed Soybean Processing Facility in 2008. We have received this report and acknowledge that does not identify any cultural constraints in the location of the present proposal. However, we also note that the EIS states no Aboriginal community consultation in relation to the present proposal has occurred. The EIS would be strengthened as a stand-alone document by more clearly stating the rationale for the assessment of intangible cultural values. Given that the advice from ILALC is now eight years old, and considering that Local Aboriginal Land Councils do not necessarily represent the views of the broader Aboriginal community, the assessment of intangible cultural heritage values could be improved by conducting Aboriginal community consultation. We note that the nearby North Beach, Hill 60 and Coomaditchy areas contain significant Aboriginal cultural values.

Response

TQ recognise the Inner Harbour of Port Kembla as a part of Country as identified by the local Aboriginal Community. As such TQ have consulted with the Illawarra Local Aboriginal Land Council (ILALC) upon first proposing to develop this land. In response to this consultation, the ILALC identified that it had no objections to proposed project area as there are no known sites within this area. The current proposal includes the site addressed within this consultation as well as a smaller site portion immediately to the north. This additional port site also does not include any identified Aboriginal sites.

In addition to this, aerial imagery presented in Figure 7-12 of the EIS demonstrates the substantial degree of modification of the landscape at this location. This site and the surrounding sites are currently utilised for

heavy industrial and commercial purposes and have done so for an ongoing period of time. Whilst the intangible cultural values of the site as part of Country remain, the proposed use of the site will not result in a shift of the current land use of the site such that current intangible values would be diminished. This approach is synonymous with the existing approach to the Port Kembla industrial lands which have been functioning with harmony with the local community for many decades.

3.6 Roads and Maritime Services

Issue

RMS has reviewed the information provided and notes that the Traffic Impact Assessment identified that in 2026 the intersection at Springhill Road and Masters Road would reach an unacceptable Level of Service regardless of the traffic generated by the Port Kembla Bulk Liquids Terminal.

RMS has reviewed the information provided and will not object to the modification application subject to the following comments being included in the conditions of development consent:

- Consideration should be given to the transportation of any oversized or over mass loads that will be required as part of the subject proposal. Prior to transporting any such loads, the applicant will be required to obtain a permit from the RMS Special Permits Unit in Glen Innes (contact number 1300 656 371). RMS recommends that the applicant liaise with the RMS Special Permits Unit early in the process to assess the appropriateness of the route and identify any other potential issues. Early consideration of these matters may help to avoid unexpected costs and delays at a later stage of the project. It should be noted that the issuing of a Special Permit may be subject to route and bridge assessments if deemed necessary by the RMS Special Permits Unit.

Conditions of development consent relating to road work, traffic control facilities and other structures on the classified road network contrary to those outlined above are unlikely to receive RMS consent under the *Roads Act, 1993*.

RMS highlights that in determining the State significant development application under Part 4 of the *Environmental Planning and Assessment Act, 1979*, it is the consent authority's responsibility to consider the environmental impacts of any road works which are ancillary to the development. This includes any works which form part of the proposal and/or any works which are deemed necessary to include as requirements in the conditions of development consent. Depending on the level of environmental assessment undertaken to date and nature of the works, the consent authority may require the developer to undertake further environmental assessment for any ancillary road works.

Response

It is appreciated that RMS acknowledges the forecast future Level of Service issues at the Springhill Road and Masters Road, regardless of the traffic generated by the PK BLT project. It is also appreciated that RMS do not have any objections to the proposed project and TQ will fully accept the proposed condition outlined above in relation to obtaining appropriate permits for oversized or over-mass vehicles, which will be subject to any required route and bridge assessments which may be deemed necessary by the RMS Special Permits Unit.

The proponent will ensure that approval conditions relating to ancillary road works are fully satisfied. It is also noted that TQ are not proposing any ancillary road works affecting any RMS managed roads at this time.

3.7 SafeWork NSW

Issue 1

The proponent/applicant should contact us prior to completing the responses to the submission.

a) SafeWork NSW's SEARS listed 12 items to be taken into account/addressed when preparing the EIS/PHA. It appears that the proponent/applicant had assumed (incorrectly) that the requirements of SafeWork NSW in the SEARS were part of the 'Guidance Material' under attachment C of the OEH requirements and therefore did not require to be specifically addressed in the EIS/PHA.

Response 1

TQ will continue to liaise with SafeWork NSW throughout the project development process to ensure ongoing compliance with the *Work Health and Safety Act 2011*. Since the submission of the EIS, TQ has met with SafeWork on 16th March 2016. During this meeting matters raised by SafeWork were discussed. These matters raised will primarily be addressed through the development of a Safety Case Outline (SCO) which will be developed 3 months after the project is formally determined as a Major Hazard Facility (MHF).

The 12 items identified by SafeWork NSW in the SEARS has been summarised in **Table 3-2** which also details how these comments have been addressed within the EIS and will be addressed in subsequent documentation.

Table 3-2 SafeWork NSW Comments within the SEARS

Item	SafeWork NSW Comments	Responses
1	Details of how compliance with the requirements of the Work Health and Safety (WHS) Act 2011 and Regulation 2011 will be achieved. Note: If the proposal is approved, a safety case as required under clause 560 of the WHS Regulation will need to be prepared that demonstrates to SafeWork NSW how the risks related to hazards and safety w	It is noted that the intention of an EIS to state the environmental context of the development and assessment the relevant environmental impacts associated with the development. The <i>Work Health and Safety Act 2011</i> is not a typical consideration as part of this process and as such the application of this Act has not been discussed as part of the EIS. TQ acknowledges this importance of the <i>Work Health and Safety Act 2011</i> and Regulation and as such commit to ongoing consultation with SafeWork NSW throughout the project development phase through to operations. This includes the necessary requirements under Chapter 9 of the Work Health and Safety Regulation 2011 for MHF. Compliance with this Regulation, and how this will be achieved, will be detailed within the SCO.
2	A clear statement on the risk criteria that will be adopted for demonstrating SFARP (So Far As is Reasonably Practicable) and the basis/justification for adopting such criteria. – Reference to relevant publications by the UK health and safety executive (HSE) and the Australian National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is recommended. Note: While the risk criteria in the Hazardous Industry Planning Advisory Paper (HIPAP) No.4 sets out criteria for land use safety planning, the WHS Regulation requires major hazard facilities to demonstrate that the risks have been reduced to SFARP.	The MHF process is separate and more onerous than the HIPAP land use planning assessment process which was utilised in Appendix D of the EIS. Land use planning process looks at offsite risk to ensure compatibility and appropriate development. The development of the relevant risk criteria in accordance with the Regulation will be undertaken prior to operation and in consultation with SafeWork NSW as part of the SCO. This process will utilise the relevant publications identified by SafeWork NSW and will include risk criteria, onsite risk and cumulative onsite risk.
3	An outline of how the requirement to prepare and submit a Safety Case to SafeWork NSW with the MHF licence application will be achieved.	As described above the process for a MHF in accordance with Regulation will be undertaken prior to Operations through the development of a SCO.
4	When preparing the PHA, the proponent is advised to identify the possible major incidents and the risk reduction measures to be included in the design.	The PHA included in Appendix D of the EIS, identifies hazards with the potential for resulting in Major Incidents and details the risk reduction measures in the HAZID. The SCO will also include the process for identifying major incidents which will be developed through the

Item	SafeWork NSW Comments	Responses
		HAZID developed from the PHA including the development of a major incident list and a safety assessment.
5	The PHA (QRA) should evaluate both on site and off site risks on a cumulative (whole of site) basis. Note: While the risk criteria in HIPAP 4 refers only to offsite risk, the WHS Regulation requires both onsite and offsite risks to be evaluated for major hazard facilities. Doing so at the PHA stage will eliminate the need to repeat this work when preparing the Safety Case under the WHS regulation in the post approval period.	Off site risks are included in the PHA (Appendix D of the EIS). The hazards associated with the proposed development, including external hazards, are covered in the HAZID study in APPENDIX C of PHA. The basis of design for the site has taken into consideration the impact of external hazards on the site. This is further described in Section 3.4 of PHA. A summary of the results is included in Section 1.3 of PHA. Inclusion of onsite risk to the level of detail for a SCO (as per the Regulation) in the PHA would not be appropriate for a document that is intended for public discussion in the context of Land use planning.
6	Details of the risk reduction measures that will be included to achieve SFARP.	Risk reduction measures are included in the PHA. Details of the risk reduction measures to demonstrate SFARP for onsite risk will be developed in detail during the SCO at a later stage.
7	An outline of how the recommendations made by the UK HSE and other industry bodies in relation to the Buncefield fuel storage depot fire and explosion in 2005 will be addressed by this proposal.	Section 1.3.3, Appendix G of PHA includes a review of Buncefield recommendations and how these relate to the PKBLT. Buncefield recommendations in relation to PKBLT are discussed in both the PHA and EIS.
8	Details of the standards and codes used in the construction of the tanks, the protection systems for the tanks and spill control systems for the tanks. E.g. API standard 2350.	EIS and PHA notes that tanks, bunds and spill control systems are assumed to be designed and constructed to the relevant standards including American Petroleum Institute (API) and Australian Standards.
9	The PHA should include an assumptions register with source/justification for the assumptions made in the risk analysis. In particular, with respect to event and failure frequencies.	These assumptions clearly stated in Section 7 of the PHA.
10	The risk matrix at table 4-1 in the scoping document indicates the risk of fatality of one in a million years as "medium". This would be inappropriate in the major hazard context. SafeWork NSW should be consulted if a risk matrix is to be used for major hazard risks.	A SCO, with risk criteria that will be adopted demonstrating SFARP, will be developed for the project in consultation with SafeWork NSW. This will detail the risk criteria, onsite risk and cumulative onsite risk as discussed above.
11	Tank bunding should be concrete or similar impervious material to minimise soil contamination in the event of a spill. Any cost benefit analysis when deciding on bunding options should take the cost of remediation of contaminated soil into consideration if it is decided not to line the base of the bunded area.	All tank bunding will be concrete wall and impervious floors to protect soils. Section 7.13.5 of EIS states mitigation measure to avoid soil contamination will include: <i>"Construction of hardstand areas with appropriately sized bunding around fuel storage and refuelling areas"</i> All bulk liquid storage tanks and bunds would be designed and constructed in compliance to AS1940 <i>The storage and handling of flammable and combustible liquids</i> and API650.
12	As proposed in clause 5.18.2 of the 8 September 2015 scoping document, the proponent should consult with SafeWork NSW during the development of the EIS and PHA.	To date TQ has been actively consulting with SafeWork NSW as is noted in Section 9.3.2 of EIS. TQ will continue ongoing consultation with SafeWork NSW throughout the design process to ensure ongoing adherence to the <i>Work Health and Safety Act 2011</i> and Regulation.

Issue 2

- a) Section 9.1 of the EIS specifically requires that the proponent/applicant must consult with SafeWork NSW, among others listed, during the preparation of the EIS. This was not done. Reference at 9.3.2 in the EIS to a meeting with SafeWork NSW on 19 August 2015 is when the proponent provided an outline of the project to the Wollongong office of SafeWork NSW. However, SafeWork NSW met with representatives of the proponent/applicant during the exhibition period, on 19 January 2016, when SafeWork NSW outlined the procedure to be followed in relation to complying with the WHS legislation in general and the major hazard facilities chapter in particular.

Response 2

A meeting was held with SafeWork NSW on 16th March 2016 to review the SafeWork submission comments. The TQ responses were discussed with SafeWork and TQ committed to ongoing meetings and consultation with SafeWork as the project progresses and also as the SCO is prepared and the Safety Case is undertaken.

Issue 3

- b) While the PHA has some references to the issues listed in the SafeWork NSW's SEARS, most have not been specifically addressed in the EIS/PHA as exhibited. The proponent/applicant must consult with SafeWork NSW prior to completing the Response to Submissions Report with regard to the requirements of SafeWork NSW.

Response 3

As discussed above, a meeting was held with SafeWork NSW on 16th March 2016 to review the SafeWork submission comments. The TQ responses were discussed with SafeWork and TQ committed to ongoing meetings and consultation with SafeWork as the project progresses and also as the SCO is prepared and the Safety Case is undertaken.

Issue 4

- c) Items 3 to 6 in The HAZID Register at Appendix C in the PHA refer to scenarios relating to the MLA failures. The possibility of high surge pressures in the ship discharge pipeline when the fast closing valves operate prior to the MLA disconnecting should also be addressed. A similar scenario to be considered is high surge pressures if the ship's pumps stop on power failure.

Response 4

The PHA HAZID has been revised by Sherpa Consulting with comment included in **Appendix E**. Sherpa Consulting acknowledges that the PHA HAZID included in Appendix D of the EIS covered loss of containment scenarios due to MLA failures and pipe leaks. The scenario of high surge pressures in the event the pumps on the vessel stop working during a power failure will be reviewed as part of the surge study during detailed design. This revision has been included in the mitigation and management measures outlined in **Table 6-1**.

3.8 Illawarra Shoalhaven Local Health District – Public Health Unit

3.8.1 Human Health Risk Assessment

Issue

The HHRA prepared by EnRiskS (Ref PJ-PK-0001-REPT-012- Revision C) states that there are no identified acute or chronic impacts on the health of the local community from the project. ISLHD PHU is satisfied that for this project the HHRA has used an appropriate approach for the assessment of impacts on human health. However the HHRA relies on the modelling used in the Air Quality Assessment being valid.

Response

TQ acknowledges ISLHD PHU is satisfied with the Human Health Risk Assessment (HHRA) undertaken (Appendix F of the EIS). As identified in Section 3.2.4.11 acute health risks associated with the peak 1-hour average concentration have been revised in accordance with the latest air quality modelling completed by Pacific Environment (**Appendix B**) and are detailed in **Appendix D**. The revised modelling by EnRiskS found concentrations to be well below a level that has the potential to result in adverse health effects on the public associated with exposure to short-duration peak air concentrations.

3.8.2 Air Quality

Issue 1

The ISLHD PHU notes that the NSW EPA Air Branch are the most appropriate agency to provide detailed comment potential emissions modelled from the facility, however the following matters have been identified by the ISLHD PHU that should be addressed:

Justification is needed as to why representations of each fuel type in the TANKS software were used despite the NPI providing additional databases for the Australian context. Furthermore the NPI Fuel and Organic Liquid Storage - TANKS User Manual indicates that individual chemical characteristics can also be entered into the database if necessary.

Response 1

It acknowledged that Pacific Environment used speciation profiles from the US EPA SPECIATE database to represent the anticipated fuel types to be imported in the PK BLT facility. Further justification on each fuel type is presented in Section 1.4 and Table 3 of **Appendix B**. This further evaluation has shown that the TANKS modelling selection referenced 'PULP' fuel as from analysis of Safety Data Sheets (SDS) provided to Pacific Environment during the AQGHG assessment it represents the worst-case VOC/air toxics emissions profile for all the petroleum products expected to be imported and distributed from the terminal.

A similar approach was applied to the diesel products with the selection of the 'Distillate fuel oil no.2' in the TANKS program. This selection was based on comparisons to the expected diesel fuel products (Biodiesel and USLD), where the distillate fuel was found to have comparable speciation profiles to the MSDS, particularly relevant to PAHs. Hence the approach taken to select US EPA's SPECIATE databases (US EPA, 2004) to represent all petrol and diesel fuel products is considered conventional and rigorous.

Issue 2

It appears that all fuel was represented by one speciation profile from the US EPA Speciated database. It is not clear if the different composition of a range of fuels were used across the site to model total emissions. The NPI TANKS database contains partial speciation data for a range of fuels that may be useful.

Response 2

As discussed in **Appendix B** and **Section 3.2.4.1** above, the speciation profiles selected from the US EPA SPECIATE database were selected as a worst case of all the petrol and diesel products that are expected to be imported to the terminal.

Issue 3

The HHRA will need to be reviewed and updated if changes are made to the Air Quality Assessment.

Response 3

A HHRA technical note has been prepared by EnRiskS (see **Appendix D**) which has reviewed the amended Air Quality Assessment (see **Appendix B**) and provided additional assessment of potential risks to human health. The additional data presented in the Pacific Environment letter does not change the assessment of potential chronic exposures as presented in the HHRA.

The additional information provided by Pacific Environment provides a comparison of the predicted emissions from the proposed facility against other emission sources in the area. The comparison showed the project was not predicted to contribute more than 3% to existing industrial emissions in the area. The Human Health Risk Assessment also noted that the predicted chronic air concentrations from the project were below background levels reported for the general area. These concentrations in air are found by EnRiskS to be well below a level that has the potential to result in adverse health effects in all members of the public associated with exposure to short-duration peak air concentrations.

3.8.3 Noise and Vibration**Issue**

The Noise and Vibration Assessment prepared by Pacific Environment Limited has found that noise generated by the construction and operation of the facility will not be expected to exceed project specific noise goals or acceptable amenity criteria.

ISLHD PHU is satisfied that the Noise and Vibration assessment has appropriately characterised the existing background noise levels and taken a conservative approach to estimating the noise that will be generated by the project.

However as it is proposed to undertake night construction activities and operate 24 hours a day, ISLHD PHU recommends that all reasonable and practicable measures are taken to minimise night time noise that may cause sleep disturbance and subsequent potential health impacts. Incorporation of the identified noise mitigation strategies into the construction and operation environmental management plans will be critical to achieving this outcome.

Response

It is understood that the ISLHD PHU is satisfied with the Noise and Vibration assessment and measures provided in the EIS. TQ acknowledges the proposal includes activities outside standard construction activities and 24 hour operation. **Appendix C** identifies activities that will be undertaken outside standard hours. The mitigation measures identified in the EIS have also been revised in **Table 6-1** to include the identified noise mitigation strategies in the CEMP to ensure impacts are appropriately managed.

3.8.4 General Hazard**Issue 1**

The effective management of hazards at the proposed facility is essential for the protection of public and environmental health. The potential impact of environmental and operational hazards has been assessed by a Surface Water Assessment and Preliminary Hazard Analysis (PHA), including an assessment against the recommendations of the Buncefield Incident.

The ISLHD PHU has reviewed these documents and can make the following comments:

- The assessment of environmental hazards summarised in table 3.2 of the PHA doesn't appropriately address the risks presented by Tsunami or Storm Surge. The risk of storm surge has been addressed in the Surface Water assessment but there is no assessment of the potential impact of a tsunami on the facility.

Response 1

The risk of potential impact due to tsunami has been assessed within PHA response to submission included within **Appendix E** of this report. Existing modelling of the wave run up height for various Average

Recurrence Intervals (ARI) was compared against the highest level of the site bund walls to determine the impact on the proposed site. Based on this modelling, 200, 500 and 1,000 year ARI tsunami run-up events would be below the top level of the Site 1 and Site 2 bund walls and the water run-up is not expected to breach the site bund walls.

It is recognised that in the unlikely event of a tsunami, advanced warning would be provided to the site which would allow evacuation and site management as necessary.

Issue 2

- The majority of the response to the Buncefield Recommendations is to be addressed at the detailed design stage and incorporated into the MHF Safety Case Report. ISLHD PHU recommends the development of the facility be subject to compliance with the project requirements identified in Table G.1 of the PHA.

Response 2

TQ are committed to considering and implementing recommendation from the Buncefield Recommendations in the detailed design of the PK BLT. These recommendation aspects will also be considered and incorporated (where relevant) into the MHF Safety Case Report for the project. TQ will ensure that the facility will be designed and operated in accordance with the project requirements outlined in Table G.1 of the PHA provided with the EIS.

3.9 Fire and Rescue NSW

Issue 1

In regards to hazard and risk it is FRNSW opinion that the reliability of the proposed facility's fire systems could be enhanced by building in additional system redundancy. In particular, the current proposal to group all firewater supply tanks and associated fire pumps in one location could result in the site's fire systems being rendered totally inoperable (e.g. by a single catastrophic impact event).

It is therefore FRNSW recommendation that the site's fire water supply tanks and pumpsets be physically separated and located so as to minimise the likelihood of a single event rendering the site's fire suppression systems inoperable.

Building this level of redundancy into the fire suppression system would greatly enhance FRNSW ability to safely & efficiently resolve a significant fire event. Consequently, FRNSW ability to minimise the consequences of a significant fire event upon the local community would be considerably enhanced.

Response 1

TQ acknowledges the comments provided by FRNSW. This requirement will be further investigated in the preliminary design and detailed design stages of the fire systems for the project. There are space restrictions on the site that may limit alternative locations of large equipment such as fire water tanks however TQ commits to further consultation meetings with FRNSW during the development of the Fire Safety Study and also as the design of PK BLT progresses.

Issue 2

From our meeting with TQ Holdings it is FRNSW understanding that consideration is being given to the site being unmanned outside of usual business hours.

It is FRNSW experience that large flammable/combustible liquid storage facilities utilise fire detection and suppression systems that are tailored to the particular site. While final detailed design of the facility's fire systems is yet to be completed, it is FRNSW understanding that the site's fire suppression systems will be automatically initiated upon fire detection system activation. In the event that automatic activation fails, manual back-up activation controls will be provided. The location of manual activation valves and their operation will require a high degree of system and site familiarity. From FRNSW perspective it is highly desirable that facility personnel be on-site at all times. The provision of timely on-site expertise greatly enhances the ability of FRNSW to rapidly fulfil our statutory duties and therefore minimise the impact of emergency incidents upon the local community.

FRNSW therefore recommends that the facility is staffed by on-site personnel on a 24/7 basis.

Response 2

TQ acknowledges the comments provided by FRNSW. Operational manning levels will be developed and reviewed as the project progresses. These manning levels will be discussed with FRNSW to ensure that timely on site expertise is provided in the event of an emergency incident.

Issue 3

In the event of development consent being granted, it is FRNSW recommendation that a fire safety study is developed and that the FSS is undertaken in accordance with the recommendations detailed in Hazardous Industry Planning Advisory Paper No.2 (HIPAP 2). It is also recommended that the FSS be approved by FRNSW.

Response 3

TQ has commenced development of the Fire Safety Study and will continue to consult with FRNSW during the preparation and submission of the Fire Safety Study.

3.10 Wollongong City Council

3.10.1 Traffic matters

Issue 1

The Traffic Impact Assessment (TIA) found that the key 'travel routes' operate at an acceptable level of service during the AM and PM peak periods. However the background growth and development generated traffic in the future have been shown to adversely impact on the Masters Road/Springhill Road intersection, which is shown to operate at Level of Service E with 'excessive delays'. The TIA has put forward an indicative intersection proposal for the Masters Road/Spring Hill Road intersection to mitigate the traffic impacts and improve the Level of Service, but Council has concerns over the proposal. The proposal seeks to convert the existing signalised short left turn on Masters Road to a continuous unsignalised free-flow left with a short exit/merge lane onto Springhill Road. The 80kmph merge uphill could be problematic for slow moving heavy vehicles and may result in increased conflict with fast moving northbound vehicles on Springhill Road that are passing the intersection. There are already a number of heavy vehicles using this leg to access Tom Thumb Road and the Port. The merge lane length would need to be determined by further detailed design but could be much longer than currently exists requiring additional works with the road reserve. In any case the proposed alterations relate to a classified road intersection and should be referred to the Roads and Maritime Services.

Response 1

Section 5.2.1.1 of the Traffic Impact Assessment (Appendix H of the EIS) indicates that the proposed mitigation of the Masters Road/Springhill Road intersection was a concept plan only that was utilised to reinforce the conclusion that this intersection in is need of an upgrade regardless of the proposed development. The indicative layout did not represent a proposal to upgrade this intersection as part of the current project. Should RMS decide to proceed with the planning of the intersection Wollongong City Council would be invited to provide comment on the proposed layout.

Issue 2

The submitted swept paths on approach to the site indicate conflict with vehicles turning from Tom Thumb Road into Morton Way and traffic travelling northbound on Morton Way. The applicant will need to address this issue either through physical works on the intersection and road network, or a suitable traffic management strategy.

Response 2

As detailed within Section 6.1 of the Traffic Impact Assessment (Appendix H of the EIS), the potential conflict of vehicles turning from Tom Thumb Road into Morton Way will be addressed during detailed design in consultation with NSW Ports.

Issue 3

A car parking layout plan needs to be provided for employees' vehicles, and other vehicles which complies with AS2890.1.

Response 3

The proposed layout of the staff parking will be developed during detailed design.

Issue 4

The TIA has highlighted that there is potential for heavy vehicle queuing in and around the site. This could impact on the safety and amenity of other road users. The applicant will need to provide details of how vehicles will be managed to enable the free flow of vehicles on approach, and limit potential safety implications.

Response 4

An Operational Traffic Management Plan will be developed for the site during detailed design. The Plan will include consideration of traffic flows outside the site whilst queuing is occurring within the site.

Issue 5

A number of mitigating measures are proposed to address potential construction impacts, such as a Traffic Management Plan, truck slot booking system, haulage routes, physical works etc. However, it is unclear whether these measures would be effective in addressing construction impacts without further details being provided for assessment.

Response 5

Further details in regards to the Operational Traffic Management Plan, truck slot booking system, haulage routes, physical works etc. will be identified during the detailed design phase of the project.

3.10.2 Environmental Matters**Issue 1**

As a State Significant Project it will be regulated by the Office of Environment and Heritage (OEH) under an Environmental Protection Licence (EPL).

Response 1

TQ acknowledges the requirement for an EPL for the project and will work with the EPA during the detailed design phase to obtain an EPL.

Issue 2

The concerns raised in Council's previous preliminary advice on this proposal have been addressed in the documentation prepared for this development application.

Response 2

TQ acknowledges Wollongong City Council's satisfaction with the information provided.

Issue 3

It is recommended that air quality monitoring be validated and that there be a regular monitoring regime for surface and groundwater quality. Further, a noise survey should be integrated into the site management plan.

Response 3

The need for ongoing environmental monitoring will be carried out in accordance with the mitigation measures identified in **Table 6-1** and as required by the future EPL.

3.10.3 Stormwater/flooding matters**Issue 1**

Concern is raised over the potential impact of the proposal in the receiving waters and the management of water through the design.

The following technical matters which should be addressed are:

- Minimum Floor Levels

Minimum floor levels for the development should be designed to comply with the NSW Government's Floodplain Development Manual 2005. These levels should take into account the effects of climate change based on current Department of Primary Industries, NSW Office of Water guidelines

Response 1

Appendix J of the EIS details the flood level considerations that were included within the assessment. Table 4-8 of the assessment identifies that “The proposed building (office / warehouse) would be located on Site 3 which is not affected by main stream flooding from Gurungaty Waterway. The building would meet the habitable floor level requirements”. Consequently, the proposed floor levels are designed to comply with the NSW Government’s Floodplain Development Manual 2005.

Issue 2

- No Adverse Run-off Impacts on Adjoining Properties

The design of the development including proposed drainage works on Morton Way should ensure there are no adverse effects to adjoining properties or upon the land as a result of flood or stormwater run-off. Attention should be paid to ensure adequate protection for buildings against the ingress of surface run-off.

Response 2

The Surface Water Assessment (Appendix J of the EIS) identified that the proposed construction works have the potential to alter runoff and flow paths of surface water flow regimes across the project area. These alterations have the potential to increase flooding on Morton Way due to construction works within Site 2 impacting on the flow path from Morton Way to Gurungaty Waterway. This flow path will be diverted as part of the detailed design for the site through an upgrade to the drainage infrastructure along Morton Way. The works will ensure that flooding impacts on Morton Way are mitigated during a high rainfall event. The event design level will be nominated during the detailed design phase in accordance with Wollongong City Council guidelines.

Issue 3

- Re-direction of Treatment of Stormwater Run-off

Allowance should be made for surface run-off from adjoining properties. Any redirection of treatment of that run-off should not adversely affect any other property.

Response 3

The Surface Water Assessment (Appendix J of the EIS) details the proposed capture, treatment and reuse of surface water runoff from the site. This would include the use of an internal drainage and stormwater treatment system including multi-staged containment and water quality treatment using oil water separation. Any water discharged from this system will be in accordance with the EPL obtained from the site. As a result of the level of treatment stormwater impacts on other properties due to runoff redirection are not expected.

Issue 4

- Drainage Works as Executed

The developer should obtain written verification from a suitably qualified civil engineer, stating that all stormwater drainage and related work has been constructed in accordance with the plans approved by the Consent Authority. In addition, full works-as-executed plans, prepared and signed by a Registered Surveyor should be submitted to the Consent Authority. These plans should include levels and location for all drainage structures and works, buildings (including floor levels) and finished ground and pavement surface levels. This information should be submitted to the Consent Authority.

Response 4

TQ recognise that upon completion of construction and prior to operation, a suitably qualified civil engineer will verify the completed works. This will include the drainage structures, buildings and finished ground and pavement surfaces.

Issue 5

- Scour Protection

All stormwater outlets, drainage channels and overland flow paths should incorporate scour/erosion protection measures. The final details should be reflected on the plans.

Response 5

The detailed design phase will identify scour and erosion protection measures.

Issue 6**- Dilapidation Report**

The developer should provide the Consent Authority with dilapidation report, identifying the condition of road/drainage/utility infrastructure and all land in the vicinity of the proposed works prior to the commencement of works in Morton way.

Response 6

A dilapidation report has been completed by TQ and will be provided to NSW Ports as required.

3.10.4 Conclusion**Issue 1**

It is considered that the Project has merit in principle and there are no particular matters that would preclude the development from proceeding, subject to the above matters being addressed.

Response 1

TQ acknowledges Wollongong City Council's support for the project.

4 Response to Stakeholder Submissions

Submissions were received from two local stakeholders, including the following:

- > GrainCorp
- > Port Kembla Coal Terminal

4.1 Overview of Stakeholder Issues Raised

Responses by local stakeholders have been provided in **Section 4.2** to **Section 4.3**. Issues raised by the stakeholders generally relate to ongoing consultation and the risks or hazards associated with site being developed. Letters of response have been provided to GrainCorp and PKCT which are included within **Appendix A** of this report.

4.2 GrainCorp

4.2.1 General

Issue

Thank you for the opportunity to express our views on the proposed State Significant DA (Application Number: SSD 7264) (the DA). GrainCorp Operations Limited (GrainCorp) would like to take this opportunity to outline its concerns with the DA and the limited extent of documentation submitted in support of the proposed works. Relevantly, GrainCorp is of the opinion that the supporting documentation contains a number of critical omissions. The Department of Planning and Environment (the Department) is requested to require the Applicant to address and respond to the matters raised in this submission before progressing the assessment of the DA. Furthermore, the Department is requested to provide GrainCorp with the opportunity to review and comment on additional information submitted by TQ Holdings Australia Pty Ltd (TQ Holdings) in response to the matters raised herein before progressing the assessment of the DA.

Response

TQ acknowledges GrainCorp's concerns with the DA and believes the RTS adequately addresses these concerns in light of the proposal. TQ understands the applicant is required to address matters raised in the submission before the assessment of the DA and as is noted in **Section 2.1**, TQ has made efforts to ensure that issues and concerns raised by GrainCorp were discussed prior to the completion of this RTS report. TQ will continue to liaise with GrainCorp (and NSW Ports as required) throughout the detailed design phase to ensure any design and operational concerns are satisfactorily addressed.

4.2.2 Staging Approval

Issue

Clause 2.5 refers to staged development and suggests that approval has already been granted for Stage 1A. GrainCorp disputes this claim given the vastly different proposals. The original Project Approval (Application Number: 08_0083) (Original DA) included a ship unloader on Berth 104 with the addition of a discharge point in a later amendment. Consultation at the time (appendix 3.2 Approval No. 08_0083) was as follows:

M Jelbart (GrainCorp) asked what the impact of the liquid bulk unload facilities would be with regards to the utilisation of Berth 104. E. Dutton ((NBL) National Biodiesel Limited, now TQ Holdings) advised that the liquid bulk unload facilities will be used to bring in biodiesel for distribution during construction of the main production facilities. The associated number of vessel movements at this time would be a fraction of the agreed and approved amount when the main production facilities are in operation. Once the main production facilities are operational, NBL will be producing biodiesel on site and there will no longer be any need to bring in biodiesel for distribution, so there will be no change in the agreed and approved amount of vessel movements when the main production facilities are in operation

This clearly indicates that any impact on GrainCorp's utilisation of Berth 104 would be minimal and temporary; ending on completion of the facility, GrainCorp relied on this when deciding not to pursue NBL's use of an alternate berth for the discharge point. However the DA indicates that 230 million litres per annum of biodiesel will be discharged from Berth 104.

The Original DA also cited that discharge would be a combustible C1 biodiesel. The DA includes the discharge of significant quantities of Class 3 dangerous goods.

Given that the above assurances from the Original DA are vastly different from the DA, GrainCorp respectfully requests that the Department advise TQ Holdings that approval to commence Stage 1A is not provided by the Original DA and that the commencement of work on the project is to be held in abeyance pending determination of the DA.

GrainCorp wishes to understand the full impact on their business of this significant change to the development from the Original DA to the DA, Engagement with GrainCorp under the Original DA has not addressed the significant and ongoing berth and wider business impacts sufficiently and has not addressed the class, proximity and quantity of fuel storage. The Original DA was for a single ship unloader rather than 4 unloading arms. As noted above, consultation was explicit around this being a short term arrangement and this was the basis of our verbal agreement. The proposed loading arm is vastly different from what was suggested under the Original DA and thus exposes GrainCorp and other operators to different risks, both safety risks and operational risks. Examples of these are provided below.

Response

TQ met with GrainCorp to discuss any concerns relating to Staging of approvals on 1st March 2016. This discussion included a detailed description of the proposed early works, known as Stage 1A, which were to allow the site to be setup through commencement of minimal construction activities allowable under an existing approval (MP08_0083) whilst the new SSD approval (SSD 7264) is being sought. TQ outlined that the potential early works only comprise of a retaining wall, piles and foundations for 6ML tanks that are in the same location and function as per the existing approval.

Also, TQ clarified that these early works do not include any works on Berth 104 which was of concern of GrainCorp.

TQ notes that construction of Stage 1A will not be commenced separately and therefore the SSD Approval (SSD 7264) being sought will cover all required development works.

4.2.3 Business Impact

Issue

The potential impact to the GrainCorp business is unclear in the proposed DA, Clause 2,1 suggests compatibility with nearby businesses however given the flammable nature of the products and potential isolations required when discharging at berth, the extent of the impact is unclear, There has been minimal consultation to date with regard to isolation requirements and again, AS3846 (The Handling and Transport of Dangerous Cargoes in Port Areas) compliance review should be provided and should identify potential impacts and modifications required to GrainCorp's assets and operational activities near the berth location due to the presence of large fuel ships and associated infrastructure, GrainCorp respectfully requests that approval for the DA is withheld until TQ Holdings has fully articulated these issues and demonstrated that there will be no impact on GrainCorp's pre-existing use of the site. Development documentation states that TQ Holdings will rely on the Port Authority of NSW - Port Kembla PIRMP for berth operations. Given the significant change in operation at the berth that will result from the proposal, we believe that this is inadequate and requires review or a separate PIRMP.

Response

TQ met with GrainCorp to discuss any concerns relating to Business Impact on 1st March 2016. During this meeting TQ outlined that they have met with NSW Ports and the Port Authority to discuss proposed future berth operations. A Pollution Incident Response Management Plan (PIRMP) will be prepared to adequately address issues around incident management considering the intended use of Berth 104 for bulk fuel product

unloading operations and to ensure that any business impacts are managed appropriately for operations of this berth. It was also noted that whilst GrainCorp only unloads combustible liquids, some of the vessels have flammable cargoes requiring isolation of the berth during discharge, hence it is important for GrainCorp to understand its isolation requirements in relation to all vessels using the berth.

TQ noted they are in the process of determining and defining the Hazardous Area surrounding vessels while unloading on Berth 104, which will be shared with GrainCorp as soon as it becomes available. This will help inform future Emergency Management planning requirements around the berth for all users as well.

During discussions GrainCorp noted the need to relocate storm anchors associated with the park position of the northern grain loader to accommodate the berth mounted infrastructure required and TQ advised that a detailed scope of works is currently being developed for this and other modification works. Once finalised, TQ will arrange a follow up meeting with GrainCorp to discuss these details further. These works will be carried out and managed in accordance with the CEMP.

4.2.4 Proximity of Flammable Tanks and Bunds to Other GrainCorp Assets

Issue 1

Class 3 tank and/or bund locations may necessitate GrainCorp plant isolations and /or asset modification (e.g. intrinsically safe electrics conversion and constraint on vehicles on road to berth). A professional peer review of the development PHA recommends that more information is required to make a better informed assessment of potential impacts, namely:

1) Provide plot plan overlays of thermal radiation impact zones at 12.6kW/m² and 23kW/m² for fire incidents from tank top and bund fires related to loss of containment events for flammable and combustible liquids. Show the location of assumed fire centres and the associated pool diameters of the major fires.

Response 1

TQ notes GrainCorp's request for further information relating to Class 3 tank and/or bund locations. Please see the response to the above requests provided below with greater detail available in the correspondence from TQ to GrainCorp (**Appendix A**) and the PHA technical note (**Appendix E**).

The pool diameters for all tank top fires and bund fires are reported in Appendix D of the EIS and reproduced in the PHA Technical Note (**Appendix E**). Plot plan overlays were produced by Sherpa for the following thermal radiation contours and consider the worst-case distance:

- > 12.6 kW/m² and 23 kW/m² for tank top fires on combustible tanks on Site 2 (Figure 7 and Figure 8)
- > 12.6 kW/m² and 23 kW/m² for tank top fires on flammable tanks on Site 2 (Figure 9 and Figure 10)
- > 12.6 kW/m² and 23 kW/m² for intermediate bund fires on tanks closest to the Graincorp site. Intermediate bunds are the small bunds around each tank (Figure 11 and Figure 12)
- > 12.6 kW/m² and 23 kW/m² for a Site 2 bund fire (Figure 13).

Sherpa recommends due to the rectangular shape of Site 2 and the circular overlays, the distances to heat radiation levels need to be applied along the length of the bund (i.e. from TK-25 to TK-38) for thermal radiation contours at 12.6 kW/m² and 23 kW/m² for a Site 2 bund fire (Figure 13).

Issue 2

2) Provide plot plan overlays of isopleths for major flammable liquid evaporation and dispersion events for F2 conditions. Show both LFL and 1/2 LFL isopleths.

Response 2

The distances to LFL are reported in Appendix D of the EIS. A plot plan overlay is provided in **Appendix E** (Figure 14) and shows the distances to Lower Flammability Limit (LFL) for three scenarios at F2 conditions. TQ understands the request for a plot plan of 1/2 LFL isopleths for F2 conditions, however, the generation these contours and would provide little benefit due to the uncertainty in modelling results and that the LFL isopleths reach the buildings on the GrainCorp site.

Issue 3

- 3) Provide justification for the use of TNO failure frequency data (5×10^{-5} per year) for "major" losses from large storage tanks, compared with the UK HSE value of 100×10^{-5} per year as seen in reference 17 of the PHA.

This will help understand the possible implications of key incidents and some assumptions on nearby GrainCorp plant and operations.

Response 3

The value for TNO failure frequency data sourced from the publically available TNO Purple Book is considered to be a credible scenario for the PK BLT as the UK HSE value does not provide advice on the reasoning behind the use of a specific tank hole diameter. Please see **Appendix A** and **Appendix E** for more detailed responses to the above request for information.

4.2.5 Lease**Issue**

Site 3 includes a sediment pit currently used by GrainCorp as an exit point for licenced stormwater discharges. The impact of the proposal to this area and alternative discharge areas is not explained within the DA submission and as such GrainCorp is unable to adequately assess the potential impact to our operations.

GrainCorp's lease boundary extends north of the Berth 104 Access Bridge, overlapping with one of the TQ lots.

Both of these issues will require consultation and approval from GrainCorp before proceeding.

Response

TQ met with GrainCorp to discuss any concerns relating to lease implications on 1st March 2016. GrainCorp noted during the discussion that their licensed discharge point is situated at their site boundary, but that the water goes through the local drainage network that exits the existing outfall on Site 3. TQ confirmed that they are currently working through the design details of modifications required to the existing drainage points with NSW Ports. The concept design proposes to replace the existing sedimentation basin with a more compact gross pollutant trap (GPT) unit to collect trash and debris that is also capable of handling the current flow capacity of the existing outfall system. TQ confirmed that this detailed design is yet to be completed. TQ will forward any details of design for the proposed modifications to the Site 3 drainage outfall so GrainCorp can verify that it does not adversely impact on the discharge from their site, and so that GrainCorp can update details of the drainage network with the EPA if necessary.

GrainCorp also noted that there are two current discharge points from Site 2 and TQ acknowledged that TQ may need to relocate these drains around the perimeter of Site 2 due to required foundation works. It was agreed that GrainCorp will provide TQ with their site stormwater discharge details from Site 2 so that TQ can ensure that design meets flow requirements.

GrainCorp also noted that TQs proposed access to Berth 104 is via a lease area on the section of road way controlled by GrainCorp. TQ noted that further discussion will be required between NSW Ports, TQ and GrainCorp to discuss and agree on formal access agreement requirements for third parties wishing to access Berth 104 via any GrainCorp leased areas. GrainCorp acknowledged they are already in discussions with NSW Ports regarding this issue.

TQ is committed to ongoing liaison with GrainCorp and NSW Ports to ensure that any lease issues are resolved and considered during the detailed design stage of development.

4.2.6 Traffic

Issue

It appears that the baseline traffic count does not take into account variation with grain harvest seasons. By averaging the fuel throughput rather than more accurately reflecting variability in both fuel and grain traffic, we believe the traffic modelling is not representative of and potentially underestimates the true potential impact to our operation. Similarly, offsite truck queuing is not addressed within the documentation provided nor does it include the intersection at Tom Thumb Road and Morton Way which the DA suggests is a major truck access point (refer to page 33). Consequently, we consider that further traffic modelling is required in order to determine the potential impact of the proposed DA on traffic flows throughout the local and regional road network.

Response

TQ met with GrainCorp to discuss any concerns relating to traffic on 1st March 2016. TQ advised GrainCorp that the RMS reviewed and accepted all of TQ's traffic modelling submitted with the PK BLT EIS. TQ committed to undertaking further assessment to confirm that seasonal grain truck movements are considered thoroughly and requested some input data from GrainCorp to complete this further assessment. Subsequently information on vehicle types, routes, arrival times and seasons were provided by GrainCorp to TQ.

Accordingly, Cardno has reviewed the forecast truck movements servicing the Port Kembla Grain Terminal (PKGT) contained within the PKGT Traffic Impact Assessment (Cardno, 2011). The maximum predicted truck volume (worst case scenario) was 192 trucks per day based on 8 trucks per hour for 24 hours, which is the maximum throughput of the hopper. Comparing these figures to the historical data supplied by Mark Jelbart of Graincorp Ltd (7 March 2016) it can be seen that the maximum predicted volumes have never been reached in the five years since operations were expanded. The maximum number of trucks servicing the PKGT from FY2011 - FY2015 was 115 trucks on 22 January 2013. This indicates that seasonal variations and even season to season fluctuations in grain harvests have been accurately captured in previous traffic planning and analysis.

As indicated in the PK BLT Traffic Impact Assessment Section 6.3 (Appendix H of the EIS), the arrival of trucks to the Bulk Liquids Terminal will be managed through a truck slot booking system to prevent queuing of vehicles on public roads and internal port access roads. Furthermore, the nature of the site means there is adequate storage within the internal road network to accommodate multiple trucks without causing queuing spillback on to the Port's access roads which would affect through traffic or access to other commercial operations.

Modelling of the intersection of Tom Thumb Road and Morton Way was not considered necessary as it only provides access to the PK BLT site and service vehicles to GrainCorp and Berth 104, therefore potential impacts on through traffic or other commercial operations will be limited. As noted in the PK BLT Traffic Impact Assessment Section 6.1 (Appendix H of the EIS), the operation of this intersection will be addressed in consultation with NSW Ports during the detailed design and future traffic management planning stages to ensure that increased truck movements to the PK BLT site do not cause unsatisfactory road safety or traffic efficiency impacts.

The PK BLT Traffic Impact Assessment (Appendix H of the EIS) highlights that peak traffic generation of the PK BLT will occur between 2am – 10am. Based on information from GrainCorp Ltd the peak traffic generation of the grain terminal generally occurs in early afternoon (**Figure 4-1**). This means that the PKGT and PK BLT peak traffic generation periods will not coincide, with subsequent benefits in terms of reduced impacts on the local road network.

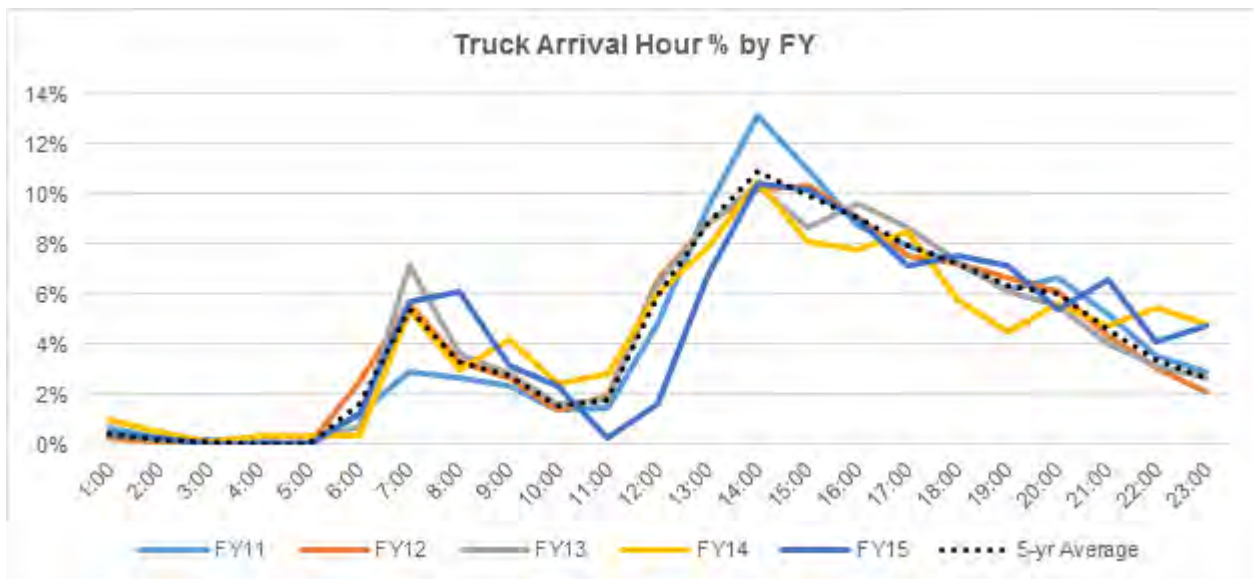


Figure 4-1 Peak Traffic Generation for the Port Kembla Grain Terminal (GrainCorp, 2016).

Additional discussion during the meeting between GrainCorp and TQ on 1st March 2016 included TQ clarifying that provisions have been made for truck queuing on Site 2 for approximately (10) B-double vehicles (subject to final design). The design of the PK BLT facility will also incorporate load scheduling to limit the flow of vehicles on to site within a given timeframe to help reduce potential impacts on traffic flows in the port precinct. TQ noted that load scheduling is how most modern fuel terminals operate efficiently.

GrainCorp enquired about potential traffic issues at the intersection of Thom Thumb Road and Moreton Way and TQ noted that they have already discussed this with NSW Ports, and TQ will continue to do so, as there are apparent constraints to potential intersection modifications imposed by the location of recently installed conveyor trestle foundations.

GrainCorp also noted that if additional vehicle parking is required there may be an opportunity for TQ to use GrainCorp's existing truck marshalling facilities. TQ will consider this additional option of truck marshalling and discuss this opportunity further with GrainCorp and NSW Ports.

TQ is committed to ongoing liaison with GrainCorp and NSW Ports to ensure that any traffic issues are considered during the detailed design stage of development and mitigated accordingly.

4.2.7 Construction

Issue

In the event, the project is ultimately approved, the construction hours should not impact GrainCorp's operations and quiet enjoyment of leasehold land and berth during shipping activities. We request that construction activities be required to cease while GrainCorp is loading and unloading.

Response

TQ met with GrainCorp to discuss any concerns relating to construction related issues on 1st March 2016. GrainCorp noted they have requested that construction cease on Berth 104 whilst they have a vessel in berth, noting that construction on other TQ land areas will not be affected by a GrainCorp vessel in berth and so construction in these areas would continue. TQ accepted this position as they agreed it is a fair and reasonable requirement. Consultation will be undertaken with GrainCorp during construction to ensure shared use of the Berth 104 is managed and allows suitable use by GrainCorp during a vessel being located at the berth.

TQ also noted that they intend to share the proposed construction schedule for Berth 104 with GrainCorp once it has been detailed. TQ also requested that during construction GrainCorp also provide forward

notification of when vessels are scheduled to be in berth so that TQ can manage planned construction activities.

TQ is committed to ongoing liaison with GrainCorp to ensure that construction impacts are considered during the detailed design stage of development and mitigated accordingly.

4.2.8 Concluding Remarks

Issue

While the above safety and operational issues are of utmost importance, we also note that no consultation has been made on the commercial impacts of using shared infrastructure such as the fire system on Berth 104 and power source for Morton Way; both of which are currently maintained and operated by GrainCorp. We would seek cost recovery for any shared use.

As emphasised throughout this submission, the Department is respectfully requested not to progress the assessment of the DA until the matters raised are addressed and resolved to GrainCorp's satisfaction.

Response

TQ met with GrainCorp to discuss any concerns relating to safety and operational issues on 1st March 2016. During discussions GrainCorp noted that fire system hose reels on Berth 104 are owned by GrainCorp and the hydrants are NSW Ports'. TQ noted that they intend to bring foam and potentially water onto the berth as required by the fire system which is yet to be detailed. NSW ports have also advised that TQ are to install fire water and foam systems on Berth 104, fed from the PK BLT fire system.

TQ also confirmed that power for Berth 104 facilities will be fed from NSW Ports' switch room, which is supplied from the GrainCorp site. TQ advised that their lease with NSW Ports allows the use of power from this particular switch room. GrainCorp raised the point that cable pits along Moreton Way are owned by GrainCorp and TQ noted that Endeavour Energy has advised this infrastructure is GrainCorp's and so any TQ proposed modification or integration with this infrastructure will require further liaison with GrainCorp. TQ have requested any available details from GrainCorp on the cable pits along Moreton Way.

TQ is committed to ongoing liaison with GrainCorp and NSW Ports to ensure that safety and electrical issues are considered during the detailed design stage of development and mitigated accordingly.

4.3 Port Kembla Coal Terminal

Issue 1

In noting the proposed development, our considerations go to the implications and acceptability of siting flammable and combustible liquids storage facilities adjacent to our premises. Broadly, our concerns pertain to the following:

- Risks to our site personnel and operations. In particular, it is noted that these storage facilities are proposed to be located in close proximity to critical infrastructure, our primary access road and our product stockyard which contains open stockpiled coal which is in itself combustible.
- Whether the siting of such a facility introduces restrictions to PKCT in its use of its leased premises and any future works or developments which may be contemplated.

With regard to (b) above, your advice is sought as to whether there will be any restrictions or caveats placed on PKCT associated with this development.

Response 1

- > The PHA recommended where the damage and propagation risk contour encroaches into PKCT land north of site 1 (shown in Figure 4 of **Appendix E** and also consultation letter in **Appendix A**), the risk can be managed by ensuring that: equipment, piping or structures are not located within this area
- > dangerous goods are not stored or present within this area.

Refer to Section 10.4.1 of the PHA report provided with the EIS for more information. The Department of Planning and Environment (DPE) also raised a comment in relation to the risk contour extending into PKCT land which has been addressed in **Section 3.3.2** (refer 'Issue' and 'Response' No.7) above.

In addition, TQ met with PKCT on 17 March 2016 (as noted in **Section 2.2**) to discuss responses to all of their submission comments. The discussion between TQ and PKCT covered each submission point noted and a letter of submission responses (see **Appendix A**), based on the PHA technical note prepared by Sherpa Consulting (see **Appendix E**), was provided to PKCT for their reference.

Issue 2

Show the thermal radiation isopleths at 12.6 and 23 kW/m² for all the full bund fires on site 1. Show the assumed fire centres. Lay these over the area map to see potential thermal impacts on PKCT's northern stockpile areas and the PKCT operations area directly north of site 1.

Response 2

The thermal radiation isopleths at 12.6 kW/m² and 23 kW/m² are shown in Figure 1 of the additional PHA technical note prepared by Sherpa Consulting (see **Appendix E** and also consultation letter in **Appendix A**). This figure shows the full bund fire scenario involving flammable material. The bund fire centre was assumed to be at the centre of the Site 1 bund and is shown in the Figure 2 of **Appendix E**, noting that the release into a full bund is considered the worst case scenario on Site 1.

Issue 3

Provide the LFL isopleth outlines for the major, full bund gasoline pool dispersions, giving some details of the surface roughness and other atmospheric and terrestrial assumptions.

Response 3

Section 3 of the technical note prepared by Sherpa Consulting (see **Appendix E**) clarified that the distance to the Lower Flammability Limit (LFL) for a full bund gasoline pool dispersion extends up to 200 m from the Site 1 bund wall downwind in F2 conditions. This is shown in Figure 3 of **Appendix E**. The results are reported in Appendix D3 of the PHA report provided with the EIS. It should be noted that release into a full bund is the worst case scenario on Site 1. There is only one full bund scenario. Intermediate bund fire scenarios produce smaller thermal radiation isopleths.

Issue 4

Provide details of how TQ would mitigate the effects of full bund fire events as well as the potential generation of large flammable vapour clouds particularly in relation to impacts on the PKCT site to the east, north and south of the TQ site 1

Response 4

The technical note prepared by Sherpa Consulting (see **Appendix E**) notes that fire prevention systems will be available in the Site 1 bund. These systems will be designed in consultation with Fire Rescue New South Wales (FRNSW) as required under the Hazardous Industry Planning Advisory Paper (HIPAP) No. 2 FSS.

Sherpa also notes that measures to prevent release of flammable material into the bunds due to overfilling of tanks, Safety Integrity Level (SIL) 2, include high level protection provided on all storage tanks on Site 1.

Ducted overfill piping are also provided on the tanks. This directs any overflow material into the bund sump, which are equipped with hydrocarbon detectors. Fixed bund foam pourers will also be installed to provide a foam blanket if there are any spills into the bund. These systems will prevent accumulation of flammable or combustible material in the bund, and hence prevent potential generation of large flammable vapour clouds due to tank overfill.

A ducted overfill system is incorporated into PK BLT's tank design as part of best practice safety design for bulk fuel storage tanks (refer to Appendix G of the PHA report provided with the EIS).

TQ has met with PKCT on 17 March 2016 to discuss all above issues and will continue ongoing consultation with PKCT to ensure that PKCT are aware of mitigation and monitoring measures in place to reduce the risk to personnel and infrastructure in neighbouring land parcels.

5 Minor Project Changes and Confirmation of Scope

5.1 Minor Project Changes

The following is a summary of any minor changes to the PK BLT project plans:

- > Stage 1A will not proceed under Major Project Approval (08_0083) and associated modification under S75W (by MOD 1, MOD 2 & MOD3) as original staging plans noted in Section 3.3 of the EIS. This proposed change in staging is described further below in **Section 5.2**.
- > Some minor layout changes may be required during the detailed design phase to accommodate ancillary works and safety equipment such as fire tank system storage tanks relocation and minor functionality changes arising from the NSW Fire and Rescue submission comments outlined in **Section 3.7** and the Fire Safety Study which is currently underway. Any minor layout changes required to accommodate ancillary equipment will consider the findings of the EIS, this document and any required mitigation measures.

5.2 Development Stages

5.2.1 Stage 1A

Section 3.3 of the EIS noted that prior to developing the overall PK BLT, TQ will commence construction of selected elements of the existing Major Project Approval (08_0083) and associated modification under S75W (by MOD 1, MOD 2 & MOD3). These works would be consistent with the environmental assessment, conditions of consent, statement of commitments (SoC) for this existing approval.

Considering the timing requirements imposed by Major Project Approval (08_0083), whereby the approval shall lapse if 'the proponent does not physically commence the building works associated with the project by 5 May 2016', TQ are now advising that the works described as Stage 1A would not be able to be commenced by this approval date. This means that all stages of works would be now be covered under the SSD (7264) application.

5.2.2 Stages 1, 2 and 3

The proposal consists of three main development stages of the PK BLT which have been separated to fast track the commencement of operations. The proposed project will be constructed in three stages on Sites 1, 2 and 3 which still require planning approval from DP&E. The new SSD planning application covers all stages of the proposed development. The stages of the Proposed Project have been identified as:

- > Stage 1
- > Stage 2
- > Stage 3.

5.2.2.1 Stage 1

Stage 1 will form part of the new SSD approval from DP&E.

This stage of development is comprised of:

- > Seven combustible liquid storage tanks on Site 1
- > Five flammable liquid storage tanks on Site 1
- > Two flammable liquid storage tanks on Site 2
- > Slops tanks on Site 1 – to collect any waste product or spills
- > Bund walls around Site 1 and the tanks constructed on Site 2

- > Truck loading bay structure and fit out of three truck loading bays on Site 2
- > Service bridge between Site 1, Site 2 and Site 3
- > Pump bay and product piping to the truck loading bays from Site 1 to Site 2 (refer to note below relating to scheduling of pump bay equipment construction)
- > Workshop and control room/office facilities on Site 3
- > Landscaping along sections of the perimeter of Site 3 including a suitable selection of native plants. Site 1 and Site 2 are not planned to include landscaping along the perimeter
- > Fire system, utilities, stormwater and pavements for Site 1 and for the truck loading bay and ethanol storage tanks on Site 2
- > Vessel unloading equipment including rail mounted trolley with 3 MLAs and associated infrastructure on Berth 104
- > Vapour Recovery Unit and Additive storage and injection system on Site 2
- > Nitrogen & Compressed Air supply systems and Oily Water Separation System on Site 3.

The tanks are 10 – 29m in diameter and have heights ranging from 20 – 29m. The throughput after completion of Stage 1 is anticipated to be 720 mega litres per annum (MLpa) at commencement, increasing to 1,200 MLpa. Stage 1 works are anticipated to be completed to allow operation commencing in early 2018.

Construction work within Stage 1 will be scheduled to allow construction of items such as foundations, tanks, bulk earthworks to commence while detailed design around the pump bay is finalised. This will ensure that items which will not affect the risk and propagation contours (as identified in the PHA provided as Appendix D of the EIS and subsequent technical provided in **Appendix E** of this report) can be constructed whilst a greater level of detailed design can be employed to engineer out the propagation and risk contours on surrounding land. TQ will review the risk and propagation contours during the detailed design stage with an aim to bring this contour within the site boundary. Construction of Stage 1 would only commence after discussion and agreement with NSW Ports.

5.2.2.2 Stage 2

Stage 2 will predominantly occur on Site 2 and will form part of the new SSD approval from DP&E.

This stage of development is comprised of:

- > Three flammable liquid storage tanks on Site 2
- > Two combustible liquid storage tanks on Site 2
- > Bunding around a reduced section on Site 2 to provide the necessary bund capacity for the largest storage tank and positioned in such a way as to allow future tanks construction to occur onsite during Stage 3
- > Fit out of one additional truck loading bay on Site 2
- > Pump bay and product piping to allow the transfer of product from Site 2 to Site 1
- > Fire system, utilities and stormwater for additional storage tanks on Site 2.

The capacities, diameters and heights of tanks will be as per Stage 1 dimensions. The additional capacity will allow throughput to increase to 2,000 MLpa. Stage 2 is anticipated to be completed by late 2018.

5.2.2.3 Stage 3

Stage 3 will predominantly occur on Site 2 and Berth 104, with the date for commencing Stage 3 construction determined by market demand. Stage 3 will form part of the new SSD approval from DP&E.

This stage of development is comprised of:

- > Two flammable liquid storage tanks on Site 2
- > Two combustible liquid storage tanks on Site 2
- > Bunding around additional tanks on Site 2, integrating with existing bunds constructed in Stage 2
- > An additional MLA on Berth 104
- > Fit out of two additional truck loading bays on Site 2
- > Fire system, utilities and stormwater, fencing and pavements for additional storage tanks on Site 2.

The additional capacity for Stage 3 will allow throughput to increase to approximately 2,900 MLpa. The completion date of Stage 3 will be determined by market factors.

5.3 Proposed Site Construction

5.3.1 Proposed Construction Activities

As per Section 3.4 of the EIS, the following is a summary of construction activities proposed:

- > Bulk earthworks across all sites.
- > Installation of drainage infrastructure.
- > Piling of pre-cast driven concrete piles for tanks.
- > Concrete foundations and roadway construction.
- > General construction and fabrication activities including installation of piping and tanks requiring use of cranes, welding, grinding, etc.

A bulk earthworks strategy has been developed for the proposed bulk earthworks. This strategy identified that all three sites to require net fill.

5.3.2 Construction Staging

Construction of the project will be staged as outlined above with construction activities associated with:

1. Stage 1 occurring on Sites 1, 2 and 3 and the Berth.
2. Stage 2 occurring predominantly occur on Site 2.

Stage 3 will predominantly occur on Site 2 and the Berth. The date for commencing Stage 3 construction will be determined by market demand.

5.4 Proposed Site Operations

5.4.1 Hours of Operation

As per Section 3.5 of the EIS, the proposed site will be operational 24 hours a day 7 days per week manned by onsite operations personnel during higher risk activities such as ship unloading or product transfer. All terminal activities (controlling tank movements, product transfers, road tanker loading, Vapour Recovery Unit monitoring, fire system control and alarms) will be coordinated by the Control Room Operator.

5.4.2 Proposed Throughput

As per Section 3.5 of the EIS, Stages 1 and 2 are designed to accommodate flammable and combustible fuels. Stage 3 will be developed for additional flammable and combustible products as required by market demand. The forecast throughput levels are summarised in **Table 5-1**.

Table 5-1 Estimated Annual Throughputs for Petroleum Products

Fuel Type	Stage 1 (ML pa)	Stage 2 (ML pa)	Stage 3 (ML pa)
Combustibles	780	1,300	1,885
Flammables	420	700	1,015

A VRU will be sized to suit the above throughputs and truck loading rates to reduce air emissions.

The above forecast is based on the following estimated ship movements as provided by TQ:

- > Stage 1 – 22 vessels per year
- > Stage 2 – 25 vessels per year
- > Stage 3 – 32 vessels per year.

5.4.3 Maintenance and Other Minor Works

To support the daily functions of the PK BLT ongoing maintenance and other minor works may be undertaken during operation to ensure that operation occurs within the parameters as identified in the EIS and this document. The works will ensure the function of the PK BLT occurs in a safe and secure manner through minimising any risks or environmental impacts on people or the environment. The works may include activities such as plant and equipment upgrades or replacement, installation of additional pollution control measures and hose/pipeline repairs. The OEMP will identify such works and will outline appropriate management measures to minimise any potential impacts.

6 Revised Environmental Mitigation Measures

The environmental impact statement for the project identified a range of environmental outcomes and management measures that would be required to avoid or reduce the environmental impacts.

After consideration of the issues raised in the public submissions, the environmental management measures for the project (refer to Section 11.3 of the EIS) have been revised.

The adjustments to the measures were made to:

- > Make additional commitment based on the issues raised in the submissions within this report
- > Modify wording so that the outcome of the commitment is clearer.

Where new commitments have been added or new text has been added to an existing measure it has been *italicised*. Where a commitment has been deleted or text from the commitment deleted is appears as ~~strike through text~~.

Should this project be approved, the environmental management measures in Table 6-1 will guide the subsequent project development phases (design and construction) of the proposed bulk liquids terminal.

Table 6-1 Summary of Mitigation and Management Measures

Parameter	Discussion	Mitigation Measures
1 Hazards and Risk	Materials to be handled at the PK BLT include biofuels as well as petroleum based hydrocarbons and small quantities of additives with similar properties to fuels. Due to fencing and natural barriers such as waterways, there will not be a constant presence of people within these areas. This coupled with an absence of flammable and combustible material in these areas results in the offsite fatality risk due to PK BLT operations identified by the PHA as tolerable.	- Ongoing consultation with PKCT is recommended to ensure that fatality and escalation risks are minimised and agreed measures are developed - To apply the relevant recommendations arising from the final Buncefield Investigation to PK BLT site as detailed in Appendix G of the PHA (see Appendix D of this report). <i>Include in a surge analysis study during detailed design, the scenarios of high surge pressures if the ship's pumps stop working during a power failure and activation of the MLA emergency release coupling while unloading a ship.</i> <i>An Emergency Plan will be developed for the PK BLT. This plan should include the associated hazards arising from ships close to shore.</i>
2 Air Quality	There are no privately owned receptors, recreation areas or on-site locations predicted to exceed the NSW EPA's average criteria for the air quality metrics assessed or the NSW EPA's nose-response criteria for odour. The results indicate that the operation of the bulk liquids terminal will have negligible impact on the air quality in Port Kembla and surrounding townships.	Construction - An Air Quality Management Plan will be developed as part of the CEMP including: - Methods to monitor the effects of construction activities - Measures required to minimize dust and vehicle emissions during the construction of the project. - The number and sizes of stockpiles will be kept to a minimum. - Dust suppression shall be undertaken during construction and clearing activities, particularly during high wind conditions. Haul roads and other unsealed areas may be watered to suppress dust. - Ensure that all vehicles and machinery are fitted with appropriate emission control equipment, maintained frequently and serviced to the manufacturers' specification. - Minimise construction equipment idling time. Operations - Each shore line will be equipped with a pig launcher and receiver in order to clear fuel product into the tank and leave the line clear for the next product. Pig propulsion will be via nitrogen pressure using a reticulation system from the terminal nitrogen tank. - The pigging facilities will be equipped with containment and sump for hydrocarbon pump out. Once pigged clear, the line is depressurised into a cyclone column that separates hydrocarbon droplets and vapours vented from the shore lines. The collected liquid is then pumped across to the slops tank, and the vapour fed into the Vapour Recovery Unit to recover the remaining hydrocarbon vapours. - When the vessel has finished pumping and the surveyor has confirmed the ship's tank is empty and dry, the ships manifold valve is closed and the MLA cleared by draining and pumping in a closed system. The shore pipeline is then pigged to the tank, the line depressurised (as detailed above), pig removed from the receiver and the line left in nitrogen at atmospheric pressure. - These processes are included to mitigate against potential emissions from product unloading. The pigging operations and vapour recovery underlie the assumption of not including this phase of the operational process in the emissions estimation. - The piping design will minimise the potential for surge overpressure via the provision of expansion loops, valve closure times, check valves in tanks and product piping. Product pumps will have variable speed drives with soft start up and shut down to prevent surging. - Pipework which is normally full with product that has closed sections will be protected by thermal relief around isolation valves. This will ensure that no product (and emissions) is lost to the environment. - Bunds will be utilised to ensure that in the unlikely case of leakages, fuel products will not seep into groundwater and leave the site. Bunds containing pipework and equipment that is normally full with product will include level detection and hydrocarbon detection so that any leakage can be readily detected, in addition to routine inspections by operators. These site bunds will incorporate a pump out system to drain any spilled product to a closed slops handling system. - Full contact internal floating roofs will be installed on all bulk storage tanks with flammable liquids to effectively mitigate against vapour headspace emissions during tank filling operations. - PK BLT will utilise a vapour recovery unit to recover vapours and minimise emissions associated with the loading of fuels into road tankers. The vapour recovery unit will be located near the truck loading gantry. The recovered product will be pumped into the slops tank near the truck loading bay for eventual recovery into a nominated bulk tank. - Product will be recovered by carbon absorption in either one of two absorption vessels, which are regenerated by vacuum. At any one time, it is expected that one vessel is being desorbed while the other is on the line. - Vapours from the vacuum process will be passed through a liquid vapour separator vessel then into a packed absorption tower which is supplied by a cold gasoline stream from the duty gasoline tank. The gasoline absorbs the vapours within the tower and the gasoline is returned to the duty gasoline tank. Residual vapours are repassed through the active absorption vessel to recover the remaining product. - Requirements outlined in Clause 63 of the Clean Air Regulation for control equipment for large storage tanks will be implemented. The following control equipment is required: - A drainage system comprising of a small sump or tundish fitted under each water draw-off valve and connected to a totally enclosed drain, or - For volatile organic liquid stored in a tank with a vapour pressure ≤ 75 kPa the tank must have either a floating metal roof, a floating cover constructed of material impervious to vapour that floats on the liquid surface inside a fixed roof, or a vapour disposal or recovery system that meets the requirements of the Clean Air Regulation. - For volatile organic liquid stored in a tank with a vapour pressure > 75 kPa the tank must have a vapour disposal or recovery system that meets the requirements of the Clean Air Regulations. <i>An operational odour response management plan should be prepared within the OEMP, to address potential response requirements in the event that adverse odour events were to occur</i>

Parameter	Discussion	Mitigation Measures
		- The efficiency of the VRU unit will be monitored through a prescribed regime consistent with test methods as per the NSW Approved Methods for the Sampling and Analysis of Air Pollutants in NSW (EPA, 2005). - Transport companies shall have vehicles demonstrating they have 'Compliance Plate Approval' to ensure trucks meet the national standards covering safety and emission requirements known as the Australian Design Rules (ADRs). - Procurement policies should consider companies that have a commitment to operational and environmental improvements.
3 Noise and Vibration	The majority of PK BLT related traffic is expected on Springhill Road and Masters Road. Increases in traffic noise during both construction and operation would be below the traffic noise increase criteria of 2 decibels. No significant operational vibration sources are anticipated to impact on the nearest residential areas from operations on the facility.	A noise <i>and vibration</i> management plan within the CEMP and OEMP is recommended for the ongoing monitoring and management of potential noise impacts resulting from the Proposal. As a minimum the noise and vibration management plan will consider: - The nearby residences and other sensitive land uses. - The noise management identified in this assessment. - Vibration limits as identified in this assessment. - Address the potential impact from the proposed construction methods. - Develop reactive and proactive strategies for dealing with any noise and vibration complaints. - Management of acoustic impacts from vessels. - Identify a site contact person to follow up complaints. - Construction noise management measures during piling should consider: consultation, noise monitoring, feasible and reasonable noise controls such as temporary acoustic screens, orientation of plant and lower noise generating methods such as pre boring - Validation of piling impacts through use of vibration trials during the initial piling works. - Vibration monitoring trials to confirm safe work distances and methods. - Develop and implement a noise monitoring and/or auditing program within the Traffic Management Plan to confirm trucks achieve noise standards during the construction and operational phases. Noise management measures <i>will</i> include: - Selection of quiet plant and equipment, particularly Larger Excavators and Haulage Trucks. - Limiting the times of operation for noisier plant items to the Daytime, or Evening period. - Scheduling noisier activity to regular hours and less noisy activity to non-scheduled hours. - Staff and contractor education and training of road traffic noise and appropriate driving behaviours. - Measures to minimise noise outside standard working hours that may cause sleep disturbance and subsequent potential health impacts. - Undertaking vibration trials during the initial piling works to ensure validation of the vibration modelling. - Site inductions highlighting minimisation of noise outside standard working hours. - Avoiding and minimising impact when loaded and unloading equipment. - Minimising engine start-ups and excessive revving. - Minimising the use of reversing alarms during works outside standard working hours. - Reschedule to a day time period any works that can potential cause excessive impact noise and therefore sleep disturbance. Further noise reduction measures will be considered during the detailed design phase.
4 Traffic and Transport	There are no critical capacity issues arising during the Stage 1 Operation /Stage 2 Construction scenario. The traffic generated by the PK BLT during Stage 3 Operations (full development of site) scenario would result in a negligible increase in traffic generation.	Construction - Develop a detailed Traffic Management Plan for the construction stages of the project in accordance with the Traffic Control at Worksites, version 4.0 (NSW Roads and Maritime Services, June 2010). The Traffic Management Plan would include: - Hours of haulage, which do not impose on peak periods and school drop-off and pick-up times. - Haulage routes, in accordance to the RMS restricted access to heavy vehicles. - Designated areas within the site for heavy and light vehicles turning movements, parking, loading and unloading. - Sequence for implementing traffic works and traffic management devices if required. - Safety principles for construction activities, such as speed limits around the site and procedures for specific activities. - Assessing the need for oversize/over mass vehicle and management of their movements. - The internal access and parking areas will be designed such that all vehicles, including the largest design vehicle (25m B-Double) are able to easily drive through the sites to ensure safe turning manoeuvres without requiring excessive reversing. - Parking facilities will be provided in accordance with Australian Standards (AS2890 Series). Operations - Design internal access and parking areas such that all vehicles, including the largest design vehicle (25m B-Double) are able to easily drive through the sites to ensure safe turning manoeuvres without requiring excessive reversing. The general morning peak traffic in the local area occurs between 8:15 AM and 9:15 AM and between 4:30 PM and 5:30 PM during the afternoon. This traffic impact assessment has demonstrated that the local road network has adequate capacity to cater for PK BLT operational traffic during the morning and evening peak hours. - Any site entry gates installed shall also be setback from the road to accommodate the longest vehicle accessing each site to allow free flow of internal and external vehicles. - TQ will utilise a truck slot booking system to prevent queueing on internal and external roads.

Parameter	Discussion	Mitigation Measures
		A truck slot booking system will be implemented during peak period. - Provide parking facilities in accordance with Australian Standards (AS2890 Series). - Risk management strategies should be considered when planning for the transportation of hazardous materials. - Risk management strategies have several aspects, including: - choice of the best routes - identification of the main risk contributors - identification and implementation of risk reduction measures; - measures to avoid avoidable risk; - adoption of the most cost beneficial safeguards; and - ensuring appropriate and comprehensive emergency plans.
5 Surface Water	The Surface Water Assessment concluded that the Site is mostly free from constraints of flooding and stormwater. The Proposal is not likely to impact on the water quality of adjoining waterways and wastewater will be suitably managed to reduce any potential adverse impacts.	Construction - Development of an Erosion and Sediment Control plan (ESCP) with measures to be in place prior to any works commencing at the site. The ESCP will be prepared as part of the CEMP in accordance with the Landcom Managing Urban Stormwater; Soils and Construction Manual 2004. The ESCP would be maintained for the duration of construction, to prevent any polluted water and sediment entering receiving waterbodies. - Installation of erosion and sedimentation control devices prior to commencement of any site works. Erosion controls would remain in place until the bare soils and surfaces are stabilised (by revegetation or other means) and removed when redundant. This needs to include the diversion of 'clean' water around the site in order to avoid treating it and also to avoid potential additional erosion from off-site sources. - Appropriate erosion and sediment control devices would be placed down-slope of all excavation works, spoil stockpiles or works that would disturb the ground surface, down-slope of access roads that are highly utilised as well as in other areas as appropriate. - Sedimentation is likely to be due to sheet flows occurring within the site. This type of sedimentation can be effectively controlled by using vegetated buffers (e.g. turf where appropriate), sediment barriers and sediment fences. - Minimise the extent and duration of disturbance by means of work planning and staging. - Disturbed areas would be restored (sealed or covered with pebbles/gravel or vegetated, as appropriate) upon the completion of the works in that area to ensure that the exposure of soils is minimised. - Embankments and other areas subject to earthworks and grading would be revegetated with an appropriate cover crop or stabilised with other means as soon as possible following achievement of final levels. - Where revegetation is required and where deemed feasible, locally indigenous plant species, including shrubs, grasses and other groundcovers, would be planted in appropriate locations to assist in soil stabilisation following completion of construction. Maintenance of these plantings would include regular watering and appropriate weed control to ensure the plants survive and continue to enhance the site. - Daily visual inspections of erosion and sediment control devices to determine the condition and effectiveness of control measures. Immediate action would be taken to repair any control devices that have failed to work adequately. Operations - All water which has been in contact with potentially hydrocarbon-soiled surfaces within the bunded area is contained and processed to Environmental Protection Agency (EPA) standard by using an Oil Water Separator (OWS) that will be strategically located on Site 3. - Sites 1 and 2 will have centralised collection sumps that will include a gravity oil separation and oil recovery system. Before an intermediate bund sump transfers water to the centralised collection sump, the pump must be locally started so that inspection for potential oil spills can take place. If a spill is detected in an intermediate bund sump the spill can be redirected away from the centralised collection sump for recovery. - Bund walls (1.8m high) will be established around the storage tank areas on Site 1 and 2. In addition, separate intermediate bunds (0.6m high) will be constructed to contain most tanks individually. All product spillage and stormwater runoff would be contained inside the bunded area. Each intermediate bund has a sump that can be drained individually into a central bund water collection pit for the site. Free hydrocarbons are recovered in these central sumps and water from the central bund water collection pit on either Site 1 or Site 2 can then be pumped into the two stage gravity settling pit on Site 3, prior to being treated by OWS-3 and then discharged from site in accordance with an EPA license. - Recovered hydrocarbons from the OWS system are directed to the waste oil decanter tank where they can be recovered or transferred to a waste collection vehicle for disposal. - Hydrocarbon and waste collection piping will be designed to run above ground so that any potential leaks are visible and can be detected and repaired, rather than underground where a leak poses a potential ground contamination issue. - Any underground stormwater pipes that may potentially be exposed to hydrocarbon contaminated water will be equipped with hydrocarbon compatible sealed joints to prevent infiltration into ground. - In order to mitigate the impacts, runoff from external catchments will be captured and conveyed into the Inner Harbour via upgraded road drainage on Morton Way. This may include upsizing existing pipes and pits as well as installing new stormwater lines. The upgrade works will increase the total inlet capacity on Morton Way and reduce the risk of pit inlets becoming blocked by debris. - Water from the central bund water collection pit on either Site 1 or Site 2 will be pumped into the two stage gravity settling pit on Site 3, prior to being treated by an OWS and then discharged from site in accordance with an EPA license. An underground Gross Pollutant Trap (GPT) will be installed on Site 3 for the treatment of stormwater flows from the existing Tom Thumb Road drainage network prior to discharging the treated stormwater into Gurungaty Waterway (non-licenced discharge point). In addition to gross pollutants and sediments, the treatment system will be designed to capture oil and grease. The GPT treatment system will be sized for the full road catchment including the western extent of Tom Thumb Road connecting to Site 3 across the bridge. Runoff from the PK BLT sites will bypass the GPT and be directed to an OWS on Site 3 instead.

Parameter	Discussion	Mitigation Measures
		- The access road on the southern and eastern extent of Site 2 will be used as a truck staging area for empty trucks waiting for loading. Runoff from this area will be discharged directly into Inner Harbour via stormwater treatment system consisting of a GPT and oil capture system to collect oil and grease from runoff. In case of spill, a clean-up will also be initiated using spill kits. - A designated overland flow path will be provided at the low point for flows in excess of the drainage system. - Leakage, spillage and wash down water within the bunded truck loading bays will be collected in grated pits at each bay. The bunded area at each truck bay will be sized to contain the contents of a tanker compartment as well as normal wash down water. Any waste collected from the truck loading bay will be pumped to the above ground slops tank. All waste piping from each truck loading bay remains above ground to eliminate the possibility of undetected subsurface contamination. - A detailed Fire Safety Study and fire system design will be undertaken to determine optimal type and methods for collection and dewatering of foams within bunded areas. Consideration for foam selection will include water quality and contamination impacts of the foam solution. <i>The study and design will include:</i> - Selection of the firefighting foams to be handled, stored or used (not containing perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA)). - Justification for the foams selected - Characterisation of any potential discharges to surface or groundwater waters - An assessment of the likely impacts in the event of any discharge of contaminated fire water; and - A description of all feasible and reasonable measures to minimise any discharge of contaminated fire water.
6 Green House Gas and Climate Change	The GHG Assessment (Appendix E) concluded that the proposed development would produce a very small portion of GHG. Consequently, the PK BLT design has been developed to address potential Climate Change impacts, with no adverse impacts anticipated.	- TQ will implement emission capture and abatement technology throughout the detailed engineering design and equipment procurement processes. This will include specification of floating roof tank designs, vapour recovery units and associated fuel emission capture and abatement technology to ensure the PK BLT is built to standard industry practices. - It is also suggested by TQ that the form of transportation may incorporate rail once new infrastructure is developed to meet the demand criteria, thus reducing future greenhouse emissions from this process. <i>TQ will attempt to utilise freight companies which commit to sourcing vehicles with Compliance Plate Approval. This ensures trucks meet the national standards covering safety and emission requirements known as the Australian Design Rules (ADRs). TQ will also attempt to utilise companies which have a commitment to operational and environmental improvements.</i>
7 Biodiversity	Green and Golden Bell Frog (<i>Litoria aurea</i>) as the only species to have either a 'high' or 'moderate' potential to use the subject site. A Commonwealth Significant Impact Assessment and NSW Assessment of Significance found that there will be no significant impacts to Green and Golden Bell Frogs from the proposal, and a referral to the Commonwealth is therefore not required. An assessment in accordance with the Framework for Biodiversity Assessment (FBA) has been undertaken to determine the biodiversity offset requirements of the project. Mitigation measures are proposed to ensure there will be no significant impact on neighbouring aquatic ecology or habitat.	Construction - A frog-exclusion fence should be put in place along the fence line to the rail corridor and around the western boundary of Site 3, limiting access for the frogs during this period. This fence should be consistent with the Green and Golden Bell Frog Best Practice Guidelines and the Green and Golden Bell Frog Survey (BEC 2015). It can be attached to the existing fence lines or the proposed retaining wall and should have a lip to ensure frogs do not jump over it. - Pre-clearance surveys are recommended consistent with the Management Plan for the site (BES 2012). - If extended periods occur between erection of the fence and construction work further pre-clearance survey is advised to clear any stranded frogs. - If extended periods occur between erection of the fence and construction work further pre-clearance survey is advised to clear any stranded frogs. - During construction activities at Site 3 construction contractors should be made aware of the position of the mangrove seedling so as to reduce the potential to cause damage. - Sediment control devices including silt curtains should be used during bank stabilisation works at Site 3 to prevent runoff causing increased turbidity within Gurungaty waterway and the greater port area. - Remove and dispose of bitou bushes within the construction area via methods described within the Weeds of national Significance 'Bitou bush Current management and controls options for bitou bush (<i>Chrysanthemoides monilifera</i> spp. <i>rotundata</i>) in Australia' (Winkler et al., 2008). - Appropriate hydrocarbon spill kits should be in the vicinity of construction activities to contain any spills. In the event that the spill kit is unable to control a spill and hydrocarbons enter the waterway an absorbent boom should be available to be deployed to reduce the spread of any such spill. - Machinery and equipment associated with construction activities should be cleaned within a designated wash down area that ensures wastewater does not enter the waterway. - Sediment control devices such as hay bales and geofabrics should be deployed throughout the construction area in the vicinity of storm water drains to reduce mobilised sediments entering the waterway. - Follow the measures to be provided in the Pollution Incident Response Management Plan developed for the project as part of the Construction Environment Management Plan (CEMP). - Ensure training and inductions for all personnel include Green and Golden Bell Frog awareness aspects and response requirements. Green and Golden Bell Frog management and response requirements need to be outlined within the Construction Environment Management Plan (CEMP). Operations - Potential for frog migration through the site is most likely at night-time during the summer months after heavy rain. Staff and contractors should be made aware of the Green and Golden Bell Frog Management Plan prepared by BES (2012), which should be amended to reflect future operational risks and requirements prior to operations commencing. - Bund and sump management procedures should consider the potential for Green and Golden Bell Frog breeding within bunds. - Ensure training and inductions for all personnel include Green and Golden Bell Frog awareness aspects and response requirements. Green and Golden Bell Frog management and response requirements need to be outlined within the OEMP. - The site manager should be made aware of any discoveries and contact an ecologist or the Wollongong Office of Environment and Heritage so that appropriate relocation of the frog/s can be undertaken if necessary.

Parameter	Discussion	Mitigation Measures
		- Ensure that appropriate hydrocarbon spill kits are placed at various locations throughout the site to contain any spills. In the event that the spill kit is unable to contain a spill and hydrocarbons enter the waterway an absorbent boom should be available to be deployed to reduce the spread of any such spill. - Gross pollutant traps and hydrocarbon capture should be a priority for stormwater catchments which service areas accessed by tanker trucks. - Implement a stormwater management plan that incorporates gross pollutant traps prior to waste water discharge. Employee and contractor induction should include a section dealing with the potential for gross pollutants to impact the site. - Clean machinery and equipment associated with construction activities within a designated wash down area that ensures wastewater does not enter the waterway. - Follow the measures to be provided in the Pollution Incident Response Management Plan developed for the project as part of the Operation Environment Management Plan (OEMP). - Ensure that all vessels comply when appropriate with the International Maritime Organisation (IMO) Ballast Water Convention to reduce the potential of harmful aquatic organisms being discharged into Australian waters. The IMO Ballast Water Convention requires that all vessels must have and comply with a 'Ballast Water Management Plan'
8 Waste Management	The proposed PK BLT facility will generate both solid and liquid waste during operation. With the implementation of the identified mitigation and management measures, the waste generated by the proposed PK BLT will not have a significant adverse impact on the environment. To minimise waste generation and promote recycling, a Waste Management Strategy (WMS) has been prepared in accordance with the aims, objectives and guidelines in the <i>NSW Waste Avoidance and Resource Recovery Strategy 2007</i> and <i>NSW Waste Avoidance and Resource Recovery Strategy 2014-2021</i>.	Construction - No contaminated soil has been identified. If any is discovered during construction, it will be disposed of in accordance with the Unexpected Finds Protocol to be incorporated into the CEMP. - All sewerage waste will be collected in a septic tank and trucked off site by licensed contractor until connection to existing rising main and agreement with Sydney Water has been established - Timber formwork will be reused where possible. Any damaged or unusable timber will be recycled, or disposed at a licensed receiving facility. - Steel will be collected and recycled. - Standard timber pallets will be reused where possible. Any damaged or unusable timber will be recycled, or disposed at a licensed receiving facility. - Plastics will be recycled where possible - Excess cable will be collected and reused or recycled by the electrical installation contractor. Operations - TQ will adopt a paperless document management system and actively seeks to reduce the need to print paper copies where possible - Paper and cardboard materials will be separated and stockpiled in appropriate areas on site for collection and recycling - Metals, plastic and timber will be separated and stockpiled in appropriate areas on site for collection and recycling - All steel and metal strapping will be recycled - Waste oil will be stored in appropriate container on site and removed from site by licensed contractor for re-processing, recycling or appropriate disposal. - Fuel spills will be contained and collected in bunded areas or drip trays and transferred to slops tanks for product recovery. - Remaining slops tank contents will be pumped to oily water separator for final treatment prior to clean water discharge <i>or removed from site by a licenced contractor.</i> - Slops will be tested and blended with product stored on site if product specifications can still be maintained. Otherwise slops to be removed from site by licensed contractor. - Waste water will be pumped from slops tank to oily water tank on each site.
9 Visual Amenity	The proposed PK BLT is located in an existing industrial area of Port Kembla's Inner Harbour that operates 24 hours per day, seven days a week. The existing industrial development surrounding the proposal provides a visual environment which is not sensitive to change. Consequently, the proposed PK BLT will have minimal visual impact on the amenity of the surrounding areas	- Use of materials and paints to mimic the existing industrial development as far as reasonably practical. - Design and implementation of lighting in accordance with: - AS 4282 - 1997 Control of the obtrusive effects of outdoor lighting - AS 1940 The storage and handling of flammable and combustible liquids - AS/NZS 1680.5:2012 Australian and New Zealand Interior and workplace lighting, Part 5: outdoor workplace lighting
10 Heritage	The PK BLT site is identified as a highly disturbed and highly modified environment. There are no sites of local, state or commonwealth heritage significance identified at the site or within three kilometres of the site. Due to this lack of sites and object of historic heritage a Statement of Heritage Impact is not required for the project as the project has a low potential to impact on objects or places of European heritage.	Include the following mitigation measures in the CEMP and OEMP: In the event that potential Aboriginal or European artefacts are discovered during the works, all works are to cease immediately within the direct area. TQ is to immediately inform NSW Ports, the NSW Office of Environment and Heritage and a member of the Illawarra Aboriginal Land Council (if in relation to an Aboriginal place or object). Coordinate appropriate management of the site with the relevant agencies.
11 Soils and Groundwater	During construction, the risk of onsite soil erosion will increase due to the works resulting in exposure of soils through earthworks. There is a potential for ASS to occur in material greater than 5m below the surface. Potential impacts to groundwater are unlikely given that the bulk of the works are above ground.	Construction - Development of a CEMP including a Soil and Water Management Sub-plan to manage potential erosion, <i>sediment and groundwater</i> impacts during construction. - Sediment and erosion control devices should be installed to minimise transport of sediment in accordance with <i>Managing Urban Stormwater, Soils & Construction, Volume 1 (Landcom, 2004)</i>. These devices should be inspected regularly and immediately after rainfall to ensure effectiveness over the duration of works. Any damage to erosion and sediment controls should be rectified immediately. - Risks associated with the disturbance of any ASS encountered during construction would be managed through an expected finds protocol outlined in the <i>Erosion and Sediment Control Plan within the</i> CEMP. - Construction of hardstand areas with appropriately sized bunding around fuel storage and refuelling areas.

Parameter	Discussion	Mitigation Measures
		- Construction of appropriate enclosed and separated clean and oily water drainage systems which shall include the installation and operation of an oil/water separator. - If groundwater is encountered during excavation, a groundwater assessment will be undertaken to determine the volume and quality of the water to determine if appropriate permits are required. <i>If groundwater is to be extracted, consultation with DPI Water is required prior to extraction.</i> Operations - Development of an OEMP to manage and monitor potential operational phase soil and groundwater impacts, such as spills and leakages. - Maintenance of hardstand areas with appropriately sized bunding around fuel storage and refuelling areas. - Operation of appropriate enclosed and separated clean and oily water drainage systems which shall include the installation and operation of an oil/water separator. - Implementation of regular maintenance inspections/audits during operation.
12 Utilities	The utility supply requirements for the PK BLT development will be designed to appropriate Australian Standards and relevant authority guidelines to consider the existing capacity and future performance of all utility servicing. The connection and augmentation of all utility works requirements will be designed, planned and carried out in a manner that will minimise impacts on the existing neighbouring operations.	General - Continue consultation with NSW Ports and relevant service providers to discuss design, supply and access for the PK BLT utility connection requirements. - Ensure all utilities are to be designed in accordance with appropriate standards and guidelines to consider the existing capacity and future performance of all utility servicing. Construction - Prior to construction, all existing utilities and their locations will be confirmed to avoid any conflicts or damage during construction. - Any associated servicing augmentation approvals and requirements will be arranged by TQ with the appropriate servicing authorities prior to construction commencing. - The connection and augmentation of all utility works requirements will be designed, planned and carried out in a manner that will minimise impacts on the existing neighbouring operations. - TQ will operate the PK BLT in accordance with any utility supply agreements.
13 Socio Economic	The nearest residence is located 1,200m from the proposed PK BLT project site. The surrounding area consists of a range of heavy industrial and port related operations situated within A number of potential impacts associated with the social amenity of the area were identified. However, subject to the mitigation measures listed throughout Section 9 of this document, these impacts will not be significant.	Construction - A Construction Environmental Management Plan (CEMP) will be prepared prior to construction commencing to ensure all environmental aspects associated with construction activities are appropriately managed to minimize impacts to neighbouring operators, sensitive receptors in the vicinity of the site as well as the broader community. Operations - An Operational Environmental Management Plan (OEMP) will be prepared to ensure environmental aspects are appropriately managed to minimize impacts to neighbouring operators, sensitive receptors in the vicinity of the site as well as the broader community.
14 Ecologically Sustainable Development	The proposed development incorporates the principles of ESD through the implementation of the recommended mitigation measures detailed within the specific environmental assessments. Consequently, the proposal aligns with the ESD requirements identified within Clause 7(4) of Schedule 2 of the EP&A Regulation and would not create a significant environmental impact. The project does not present any significant impact on the local community.	Construction - A CEMP will be prepared prior to construction and will contain procedures to address risks and incidents during construction, as well as operation. Procedures would be developed for incidents including product spills, flooding, excavation of contaminated material uncovering of heritage items or relics. Operations - An OEMP, storm water drainage plan and WMS will be prepared to ensure environmental aspects associated with the capture and management of runoff and waste, air quality and noise are appropriately managed to minimize impacts to neighbouring operators, sensitive receptors in the vicinity of the site as well as the broader community. Where access to property is to be blocked temporarily, the contractor would advise the affected parties in advance of the work.
15 Cumulative Impact Assessment	The individual impact assessments demonstrate that the Proposal, in conjunction with existing and known future developments, would not have a significant level of impact. Based on the assessment provided, the works will have minor cumulative impacts on the existing environment during the course of construction.	Works will be undertaken in accordance with the mitigation measures outlined in the EIS and the contractors CEMP and OEMP.

7 References

Australian and New Zealand Environment and Conservation Council (ANZECC) (2000) *Australian and New Zealand Guidelines for Fresh and Marine Water Quality: Volume 1 – The Guidelines*. Published by Australian and New Zealand Environment and Conservation Council and the Agriculture and Resource Management Council of Australia and New Zealand

Cardno (2011) *Port Kembla Grain Terminal Traffic Impact Assessment*. Prepared for GrainCorp Limited.

Cardno (2015) *Environmental Impact Statement: Proposed Port Kembla Bulk Liquids Terminal (SSD 7264)*. Prepared for TQ Holdings Australia Pty Ltd.

Department of Environment Climate Change and Water (DECCW) (2006) *Illawarra Water Quality and River Flow Objectives*. Available online at <https://www.environment.nsw.gov.au/ieo/Lakellawarra/report-02.htm>

Environmental Protection Authority (EPA) (2000) *Industrial Noise Policy*. Published by NSW Government.

Environmental Protection Authority (EPA) (2015) *Diesel and Marine Emissions Management Strategy*. Published by NSW Government.

GrainCorp (2016) Pers Comm. Email dated 7th March 2016 from Mark Jelbart (GrainCorp) to Robert Kempton (TQ Holdings Australia Pty Ltd).

NTC Australia (2006), Noise Test Procedures for In-Service Motor Vehicles, National Transport Commission [http://www.ntc.gov.au/Media/Reports/\(9745A524-E60D-9B7C-835B-CDAF7DC19D8B\).pdf](http://www.ntc.gov.au/Media/Reports/(9745A524-E60D-9B7C-835B-CDAF7DC19D8B).pdf)

URS (2014) ES001 *Environmental Scoping Assessment – National Terminals Proposed Bulk Liquids Terminal*. Prepared for National Terminals Pty Ltd.

United States Environmental Protection Agency (US EPA) (2004) *SPECIATE Database*, http://cfpub.epa.gov/si/speciate/ehpa_speciate_browse_details.cfm?ptype=G&pnumber=4673

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

APPENDIX

A

CONSULTATION

TQ Holdings Australia Pty Limited

T: +61 2 9016 8514

F: +61 2 9929 2243

Level 4, 71 Walker Street

North Sydney NSW 2060

www.tqholdings.com.au

ABN: 67 606 242 568



16 March 2016

Matthew Warrington
General Manager - Supply Chain
GrainCorp Operations Limited
Level 28, 175 Liverpool Street
Sydney NSW 2000

We are writing in response to your letter to Mr Chris Ritchie from the Department of Planning and Environment on 28 January 2016, relating to TQ Holdings Australia Pty Ltd Port Kembla Bulk Liquids Terminal (SSD 7264) State Significant Development Application Submission.

We wish to provide the following information as requested in your letter.

The information provided here specifically relates to consequences. The Preliminary Hazard Analysis (PHA) included in the EIS provides a risk-based approach to land use planning as adopted in NSW, i.e. the PHA considers both the consequence and likelihood of the bund fire scenarios at Port Kembla Bulk Liquids Terminal. The issues raised by GrainCorp will be further explored in the Fire Safety Study that is currently being prepared by TQ Holdings. The Fire Safety Study adopts a consequence based approach to identify the requirements for fire prevention strategies and measures. We would welcome the opportunity to meet and discuss prevention strategies in detail once you have had an opportunity to consider the information provided in this letter.

The following items specifically address

- 1. Provide plot plan overlays of thermal radiation impact zones at 12.6 kW/m² and 23 kW/m² for fire incidents from tank top and bund fires related to loss of containment events for flammable and combustible liquids. Show the location of assumed fire centres and the associated pool diameters of the major fires.**

For tank top fires, the tank diameter was used as the pool diameter. The pool diameters are reproduced in Table 1 for tank top fires, and Table 2 for bund fires. The pool diameters for all tank top fires and bund fires are outlined in Appendix D of the PHA report.

The thermal radiation isopleths have been modelled using Effects software, version 9.0. The weather conditions used for modelling include a stability class of D, wind speed of 5 m/s, temperature of 22°C and a relative humidity of 70%. The isopleths provided are based on the maximum distance at any elevation to provide the most conservative values.

Table 1 - Tank top fire pool diameter

Tank Number	Pool Diameter (m)
TK-23	10
TK-24	10
TK-25	29
TK-28	29
TK-29	29
TK-30	3
TK-33	3
TK-37	29
TK-38	24

Table 2 - Bund fire pool diameter

Bund Contents	Bund Surface Area (m ²)	Equivalent Pool Diameter (m)
TK-23, TK-24	1,131	38
TK-25	1,313	41
Site 2 Pump Bay (Intermediate Bund)	1,215	39
TK-28	1,620	45
TK-29	1,615	45
TK-37	2,017	51
TK-38	1,339	41
Site 2 Bund	16,644	75

Figure 5 and Figure 6 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for tank top fires on tanks closest to the GrainCorp site.

Figure 7 and Figure 8 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for intermediate bund fires on tanks closest to the GrainCorp site. Intermediate bunds are the small bunds around each tank.

Figure 9 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for a Site 2 bund fire. Due to the rectangular shape of the site and the circular overlays, the distances to heat radiation levels need to be applied along the length of the bund i.e. from TK-25 to TK-38.

2. Provide plot plan overlays of isopleths for major flammable liquid evaporation and dispersion events for F2 conditions. Show both LFL and 1/2 LFL isopleths.

The distances to LFL are reported in Appendix D of the PHA report. Figure 10 shows the distances to Lower Flammability Limit (LFL) for three scenarios at F2 conditions:

- the largest intermediate bund surface area on Site 2 (i.e. TK-27)
- flash fire as a result of the entire Site 2 bund filled with gasoline
- pump bay fire on Site 2.

The tanks that are on Site 2 closest to GrainCorp site store combustible material only.

It should be noted that the LFL isopleths reach the buildings on GrainCorp site. Modelling distances to ½ LFL at low wind speeds has a degree of uncertainty and hence it was considered that generating the ½ LFL contours would provide little additional benefit.

3. Provide justification for the use of TNO failure frequency data (5×10^{-6} per year) for "major" losses from large storage tanks, compared with the UK HSE value of 100×10^{-6} per year as seen in reference 17 of the PHA.

The frequency for major storage tank failure used in the PHA consists of two values where:

- Major tank failure (5.0×10^{-6} per tank-year, TNO Purple Book)
- Tank rupture (3.0×10^{-6} per tank-year, OGP).

The UK HSE value of 1×10^{-4} per tank-year was considered to be equivalent to the value used for 'major tank failure' reported in TNO Purple Book. UK HSE states that the likelihood of a 'Major' release for tank volumes greater than 12,000 m³ represents a 1000 mm hole diameter on the side of the tank but does not provide advice on the reasoning behind the hole size (states the reasoning as being confidential). The tanks at the Port Kembla site do not contain agitators, rotating equipment or heaters that could cause a hole in any tank wall of that size.

We assumed a position that TNO Purple Book's value for 'major tank failure' due to continuous release of the complete inventory to atmosphere in 10 minutes represents a credible scenario on Port Kembla Bulk Liquids Terminal.

We hope this information covers the requests in sufficient detail, though we will make ourselves available to meet with GrainCorp at your convenience and discuss any matters where you feel further information is required.

Yours sincerely



David Pincott
Engineering Manager
TQ Holdings Australia Pty Limited
Email: david.pincott@tqholdings.com.au
Ph: +61 2 9016 8514

For and on behalf of TQ Holdings Australia Pty Limited and their related entities from time to time.

Figure 5 – Tank top fire – 23 kW/m² heat radiation



Figure 6 – Tank tip fire – 12.6 kW/m² heat radiation



Figure 7 – Bund fire – 23 kW/m² heat radiation



Figure 8 – Bund fire – 12.6 kW/m² heat radiation



Figure 9 – Site 2 Full Bund Fire

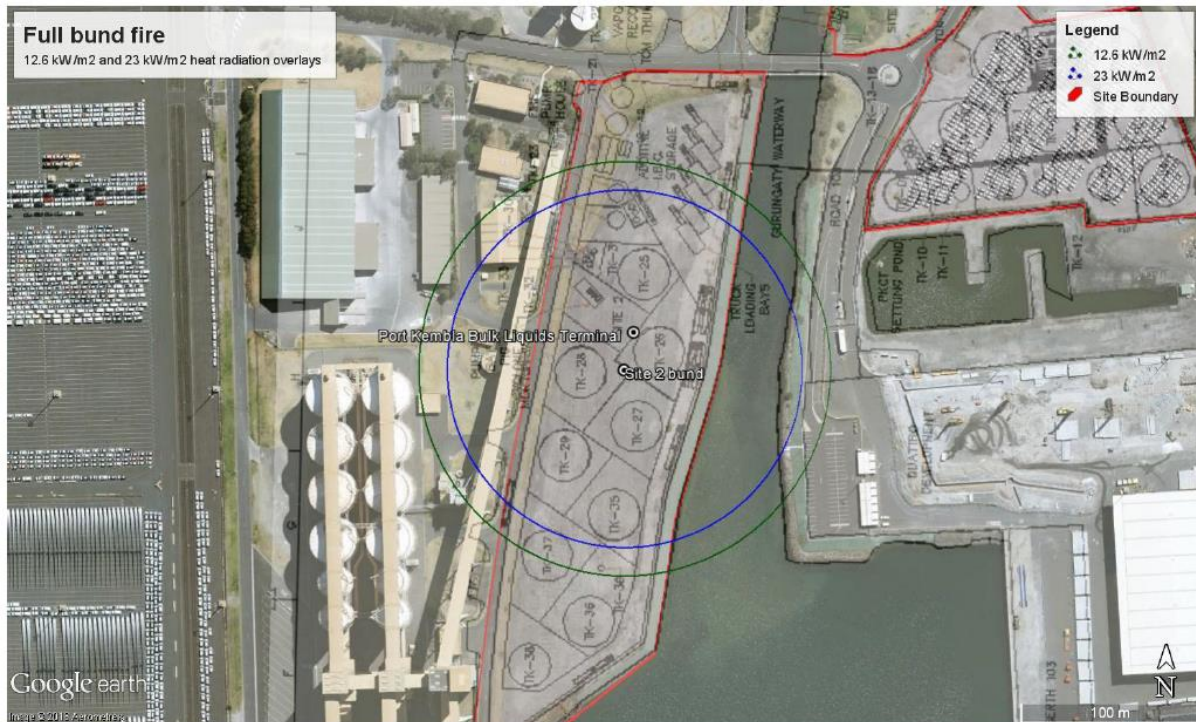
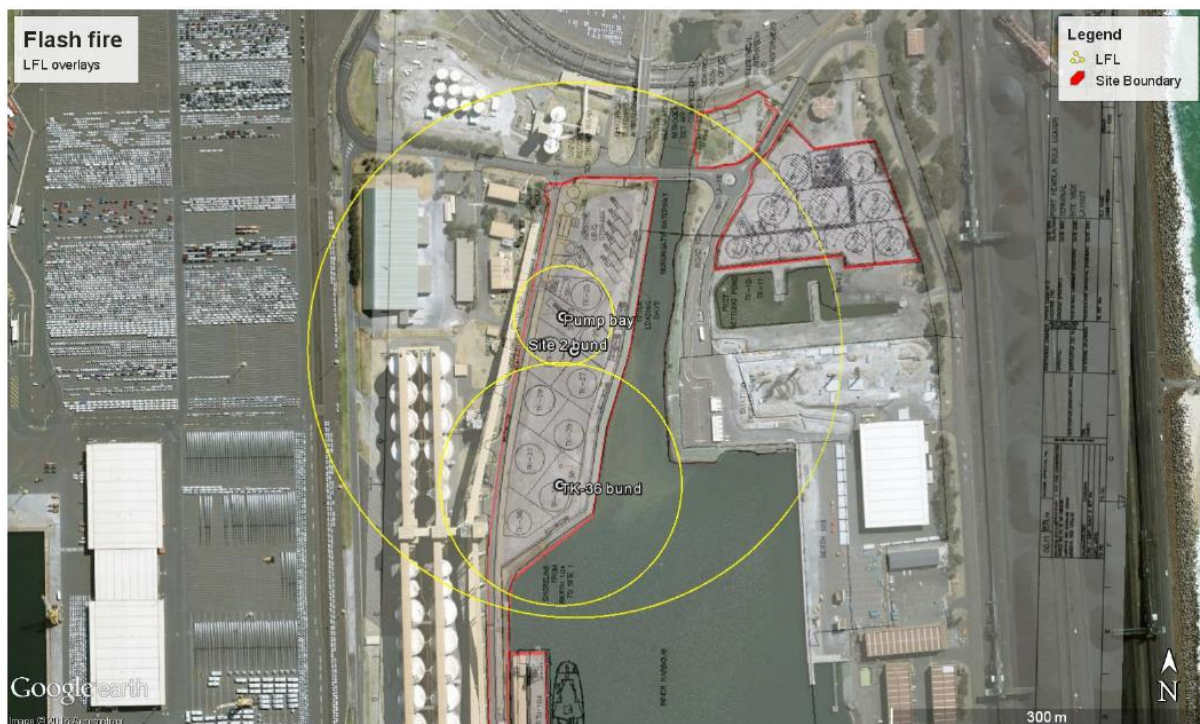


Figure 10 – Flash Fire – Distance to LFL





16 March 2016

Peter Green
General Manager – Port Kembla Coal Terminal
Port Kembla Road, Inner Harbour
Wollongong NSW 2520

We are writing in response to your letter to Mr Chris Ritchie from the Department of Planning and Environment on 27 January 2016, Subject: Port Kembla Bulk Liquids Terminal (SSD 7264) Notice of Exhibition.

We wish to provide the following information as requested in your letter.

The information provided here specifically relates to consequences. The Preliminary Hazard Analysis (PHA) included in the EIS provides a risk-based approach to land use planning as adopted in NSW, i.e. the PHA considers the consequence and likelihood of the bund fire scenarios at Port Kembla Bulk Liquids Terminal. The issues raised by PKCT will be further explored in the Fire Safety Study that is currently being prepared by TQ Holdings. The Fire Safety Study adopts a consequence based approach to identify the requirements for fire prevention strategies and measures. We would welcome the opportunity to meet and discuss prevention strategies in detail once you have had an opportunity to consider the information provided in this letter.

The following items specifically address:

- 1. Show the thermal radiation isopleths at 12.6 23 kW/m² and 23 kW/m² for all the full bund fires on Site 1. Show the assumed fire centres. Lay these over the area map to see potential thermal impacts on PKCT's northern stockpile areas and the PKCT operations area directly north of Site 1.**

The thermal radiation isopleths at 12.6 kW/m² and 23 kW/m² are shown in Figure 1 for the Site 1 full bund fire scenario involving flammable material. The bund fire centre was assumed to be at the centre of the Site 1 bund and is shown in the Figure 1.

The 12.6 kW/m² and 23 kW/m² thermal radiation isopleths distances from the centre of the bund are 171 metres and 148 metres respectively. The results are reported in more detail in Appendix D5 of the PHA report.

The thermal radiation isopleths have been modelled using Effects software, version 9.0. The weather conditions used for modelling include a stability class of D, wind speed of 5 m/s, temperature of 22°C and a relative humidity of 70%. The isopleths provided are based on the maximum distance at any elevation to provide the most conservative values.



Figure 1 - Heat radiation isopleths from PKBLT Site 1 full bund fire scenario

2. Provide the LFL isopleth outlines for the major, full bund gasoline pool dispersions, giving some details of the surface roughness and other atmospheric and terrestrial assumptions.

Distance to LFL for a full bund gasoline pool dispersion extends up to 200 m from the Site 1 bund wall. The results are reported in more detail in Appendix D3 of the PHA report.

The parameters used in the modelling include:

- Surface roughness length: 0.1 m (Low crops, occasional huge obstacles)
- Pasquill stability class and wind speed: F, 2 m/s
- Humidity: 70%
- Ambient temp: 22°C
- Terrestrial: Level ground.

3. Provide details of how PKBLT would mitigate the effects of full bund fire events as well as the potential generation of large flammable vapour clouds particularly in relation to impacts on the PKCT site to the east, north and south of the PKBLT Site 1.

Prevention strategies for bund fires include fuel detection in the intermediate bund sump, gas detection in the product pump bays, a SIL 2 rated bulk storage tank overflow protection system in all bulk storage tanks that triggers an Emergency Shutdown (ESD), ducted overflow pipes from all bulk storage tanks to direct overflows into a sump that also triggers an Emergency Shutdown (ESD), remotely operated foam pourers in each intermediate bund and electrical equipment within the terminal being appropriately rated for the classified hazardous areas.

The ducted overfill system was incorporated into Port Kembla Bulk Liquids Terminal's tank design as part of best practise safety designs for bulk fuel storage tanks. TQ will be taking into account all recommendations from Appendix G of the PHA report.

These systems will prevent accumulation of flammable or combustible material in the bund, reduced the potential for ignition sources and also prevent potential generation of large flammable vapour clouds due to tank overfill.

The fire prevention systems will be designed in consultation with Fire Rescue New South Wales (FRNSW) as required under the Hazardous Industry Planning Advisory Paper (HIPAP) No. 2 Fire Safety Study.

4. With regard to (b), your advice is sought as to whether there will be any restrictions or caveats placed on PKCT associated with this development.

Note: (b) Whether the siting of such a facility (Bulk Liquids Terminal) introduces restrictions to PKCT in its use of its leased premises and any future works or developments which may be contemplated.

The PHA recommended where the damage and propagation risk contour encroaches into PKCT land north of Site 1 (shown in Figure 2) the risk can be managed by ensuring that:

- equipment, piping or structures are not located within this area
- dangerous goods are not stored or present within this area.

Refer to Section 10.4.1 of the PHA report for more information.



Figure 2 - Damage and propagation risk contour (PHA extract)

The current damage and propagation risk contour has been prepared as part of the Preliminary Hazard Analysis and further design work will be undertaken as the project progresses through the design stages. One aim of the detailed design stage of the project will be to investigate ways in which the damage and propagation risk contours can be further reduced, in particular where it impacts of the PKCT site to the north of Site 1, with an aim to eliminate this contour from the PKCT lease area.



We hope this information covers the requests in sufficient detail, though we will make ourselves available to meet with PKCT at your convenience and discuss any matters where you feel further information is required.

Yours sincerely

A handwritten signature in black ink, appearing to read 'D. Pincott'.

David Pincott

Engineering Manager

TQ Holdings Australia Pty Limited

Email: <david.pincott@tqholdings.com.au>

Ph: +61 2 9016 8514

For and on behalf of TQ Holdings Australia Pty Limited and their related entities from time to time.

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

APPENDIX

B

AIR QUALITY AND GREENHOUSE

14 March 2016

Alex Larance
Senior Environmental Engineer
Cardno
47 Burelli Street,
Wollongong NSW 2500

RE: Response to Submissions – Air Quality and Greenhouse Gas: TQ Holdings Bulk Liquids Terminal, Port Kembla

Dear Alex,

This letter provides responses to submissions regarding air quality and greenhouse gas (GHG) aspects associated with the proposed Bulk Liquids Terminal facility ('the Project') in Port Kembla. Responses have been made with reference to submissions made on the following Pacific Environment Report:

- 20180 TQ Holdings Australia Air Quality and GHG Rev 1, dated 6 November 2015 ("the AQGHG Assessment"; **Pacific Environment, 2015**);

We have addressed each submission, along with its associated response, sequentially overleaf.

1 NSW ENVIRONMENT PROTECTION AUTHORITY

1.1 Assessment of Additional Emission Sources

Project emission sources include the following:

- Tank breathing
- Ship unloading and truck loading emissions
- Fugitive emissions from leakages, spills, and the truck loading gantry; and
- Auxiliary engine combustion emissions from ships importing petroleum products at berth.

The AQGGA estimates VOC emissions from tank venting and breathing losses and emissions from the Vapour Recovery Unit (VRU) servicing road tanker load out. The AQGGA does not include emission estimates for other sources. It is stated that the 'fugitive emissions associated with filling the shorelines and transfer lines, initial filling of volatile storage tanks up to the internal floating roof working level, and leakages and spills are expected to be minor and temporary. Thus, these potential emission sources are not considered further in the modelling'.

The EPA notes that VOCs emissions from tank breathing losses and from truck loading activities have been modelled and presented separately rather than for the project site as a whole.

In addition, the proposed Project throughput has not been contextualised with other major industrial sources of VOCs in close proximity.

The AQGGA states that 'in view of the adjacent land uses, it is not anticipated that there will be significant concentrations of VOCs that should be considered on a cumulative basis. In any event, the EPA's *Approved Methods for the Modelling and Assessment of Air Pollutants in New South Wales* (EPA, 2005) (EPA's Approved Methods) does not require the evaluation of cumulative impacts (that is, addition of existing ambient concentrations) for the assessment of VOCs and air toxics. Rather, these parameters are evaluated in terms of their incremental contribution. For this reason, it has not been deemed necessary to conduct background monitoring of ambient concentrations of VOCs / air toxics'.

The EPA advises that incremental assessment (project contributions only) are applicable where it can be reasonably demonstrated that existing ambient levels are low and there are no other significant emissions sources in close proximity to the proposed Project which emit the same substances. Based on other sites and activities undertaken between the proposed Project and nearby receptors, there are likely to be other emissions sources that also contribute to potential localised air quality impacts.

No comprehensive assessment characterising the potential impacts from all emissions associated with other major VOC sources in the locality of the proposed Project is available for the EPA's review.

Potentially significant VOCs emission sources not included in the AQGGA include, but may not be limited to:

- Tanks – of other operators in the vicinity of the proposed Project; and
- Large steelmaking operations in the vicinity of the proposed Project – coke ovens and metal coating.

The AQGGA should be revised to comprehensively characterise and assess emissions associated with the proposed Project as a whole, in conjunction with other emission sources located in close proximity to the proposed Project. Where toxic air pollutants are emitted from other sites, in significant quantities and in close proximity to the proposed Project, these additional emissions should be assessed on a cumulative basis.

1.2 PE Response

An additional review of existing background air quality has been completed for the region of Wollongong / Port Kembla. The primary references used to characterise local emission sources and associated background air quality are as follows:

- *Air Quality Trends in the Illawarra – Current knowledge based on emission, monitoring and modelling studies, and areas of ongoing research (EPA, 2015)*
- *NSW EPA 2008 Calendar Year Air Emission Inventory for the Greater Metropolitan Region in NSW (EPA, 2012)*
- *License Monitoring Data Monthly Summary Report for 1 Dec 2015 to 31 Dec 2015 (BlueScope Steel, 2015)*

Table 1 shows the total predicted emission estimates of relevant air quality metrics associated with the Project compared against the most recent atmospheric emission inventory for industrial processes in the Wollongong region (EPA, 2012).

The predicted Project emissions make up a less than 1 percent of the existing industrial emissions of the air quality metrics evaluated (excluding toluene which is below 3 percent). This highlights that the incremental increase in atmospheric emissions resulting from the Project is not expected to contribute significantly to the regional airshed.

Table 1: Industrial Emissions in the Wollongong Region compared against Predicted Project Emissions

Pollutant	Wollongong Emissions (kg/yr)	Predicted Project Emissions (kg/yr)	Project % of Wollongong GMR Emissions
NO _x	7,784,012	76,212	1.0%
SO ₂	8,493,773	50,983	0.6%
PM ₁₀	2,099,334	5,256	0.3%
PM _{2.5}	1,353,703	5,256	0.4%
PAHs	34,065	0.2	0.0006%
Benzene	252,585	132	0.05%
Toluene	43,076	1,042	2.4%

The information outlined in the GMR study is consistent with data provided in the **EPA, 2015** publication. **Figure 1** shows the anticipated annual emissions of PM₁₀, SO₂, NO_x and VOCs by year. Note that these data appear to be reported on a financial year basis, rather than a calendar year as shown in **EPA, 2012**.

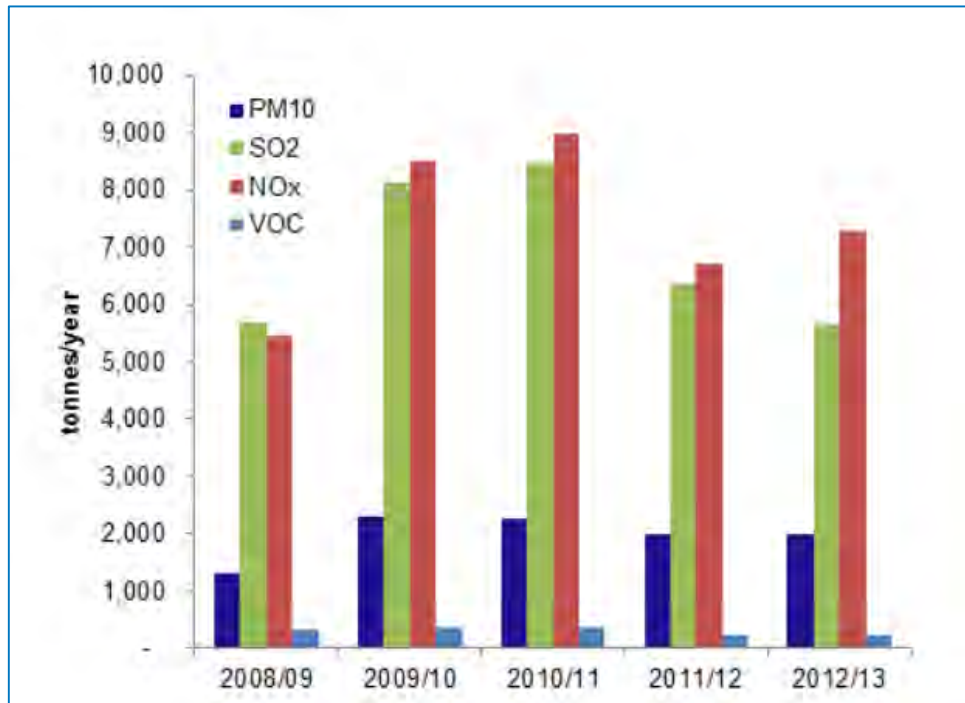


Figure 1: Total Industrial Facility Emissions for PM₁₀, SO₂, NO_x and VOC in the Illawarra (EPA, 2015)

Significant contributors to industrial NO_x, VOC and SO₂ emissions in Port Kembla region include:

- Energy Australia Tallawarra;
- Metropolitan Collieries;
- Dendrobium Mine;
- Caltex Port Kembla Petroleum;
- Coalcliff Coke Works;
- Orica Port Kembla Site; and
- BlueScope Steel, Mills & Coating

As stated in the *Air Quality Trends in the Illawarra* publication (**EPA, 2015**), the BlueScope Steel facility contributed 52% of VOC emissions to the National Pollutant Inventory-reported industrial emissions in the Illawarra (approximately 121 tonnes/year). This is compared to the conservative prediction of 2.6 tonnes/year from the bulk liquids terminal.

The above discussion is relevant to regional emissions, which is distinct from characterising background air quality in terms of ambient concentrations. Again, BlueScope Steel is relevant being the only industrial facility with a significant ambient air quality monitoring network evaluating parameters of relevance to the Project.

Table 2 provides a summary of BlueScope Steel's December 2015 monthly air quality report showing benzene and PAH concentrations measured for the period. Note that these data represent the only relevant information readily available in the public domain.

**Table 2: BlueScope, Port Kembla - Receiver 1 measured concentrations of Benzene and PAH,
December 2015 (BlueScope, 2015)**

Pollutant	Units of Measure	Monitoring frequency required by license	No of times measured during month	Min. Value	Mean Value	Median Value	Max. Value	EPA Criterion	% of EPA Criterion
Benzene	Parts per billion	Every 6 days	5	0.0250	0.1442	0.1300	0.3900	0.009 ppm	Maximum recorded value is 4.3 % of EPA criterion
Polycyclic Aromatic Hydrocarbons	Nanograms per cubic metre	24 hour period, every 6 days.	5	0.60	4.36	2.90	13.00	0.0004 mg/m ³	Maximum recorded value is 3.3 % of EPA criterion

Table 2 indicates that the concentrations of benzene and PAHs measured by BlueScope are low (less than 5% of the EPA criterion).

While the above represents the most comprehensive ambient air quality monitoring relevant to the Project completed in the region, it is acknowledged that dispersion modelling has also been completed for BlueScope that may be instructive in characterising background air quality.

Dispersion modelling included the quantification of site emissions, including point and major fugitive sources, and the simulation of resultant off-site air quality impacts. Relevant to the project, this included an evaluation of benzene, toluene, ethylbenzene, xylene (BTEX) concentrations predicted to occur at selected sensitive receptors surrounding the facility. This comprehensive modelling exercise predicted no exceedances of OEH air quality impact assessment criteria or the NEPM air toxic investigation levels for these compounds, with resultant maximum concentrations predicted to be as a minimum two, and up to four, orders of magnitude below their relevant ambient air quality criteria.

In summary, the above discussion indicates that:

- In terms of emissions, the Project is not predicted to contribute more than 3% to existing industrial emissions within the Wollongong region
- In terms of existing ambient concentrations of relevant air quality metrics, adding five percent of the stated criterion for each of the VOCs presented will conservatively account for existing background air quality in the region.

1.3 Speciation of Fuel

The US EPA TANKS software program has been used to estimate total VOCs emissions from the storage tanks for each fuel type to be stored at the proposed Project. Storage tank emissions have been speciated into hydrocarbons of interest using the US EPA's SPECIATE software.

Where possible, tank emissions should be characterised based on measured vapour phase speciation data for each product (mixture) as products can vary between refiners/markets. The speciation profile used must also reasonably reflect Australian fuel characteristics and standards. For example, the speciation profile used for unleaded petrol in the assessment assumes 0.755% benzene whereas it could be as high as 1% as per Australian fuel standards.

The Proponent should obtain speciation profiles for the proposed products where possible and revise the AQGGA accordingly. If product specific profiles are not available, the Proponent must demonstrate that the US speciation profiles used in the assessment reasonably reflect products to be handled at the proposed Project.

1.4 PE Response

It is acknowledged that Pacific Environment used speciation profiles from the US EPA SPECIATE database (US EPA, 2004) to represent the anticipated fuel types to be imported into the facility (varying grades of petrol and diesel). Specifically, each fuel type was selected based on the definitions provided within the program TANKS, with the assumptions shown in **Table 3**.

Table 3: TANKS Petroleum Product Selection

Product Fuel	TANKS Modelling Selection
Biodiesel	Distillate fuel oil no. 2
ULSD	Distillate fuel oil no. 2
PULP	PULP
P98	PULP
P95	PULP
ULP	PULP
E10	PULP
Ethanol	PULP

Evaluation of **Table 3** shows that the TANKS modelling selection referenced 'PULP' fuel as it represents the worst-case VOC / air toxics emissions profile for all the petroleum products expected to be imported to the terminal. The same approach was also taken for the ethanol fuel to be imported, where the conservative assumption to reference the 'PULP' emission profile was taken. The selection of 'PULP' within TANKS was made following an analysis of the Material Safety Data Sheets provided to Pacific Environment from TQ Terminals during the AQGHG Assessment.

A similar approach was applied to the diesel products with the selection of the 'Distillate fuel oil no. 2' in the TANKS program. The selection was based on comparisons to the expected diesel fuel products (Biodiesel and ULSD), where the distillate fuel was found to have comparable speciation profiles to the MSDS', particularly relevant to PAHs. Hence the approach taken to select US EPA's SPECIATE databases (US EPA, 2004) to represent all petrol and diesel fuel products is conventional.

It is noted that given the products imported represent finished fuel products from international refineries. However it is not anticipated that the fuels delivered to the Australian market will vary from those referenced in the US (and hence the TANKS software). This is supported through a comparison of the Australian fuel quality standards (DoE, 2001) for both petrol and diesel (and MSDS') to the US EPA SPECIATE database used in the AQGHG Assessment. Explicitly, the benzene percentage in fuel for the Australian Standard and provided MSDS' is a maximum of one percent. The modelled benzene percentage in the vapour phase was 0.753 %, referenced from the US EPA SPECIATE database. Assuming that all fuel constituents have similar vapour pressures, the value referenced within SPECIATE appears reasonable, particularly in view that one percent benzene is the maximum limit within liquid fuel.

Obtaining actual speciation profiles for the vapour components of the finished fuel products (i.e. sampling of speciated hydrocarbons within tank head spaces) was not possible for the purposes of the AQGHG Assessment.

1.5 Assessment of Peak Impacts

Section 5.4 of the AQGGA indicates that the assessment was conducted on the assumption that emissions occur 24 hours per day, 365 days per year. Appendix A of the AQGGA provides a summary output of the emissions model (TANKS), which indicates emissions were estimated on an annual basis. Emission rates applied to the dispersion model were grams per second. As such it is likely that annual emissions were smoothed evenly across the model year.

The EPA advises that smoothing emissions throughout the model year is not an appropriate assessment methodology when assessing peak 1-hour impacts from emissions that will vary temporally.

The AQGGA should be revised to ensure that peak emissions are assessed for the proposed Project and neighbouring emission sources, without smoothing based on annualised variables.

1.6 PE Response

The AQGHG Assessment has assumed constant tank breathing emissions across the year of modelling. To account for seasonal changes to emission rates, monthly emission estimates were obtained from the TANKS emission estimation software. These were then input into the dispersion model to account for the higher projected emissions during the summer season resulting from greater vapour pressure and hence headspace venting.

In addition to this, and to respond to a subsequent EPA submission, the impact of tank breathing and road tanker loadout (RTL) occurring concurrently has been evaluated within the revised modelling exercise.

Further detail as to the vapour recovery unit (VRU) specifications has been provided to Pacific Environment from TQ Holdings (summarised in **Section 1.16**), and this has been incorporated into the tank breathing and RTL emission scenario assessed. The emission rates associated with these refined VRU specifications are presented in **Table 4**.

Table 4: VRU Specifications and Modelled Parameters

Parameter	Value
Specifications	
Diameter	0.25 m
Flowrate	0.196 m ³ /s
Velocity	4.0 m/s
Height	8 m
VRU Intake	
Maximum Fuel Displacement	705 m ³ /hr
Emission Rates	
Benzene	0.015 g/s
Toluene	0.117 g/s
Xylene	0.137 g/s
Ethylbenzene	0.025 g/s
PAH	2.1E-05 g/s

The ground level concentration predictions associated with this assessment are presented in **Table 5**.

Note that, for both simplicity and conservatism, the maximum model predictions for both tank breathing and RTL have been combined to give a 'Total' value, notwithstanding that the maximum tank breathing impact may occur on a different model hour than the RTL predicted maximum.

Table 5: Revised Modelling showing Maximum 1-Hour Average Tank Breathing, Road Tanker Loadout and Total Scenarios

Discrete Receptor ID	Benzene			Toluene			Xylene			Ethylbenzene			PAH (as Benzo[a]pyrene)		
	1-hour Assessment Criterion (mg/m³)														
	0.029			0.36			0.19			8.0			0.0004		
	Tank Breathing	RTL	Total	Tank Breathing	RTL	Total	Tank Breathing	RTL	Total	Tank Breathing	RTL	Total	Tank Breathing	RTL	Total
1	1.1E-05	2.9E-03	2.9E-03	8.5E-05	2.3E-02	2.3E-02	1.0E-04	2.7E-02	2.7E-02	1.8E-05	4.9E-03	4.9E-03	1.6E-08	4.0E-06	4.0E-06
2	2.2E-05	3.5E-03	3.5E-03	1.7E-04	2.8E-02	2.8E-02	2.1E-04	3.3E-02	3.3E-02	3.8E-05	6.0E-03	6.0E-03	3.2E-08	4.9E-06	4.9E-06
3	6.8E-06	9.0E-04	9.1E-04	5.4E-05	7.1E-03	7.2E-03	6.4E-05	8.4E-03	8.5E-03	1.2E-05	1.5E-03	1.5E-03	1.0E-08	1.2E-06	1.2E-06
4	8.8E-06	2.1E-03	2.1E-03	7.0E-05	1.7E-02	1.7E-02	8.2E-05	2.0E-02	2.0E-02	1.5E-05	3.6E-03	3.6E-03	1.3E-08	2.9E-06	2.9E-06
5	9.6E-06	1.8E-03	1.8E-03	7.6E-05	1.4E-02	1.4E-02	9.0E-05	1.7E-02	1.7E-02	1.6E-05	3.1E-03	3.1E-03	1.4E-08	2.6E-06	2.6E-06
6	8.3E-06	1.2E-03	1.2E-03	6.6E-05	9.1E-03	9.2E-03	7.7E-05	1.1E-02	1.1E-02	1.4E-05	2.0E-03	2.0E-03	1.2E-08	1.6E-06	1.6E-06
7	9.0E-06	1.1E-03	1.1E-03	7.1E-05	8.4E-03	8.5E-03	8.4E-05	9.9E-03	1.0E-02	1.5E-05	1.8E-03	1.8E-03	1.3E-08	1.5E-06	1.5E-06
8	9.7E-06	1.3E-03	1.3E-03	7.7E-05	1.0E-02	1.0E-02	9.1E-05	1.2E-02	1.2E-02	1.7E-05	2.2E-03	2.2E-03	1.4E-08	1.8E-06	1.8E-06
9	6.0E-06	7.0E-04	7.1E-04	4.7E-05	5.5E-03	5.5E-03	5.6E-05	6.5E-03	6.6E-03	1.0E-05	1.2E-03	1.2E-03	8.9E-09	9.8E-07	9.9E-07
10	7.1E-06	1.2E-03	1.2E-03	5.6E-05	9.1E-03	9.2E-03	6.6E-05	1.1E-02	1.1E-02	1.2E-05	2.0E-03	2.0E-03	1.1E-08	1.6E-06	1.6E-06
11	4.7E-06	4.9E-04	4.9E-04	3.7E-05	3.9E-03	3.9E-03	4.4E-05	4.6E-03	4.6E-03	8.0E-06	8.4E-04	8.5E-04	7.2E-09	6.9E-07	7.0E-07
12	9.6E-06	1.9E-03	1.9E-03	7.6E-05	1.5E-02	1.5E-02	8.9E-05	1.8E-02	1.8E-02	1.6E-05	3.3E-03	3.3E-03	1.4E-08	2.7E-06	2.7E-06
13	6.5E-06	4.7E-04	4.8E-04	5.2E-05	3.8E-03	3.9E-03	6.1E-05	4.4E-03	4.5E-03	1.1E-05	8.1E-04	8.2E-04	9.6E-09	6.6E-07	6.7E-07
14	1.4E-04	2.8E-03	2.9E-03	1.1E-03	2.2E-02	2.3E-02	1.3E-03	2.6E-02	2.7E-02	2.5E-04	4.7E-03	5.0E-03	2.1E-07	3.9E-06	4.1E-06
15	1.0E-04	3.7E-03	3.8E-03	7.9E-04	2.9E-02	3.0E-02	9.3E-04	3.4E-02	3.5E-02	1.7E-04	6.2E-03	6.4E-03	1.4E-07	5.1E-06	5.2E-06
16	3.3E-05	1.9E-03	1.9E-03	2.6E-04	1.5E-02	1.5E-02	3.0E-04	1.7E-02	1.7E-02	5.5E-05	3.1E-03	3.2E-03	4.7E-08	2.6E-06	2.6E-06
17	2.7E-05	2.4E-03	2.4E-03	2.1E-04	1.9E-02	1.9E-02	2.5E-04	2.3E-02	2.3E-02	4.6E-05	4.2E-03	4.2E-03	4.0E-08	3.4E-06	3.4E-06
18	4.8E-05	2.2E-03	2.2E-03	3.8E-04	1.7E-02	1.7E-02	4.5E-04	2.0E-02	2.0E-02	8.1E-05	3.7E-03	3.8E-03	6.8E-08	3.0E-06	3.1E-06
19	1.7E-05	1.2E-03	1.2E-03	1.4E-04	9.8E-03	9.9E-03	1.6E-04	1.2E-02	1.2E-02	2.9E-05	2.1E-03	2.1E-03	2.6E-08	1.7E-06	1.7E-06
20	1.8E-05	1.3E-03	1.3E-03	1.4E-04	1.0E-02	1.0E-02	1.7E-04	1.2E-02	1.2E-02	3.0E-05	2.2E-03	2.2E-03	2.6E-08	1.8E-06	1.8E-06
21	1.5E-05	1.2E-03	1.2E-03	1.2E-04	9.7E-03	9.8E-03	1.4E-04	1.1E-02	1.1E-02	2.6E-05	2.1E-03	2.1E-03	2.3E-08	1.7E-06	1.7E-06
22	2.3E-04	3.0E-03	3.2E-03	1.8E-03	2.3E-02	2.5E-02	2.1E-03	2.8E-02	3.0E-02	3.8E-04	5.0E-03	5.4E-03	3.1E-07	4.1E-06	4.4E-06
23	1.3E-04	2.8E-03	2.9E-03	1.0E-03	2.2E-02	2.3E-02	1.2E-03	2.6E-02	2.7E-02	2.2E-04	4.7E-03	4.9E-03	1.9E-07	3.8E-06	4.0E-06
Max Receptor	3.80E-03			2.98E-02			3.49E-02			6.37E-03			5.24E-06		
% of Criterion	13%			8%			18%			0%			1%		

Inspection of **Table 5** indicates that predicted tank breathing impacts are typically an order of magnitude lower than the values predicted within the AQGHG Assessment. This is anticipated to be as a result of winter time emissions reducing, which are the periods when worst-case dispersion meteorology is likely to occur.

Overall, results indicate RTL emissions result in maximum off-site impacts two orders of magnitude greater than those due to tank breathing. It is noted however that the maximum truck loading rate has been modelled to occur 24 hours per day, which is a highly conservative assumption, and not anticipated to occur operationally.

Table 5 confirms that the AQGHG Assessments conclusions are supported. Namely that there are not anticipated to be any exceedances of the air quality criteria even under the conservative assumptions adopted.

Further, these conclusions are supported even under the nominal addition of 5% of their respective criteria to account for existing background air quality (as discussed in **Section 1.1**).

Finally, and in response to an additional EPA submission, it is noted that revised modelling has evaluated projected impacts at selected points around the site boundary. Additional receptor locations (15 through to 23) have been assessed to determine the impacts at the boundary (or in close vicinity) of the Project as shown **Figure 2**.

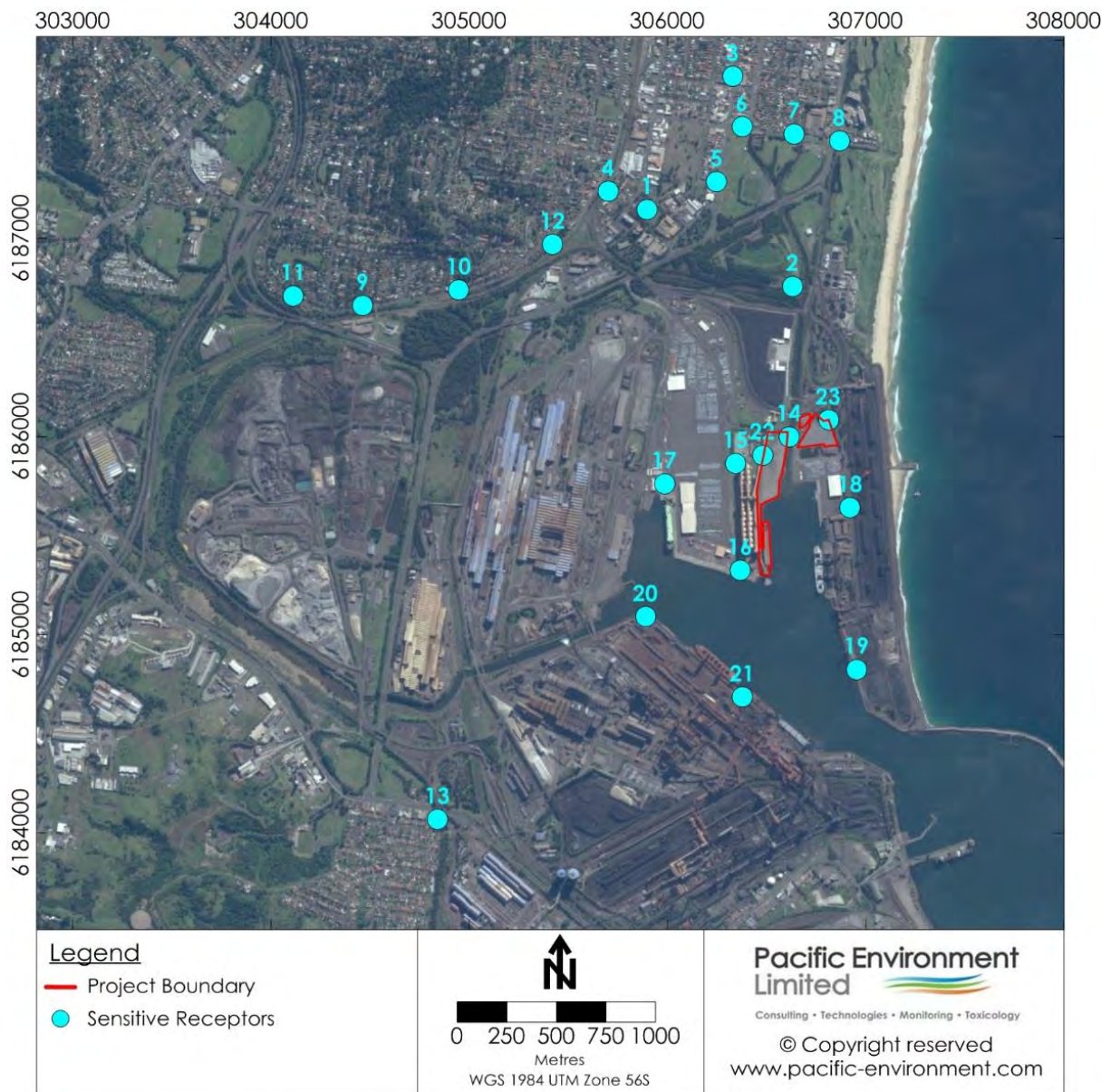


Figure 2: Sensitive Receptor Locations, including Additional Receptors 15-23 at the Site Boundary

1.7 Representativeness of Model Meteorology is Not Adequately Demonstrated

The meteorological data used in the dispersion modelling is of fundamental importance as it drives the transport and dispersion of the air pollutants in the atmosphere. For a detailed assessment, the EPA's Approved Methods requires site representative data to be correlated against a longer duration meteorological data set. Analysis of wind speed data between 2005 and 2009 at Bellambi and Wollongong Airport is provided.

The dispersion modelling was undertaken for the year 2009. It is stated that:

- 'Long term wind speed analysis of Bellambi monitoring site shows that wind speeds from the years 2008 and 2009 fitted best with the long term averages;' and
- 'It is noted that the Port Kembla Harbour automatic weather station (Site Number 68253) was commissioned post-2009 and as such this data was not able to be incorporated within the meteorological modelling. However, annual windroses for this location compare well with the CALMET generated windroses presented in Figure 6.4'.

The statistics as presented, do not confirm 2009 as a representative year for dispersion modelling. The EPA notes that the Port Kembla wind roses referred to in the report have not been provided. In addition, the statement that the 2008/2009 wind data best fits with long term averages is based on qualitative assessment alone.

The AQGGA should be revised to include the results of the analysis demonstrating year 2009 is a representative year.

1.8 PE Response

A comprehensive assessment of the 2009 calendar year meteorological observations against five years of equivalent data (2005-2009) is provided in Section 6 and Appendix C of the AQGHG Assessment. For explicit clarification, the selected year is not considered to be 'representative' across the five years per se, but rather no less representative than any other year that may be selected within the period analysed. That is to say, there is little variability to demonstrate that one year is deemed more suitable, or representative, than another over the period.

To expand on the analyses provided to date, **Figure 3** presents the CALMET generated windroses for 2009 used in CALPUFF for the dispersion modelling alongside windroses for 2013 and 2014 taken from the Port Kembla NTC AWS, located approximately 2 km south-east of the Project. Alternative years of observations to the CALMET year are presented only as these represent data sets readily available from our internal database.

Observations from the Port Kembla NTC AWS have not been incorporated in the CALMET modelling for the project (since the AWS was only commissioned in July 2009). However, this windrose comparison provides useful validation that the CALMET file used is generally representative of the area. Specifically, the calms and winds from the north to north-east and south to south-west are consistent across both data sets.

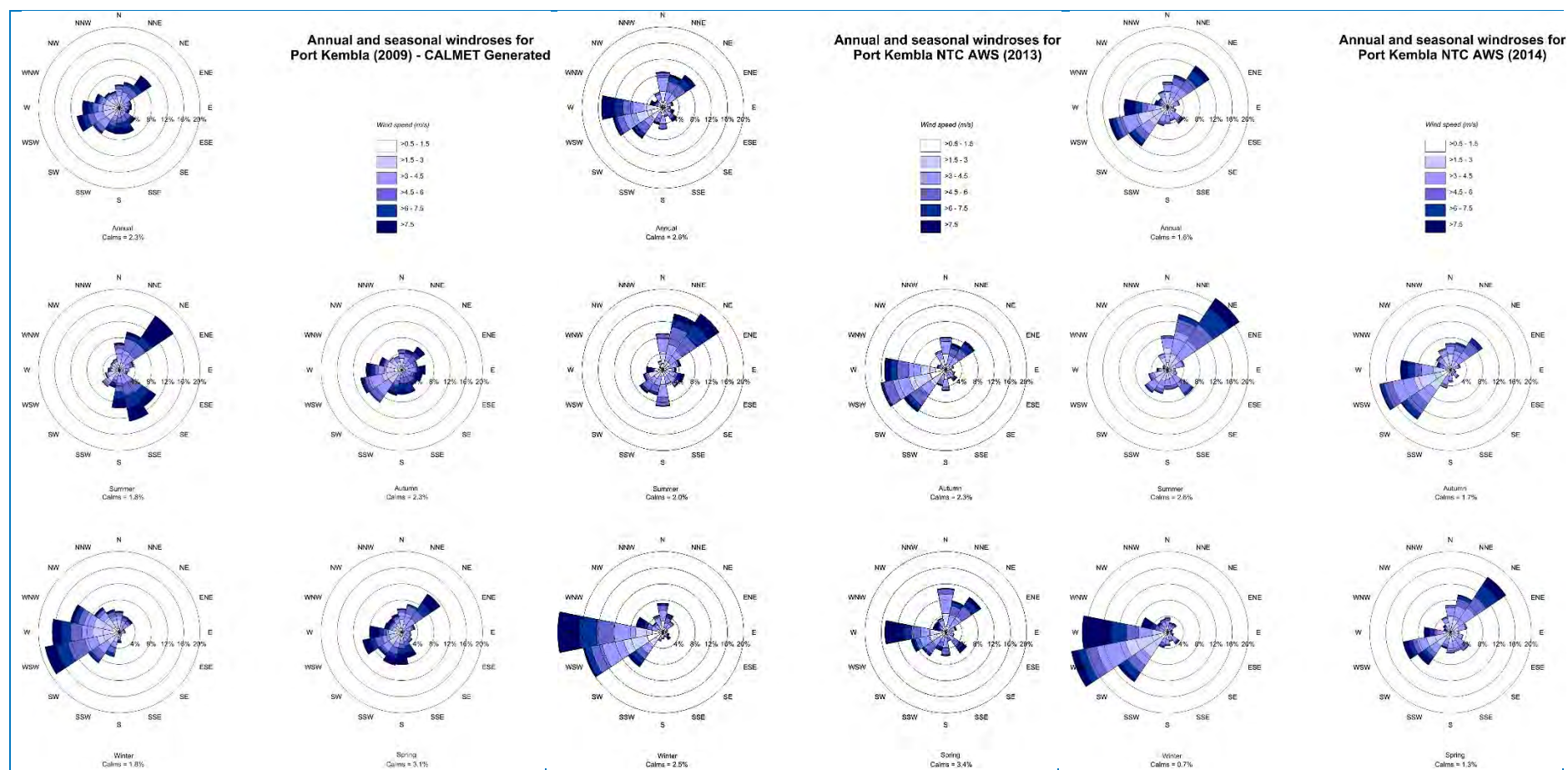


Figure 3: Annual and Seasonal Windroses (Left: CALMET Generated for AQGHG Assessment, 2009, Middle: Port Kembla, 2013, Right: Port Kembla 2014)

1.9 CALMET Model Evaluation Not Adequate

It is important to undertake an evaluation of the CALMET modelling results as the CALMET module requires careful consideration of input data, modelling domain, grid resolution, and the seven critical parameters (TERRAD, RMAX1, RMAX2, R1, R2, IEXTRP and BIAS).

The AQGGA presents a summary of the 2009 CALMET data extracted for Port Kembla.

Observed wind fields for Wollongong Airport are provided in the AQGGA as Appendix C. Observed wind fields for Port Kembla are not provided. Appendix C shows some potentially significant differences between modelled and observed wind fields. The AQGGA does not demonstrate the suitability of the CALMET generated data.

An adequate evaluation of the CALMET generated data is always important but particularly necessary where observational data assimilation requires the user to make 'several critical choices which can significantly affect the final outcome of the model runs'.

The AQGGA should be revised to include an evaluation of the CALMET generated meteorology data to demonstrate it is suitable for use in CALPUFF.

1.10 PE Response

Detailed in **Table 6** are the CALMET parameters recommended value referencing the NSW Office of Environment and Heritage's publication *Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia (NSW OEH, 2011)*.

The recommended values provided have been compared against those adopted in the AQGHG Assessment, shown in **Table 6**. As shown, the majority of the CALMET parameters presented have no recommended value within the OEH guidance. However, where specified (IEXTRP, BIAS), the actual values input into the CALMET model are equivalent to the OEH recommended values.

Table 6: Comparison of OEH Recommended and Actual CALMET Parameters

CALMET Option	Parameter	Recommended Value	Actual Value
Radius of influence of terrain feature	TERRAD	No Default	0.4
Maximum radius of influence for meteorological stations in layer 1 and layers aloft	RMAX1	No Default	0.4 km
	RMAX2	No Default	0.4 km
Weighting parameter for Step 1 wind field vs. observations in Layer 1 and Layer 2 and above	R1	No Default	0.2 km
	R2	No Default	0.2 km
Extrapolate surface wind observations to upper layers	IEXTRP	-4	-4
Layer dependent weighting factor of surface vs. upper air wind observations in defining the Initial Guess Field (IGF) winds. Observations are always weighted by inverse distance squared ($1/R^2$) from the station to the grid point. The BIAS parameter changes that weight.	BIAS	Default ($NZ * 0$) is to not change the $1/R^2$ weighting given equally to surface and upper air data.	BIAS ¹ = -1, 0, 0, 0, 0, 0, 0

¹ Output taken from CALMET input file.

Furthermore, as noted in PE Response **Section 1.8**, the selected 2009 meteorological year is considered to be generally representative of the metrological conditions at Port Kembla and hence the Project area.

1.11 Assessment of Impacts at and Beyond Boundary of the Facility for Combined Project Emissions Sources

Stage three has been modelled to represent maximum throughput and emissions from the proposed Project. Results have been presented for Xylene, which had the highest emission rate of the VOCs entered into the mode. The EPA notes:

- Predicted impacts from the storage tanks and truck loading operations have been presented separately;
- Total predicted impacts from the project have not been provided; and
- Predicted impacts have been presented at the nearest non-industrial sensitive receptors and not at and beyond the boundary of the project premises as is required for air toxics and individual odorous pollutants such as xylene in the EPA's Approved Methods.

The EPA notes that one of the designated receptors is the entry/exit to the site and notes that predicted impacts at this receptor are at a minimum one order of magnitude above predicted impacts for the other non-industrial receptors for both the storage tanks and truck loading operations. As such, a clearer indication of total combined tanks and VRU predicted impacts at and beyond the boundary of the proposed Project is required.

The AQGGA should be revised to include a summary of total predicted impacts for each of the modelled air toxics and individual odorous pollutants at and beyond the boundary of the premises in tabular format.

1.12 PE Response

Section 1.6 provides an evaluation of 'Total' (tank breathing plus RTL) Project impacts, including at additional receptors at and beyond the boundary (**Figure 2**). The results indicate there are not anticipated to be any exceedances of the air quality criteria even under the conservative assumptions adopted.

1.13 Assessment of Odour Impacts at Nearest Sensitive Receptors

As for air toxics, the predicted odour impacts have been provided at the nearest non industrial receptors to the Port Kembla port complex. Predicted impacts of 2OU at the entrance of the proposed Project are anticipated. It is stated that "...it is considered valid to inspect the dispersion modelling contours presented to assess potential occupational exposures for those working outside in the wider port complex, providing the maximum predictions presented are compared with occupational exposure criteria...'

The EPA notes the EPA's Approved Methods defines sensitive receptors as 'a location where people are likely to work or reside. In addition, offensive odour provisions under Section 129 of the POEO Act apply at and beyond the boundary of scheduled premises. It is recommended that the assessment be revised to assess potential for impacts at and beyond the boundary to determine if management and mitigation options are required.

The Proponent should consider predicted odour impacts at and beyond the boundary of the facility, and, if required proposed odour mitigation measures.

1.14 PE Response

As noted in **Section 1.12** and **Figure 2**, additional sensitive receptor locations have been added to the revised dispersion model to evaluate predicted impacts at and beyond the Project boundary. The results of the odour assessment, including these new receptor locations, are presented in **Table 7**.

As is to be anticipated, the results indicate that maximum odour concentrations will be greatest at the boundary of the site (specifically receptors 22 and 23).

While it is not meaningful to discuss odour units in less than whole numbers, results have been presented to one decimal place to illustrate the spatial variability in prediction. Even at the Project boundary, there is predicted to be no exceedances of the 2 OU odour criterion (i.e. the most stringent odour criterion is anticipated to be satisfied).

Notwithstanding the above, it is acknowledged that adverse odour emissions can occur, and it is recommended that TQ Holdings incorporate an operational odour management plan to address such events within the Project's air quality management plan.

Table 7: Dispersion Results – Odour from Tank Venting

Discrete Receptor ID	Odour
	(OU) ⁱ
	1-second
	Assessment Criterion
	2
1	0.1
2	0.2
3	0.1
4	0.1
5	0.1
6	0.1
7	0.1
8	0.1
9	0.0
10	0.0
11	0.0
12	0.1
13	0.0
14	1.9
15	1.6
16	0.4
17	0.4
18	0.9
19	0.2
20	0.2
21	0.2
22	2.1
23	2.1

1.15 Justification for the Control Efficiency of the Proposed Vapour Recovery Unit

Under the *Protection of the Environment Operations (Clean Air) Regulation 2010* (Clean Air Regulation) a vapour recovery or disposal system is required for large storage tanks in the Sydney, Newcastle or Wollongong Metropolitan Area where the volatile organic liquid to be stored has a vapour pressure of or below 75 kilopascals.

In section 5.6 of the AQGGA, it is stated that 'potential emissions from the VRU servicing the RTL were estimated using an assumption that the VRU will operate at all times during truck loading and will have a control efficiency adequate to absorb 99.5% of potential VOC emission from this process'.

Emission parameters for the proposed VRU are claimed to be based on those provided in a prior AQGGA for a bitumen storage facility in Sydney, the SPECIATE based speciation profile and a recent article although specific calculations are not provided. The EPA notes that:

- Justification for the proposed control efficiency has not been provided. The EPA notes that the low predicted impacts from the tank unloading operations are predicated on the VRU achieving high control efficiencies;
- No supporting information such as performance specifications has been provided to demonstrate that the proposed VRU will meet the requirements of the Clean Air Regulation. Note, that the EPA considers that a contemporary VRU operating in a proper and efficient manner should be able to achieve significantly lower emissions than required under the regulation, and this level of performance is expected for a new facility; and
- No information is provided regarding how the VRU is proposed to be monitored to ensure high control efficiencies and compliance with Clean Air Regulation design and regulatory requirements.

The AQGGA should be revised to include additional information about the performance of the proposed VRU including, but not limited to, manufacturer's performance specifications and proposed monitoring regime.

1.16 PE Response

No manufacturer's performance specifications for the vapour recovery unit (VRU) control efficiency were available at the time of writing the AQGHG Assessment. Therefore it was conservatively assumed that the unit would be operating to adsorb 99.5% of potential VOC emissions associated with RTL. Since this time, further design information on the VRU has been provided by TQ Holdings.

The VRU will be implemented at the facility as the primary emissions control device to recover VOCs displaced during RTL, with the recovered liquid hydrocarbon products captured and recovered. TQ has proposed to use a VRU with carbon adsorption pressure swing technology. This technology is used by all operating bulk fuel terminals within Australia and New Zealand (where an emissions control device is required). Carbon adsorption is considered to be best practice for the Project as it is a reliable technology with low waste streams and recovers the fuel vapours rather than destroying them (i.e. incineration).

This unit will be designed to meet industry accepted 'world's best practice' emission limits, as per the US EPA guidelines outlined below:

- US EPA emissions limit:
 - 10 mg/L – MACT Facilities
 - MACT = Maximum Achievable Control Technology
 - Applied to large throughput Terminals
 - 35 mg/L – GACT Facilities
 - GACT = Generally Available Control Technology
 - Applied to small throughput Terminals

The proponent intends to meet the 10 mg/L fuel emission limit. This limit is 11 times lower than those required within NSW Protection of the Environment (Clean Air) Regulation, 2010 (regulation 63 (6b)) and as stated, meets the US EPA MACT emission limits. Additional, it is anticipated to reduce equipment run time by up to 50%, reducing energy consumption in the terminal and the associated emissions.

The proposed VRU will be designed with the following operating parameters and equipment specifications:

- Operating parameters:
 - 10 mg/L (VOC liquid passing through the tank) emissions limit.
 - 40% v/v inlet vapour concentration.
- Technology specifications:
 - Dry vacuum pump technology.
 - Variable speed driven rotating equipment.
 - Constant emissions monitor (CEM).

TQ Holdings will provide assurance over the VRU unit control efficiency through a prescribed monitoring regime consistent with test methods as per the NSW EPA (**NSW EPA, 2005**), listed below:

- TM-20: Determination of total mass of unrecovered organic vapours from vapour recovery units.
 - Performed once per year during summer months.
 - Will provide VRU emissions performance validation.
- TM-34: US EPA method 25B – Determination of total gaseous organic concentration using a nondispersive infrared analyser.
 - Performed nominally 6 months after TM-20 test.
 - Will provide ongoing performance validation and provide input data for load based license calculations.
- ATO (Australian Tax Office) Test: Determination of VRU efficiency.
 - Performed 6 times per annum in first year, 4 times per annum in second year and 2 times per annum for all subsequent years of operation.
 - Will determine the VRU efficiency.
 - Will determine the excise credit on recovered product.
 - Not EPA approved method, but generally accepted as further validating data for VRU performance.

1.17 Assessment of all Relevant Pollutants

Tables 4.1 and 4.2 of the AQGGA specify the impact assessment criteria for the pollutants assessed, including NO₂, SO₂, PM₁₀, Benzene, Toluene, Xylenes, Ethylbenzene and PAHs. The EPA notes:

- The annual criteria for NO₂, and the ten minute average and annual average criteria for SO₂ were not included in the table. It is unclear whether assessments were conducted for these averaging periods;
- PM_{2.5} has not been included in the assessment. The EPA notes that while the NEPM reporting standard for PM_{2.5} was recently adopted in December 2015 and advisory reporting standard was in place at the time of preparation of the AQGGA; and
- There is no discussion as to whether an ozone impact assessment was required or not required utilising the EPA's tiered assessment framework guidance.

The Proponent should confirm whether NO₂ and SO₂ were assessed for all averaging periods. Justification needs to be provided regarding assessment of ozone and PM_{2.5}.

1.18 PE Response

Table 8 shows the results of the combustion emissions from ship emissions for all averaging periods referencing the relevant NSW OEH assessment criteria (**NSW EPA, 2005**). The results indicate that there are not predicted to be any exceedances of the air quality criteria for the assessed combustion emissions from ships while they are at berth (unloading finished fuel products).

It must be noted that a conservative estimate has been made to assume that all PM₁₀ combustion emissions are equivalent to PM_{2.5}. Further, an empirical relationship (**VEPA, 1986**) was used to predict the maximum 10-minute SO₂ concentrations from the models predicted 1-hour average SO₂ concentrations, as follows:

$$C_t = C_{60} [60/t]^{0.2}$$

Where:

- C_t = concentration at time t
- C₆₀ = concentration for averaging time (60 minutes)
- t = time in minutes

Table 8: Dispersion Modelling Results – Ship Unloading

Discrete Receptor ID	NO ₂		SO ₂				PM ₁₀		PM _{2.5}	
	1-hour	Annual	10-min	1-hour	24-hour	Annual	24-hour	Annual	24-hour	Annual
	Assessment Criteria (µg/m ³)									
	246	62	712	570	228	60	50	30	25	8
1	15.8	0.1	15.1	10.6	0.7	0.1	0.1	9.5E-03	0.1	9.5E-03
2	22.6	0.1	21.6	15.1	1.5	0.1	0.2	1.2E-02	0.2	1.2E-02
3	5.5	0.1	5.2	3.7	0.5	0.0	0.1	5.8E-03	0.1	5.8E-03
4	11.4	0.1	10.9	7.6	0.7	0.1	0.1	7.9E-03	0.1	7.9E-03
5	8.6	0.1	8.2	5.7	1.0	0.1	0.1	9.5E-03	0.1	9.5E-03
6	7.9	0.1	7.6	5.3	0.6	0.1	0.1	7.1E-03	0.1	7.1E-03
7	12.2	0.1	11.6	8.1	0.9	0.1	0.1	7.0E-03	0.1	7.0E-03
8	13.9	0.1	13.3	9.3	0.9	0.1	0.1	7.1E-03	0.1	7.1E-03
9	7.5	0.0	7.1	5.0	0.9	0.0	0.1	3.6E-03	0.1	3.6E-03
10	8.7	0.1	8.3	5.8	0.7	0.0	0.1	4.9E-03	0.1	4.9E-03
11	5.6	0.0	5.4	3.7	0.8	0.0	0.1	2.8E-03	0.1	2.8E-03
12	9.7	0.1	9.2	6.5	0.9	0.1	0.1	6.6E-03	0.1	6.6E-03
13	7.0	0.1	6.7	4.7	0.4	0.1	0.1	8.3E-03	0.1	8.3E-03
14	13.2	0.1	12.6	8.8	0.6	0.1	0.1	6.3E-03	0.1	6.3E-03

To evaluate the potential for regional ozone impact, the annual NO_x load has been applied within the EPA's Tier 1 screening tool with the outcomes presented in **Table 9 (NSW EPA, 2015)**.

Table 9: Inputs / Outputs of Tier 1 Ozone Screening Assessment

Parameter	Value
Location	
Source Location	Wollongong
Baseline Ozone (1-hr)	84 ppb
Baseline Ozone (4-hr)	74.2 ppb
Region Classification	Non-attainment
Maximum Allowable Increment (1-hr)	1 ppb
Maximum Allowable Increment (4-hr)	1 ppb
Ozone Standard (1-hr)	100 ppb
Ozone Standard (4-hr)	80 ppb
Emissions	
NO _x	0.21 tonnes/day
CO	Not-assessed
VOC	0.0072 tonnes/day
Reactivity adjusted VOC (1-hr)	0.0072 tonnes/day
Reactivity adjusted VOC (4-hr)	0.0072 tonnes/day
Incremental Ozone Concentrations	
Maximum 1-hr Incremental	0.079 ppb
Maximum 4-hr Incremental	0.052 ppb
Cumulative Ozone Concentrations	
Maximum 1-hr Cumulative	84.1 ppb
Maximum 4-hr Cumulative	74.3ppb

The results of the screening assessment presented in **Table 9** indicate that the impact of the Project on potential increases on ozone is minor. The maximum allowable incremental increases for both 1-hr and 4-hr ozone are below 0.01 ppb, two orders of magnitude below the allowable 1 ppb. On this basis, it is concluded that no further (i.e. Tier 2) ozone assessment is required.

2 NSW HEALTH

2.1 Justification is needed as to why representations of each fuel type in the TANKS software were used despite the NPI providing additional databases for the Australian context. Furthermore the NPI Fuel and Organic Liquid Storage - TANKS User Manual indicates that individual chemical characteristics can also be entered into the database if necessary.

2.2 PE Response

It is acknowledged that Pacific Environment has referenced US EPA standard fuel types consistent with the databases provided in the TANKS Software. However, analysis of the difference between the US fuel and Australian fuel speciation completed in **Section 1.4** indicates that the speciation data is comparable.

2.3 It appears that all fuel was represented by one speciation profile from the US EPA Speciate database. It is not clear if the different composition of a range of fuels were used across the site to model total emissions. The NPI TANKS database contains partial speciation data for a range of fuels that may be useful.

2.4 PE Response

It is acknowledged that Pacific Environment used speciation profiles from the US EPA SPECIATE database to represent the anticipated fuel types to be imported into the facility (**US EPA, 2004**).

It is noted that Pacific Environment did not use the NPI TANKS database in the assessment. Like the US EPA SPECIATE database, it provides partial speciation data for a variety of fuel types. However it is anticipated that the difference between the TANKS/SPECIATE speciation profiles would be minor and inconsequential to the outcomes of the AQGHG Assessment. This is explained in more detail in **Section 1.4**.

To summarise however, the TANKS modelling selection was based on a conservative assessment approach. Explicitly, the 'PULP' and 'Distillate fuel oil no. 2' options reflect the worst-case (i.e. highest comparable percentage of VOCs) of all the petrol, ethanol and diesel products that are expected to be imported to the terminal.

2.5 The HHRA will need to be reviewed and updated if changes are made to the Air Quality Assessment.

2.6 PE Response

The above responses support the AQGHG Assessments conclusions, namely that the relevant air quality criteria are anticipated to be easily satisfied, even under the conservative assumptions adopted, and inclusive of an evaluation of existing background air quality.

3 CONCLUSION

I trust that the above information provides adequate additional information in response to the submissions provided in relation to *20180 TQ Holdings Australia Air Quality and GHG Rev 1* (**Pacific Environment, 2015**) associated with the TQ Holdings Terminals facility.

If you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely,



Damon Roddis
Principal / General Manager (NSW)
Pacific Environment Limited

4 REFERENCES

BlueScope Steel, 2015 *License Monitoring Data Monthly Summary Report for 1 Dec 2015 to 31 Dec 2015*

Department of Environment (2001), "Fuel Standard (Petrol) Determination 2001"

Department of Environment (2001), "Fuel Standard (Automotive Diesel) Determination 2001"

GMR (2008). "2008 Calendar Year Air Emission Inventory for the Greater Metropolitan Region in NSW".

EPA (2015). "Air Quality Trends in the Illawarra – Current knowledge based on emission, monitoring and modelling studies, and areas of ongoing research", September 2015.

NSW EPA (2005). "Approved Methods for the Modelling and Assessment of Air Pollutants in NSW", August 2005

NSW EPA (2005). "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW", August 2005

NSW EPA (2015). Level 1 Screening Procedure Tool for Estimating Ground-Level Ozone – Impacts from Stationary Sources in the NSW Greater Metropolitan Region

NSW OEH (2011). "Generic Guidance and Optimum Model Settings for the CALPUFF Modelling System for Inclusion into the 'Approved Methods for the Modelling and Assessments of Air Pollutants in NSW, Australia'", March 2011.

Pacific Environment (2015). "20180 TQ Holdings Australia Air Quality and GHG Rev 1", November 2015

US Environmental Protection Agency (2004), SPECIATE Database,
http://cfpub.epa.gov/si/speciate/ehpa_speciate_browse_details.cfm?ptype=G&pnumber=4673

US Environmental Protection Agency (2004), SPECIATE Database,
http://cfpub.epa.gov/si/speciate/ehpa_speciate_browse_details.cfm?ptype=G&pnumber=4555

VEPA (1986). The Ausplume Gaussian Plume Dispersion Model. Environment Protection Authority, Olderfleet Buildings, 477 Collins Street, Melbourne Victoria 3000, Publication Number 264.

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

APPENDIX

C

NOISE AND VIBRATION RESPONSE



21 March 2016

Alex Larance
Senior Environmental Engineer
Cardno
47 Burelli Street,
Wollongong NSW 2500

RE: Response to Submissions - Noise and Vibration: TQ Holdings Bulk Liquids Terminal, Port Kembla.

Dear Alex,

This letter provides responses to submissions regarding noise and vibration aspects associated with the proposed Bulk Liquids Terminal facility (the 'Project') in Port Kembla. Responses have been made with reference to the following Pacific Environment Report:

- *20180 TQ Holdings Australia Noise and Vibration assessment for proposed Port Kembla Bulk Liquids Terminal Rev , dated 5 November 2015 ("the Noise and Vibration Assessment"; **Pacific Environment, 2015**);*

We have addressed each submission, along with its associated response, sequentially below.

1 EPA

1.1 Construction Noise

The EIS states that construction may include piling of pre-cast driven concrete piles for tanks. The EIS does not contain any further information on any proposed piling. The EIS states that noise and vibration management will be addressed and incorporated into the Proponent's CEMP through the development of a Noise Management Plan. It is therefore important that additional information on any proposed piling be incorporated into the proposed CEMP.

Additional information to be addressed in the CEMP includes:

- Selection of the piling method
- Sufficient justification for the method selected
- Assess the feasibility of alternative quieter methods or equipment.
- An assessment of piling noise in accordance with the Interim Construction Noise Guideline (DECC, 2009) available at <http://www.epa.nsw.gov.au/noise/constructnoise.htm>. If any high noise activities are to be undertaken, they should be factored into the quantitative assessment by adding 5 dB to the predicted levels.
- An assessment of vibration in accordance with the Assessing Vibration: A Technical Guideline (DEC, 2006) available at <http://www.epa.nsw.gov.au/noise/vibrationguide.htm>
- A description of all feasible and reasonable measures to minimise noise and vibration impacts.

Past piling activities have proven to be annoying to occupants of nearby industrial premises in Port Kembla. The Proponent should consult with occupants of industrial premises prior to finalising the proposed CEMP. During construction, the Proponent should also regularly update the occupants of industrial premises regarding noise levels and hours of work. If approved, the CEMP should support any application for a scheduled development work licence.

1.2 PE Response

At the time of preparing the assessment, limited information on piling was available.

Further details of piling have been provided and are detailed follows:

- Piles are required to support the foundations of the product tanks with the number and spacing required dependant on the tank size and subsequent load. Estimates on the number of piles per tank vary as follows:
 - 1.5 ML tanks, 10 piles each
 - 6 ML tanks, 36 piles each
 - 12 ML tank, 80 piles each
 - 18 ML tanks, 110 piles each.
- The project site ground conditions comprise an upper 13-15m of sandy strata.
- Concrete pile with steel reinforcement impact driven is one recommended method for these conditions. Alternate piling methods will be considered as the detailed design progresses
- The pile toe will have to be driven to bedrock at a level of approximately 24-29m below ground level. This may result in pile lengths of greater than 30m.
- Jetting or pre boring maybe required.
- Pile size is estimated to be 400mm by 400mm.

The piling method proposed includes impact piling due to the ground conditions, however as the piles are reinforced concrete, noise impacts are reduced when compared with steel piles.

A construction noise and vibration assessment was included in the Noise and Vibration Assessment (**Pacific Environment, 2015**). The results, presented in section 6.2.4 of the assessment indicated noise impacts well below the criteria for all receivers including; piling (scenario 2, foundations) for residential, commercial place of worship, school and active and passive recreation areas. Where a 5 dB(A) penalty for high noise construction activity as described in the ICNG (**EPA, 2009**) is applied to overall predicted noise levels for any of the day time construction scenarios no exceedances of the construction noise criteria are expected.

A construction noise and vibration assessment for the piling stage (foundations) has been conducted for nearest industrial facilities to provide further detail on piling impacts on adjacent industrial receivers.

Figure 1 and **Table 1** present the location of the additional industrial receivers. The locations of receivers were chosen in order to represent sensitive spaces (i.e offices and work areas).

Table 1: Industrial Receivers Coordinates

Receiver ID	Easting (m)	Northing (m)
I1	306479	6185959
I2	306575	6186068
I3	306688	6185822
I4	306795	6185718
I5	306808	6185587
I6	306911	6184332

Table 2 presents predicted noise levels for construction scenario 2 which includes piling noise levels at the industrial receivers. All industrial receivers will meet the construction noise criteria for receiver types. An exceedance of 3 dB is predicted for receiver I1 during piling activities. Construction noise management measures for this receiver should consider; consultation, noise monitoring, feasible and reasonable noise controls such as temporary acoustic screens, orientation of plant and lower noise generating methods such as pre boring.

Table 2: Industrial Receivers Construction Scenario 2 (Piling) Impact

Receiver ID	Criteria LAeq,15min dB(A)	Predicted Noise Level LAeq,15min dB(A) ¹
I1 ²	Industrial External 75 dB(A) Offices External 70 dB(A)	73
I2		68
I3		68
I4		64
I5		62
I6		39

Notes: 1. Predicted noise levels include a 5 dB(A) penalty.
2. Includes offices



Figure 1: Industrial Receivers Location

Vibration annoyance or human comfort is assessed with consideration to Assessing Vibration: A Technical Guideline (EPA 2006).

Where vibration is intermittent, a vibration dose value (VDV) is calculated. Acceptable values are shown in **Table 3** below.

Table 3: Acceptable Vibration Dose Values for Intermittent Vibration ($\text{m/s}^{1.75}$)

Location	Daytime ¹		Night Time ¹	
	Preferred Value	Maximum Values	Preferred Value	Maximum Value
Offices, schools, educational institutions and places of worship	0.40	0.80	0.40	0.80
Workshops	0.80	1.60	0.80	1.60

Two different pile driving scenarios (sandy soil and at refusal on bedrock) have been assessed. To predict vibration dose particle velocity is initially calculated with reference to the empirical method described in BS 5228-2:2009 - Part 2 for percussive piling. Peak particle velocity (PPV) is predicted based on impact energy, distance and a scaling factor (k_p) for soil type.

Impact energy of 50 kJ and K_p values of 1 and 5 to represent loose granular soils and bedrock at refusal (maximum vibration level) were adopted respectively.

Table 4 below presents predicted peak particle velocity (PPV) values at increasing distances from the piling source.

Table 4: Predicted PPV Values (mm s^{-1})

Distance	10	20	40	80	160
Sandy soil pile driving	11.2	4.6	1.8	0.8	0.3
Refusal at bedrock pile driving	56.0	22.8	9.2	3.8	1.5

Notes: PPV calculated based on BS 5228-2:2009 - Part 2 for percussive piling.

The predicted vibration levels are theoretical and expected to be conservative.

To predict the vibration dose, duration of the piling (day time only) have been assumed as follows:

- Soft cohesive and loose granular soils piling: 240 minutes and 5 minutes during day period for sandy soil and bedrock refusal piling respectively.

Table 5 below presents predicted eVDV values with separation distances from the piling works.

Table 5: Predicted eVDV Values ($\text{m/s}^{1.75}$)

Distance (m)	10	20	40	80	160
Sandy soil pile driving	1.5	0.6	0.3	0.1	0.04
Refusal at bedrock, pile driving	2.9	1.2	0.5	0.2	0.1

Based on the predicted vibration dose values presented in **Table 5** it is expected that the risk of annoyance would be minimal at distances greater than 80 metres from impact piling.

The nearest receiver I1 is located approximately 40 metres from the piling works which is predicted to exceed vibration annoyance limits. Vibration monitoring trials are recommended to confirm site specific vibration transmission and safe work distances from piling.

The above vibration velocity and vibration dose values are indicative only and should be confirmed with vibration trials during initial piling works.

Construction noise and vibration management would include development of noise and vibration management requirements within a Construction Environmental Management Plan (CEMP) prior to commencement of works onsite. This would utilise more detailed information in relation to the proposed construction methodology, activities, durations and equipment type and numbers. It is envisaged that the CEMP would consider the following at a minimum:

- Justification for the final piling method selected.
- The nearby residences and other sensitive land uses.
- The noise management levels identified in this assessment.
- Vibration limits as identified in this assessment
- Address the potential impact from the proposed construction methods.
- Develop proactive and reactive and strategies for dealing with any noise and vibration complaints.
- Identify a site contact person to follow up complaints.
- Noise monitoring.
- Vibration monitoring trials to confirm safe work distances and methods.

TQ are currently consulting with neighbouring industrial premises on a number of construction and operational issues and will continue to consult with these neighbours during the development of the project CEMP. Consultation has included PKCT and GrainCorp and as the two closest neighbours to the areas where piling will occur, these neighbours will continue to be consulted on this matter.

1.3 Operational Noise

Considering the proposed Project location, the EPA presents the Proponent with two options in addressing the key issues where either clarification and/or additional information is required. These options include but are not necessarily limited to the following:

OPTION 1: That the Proponent commit to the project being designed, built and operated to not exceed an operational noise level of LAeq(15min) 36dB at the nearest residential receiver during F class stability category conditions. TQ must also commit for the life of the project to not to exceed maximum Leq sound pressure levels, at one metre from each piece of equipment, of:

- 87dBA for each of the four marine loading arms
- 94dBA for the air compressor
- 92 dBA for each of the loading and product pumps; and
- 89 dBA for the vapour recovery unit pump.

1.4 PE Response

1.4.1 Operational Noise Predictions

The noise model was run with an F class stability including a south east 2m/s wind to represent potential worse case F class inversion conditions. **Table 6** presents predicted results at the most impacted receivers under these conditions. Details of the Noise Catchment Areas (NCA) and the specific receiver locations can be found in the original Noise and Vibration Assessment.

Table 6: Predicted Operational Noise

Predicted Noise Level L _{Aeq,15min} dB(A)					
Receiver ID	Receiver Type	Criteria L _{Aeq,15min}			Eve/Night
		Day	Eve	Night	6 (2m/s SE wind– F Stability Class)
NCA A					
21	Passive Recreation Area	50	50	50	38
24	Residence	46	47	43	37
27	Place of Worship	50	50	50	34
36	Residence	46	47	43	36
40	Commercial	65	65	65	40
42	Active Recreation Area	55	55	55	44
43	Active Recreation Area	55	55	55	43
NCA B					
16	Residence	53	46	38	36
18	School	45	-	-	37
20	School	45	-	-	38
NCA C					
5	Residence	56	44	39	32

Table 6 demonstrates noise model predictions up to 37 dB(A) at nearest residences under F class stability conditions. Limiting the operational noise impact to 36 dB(A) when the lowest night time project

specific noise level (PSNL) was developed to 38 dB(A) would not allow any safety margin for differences between theoretical noise propagation modelling and actual meteorological conditions. As discussed in Section 5 of the Industrial Noise Policy weather conditions can vary noise propagation significantly and it is preferred to set the noise limits at the PSNL rather than reduce it further based on theoretical modelling results.

With regard to establishing noise limits on individual items of plant, as a number of the sources will be grouped in close proximity (eg pumps), and others will be large in size, a noise limit based on converting sound power level (SWL) to a sound pressure level (SPL) at 1 metre assuming a correction of -8 dB is not applicable. As such the direct measurement of the noise source at 1 metre cannot be compared to the sound power levels used for modelling and would be a misleading representation of appropriate noise limits for the site.

OPTION 2: That the Proponent:

Provides more detail to support noise monitoring results, such as:

- **Noise logger model and date of last calibration**
- **Photographs of monitoring equipment in place**
- **Detailed descriptions of monitoring locations**
- **Plots and weather data on the noise monitoring graphs; and**
- **An assessment background levels.**

The noise loggers were set to record A-weighted noise levels every 15 minutes and set to 'fast' response time. All three noise loggers were Type I EL-215 Acoustic Research Laboratories Pty Ltd and a calibration (measurement reference) was conducted before and after use with no significant drift observed. **Table 7** presents the serial numbers and pre and post calibration (pre-measurement) and Post-measurement respectively.

Table 7: Noise Loggers Used for Unattended Measurements

Location	Serial number	Pre-measurement Reference (dB)	Post-measurement Reference (dB)
NCA A – 91 Evans Street	194678	94.1	94.0
NCA B - 176 Gladstone Avenue	194801	94.1	94.1
NCA C – 318-320 Gladstone Avenue	15-203-504	94.0	93.8

The calibration certificates for all three loggers are included as **Appendix A** to this letter.

The three monitoring locations were selected to provide a representation of the noise levels experienced in the selected noise catchment areas.

All of the noise loggers were located in the front yard of the households as presented in following figures. The distance of the logger locations to any reflective surface was greater than 2 metres, hence it is stated that the measurements of background noise were taken in the 'free field'.

Photographs of the noise monitoring locations in situ are not available; however the locations are shown for further clarity in the following **Figure 2** to **Figure 4**.



Figure 2: 91 Evans Street approximate Noise Logger Location (Blue dot)



Figure 3: 176 Gladstone Avenue approximate Noise Logger Location (Blue dot)



Figure 4: 318-320 Gladstone Avenue approximate Noise Logger Location (Blue dot)

For the duration of monitoring, weather conditions were recorded at Port Kembla weather station (no 68253). It should be noted that wind speeds at this weather station would be greater than those experienced at the noise monitoring sites due to the exposed location of the weather station.

Figure 5 shows wind data collected over the monitoring interval at Port Kembla and that no rainfall occurred during the monitoring interval. Data was excluded for periods of elevated wind speed where upward trends in noise level were observed in logger data. A graphical representation of the noise logging data is included in Appendix B of the Noise and Vibration Assessment (**Pacific Environment, 2015**).

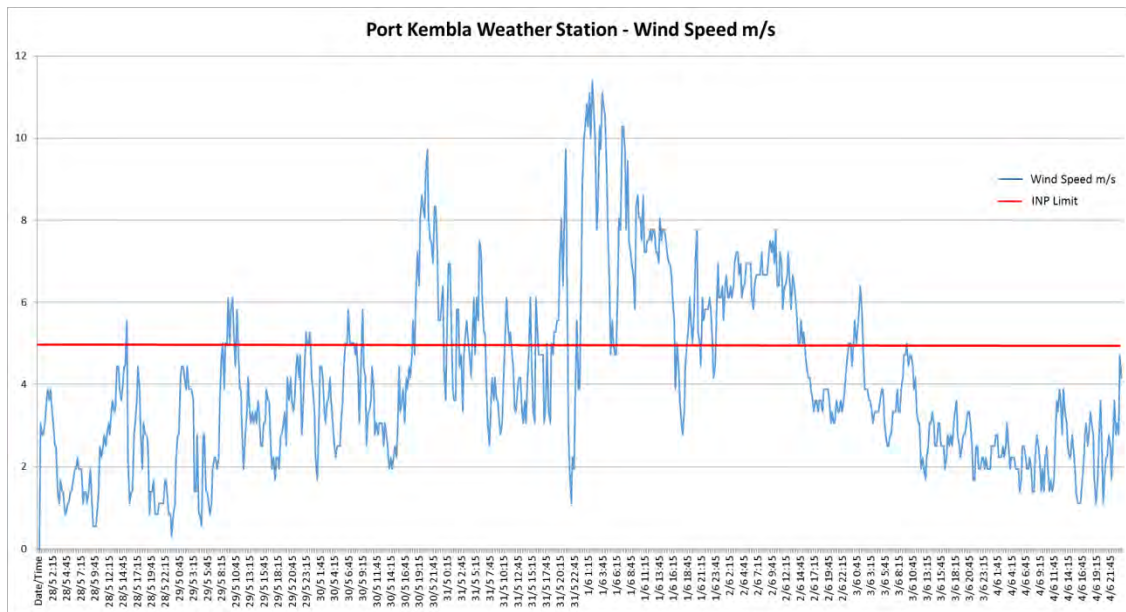


Figure 5: Port Kembla Wind Speed Data and Associated INP Limit (5m/s)

In order to calculate rated background levels (RBL) the procedure detailed in Appendix B of the INP (EPA, 2000) was followed. In summary the tenth percentile of all $L_{90,15, \min}$ was calculated for each period (day, evening and night) and for each day. Reported RBL values is the median of all days within the same period (day, evening and night) as per Table 8 below, reproduced from section 2.5.1 of the Noise and Vibration Assessment (Pacific Environment, 2015).

Table 8: Calculated RBL values (in bold)

Location	NCA	Measured Noise Level, dB(A)								
		L_{10}	Day RBL	L_{eq}	L_{10}	Evening RBL	L_{eq}	L_{10}	Night RBL	L_{eq}
BG01	A	56	41	51	53	42	49	49	39	44
BG02	B	71	48	65	68	50	62	64	47	58
BG03	C	64	51	60	62	50	58	60	46	56

- Further explains the method used to estimate exiting industrial noise levels

A discussion of the noise monitoring results and how these were applied to determine industrial influence during the night time periods was included in Section 2.6 of the Noise and Vibration Assessment (Pacific Environment, 2015). This explanation is reproduced below:

“The L_{A90} noise level recorded during the logging period can be considered as a conservative estimate of constant industrial noise sources from industry in the local area. This is because traffic noise is also contributing to the L_{A90} descriptor at BG2 and BG3.

Review of the noise logger graphs showed increased night time background noise levels at BG2 and BG3 on the 3rd and 4th of June 2015 indicating potential noise enhancing inversion conditions.

The median L_{A90} noise level during periods of minimal extraneous influence (that is the night time period) at BG1 was 40 dB(A), BG2 was 48 dB(A) and BG3 was 49 dB(A). “

The estimated industrial noise levels were used to adjust the night time amenity criteria as per Table 2.2 of the INP for urban residential receivers.

- **Provides third octave sound power levels for each modelled source**

The ISO 9613 prediction method does not include attenuation corrections for third octave, as such modelling is undertaken using octave source data. Noise source frequency data adopted for noise modelling is presented in **Table 9** below.

Table 9: Operational Source Power Levels, dB(A)

	Octave Band Sound Power Level, (Hz) dB(A)								Total SWL dB(A)
	63	125	250	500	1000	2000	4000	8000	
POINT SOURCES									
Marine Loading Arm ¹	72	74	82	91	90	85	82	74	95
Air Compressor ²	93	94	95	96	94	92	88	81	102
Loading and Product Pump ¹	77	79	87	96	95	90	87	79	100
Vapour Recovery Unit Pump ¹	72	74	82	91	94	85	82	74	96.5
Idling Truck ^{3,2}	69	78	78	83	84	82	73	62	89
Ship Auxiliary Power ⁵	93	96	96	100	101	96	88	86	106
HVAC ⁶	47	49	57	66	65	60	57	49	70
LINE SOURCES									
Light Vehicle ⁴	64	70	73	78	80	78	72	64	84
Fuel Tanker ^{3,1}	87	93	97	100	102	100	97	90	107

- Notes:
1. SWL estimated from hydraulic drive pump power rating (Bies and Hansen 2009).
 2. SWL estimated from 85dB(A) at 1 metre.
 - 3.1 SWL referenced from DEFRA database. Update of Noise Database for Prediction of Noise on Construction and Open Sites 2005 & AS2436:2010
 - 3.2 SWL referenced from DEFRA database. Update of Noise Database for Prediction of Noise on Construction and Open Sites 2005
 4. SWL referenced from Federal Highway Administration – Traffic Noise Model
 5. SWL referenced from publically available Auxiliary ship data.
 6. SWL referenced from Fujitsu catalogue: <https://www.fujitsu-general.com.au/docs/default-source/Brochures/ducted-brochure.pdf?sfvrsn=2>

- Provides the number and speed of vehicle movements modelled in each 15 minutes to explain how the sound power levels were used

Table 10 shows the number of moving vehicles and total sound power level assessed for any 15 minutes period. The modelling approach was to model moving sources as a line source with the equivalent energy of the vehicles spread along the transport route within the site. The modelling assumes that 3 trucks are moving around the site at any time. This approach is independent of vehicle speed.

The locations of all operational noise sources were included as a figure in Appendix C.1 of the Noise and Vibration Assessment (**Pacific Environment, 2015**).

Table 10: Modelled Vehicles within 15min Period

Item	Number	Total SWL dB(A)
Fuel Tanker (moving)	3	112
Light Vehicle (moving)	1	84

- Specifies which source type from the DEFRA database was used for idling trucks

Idling truck sound power level referenced from DEFRA database 'Update of Noise Database for Prediction of Noise on Construction and Open Sites 2005 Source noise type' from a mobile crane (Idling) 240kW 50 T was adopted as a typical spectrum and power level.

- Explains the source heights used in modelling, describing the actual equipment which will be used

Source heights adopted were included in Table 4.2 of the Noise and Vibration assessment (**Pacific Environment, 2015**) and are reproduced in **Table 11** below.

Table 11: Modelled Noise Source Heights

Item	Height (m)
Marine Loading Arm	3
Air Compressor	1.5
Loading and Product Pump	1.5
Vapour Recovery Unit Pump	1.5
Fuel Tanker	2
Light Vehicle	2
Idling Truck	2
Ship Auxiliary Power	5
HVAC	3

Specification of the actual equipment to be used on site is not available at this stage of the project.

- **Explains why additional sources such as pumps on the berthed ship and other three marine loading arms were not modelled, or provides model results including all significant noise sources.**

The bulk liquids terminal basis of design includes three marine loading arms (MLA), with the capacity for a fourth MLA to be located on a single moveable trolley. The trolley will contain a small onboard diesel generator to allow the trolley to long travel into position. Once in position, the MLA will be supplied with electricity to power the onboard hydraulic power pack which will supply hydraulic pressure to all MLA arms. The modelling has included a noise source for the hydraulic power pack.

The noise generated by the onboard diesel generator for traversing functions was not identified as a significant noise source as it would only operate for a limited number of hours in a year (less than 20 hrs per annum) and would be significantly less than ship noise sources.

Product unloading pumps within the berthed ship are expected to be inside an enclosed pump room and the noise breakout from that room is expected to be minimal when compared to contributions from the ship auxiliary power exhaust, captured in the section 4.1.4 of the Noise and Vibration Assessment (**Pacific Environment, 2015**) and other external noise sources.

- **Explains why F class stability category conditions were not modelled based on local data, or provides model results including F class stability category conditions.**

The assessment of inversion conditions was detailed in section 2.7 of the Noise and Vibration Assessment (**Pacific Environment, 2015**). According to the analysis of stability class data performed using CALMET data prepared for the air quality modelling, temperature inversions were identified to occur for 24% of the time during winter nights.

The INP states in sections 5.2 and Figure 5.1 that temperatures inversions should be considered for further assessment when they occur more than 30% of night in winter.

Predicted results under F class stability conditions are included in **section 1.3** of this document.

- **Provides operational noise results including all applicable modifying factors adjustments, and assessment of low frequency noise in accordance with the INP; and**

Modifying factors including tonal, impulsive or night time intermittent noise are not expected to occur for normal operation of the facility at a level which would significantly impact on ambient noise profiles at the nearest residences and sensitive noise receivers.

Table 12 presents a low frequency 'modifying factor' assessment for the most affected receivers in each catchment area including the F class stability category results. A complete set of results are included in **Appendix B** to this letter.

Table 12: Predicted Low Frequency Noise Assessment Results

		Predicted Noise Level Differences $L_{Ceq,15min} - L_{Aeq,15min}$ dB						
Receiver ID	Receiver Type	Criteria	Day	Eve/Night	Eve/Night	Eve/Night	Eve/Night	Eve/Night
			1 (Neutral)	2 (Neutral)	3 (NE wind)	4 (E wind)	5 (SE wind)	6 (F class)
NCA A								
36	Residence	$L_C - L_A < 15$ dB	15	14	16	15	12	12
NCA B								
16	Residence	$L_C - L_A < 15$ dB	15	14	13	11	11	11
NCA C								
5	Residence	$L_C - L_A < 15$ dB	17	15	13	13	13	13

Applying the INP would result in a penalty for low frequency noise at the majority of residential receivers in each noise catchment area. This is a result of greater attenuation of higher frequency noise.

Recent research (**Broner, 2011**) into annoyance from low frequency noise when assessed at lower noise levels suggests that the approach of subtracting A from C weighted noise levels is not representative of annoyance potential and in many situations would result in the 5 dB penalty being applied to sources which have a very low risk of causing annoyance.

Draft EPA noise policy has recognised the limitations of the INP methodology and has provided additional information for assessing low frequency noise in the draft industrial Noise Guideline (**EPA, 2015**). Where the draft guideline approach is adopted no additional penalties would apply.

To provide a comparison of project low frequency contributions against the background L_{A90} frequency data collected during attended noise monitoring has been compared with the frequency data predicted at SR5, SR16 and SR36. This comparison is shown in **Figure 6** to **Figure 8**. The predicted results in the low frequency 63Hz and 125Hz octave bands are not expected to significantly contribute to ambient background noise levels.

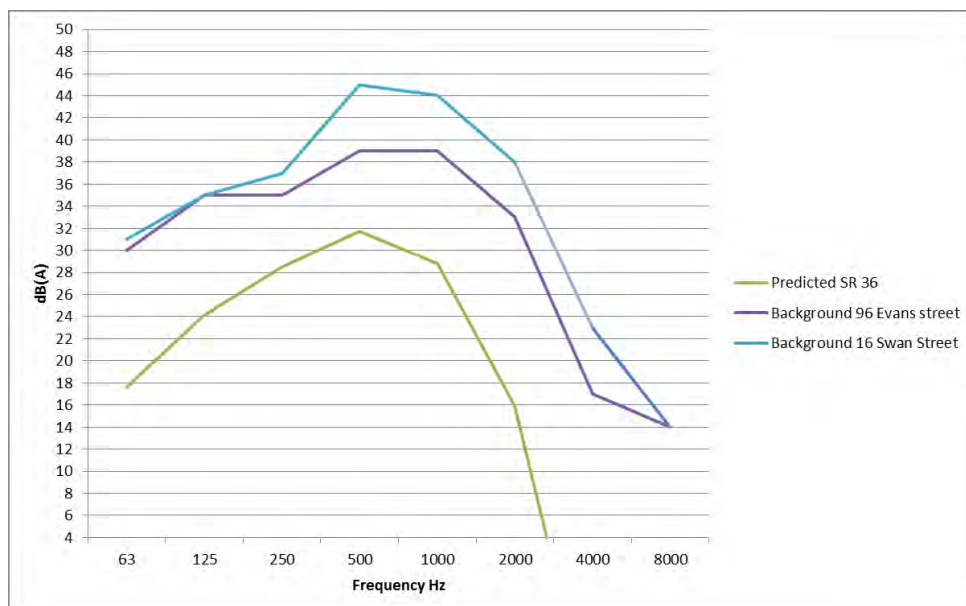


Figure 6: NCA A, Comparison of Background with Predicted Noise Spectrum

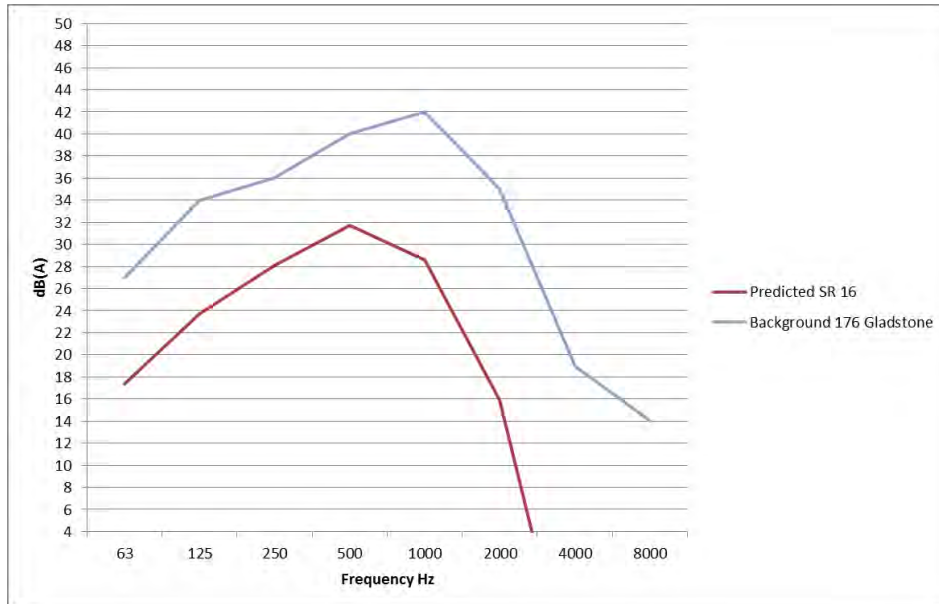


Figure 7: NCA B, Comparison of Background with Predicted Noise Spectrum

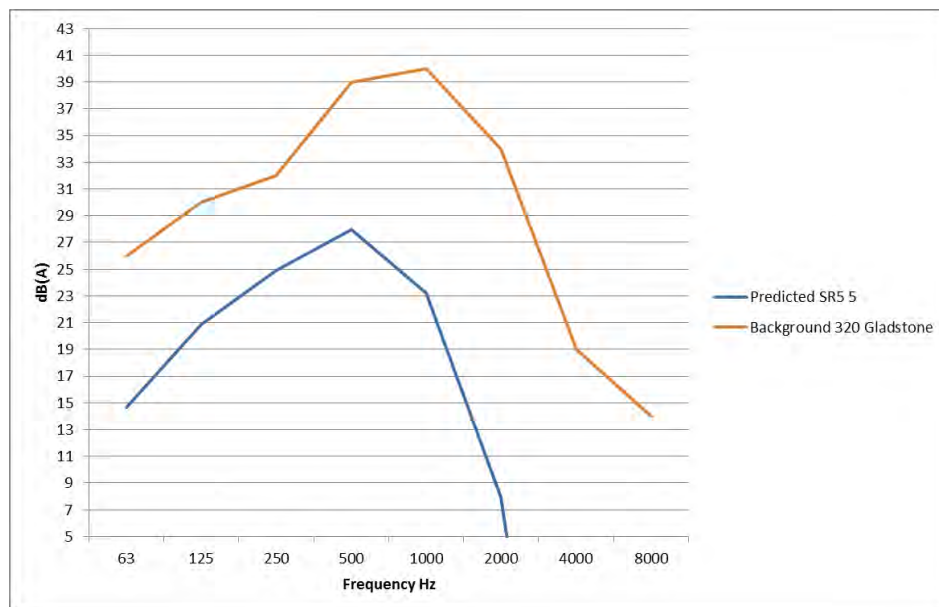


Figure 8: NCA C, Comparison of Background with Predicted Noise Spectrum

- Provides result tables referring to the correct noise catchment areas and criteria. In the result tables provided, noise catchment areas A and C appear to have been confused.

Assessment results are presented in **Appendix B**.

1.5 Traffic and Transport

The EIS states that biodiesel and ethanol will be delivered by road. It appears that the TIA has not made predictions of the traffic volumes likely to be generated by the delivery of biodiesel and ethanol by road.

1.6 PE Response

Additional heavy vehicles associated with ethanol and biodiesel deliveries to the terminal have been included in an updated calculation of traffic noise impacts and presented below.

The additional heavy vehicles are expected to include up to 8 additional trips during stage 1, 12 additional trips during Stage 2 and 18 additional movements during Stage 3. As a worse case assessment, all these trips have been added to the night time period.

The updated vehicle generation for the project is indicated in **Table 13**.

Table 13: Project Daily Generated (vehicle trips)

Year	Stage 1 (operation), Stage 2 (construction)		Stage 3 (operation)	
	Day Period	Night Period	Day Period	Night Period
Light Vehicles	150	150	12	12
Heavy Vehicles	118	82 ¹	254	176 ²

Notes: 1. Additional 12 trips added. 2. Additional 18 trips added.

Based on the existing traffic volumes presented in Section 7 of the Noise and Vibration Assessment (**Pacific Environment, 2015**) and the revised project traffic generation presented in **Table 13** there was not a significant increase in traffic noise from the Noise and Vibration assessment. The predicted traffic noise increase has been calculated to be less than 1 dB during both the day and night time period, which is within the 2dB(A) increase criteria.

2 NSW HEALTH - ILLAWARRA SHOALHAVEN LOCAL HEALTH DISTRICT PUBLIC HEALTH UNIT – NSW GOVERNMENT

NOISE AND VIBRATION IMPACT ASSESSMENT

The Noise and Vibration Assessment prepared by Pacific Environment Limited has found that noise generated by the construction and operation of the facility is not expected to exceed project specific noise goals or acceptable amenity criteria.

ISLHD PHU is satisfied that the Noise and Vibration assessment has appropriately characterised the existing background noise levels and taken a conservative approach to estimating the noise that will be generated by the project.

However as it is proposed to undertake night construction activities and operates 24 hours a day, ISLHD PHU recommends that all reasonable and practicable measures are taken to minimise night time noise that may cause sleep disturbance and subsequent potential health impacts. Incorporation of the noise mitigation strategies into construction and operation environmental management plans will be critical to achieving this outcome.

2.1.1 PE Response

The construction activities that will be completed outside standard hours are as follows:

- Transport of large items such as pre-fabricated switchrooms, pre-fabricated tanks, and other large OEM equipment such as the Marine Loading Arms.
- Electrical outages to connect transformers and electrical infrastructure.
- Rigging and preparation for heavy crane lifts.

Outside standard working hours construction activities will be managed to minimise noise emissions. The CEMP will include night time noise management measures such as

- Site inductions highlighting minimisation of outside standard working hours noise.
- Avoiding and minimising impact when loaded and unloading equipment.
- Minimising engine start-ups and excessive revving.
- Minimising the use of reversing alarms.
- Reschedule to a day time period any works that can potential cause excessive impact noise and therefore sleep disturbance.

3 CONCLUSION

I trust that the above information provides adequate additional information to respond to the submissions provided in relation to *20180 TQ Holdings Australia Noise and Vibration Assessment for Proposed Port Kembla Bulk Liquids Terminal Rev 01* (**Pacific Environment, 2015**) associated with the TQ Holdings Terminals facility.

If you have any questions, please do not hesitate to contact the undersigned.

Yours sincerely,



Aaron McKenzie
Acoustics Lead
Pacific Environment Limited

4 REFERENCES

British Standards Institute (2008). BS 5228-2:2009 *Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*.

CONCAWE Report No. 4/81, Manning C.J., 1981, *"The propagation of noise from petroleum and petrochemical complexes to neighbouring communities"*.

ACOUSTICS AUSTRALIA Vol. 39 No. 1, Broner N., Knight S., 2011, *"A simple outdoor criterion for assessment of low frequency noise emission"*.

International Standards Organisation (1996), ISO 9613-2:1996, *Acoustics -- Attenuation of sound during propagation outdoors -- Part 2: General method of calculation*.

NSW EPA (2000), *"Industrial Noise Policy"*.

NSW EPA (2008), *"Industrial Noise Policy Application Notes"*.

NSW EPA (2009), *"Interim Construction Noise Guidelines"*.

NSW EPA (2006), *"Assessing Vibration a technical guideline"*.

Pacific Environment (2015). *"20180 TQ Holdings Australia Noise and Vibration Assessment for Proposed Port Kembla Bulk Liquids Terminal Rev 01"*, November 2015.

APPENDIX A. EQUIPMENT CALIBRATION CERTIFICATES



**Acoustic
Research
Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C14334

Client Details : ARL Hire

423 Pennant Hills Rd
Pennant Hills NSW 2120

Equipment Tested/ Model Number : ARL EL-215

Instrument Serial Number : 194678

Microphone Serial Number : NA

Preamplifier Serial Number : NA

Ambient Temperature : 21.7°C

Relative Humidity : 41.6%

Barometric Pressure : 99.94 kPa

Calibration Technician : Kyle Alvarez

Calibration Date : 16-June-2014

Secondary Check by : Tim Williams

Report Issue Date : 17-June-2014

Approved Signatory :

Tested To : AS1259.1:1990

Comments : All tests passed for type 2

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.4.5: R.M.S performance	Pass
10.2.3: Frequency weighting	Pass		
10.3.2: Overload indications	Pass		
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		



Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172.
This document is issued in accordance with NATA's accreditation requirements.
Accredited for compliance with ISO/IEC 17025.
This document shall not be reproduced except in full.



**Acoustic
Research
Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Calibration Certificate

Number : C14012

Client Details : ARL Hire

423 Pennant Hills Rd
Pennant Hills NSW 2120

Equipment Tested/ Model Number : ARL EL-215

Instrument Serial Number : 194801

Microphone Serial Number : N/A

Preamplifier Serial Number : N/A

Ambient Temperature : 22°C

Relative Humidity : 57%

Barometric Pressure : 102.14 kPa

Calibration Technician : Kyle Alvarez

Calibration Date : 13-January-2014

Secondary Check by : Tim Williams

Report Issue Date : 13-January-2014

Approved Signatory :

Tested To : AS1259.1:1990

Comments : All tests passed for type 2

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass		
10.2.3: Frequency weighting	Pass		
8.9: Detector-indicator linearity	Pass		
8.10: Differential level linearity	Pass		
10.3.4: Inherent weighted system noise level	Pass		
10.4.2: Time weighting characteristics F and S	Pass		
10.4.5: R.M.S performance	Pass		



Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172
This document is issued in accordance with NATA's accreditation requirements
Accredited for compliance with ISO/IEC 17025
This document shall not be reproduced except in full.



**Acoustic
Research
Labs Pty Ltd**

Level 7 Building 2 423 Pennant Hills Rd
Pennant Hills NSW AUSTRALIA 2120
Ph: +61 2 9484 0800 A.B.N. 65 160 399 119
www.acousticresearch.com.au

Sound Level Meter
AS 1259.1:1990 - AS 1259.2:1990
Calibration Certificate

Calibration Number C15038

Client Details Acoustic Research Labs Pty Ltd - Hire
Level 7, Building 2, 423 Pennant Hills Road
PENNANT HILLS NSW 2120

Equipment Tested/ Model Number : ARL EL-315
Instrument Serial Number : 15-203-504
Microphone Serial Number : 91812
Pre-amplifier Serial Number : 26886

Atmospheric Conditions

Ambient Temperature : 24.2°C
Relative Humidity : 48.9%
Barometric Pressure : 99.48kPa

Calibration Technician : Corey Stewart
Calibration Date : 02/02/2015

Secondary Check: Sandra Minto
Report Issue Date : 04/02/2015

Approved Signatory :

Ken Williams

Clause and Characteristic Tested	Result	Clause and Characteristic Tested	Result
10.2.2: Absolute sensitivity	Pass	10.3.4: Inherent system noise level	Pass
10.2.3: Frequency weighting	Pass	10.4.2: Time weighting characteristic F and S	Pass
10.3.2: Overload indications	Pass	10.4.3: Time weighting characteristic I	Pass
10.3.3: Accuracy of level range control	Pass	10.4.5: R.M.S performance	Pass
8.9: Detector-indicator linearity	Pass	9.3.2: Time averaging	Pass
8.10: Differential level linearity	Pass	9.3.5: Overload indication	Pass

Least Uncertainties of Measurement -

Acoustic Tests		Environmental Conditions	
31.5 Hz to 8kHz	±0.15dB	Temperature	±0.3%
12.5kHz	±0.165dB	Relative Humidity	±4.1%
16kHz	±0.245dB	Barometric Pressure	±0.1kPa
Electrical Tests			
31.5 Hz to 20 kHz	±0.095dB		

All uncertainties are derived at the 95% confidence level with a coverage factor of 2.



This calibration certificate is to be read in conjunction with the calibration test report

Acoustic Research Labs Pty Ltd is NATA Accredited Laboratory Number 14172
Accredited for compliance with ISO/IEC 17025

The results of the tests, calibrations and/or measurements included in this document are traceable to
Australian National standards

PAGE 1 OF 1

APPENDIX B. MODELLING RESULTS

Table B.1: Predicted Noise Levels Highest Results

		Predicted Noise Level $L_{Aeq,15min}$ dB(A)								
Receiver ID	Receiver Type	Criteria $L_{Aeq,15min}$			Day	Eve/Night	Eve/Night	Eve/Night	Eve/Night	Eve/Night
		Day	Eve	Night	1 (Neutral)	2 (Neutral)	3 (NE wind)	4 (E wind)	5 (SE wind)	6 (Inversions)
NCA A										
21	Passive Recreation Area	50	50	50	30	31	27	36	37	38
24	Residence	46	47	43	30	31	27	35	36	37
27	Place of Worship	50	50	50	26	27	24	31	33	34
36	Residence	46	47	43	29	30	26	29	35	36
40	Commercial	65	65	65	34	34	33	34	39	40
42	Active Recreation Area	55	55	55	40	40	39	39	44	44
43	Active Recreation Area	55	55	55	38	39	37	41	43	43
NCA B										
16	Residence	53	46	38	29	30	30	35	35	36
18	School	45	-	-	29	31	30	36	36	37
20	School	45	-	-	31	32	30	37	37	37
NCA C										
5	Residence	56	44	39	24	26	31	31	31	32

TableB.2: Operational Modelling Results All Receivers

Period Condition ID Receiver ID	Predicted Noise Level $L_{Aeq,15min}$ dB(A)					
	Day	Eve/Night	Eve/Night	Eve/Night	Eve/Night	Eve/Night
	1	2	3	4	5	6
SR1	21	22	28	28	28	29
SR2	21	22	28	28	28	29
SR3	22	23	29	29	29	30
SR4	25	26	32	32	32	32
SR5	24	26	31	31	31	32
SR6	24	25	31	31	31	32
SR7	24	26	31	31	31	32
SR8	27	28	33	34	34	35
SR9	26	27	32	33	33	34
SR10	24	25	29	30	30	32
SR11	24	24	28	29	29	31
SR12	27	28	31	33	33	35
SR13	26	27	31	33	33	34
SR14	28	29	31	34	34	35
SR15	28	29	30	34	34	35
SR16	29	30	30	35	35	36
SR17	29	30	29	35	35	36
SR18	29	31	30	36	36	37
SR19	27	28	26	33	33	35
SR20	31	32	30	37	37	38
SR21	30	31	27	36	37	38
SR22	27	28	24	33	33	34
SR23	29	30	26	35	35	36
SR24	30	31	27	35	36	37
SR25	29	30	26	34	35	36
SR26	28	29	25	33	35	35
SR27	26	27	24	31	33	34
SR28	28	29	25	32	34	35
SR29	28	29	25	32	34	35
SR30	28	29	25	32	34	35
SR31	28	29	25	29	34	35
SR32	28	29	25	29	35	36
SR33	28	29	25	29	34	36
SR34	29	30	26	30	35	37
SR35	29	30	26	29	35	36
SR36	29	30	26	29	35	36
SR37	29	30	26	28	35	36

Period Condition ID Receiver ID	Predicted Noise Level $L_{Aeq,15min}$ dB(A)					
	Day	Eve/Night	Eve/Night	Eve/Night	Eve/Night	Eve/Night
	1	2	3	4	5	6
SR38	29	30	26	27	35	36
SR39	29	30	26	33	35	36
SR40	34	34	33	34	39	40
SR41	34	34	33	34	39	40
SR42	40	40	39	39	44	45
SR43	38	39	37	41	43	44

TableB.3: Predicted Low Frequency Noise Assessment Results

Period Condition ID Receiver ID	Predicted Noise Level Differences $L_{Ceq,15min} - L_{Aeq,15min}$ dB					
	Day	Eve/Night	Eve/Night	Eve/Night	Eve/Night	Eve/Night
	1	2	3	4	5	6
SR1	17	16	13	13	13	13
SR2	17	16	13	13	13	13
SR3	17	16	13	13	13	13
SR4	17	15	12	12	12	12
SR5	17	15	13	13	13	13
SR6	17	16	13	13	13	13
SR7	16	15	12	12	12	12
SR8	16	15	12	12	12	12
SR9	16	15	12	12	12	12
SR10	17	16	14	14	14	14
SR11	18	17	15	14	14	14
SR12	15	14	13	12	12	12
SR13	16	15	13	12	12	12
SR14	15	14	12	11	11	11
SR15	15	14	13	11	11	11
SR16	15	14	14	12	12	12
SR17	15	14	14	12	12	12
SR18	15	14	14	11	11	11
SR19	16	15	15	12	12	12
SR20	14	13	14	11	11	11
SR21	15	14	15	11	11	11
SR22	16	15	17	13	13	13
SR23	15	14	15	11	11	11
SR24	15	14	16	11	11	11
SR25	15	14	16	12	12	12
SR26	15	14	16	12	12	12
SR27	16	15	16	13	12	12
SR28	16	15	16	13	12	12
SR29	16	15	16	12	12	12
SR30	16	15	16	12	12	12
SR31	16	15	16	15	12	12
SR32	16	15	16	15	12	12
SR33	16	15	16	15	12	12
SR34	15	14	16	14	12	12
SR35	16	15	16	15	12	12
SR36	15	14	16	15	12	12
SR37	15	14	16	14	12	12

Predicted Noise Level Differences $L_{Ceq,15min} - L_{Aeq,15min}$ dB						
Period	Day	Eve/Night	Eve/Night	Eve/Night	Eve/Night	Eve/Night
Condition ID	1	2	3	4	5	6
Receiver ID						
SR38	15	14	16	14	11	11
SR39	16	15	17	13	12	12
SR40	14	13	13	13	11	11
SR41	14	13	13	12	11	10
SR42	12	12	11	12	10	9
SR43	13	12	12	11	10	10

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

APPENDIX

D

HUMAN HEALTH RISK RESPONSE



17 March 2016

Cardno
Level 1
47 Bureli Street
Wollongong NSW 2500

Attn: Alex Larance

Environmental Risk Sciences Pty Ltd
PO Box 2537
Carlingford NSW 2118

Phone: +61 2 9614 0297
Fax: +61 2 8215 0657
Email: Jackie@enrisks.com.au
www.enrisks.com.au

Human Health Risk Assessment – Port Kembla Bulk Liquids Terminal: Response to Submissions

Environmental Risk Sciences Pty Ltd (enRiskS) completed the report: Human Health Risk Assessment – Port Kembla Bulk Liquids Terminal, Report reference PJ-PK-0001-REPT-012_00-01, dated 12 November 2015. This letter provides responses to submissions received in relation to human health risk aspects of the proposed Bulk Liquids Terminal facility addressed in the enRiskS report.

Submissions received from the Illawarra Shoalhaven Local health District Public Health Unit and the NSW EPA indicate that the Human Health Risk Assessment report should be updated, if required, based on comments provided in submissions in relation to the Air Quality and Greenhouse Gas Assessment (AQGGA).

Issues raised in submissions in relation to the AQGGA have been addressed in the letter from Pacific Environment dated 14 March 2016. The additional information provided by Pacific Environment has been reviewed in the context of the Human Health Risk Assessment. The responses to submissions on the AQGGA largely provide additional clarification. The aspects that need to be considered in the Human Health Risk Assessment are further discussed below:

Variable Emissions:

To address the question in relation to assessing variable emission rates from the Project, Pacific Environment has undertaken additional modelling based on variable monthly emission rates. In addition the modelling has also considered the impact of tank breathing and road tanker loadouts occurring concurrently. The air quality modelling provides revised peak or maximum 1-hour average concentrations, as presented in Table 5 of the Pacific Environment Letter.

The revised air modelling specifically relates to peak emissions, rather than average emissions that may occur throughout the year. As a result the revised air modelling is considered to represent the maximum or peak short term concentrations where assessment of acute exposures is relevant. The assessment of chronic exposures, where average emissions throughout the year are of more relevance is presented in the Human Health Risk Assessment. The chronic assessment of health risks has not been revised as the air impacts associated with average yearly emissions have not changed from those presented in the AQGGA and Human health Risk Assessment.

Acute health risks associated with the peak 1-hour average concentrations have been revised on the basis of the new air concentrations. This has been undertaken in accordance with the approach outlined in the Human Health Risk Assessment. **Table 1** presents the revised acute health risk calculations. It is noted that the revised air quality modelling included additional receptors (15-32). The location of all receptors is illustrated on **Figure 1**.

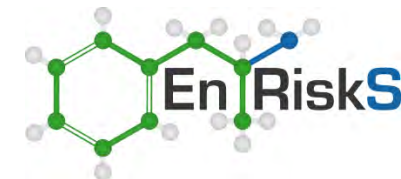


Table 1 Assessment of Acute Inhalation Exposures from Tank Venting and Road Tanker Loading: Revised Calculations (all concentrations in mg/m³)

Receptor ID	Benzene		Toluene		Ethylbenzene		Xylenes		Total HI
	Guideline	0.029	Guideline	4.5	Guideline	22	Guideline	2.2	
	Max 1-hr average	HI	Max 1-hr average	HI	Max 1-hr average	HI	Max 1-hr average	HI	
1	0.0029	0.100	0.023	0.0051	0.0049	0.00022	0.027	0.012	0.12
2	0.0035	0.121	0.028	0.0062	0.0060	0.00027	0.033	0.015	0.14
3	0.0009	0.031	0.007	0.0016	0.0015	0.000068	0.0085	0.0039	0.037
4	0.0021	0.072	0.017	0.0038	0.0036	0.00016	0.020	0.0091	0.085
5	0.0018	0.062	0.014	0.0031	0.0031	0.00014	0.017	0.0077	0.073
6	0.0012	0.041	0.0092	0.0020	0.0020	0.000091	0.011	0.0050	0.048
7	0.0011	0.038	0.0085	0.0019	0.0018	0.00008	0.010	0.0045	0.044
8	0.0013	0.045	0.0100	0.0022	0.0022	0.00010	0.012	0.0055	0.053
9	0.0007	0.024	0.0055	0.0012	0.0012	0.000055	0.0066	0.0030	0.029
10	0.0012	0.041	0.0092	0.0020	0.0020	0.000091	0.011	0.0050	0.048
11	0.00049	0.017	0.0039	0.00087	0.00085	0.000039	0.0046	0.0021	0.020
12	0.0019	0.066	0.0150	0.0033	0.0033	0.00015	0.018	0.0082	0.077
13	0.0005	0.017	0.0039	0.0009	0.0008	0.000037	0.0045	0.0020	0.019
14	0.0029	0.100	0.023	0.0051	0.0050	0.00023	0.027	0.012	0.12
15	0.0038	0.131	0.030	0.0067	0.0064	0.00029	0.035	0.016	0.15
16	0.0019	0.066	0.015	0.0033	0.0032	0.00015	0.017	0.0077	0.077
17	0.0024	0.083	0.019	0.0042	0.0042	0.00019	0.023	0.010	0.098
18	0.0022	0.076	0.017	0.0038	0.0038	0.00017	0.020	0.0091	0.089
19	0.0012	0.041	0.0099	0.0022	0.0021	0.00010	0.012	0.0055	0.049
20	0.0013	0.045	0.010	0.0022	0.0022	0.00010	0.012	0.0055	0.053
21	0.0012	0.041	0.010	0.0022	0.0021	0.00010	0.011	0.0050	0.049
22	0.0032	0.110	0.025	0.0056	0.0054	0.00025	0.030	0.014	0.13
23	0.0029	0.100	0.023	0.0051	0.0049	0.00022	0.027	0.012	0.12
Acceptable total HI									≤1



Figure 1 Location of Sensitive Receptors Modelled in Air Quality Assessment

The revised risk calculations indicate that all individual and cumulative exposures associated with the maximum 1-hour average increase in air concentrations surrounding the site are below the relevant acute health based guidelines.

This means all concentrations in air (for all individual chemicals and for the cumulative exposure to these chemicals together) are below a level that has the potential to result in adverse health effects in all members of the public associated with exposure to short-duration peak air concentrations.

The revised risk calculations do not change the outcomes presented in the Human Health Risk Assessment.



Background levels:

The additional information provided by Pacific Environment provides a comparison of the predicted emissions from the proposed facility against other emission sources in the area. The comparison showed the project was not predicted to contribute more than 3% to existing industrial emissions in the area. The Human Health Risk Assessment also noted that the predicted chronic air concentrations from the project were below background levels reported for the general area. No additional background data is presented in the Pacific Environment letter that changes the assessment of potential chronic exposures as presented in the Human Health Risk Assessment.

Limitations

Environmental Risk Sciences has prepared this letter for the use of Cardno and TQ Holdings Australia Pty Ltd (TQ) in accordance with the usual care and thoroughness of the consulting profession. It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this technical working paper.

It is prepared in accordance with the scope of work and for the purpose outlined in this letter. This letter should be read in conjunction with the report: Human Health Risk Assessment – Port Kembla Bulk Liquids Terminal, Report reference PJ-PK-0001-REPT-012_00-01, dated 12 November 2015.

Environmental Risk Sciences has made no independent verification of information provided beyond the agreed scope of works and assumes no responsibility for any inaccuracies or omissions. No indications were found that information contained in the reports provided for use in this assessment was false.

This letter was prepared March 2016 and is based on the information provided and reviewed at that time. Environmental Risk Sciences disclaims responsibility for any changes that may have occurred after this time.

This letter should be read in full. No responsibility is accepted for use of any part of this letter in any other context or for any other purpose or by third parties. This letter does not purport to give legal advice. Legal advice can only be given by qualified legal practitioners.

If you require any additional information or if you wish to discuss any aspect of this letter please do not hesitate to contact me on (02) 9614 0297 or 0425 206 295.

Yours sincerely,

Jackie Wright (Fellow ACTRA)
Principal/Director
Environmental Risk Sciences Pty Ltd

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

APPENDIX

E

PRELIMINARY HAZARD ASSESSMENT RESPONSE

TECHNICAL NOTE

PORT KEMBLA BULK LIQUIDS TERMINAL

TQ HOLDINGS AUSTRALIA PTY LTD

RESPONSE TO SUBMISSIONS - PRELIMINARY HAZARD ANALYSIS (PHA)

Rev	Date	Description	Prepared	Checked	Approved	Method of issue
0	18-Mar-16	Issued for inclusion in the overall RTS report	F. Wong	G. Peach	G. Peach	Email PDF
RELIANCE NOTICE <i>This technical note is issued pursuant to an Agreement between SHERPA CONSULTING PTY LTD ('Sherpa Consulting') and Cardno Pty Ltd which agreement sets forth the entire rights, obligations and liabilities of those parties with respect to the content and use of the report.</i> Reliance by any other party on the contents of the technical note shall be at its own risk. Sherpa Consulting makes no warranty or representation, expressed or implied, to any other party with respect to the accuracy, completeness, or usefulness of the information contained in this technical note and assumes no liabilities with respect to any other party's use of or damages resulting from such use of any information, conclusions or recommendations disclosed in this technical note.						
				QA verified	A. Campanilla	
				Date	18-Mar-2016	

CONTENTS

ABBREVIATIONS.....	3
1. INTRODUCTION	4
2. DEPARTMENT OF PLANNING & ENVIRONMENT (DPE)	5
3. PORT KEMBLA COAL TERMINAL (PKCT).....	9
4. GRAINCORP	13
5. SAFEWORK NSW.....	24
6. ENVIRONMENT PROTECTION AUTHORITY (EPA).....	28
7. ILLAWARRA SHOALHAVEN LOCAL HEALTH DISTRICT PUBLIC HEALTH UNIT (ISLHD PHU).....	30
8. REFERENCES	32

TABLES

Table 1: Tank top fire pool diameter	13
Table 2: Bund fire pool diameter.....	14
Table 3: SafeWork NSW comments	24
Table 4: SafeWork matters to be considered.....	25
Table 5: Port Kembla wave run-up heights	30

FIGURES

Figure 1: Pool geometries (a) cylindrical flame (b) cylindrical flame with elongated flame at higher wind speed	6
Figure 2: Heat radiation isopleths from PKBLT Site 1 full bund fire scenario	9
Figure 3: Site 1 Flash Fire – Distance to LFL.....	10
Figure 4: Damage and propagation risk contour (PHA extract).....	12
Figure 5: Combustible tank top fire – 12.6 kW/m ² heat radiation	16
Figure 6: Combustible tank top fire – 23 kW/m ² heat radiation	17
Figure 7: Flammable tank top fire – 12.6 kW/m ² heat radiation.....	18
Figure 8: Flammable tank top fire – 23 kW/m ² heat radiation.....	19
Figure 9: Bund fire – 12.6 kW/m ² heat radiation	20
Figure 10: Bund fire – 23 kW/m ² heat radiation	21
Figure 11: Site 2 Full Bund fire	22
Figure 12: Site 2 Flash Fire – Distance to LFL.....	23

ABBREVIATIONS

AHD	Australian Height Datum
ARI	Average Recurrence Interval
AS	Australian Standard
DPE	Department of Planning & Environment
EIS	Environmental Impact Statement
EPA	Environment Protection Authority
FRNSW	Fire Rescue New South Wales
FSS	Fire Safety Study
HIPAP	Hazardous Industry Planning Advisory Paper
ISLHD PHU	Illawarra Shoalhaven Local Health District Public Health Unit
LFL	Lower Flammability Limit
NSW Ports	New South Wales Ports
PHA	Preliminary Hazard Analysis
PKBLT	Port Kembla Bulk Liquids Terminal
PKCT	Port Kembla Coal Terminal
RTS	Response to Submission
SFARP	So Far As Reasonably Practicable
SIL	Safety Integrity Level
TQ	TQ Holdings Australia Pty Ltd
WHS	Work Health and Safety

1. INTRODUCTION

TQ Holdings Australia Pty Ltd (TQ) issued the Environmental Impact Statement (EIS) for the proposed Port Kembla Bulk Liquids Terminal (PKBLT) for exhibition to the general public in December 2015.

The EIS for PKBLT was prepared by Cardno Pty Ltd (Cardno). The Hazard and Risk issues were addressed in the Preliminary Hazard Analysis (PHA), conducted by Sherpa Consulting Pty Ltd (Sherpa).

The EIS, and PHA, was submitted to Department of Planning & Environment (DPE) for review and approval of the development application (SSD 7264). As part of the approval process, DPE requires TQ to respond to all submissions by the general public and any additional issues raised by DPE.

Submissions relating to the PHA were provided from the following stakeholders:

- DPE
- Port Kembla Coal Terminal (PKCT)
- SafeWork NSW
- Graincorp
- Environment Protection Authority (EPA)
- Illawarra Shoalhaven Local Health District Public Health Unit (ISLHD PHU).

TQ and Cardno has approached Sherpa to review and assist with responding to the stakeholder comments as they require further clarification and further work on the technical aspects of the PHA. This technical note forms part of the Response to Submission (RTS) compiled by Cardno and an appendix in the PHA report.

This technical note covers response to issues relating to PHA comments only.

It should be noted that the submission letters can be found in the overall RTS report and are not included in this document. The comments that are relevant to the PHA are reported in this document under the relevant stakeholder section.

2. DEPARTMENT OF PLANNING & ENVIRONMENT (DPE)

As part of the development application approval process, DPE requires TQ to respond to all submissions by the general public and any additional issues raised by DPE. DPE submitted a letter outlining their comments on 10 February 2016 titled 'Request for Response to Submissions PKBLT, Port Kembla (SSD 7264)'. The comments relating to the PHA addressed in this technical note are reproduced and responses provided in this section.

1. For the risk analysis undertaken for the event of a flash fire due to evaporating pool and tank overfill, have all wind conditions (i.e. wind rose probabilities) been considered? If so, please justify.

The flash fire consequences due to evaporating pool from a storage tank bund and operational releases were modelled at B3, D5 and F2 weather conditions. The results showed that a flammable cloud reaching Lower Flammability Limit (LFL) levels is formed only under F2 conditions. This is because at higher wind speeds and unstable atmospheric conditions i.e. B3 and D5, flammable gas cloud formed from gasoline pool evaporation mixes with air sufficiently that the cloud does not reach LFL levels. It should be noted that in the PHA, tank overfill was considered to lead to gasoline pool in the bund as ducted piping directs flow into the bund sump.

The wind rose probabilities reported in Appendix F of the PHA report, Ref. (1), was accounted for in the risk model as follows:

- The frequency of flash fires is adjusted for the probability that the gasoline release would coincide with F2 weather condition leading to a flammable cloud and subsequent ignition.
- The flammable gas cloud dimensions are adjusted for the wind directional probability.

This approach allows for incorporation of site-specific environmental factors in the risk model.

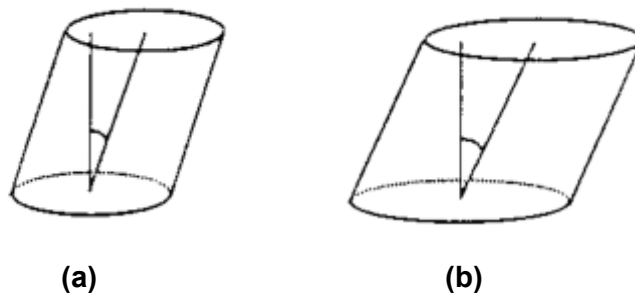
2. In the event of a jet and pool fire, has only high wind speed (05) been considered? If so, please justify.

The heat radiation distances for a jet and pool fire scenario was based on the high wind speed case (5 m/s rather than 2 or 3 m/s) with the wind in the direction of the release.

The 5 m/s wind speed was chosen as the basis for consequence modelling of a pool fire. A higher wind speed will elongate the flame giving it an elliptical shape, Ref. (2). Figure 1 shows the pool geometries and cylindrical flame shape at a lower and higher wind speed.

The elongated diameter of the flame can increase the surface area of the flame. The view factor¹ of a fixed receptor downwind of the flame would be greater at a higher wind speed. The receptor would be exposed to a higher thermal radiation heat flux. This would produce a more conservative result.

Figure 1: Pool geometries (a) cylindrical flame (b) cylindrical flame with elongated flame at higher wind speed



For the consequence modelling of a jet fire, the flame length is dependent on the pressure at which it is released. The heat radiation distances are slightly greater for a 2 m/s wind speed as the wind is less likely to be entrained in the heat generated from the flame (up to 20% for the largest and highest pressure release). However, based on the meteorological data obtained for the area, wind speeds less than 2 m/s occur less than 20% of the time and wind speeds between 3 and 5 m/s are more likely (60%). Therefore, a wind speed of 5 m/s was chosen for consistency across jet fire and pool fires.

3. It is noted in Appendix F that the weather data is based on readings from the automatic weather station at Port Kembla. Please clarify the duration of time over which weather data was collected (on which the analysis was based).

The weather data reported in Appendix F of the PHA, Ref. (1), was based on readings from July 2012 to June 2015 for a total of three years. Readings prior to July 2012 were not available for the weather station.

4. In the last paragraph of Section E7.1, it is noted that the tank roof fire frequencies for combustible bulk and slop tanks are based on escalation from a flammable tank roof fire. What is the escalation probability, and the probability of spray water cooling failure?

The tank roof fire frequency for combustible storage and slop tanks are based on two factors:

- Escalation probability, which was taken to be 50% based on the likelihood that the wind will direct the flame towards the combustible tank leading to escalation

¹ The geometrical view factor is the ratio between the received and the emitted radiation energy per unit area, Ref. (1).

- Probability of spray water cooling failure, which was taken to be 10% based on fixed systems.

5. In Section 2.5, it is noted that ship tanker transport is outside the scope of the PHA. The Department considers that loss of containment when the ship is close to shore before connecting to the shoreline may pose a risk to the terminal operations. Please note and confirm that hazards arising from ship tankers are to be considered in the Emergency Plan.

TQ met with Port Authority of NSW and NSW Ports on 11 February 2016 to discuss the PKBLT project. One item raised in the meeting was the management of hazards arising from ships in the harbour. Port Authority of NSW confirmed that they are the responsible party to manage hazards within the port. TQ can confirm that the Emergency Plan will cover hazards arising from ships close to shore when the document is developed.

6. In Section 10.2, the individual risk fatality extends into the Gurungaty waterway up to 2m from the site boundary. It is also stated that the affected area is a shallow waterway which precludes ship or boat access. Please clarify and describe if any controls are in place to ensure public access is restricted.

TQ has consulted with NSW Ports regarding the controls that are in place to ensure public access is restricted. NSW Ports advised that the waterways are patrolled by the Port Authority of NSW. The Harbour Master of the Port Authority authorises the movement and berthing of vessels within the Port. The width and depths of Gurungaty waterway would not permit a bulk liquid vessel to access this area.

7. In Section 10.3, the risk of property damage and propagation extends into the land north of Site 1 up to 5m from the site boundary. The land is zoned to accommodate hazardous installations. Who is the land owner of this land? Please provide detail on your consultation with the land owner, particularly with regards to:

- exclusion of occupancy in the area;
- moving the site boundary to keep the risk on site; and
- management of potential risks.

The land north of Site 1 is owned by NSW Ports and is currently leased to PKCT for their activities. The risk of property damage and propagation extending into the land north of Site 1 was discussed with PKCT at a meeting held on 18 December 2015.

TQ advised that as the detailed design of the terminal progresses the risk contour may change and that their intention would be to bring the contour back onto the TQ site where possible. The request to avoid placing occupied buildings and dangerous goods storage in this location was also discussed. A copy of the EIS was provided to PKCT at this meeting and this included the PHA which specifically mentioned the risk

contours in this area. TQ have not had discussions with PKCT in regards to movement of boundaries as the terminal design has not progressed beyond a concept stage and there is opportunity to optimise the design in this area to further reduce the risk contours.

8. In Section 10.5, it is stated that escalation from a coal stockpile fire at the Port Kembla Coal Terminal (PKCT) is unlikely - as the separation distance between coal stockpiled at the PKCT to the nearest bulk fuel tank is approximately 90 metres. However, as the stockpiling of coal can result in coal dust explosions, confirm whether there is any potential for objects on the PKCT site to hit a tank on the development site during explosions. If such a risk exists, has this risk been considered in the risk analysis and what are the proposed control measures?

TQ has consulted with PKCT regarding the potential risk of coal dust explosions resulting in objects potentially striking the proposed PKBLT bulk storage tanks. The risk of this scenario is considered to be low for the following reasons:

- PKCT have never experienced a coal dust explosion on their site.
- There are control measures in place at PKCT to prevent such events, including:
 - PKCT site assessment in accordance with AS60079.10.2-2011 Explosive Atmospheres – Classification of Area – Combustible Dust Atmospheres
 - The use of appropriately rated equipment within the classified areas at PKCT
 - PKCT's housekeeping regime which further reduce the likelihood of combustible dust atmospheres being generated.
- The PKCT coal stockpile area is not confined and any dust explosions in a large unconfined area are unlikely to generate sufficiently high overpressures required for objects to strike the proposed bulk liquid storage tanks on PKBLT site
- The distance from combustible dusts hazardous areas in the PKCT facility is at least 180 m from the PKBLT site boundary.

3. PORT KEMBLA COAL TERMINAL (PKCT)

A neighbouring facility to PKBLT site, PKCT, has reviewed the PHA and has raised specific issues for the implications of the proposed PKBLT site on their existing operations and future works or developments. PKCT submitted a letter outlining their comments on 27 January 2016 titled 'PKBLT (SSD 7264) Notice of Exhibition'. The comments are reproduced and responses provided in this section.

The information that is provided here is in relation to consequences. The PHA provides a risk-based approach to land use planning as adopted in NSW i.e. considers the consequence AND likelihood of the bund fire scenarios at PKBLT.

1. Show the thermal radiation isopleths at 12.6 and 23 kW/m² for all the full bund fires on site 1. Show the assumed fire centres. Lay these over the area map to see potential thermal impacts on PKCT's northern stockpile areas and the PKCT operations area directly north of site 1.

The thermal radiation isopleths at 12.6 kW/m² and 23 kW/m² are shown in Figure 1 for the Site 1 full bund fire scenario involving flammable material. The bund fire centre was assumed to be at the centre of the Site 1 bund and is shown in the Figure 2. It should be noted that release into a full bund is the worst case scenario on Site 1. There is only one full bund scenario. Intermediate bund fire scenarios produce smaller thermal radiation isopleths.

The 12.6 kW/m² and 23 kW/m² thermal radiation isopleths distances from the centre of the bund are 171 metres and 148 metres respectively. The results are reported in Appendix D5 of the PHA report, Ref. (1).

Figure 2: Heat radiation isopleths from PKBLT Site 1 full bund fire scenario



2. Provide the LFL isopleth outlines for the major, full bund gasoline pool dispersions, giving some details of the surface roughness and other atmospheric and terrestrial assumptions.

Distance to LFL for a full bund gasoline pool dispersion extends up to 200 m from the Site 1 bund wall downwind in F2 conditions. This is shown in Figure 3. The results are reported in Appendix D3 of the PHA report, Ref. (1). It should be noted that release into a full bund is the worst case scenario on Site 1. There is only one full bund scenario. Intermediate bund fire scenarios produce smaller thermal radiation isopleths.

The parameters used in the modelling include:

- Surface roughness length: 0.1 m (Low crops, occasional huge obstacles)
- Pasquill stability class and wind speed: F, 2 m/s
- Humidity: 70%
- Ambient temp: 22°C
- Terrestrial: Level ground.

Figure 3: Site 1 Flash Fire – Distance to LFL



3. Provide details of how PKBLT would mitigate the effects of full bund fire events as well as the potential generation of large flammable vapour clouds particularly in relation to impacts on the PKCT site to the east, north and south of the PKBLT site 1.

Fire prevention systems will be available in the Site 1 bund. These systems will be designed in consultation with Fire Rescue New South Wales (FRNSW) as required under the Hazardous Industry Planning Advisory Paper (HIPAP) No. 2 FSS.

To prevent release of flammable material into the bunds due to overfilling of tanks, Safety Integrity Level (SIL) 2, high level protection are provided on all storage tanks on Site 1. Ducted overfill piping are also provided on the tanks. This directs any overflow material into the bund sump, which are equipped with hydrocarbon detectors. Fixed bund foam pourers will also be installed to provide a foam blanket if there are any spills into the bund. These systems will prevent accumulation of flammable or combustible material in the bund, and hence prevent potential generation of large flammable vapour clouds due to tank overfill.

The ducted overfill system was incorporated into PKBLT's tank design as part of recommendations from the Buncefield incident. TQ will be taking into account all recommendations from Buncefield during the detailed design phase (refer to Appendix G of the PHA report, Ref. (1)).

4. With regard to (b), your advice is sought as to whether there will be any restrictions or caveats placed on PKCT associated with this development.

Note: (b) Whether the siting of such a facility (Bulk Liquids Terminal) introduces restrictions to PKCT in its use of its leased premises and any future works or developments which may be contemplated.

A finding of the PHA is that the 50×10^{-6} per year damage and propagation risk contour encroaches into PKCT land north of site 1 (shown in Figure 4). The risk can be managed by ensuring that:

- equipment, piping or structures are not located within this area
- dangerous goods are not stored or present within this area.

The PHA report had raised these recommendations to manage this risk. Refer to Section 10.4.1 of the PHA report, Ref. (1), for more information. The Department of Planning and Environment (DPE) also raised a comment in relation to the risk contour extending into PKCT land (refer to Section 2 Comment 7 of this document).

Figure 4: Damage and propagation risk contour (PHA extract)



4. GRAINCORP

A neighbouring facility to PKBLT site, Graincorp, to the west of Site 2, has reviewed the PHA and have raised specific issues for the implications of the proposed PKBLT site on their existing operations and future works or developments. Graincorp submitted a letter outlining their comments on 28 January 2016 titled 'TQ Holdings Australia Pty Ltd Port Kembla Bulk Liquids Terminal (SSD 7264) State Significant Development Application Submission'. The comments are reproduced and responses provided in this section.

1. Provide plot plan overlays of thermal radiation impact zones at 12.6kW/m² and 23kW/m² for fire incidents from tank top and bund fires related to loss of containment events for flammable and combustible liquids. Show the location of assumed fire centres and the associated pool diameters of the major fires.

The pool diameters for all tank top fires and bund fires are reported in Appendix D of the PHA report, Ref. (1). For tank top fires, the tank diameter was used as the pool diameter. The pool diameters are reproduced in Table 1 for tank top fires, and Table 2 for bund fires.

Table 1: Tank top fire pool diameter

Tank Number	Pool Diameter (m)
TK-23	10
TK-24	10
TK-25	29
TK-26	29
TK-27	29
TK-28	29
TK-29	29
TK-30	3
TK-33	3
TK-35	29
TK-36	29
TK-37	29
TK-38	24

Table 2: Bund fire pool diameter

Bund Contents	Bund Surface Area (m ²)	Equivalent Pool Diameter (m)
TK-23/24	1131	38
Site 2 Pump Bay (intermediate bund)	1215	39
TK-25	1313	41
TK-28	1620	45
TK-29	1615	45
TK-37	2017	51
TK-38	1339	41
Site 2 bund	16644	75

Figure 5 and Figure 6 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for tank top fires on combustible tanks on Site 2 which are closest to the Graincorp site. Figure 7 and Figure 8 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for tank top fires on flammable tanks on Site 2 which are closest to the Graincorp site. The contours show the maximum distance to the thermal radiation level recorded at any height and hence provides the worst-case distance.

Figure 9 and Figure 10 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for intermediate bund fires on tanks closest to the Graincorp site. Intermediate bunds are the small bunds around each tank.

Figure 11 show the thermal radiation contour overlays at 12.6 kW/m² and 23 kW/m² respectively for a Site 2 bund fire. Due to the rectangular shape of the site and the circular overlays, the distances to heat radiation levels need to be applied along the length of the bund i.e. from TK-25 to TK-38.

2. Provide plot plan overlays of isopleths for major flammable liquid evaporation and dispersion events for F2 conditions. Show both LFL and 1/2 LFL isopleths.

The distances to LFL are reported in Appendix D of the PHA report, Ref. (1). Figure 12 show the distances to Lower Flammability Limit (LFL) for three scenarios at F2 conditions:

- the largest intermediate bund surface area on Site 2 (i.e. TK-27)
- flash fire as a result of the entire Site 2 bund filled with gasoline
- pump bay fire on Site 2.

The tanks that are on Site 2 closest to Graincorp site store combustible material and would not generate a flammable cloud.

Distances to $\frac{1}{2}$ LFL will require additional modelling and at low wind speeds has a degree of uncertainty. Additional work will be required to generate these contours. It should be noted that the LFL isopleths reaches the buildings on Graincorp site and hence the additional work would provide little benefit.

3. Provide justification for the use of TNO failure frequency data (5×10^{-6} per year) for "major" losses from large storage tanks, compared with the UK HSE value of 100×10^{-6} per year as seen in reference 17 of the PHA.

The frequency for major storage tank failure used in the PHA consists of two values where:

- Major tank failure² (5.0×10^{-6} per tank-year, TNO Purple Book)
- Tank rupture (3.0×10^{-6} per tank-year, OGP).

UK HSE states that the likelihood of a release for tank volumes greater than $12,000 \text{ m}^3$ (1×10^{-4} per tank-yr) represents a 1000 mm hole diameter on the side of the tank but does not provide advice on the reasoning behind the hole size (states the reasoning as being confidential). The hole size may be attributed to an agitator mixer or heater in a tank. The tanks at the site do not contain agitators, rotating equipment or heaters.

The TNO Purple Book's value for a complete inventory to atmosphere in 10 minutes represents a credible scenario on PKBLT in a publically available document.

² 'Continuous release of the complete inventory to atmosphere in 10 minutes according to TNO Purple Book, Ref. (2)

Figure 5: Combustible tank top fire – 12.6 kW/m² heat radiation

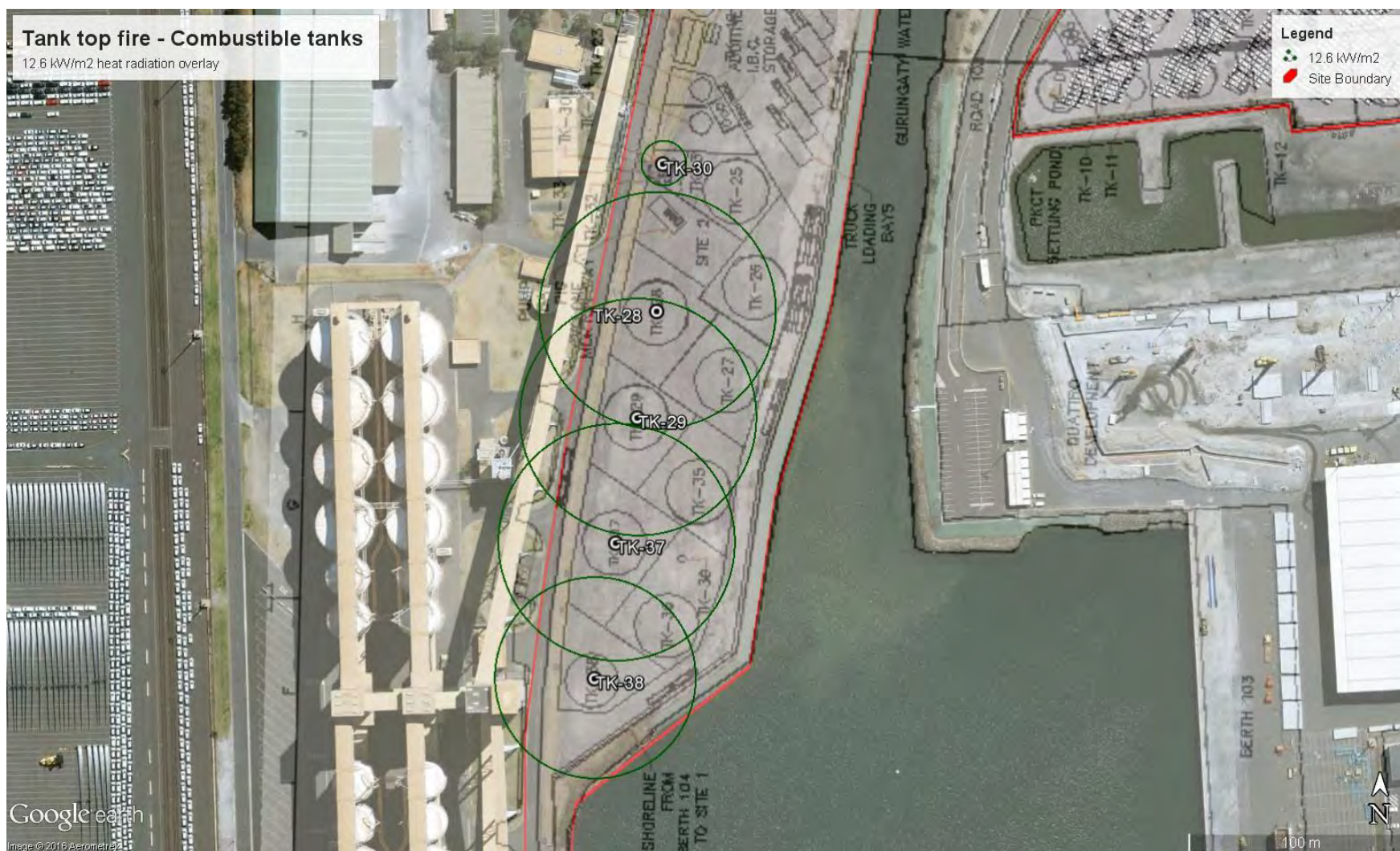


Figure 6: Combustible tank top fire – 23 kW/m² heat radiation



Figure 7: Flammable tank top fire – 12.6 kW/m² heat radiation



Figure 8: Flammable tank top fire – 23 kW/m² heat radiation



Figure 9: Bund fire – 12.6 kW/m² heat radiation



Figure 10: Bund fire – 23 kW/m² heat radiation



Figure 11: Site 2 Full Bund fire

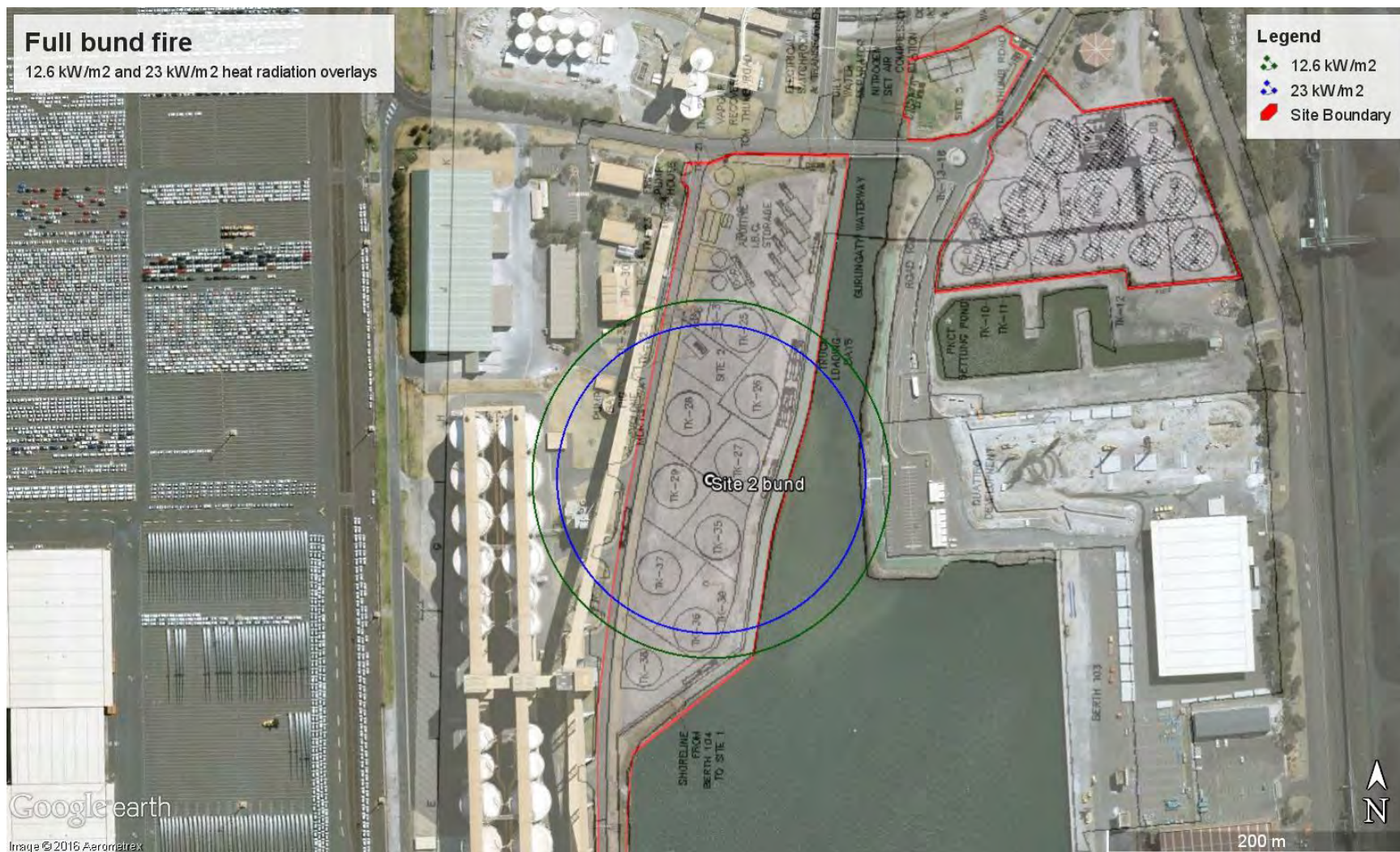


Figure 12: Site 2 Flash Fire – Distance to LFL



5. SAFEWORK NSW

SafeWork NSW (SafeWork) provided four comments during the EIS submission process. SafeWork submitted a letter outlining their comments on 4 February 2016 titled 'Port Kembla Bulk Liquids Terminal (SSD 7264)'.

SafeWork comments for the EIS submission and responses are provided in Table 3. SafeWork comments included in the Secretary Environment Assessment Requirements (SEARs) and responses are provided in Table 4 (refer to Item 1 in Table 3).

Table 3: SafeWork NSW comments

Item	SafeWork Comment	Response
1	SafeWork NSW's SEARS listed 12 items to be taken into account/addressed when preparing the EIS/PHA. It appears that the proponent/applicant had assumed (incorrectly) that the requirements of SafeWork NSW in the SEARS were part of the 'Guidance Material' under attachment C of the OEH requirements and therefore did not require to be specifically addressed in the EIS/PHA.	See Table 4 for detailed responses to items 1 through 10 of the SEARS
2	Section 9.1 of the EIS specifically requires that the proponent/applicant must consult with SafeWork NSW, among others listed, during the preparation of the EIS. This was not done. Reference at 9.3.2 in the EIS to a meeting with SafeWork NSW on 19 August 2015 is when the proponent provided an outline of the project to the Wollongong office of SafeWork NSW. However, SafeWork NSW met with representatives of the proponent/applicant during the exhibition period, on 19 January 2016, when SafeWork NSW outlined the procedure to be followed in relation to complying with the WHS legislation in general and the major hazard facilities chapter in particular.	Also raised as item 12 in the SEARS. A meeting with Safework was held on 16 March 2016 to discuss the items from Table 4 which will need to be covered in the Safety Case Outline.
3	While the PHA has some references to the issues listed in the SafeWork NSW's SEARS, most have not been specifically addressed in the EIS/PHA as exhibited. The proponent/applicant must consult with SafeWork NSW prior to completing the Response to Submissions Report with regard to the requirements of SafeWork NSW.	See response to item 1 and item 2 above.
4	Items 3 to 6 in The HAZID Register at Appendix C in the PHA refer to scenarios relating to the MLA failures. The possibility of high surge pressures in the ship discharge pipeline when the fast closing valves operate prior to the MLA disconnecting should also be addressed. A similar scenario to be considered is high surge pressures if the ship's pumps stop on power failure.	The PHA HAZID covered loss of containment scenarios due to MLA failures and pipe leaks. The frequency in the PHA is based on a generic 'average' leak frequency. The scenario of high surge pressures due to ship pump stopped will be reviewed as part of the surge analysis study during detailed design of the terminal.

Table 4: SafeWork matters to be considered

Item	SafeWork SEARS	Response
1	Details of how compliance with the requirements of the Work Health and Safety (WHS) Act 2011 and Regulation 2011 will be achieved.	In the context of the facility being determined to be an MHF, the relevant requirements will be met through the process of generating a safety case to demonstrate that the risks are being managed So Far As Reasonably Practicable (SFARP). The WHS Act and Regulation include a provision that TQ may notify the regulator of a proposed facility at which Schedule 15 chemicals are likely to be present in a quantity that exceeds 10% of the threshold. Following notification and determination TQ will prepare a safety case outline that details how the process of demonstrating compliance with the MHF requirements of the WHS act and regulation will be achieved.
2	A clear statement on the risk criteria that will be adopted for demonstrating SFARP and the basis/justification for adopting such criteria. – Reference to relevant publications by the UK health and safety executive (HSE) and the Australian National Offshore Petroleum Safety and Environmental Management Authority (NOPSEMA) is recommended.	The purpose of the PHA is to demonstrate that the proposed development is appropriate in the context of the impact on surrounding land uses. The HIPAP risk criteria are the appropriate criteria to be used in the PHA. The safety case outline will detail the risk criteria to be used for the development of the safety case and the SFARP demonstration.
3	An outline of how the requirement to prepare and submit a Safety Case to SafeWork NSW with the MHF licence application will be achieved	The purpose of the PHA is to demonstrate that the proposed development is appropriate in the context of the impact on surrounding land uses. The HIPAP risk criteria are the appropriate criteria to be used in the PHA. The safety case outline is the appropriate tool to present the approach to the safety case.
4	When preparing the PHA, the proponent is advised to identify the possible major incidents and the risk reduction measures to be included in the design	The HAZID section of the PHA identifies incidents involving schedule 15 materials and details the proposed controls. The PHA has included risk reduction measures (for example the use of SIL rated overfill protection). Whilst the PHA does not use the language 'major incidents' the scenarios are covered in the PHA and the controls described at a level of detail that is appropriate for a PHA.

Item	SafeWork SEARS	Response
5	The PHA (QRA) should evaluate both on site and off site risks on a cumulative (whole of site) basis	The purpose of the PHA is to determine if the facility is an appropriate development in the context of surrounding land uses. The focus of the PHA is offsite risk and the QRA has been undertaken to support the PHA. Onsite risk will be assessed in the safety case.
6	Details of the risk reduction measures that will be included to achieve SFARP.	Risk reduction measures that will be included to meet the land use planning criteria are included in the PHA. SFARP will be assessed in the safety case for the site.
7	An outline of how the recommendations made by the UK HSE and other industry bodies in relation to the Buncefield fuel storage depot fire and explosion in 2005 will be addressed by this proposal.	The Buncefield recommendations are addressed in Appendix G of the PHA.
8	Details of the standards and codes used in the construction of the tanks, the protection systems for the tanks and spill control systems for the tanks. E.g. API standard 2350.	Tanks will be designed and constructed in accordance with AS1940, AS1692 and API650. Overfill probabilities of the bulk storage tanks has been assessed during a SIL selection study. The terminal process design has also been assessed in a HAZOP study. Overfill protection of the bulk storage tanks will be implemented in accordance with API2350 for a SIL 2 rated system.
9	The PHA should include an assumptions register with source/justification for the assumptions made in the risk analysis. In particular, with respect to event and failure frequencies.	The PHA includes the operational basis for the assessment as Appendix B, the basis for the frequency and event trees as Appendix E. Additional detail can be provided on assumptions as required.
10	The risk matrix at table 4-1 in the scoping document indicates the risk of fatality of one in a million years as 'medium'. This would be inappropriate in the major hazard context. SafeWork NSW should be consulted if a risk matrix is to be used for major hazard risks.	The risk matrix used in the HAZID (PHA supporting study) defines a single fatality as a 'Major' consequence and the lowest likelihood ranking is 'rare'. A Major / Rare risk ranking results in a 'high' risk scenario. The tools that will be used in the safety case will be detailed in the safety case outline.
11	Tank bunding should be concrete or similar impervious material to minimise soil contamination in the event of a spill. Any cost benefit analysis when deciding on bunding options should take the cost of remediation of contaminated soil into consideration if it is decided not to line the base of the bunded area	All tank bunding will be concrete and impervious to protect soils. Section 7.13.5 of EIS states mitigation measure to avoid soil contamination will include: "Construction of hardstand areas with appropriately sized bunding around fuel storage and refuelling areas" All bulk liquid storage tanks and bunds would be designed and constructed in compliance to AS1940 and API650.

Item	SafeWork SEARS	Response
12	As proposed in clause 5.18.2 of the 8 September 2015 scoping document, the proponent should consult with SafeWork NSW during the development of the EIS and PHA.	Refer to Item 2 in Table 3.

6. ENVIRONMENT PROTECTION AUTHORITY (EPA)

EPA submitted a letter outlining their comments on the EIS submission on 8 February 2016 titled 'Exhibition of Environmental Impact Statement Port Kembla Bulk Liquids Terminal (SSD 15 7264)'. The hazard and risk comments are in relation to 'spill containment' and 'firefighting foams'. The comments are reproduced and responses provided in this section.

1. The Proponent should identify all measures to address the potential for spills and leaks and any spill management contingency measures that may need to be implemented, including but not limited to:

- **Information to demonstrate that any pipes, pipe fittings and pumps will be arranged in such a way that no spills or leaks can escape the containment bund and that all pumps will still operate if the bund is full. Any pipes connected to the storage tanks should be located over the containment bund and sited above ground and properly supported to make inspection and repair easier**
- **Information to demonstrate that the shoreline pipeline across Gurungaty Waterway will be arranged in such a way that no spills or leaks can escape the pipeline. The pipeline should be located over the containment bund and properly supported to make inspection and repair easier**
- **Details on the proposed routine inspection and maintenance program for any bunds, sumps, pipes, pipe fittings and pumps; and**
- **Information to demonstrate that the net capacity of gantry containment provides sufficient containment to hold tanker contents.**

The terminal layout and piping routes have only been developed to a concept level at this stage. As the terminal design progresses through the preliminary design phase and the detailed design phase, the information requested by EPA will be confirmed. At this stage the terminal design includes all flanged piping connections to the tanks and product pumping equipment are located within the bunded area. Where flanged valves on the shorelines are located outside the main bunds, a sump with level detection has been provided where possible to collect any leaks.

Sump drainage pumps within the bund will be used to collect and transfer both rainwater and liquids spills. These pumps are submersible style pumps and are designed to be operated if the bund is full of liquid. It is not the intention that product transfer pumps continue to operate if the bund they are located in is flooded.

The pipe bridge across the Gurungaty waterway will house fully welded product pipelines to minimise the possibility of leaks from flanged joints. A drip tray will be provided under the pipes on this pipe bridge to catch any leaks from the pipes and

convey the liquid to a sump at the end of the bridge. This sump will include level detection.

During ship unloading and product transfer operations there will be an operator checklist that includes walking the pipeline at regular intervals to inspect for leaks. Normal operator rounds will also include regular hydrocarbon checks in the sumps. The truck loading gantry area will be designed in accordance with the requirements of AS1940 in regards to containment volume.

2. The EIS states that a detailed Fire Safety Study and fire system design will be undertaken to determine optimal type and methods for collection and dewatering of foams within bunded areas. It is therefore important that additional information on any proposed firefighting foams be incorporated into the proposed Fire Safety Study.

Additional information to be addressed should include:

- **Selection of the firefighting foams to be handled, stored or used**
- **Justification for the foams selected**
- **Characterisation of any potential discharges to surface or groundwater waters**
- **An assessment of the likely impacts in the event of any discharge of contaminated fire water; and**
- **A description of all feasible and reasonable measures to minimise any discharge of contaminated fire water.**

The proposed firefighting foam should not contain perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA).

At the current stage of the project, the type of firefighting foam that will be used onsite has not been selected for the facility. The selection of the firefighting foam will be considered in consultation with foam suppliers taking into account environmental considerations.

Due to the presence of ethanol onsite, alcohol resistant foam will need to be used. TQ will ensure that the firefighting foam selected will not contain components that may lead to long-term toxic impacts in the environment such as PFOS and PFOA. Upon selection of the foam type, an assessment of the potential impact of contaminated water into the surface or ground waters will be undertaken and measures considered to minimise discharge of contaminated firewater.

7. ILLAWARRA SHOALHAVEN LOCAL HEALTH DISTRICT PUBLIC HEALTH UNIT (ISLHD PHU)

ISLHD PHU submitted a letter outlining their comments on the EIS review on 4 February 2016 titled 'Proposed Port Kembla Bulk Liquids Terminal Application SSD 15_7264'. ISLHD PHU provided two comments under the section 'general hazards'. The comments are reproduced and responses provided in this section.

1. The assessment of environmental hazards summarised in table 3.2 of the PHA doesn't appropriately address the risks presented by Tsunami or Storm Surge. The risk of storm surge has been addressed in the Surface Water assessment but there is no assessment of the potential impact of a tsunami on the facility.

The risk of storm surge has been addressed in Appendix J of the EIS 'Surface water assessment' and has not been assessed further in this response.

To assess the potential impact of a tsunami on the proposed PKBLT site, Cardno has undertaken modelling to determine the wave run up height for various Average Recurrence Interval (ARI) values, Ref. (3). The results are summarised in Table 5.

Table 5: Port Kembla wave run-up heights

Average Recurrence Interval, ARI (years)	Maximum Water Level (m AHD)
200	3.4
500	4.1
1,000	4.3

These results were compared against the highest level of the site bund walls to determine the impact on the proposed site.

The top level of the bund walls will be at an elevation of:

- 7.425 m Australian Height Datum (AHD) for Site 1
- 5.925 m AHD for Site 2 bund.

Therefore, for the 200, 500 and 1000-year ARI tsunami run-up events, the maximum water level would be below the top level of the Site 1 and Site 2 bund walls, and the water run-up is not expected to breach the site bund walls.

In addition to the analysis of wave run-up heights, it is recognised that in the unlikely event of a tsunami approaching the PKBLT site, advance warning would be provided to the site. The response to this emergency event would be to activate terminal ESD, stop all ship import and road tanker import/export operations and remove all road tankers from the site. Site personnel would be expected to evacuate to a designated high point.

2. The majority of the response to the Buncefield Recommendations is to be addressed at the detailed design stage and incorporated into the MHF Safety Case Report. ISLHD PHU recommends the development of the facility be subject to compliance with the project requirements identified in Table G.1 of the PHA.

On approval of the development application, TQ is willing to commit to addressing the Buncefield recommendations according to Table G.1 of the PHA as part of the conditions of consent.

8. REFERENCES

1. **Sherpa Consulting Pty Ltd.** Port Kembla Bulk Liquids Terminal - Preliminary Hazard Analysis (PHA). 2015. PK-PK-0001-REPT-010 Rev 3.
2. **The Netherlands Organization of Applied Scientific Research (TNO).** 'Yellow Book' Methods for the calculation of physical effects - due to releases of hazardous materials (liquids and gases) CPR 14E. 2005. 3rd edition.
3. **Cardno Pty Ltd.** Email: Port Kembla Tsunami Wave Run-up Heights (8201510305). 14 March 2016.
4. **The Netherlands Organization of Applied Scientific Research (TNO).** 'Purple Book' Guidelines for quantitative risk assessment CPR18E. 2005.

Proposed Port Kembla Bulk Liquids
Terminal (SSD 7264)

APPENDIX

F

BEST PRACTICE REVIEW – DIESEL
VEHICLES

Best Practice Management Review for Diesel Vehicles

Port Kembla Bulk Liquids Terminal

8201510305/Report 002

Prepared for
TQ Holdings Pty Ltd

16 March 2016



Contact Information

Cardno South Coast
Trading as Cardno (NSW/ACT) Pty Ltd
ABN 95 001 145 035

Level 1, 47 Burelli Street
PO Box 1285
Wollongong NSW 2500

Telephone: 02 4228 4133
Facsimile: 02 4228 6811
International: +61 2 4228 4133

southcoast@cardno.com.au
www.cardno.com.au

Author(s):



Rhiannon Hughes
Environmental Scientist

Approved By:



Alex Larance
Senior Environmental Engineer

Document Information

Prepared for	TQ Holdings Pty Ltd
Project Name	Port Kembla Bulk Liquids Terminal
File Reference	Report 002 Ver 2 Best Practice Management Diesel Vehicles.docx
Job Reference	8201510305/Report 002
Date	16 March 2016
Version Number	Ver 2

Effective Date March 2016

Date Approved: March 2016

Document History

Version	Effective Date	Description of Revision	Prepared by:	Reviewed by:
Ver 1	10/03/2016	Issue for client comment	RMH/CNB	AJL
Ver 2	16/03/2016	Final Issue	RMH	AJL

© Cardno. Copyright in the whole and every part of this document belongs to Cardno and may not be used, sold, transferred, copied or reproduced in whole or in part in any manner or form or in or on any media to any person other than by agreement with Cardno.

This document is produced by Cardno solely for the benefit and use by the client in accordance with the terms of the engagement. Cardno does not and shall not assume any responsibility or liability whatsoever to any third party arising out of any use or reliance by any third party on the content of this document.

Table of Contents

1	Introduction	1
1.1	Background	1
1.2	Project Description	1
1.3	TQ Context	2
2	Current Emission Standards	3
2.1	International Standards	3
2.1.1	UNECE Vehicle Regulations	3
2.2	National Emission Control Standards	3
2.2.1	Australian Design Rules for Heavy-duty Engines and Vehicles	4
3	Emission Reduction Options	6
3.1.1	Vehicle Selection	6
3.1.2	Retrofit Programs	6
3.1.3	Technology Assessment	7
3.1.4	Fuel Types	7
4	TQ Context and Commitments	9
4.1	Vehicle Design and Maintenance	9
4.2	Drivers Policy	9
4.3	Environmental Commitments	9
5	Conclusions and Recommendations	11
5.1	Conclusions	11
5.2	Recommendations	11
6	References	12

Tables

Table 2-1	Overview of the Australian Design Rules (emission standards) for new light and heavy vehicles on the Australian market (RMS, 2010).	4
Table 2-2	Summary of emission limits that apply to heavy diesel vehicles and their timetable for adoption in the ADRs.	5
Table 3-1	Diesel Fuel Substances and Testing Methods	8

Glossary

The table below provides a glossary of key terms and acronyms used within this document

Term or Acronym	Definition
ADR	Australian Design Rules
CO	Carbon Monoxide
DPF	Diesel Particulate Filter
DOC	Diesel Oxidation Catalyst
EIS	Environmental Impact Statement
EPA	NSW Environmental Protection Authority
EURO I	European Emission Standards 1
EURO II	European Emission Standards 2
EURO III	European Emission Standards 3
EURO IV	European Emission Standards 4
HC	Hydrocarbons
NEPM	National Environment Protection Measure
NO _x	Nitrogen Oxides
PFT	Particle Filter Trap
PK BLT	Port Kembla Bulk Liquids Terminal
PM	Particulate Matter
RTS	Response to Submissions
TQ	TQ Holdings Australia Pty Ltd
UNECE	United Nations Economic Commission for Europe
UN GTR	United Nations Global Technical Regulations
VSS	Vehicle Safety Standards

1 Introduction

TQ Holdings Australia Pty Ltd (TQ) recently submitted an Environmental Impact Statement (EIS), prepared by Cardno Pty Ltd (Cardno), for the proposed Port Kembla Bulk Liquids Terminal (PK BLT) as a State Significant Development Application (SSD 7264). The EIS was exhibited inviting comment from the general public and agencies in December 2015 and subsequent submissions have been received.

The NSW Environmental Protection Authority (EPA) has provided a submission, dated 8th February 2016, after the exhibition period was completed requesting that a feasibility assessment of best management practices be prepared in relation to all on-road diesel trucks associated with the proposed Project.

In particular the EPA has requested that all on-road diesel trucks associated with the project should:

- > Conform with relevant and current emission standards as prescribed in Australian Design Rules for heavy-duty engines and vehicles (EURO IV); or
- > Where the vehicle is older than the 2006 model year (that is, EURO I, EURO II or EURO III standards), the vehicle should be fitted with a diesel exhaust treatment device.
- > Consider emission reduction options in the diesel National Environment Protection Measure (NEPM).

1.1 Background

Emissions from road vehicles are significant contributors to key air pollutants which can potentially impact on human health. The pattern and scale of urban development in parts of Australia, and the associated increase in vehicle use, increases pressure on the challenge to maintain improvements in urban air quality, particularly ozone and particulates. Vehicle emissions standards, and associated improvements in fuel quality, have been shown in both Australia and internationally to be the most cost-effective measures to reduce urban air pollution from the road transport sector (DEC 2008).

In Australia, vehicle emissions and safety performance standards are set via the Australian Design Rules (ADR), which are legislative instruments under the *Motor Vehicle Standards Act 1989*. Diesel fuel standards are set under the *Fuel Quality Standards Act 2000*.

Australia's motor vehicle emissions standards have been highly effective in reducing air pollution for more than 30 years (Australian Government 2012). Over that period, emissions standards have been periodically tightened in response to:

- > vehicle technology advances and availability of suitable fuels;
- > increasing international concern over air pollution problems, as more scientific knowledge has highlighted detrimental effects on human health; and
- > increases in the size of vehicle fleets and vehicle usage, particularly in urban areas.

1.2 Project Description

TQ propose to establish the PK BLT (the Site) at the Inner Harbour of Port Kembla, within the Wollongong local government area in NSW. This will comprise a bulk liquids terminal for the importation and distribution of finished fuel products. The key features of the project include a combustible and flammable bulk liquids storage and pump bay, tuck loading facilities, site control room and office block as well as bulk liquids unloading facilities. A more detailed assessment of the project and its possible environmental impact is provided in the Environmental Impact Statement (EIS) (Cardno, 2015) and Response to Submissions (RTS) Report (Cardno, 2016).

1.3 TQ Context

A range of freight and logistics companies and their associated vehicle fleets will utilise the PK BLT facilities in the future to transport fuel products. TQ is committed to ensuring that their operations minimise environmental and community impacts through the application of feasible and reasonable measures.

The details outlined within this technical note identify and provide a summary of best practice measures with regards to emission control on heavy vehicles, however it is important to note that TQ will have some limitations on the control of implementation aspects due to commercial engagement constraints. These constraints are likely to exist as TQ is not directly operating the transport fleet and therefore they are unable to impact complete control over the make, age, maintenance regime of transport vehicles which are likely to utilise the fuel storage and handling facilities at the PK BLT.

TQ will seek to implement mechanisms within their procurement processes that will consider the best practice measures outlined below to ensure that heavy vehicles associated with the PK BLT project will operate legally, safely and with consideration of potential impacts to the surrounding environment. The operational management processes will also encourage continuous improvement and use of best practices where possible to ensure that the PK BLT facility meets required operating standards.

2 Current Emission Standards

EPA Response to Submissions Comment

All on-road diesel trucks associated with the project should:

- > *Conform with relevant and current emission standards as prescribed in Australian Design Rules for heavy-duty engines and vehicles (EURO IV); or*
- > *Where the vehicle is older than the 2006 model year (that is, EURO I, EURO II or EURO III standards), the vehicle should be fitted with a diesel exhaust treatment device.*

The current international and national emissions standards applicable to project have been reviewed to provide a best management context to the PK BLT project. The standards and regulations outlined below detail best practice measures. TQ should be encouraged to utilise freight companies which commit to sourcing vehicles with compliance plate approval (described in **Section 2.2.1**). This ensures trucks meet the national standards covering safety and emission requirements known as the Australian Design Rules (ADRs).

2.1 International Standards

2.1.1 UNECE Vehicle Regulations

Australia is a signatory to the United Nations Economic Commission for Europe (UNECE) 1958 Agreement or UN Regulations, which provides the legal framework for the adoption of uniform technical prescriptions for vehicles and the recognition of approvals granted by other Contracting Parties (UNECE 2016). As a signatory of this agreement, Australia has the authority to test and approve any manufactured design or product and to have this approval recognised internationally by type. The UN Regulations aim to improve vehicle safety, environmental protection, fuel efficiency and anti-theft performance with consistency at the global scale (Ramos, 2011).

Australia is also a signatory to the 1998 Agreement known as the UN Global Technical Regulations (UN GTR's) which works to establish a registry of global technical regulations by consensus vote (Ramos, 2011).

Each agreement is developed and progressively updated by the World Forum for Harmonization of Vehicle Regulations (WP.29) which is comprised of any member country to the United Nations and meets 3 times per year to offer a "unique framework for globally harmonize regulations on vehicles" (UNECE, 2016).

Some contracting parties such as the European Community, have chosen to replace their national legislation with the Regulations annexed to the 1958 Agreement, however, the Australian Government is currently working towards harmonising national vehicle safety standards with international regulations (Australian Government, 2016c).

2.2 National Emission Control Standards

In recent years there has been a greater international alignment with the vehicle emissions standards set out by the UNECE.

The Australian Government has committed to adopting UNECE standards as this approach provides the desired environmental outcome and facilitates international trade in motor vehicles. Globalisation of the motor vehicle industry, and the small size of the vehicle market in Australia makes the development of unique Australian standards undesirable from both a government and manufacturing perspective.

The Australian Government has therefore developed a policy of harmonising Australia's vehicle standards wherever possible with the international standards established by the UNECE. The current ADRs specific to emissions adopt the standards known as Euro 4 (Australian Government 2016).

The Australian Government announced Euro 5 emissions standards will commence in Australia for new model light vehicles from 1 November 2013 and for existing light vehicles from 1 November 2016; Euro 6 emissions standards will commence for new model vehicles from 1 July 2017 and for existing models from 1 July 2018. A non-compliance timeline has been announced for heavy diesel vehicles.

2.2.1 Australian Design Rules for Heavy-duty Engines and Vehicles

Before a road vehicle can be registered for the first time in Australia it must meet the requirements of the *Motor Vehicle Standards Act 1989* (the Act). This requirement applies to new and used imported vehicles and locally manufactured vehicles. The Act requires vehicles to meet the national standards covering safety and emission requirements known as the ADRs. When a new vehicle has been certified as meeting the ADRs it can be fitted with a compliance plate (also known as a compliance plate approval). The fitment of a compliance plate is mandatory under the Act, and it indicates to the registering authority that the vehicle meets all the required ADRs (Australian Government, 2016a).

The certification process in Australia is administered by Vehicle Safety Standards (VSS) in the Commonwealth Department of Infrastructure and Regional Development. Use of vehicles, roadworthiness of vehicles in service, and approval of modifications to vehicles in service, are administered by the various State and Territory registering authorities (Australian Government, 2016b).

ADRs also govern the acoustic performance of motor vehicles within Australia (including heavy vehicles). Specifically, the function of ADR-83 is to define limits on external noise generated by motor vehicles in order to limit the contribution of motor traffic to community noise.

Table 2-1 Overview of the Australian Design Rules (emission standards) for new light and heavy vehicles on the Australian market (RMS, 2010).

Euro Standard	Australian Design Rule (ADR)	Year of introduction and vehicle type
Euro 2	ADR 79/00 (Emissions Control for light vehicles)	2002 – New light vehicles operating on petrol, liquefied petroleum gas (LPG)
	ADR 79/00 (Emissions Control for light vehicles)	2003 – New light vehicles operating on natural gas
Euro 3	ADR 80/00 (Emissions Control for heavy vehicles)	2002 – New Heavy Vehicles operating on diesel, LPG and compressed natural gas (CNG)
	ADR 80/00 (Emissions Control for heavy vehicles)	2003 - New heavy vehicles operating on petrol from 1 January 2003
	ADR 79/01	2005 – New light vehicles operating on petrol, LPG or natural gas from 2005
	ADR 79/01	2006 – New light vehicles operating on diesel fuel
Euro 4	ADR 79/02	2008 – New model light petrol, LPG and natural gas vehicles
	ADR 79/02	2010 (July) – Will be implemented for all new model light vehicles
	ADR 80/01	2005 – Heavy vehicles operating on petrol
	ADR 80/01	2006 – Heavy vehicles operating on diesel, LPG and natural gas
	ADR 80/02	2007 – For new model heavy vehicles which run on diesel, LPG or natural gas
	ADR 80/02	2008 – Existing models of heavy vehicles
Euro 5	ADR 80/03	2010 – Will be implemented for new model heavy vehicles with a gross vehicle mass (GVM) greater than 3.5 tonnes which run on diesel, liquefied petroleum gas, petrol or natural gas
	ADR 80/03	2011 – All other heavy vehicles

(Source: Roads and Maritime Service, 2010)

Table 2-2 Summary of emission limits that apply to heavy diesel vehicles and their timetable for adoption in the ADRs.

Standard	Date Introduced	Emission Limits of Source Standard (g/kWh - unless otherwise specified)				Source Standard / Emissions Test	Alternative Standards
		CO	HC	NOx	PM		
ADR80/0211	1/1/07 – 1/1/08	1.5	0.46	3.5	0.02	Directive 2005/55/EC, 2005/78/EC & 2006/51/EC (Euro IV): Euro Stationary Cycle (ESC); Euro Transient Cycle (ETC)	US EPA 2004 and Japan JE05 Long Term accepted as alternative standard
ESC Limit		4.0	0.5512	3.5	0.03		
ETC Limit							
ADR80/03	1/1/10 – 1/1/11	1.5	0.46	2.0	0.02	Directive 2005/55/EC, 2005/78/EC & 2006/51/EC (Euro V): Euro Stationary Cycle (ESC); Euro Transient Cycle (ETC)	US EPA 200714 and Japan JE05 Long Term accepted as alternative standards
ESC Limit		4.0	0.5513	2.0	0.03		
ETC Limit							

(Source: Australian Government, 2016c)

3 Emission Reduction Options

EPA Response to Submissions Comment

All on-road diesel trucks associated with the project should:

- > Consider emission reduction options in the diesel NEPM.*

The *National Environment Protection (Diesel Vehicle Emissions) Measure 2001* (Diesel NEPM) is a statutory instrument which provides guidelines and strategies to improve emissions from diesel vehicles. The objective of the NEPM is to *'to reduce exhaust emissions from diesel road vehicles, by facilitating compliance with emissions standards for in-service diesel vehicles'*.

A range of emission reduction options are outlined within the Diesel NEPM and they have been reviewed to determine if any of the available emission options can be applied to the PK BLT project. As outlined previously even though the details outlined below identify and provide a summary of best practices, TQ will have some limitations on the control of implementation aspects due to commercial engagement constraints.

3.1.1 Vehicle Selection

With the exception of newer models, most diesel vehicles are potential candidates for retrofit programs. The criteria for selection are a matter for the jurisdiction, and may be based purely on a cost/effectiveness assessment or involve other broader government objectives. This guideline sets out a range of possible criteria that jurisdictions may use in considering the introduction of a retrofit program.

There are some general principles which apply, regardless of the target groups.

1. The emissions benefits are proportionally greater for earlier technology vehicles such as those provided to the Australian market before ADR79/00 (refer to **Table 2-1**) (i.e. largely unregulated or "Euro 0", late 1980's US), but there are still significant benefits from retrofitting vehicles meeting Euro 1/Euro 2, and US 91/US 94 standards.
2. There can still be some benefit in retrofitting vehicles that meet the newer emission standards in ADR80/00 and ADR79/00.
3. The vehicle engine must be in reasonable condition. In particular, retrofit devices should not be fitted to engines emitting excessive smoke or using excessive amounts of oil. Retrofitting engines in a poor state of repair may become a catalytic agent or filter damage and increased smoke and odours from oil.
4. Emissions reductions are likely to be greatest when the Diesel Oxidation Catalyst (DOC), Diesel Particulate Filter (DPF) or Particle Filter Trap (PFT) is tailored to the engine (in accordance with advice from the engine manufacturer). Purchase and installation costs for PFTs are usually around half that of DPFs.

Ideally, all above criteria would need to be met in order to further consider the implementation of a retrofit program for a particular vehicle or fleet.

As noted previously, TQ will have limited control over the vehicles utilised on their site, however they will seek to encourage the use of modern, well-maintained vehicles that meet current Compliance Plate Approval requirements and which have ideally considered available options for retrofitting programs as outlined below in **Section 3.1.2**.

3.1.2 Retrofit Programs

The aim of retrofit programs is to improve the emissions performance of in-service diesel vehicles by the fitment of exhaust after-treatment devices. The EPA submission has stated that:

Where the vehicle is older than the 2006 model year (that is, EURO I, EURO II or EURO III standards), the vehicle should be fitted with a diesel exhaust treatment device.

There are a large number of older diesel vehicles in the diesel fleet which have limited emissions control technology. There is capacity to reduce harmful emissions from vehicles certified to pre-2002 standards by retrofitting diesel exhaust treatment devices.

The principal after-treatment technologies currently in use in retrofit programs are DOCs and DPF. DOCs are well proven technology, commercially available and are used in retrofit programs in the United States, Europe, Asia and Australia. DOCs are effective in reducing PM, hydrocarbon and carbon monoxide emissions. DOCs are also effective in reducing odours from diesel exhaust (Diesel NEPM, 2001).

There are a range of emission reduction technologies which could be considered for a retrofit program. Factors to consider in selecting suitable technologies include:

- > commercial availability;
- > emissions reduced;
- > engine applicability (limited or widespread);
- > durability; and
- > cost and maintenance.

DOCs are the cheapest after-treatment technology, require no maintenance and are very durable. Current retrofit programs often focus on the use of diesel oxidation catalysts. However, while the costs and other complexities with the use of particle filters tend to limit their adoption at this stage, they have the capacity to deliver substantial reductions in PM emissions, and may be a viable option where particular engine operating conditions can be achieved.

DPFs can deliver large Particulate Matter (PM) emission reductions in specific applications. To be effective they need to be carefully tailored to particular engines and in-service use patterns. PFTs are particulate filters that can provide a 50% particle reduction. Purchase and installation costs for PFTs are around half that of DPFs.

Under the NSW Diesel Exhaust Retrofit Program PM reduction efficiencies of around 30% for DOC and over 90% for DPF have been demonstrated. The cost effectiveness of both devices are very similar as purchase and installation costs for DOCs are around one third that of DPFs.

Original vehicle and equipment manufacturers should be consulted before undertaking any retrofit activity.

3.1.3 Technology Assessment

It is crucial that the vehicle manufacturer be notified of any proposed modification of engines, exhaust or engine management control systems to ensure compatibility, reliability and overall emission performance of the vehicle. Any retrofit devices proposed to be used need to be objectively assessed for their:

- > capacity to deliver emission reductions;
- > applicability to particular vehicles/engines; and
- > durability and reliability.

3.1.4 Fuel Types

Australian fuel standards are governed by the *Fuel Quality Standards Act 2000* and amendments arising from the *Fuel Standard (Automotive Diesel) Determination 2001*. Compliance with the standards for substance or parameter is determined by application of the testing method summarised below in **Table 3-1**.

Table 3-1 Diesel Fuel Substances and Testing Methods

Substance	Amount	Date	Testing Method
Sulfur	500 mg/kg	31 December 2002	ASTM D5453
Sulfur	50 mg/kg	1 January 2006	ASTM D5453
Sulfur	10 mg/kg	1 January 2009	ASTM 5453
Ash	0.01% (m/m)	1 January 2002	ASTM D482
PAH (Polycyclic aromatic hydrocarbons)	11% mass by mass	1 January 2006	IP 391
Biodiesel	5.0% volume by volume	1 March 2009	EN 14078

(Source: Australian Government, 2001)

Sulfur is a pollutant directly, but more importantly, sulfur prevents the adoption of all major pollution control technologies including Nitrogen Oxides (NO_x), hydrocarbons (HC), Carbon Monoxide (CO), and PM. Reducing sulfur levels in fuels will decrease the vehicle emissions of smog precursors and other pollutants that will improve air quality and reduce greenhouse gas emissions (Blumberg *et.al.* 2003).

Considering these air emission reduction benefits, TQ should seek to promote and encourage the use of low sulphur diesel fuels by utilising the PK BLT facility.

Since January 2009, the *Fuel Standard (Automotive Diesel) Determination 2001* requires the use of low sulfur (10ppm) diesel fuel (**Table 3-1**) therefore truck haulage companies utilising the PK BLT facility should comply with the *Fuel Quality Standards Act 2000* and *Fuel Standard (Automotive Diesel) Determination 2001*. TQ is encouraged to promote best practice in line with the most up to date fuel standards.

4 TQ Context and Commitments

4.1 Vehicle Design and Maintenance

The status of the truck fleet composition and associated emission and noise standards should be regularly reviewed over time to ensure appropriate mitigation measures are identified and implemented by the respective transport companies utilising PK BLT. TQ will therefore need to promote and encourage procurement of transport companies that comply with the ADRs and Euro 5 standards where possible for vehicle noise and air emissions, and to seek further opportunities to improve environmental performance as part of a continuous improvement process.

Commercial arrangements may not provide a direct means for TQ to control and stipulate specific requirements on truck transport operations to and from the PK BLT site, however TQ will need to be committed to have systems in place that promote and encourage best practices for diesel truck fleet operations and maintenance in any direct supply agreements and other procurement processes, which include:

- > Engine maintenance to ensure optimum performance (regular manufacturers scheduled servicing) on all diesel trucks;
- > Maintenance of exhaust and muffler systems and where required, replacement of deteriorated exhaust and mufflers with improved noise suppression;
- > Ensuring vehicles older than the 2006 model year are retrofitted with DOCs and DPF to reduce emissions;
- > Maintenance of trailers so that loose components on tailgates for example are eliminated;
- > Regreasing where required of suspension components to eliminate squeaking as the vehicle is in motion;
- > Maintaining correct tyre pressures on all fuel trucks, including trailers; and
- > Encouraging best practice in line with the relevant fuel standards for all trucks operating in and out of the PK BLT.

4.2 Drivers Policy

TQ currently operates under a *Drivers Policy* which ensures drivers associated with TQ storage and distribution activities operate in a safe manner in line with the relevant safety and environmental policies and procedures. TQ should consider a review of the *Drivers Policy* in consultation with relevant stakeholders to encourage associated haulage contractors to commit, where possible, to the best practice measures outlined in this document.

An update to the *Drivers Policy* will also offer an opportunity to assess compliance and to identify environmental improvement opportunities by reviewing previous auditing activities, training/induction, incident/complaints management, vehicle standards, industry certifications, performance measures and record keeping standards. It could also provide an opportunity to promote environmental outcomes by influencing driver behaviour through differing methods such as reducing engine idling time, vehicle maintenance and controlling braking and acceleration speeds.

4.3 Environmental Commitments

The transport companies who will be servicing the PK BTL will need to be able to demonstrate a commitment to continuously improving the efficiency and performance of their truck fleet through the implementation of larger, modern, safer, well maintained and quieter vehicles.

Any future transport contractors servicing the PK BLT should be able to demonstrate they can commit to compliance with the *Drivers Policy* and provide evidence they are continuously seeking to improve the efficiency and environmental performance of their truck fleet, in consideration of the Diesel NEPM emission reduction options outlined above in **Section 3**.

5 Conclusions and Recommendations

5.1 Conclusions

This report provides a review of current emission standards to provide background on conformance requirements and the feasibility of how these measures can be applied to the PK BLT project

The EPAs submission letter requested that all on-road diesel trucks associated with the project should:

- > Conform with relevant and current emission standards as prescribed in Australian Design Rules for heavy-duty engines and vehicles (EURO IV); or
- > Where the vehicle is older than the 2006 model year (that is, EURO I, EURO II or EURO III standards), the vehicle should be fitted with a diesel exhaust treatment device.
- > Consider emission reduction options in the diesel NEPM.

This review has outlined requirements for each emission standard, retrofit opportunities and available emission reduction options within the Diesel NEPM. This review has also identified that TQ is likely to have contractual limitations on the implementation of these requirements as they will not directly own or operate truck fleets servicing their site. TQ can however seek to ensure truck companies utilising the site meet specific emission standards and implement emission reduction programs where possible through procurement mechanisms such as supply contracts. Expectations on the standard of vehicle compliance, maintenance regimes, as well as driver behaviour can be controlled within the PK BLT through the *Drivers Policy* and the implementation of annual Carrier Assessments. Outside the PK BLT, TQ is likely to be limited in their ability to control the implementation of these requirements, however, law abiding and environmentally conscious driving behaviour can be encouraged.

A review of the *Drivers Policy* can also be implemented to outline the expectations of transport vehicle drivers. This policy will ensure general aspects of behaviour and site specific requirements can be outlined and communicated to any transport operator as part of site driver inductions. A review of the *Drivers Policy* will also offer an opportunity to assess compliance and to identify environmental improvement opportunities by reviewing previous auditing activities, training/induction, incident/complaints management, vehicle standards, industry certifications, performance measures and record keeping standards. It could also provide an opportunity to promote environmental outcomes by influencing driver behaviour through methods such as reducing engine idling time, minimising exhaust braking (where safe to do so), vehicle maintenance and controlling braking and acceleration speeds.

5.2 Recommendations

TQ should commit to the following initiatives:

- > Transport companies shall have vehicles demonstrating they have 'Compliance Plate Approval' to ensure trucks meet the national standards covering safety and emission requirements known as the Australian Design Rules (ADRs).
- > Procurement policies should consider companies which have a commitment to operational and environmental improvements.
- > TQ is encouraged to review the existing Drivers Policy (as outlined in Section 4.2) to provide a set of guiding principles for transport operators using the PK BLT and to ensure emission impacts arising from heavy vehicle use are minimised.

6 References

- Australian Government (2001), Fuel Standard (Automotive Diesel) Determination 2001, made under Section 21 of *Fuel Quality Standards Act 2000*, Federal Register of Legislation; Website Viewed 8th March 2016 <https://www.legislation.gov.au/Details/F2009C00145>
- Australian Government (2012), Review of Emission Standards (Euro VI) for Heavy Vehicles, Discussion Paper, Department of Infrastructure and Regional Development.
- Australian Government (2016a), Vehicle Certification in Australia, Department of Infrastructure and Regional Development; Website Viewed 8th March 2016 <http://infrastructure.gov.au/roads/motor/standards/certification/index.aspx>
- Australian Government (2016b), Australian Design Rules, Department of Infrastructure and Regional Development; Website Viewed 8th March 2016 <https://infrastructure.gov.au/roads/motor/design/index.aspx>
- Australian Government (2016c), Vehicle Emission Standards, Department of Infrastructure and Regional Development; Website Viewed 9th March 2016 <https://infrastructure.gov.au/roads/environment/emission/>
- DEC (2008), NSW Cleaner Vehicles and Fuels Strategy; NSW and Department of Environment and Climate Change NSW
- Diesel NEPM (2001), National Environment Protection (Diesel Vehicle Emissions) Measure 2001; Federal Register of Legislation; Website Viewed 8th March 2016 <https://www.legislation.gov.au/Details/F2009C00402>
- Katherine O. Blumberg, Michael P. Walsh and Charlotte Pera, (2003), Low-sulfur gasoline & diesel: The key to lower vehicle emissions, United Nations Environment Program, p. 17
- Ramos J, (2011), The UNECE World Forum for Harmonization of Vehicle Regulations (WP.29), PowerPoint Presentation at the World Trade Organization (WTO), UNECE Transport Division, Geneva, 9th November 2011
- United Nations Economic Commission for Europe (UNECE) (2016), Vehicle Regulations, UNECE; Website Viewed 9th March 2016 <http://www.unece.org/trans/main/welcwp29.html>