



Bulk Liquids Berth 2 – Pre-Start Up Compliance Report

Version 1 – October 2013

NSW Ports

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1. Introduction

1.1. Purpose of this Document

This is the Pre-Start Up Compliance Report for the Bulk Liquids Berth 2 development. This report has been prepared by NSW Ports in accordance with the Minister's Condition of Approval (CoA) 4.3 as stated below:

*One month prior to the commencement of project operations, the Proponent shall submit to the Director-General a **Pre-Start Up Compliance Report** detailing compliance with conditions 2.1 and 2.2 including:*

- a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;*
- b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and*
- c. Response to any requirements imposed by the Director-General under condition 1.3.*

1.2. Background

On 1 January 2013, the landside ownership of Port Botany was transferred from Sydney Ports to Port Botany Lessor Pty Ltd to facilitate the long term lease of Port Botany. This transfer included 'purple land' structures previously owned by Sydney Ports (i.e. structures located over water on land owned by NSW Roads and Maritime Services) such as the BLB2. Sydney Ports continued to manage the port facilities at Port Botany until the end of May 2013.

NSW Ports commenced operations on 31 May 2013, following its successful purchase of the 99 year lease rights from the NSW Government for Port Botany. NSW Ports is responsible for the management of these assets and their development to cater for future trade growth, which includes the BLB2.

The development of the BLB2 will ensure New South Wales has adequate berth capacity to satisfy existing and future forecast demands for the import and export of bulk liquids including chemical, petroleum and gas products. The construction of the BLB2 will also reduce demurrage costs for ships delivering or receiving the products.

Project Approval of BLB2 was determined by the NSW Minister for Planning on 20 March 2008 (Major Projects Application 07_0061). The Conditions of Approval have been modified and amended as follows:

- a) By letter from the Director-General, dated 22/12/10 (your reference: S07/00205);
- b) By letter from the Director-General, dated 24/12/10 (your reference: S07/00205);
- c) By letter from the Director-General, dated 14/4/11 (your reference: 11/03374-1);
- d) under section 75W of the Environmental Planning and Assessment Act 1979 (EP&A Act) on 28 April 2011 (07_0061 MOD 1);

1.3. Project Description

The construction and operation of the BLB2 consists of the following key relevant components:

- A central working platform and working area, with berthing face (including bollards and fenders) and pipe manifold / marine loading arm arrangements;
- Adjacent berthing dolphins on each side of the working platform designed to accommodate the maximum design length vessel;
- Two mooring dolphins on each side of the working platform (four in total);
- Walkways (catwalks) connecting the dolphins and working platform;
- An access bridge structure connecting the working platform with the shore, providing vehicle access and pipeline support structures;
- Support infrastructure including fire control facilities (pumps, foam/water monitors and associated tanks), amenities buildings and services such as water, sewer, electrical communications;
- Berth fit out, including fire fighting monitors and operator shelter; and
- Pipelines to user facilities including support and access structures such as pipe racks and culverts.

1.4. Location

The BLB2 has been constructed adjacent to the existing Bulk Liquids Berth 1, at the south western end of Brotherson Dock and to the west of Fishburn Road, adjacent to Vopak and the Elgas Cavern. The development is being undertaken on land now owned by NSW Ports and Roads and Maritime Services. The land owned by Port Botany Lessor Pty Ltd which forms part of the development site is located on:

- Part of Lot 52 DP 1182618 (formally part of Lot 7 DP 1126332).

The waterside component of the development is undertaken on land owned by Roads and Maritime Services:

- Part Lot 456 DP 1137279.

1.5. Project Update

Practical completion of the main berth construction works was achieved on 12 April 2013, with minor defects works being undertaken by the main contractor after this date. Two terminal operators (Vopak and Terminals) are required to install their pipeline infrastructure before operations can commence. Terminals have commenced construction on site, with Vopak expected to commence construction before the end of October.

Terminals intend to commence operations on BLB2 in early November 2012, hence the requirement for the Pre-Start Up Compliance Report to be submitted to the Department of Planning and Infrastructure (DP&I) in early October.

2. Hazard, Emergency and Safety Compliance

The Minister's Conditions of Approval as required to be addressed in this report are listed in Tables 1-6 below, include a summary of how and when each condition has been complied with.

2.1. BLB2 Fire Safety Study

a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;

Table 1 – Hazards and Risk – Fire Safety Study Dates of Submission and Approval

Condition Approval Title	Condition Requirements				
2.1 (a) – Hazards and Risk – Fire Safety Study (Main Works Construction)	<i>One month prior to the commencement of construction of the project (except for preliminary works as described in CoA 2.1), a Fire Safety Study shall be prepared and submitted for the approval of the Director-General, covering the relevant aspects of the Department of Planning’s ‘Hazardous Industry Planning Advisory Paper No. 2 – Fire Safety Study Guidelines’ and the NSW Government’s ‘Best Practice Guidelines for Contaminated Water Retention and Treatment Systems’. In addition to approval from the Director General, approval for this study shall be obtained from the Commissioner of the NSW Fire Brigades.</i>				
	FSS submitted to DP&I and FRNSW	FSS approved by DP&I	FSS approved by FRNSW	Construction Start Date	Notes
	14 February 2011	14 April 2011	Amendments requested 28 April 2011. Revised FSS provided – approval received - 10 June 2011	August 2011	FSS revised 31 October 2011 for foam tank changes – approved by DP&I 27 January 2012 and FRNSW 25 January 2012.
DP&I Letter - 14 April 2011 – Hazard and Risk Studies (CoA 2.1) (Users	<i>The Users’ designers are to review the Fire Safety Study (re CoA 2.1 a) as part of the design process and amend it based on the proposed gas and liquid transfer and infrastructure installed. The updated FSS shall then be submitted to Sydney Ports (now NSW Ports) for review prior to the finalisation of the detailed design works for the berth. The Users are to confirm that the recommended safety features have been incorporated for the Marine Loading Arms during design of the pipeline facilities. The updated FSS is to be submitted to the DG for approval.</i>				

Construction)	Updated FSS (Addendum) submitted to DP&I	FSS (Addendum) approved by DP&I	Notes
	31 May 2013	29 July 2013	<p>Users reviewed and adopted the FSS prior to submission to DP&I (see section (c.) below).</p> <p>Addendum FSS was also submitted to FRNSW (5/6/13) for their information and comment. No response has been received to date.</p> <p>Vopak have identified they will need to seek an amendment to the approval to accommodate the method of connection proposed (quick connect /disconnect couplings instead of bolted connections) between MLA and ship's manifolds. This amendment is yet to be submitted, details will be provided in the Compliance Tracking Report No 5 due in November 2013 (should they be available at this time).</p>

b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and

Detailed technical and management safeguards are currently used at the existing BLB and are also implemented at BLB2. All the safeguards identified in the Fire Safety Study (FSS) have been included in the Operating Manual for BLB1 and BLB2. A copy of the Operating Manual is kept on site at all times and is also available electronically through the NSW Ports computer systems at G:\BLB Operations\2 Procedures\Bulk Liquids Berth\Bulk Liquids Berth Operations Manual. All BLB officers, Users' employees and contractors are trained in the implementation of the safeguards and controls outlined in the Operating Manual. A copy of the Operating Manual can be provided to the Department upon request. Also refer to Section (c.) below for further information on the implementation of safeguards.

c. Response to any requirements imposed by the Director-General under condition 1.3.

Requirements from the Director-General have been added to the NSW Ports Compliance Tracking System to ensure they are complied with under Condition of Approval 1.3. Specific requirements relating to Conditions 2.1(a) were provided in the following documents:

- *DP&I Letter - 14 April 2011 – Hazard and Risk Studies*

The requirements of this letter have been complied with as per the details provided in Table 1 above.

In the letter dated 29 July 2013 from DP&I (Ref 11/03374-1) the Department also noted that:

“...additional information was also submitted to confirm that the original FSS undertaken for the BLB2 has been reviewed by the Users, as required in the Department’s letter dated 14 April 2011 and that Sydney Ports has the capability and appropriate fire fighting equipment to act sufficiently in the event of an emergency”

- DP&I Letter - 29 July 2013 – Safety Studies

- *Implementation and maintenance of the safeguards listed in Table 5-2 of the document*

Implementation of safeguards has been addressed in Section (b.) above. Additional information in regards to the safeguards outlined in Table 5-2, is provided in the following table.

Hazard Description	Prevention/detection safeguards	Where Addressed/Considered/Implemented
Hose Failure	Hose testing	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the Operational Environmental Management Plan (OEMP).
	Pressure test with nitrogen prior to use	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Low flow start and monitoring of hose pressure and monitoring for leaks	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Manual shutdown valves at each end	Design component of BLB2
	Pipelines surge study	Included in users HAZOP requirements
	Operator PPE	Included in Section 4 and Section 8 of BLB2 Operations Manual

	Communication between ship/shore and terminal	Included in Section 4 and Section 8 of BLB2 Operations Manual
	Wharf is bunded and ship has catchment area	Design component of BLB2
Pipeline leak	Fully welded pipeline along transfer route (flanges minimised)	Design component of BLB2
Escalation from adjacent pipeline	Piping design pressure	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Pipelines surge study	Included in users HAZOP requirements
	Regular maintenance and inspection procedures	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP, as well as NSW Ports internal Asset Maintenance Procedures.
	Leak test with nitrogen prior to transfer	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Routine inspection during transfers (operator inspects for leaks)	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Emergency isolation valves (at storage tank end)	Design component of BLB2
	Fire fighting system (including foam)	Design component of BLB2
	Wharf is bunded	Design component of BLB2
	Containment at pipe isolation valves (onshore)	Design component of BLB2
	Safety showers on berth	Design component of BLB2
	Personnel trained for bitumen burns	BLB officers are required to be First Aid trained – bitumen burns included in NSW Ports' BLB induction procedures.

Mooring system failure – ship breaks from moorings	Weather conditions monitored	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Transfer may cease when wind speeds >35km/hr (hose isolated)	Included in Section 4 and Section 8 of BLB2 Operations Manual and Section 2.3 and Section 3 of the OEMP.
	Wind data available from local anemometer at Molineaux Point reported in the BLB1 Administration office	Used by BLB offices – available in BLB1 Administration Office
	Securing lines are designed to secure against normal passing ships (i.e. waves generated in the bay)	Design component of BLB2
	Tugboat on call in nearby dock	Tugboats available 24/7. Contact details are kept on-site.
	Prevailing wind is towards wharf	Meteorological conditions
Contaminated fire water	Solid bitumen is likely to float in seawater ensuring clean-up can be done effectively (some light materials may weather off).	Sydney Ports' emergency response details are kept on-site and documented in the Operations Manual and OEMP.
	Emergency response and spill containment procedures.	Included in NSW Ports and Sydney Ports Emergency Plans, as well as Section 2.9 of the OEMP.
	Marine booms to be used to contain spill.	Deployed from nearby Brotherson Dock by Sydney Ports
Burns or exposure to hydrogen sulphide	Trained first aiders on site for bitumen burns	BLB officers are required to be First Aid trained – bitumen burns included in NSW Ports' BLB induction procedures.
	Pipeline is in outdoor area reducing the potential of impacts from hydrogen sulphide	Design component of BLB2

- *Updating of Sydney Ports Corporation's emergency response and clean up procedures for BLB2 to include procedures for responding to bitumen spills and fires*

Given bitumen is already being handled at BLB1, Sydney Ports already has procedures in place for responding to bitumen spills and fires. Sydney Ports has also been consulted in the preparation of the recently finalised Emergency Plan for BLB 1 & 2 that was submitted to DP&I on 26 September 2013.

2.2. BLB2 Hazard and Operability Study

a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;

Table 2 – Hazards and Risk – Hazard and Operability Study Dates of Submission and Approval

Condition Approval Title	Condition Requirements			
<p>2.1 (b) – Hazards and Risk – Hazard and Operability Study</p> <p>(Main Works Construction)</p>	<p><i>One month prior to the commencement of construction of the project (except for preliminary works as described in CoA 2.1), a Hazard and Operability Study, chaired by an independent and qualified person approved by the Director-General prior to the commencement of the study, shall be carried out in accordance with Department of Planning’s Hazardous Industry Planning Advisory Paper No. 8 – HAZOP Guidelines. The study report shall be accompanied by a program for the implementation of all recommendations made in the report. If the proponent proposes to defer the implementation of a recommendation, full justification must be included.</i></p>			
	<p>HAZOP Studies submitted to DP&I</p>	<p>HAZOP Studies approved by DP&I</p>	<p>Construction Start Date</p>	<p>Notes/Evidence of Compliance</p>
	<p>14 February 2011</p>	<p>14 April 2011</p>	<p>August 2011</p>	<p>HAZOP Chairperson Mr Joe Micallef was approved by DP&I in a letter dated 25 September 2009. Due to foam tank changes – the Foam Fire Fighting HAZOP Report was amended and provided on 12 December 2011.</p>
<p>DP&I Letter - 14 April 2011 - Hazard and Risk Studies (CoA 2.1)</p>	<p><i>A program for the implementation of all recommendations is required to be submitted to the Department within one month of the date of this letter (14 April 2011). The study is to take into consideration the final piling methodology and associated environmental management, as relevant.</i></p>			
	<p>HAZOP Program submitted to DP&I</p>	<p>HAZOP Program approved by DP&I</p>	<p>Construction Start Date</p>	<p>Notes/ Evidence of Compliance</p>
	<p>23 May 2011</p>	<p>16 June 2011</p>	<p>August 2011</p>	<p>Extension of program submission granted by DP&I as per email from Ingrid Ilias, dated 10/5/11.</p>

2.1 (b) – Hazards and Risk – Hazard and Operability Study (Users Construction)	HAZOP Studies – 31 May 2013	HAZOP Studies – 29 July 2013	August 2013 (Terminals) October 2013 (Vopak)	Approval provided from DP&I subject to conditions outlined in the letter dated 29/7/13 and are responded to in section c below.
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b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and

Main Construction HAZOPs

Appendix A outlines the Implementation Program for the HAZOP studies issued under the Main Construction contract. The spreadsheet was submitted to DP&I in June 2011 and updated in December 2011 (as per Table 2 above). This spreadsheet has been further updated by NSW Ports in October 2013 to demonstrate all issues identified in the Main Construction HAZOPs have now been closed out.

Terminals HAZOP Report BLB2 – Docklines

The following table outlines the Terminals HAZOP Compliance Matrix, showing the completion of the main actions from the HAZOP report. The procedures and recommendations of the HAZOP report have been included in the Terminals Pty Ltd Terminal Operating Manual and the Terminals Safety Management Manual which has been provided to NSW Ports.

Item ID	Action ID	Detail	Action	Completion
1.6	2	Procedure required to ensure that if you are discharging to one berth and the other berth is under maintenance then safeguards are in-place to prevent a bitumen spill	Develop operating and maintenance procedure for valve locking in the manifold area	Complete
1.7	3	Procedure required to ensure that if you are discharging to one berth and the other berth is under maintenance then safeguards are in-place to prevent a bitumen spill	Special locking system to be installed that only allows one line to be open at a time	Complete
1.14	7	Procedural control required to monitor temperature of bitumen on ship prior to unloading	Operating procedure required to ensure bitumen is not unloaded above a nominated temperature	Complete

2.4	11	Requirement to blow bitumen line and one other line at the same time	Develop procedure to coordinate blowing of multiple lines at the same time	Complete
3.4	15	Requirement to hydro test line	Develop commissioning plan to cover requirements for line to be water free	Complete
4.18	26	Personnel exposure to chemicals when changing lines	Undertake risk assessment and provide safety equipment (eg camera, phone, man down button, ESD, ID of lines that are in use)	Complete
6.5	32	Spill/leak in valve changeover area	Undertake a risk assessment to determine the requirements for fire protection – applies to all nodes	Complete

Vopak HAZOP Report BLB2 – Wharflines

Vopak are yet to start construction, hence sufficient evidence cannot be provided at this time that all the actions and recommendations of the HAZOP report have been implemented. The HAZOP requirements for Vopak will be covered in Compliance Tracking Report 5 due in November 2013.

c. Response to any requirements imposed by the Director-General under condition 1.3.

Requirements from the Director-General have been added to the NSW Ports Compliance Tracking System to ensure they are complied with under Condition of Approval 1.3. Specific requirements relating to Conditions 2.1(b) were provided in the following documents:

- *DP&I Letter - 14 April 2011 – Hazard and Risk Studies*

The requirements of this letter have been complied with as per the details provided in Table 2 above. In regards to the final piling methodology, an email was sent to DP&I, dated 8 June 2011, indicating that the HAZOP Studies are not the relevant medium to consider this issue. The letter received from DP&I, dated 16 June 2011, indicated that DP&I were satisfied that the final piling methodology and associated environmental management has been adequately addressed in other studies and reports.

- *DP&I Letter - 29 July 2013 – Safety Studies*

- *Review of the materials of construction to ensure they are compatible with the materials transported;*

NSW Ports personnel participated in Terminals' and Vopak's HAZOPs of the equipment to be used to used at BLB2 and is satisfied, based on its experience at BLB 1 with an identical range of products that the materials of construction being used are compatible with the materials to be transported.

- *Implementation of the recommendations of the report listed in Section 1.2 Main Findings and Recommendations (Terminals HAZOP Report BLB2 Docklines)*
- *Completion of the actions arising from the HAZOP in a timely manner*

Details regarding the implementation of the recommendations of the report and completion of the actions are detailed in section (b) above.

- *Design changes subsequent to the HAZOP being subject to Management of Change process and HAZOP review, if required.*

Noted – the HAZOP reports have not been subject to Management of Change process to date. A formal Management of Change procedure has been developed by NSW Ports as a part of the Safety Management System to ensure that changes are not introduced which could inadvertently compromise the safety of the facility and impact on employees, the community, and the environment. The Management of Change procedure ensures that proposed technological, facility, procedural, transport or organisational changes are reviewed and implemented following strict procedures for identifying the impact on safety, assessing the risk, and taking the necessary action to manage that risk. The Management of Change procedure will be applied if required and includes the following key documentation:

- Modification Form
- Modification Register
- Change Assessment Form – Equipment, Process Settings and Procedures
- Change Assessment Form – Structures and Buildings
- Change Assessment Form – Organisational Change
- Modification Completion Check List

2.3. BLB2 Final Hazard Analysis

a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;

Table 3 – Hazard and Risk – Final Hazard Analysis Dates of Submission and Approval

Condition Approval Title	Condition Requirements			
2.1 (c) – Hazard and Risk – Final Hazard Analysis	<i>One month prior to the commencement of construction of the project (except for preliminary works as described in CoA 2.1), a Final Hazard Analysis shall be prepared in accordance with the Department of Planning’s Hazardous Industry Planning Advisory Paper No 6 – Guidelines for Hazard Analysis.</i>			
(Users Construction)	FHA Completed	FHA sent to DP&I	Construction Start Date	Notes/Evidence of Compliance
	27 May 2013	31 May 2013	August 2013 (Terminals) October 2013 (Vopak)	Letter sent to DP&I on 14/02/11 to seek agreement for submission of the FHA one month prior to the BLB2 Users construction commencement. DG agreed in a letter dated 14/04/11.

b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and

Detailed technical and management safeguards are currently used at the existing BLB and are also implemented at BLB2. All the safeguards identified in the Final Hazard Analysis (FHA) (in particular in Section 3.7) have been included in the Operating Manual for BLB2. A copy of the Operating Manual is kept on site at all times and is also available electronically through the NSW Ports computer systems at G:\BLB Operations\2 Procedures\Bulk Liquids Berth\Bulk Liquids Berth Operations Manual. All BLB officers, Users’ employees and contractors are trained in the implementation of the safeguards and controls outlined in the Operating Manual. A copy of the Operating Manual can be provided to the Department upon request. The safeguards from the FHA have also been incorporated into the NSW Ports’ Operational Environmental Management Plan (OEMP) under Section 3.2, and are the joint responsibility of the BLB Manager, the BLB Officers and the Operating Terminal’s staff to implement.

b. Response to any requirements imposed by the Director-General under condition 1.3.

No requirements have been imposed by the Director-General in regards to the Final Hazard Analysis. The FHA was approved subject to the safeguards identified being implemented and maintained, in particular (but not limited to) those outlined in Section 3.7 (addressed in Section (b.) above).

2.4. BLB2 Construction Safety Study

a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;

Table 4 – Hazard and Risk – Construction Safety Study Dates of Submission and Approval

Condition Approval Title	Condition Requirements			
2.1 (d) – Hazard and Risk – Construction Safety Study	<i>One month prior to the commencement of construction of the project (except for preliminary works as described in CoA 2.1), a Construction Safety Study shall be prepared in accordance with the Department of Planning’s Hazardous Industry Planning Advisory Paper No. 7 – Construction Safety Study Guidelines. Because the construction period exceeds six months, the “commissioning” portion of the study may be submitted two months prior to the commencement of commissioning.</i>			
(Users Construction)	CSS submitted to DP&I	CSS approved by DP&I	Construction Start Date	Notes/Evidence of Compliance
	31 May 2013 (Terminals and Vopak)	29 July 2013 (Terminals and Vopak)	August 2013 (Terminals) October 2013 (Vopak)	Letter sent to DP&I on 14/02/11 to seek agreement for submission of the User’s CSS one month prior to the BLB2 Users construction commencement. DG agreed in a letter dated 14/04/11. In the approval letter dated 29/07/13 the Department notes that the Vopak CSS does not address commissioning activities and a separate study must be submitted to the D-G for approval no later than one month prior to commissioning.

b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and

Terminals Construction Safety Study BLB2 Docklines

The following table outlines the Terminals CSS Compliance Matrix which demonstrates the program and evidence of the implementation of the recommended actions of the CSS.

Item	Page	Section	Detail	Action	Completion	Reference
1	ii	ii	Means to control hazard over water	<p>TPL operates under an integrated construction safety management system. This is audited on a weekly basis and provides the following safeguards for controlling hazards over water:</p> <ul style="list-style-type: none"> • Permit to work system • Dedicated safety supervisor on-site • Plant and equipment safety checklist • SWMS – highlighting measures such as additional safety fencing and life rings 	Ongoing – as working conditions change	BOT-TPL-CSMP-001-1 <i>Construction Safety Management Plan</i>
2	ii	ii	Stakeholder liaison to coordinate construction works	Weekly coordination meetings are held by NSW Ports with representation from Vopak. All formal communication is done using the Aconex system.	Weekly – Tuesdays 1000	Meeting Minutes
3	10	10	Ensure two (2) means of egress if containment lost	Multiple egress paths have been provided. Workers can exit to the south via the BLB2 wharf, to the north via the BLB1 working platform or to the east where multiple fencing panels have been removed to allow access to the 2 emergency assembly areas.	August 2013 – during site mobilisation	BSPP247A – <i>Emergency Assembly Area Drawing</i>
4	12	12	Terminals personnel to be present during tie-ins	TPL operations personnel will be actively involved in all tie-ins. They will be issuing permits and commissioning the lines. They will provide final sign-off on practical completion.	Ongoing – October/November 2013	Project Schedule Permit to work

Vopak Construction Safety Study BLB2 Pipeline Connection

Vopak are yet to start construction, hence evidence cannot be provided that the actions and recommendations of the CSS have been implemented. The CSS for Vopak will be covered in Compliance Tracking Report 5 due in November 2013. It is noted that a separate study is required from Vopak to cover commissioning activities and will be submitted for approval no later than one month prior to commissioning (for their infrastructure/operations – expected commissioning date yet to be confirmed – however it is expected to be around the end of November).

c. Response to any requirements imposed by the Director-General under condition 1.3.

- *DP&I Letter - 29 July 2013: Safety Studies*

- *Implementation of the recommendations of the CSS:*
- *Implementation and maintenance of the safeguards listed in the CSS:*
- *Completion of the actions recommended in Table 2 Hazard Identification Word Diagram: and*

Details regarding the implementation of the recommendations of the report and completion of the actions are detailed in section (b) above.

- *Implementation of safeguards to ensure that construction work on common areas is undertaken one User at a time.*

The two users (Terminals and Vopak) have submitted their construction schedules to NSW Ports to assist in managing compliance with this condition. Due to differences in timing (i.e. Terminals commenced construction in August and Vopak are yet to start), the two users will not be working within the same part of the common areas at the same time (e.g. Terminals will be working at the northern end of the working platform when Vopak will be working at the southern end of the platform). Weekly user's coordination meetings are currently held at the BLB2 Control Room every Tuesday morning and are attended by Terminals, and will be attended by Vopak when their construction commences, to ensure compliance with the coordinated works program.

2.5. BLB2 Emergency Plan

a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;

Table 5 – Emergency Plan Dates of Submission and Approval

Condition Approval Title	Condition Requirements			
2.2 (a) – Emergency Plan	<i>Two months prior to the commencement of project commissioning, or within such period otherwise agreed by the Director-General, the proponent shall develop and implement a comprehensive Emergency Plan and detailed emergency procedures for the project prepared in accordance with the Department of Planning’s Hazardous Industry Planning Advisory Paper No. 1 – Industry Emergency Planning Guidelines, and submit them for approval of the Director-General.</i>			
	EP submitted to DP&I	EP approved by DP&I	Project Commissioning	Notes/Evidence of Compliance
	26 September 2013	Currently awaiting approval	November 2013	

b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and

The Emergency Plan that has been developed covers both the BLB1 and BLB2. Detailed technical and management safeguards are currently used at the existing BLB and these have been adapted and implemented for the BLB2. A copy of the Emergency Plan is kept on site at all times and is also available electronically through the NSW Ports computer systems at G:\BLB Operations\2 Procedures\Bulk Liquids Berth\BLB 1 & 2 Emergency Plan. All BLB officers, Users’ employees and contractors are trained in the implementation of the safeguards and controls outlined in the Emergency Plan, in particular the requirements listed under Section 4 – Responsibilities, Section 5 – Emergency Procedures, Section 6 – Communications and Section 7 – Administration.

c. Response to any requirements imposed by the Director-General under condition 1.3.

No requirements have been imposed by the Director-General in regards to the Emergency Plan as this stage. Should any requirements arise from the review currently being undertaken by DP&I, these requirements will be addressed (and re-submitted to DP&I for approval as required). The Compliance Tracking Report 5 (due in November) will also address compliance with this issue.

2.6. BLB2 Safety Management System

a. Dates of study/plan/system submission, approval, commencement of construction and commissioning;

Table 6 – Safety Management System Dates of Submission and Approval

Condition Approval Title	Condition Requirements			
2.2 (b) – Safety Management System	<i>Two months prior to the commencement of project commissioning, or within such period otherwise agreed by the Director-General, the proponent shall develop and implement a comprehensive Safety Management System covering all on-site operations and associated transport activities involving hazardous materials. The document shall clearly specify all safety related procedures, responsibilities and policies, along with details of mechanisms for ensuring adherence to the procedures. Records shall be kept on-site and shall be available for inspection by the Director-General upon request. The Safety Management System shall be developed in accordance with the Department of Planning’s Hazardous Industry Planning Advisory Paper No. 9 – Safety Management.</i>			
	SMS developed	SMS implemented	Project Commissioning	Notes/Evidence of Compliance
	August 2013	Effective from 1 November 2013	November 2013	The SMS is available on-site at: G:\BLB Operations\2 Procedures\Bulk Liquids Berth\BLB 1&2 Safety Management System and is available for inspection by the DG upon request. A hard copy is also available at the BLB offices.

b. Actions taken or proposed to implement recommendations made in the studies/plans/systems; and

A Safety Management System (SMS) was developed and implemented for BLB1 operations and this document has been updated to incorporate the BLB2. The model for the NSW Ports SMS for BLB1 and BLB2 is based on AS4801, the Australian Standard for Occupational Health and Safety Management Systems, and the Department of Planning’s Hazardous Industry Planning Advisory Paper No. 9 (HIPAP 9). The SMS is available on-site in hard copy at all

times, as well as electronically on the NSW Ports computer systems at G:\BLB Operations\2 Procedures\Bulk Liquids Berth\BLB 1&2 Safety Management System.

The procedures outlined in the SMS have been incorporated into the BLB2 induction, the Operating Manual, the BLB2 Emergency Plan and other NSW Ports WHS procedures. A formal Management of Change procedure has been developed NSW Ports as a part of the SMS to ensure that changes are not introduced which could inadvertently compromise the safety of the facility and impact on employees, the community, and the environment. The Management of Change procedure ensures that proposed technological, facility, procedural, transport or organisational changes are reviewed and implemented following strict procedures for identifying the impact on safety, assessing the risk, and taking the necessary action to manage that risk. The Management of Change procedure includes the following key documentation:

- Modification Form
- Modification Register
- Change Assessment Form – Equipment, Process Settings and Procedures
- Change Assessment Form – Structures and Buildings
- Change Assessment Form – Organisational Change
- Modification Completion Check List

c. Response to any requirements imposed by the Director-General under condition 1.3.

No requirements have been imposed by the Director-General in regards to the Safety Management System. The SMS was not required to be submitted to the Director-General for approval, however is available for inspection upon request.

3. Additional Reports, Plans and Requirements

In addition to those reports and plans issued to DP&I under Conditions 2.1 and 2.2, NSW Ports have also issued the following plans/reports to the D-G for approval. The tables below detail evidence of their submission to the DP&I and how any requirements from the D-G issued under Condition 1.3 have been addressed.

Table 7 - Compliance Tracking Reports and Environmental Audits

Condition Approval Title	Condition Requirements		
4.1 – Compliance Tracking System	<p><i>The Proponent shall develop and implement a Compliance Tracking Program to track compliance with the requirements of this approval. The Program shall be submitted to the Director-General for approval prior to the commencement of construction. The Program shall relate to both construction and operational stages of the project and shall include, but not necessarily be limited to:</i></p> <ul style="list-style-type: none"> <i>a) provisions for periodic review of the compliance status of the project against the requirements of this approval;</i> <i>b) provisions for periodic reporting of compliance status to the Director-General;</i> <i>c) provisions for specific reporting requirements as required by conditions 4.2 and 4.3;</i> <i>d) a program for independent environmental auditing at least annually, or as otherwise agreed by the Director-General, in accordance with ISO 19011:2002 - Guidelines for Quality and/ or Environmental Management Systems Auditing; and</i> <i>e) mechanisms for rectifying any non-compliance identified during environmental auditing or review of compliance.</i> 		
	Compliance Reports sent to DP&I	Approved by DP&I	Notes/Evidence of Compliance
	Compliance Tracking Program – 23 May 2011	14 June 2011	<p>The Compliance Tracking Program detailed bi-annual compliance tracking reports (CTR) due in May and November. The program also detailed annual environmental auditing.</p> <p>In accordance with the request from DP&I (letter dated 18/07/12) Sydney Ports provided the Environmental Audit Report to DP&I and uploaded the Compliance Tracking Program and Compliance Tracking Reports to the Sydney Ports website. As at May 2013, the Sydney Ports (BLB2) website was moved to the NSW Ports website: http://www.nswportsbotany.com.au/projects/bulk-</p>

			liquids-berth-2/ The compliance tracking reports and second environmental audit report have also been uploaded to this page on the NSW Ports website.
	CTR) 1 – 21 November 2011	7 December 2011	
	CTR 2 – 29 May 2012	18 July 2012	
	CTR 3 – 15 November 2012	25 January 2013	
	CTR 4 – 28 May 2013	17 June 2013	
	First environmental audit report – 23 August 2012	22 February 2013	The first Environmental Audit Report was submitted to DP&I on 23/08/2012. Sydney Ports followed up a DP&I query received 26/10/2012 seeking clarification of non-compliances relating to the disposal of waste and provided a response to DP&I on 19/11/2012. DP&I raised further questions by phone (Feb 2013), which were responded to by email from SPC on 13/02/13. A response letter from DP&I accepting the SPC response was received, dated 22/02/13.
	Second environmental audit report – 26 September 2013	8 October 2013	

Table 8 - Operational Environmental Management Plan

Condition Approval Title	Condition Requirements
6.3 - Operation Environmental	<i>Prior to the commencement of operation of the project, the Proponent shall prepare and submit for the approval of the Director-General an Operation Environmental Management Plan to detail an environmental management framework, practices and</i>

Management Plan	<p><i>procedures to be followed during the operation of the project. The Plan shall be consistent with the Department's Guideline for the Preparation of Environmental Management Plans (DIPNR 2004), and shall include, but not necessarily be limited to:</i></p> <p><i>a) a description of all activities to be undertaken on the site during operation of the project;</i></p> <p><i>b) statutory and other obligations that the Proponent is required to fulfil during operation, including all approvals, consultations and agreements required from authorities and other stakeholders, and key legislation and policies;</i></p> <p><i>c) specific consideration of measures to address any requirements of Council and the DECC during operation;</i></p> <p><i>d) details of how the environmental performance of operations will be monitored, and what actions will be taken to address identified adverse environmental impacts;</i></p> <p><i>e) a description of the roles and responsibilities for all relevant employees involved in the operation of the project and a program for how these employees will be trained in responsibilities identified in the plan; and</i></p> <p><i>f) complaints handling procedures to be applied during operation of the project (conditions 5.2 and condition 5.3 of this approval).</i></p>		
	Report sent to DP&I	Approved by DP&I	Notes/Evidence of Compliance
	13 September 2013	Awaiting approval	DP&I provided comments back on the draft OEMP on 2 October 2013. The revised OEMP incorporating the requested amendments was sent to DP&I on 16 October 2013.

Table 9 - Pile Vibration Management Plan

Condition Approval Title	Condition Requirements		
<i>DoP Letter - 22/12/10 - Pile Vibration Management Plan</i>	<p><i>A Pile Vibration Management Plan is to be prepared and implemented as a requirement of the Director General agreeing to the use of driven piles. The Plan is to be approved by the Director - General prior to piling works and will be incorporated into the CEMP (CoA 6.1). The changes in construction methodology shall also be considered, as appropriate, within the Hazard and Risk studies prepared under CoA 2.1. The Plan shall be prepared in consultation with Elgas and include management measures to control vibration to acceptable limits and to protect surrounding port infrastructure (including the integrity of the Elgas LPG Cavern). This shall include the identification of vibration level criteria and a Pile Vibration Monitoring System.</i></p>		
	Report sent to DP&I	Approved by DP&I	Notes/Evidence of Compliance
			DP&I queried whether the duration of piling was considered in preparation of

	28 March 2011	30 May 2011	<p>the PVMP and asked for the resolution of the geophones. This information was submitted to Lilia Donkova in an email dated 3/5/11. An email response from Ingrid Ilias DP&I on 4/5/11 requested additional information with regard to the PVMP. Letter with additional information provided to DP&I 19 May 2011. As requested by DP&I in an email dated 24/5/11, the GHD Report "BLB2 Piling and Vopak Terminal Sydney, Pile Vibration Analyses and Assessments, May 2011" was supplied on 27/5/11. DP&I approval granted via a letter, dated 30/5/11. Letter received from DP&I, dated 16/6/11, indicating they are satisfied that the final piling methodology and associated environmental management has been adequately addressed in other studies and reports and does not need to be further considered in the Hazard and Risk studies under CoA 2.1. The PVMP was incorporated into the CEMP. Installation of the Vibration Monitoring System is complete and background vibration monitoring commenced in June 2011. Vibration monitoring was ongoing during piling and there were no exceedances of the prescribed set levels. Piling installation completed 26/04/12.</p>
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Table 10 – Construction Noise Management Plan

Condition Approval Title	Condition Requirements		
DoP Letter - 24/12/10 - Construction Noise Management Plan	<p><i>The Construction Noise Management Plan (re CoA 6.2d) must include clear commitments in relation to the duration of driven piling activities, the provision of respite periods, and mitigation measures in response to noise criteria exceedances. The CNMP must be submitted to the Department of Planning prior to the commencement of works.</i></p>		
	Report sent to DP&I	Approved by DP&I	Notes/Evidence of Compliance
	19 August 2011	14 October 2011	<p>The Noise ECP fulfills the requirements of CoA 6.2(d) as well as the requirements of the letter from DP&I (24/12/10). The Noise ECP was incorporated into the project's CEMP. A letter from DP&I (14/10/11) confirms that the Noise ECP meets the requirements of CoA 6.2d and that it has been incorporated into the project's CEMP as required.</p>

Appendix A – NSW Ports Main Construction HAZOP Actions Implementation Program

Discipline	Item No.	Item	Action Required By	Comments	Status / Programme for Completion (Dec 2011)	Comments	Status / Programme for Completion (Oct 2013)
Hazop & Safety in Design Review SPC Workshop Report							
Ship Mooring							
MA	HZ-SPC-001	1. Review the spacing between the two vessels at BLB1 and BLB2 when parked and berthing to ensure 25m minimum distance maintained	WP	Refer drawing GE-DWG-0060	Closed		
		2. SPC to develop a revised berthing guideline policy due to the likelihood of a vessel being at BLB1 during BLB2 berthing operations	SPC		Prior to Commencement of Operations	Updated Mandatory Requirements for Booking and Use Of BLB 1 & 2 in place	Closed
MA	HZ-SPC-002	1. Design to examine the adequacy of the emergency response connections to prevent a loss of containment into the bay (e.g. floating boom)	WP / SPC	Details of boom connections given by SPC. SPC responsible for spill containment and boom connection.	Closed		
		2. Single hull ships may need to provide own fenders	SPC	As per existing BLB1 operations	Closed		
		3. Establish minimum distance between berths allowing for the longest likely vessel lengths	SPC	Minimum clearance of 25m between the berths established and agreed by Sydney Ports.	Closed		
MA	HZ-SPC-003	1. Define the criteria for accidental impacts 2. Design to allow for accidental impacts 3. Investigate feasibility of using fixed or mobile berth tools	WP / SPC	Mooring meeting was held and criteria were agreed. Refer to BOD. Design allows for installation of fixed berthing system.	Closed		
		4. SPC to develop a revised berthing guideline policy due to the likelihood of a vessel being at BLB1 during BLB2 berthing operations	SPC		Prior to Commencement of Operations	Updated Mandatory Requirements for Booking and Use Of BLB 1 & 2 in place	Closed
Unloading Facilities							
EL	HZ-SPC-004	Ensure correct lightning protection and detection in design (isolation flanges)	WP	Lighting protection has been considered in design	Closed		

MA / WW	HZ-SPC-005	1. Consider containment of spillages between the wharf and the ship	SPC / Users		Prior to Commencement of Operations	Procedures included in BLB2 Operating Manual and BLB2 OEMP	Closed
		2. Consider providing automatic isolation on loss of connection	Users	Users to review during design development	During User Design Development	High volume transfers eg MLAs have dry break couplings and remote emergency shutdown buttons as does bitumen.	Closed
		3. Provide a criteria for determining rate of spillage which affects the berth bund design	SPC	SPC provided the spill volume criteria. Incorporated in design.	Closed		
MA	HZ-SPC-006	Provide adequate access for maintenance of pipelines	WP / SPC	Included in design. Minimum height between piperack was agreed with SPC and minimum height between pipes was agreed. Refer to BOD for values	Closed		
MA	HZ-SPC-007	1. Consider the placing of fire monitors away from travel paths	WP	Fire monitors on deck out of travel path	Closed		
		2. Develop critical lift procedure	SPC		Prior to Commencement of Operations	SWMS for these lifts developed	Closed
		3. Install height limiters / danglers to prevent impact to elevated pipelines	WP	Height limiters included in design	Closed		
		4. Install kerbs to limit travel path	WP	Armco barriers provided around the berth in area prone to impact	Closed		
WW	HZ-SPC-008	Consider level alarm/hydrocarbon detector in Stormwater collection pit	WP / SPC	Not required by SPC	Closed		
WW / ST	HZ-SPC-009	Review design and risks of valve isolation station	SPC / Users	Further review during Users' design development	During User Design Development	Hazop conducted with Terminals to address issues with pipeline exchange platform	Closed
		Emergency Response					
FG / ST / MA	HZ-SPC-010	1. Review explosion protection for pump house 2. Review pump requirements	WP	Blast design Included in design of building and pumps have been sized to suit facility	Closed		
FG	HZ-SPC-011	1. Design for sufficient duration of foam 2. Consider type of foam to use (SPC to confirm)	WP	2 x 5500L foam bladder tanks provided Ansul 3x3 LV concentrate as required by SPC	Closed		

FG / MA	HZ-SPC-012	Discuss height of fire monitor with SPC	WP / SPC	Refer to TQY-0045. Fire monitor tower height 18 meters.	Closed		
FG	HZ-SPC-013	Consult with Fire Brigade regarding sea water suction facilities		NSWFB requested 2-3 seawater suction points. Fire design submitted to NSWFB as part of the Fire Safety Study in January 2011 and NSWFB comments received Feb 2011.	Closed		
FG / MA	HZ-SPC-014	Sprays are provided on road and under piperack along MLA's Fire monitors can provide spray coverage	WP	Refer to fire design drawings FG series	Closed		
MA	HZ-SPC-015	Provide ladder and life jackets/ buoys at dolphins for evacuees in water. As per ISGOTT ship to provide a secondary means of escape for its crew.	WP	Specified on drawings	Prior to Commencement of Operations	Closed	Closed
		Spill Containment					
MA / WW	HZ-SPC-016	1. Design should consider portable booms connection points	WP	Refer drawing MA-DWG-5100	Closed		
WW	HZ-SPC-017	2. Provide spill kit and identify appropriate location	SPC / Users		Prior to Commencement of Operations	Procedures and location included in BLB2 Operating Manual and BLB2 OEMP	Closed
		Communications					
EL	HZ-SPC-018	Develop communications system in consultation with SPC based on system at BLB1	WP / SPC	Refer to Electrical Specifications	Closed		
		Structural					
MA / ST	HZ-SPC-019	1. Scour considered unlikely but need to include how this is being dealt with in BoD.	WP	Scour consideration covered in BOD	Closed		
		2. Review where the access bridge meets the revetment. Consider whether any specific action to be taken.	WP	Area at access bridge land interface has been specified in drawings and allowance for existing revetment has been considered.	Closed		
		3. Review the existing BLB1 culvert - consider whether any specific action to be taken.	WP	BLB1 culvert amendments have been documented ST-DWG-0080	Closed		

GE	HZ-SPC-020	Ensure that design considers potential damage issue and to specify requirements to contractors not to damage during excavation.	WP / SPC / Contractor	Specified in specifications and contractor will need to produce CEMP for SPC approval before construction start. Site Access Plan developed with protocols in place for these areas. Compliance with these Plans will be monitored during construction.	During Construction	Contractor CEMPs addressed excavation. Compliance with these plans are being monitored	During Users Construction
CI / WW / EL / MA	HZ-SPC-021	1. Laydown area on shore will be set up as a maintenance work area with utilities provided.	WP / SPC	Layout agreed with SPC refer GE-DWG-0040	Closed		
		2. Relook at access to utilities (piping/cable) provided by WP to wharf.	WP / SPC	Services location agreed with SPC	Closed		
		3. Have requested direction from SPC as to whether they want ladder or cherry picker access for fire monitor towers	SPC	SPC advised ladder to fire monitor tower where required which has been included in design	Closed		
MA	HZ-SPC-022	1. Ensure sufficient room on dolphin for forklift to turn around 2. Gangway capstan to be relocated north of current proposed position 3. Provide locations for a snatch box along northern ramp	WP	Included in design, refer drawing MA-DWG-3004	Closed		
FG / ST	HZ-SPC-023	1. Need to define blast loading and wind loading for shelter on wharf and on shore building - look at fire resistance as well	WP	1. & 2. Allowed for in design	Closed		
		2. Pump house blast resistance to be determined in PHA review.					
		3. Review users operating procedures for personnel during loading/unloading	SPC	SPC to produce operating procedures for personnel	Prior to Commencement of Operations	BLB1 Operating Manual reviewed and updated to incorporate BLB2 Operating procedures	Closed
MA	HZ-SPC-024	Hydraulic Gangway tower to be provided	SPC / Contractor	Refer Gangway Tower specifications	Closed		
ST	HZ-SPC-025	Install a removable roof over the fire pump area - allows a crane to remove pumps for maintenance etc	WP	Refer drawing MA-DWG-2358	Closed		
CI	HZ-SPC-026	1. Need to provide pedestrian walkway line marking on roadway. 2. Put in place road markings around admin building e.g. pedestrian markings 3. Put in pedestrian crossing across Fishburn road opposite BLB2 bridge	WP	Refer drawing CI-DWG-0014 & AR-DWG-1009	Closed		

MA	HZ-SPC-027	1. On the platform need to reconsider if wheel stop is adequate - may need more robust barrier.	WP	Wheel stops replaced with traffic barrier	Closed		
		2. Install Armco or other appropriate barrier along pipe way on Fishburn road	WP	Current barrier is adequate	Closed		
MA	HZ-SPC-028	1. Install vertical impact prevention under the 5.5 meter elevated piperack section.	WP	Refer drawing MA-DWG-4003	Closed		
		2. Install impact protection around fire and light towers	WP				
MA	HZ-SPC-029	Need to provide elevated work platforms at fire water towers.	WP	Refer drawings MA-DWG-5001, 5002 and 5003	Closed		
MA	HZ-SPC-030	1. Need to consider vibration issues for pump house installation.	WP	Vibration considered	Closed		
		2. Need to design racks for 3 operating MLA's or 8 chemical hose lines under ESD conditions e.g. hammer effects.	WP	Allowed for in design as per BOD	Closed		
		3. Need to review impact of proposed infrastructure on existing infrastructure e.g. underground caverns and existing pipelines.	SPC / Contractor	Pile Vibration Management Plan and Site Access Plan developed. Compliance with these will be monitored during construction.	During Construction	Compliance with these required for main works construction. Compliance achieved. Not applicable to users works construction.	Closed
		4. Design needs to consider the movement of the wharf due to vessel, wind or wave impact.	WP	Movement of wharf has been included in design including pipe joints	Closed		
		5. WP will provide load information that may impact operation on wharf	WP	Loading allowances outlined in BOD	Closed		
		6. Check design of civil works to ensure cranes can be used and loads not exceeded	WP	Designed as per BOD	Closed		
GE	HZ-SPC-031	Review as part of PHA review.	WP	Refer Technical Note re: Dispersion Modelling Summary Results dated 1-Feb	Closed		
GE	HZ-SPC-032	Ensure design has sufficient redundancy	WP	BOD sets out design requirements which have been included in the design	Closed		
WW	HZ-SPC-033	Consider the types of products that could end up in spill containment system and on the wharf deck.	WP	Consideration has been included in spill design and for pump specification. Stainless steel pipes to be used.	Closed		

MA	HZ-SPC-034	Consider differential movement for utilities piping and walkways between platform and dolphins.	WP	Allowance for movement has been made in design	Closed		
		General					
CI / MA / EL	HZ-SPC-035	1. SPC are going to provide WP with requirements for additional security gates.	SPC	SPC provided requirements	Closed		
		2. WP to provide separate vehicle and pedestrian barriers at wharf entrance.	WP	Specified in drawings	Closed		
		3. WP to provide security around proposed lay down area in Fishburn road - will review need with SPC	WP / SPC	Agreed with SPC that security was not required around this area as site if fully secured	Closed		
		4. SPC to consider putting in new sliding gate south of southern emergency egress gangway- move to south of hazardous zoning	WP / SPC	Main gate to be located south of southern catwalk	Closed		
		5. Provide emergency one way gate on southern emergency egress gangway	WP	Specified in drawings	Closed		
		6. SPC to consider gate on emergency egress gangway between the two BLB's	SPC	SPC advised no gate on emergency gangway between the two BLB's required	Closed		
MA	HZ-SPC-036	1. Handrails to be provided on the landward side for dolphins. For the catwalks also just a handrail on landward side to allow lines to be dragged along. WP to discuss need for second handrail on catwalks with SPC and seek their direction.	WP	Handrails provided on both sides of catwalks	Closed		
		2. For forklift access platforms to dolphin need to install curb or armco barrier on both sides.	WP	Kerb provided	Closed		
		3. Forklift could damage quick release hooks but loss of one line should not result in an incident due to vessel movement. Only an issue for the smaller vessels.	WP / SPC	No barriers to be provided around QRMH. SPC to manage in procedures	During Operations	Addressed in BLB2 Operating Manual	Closed
		4. Need to review with SPC need for forklifts to be out on dolphins and access platforms.	WP	Agreed forklift to have access to northern berthing dolphin. Specified in design	Closed		
		5. Bridge barrier on access bridge. On platform have handrail plus 200mm curb - need to review as may need more substantial barrier ie bridge barrier. The spill collection pit is only 200mm deep so no handrails needed. Need to continue bridge barrier to Fishburn road. NB ; not within project scope to provide	WP	Bridge barrier provided in design and drawings	Closed		

		impact protection for existing pipe corridor along Fishburn road.					
		6. For southern side of bridge agreed to provide both vehicular and pedestrian protection. WP to provide SPC with alternate designs.	WP	Vehicle protection provided only as road is wide and handrail not required	Closed		
		7. Install a curb on the berthing dolphin	WP	Handrail provided to rear of dolphins and front of dolphins have a small rope rail	Closed		
		8. Install armco on eastern side of piperack	WP	Armco called up on drawings	Closed		
		9. Install handrail on both sides of emergency catwalks	WP	Handrail called up on drawings	Closed		
		10. Install brushed concrete for emergency catwalks	WP	Broom finished specified	Closed		
		11. Install handrails and access into/around culverts	WP / SPC	Culverts are a confined space, and as such it is best practice not to provide ladder access to these areas as it encourages people to enter without the appropriate equipment. As the area is secured and won't be passed regularly, no handrails have been provided. SPC to develop procedure for entry to this area. Pipe diversions in new culvert are fully welded, therefore decision made to provide steps for access to culvert and as a result, handrailing will also be required. This area will be secured during operations.	Prior to Commencement of Operations		
GE / FG	HZ-SPC-037	1. Lifting equipment may be needed at Fire pump facility - to be reviewed.	WP	Lifting facilities not required in building. Crane access to pumps is provided via removable panels in roof.	Closed		
		2. May need some lifting equipment to allow equipment to be taken to top of fire monitor towers. To be agreed to with SPC.	WP / SPC	In subsequent meeting with SPC, it was confirmed that no davits would be provided as full personnel access has been provided.	Closed		
		3. Discuss at Users Hazop - potential for need for monorail to allow hose lifting gear	SPC / Users	Users to provide monorail for hose lifting if required.	Prior to Commencement of Operations	Not deemed necessary by users	Closed
MA / EL / ST	HZ-SPC-038	1. Ladders to be designed to appropriate AS1657 and marine code for ladders.	WP	Ladder specified on drawings to AS1657	Closed		
		2. Provide anchor points on elevated areas where work may be required	WP	Anchor Points provided	Closed		

		3. Put lights on fire monitor towers where possible	WP	Lights cannot go on tower as they need to be hydraulic lifted and lowered on a pole for maintenance. Separate pole to be provided.	Closed		
		4. Install access ladder to and anchor points on amenities building roof	WP	Anchor point and ladder provided	Closed		
AR / FG / EL	HZ-SPC-039	1. Engage an architect to develop internal design (including control room) - will need to consider ergonomic issues.	WP	Refer to AG series drawings. Architect developed room layout	Closed		
		Control Room 2. Install an interview/permit issue half window on the south side instead of proposed door	WP	Window provided	Closed		
		3. Ergonomic review required for control room design	WP	Room layout provided	Closed		
		4. Relook at emergency egress - currently only one exit door	WP	One door is all that is required by BCA. Second egress from building is available through switch room	Closed		
		5. Fire panel needs to be located with other monitoring facilities	WP	Final layout will need be specific to Contractor provided interfaces	During Construction	Fire panel in BLB 2 office with 24/7 presence	Closed
		6. Need to provide as much vision as practical of BLB2 Operator Hut	WP / SPC	Agreed view of BLB with SPC	Closed		
		7. Consider locating emergency shutdown button to more visible location	WP	Included in design	Closed		
		8. Users to determine number of ES buttons to be provided	SPC / Users		During User Design Development	Number and location of ESDs agreed for Terminals and Vopak	Closed
		9. Review location of exhaust fan - can be damaged by passing forklifts	WP	On north elevation now	Closed		
		10. Review need for protection of building corners from forklift collision	WP	Ex D rated toilet pump out system provided, located external to hut	Closed		
		11. Ventilation requirements to be determined and incorporated into hut design	WP	Included in design	Closed		
		12. Remove marine radio	WP	Removed.	Closed		
		13. Ensure location for portable radios is adequate	WP	Confirmed.	Closed		
		14. Area to change out wet gear to be provided	WP	Shelter outside building provided	Closed		
		15. Fire alarm and wharf emergency alarm buttons to be provided	WP	Defined in specs	Closed		

		16. Review toilet waste disposal system	WP	EX rated system on wharf specified	Closed		
GE	HZ-SPC-040	Discuss bunding further at User Hazop	WP / SPC / Users	Discussed.	Closed		
		Electrical/Instrumentation					
EL	HZ-SPC-041	Have to gain agreement from SPC on hazardous area classification	WP / SPC	Agreement reached in workshop with SPC and Users	Closed		
EL / AR	HZ-SPC-042	SPC to confirm if any smoke sheds or shelters are to be provided	SPC	SPC advised smoking lighter to be provided at rear of admin building	Closed		
EL	HZ-SPC-043	Need to consider static in durability assessment for piping.	WP	Static considered in design of spill system	Closed		
EL	HZ-SPC-044	1. Emergency lighting has to come on immediately e.g. fluoro. UPS will allow halide or other lighting 2 WP to document back up strategy and send to SPC	WP	UPS will ensure no lights out situation	Closed		
EL	HZ-SPC-045	1. Check electrical isolation requirements for any utility taken onto vessel e.g. water.	WP	Isolation considered in design	Closed		
		2. SPC are responsible for ensuring that operators product are properly isolated from vessel.	SPC / Users		During Operations	Procedures are included in the BLB2 Operating Manual	Closed
EL	HZ-SPC-046	Gangway tower electrical requirements to be reviewed.	WP	Power to be provided in cable trays for connection to towered	Closed		
EL / FG	HZ-SPC-047	Alarm system on safety showers will be a SIF	WP	Safety shower to be in accordance with AS standard	Closed		
EL	HZ-SPC-048	Will need to conduct a SIL determination on identified SIF's	WP	SPC advised SIL review of Spill System was not required	Closed		
EL	HZ-SPC-049	Use SIL rated PLC	WP	SPC advised SIL review of Spill System was not required	Closed		
GE	HZ-SPC-050	Review alarm and trip settings for all SIF's and BPCS prealarms	WP	Covered in fire safety review/User Hazop	Closed		
GE	HZ-SPC-051	Review trip rates for SIF's	WP	Covered in fire safety review/User Hazop	Closed		
		Emergency Response					

MA	HZ-SPC-052	Provision of a wind sock - must be visible from all areas of BLB2	WP	Specified on drawings	Closed		
FG	HZ-SPC-053	Firebox on operator hut to be moved to behind the hut	WP	Included on general arrangement drawings	Closed		
Hazop & Safety in Design Review Users Workshop Report							
		Evacuation					
AR	HZ-USR-001	Look at need for second door on the new amenities building to cope with emergency inside building. Alternate is to look at emergency egress door out through switch room	WP	Emergency egress through switch room.	Closed		
FG	HZ-USR-002	Sprays are provided on road and under pipe rack along MLA's Fire monitors can provide spray coverage	WP	WP has provided sprays along all walkways in 4.7N/m2 heat contour. This includes both sides of catwalks within the contour as well as along the roadway and east side of working platform.	Closed		
MA	HZ-USR-003	1. Provide ladder and life jackets/ buoys at dolphins for evacuees in water 2. As per ISGOTT ship to provide a secondary means of escape for its crew	WP	Ladders and life jacket locations provided in design.	Closed		
		3. Add ladder at shore end of road bridge and walkway	WP	Ladder access at the shore end of the bridge cannot feasibly be provided due to the density and layout of the services which are located on both sides of the bridge. It is considered that in the case of an emergency that access from the water could be obtained via the rock revetment where personnel could rest on the top of the revetment until a rescue boat could be launch to enable rescue.	Closed		
EL	HZ-USR-004	Develop communications system in consultation with SPC based on system at BLB1	SPC	Emergency siren system for emergencies. Lights warning system. Intercom system to be provided. PA intercom system to be provided. Final communications plan to be provided by SPC.	Prior to Commencement of Operations	Communications system specifications have been included in the Emergency Plan for BLB2. Wharf emergency alarm provided, intercom and pa provided	Closed

EL	HZ- USR- 005	1. Provide fire and smoke detection in the Users Electronic Equipment Room	WP	Smoke detectors provided and linked to FIP	Closed		
		2. Provide additional camera at south end of Fishburn road near south gangway	WP	Included in design, Camera locations shown on the 301015-01655-EL-DWG-0014	Closed		
		3. User cameras to provide feed to SPC and SPC to provide feed to Users.	SPC	SPC to advise Users	Prior to Commencement of Operations		Closed
		4. WP to provide camera specification for Users	Contractor	Camera spec will be provided by Contractor	During User Design Development		Closed
		5. Elevate camera above operator hut to ensure view of manifold connection	WP	Included in design	Closed		
		Piping, Supports and Culverts					
GE	HZ- USR- 006	1. Review maintenance access to pipe lines on roadway. 2. Incorporate with review of cable tray locations	SPC / Users	Free access to pipelines along piperack has been provided in design. SPC will need to regulate where users put their trays and pipe lines - with SPC Property. To be developed during User Licence Agreement finalisation.	During User Design Development	User Design Guidelines addressed location of pipelines and services in trays - BLB 2 User Licence Agreement in place for Terminals and Vopak	Closed
		Fire SID					
FG / ST	HZ- USR- 007	1. Review explosion protection for pump house	WP	3 x 50% pumps at BLB2 is now the final design independent of BLB1. Each pump is 7000l/min. Pump house is in enclosed concrete building which will provide some blast resistance	Closed		
		2. Review pump requirements	WP	Design case is two monitors and two pumps on line. Can supply water curtains as well. Design assumes either monitors or deluges would be used - not run simultaneously.	Closed		
FG	HZ- USR- 008	1. Design for sufficient duration of foam	WP / SPC	One hour foam supply is proposed as per AS3846. Replenishment capacity has been provided for to allow for longer duration fire.	Closed		
		2. Consider type of foam to use (SPC to confirm)		3% alcohol compatible AFFF foam to be used	Closed		

FG	HZ- USR- 009	Remote fire fighting method to be provided.	WP	Design is to install hydrants on the bridge, platform and egress gangways. Hydrant spacing is nominally 60m. NSW Fire Brigade consulted on hydrant location. Design allows foam addition through hydrant system - consistent with BLB1 and some user facilities. Portable foam and fire extinguisher addition requirements outlined in specifications. Emergency facilities layout drawing provided. Fire brigade booster point on Fishburn road presented to NSWFB.	Closed		
FG	HZ- USR- 010	Review radiant heat	WP	4.7kw/m2 radiant heat contour drawing has been completed.	Closed		
FG	HZ- USR- 011	Discuss height of fire monitor with SPC	WP	Deluge systems covers MLAs and has been designed to allow for future expansion. The foam proportioned has near infinite turndown capacity. Water curtains on emergency egress gangways and along the access bridge and at back of platform. Local and remote actuation buttons and their locations shown on emergency drawing. Fire monitor tower height 18 meters. Control system diagram provided	Closed		
FG	HZ- USR- 012	Consult with Fire Brigade regarding sea water suction facilities	SPC	Fire booster connection for mutual aid use to be provided on Fishburn Road. Meeting held to present design to NSW Fire Brigade. Fire design submitted to NSWFB as part of the Fire Safety Study in January 2011 and NSWFB comments received Feb 2011.	Closed		
FG	HZ- USR- 013	Review the sizing and the connection type	WP	Sizing and connection types reviewed.	Closed		
FG	HZ- USR- 014	1. Design intent - use seawater resistant piping around fire water pumps only. Rest of system is design to be kept full of fresh water and to use galvanized steel.	WP	CuNi piping used around fire water pumps, rest is galv mild steel, HDPE or stainless.	Closed		

		2. Painting standard to be identified for piping.	WP	Pipe specifications supplied.	Closed		
		3. Review connection design. Victaulic couplings are being proposed rather than expansion joints.	WP	Connection types confirmed as Victaulic couplings.	Closed		
		Spill Containment					
		Node 1: MLA and hose tray liquid removal system and IBC loading					
WW	HZ- USR- 015	1. Ensure that IBC volume exceeds tray volume 2. IBC's are to be disposed of by the Users 3. All stormwater in trays to be pumped into IBC's	Users Users Users		During User Design Development		Closed
WW	HZ- USR- 016	1. Ensure backflow prevention provided	Users		During User Design Development	Non return valves in Terminals pipework	Closed for Terminals
WW	HZ- USR- 017	1. Need to ensure pumps and hoses and IBC/drums are earthed 2. Ensure IBC fill procedures deal with potential static build-up 3. IBC's and hoses need to be of appropriate material to handle potential spills	Users Users Users		During User Design Development	included in Terminals operating procedures	Closed for Terminals
GE	HZ- USR- 018	Up to Users to determine if any PPE issues or high temperature design issues	Users		During User Design Development	included in Terminals operating procedures	Closed for Terminals
GE	HZ- USR- 019	Users to decide if need to install additional facility e.g. shore based storage	Users		During User Design Development	Terminals decided not required	Closed for Terminals
		Node 2: platform deck liquid removal system					
WW / EL	HZ- USR- 020	1. Design to include a high level trip that stops pumps 2. Level indication to be provided to control room	WP	Included in electrical design	Closed		
WW	HZ- USR- 021	1. Provide in platform sumps ability to sample material 2. Provide sampling facility for spill containment tank and ensure adequate access (top sampling).	WP	Open grated removable covers in design. Tank test point specified .	Closed		
WW	HZ- USR- 022	1. Need to consider potential for air intake into pumps 2. Add sump level instrumentation onto the drawing as pumps are automatically turned on	WP	Hose pumps used. Air ok. Pumps are manual control only. Not auto	Closed		
WW	HZ- USR-	1. Provide check valve on pumps and at tank inlet (if bottom inlet)	WP	Included in design/specifications	Closed		

	023	2. Decide on top or bottom inlet to tank					
WW	HZ- USR- 024	1 Provide an overflow line on spill containment tank	WP	Included in design/specifications	Closed		
WW	HZ- USR- 025	1. Put a tee/branch on line to spill containment line to allows users to connect to their system as per BLB1. 2. Proposed pumps to be sized for supply to spill containment tank	WP	Included in design/specifications	Closed		
WW	HZ- USR- 026	1. Need to consider all chemicals that could be put into system - includes piping/pumps and tank/bund	WP	Wide range of chemicals possible. Design generally suited to hydrocarbons based on majority use of platform BUT CONSIDERED REPLACEABLE Pumps :Hose pump with Hypalon hose, ss piping, ms tank, concrete bunds	Closed		
WW	HZ- USR- 027	Install PV vent on spill containment tank	WP	Included in design/specifications	Closed		
WW	HZ- USR- 028	Need to review the bottom design of tank to ensure can completely pump out tank and clean adequately	WP	Above Ground Horizontal Tank, with fall	Closed		
WW	HZ- USR- 029	1. Consider complete inner liner or painting of spill containment tank 2. ensure adequate manway access to allow entry into spill containment tank	WP WP	FOLLOWED THREE COAT ZINC BASED PAINT SYSTEM WITH A POLYURETHANE TOP COAT	Closed		
WW	HZ- USR- 030	1. Consider Inerting system	WP	Following correspondence with SPC and WP, SPC decided not to provide a Inerting system.	Closed		
		2. Look at impact of hazardous area zoning	WP	Hazardous zoning determined and shown in drawing 301015-01655-EL-DWG-0022-01 and agree with SPC in meetings. No impact on nearby facilities	Closed		
		3. Look at issue of static issue re initial filling	WP	Static has been considered in design of spill containment tank and spill pump specification	Closed		
WW	HZ- USR- 031	Need to check likely temp of materials	WP	Assumed ambient	Closed		
WW	HZ- USR- 032	Look at thermal relief requirements for inlet line to spill containment tank	WP	Assumed ambient	Closed		

WW	HZ- USR- 033	1. Design to handle tank volume 2. Bund material to be impervious	WP	Bund volume 110% tank vol + 150mm rain allowance. Reinforced concrete	Closed		
		Node 3: gravity liquid removal system					
WW	HZ- USR- 034	1. Sump design to be finalized to incorporate drainage (P3 and P4 are manual start and auto stop) - refer to BLB1 detail 2. V5 and V6 are to be kept closed for all cases. 3. Review valve opening/closing sequence and integrate with LPG ESD process	WP	Refer environmental control sequence	Closed		
WW	HZ- USR- 035	Need to consider pump design to deal with this or provide a design that allows maintenance/cleaning of sump. Consider low shear pump e.g. Mono	WP	Pump moved to deck to facilitate maintenance. Hose pump adopted	Closed		
WW	HZ- USR- 036	1. Need to analyse potential vapour build up in line and provide backflow protection 2. We need to ensure pipe sloping is adequate to prevent holdup	WP	Backflow flap provided on pipe outlet. Pipe on 0.5% grade	Closed		
WW / CI	HZ- USR- 037	1. GPT and Oil can deal with pump testing fluid 2. P5 pressure needs to not cause overpressure issues with GPT/Oil Separator	WP	Not a direct pressure connection to GPT.	Closed		
WW	HZ- USR- 038	Stainless piping would be preferred. Will be under wharf so will need painting.	WP	Use of Hobas. Painting not required	Closed		
WW / CI	HZ- USR- 039	1. Should car park/amenities stormwater go to a separate system	WP	Storm water goes through GPT and Oily water separator	Closed		
		2. SPC will take responsibility for operation of V11 and V12 - SPC to decide normal position	SPC	Addressed in design. Operating protocol to be developed prior to operations.	Prior to Commencement of Operations	Procedures are included in the BLB 1 & BLB2 Operating Manual	Closed
WW	HZ- USR- 040	Provide a removable cover over sumps	WP	Web Forge grating	Closed		
WW	HZ- USR- 041	1. Need ESD valves to be tight shutoff 2. Design tank high level trip and ESD's to SIL 1 3. All ESD should be Normally Closed 4. Confirm type of driver for valve e.g. pneumatic or electric	WP	ESD not required as emergency pump shut off provided. SIL level to be confirmed. No ESD. Electric	Closed		
		Node 4: spill containment tank and tank unloading					

WW	HZ- USR- 042	Put check valve on tank outlet	WP	Added	Closed		
WW	HZ- USR- 043	Establish the volume for the road tanker bund	WP	3m3 - note loading carried out via tanker onboard pump	Closed		
WW	HZ- USR- 044	Provide camlock fitting at end of pipe plus isolation valve	WP	Added	Closed		
WW/EL	HZ- USR- 045	Provide 3 phase outlet - 11kw at the road tanker loading bay area.	WP	specified in drawings	Closed		
Fire Water System Hazop							
Safety in Design Review							
ST	HZ- FWS- 001	1. Review explosion protection for pump house	WP / SPC	3 x 50% pumps at BLB2 is now the final design independent of BLB1. Each pump is 7000l/min. Pump house is in enclosed concrete building which will provide some blast resistance.	Closed		
		2. Review pump requirements	WP	Design case is two monitors and two pumps on line. Can supply water curtains as well. Design assumes either monitors or deluges would be used - not run simultaneously.			
FG	HZ- FWS- 002	1. Design for sufficient duration of foam 2. Consider type of foam to use (SPC to confirm)	WP / SPC	One hour foam supply is provided as per AS3846. Replenishment capacity allowed in bladder tank. 3% alcohol compatible AFFF foam to be used. Design is to install hydrants on the bridge, platform and egress gangways. Hydrant spacing is nominally 60m. NSW Fire Brigade consulted on hydrant location. Design allows foam addition through hydrant system - consistent with BLB1 and some user facilities. Portable foam and fire extinguisher addition requirements outlined in specifications. Emergency facilities layout drawing provided. Fire brigade booster point on Fishburn road presented to NSWFB.	Closed		

FG	HZ-FWS-003	Review radiant heat	WP	4.7kw/m2 radiant heat has been assessed and presented in drawing.	Closed		
FG	HZ-FWS-004	Discuss height of fire monitor with SPC	WP / SPC	Deluge systems covers working platform and includes a curtain spray. Additional capacity for future expansion has been allowed for. The foam proportioner has near infinite turndown capacity. Water curtains on emergency egress gangways and along the access bridge and at back of platform (all walkways within 4.7 heat radius). Drawing provided showing local and remote actuation buttons and their locations. Fire monitor tower height at 18 meters. Emergency equipment control system diagram provided.	Closed		
FG	HZ-FWS-005	Review fire booster connection	WP	Fire booster connection for mutual aid use provided on Fishburn Road. This was presented to NSWFB.	Closed		
FG	HZ-FWS-006	Consult with Fire Brigade regarding sea water suction facilities	WP	Meeting held with NSWFB, who requested 2-3 suction points at south end of Fishburn Rd. These have been included in design.	Closed		
FG	HZ-FWS-007	Review the sizing and the connection type	WP	Sizing and connection types have been reviewed.	Closed		
FG	HZ-FWS-008	1. Design intent - use seawater resistant piping around fire water pumps only. Rest of system is design to be kept full of fresh water and to use galvanized steel.		CuNi piping used around fire water pumps. Rest of piping is Galv mild steel, HDPE and Stainless.	Closed		
		2. Painting standard to be identified for piping.	WP	Piping specification provided which includes surface protection requirements.	Closed		
		3. Review connection design. Victaulic couplings are being proposed rather than expansion joints.	WP	Victaulic couplings to be used.	Closed		
		Emergency Response					
		Firewater Testing System PID FW-DWG-0013					

FG	HZ-FWS-009	Consider installation a low flow or water level trip on the test pump	WP	This was considered however as this is a considered a fire pump, it was considered better to have the possibility of the tank running dry than risk the pump not starting.	Closed		
FG	HZ-FWS-010	1. Double check valve to be added to line 200-041 2. Consider removing other check valves on test and jockey pumps	WP	Double check valves added on individual pump discharges. Other check valves have been removed.	Closed		
FG	HZ-FWS-011	1. Suggest limiting pump discharge pressure.	WP	Pressure has been controlled at hydrants with pressure reducing valves.	Closed		
		2. Suggest thermal expansion protection system installed.	WP	Thermal expansion protection not required due to cooling effect of fire water.	Closed		
		3. Install high pressure relief on system to protect piping if jockey or test pump dead head pressure exceeds piping design pressure.	WP	PSV has been used on test/jockey pump discharges.	Closed		
FG	HZ-FWS-012	1. Design specs for smoothing tank to be referenced in the P&ID. 2. Design pressure and temperature of tank to match piping specification	WP	Design specs added to P&IDs. PSV specifications on tank match piping specifications.	Closed		
FG	HZ-FWS-013	1. New PSV to protect piping to be spring loaded conventional safety valve 2. Requires discharge to be directed to safe location.	WP	Spring loaded conventional safety valve added. Discharges into test tank.	Closed		
FG	HZ-FWS-014	Show overflow on test tank on P&ID. To flow into admin stormwater.	WP	Test tank overflow added.	Closed		
FG	HZ-FWS-015	Install drain on test tank.	WP	Drain added to tank design	Closed		
FG	HZ-FWS-016	Refer iso's to determine whether air bleeds are required.	WP	WP not providing isometric drawings. Air bleeds to be installed according to installation contractor's recommendations.	Closed		
FG	HZ-FWS-017	Ensure appropriate protection of underground pipes.	WP	Underground pipes to be HDPE to avoid corrosion.	Closed		
FG	HZ-FWS-018	1. Check couplings meet all requirements and standards.	WP	Victaulic Couplings have a large number of approvals including FM UL Lloyds DNV etc.	Closed		
		2. Mark spec breaks on P&IDs.	WP	Spec breaks marked on P&IDs.	Closed		

		3. Review coupling material with regards to corrosion.	WP	Coupling material will not corrode with piping specified.	Closed		
FG	HZ-FWS-019	1. Indicate second pressure switch on jockey pump on PID. 2. Indicator to alert control room. (running light).	WP	Second pressure switch added to pump discharge. Indicator included on Fire Panel.	Closed		
		Pump sets PID FG-DWG-0011					
FG	HZ-FWS-020	SPC required to review hose handling pressure requirements.	SPC	Fire hose pressure controlled at 800kPa at hydrant using pressure reducing valves as per discussion with NSW Fire Brigade.	Closed		
FG	HZ-FWS-021	1. WP to check MLA deluge system to ensure the sprays cover MLA bases and chemical hose manifold for cooling. 2. Reconfigure diesel tank storage for 12 hours usage.	WP	WP has checked deluge system for adequate coverage. Diesel tank configured for 12 hour usage.	Closed		
FG	HZ-FWS-022	Note position indicator on P&ID and for all valves with position indicators	WP	Position indicators added to P&IDs.	Closed		
FG	HZ-FWS-023	Suggest limiting pump discharge pressure.	WP	Pump discharge pressures limited using pressure switches.	Closed		
FG	HZ-FWS-024	1. Note on P&IDs that everything to be used as a low flow device should be noted as such.	WP	Low flow devices labelled on P&ID.	Closed		
		2. Check valve to be moved upstream of isolation valve.	WP	Check valves added to the pump discharges, not the manifold. This is because if they were on the manifold, the pressure switches would not activate the jockey pump and system would not function.	Closed		
		3. Minor P&ID mark-up to change reducer to check valve on 0011.	WP	Reducers added.	Closed		
		4. Suggest that Low Flow Relief valves on lines 001, 002 and 003 be removed as unnecessary when pumps are in full operation.	WP	Low flow devices removed.	Closed		
FG	HZ-FWS-025	1. Review bunding requirement of Pump Platform with regards to diesel spillage. 2. Include diesel fill lines on P&ID.	WP	Bund added on pump platform. Diesel tank fill lines added to P&ID.	Closed		
FG	HZ-FWS-026	1. Review Iso's to determine hazards and actions 2. Review venting procedure of diesel engines in light of pump enclosure.	WP	Iso's not required. Inlet vents added to pump platform walls. Diesel engine exhausts to vent above roofline.	Closed		

FG	HZ-FWS-027	Review interfaces between SS and MS.	WP	MS-SS interfaces reviewed and not considered problematic.	Closed		
FG	HZ-FWS-028	1. Check couplings meet all requirements and standards. 2. Mark spec breaks on P&IDs. 3. Review coupling material with regards to corrosion.	WP	Victaulic Couplings have a large number of approvals including FM UL Lloyds DNV etc. Spec breaks shown on P&IDs Couplings to be made using galv mild steel.	Closed		
FG	HZ-FWS-029	Connections comments to be added to P&ID	WP	Included	Closed		
FG	HZ-FWS-030	Diesel motor exhaust to vent above shelter roof.	WP	Added to P&ID	Closed		
FG	HZ-FWS-031	Review bunding/drainage/ventilation requirements	WP	Bunding, drainage and ventilation requirements have been reviewed and integrated into design.	Closed		
FG	HZ-FWS-032	1. Solenoid controls need to be shown on P&ID. 2. Note "normal" failure system of Solenoid valves on P&ID. (for all P&ID's)	WP	Controls added to P&IDs. There is no normal failure mode for ROVs. They are able to fail open or closed.	Closed		
FG	HZ-FWS-033	1. Require review of SPC functionality once FPS functions have been documented e.g. cause & effects matrix	WP	Functionality included in Controls specification, has been submitted to SPC for review.	Closed		
		2. Consider need for CHAZOP after review	WP	CHAZOP not considered necessary, Controls Matrix in specification reviewed by SPC instead.	Closed		
		3. Review need for SIL review of critical functions such as firewater pump pressure cut-in systems	WP	It was decided during HAZOP that SIL was not required for Fire System.	Closed		
FG / ST / MA	HZ-FWS-034	1. Bund for fuelling station required where fuel tanker connects to diesel fill lines. 2. Pump shelters' roofs to be removable for crane access. 5. Strainers shown on fire pumps to be removed from P&IDs.	WP	Fuelling to occur over bunded slab Included in design Strainers are included in design	Closed		
		Fire main system PID FG-DWG-0011 and FG-DWG-0012					
FG	HZ-FWS-035	1. P&ID to show two curtains (both sides of escape walkways)	WP	Water curtains shown both sides of walkways on P&IDs.	Closed		
		2. Number of sprays on each curtain to be indicated on P&IDs	WP	Numbers of sprays added to P&IDs.	Closed		

		3. Operation of Ship to Shore connections/ monitors / hydrants to be shown better on P&ID's	WP	ROV controls shown on ship to shore connections on P&IDs.	Closed		
FG	HZ-FWS-036	Add a secondary line of supply to water curtains if valve on manifold fails to close	WP	Secondary supply line to ROV considered unnecessary by Fire Engineering Solutions. (failure mode of water ROVs is fail to open)	Closed		
FG	HZ-FWS-037	1. Confirm maximum discharge pressures and flow rates likely from ship pumps	WP	1. The ship to shore mutual aid requirements of ISGOTT are approximately 12000 l/min for the largest ships. Pressure is not specified but, the intent is to be able to power monitors which normally require an inlet pressure of 700 – 800 kPa	Closed		
		2. Resize PSV's providing pressure protection on ring main to handle potential flow rate of ships pumps if greater than BLB2 flow rate	WP	2. It is unlikely that any ships will be able to deliver significantly more than 12000, and smaller ships are only required to be able to deliver 6000 l/min. Therefore it is highly unlikely that the ship will be able to deliver the 1600 kPa necessary to lift our PSVs, even when operating into a closed system. In addition the PSV at the pump platform will be capable of discharging 5000-6000 l/min (at 1600 kPa)	Closed		
FG	HZ-FWS-038	1. Need to provide complete list of PSV's with relief pressure, sizing relief rate and contingency list	WP	PSV's added to valve list. Datasheets for each PSV created.	Closed		
		2. PSV set pressure, inlet & outlet sizes and orifice sizes to be put on P&ID's	WP	PSV set pressures shown on P&ID.	Closed		
		3. Discharge locations to be indicated on P&ID's	WP	Discharge locations added to P&IDs.	Closed		
FG	HZ-FWS-039	Review Iso's to determine hazards and actions	WP	Iso's not required. Details shown on layouts and section drawings.	Closed		
FG	HZ-FWS-040	Remove incorrect line crosses on P&IDs	WP	Clashes removed from P&ID.	Closed		
FG	HZ-FWS-041	Foam ROV's to fail closed and water ROV's to fail open	WP	This is confirmed by Fire Engineering Solutions.	Closed		

FG	HZ-FWS-042	Ensure adequate room for maintenance around ship to shore connection	WP	Ship to shore connection area engineered for adequate access.	Closed		
		Foam System PID FG-DWG-0011					
FG	HZ-FWS-043	Valve types to be differentiated on P&IDs	WP	Valve symbols revised to differentiate types on P&ID.	Closed		
FG	HZ-FWS-044	1. Ensure valves on outlet of tanks to be shown as fail open on P&IDs 2. Valves on top of tanks to be shown as fail closed.	WP	Failure positions of valves shown on P&ID.	Closed		
FG	HZ-FWS-045	WP to document failure mode of each safety valve	WP	1. Thermal protection PSVs are spring loaded globe valve type which fail to open. 2. Pilot operated diaphragm PSVs also fail to open.	Closed		
FG	HZ-FWS-046	Review bunding and drainage.	WP	Bunding and drainage reviewed around foam tanks. Bund added.	Closed		
FG	HZ-FWS-047	1. Dipsticks to be included in foam tank spec 2. Fill line isolation valves to be Padlocked	WP SPC	Dipstick added.	Closed		
FG	HZ-FWS-048	FC joint identification shown between foam tanks is confusing - rectify this.	WP	Foam concentrate line revised.	Closed		
FG	HZ-FWS-049	1. Supply filling procedure for filling foam tanks 2. WP to supply means of checking if foam bladder is ruptured.	WP	Filling procedure sent to SPC. Checking procedure included in filling procedure sent to SPC.	Closed		
Foam Fire Fighting System Hazop Report							
		Node 1: Foam System Suction to P-00X					
FG	HZ-FFS-001	1. Develop flushing procedure 2. Install low level indication on tank	1. By SPC 2. Complete	2. Level transmitter & local level gauge have been indicated on the latest P&ID DWG-0011-02.	2. Closed		
	HZ-FFS-002	1. Install a level indicator on the foam storage tank with low level alarm(s) 2. Install a Low Low trip on the foam storage tank that shuts foam pumps 3. Consider installation of permanent concentrate loading pump for the BLB2 foam storage tank	1. Complete (see HZ-FSS-001) 2. By SPC 3. Complete	1. see HZ-FSS-001 2. Transmitter to be provided, SPC to configure low low trip setting. 3. Shown on P&ID DWG-0011-02, to be supplied by SPC.	1. Closed 2. SPC 3. Closed	2. Low low trip setting configured	2. Closed

HZ-FFS-003	Verify the design fire case to establish foam requirement	Complete	Design fire case in accordance with Fire Safety Study FG-REP-0001. double the requirement of foam is provided in a 20,000 l tank	Closed		
HZ-FFS-004	1. Develop a foam system flushing procedure 2. Provide overflow on foam storage tank with a checkvalve at the inspection opening (lockable) 3. Check bund sizing - establish a bund volume	1. By SPC 2. Complete 3. Complete	2. Shown on P&ID DWG-0011-02 3. Bunding for 20,000l provided in design	1. SPC 2. Closed 3. Closed	1. Foam system flushing procedure developed with fire contractor DA Design	1 Closed
HZ-FFS-005	1. Confirm piping design pressure is adequate to take pump pressure 2. Install a PSV in the return line common section	1. Complete 2. Complete	1. New piping class A5 created in specification FG-SPC-0006. 2. Shown on P&ID DWG-0011-02 & listed in FG-SPC-0010	Closed		
HZ-FFS-006	1. Check PV vent sizing against API 2000 2. Testing program to be established for PV vent and any PSVs	1. By Fire Contractor 2. By SPC		1. By Fire Contractor 2. By SPC	1. Confirmed compliance 2. Included in fire system maintenance contract	1. Closed 2. Closed
HZ-FFS-007	Confirm correct PSV/PV vent sizing	1. By Fire Contractor		1. By Fire Contractor	1. Sizing confirmed	1. Closed
HZ-FFS-008	Install lockable drain line on bund and confirm discharge points	1. Complete	1. Shown on P&ID 301015-01655-FG-DWG-0011-02 and on drawing 301015-01655-ST-DWG-0066.	Closed		
HZ-FFS-009	1. Install low level indicator with low level alarm(s) 2. Install a Low Low trip that shuts foam pumps	Complete (see HZ-FSS-001)		Closed		
HZ-FFS-010	Verify the design fire case to establish foam requirement	Complete (see HZ-FSS-003)		Closed		
HZ-FFS-011	Confirm location is large enough for potential tank and loading pump	Preliminary layout complete. Verification following vendor data by Fire Contractor.	Layout indicated on FG-DWG-0008. Final layout to be confirmed following receipt of vendor pump skid arrangement, foam tank configuration and piping layout.	Final Layout	All resolved	Closed
HZ-FFS-	Install of a canopy or covering over the piping and pumps	Completed	Shelter shown over ROV & Pump Skids, refer FG-DWG-0008.	Closed		

012						
HZ-FFS-013	Develop maintenance procedures for this system	By SPC		With SPC	Procedures are included in the BLB2 Operating Manual	Closed
HZ-FFS-014	Review proportioner induction rate adjustment capability	Complete	Provision for variable induction listed in proportioner datasheet, refer FG-DAS-0017.	Closed		
HZ-FFS-015	Confirm that all corrosion mechanisms identified and SS is correct material	By SPC	WP have previously advised manufacturers recommendation for storage of foam concentrate is to us 316SS.	With SPC	Confirmed 316SS is correct material	Closed
HZ-FFS-016	1. Install Storz coupling on tank filling line 2. Review connection requirement for flushing points	1. Complete 2. Complete	Storz couplings shown on both tank fill and flushing points and shown on P&ID DWG-0011-02	Closed		
HZ-FFS-017	Install GPO outlet for foam loading pump and other ancillary electrical tools	Complete	Requirement to provide GPO listed in Pump Skid specification FG-SPC-010.	Closed		
HZ-FFS-018	Identify spec breaks and put any on P&ID	Complete	Shown on P&ID DWG-0011-02.	Closed		
HZ-FFS-019	1. Refer to low level alarm actions 2. Develop sample procedure which has valve closure check in it	1. By SPC 2. By SPC		With SPC	Foam sampling procedure in place including vlave check	Closed
HZ-FFS-020	SPC to consider water level indication in bund alarmed to control room	By SPC		With SPC	Not required - part of routine inspections	Closed
HZ-FFS-021	1. Consider installation of platform - for maintenance of PV vent etc 2. Review access requirements for foam tank bund	Complete	Access to foam tank provided by elevated access platform. Access to bunded area via stairs as shown on civil drawings.	Closed		
HZ-FFS-022	Review installation of bollards around proposed foam pad	1.By WP		With WP	Reviewed and deemed appropriate	Closed
	Node 2: Foam System from P-00X to Proportioner					

HZ-FFS-023	<ol style="list-style-type: none"> 1. Install a pressure transmitter on foam pump discharge with low alarm back to MCR 2. Low foam pressure start of standby foam pump 3. Provide bypass line around the balance valve 4. SPC to review requirement for full bypass line around firewater system ROVs 5. Manual injection point valve to be LC (locked close) 	<ol style="list-style-type: none"> 1. Complete 2. By SPC 3. Complete 4. Complete 5. Complete 	<ol style="list-style-type: none"> 1. Shown on P&ID DWG-0011-02. 2. SPC / Fire Contractor to provide control logic to facilitate change over. 3. Shown on P&ID DWG-0011-02. 4. Bypass provided around all ROV's , refer P&ID DWG-0011-02. 5. Shown on P&ID DWG-0011-02. 	<ol style="list-style-type: none"> 1. Closed 2. With SPC 3. Closed 4. Closed 5. Closed 	2. Low pressure start configured	2. Closed
HZ-FFS-024	Verify piping up to check valve is rated the same as firewater piping	Completed	New piping class A5 created in specification FG-SPC-0006.	Closed		
HZ-FFS-025	<ol style="list-style-type: none"> 1. Provide PSV on each pump discharge 2. Sustaining valve fail safe position to be fail open 	<ol style="list-style-type: none"> 1. Complete 2. By Fire Contractor 	2. Fail safe capability is a function of valve design to be reviewed following submission of vendor data.	<ol style="list-style-type: none"> 1. Closed 2. By Fire Contractor 	2. Configured to fail open	2. Closed
HZ-FFS-026	<ol style="list-style-type: none"> 1. Install conventional PSVs 2. Confirm sizing of PSVs 	<ol style="list-style-type: none"> 1. Complete 2. By Fire Contractor 	1. Shown on P&ID DWG-0011-02.	<ol style="list-style-type: none"> 1. Closed 2. By Fire Contractor 	2. 50mm dia PSVs	2. Closed