

Tank Bunding Risk Assessment

Report

Prepared for GrainCorp Ltd
ABN: 85 004 974 341

21 January 2026



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Revision History

Revision N°	Prepared By	Description	Date
A	John Shehadie	Issued for Client Review	23/12/2025
B	John Shehadie	Issued for Information	21/01/2026

Document Acceptance

Action	Name	Signed	Date
Prepared by	John Shehadie		21/01/2026
Reviewed by	Ming Heng		21/01/2026
Approved by	Ian Fenemore		21/01/2026

Executive Summary

A comprehensive Risk Assessment has been completed for the bulk tank farm at the GrainCorp Port Kembla site. The site has been previously assessed as compliant with AS1940 2004, however does not meet some of the requirements that have been updated in the current 2017 version.

The assessment aimed to evaluate the current risk levels associated with the bulk tank farm by accounting for current site operations, actual likelihood of spills and the risks posed to site personnel and the environment from possible tank failures. The assessment also considered any changes in risk profile created by the proposed upgrade to the existing tank farm.

All current bunding and spillage containment provisions for the tank farms were noted from design information and historical assessments. Based on this information, a Risk Register was developed to outline existing controls for three scenarios in which the bund capacities would be exceeded: failure of an individual tank, failure of multiple tanks and overfilling by external sources. A subsequent risk assessment meeting was conducted to review these controls and propose new mitigation measures to lower any risks to acceptable levels.

1 Introduction

GrainCorp Port Kembla has 10 x 1,250 m³ storage tanks within a bunded tank farm, which are currently used to store a range of mineral and edible oils. The bunded area also contains 70 m³ and 25 m³ tanks, used to store respectively waste oil (referred to as “slops”) and diesel. The proposed upgrade project includes the following changes relating to bulk tank storage;

- Addition of internal hot water heating coils and external insulation on 9 bulk tanks
 - Heating coil and insulation are already present on one tank
- Switching function of 70 m³ tank (from slops to diesel) and 25 m³ tank (from diesel to slops)
- The facility will switch from import only to export only, with ship deliveries to the terminal ceasing.

The tank farm was assessed as being compliant with the *AS 1940:2004 - Storage and Handling of Flammable and Combustible Liquids*, which was the relevant standard at the time of construction. This standard has since been updated in 2017, with additional requirements included for storage of bulk liquids. The tank farm does not meet the additional requirements included in the 2017 version of the standard, specifically the requirements for bund capacity.

This assessment is only considering the existing tank farm and any risks posed by non-conformance of the bund with the current version of AS1940. New works under the project are excluded from this assessment as they will be compliant with relevant standards and regulations.

2 Purpose

This report and risk assessment aims to evaluate risks associated with present bunding measures on site and provide recommendations to reduce risk levels further where practical. The assessment also considers if the proposed project works will impact risks associated with a loss of containment outside the bunded area.

This review will focus on the key design requirements involving bunding for the tank farms and the related tank capacities. By extension, any risks posed by tank leaks (and ruptures) and spillage prevention measures will also be examined. The following documents have been used for the assessment:

- EPA 2023 Operating License for Port Kembla Grain Terminal Site (Appendix A)
- Port Kembla Bulk Liquids Storage Terminal Fire Safety Study (Appendix B)

A range of other standards and industry documents have been referred to for guidance on risk protection measures. Other regulatory requirements relating to the Building Code, local and district council plans, building and resource consents or fire safety advice, require separate consideration as they have not been covered in this report.

The report will outline all potential hazards identified from the risk assessment and provide recommendations to mitigate these hazards. Any subsequent changes will require an appropriate level of review and approval to retain the integrity of this advice.

GrainCorp shall have ultimate control of any decision-making authority with regards to the implementation of any recommendations from this report.

3 Site Information and Current Bunding Provisions

3.1 Overall Capacities and Bunding Arrangements

The risk assessment is focused on the existing bulk tank farm. New works that form part of the project scope outside the bulk tank farm are assumed to be compliant with relevant standards and regulations and have not been assessed in this report.

A summary of tank farm area and storage volume is shown in the table below, these values are based on calculations and site scans / measurements undertaken by Graincorp.

Table 1 – Tank Farm Capacities

Parameter	Value
Tank Farm footprint	2,070 m ²
Net bund volume ^{1,2}	1,420 m ³
Total storage volume ³	12,595 m ³

Note 1: Net volume provided by GNC based on 3D scan of tank farm, excludes displaced volume from tank plinths, piping and equipment footings. Beca has not validated dimensions and site measurements that form the input data to these calculations.

Note 2: Net volume allows for footprint of one tank for the purpose of a tank failure scenario

Note 3: Tank farm storage includes 10 x 1,250 m³ bulk oil tanks, 70 m³ diesel tank and 25 m³ slops tank

A summary of the potential volumes from an internal failure or external source are listed below

Table 2 – Failure volumes

Inflow source	Volume
Bulk tank failure	1,250 m ³
Diesel tank failure	70 m ³
Slops tank failure	25 m ³
Fire water ¹	34 m ³
Rainfall ²	474 m ³
Road tanker delivery	40 m ³
Ship delivery	11,305 m ³
Hot water service failure ³	~25 m ³

Note 1: Fire water volumes are based on 20 minutes of firewater, taken from Fire Safety Study

Note 2: Rainfall based on 1% AEP event for a 12hr period (229mm rainfall)

Note 3: Hot water service consists of 20 m³ storage tank and reticulation pipework.

3.2 Failure Scenarios

A range of failure scenarios were identified, based on the potential inflow sources into the tank farm identified in Table 2. The scenarios, current safeguards and any further proposed controls are listed below.

The observations and information for all failure scenarios is compiled in a Risk Register (Appendix D).

Preliminary controls have also been proposed in the register. All proposed actions were reviewed in the risk assessment meeting.

The failure scenarios were assessed using the guidelines below relating to consequence and likelihood.

- Scenarios were assessed based on Graincorp's Risk Matrix and Consequence Table, included in Appendix D
- As the focus of this risk assessment was on bund capacity, any failure that is contained within the bund was deemed to be of negligible risk.
- A failure event that exceeds bund capacity will result in contamination of stormwater, this was deemed to be an Extreme consequence level.
- The Risk Matrix defines a rare event as a consequence that is *not expected to occur or occur less than once in 3 years*. For the purpose of this assessment the definition was taken as *not expected to occur or occur less than once in 30 years*, to better reflect the typical operating lifespan of this type of facility and equipment.
- Overall risk levels were assessed using an SFAIRP (So Far As Is Reasonably Practical) approach.

3.2.1 Failure of a single tank

a. Causes

The primary causes identified for the failure and loss of containment of a single tank were;

- Failure of tank shell due to structural fatigue, mechanical damage and / or environmental stress
- Failure of a component, seal or gasket deterioration
- The addition of heating coils slightly increases the failure risk, due to increased thermal stresses due to the temperature differential at the nozzle connections

b. Controls

The primary control identified is the bund capacity exceeding the volume of any single tank. Additional control measures to prevent failure or loss of containment of a full tank volume identified were;

- All tanks can be isolated by manual and automatic valves close to the tank body, limiting the risk of a failure from piping and components external to the tank
- Daily, monthly and quarterly visual inspections are carried out to check for leaks or signs of wear / damage
- Scheduled maintenance works to repair / replace components that are prone to fatigue
- Detailed internal inspections are carried out on the tanks every 10 years
- Dual radar level detection is installed on all tanks to prevent overfilling
- The site has a bund release procedure for managing discharge of wastewater and maintaining bund integrity
 - Bund release valve is padlocked closed during normal operation
 - Permission is required to empty the bund after an inspection is carried out
 - The area is manned at all times during bund discharge
 - Bund release valve is confirmed to be padlocked closed on completion of discharge
- The bund is designed as a water retaining structure and inspected visually as part of monthly and quarterly inspections

c. Recommendations

Further recommendations identified to reduce the risk of a tank failure identified were;

- Review stress analysis of heating coil nozzle connections at the tanks and identify if any further inspection procedures are required
- Include alarming if tank volume changes unexpectedly
- Review if any specific bund inspection procedures are required
- Implement additional inspections after extreme environmental events that may cause stress to the tanks, such as fire, earthquake or severe storms.

- Review the bund design and construction to identify any aspects that may be prone to degradation or failure over time.

d. Risk Assessment

The consequence of a single tank failure was assessed as **Negligible**, due to the bund capacity exceeding the largest tank volume.

The likelihood of a single tank failure was assessed as **Rare**. It should be noted this was assessed as the risk of a loss of containment of a full tank volume, not the failure exceeding bund capacity. This is due to a single tank failure contributing to scenarios involving multiple failure events of overfilling from external sources.

The overall risk level for a single tank failure was assessed as **Very Low**.

3.2.2 Failure of Multiple Tanks

a. Causes

The primary causes of a failure that would lead to loss of containment of multiple tank volumes identified were;

- Failure of common piping
- Catastrophic environmental / external event or fire / explosion

b. Controls

The primary control measure identified is that all tanks are able to be isolated by manual and automatic valves at the tank body, therefore there is no piping that acts as a single point of failure for multiple tanks.

Further controls that were identified were;

- Tanks are only ever loaded or unloaded one at a time. The only time when multiple tanks are open is during ship unloading when a tank is approaching being full and a second tank is opened to prevent dead-heading the ship unloading pump. This practice will cease after the project upgrade when the facility becomes export only.
- Tank automatic valves are fail closed
- There are two different access points into the bund to access manual valves for isolation
- The bund has capacity for a bulk oil tank and any of the other storage tank volumes
- The site has escalation procedures in place for oil emergencies to manage subsidiary risks in the event of a major oil spill.

c. Recommendations

Further recommendations identified to reduce the risk of loss of containment of multiple tanks were;

- Consider providing the ability to close automatic isolation valves from outside the bunded area, either from the main HMI or E-stop's located outside the tank farm.

d. Risk Assessment

The consequence of a multiple tank failure was assessed as **Extreme**, due to the potential to exceed the bund capacity and contaminate stormwater discharge.

The likelihood of a multiple tank failure occurring was assessed as **Rare**, due to the only feasible scenario identified being a catastrophic event from environmental conditions, external factors or fire / explosion.

The overall risk level for a multiple tank failure was assessed as **Medium**. The risk level is considered to be acceptable using SFAIRP principles as the likelihood has been reduced to the lowest level possible.

3.2.3 Single tank failure during rainfall event

a. Causes

Rainwater collected in the tank farm bund is discharged via a triple interceptor system to separate oil from stormwater. In the event of a significant loss of containment the oil volume will exceed the capacity of the triple interceptor system and collected oil / rainwater will not be able to be discharged.

The combined volume of a single bulk oil tank failure and a 12hr 1% AEP rainfall event exceeds the bund capacity. The bund capacity is sufficient to retain a single bulk oil tank failure and a 1hr 1% AEP rainfall event.

It is also noted that bund liquid levels are not monitored by instrumentation and discharge is based on visual inspection. The site is only manned on a 12hr pattern, with potentially longer periods over shutdown or holiday periods. This period when rainwater might not be discharged increases the risk level, both in terms of the volume of rainwater that could accumulate and the increased timeframe for a heavy rainfall event and tank failure to occur simultaneously.

b. Controls

Controls identified to protect against overfilling were;

- If operating during heavy rainfall an operator is assigned to monitor bund levels and release as required
- During rainfall events water level in the bund is maintained at a low level to maintain operator access

c. Recommendations

Further recommendations identified were;

- Consider adding level switches in the bund sump to indicate / alarm when liquid has accumulated and needs to be discharged
- Implement procedures to discharge rainwater during periods when the site is not operational / manned

d. Risk Assessment

The consequence of a tank failure during a heavy rainfall event was assessed as **Extreme**, due to the potential to exceed the bund capacity and contaminate stormwater discharge.

The likelihood of a tank failure during a heavy rainfall event was assessed as **Rare**, due to a single tank failure already being assessed as a rare event.

The overall risk level for a multiple tank failure was assessed as **Medium**. While the likelihood has the lowest possible rating, there are recommendations that can be implemented to provide further protection.

3.2.4 Failure from External Sources / Operations

A range of failure scenarios were assessed based on exceeding bund capacity from external sources or a failure during operations. As the volumes from all external sources is less than the bund volume, these were assessed as occurring simultaneously with a single tank failure.

The scenarios are summarised below, all were identified as having sufficient protections in place and assessed with a **Very Low** risk level.

a. Failure during ship unloading

- Not applicable, ship unloading will cease after project completion

b. Failure during ship loadout

- Only one tank open to loadout at a time, no additional risks identified from single tank failure scenario

c. Failure during road tanker unloading

- Failure in tanker bay

- Drive over bund, spillage directed to triple interceptor system
- Failure in transfer piping inside bund
 - Bund capacity exceeds bulk tank + tanker volume
- d. Failure during road tanker loading
 - As per road tanker unloading
- e. Failure during diesel tanker delivery
 - As per road tanker unloading
- f. Pool fire within bund
 - No changes due to project works, Fire Safety study has been undertaken and recommendations adopted.

4 Risk Assessment Meeting

A risk assessment meeting was conducted to review potential failure scenarios that were identified in the Risk Register (Appendix D). The focus was on scenarios that would lead to exceedance of the current bund capacity. The criteria for this meeting was as follows:

- Identify the potential causes and spill volumes that could practically occur in the tank farm.
- Confirm if the current bunding arrangement is adequate to control the spill volume.

The meeting confirmed the possible causes and outcomes for exceeding bund capacities for 3 scenarios:

- Failure of an Individual Tank
- Failure of Multiple (2 or more) Tanks
- Overfilling from External Sources

Based on these scenarios, the existing controls were identified and reviewed with each case assigned a risk score. For scenarios with a risk category above Very Low (VL), the current controls were assessed, and new mitigation measures were proposed.

Any new proposed controls are listed in the Risk Register. The risk owner for each case is assumed to be GrainCorp at this stage.

5 Conclusions

Potential failure scenarios were identified and assessed against the risk of a spill or leak exceeding the bund capacity, resulting in an uncontrolled loss of containment and contamination of the local environment.

The majority of scenarios were assessed as having a **Very Low / Negligible** risk level, which was considered to be acceptable. The primary mitigation for these scenarios is the bund having sufficient capacity to contain the spill volume.

The two scenarios identified which could exceed the bund capacity were;

- Failure of multiple bulk storage tanks simultaneously
- Failure of a single bulk storage tank during a heavy rainfall event which exceeds 1hr 1% AEP.

Both scenarios were assessed as have a **Medium** risk level, based on the extreme consequence of a loss of containment. This was considered to be acceptable following SFAIRP principles, on the basis that the likelihood is **Rare** which is the lowest possible rating.

For all scenarios any potential additional mitigations were identified, regardless of the assessed risk rating. It is recommended that all mitigations identified are implemented, on the basis they are likely to be low cost / complexity and the consequence of a failure is significant.



Appendix A – EPA 2023 Operating License for Port Kembla Site



Environment Protection Licence

Licence - 3693

Licence Details	
Number:	3693
Anniversary Date:	24-June

Licensee
GRAINCORP OPERATIONS LIMITED
PO BOX 1029
WOLLONGONG NSW 2500

Premises
PORT KEMBLA GRAIN TERMINAL
MORTON WAY
PORT KEMBLA NSW 2505

Scheduled Activity
Cement or lime works
Chemical storage
Shipping in bulk

Fee Based Activity	Scale
Cement or lime handling	> 100000-500000 T annual handling capacity
General chemicals storage	> 5000-100000 kL storage capacity
Petroleum products storage	> 5000-100000 kL storage capacity
Shipping in bulk	> 500000 T of annual capacity to load and unload

Contact Us
NSW EPA
6 Parramatta Square
10 Darcy Street
PARRAMATTA NSW 2150
Phone: 131 555
Email: info@epa.nsw.gov.au
Locked Bag 5022
PARRAMATTA NSW 2124



Environment Protection Licence

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Information about this licence

Dictionary

A definition of terms used in the licence can be found in the dictionary at the end of this licence.

Responsibilities of licensee

Separate to the requirements of this licence, general obligations of licensees are set out in the Protection of the Environment Operations Act 1997 ("the Act") and the Regulations made under the Act. These include obligations to:

- ensure persons associated with you comply with this licence, as set out in section 64 of the Act;
- control the pollution of waters and the pollution of air (see for example sections 120 - 132 of the Act);
- report incidents causing or threatening material environmental harm to the environment, as set out in Part 5.7 of the Act.

Variation of licence conditions

The licence holder can apply to vary the conditions of this licence. An application form for this purpose is available from the EPA.

The EPA may also vary the conditions of the licence at any time by written notice without an application being made.

Where a licence has been granted in relation to development which was assessed under the Environmental Planning and Assessment Act 1979 in accordance with the procedures applying to integrated development, the EPA may not impose conditions which are inconsistent with the development consent conditions until the licence is first reviewed under Part 3.6 of the Act.

Duration of licence

This licence will remain in force until the licence is surrendered by the licence holder or until it is suspended or revoked by the EPA or the Minister. A licence may only be surrendered with the written approval of the EPA.

Licence review

The Act requires that the EPA review your licence at least every 5 years after the issue of the licence, as set out in Part 3.6 and Schedule 5 of the Act. You will receive advance notice of the licence review.

Fees and annual return to be sent to the EPA

For each licence fee period you must pay:

- an administrative fee; and
- a load-based fee (if applicable).



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The EPA publication “A Guide to Licensing” contains information about how to calculate your licence fees. The licence requires that an Annual Return, comprising a Statement of Compliance and a summary of any monitoring required by the licence (including the recording of complaints), be submitted to the EPA. The Annual Return must be submitted within 60 days after the end of each reporting period. See condition R1 regarding the Annual Return reporting requirements.

Usually the licence fee period is the same as the reporting period.

Transfer of licence

The licence holder can apply to transfer the licence to another person. An application form for this purpose is available from the EPA.

Public register and access to monitoring data

Part 9.5 of the Act requires the EPA to keep a public register of details and decisions of the EPA in relation to, for example:

- licence applications;
- licence conditions and variations;
- statements of compliance;
- load based licensing information; and
- load reduction agreements.

Under s320 of the Act application can be made to the EPA for access to monitoring data which has been submitted to the EPA by licensees.

This licence is issued to:

GRAINCORP OPERATIONS LIMITED
PO BOX 1029
WOLLONGONG NSW 2500

subject to the conditions which follow.



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1 Administrative Conditions

A1 What the licence authorises and regulates

A1.1 This licence authorises the carrying out of the scheduled activities listed below at the premises specified in A2. The activities are listed according to their scheduled activity classification, fee-based activity classification and the scale of the operation.

Unless otherwise further restricted by a condition of this licence, the scale at which the activity is carried out must not exceed the maximum scale specified in this condition.

Scheduled Activity	Fee Based Activity	Scale
Cement or lime works	Cement or lime handling	> 100000 - 500000 T annual handling capacity
Chemical storage	General chemicals storage	> 5000 - 100000 kL storage capacity
Chemical storage	Petroleum products storage	> 5000 - 100000 kL storage capacity
Shipping in bulk	Shipping in bulk	> 500000 T of annual capacity to load and unload

A2 Premises or plant to which this licence applies

A2.1 The licence applies to the following premises:

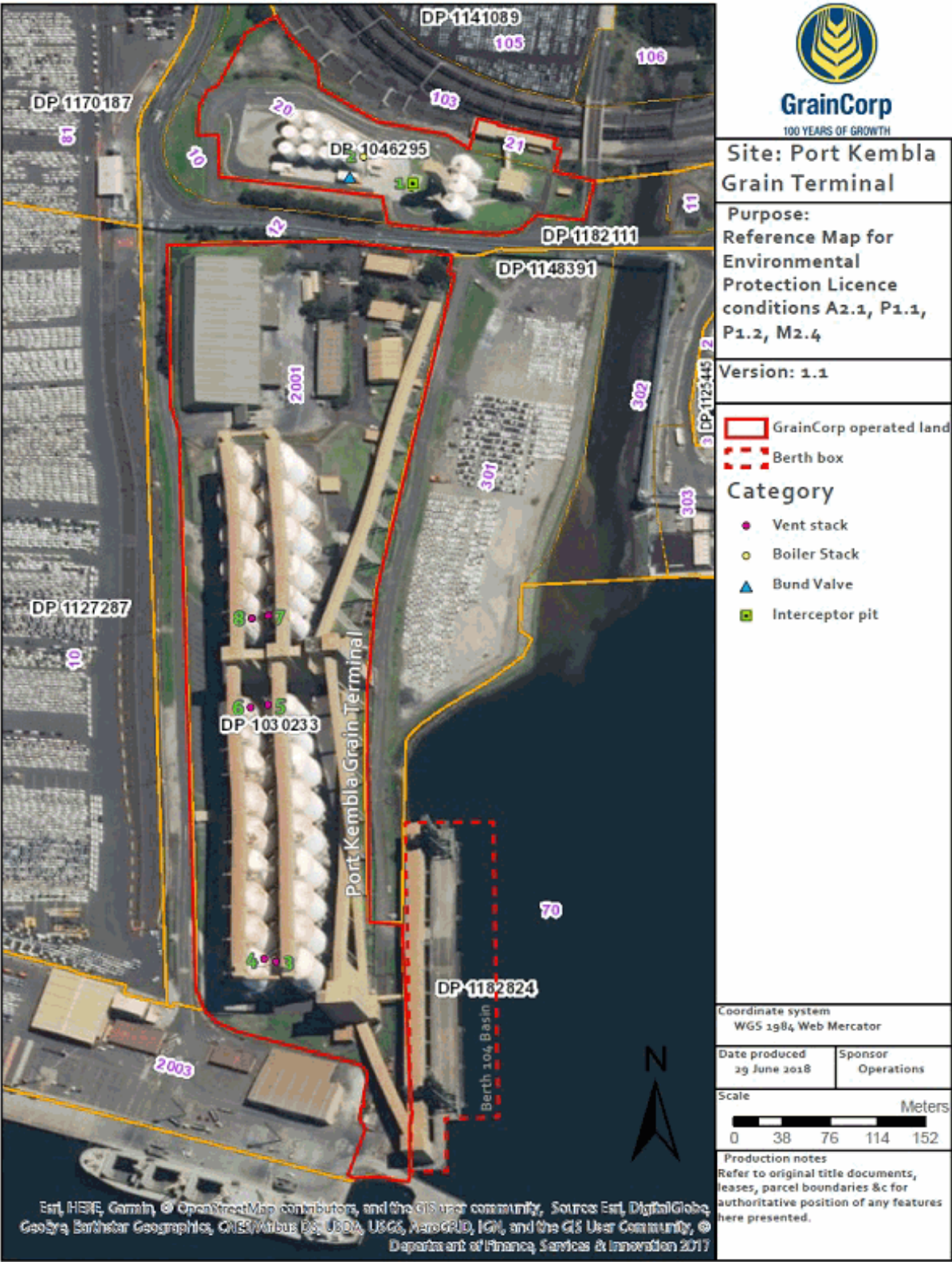
Premises Details
PORT KEMBLA GRAIN TERMINAL
MORTON WAY
PORT KEMBLA
NSW 2505
LOT 2001 DP 1030233, LOT 20 DP 1046295, LOT 21 DP 1046295
PART LOT 70 DP 1182824
THE PREMISES INCLUDES THE AREA MARKED AND SHOWN AS "THE BERTH BOX" ON THE PLAN WHEN THE LICENSEE OCCUPIES THIS AREA FOR THE PURPOSES OF UNDERTAKING ACTIVITIES UNDER THE LICENCE.

A2.2 The premises location is shown on the map below.

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A3 Information supplied to the EPA

A3.1 Works and activities must be carried out in accordance with the proposal contained in the licence application, except as expressly provided by a condition of this licence.

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In this condition the reference to "the licence application" includes a reference to:

- a) the applications for any licences (including former pollution control approvals) which this licence replaces under the Protection of the Environment Operations (Savings and Transitional) Regulation 1998; and
- b) the licence information form provided by the licensee to the EPA to assist the EPA in connection with the issuing of this licence.

A4 Other administrative conditions

- A4.1 All Cement Terminal plant and equipment must be designed and installed to meet Group 6 limits under the *Protection of the Environment Operations Clean Air Regulation*. Adherence with TM-1 is required for any air emissions monitoring points.
- A4.2 The Cement Terminal conveyors, bucket elevators, transfer points must be designed and installed so that they are fully enclosed on 4 sides.
- A4.3 The Cement Terminal conveyor motors and drive units must be designed and installed to be fully enclosed to minimise noise.

2 Discharges to Air and Water and Applications to Land

P1 Location of monitoring/discharge points and areas

- P1.1 The following points referred to in the table below are identified in this licence for the purposes of monitoring and/or the setting of limits for the emission of pollutants to the air from the point.

Air			
EPA identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
2	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Boiler Stack E 306435 N 6186091
3	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission vent adjacent to Silo A1 - Not in operation
4	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission vent adjacent to Silo B1 - Not in operation
5	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission vent adjacent to Silo A9
6	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission vent adjacent to Silo B9
7	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission vent adjacent to Silo A10
8	Discharge to air Air emissions monitoring	Discharge to air Air emissions monitoring	Emission vent adjacent to Silo B10

- P1.2 The following points referred to in the table are identified in this licence for the purposes of the monitoring and/or the setting of limits for discharges of pollutants to water from the point.



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Water and land

EPA Identification no.	Type of Monitoring Point	Type of Discharge Point	Location Description
1	Discharge to waters Water quality monitoring	Discharge to waters Water quality monitoring	Discharge from Interceptor System E 306469 N 6186070

3 Limit Conditions

L1 Pollution of waters

L1.1 Except as may be expressly provided in any other condition of this licence, the licensee must comply with section 120 of the Protection of the Environment Operations Act 1997.

L2 Load limits

Note: An assessable pollutant is a pollutant which affects the licence fee payable for the licence.

L2.1 The actual load of an assessable pollutant discharged from the premises during the reporting period must not exceed the load limit specified for the assessable pollutant in the table below.

L2.2 The actual load of an assessable pollutant must be calculated in accordance with the relevant load calculation protocol.

Assessable Pollutant	Load limit (kg)
Benzene (Air)	0.40
Volatile organic compounds (Air)	140.00

L3 Concentration limits

L3.1 For each monitoring/discharge point or utilisation area specified in the table/s below (by a point number), the concentration of a pollutant discharged at that point, or applied to that area, must not exceed the concentration limits specified for that pollutant in the table.

L3.2 Air Concentration Limits

POINT 2

Pollutant	Units of measure	100 percentile concentration limit	Reference conditions	Oxygen correction	Averaging period
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Carbon monoxide	milligrams per cubic metre	125	Dry, 273K, 101.3kPa	3 percent	As per test method
Nitrogen Oxides	milligrams per cubic metre	250	Dry, 273K, 101.3kPa	3 percent	As per test method
Solid Particles	milligrams per cubic metre	50	Dry, 273K, 101.3kPa	3 percent	As per test method
Sulfur dioxide	milligrams per cubic metre	1.5	Dry, 273K, 101.3kPa	3 percent	As per test method

Note: For the purpose of the table in Condition L3.2 Nitrogen oxides means nitrogen dioxide (NO₂) or nitric oxide (NO) or both, as NO₂ equivalent.

L3.3 Point 3,4,5,6,7,8

Pollutant	Units of measure	100 percentile mass limit	Averaging period
Methyl Bromide	grams per second	8	Instantaneous
Phosphine	grams per second	0.0424	Instantaneous

- L3.4 The maximum emission rate (averaged every one (1) minute) from any one vent stack during ventilation must not exceed:
- a) 8 grams per second of Methyl Bromide; or
 - b) 0.0424 grams per second of Phosphine.
- L3.5 The minimum velocity (averaged over any 15 minute period) from any one vent stack during ventilation must not be less than:
- a) 1.4 metres per second of Methyl Bromide; or
 - b) 0.5 metres per second of Phosphine.
- L3.6 The maximum number of grain silos ventilating at any one time must not exceed two.
- L3.7 Only one grain silo can be in the initial purge phase at any one time. Ventilation of the second grain silo may only commence if the emission rate from the first grain silo has reduced to:
- a) 1 gram per second of Methyl Bromide; or
 - b) 0.01 grams per second of Phosphine.
- L3.8 If the maximum emission rate of Methyl Bromide or Phosphine from any one vent stack during ventilation exceeds the limit specified in Condition L3.3 or Condition L3.4, the licensee must notify the EPA in writing within 7 days of the exceedance. The licensee must provide written details of the nature of the emission scenario and an assessment of probable off site ground level concentrations caused by the exceedance.
- L3.9 Water and/or Land Concentration Limits

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POINT 1

Pollutant	Units of Measure	50 Percentile concentration limit	90 Percentile concentration limit	3DGM concentration limit	100 percentile concentration limit
Oil and Grease	Visible	N/A	N/A	N/A	Not visible
pH	pH	N/A	N/A	N/A	6.5–8.5
Turbidity	nephelometric turbidity units	N/A	N/A	N/A	40

L3.10 Where a pH quality limit is specified in the table, the specified percentage of samples must be within the specified ranges.

L3.11 To avoid any doubt, this condition does not authorise the pollution of waters by any pollutant other than those specified in the table/s.

L4 Potentially offensive odour

L4.1 The licensee must not cause or permit the emission of offensive odour beyond the boundary of the premises.

Note: Section 129 of the Protection of the Environment Operations Act 1997, provides that the licensee must not cause or permit the emission of any offensive odour from the premises but provides a defence if the emission is identified in the relevant environment protection licence as a potentially offensive odour and the odour was emitted in accordance with the conditions of a licence directed at minimising odour.

L4.2 No condition of this licence identifies a potentially offensive odour for the purposes of section 129 of the Protection of the Environment Operations Act 1997.

L5 Other limit conditions

Liquid Terminal Operations

L5.1 The 1250m³ tanks must only be used to store Class C1 and C2 liquids.

C1 and C2 are combustible liquids as defined by Australian Standards (AS1940-2017) where:

- Class C1 is a combustible liquid that has a closed cup flashpoint of greater than 60 degrees Celcius and no greater than 93 degrees Celcius; and
- Class C2 is a combustible liquid that (i) has a flash point of greater than 93 degrees Celcius; or (ii) has been excluded from being a flammable liquid by any of the criteria for sustaining combustion.

L5.2 Diesel fuel must not be stored in the 1250m³ tanks.

L5.3 Diesel filling operations of the 60m³ tanks must only be undertaken between 0600 and 1800 hours.

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L5.4 Diesel used in the boiler must not exceed a sulfur content of 10ppm.

Note: If the licensee wishes to store liquids other than Class C1 and C2 they must obtain prior written approval of the EPA.

4 Operating Conditions

O1 Activities must be carried out in a competent manner

O1.1 Licensed activities must be carried out in a competent manner.

This includes:

- a) the processing, handling, movement and storage of materials and substances used to carry out the activity; and
- b) the treatment, storage, processing, reprocessing, transport and disposal of waste generated by the activity.

O2 Maintenance of plant and equipment

O2.1 All plant and equipment installed at the premises or used in connection with the licensed activity:

- a) must be maintained in a proper and efficient condition; and
- b) must be operated in a proper and efficient manner.

O3 Dust

O3.1 The premises must be maintained in a condition which minimises or prevents the emission of dust from the premises.

O3.2 All sealed surfaces intended to carry vehicular traffic must be kept clean at all times. Spillages of materials onto sealed roads or other areas as a result of delivery, export or handling must be immediately cleaned up.

O4 Processes and management

O4.1 The licensee must ensure that any liquid and/or non liquid waste generated and/or stored at the premises is assessed and classified in accordance with the DECC Waste Classification Guidelines as in force from time to time.

5 Monitoring and Recording Conditions

M1 Monitoring records

M1.1 The results of any monitoring required to be conducted by this licence or a load calculation protocol must be recorded and retained as set out in this condition.



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- M1.2 All records required to be kept by this licence must be:
- a) in a legible form, or in a form that can readily be reduced to a legible form;
 - b) kept for at least 4 years after the monitoring or event to which they relate took place; and
 - c) produced in a legible form to any authorised officer of the EPA who asks to see them.
- M1.3 The following records must be kept in respect of any samples required to be collected for the purposes of this licence:
- a) the date(s) on which the sample was taken;
 - b) the time(s) at which the sample was collected;
 - c) the point at which the sample was taken; and
 - d) the name of the person who collected the sample.

M2 Requirement to monitor concentration of pollutants discharged

- M2.1 For each monitoring/discharge point or utilisation area specified below (by a point number), the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1. The licensee must use the sampling method, units of measure, and sample at the frequency, specified opposite in the other columns:

M2.2 Air Monitoring Requirements

POINT 2

Pollutant	Units of measure	Frequency	Sampling Method
Carbon monoxide	milligrams per cubic metre	Yearly	TM-32
Moisture	percent	Yearly	TM-22
Nitrogen Oxides	milligrams per cubic metre	Yearly	TM-11
Oxygen (O2)	percent	Yearly	TM-25
Solid Particles	micrograms per cubic metre	Yearly	TM-15
Sulfur dioxide	milligrams per cubic metre	Yearly	TM-4
Temperature	degrees Celsius	Yearly	TM-2
Velocity	metres per second	Yearly	TM-2
Volumetric flowrate	cubic metres per second	Yearly	TM-2

Note: For the purpose of the table in Condition M2.2 Nitrogen oxides means Nitrogen dioxide (NO₂) or Nitric oxide (NO) or both, as NO₂ equivalent.

Note: For the purpose of the table in Condition M2.2 the frequency of monitoring the 250kW boiler stack is annually. Should the licensee commission the 1000kW boiler, the licensee must monitor (by sampling and obtaining results by analysis) the concentration of each pollutant specified in Column 1 upon commissioning of the 1000kW boiler stack and annually thereafter.

M2.3 Point 3,4,5,6,7,8

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Pollutant	Units of measure	Frequency	Sampling Method
Velocity	metres per second	Continuous	CEM-6
Methyl Bromide	grams per second	Continuous	Special Method 1
Phosphine	grams per second	Continuous	Special Method 2

M2.4 For the purpose of the table(s) above, 'Special Method 1' means a Draeger Polytron 8700 (optical interferometer), or equivalent, or a more up to date model of the same meter.

M2.5 For the purpose of the table(s) above, 'Special Method 2' means a Draeger Polytron 8100, or equivalent, or a more up to date model of the same meter.

M2.6 Water and/ or Land Monitoring Requirements

POINT 1

Pollutant	Units of measure	Frequency	Sampling Method
Oil and Grease	Visible	Daily during any discharge	Visual Inspection
pH	pH	Daily during any discharge	Probe
Total suspended solids	milligrams per litre	Daily during any discharge	Grab sample
Turbidity	nephelometric turbidity units	Daily during any discharge	Probe

Note: The licensee may apply in writing to the EPA to remove the requirement to monitor Total Suspended Solids once a Turbidity equivalent of 50mg/L Total Suspended Solids has been statistically established.

Note: For the purposes of the table above, 'daily during any discharge' means daily during any discharge from the bund valve. The bund valve being the valve indicated by Graincorp site drawing titled "Port Kembla Grain Terminal Reference Map for Environmental Protection Licence conditions A2.1, P1.1, P1.2 M2.4 Version 1.1" and dated 29 June 2018.

M3 Testing methods - concentration limits

Note: The *Protection of the Environment Operations (Clean Air) Regulation 2022* requires testing for certain purposes to be conducted in accordance with test methods contained in the publication "Approved Methods for the Sampling and Analysis of Air Pollutants in NSW".

M3.1 Monitoring for the concentration of a pollutant emitted to the air required to be conducted by this licence must be done in accordance with:

- any methodology which is required by or under the Act to be used for the testing of the concentration of the pollutant; or

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- b) if no such requirement is imposed by or under the Act, any methodology which a condition of this licence requires to be used for that testing; or
- c) if no such requirement is imposed by or under the Act or by a condition of this licence, any methodology approved in writing by the EPA for the purposes of that testing prior to the testing taking place.

M3.2 Subject to any express provision to the contrary in this licence, monitoring for the concentration of a pollutant discharged to waters or applied to a utilisation area must be done in accordance with the Approved Methods Publication unless another method has been approved by the EPA in writing before any tests are conducted.

M4 Testing methods - load limits

Note: Division 4 of the *Protection of the Environment Operations (General) Regulation 2022* requires that monitoring of actual loads of assessable pollutants listed in L2.2 must be carried out in accordance with the relevant load calculation protocol set out for the fee-based activity classification listed in the Administrative Conditions of this licence.

M5 Recording of pollution complaints

- M5.1 The licensee must keep a legible record of all complaints made to the licensee or any employee or agent of the licensee in relation to pollution arising from any activity to which this licence applies.
- M5.2 The record must include details of the following:
 - a) the date and time of the complaint;
 - b) the method by which the complaint was made;
 - c) any personal details of the complainant which were provided by the complainant or, if no such details were provided, a note to that effect;
 - d) the nature of the complaint;
 - e) the action taken by the licensee in relation to the complaint, including any follow-up contact with the complainant; and
 - f) if no action was taken by the licensee, the reasons why no action was taken.
- M5.3 The record of a complaint must be kept for at least 4 years after the complaint was made.
- M5.4 The record must be produced to any authorised officer of the EPA who asks to see them.

M6 Telephone complaints line

- M6.1 The licensee must operate during its operating hours a telephone complaints line for the purpose of receiving any complaints from members of the public in relation to activities conducted at the premises or by the vehicle or mobile plant, unless otherwise specified in the licence.
- M6.2 The licensee must notify the public of the complaints line telephone number and the fact that it is a complaints line so that the impacted community knows how to make a complaint.
- M6.3 The preceding two conditions do not apply until 3 months after: the date of the issue of this licence.

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6 Reporting Conditions

R1 Annual return documents

R1.1 The licensee must complete and supply to the EPA an Annual Return in the approved form comprising:

1. a Statement of Compliance,
2. a Monitoring and Complaints Summary,
3. a Statement of Compliance - Licence Conditions,
4. a Statement of Compliance - Load based Fee,
5. a Statement of Compliance - Requirement to Prepare Pollution Incident Response Management Plan,
6. a Statement of Compliance - Requirement to Publish Pollution Monitoring Data; and
7. a Statement of Compliance - Environmental Management Systems and Practices.

At the end of each reporting period, the EPA will provide to the licensee notification that the Annual Return is due.

R1.2 An Annual Return must be prepared in respect of each reporting period, except as provided below.

Note: The term "reporting period" is defined in the dictionary at the end of this licence. Do not complete the Annual Return until after the end of the reporting period.

R1.3 Where this licence is transferred from the licensee to a new licensee:

- a) the transferring licensee must prepare an Annual Return for the period commencing on the first day of the reporting period and ending on the date the application for the transfer of the licence to the new licensee is granted; and
- b) the new licensee must prepare an Annual Return for the period commencing on the date the application for the transfer of the licence is granted and ending on the last day of the reporting period.

Note: An application to transfer a licence must be made in the approved form for this purpose.

R1.4 Where this licence is surrendered by the licensee or revoked by the EPA or Minister, the licensee must prepare an Annual Return in respect of the period commencing on the first day of the reporting period and ending on:

- a) in relation to the surrender of a licence - the date when notice in writing of approval of the surrender is given; or
- b) in relation to the revocation of the licence - the date from which notice revoking the licence operates.

R1.5 The Annual Return for the reporting period must be supplied to the EPA via eConnect *EPA* or by registered post not later than 60 days after the end of each reporting period or in the case of a transferring licence not later than 60 days after the date the transfer was granted (the 'due date').

R1.6 The licensee must retain a copy of the Annual Return supplied to the EPA for a period of at least 4 years after the Annual Return was due to be supplied to the EPA.

R1.7 Within the Annual Return, the Statements of Compliance must be certified and the Monitoring and Complaints

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Summary must be signed by:

- a) the licence holder; or
- b) by a person approved in writing by the EPA to sign on behalf of the licence holder.

- R1.8 Where the licensee is unable to complete a part of the Annual Return by the due date because the licensee was unable to calculate the actual load of a pollutant due to circumstances beyond the licensee's control, the licensee must notify the EPA in writing as soon as practicable, and in any event not later than the due date. The notification must specify:
- a) the assessable pollutants for which the actual load could not be calculated; and
 - b) the relevant circumstances that were beyond the control of the licensee.
- R1.9 The licensee must provide the EPA details of the MeBr and Phosphine monitor(s) in use during the licence year, with the Annual Return documentation. The information must include: Type of monitor, brand of monitor, model year and any other relevant information.

R2 Notification of environmental harm

- R2.1 Notifications must be made by telephoning the Environment Line service on 131 555.

Note: The licensee or its employees must notify all relevant authorities of incidents causing or threatening material harm to the environment immediately after the person becomes aware of the incident in accordance with the requirements of Part 5.7 of the Act.

- R2.2 The licensee must provide written details of the notification to the EPA within 7 days of the date on which they became aware of the incident.

R3 Written report

- R3.1 Where an authorised officer of the EPA suspects on reasonable grounds that:
- a) where this licence applies to premises, an event has occurred at the premises; or
 - b) where this licence applies to vehicles or mobile plant, an event has occurred in connection with the carrying out of the activities authorised by this licence,
- and the event has caused, is causing or is likely to cause material harm to the environment (whether the harm occurs on or off premises to which the licence applies), the authorised officer may request a written report of the event.
- R3.2 The licensee must make all reasonable inquiries in relation to the event and supply the report to the EPA within such time as may be specified in the request.
- R3.3 The request may require a report which includes any or all of the following information:
- a) the cause, time and duration of the event;
 - b) the type, volume and concentration of every pollutant discharged as a result of the event;
 - c) the name, address and business hours telephone number of employees or agents of the licensee, or a specified class of them, who witnessed the event;
 - d) the name, address and business hours telephone number of every other person (of whom the licensee is aware) who witnessed the event, unless the licensee has been unable to obtain that information after making reasonable effort;
 - e) action taken by the licensee in relation to the event, including any follow-up contact with any complainants;



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- f) details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event; and
- g) any other relevant matters.

R3.4 The EPA may make a written request for further details in relation to any of the above matters if it is not satisfied with the report provided by the licensee. The licensee must provide such further details to the EPA within the time specified in the request.

R4 Other reporting conditions

R4.1 The following must be recorded and submitted to the EPA with the Annual Return:

For each grain silo fumigated:

- a) the date, time and duration of fumigation;
- b) the grain silo name and number that was fumigated;
- c) the quantity of grain fumigated;
- d) the quantity of fumigant used;
- e) the date, time and duration of ventilation from any one vent stack;
- f) the maximum emission rate of Methyl Bromide emitted from any one vent stack;
- g) the minimum velocity of Methyl Bromide emitted from any one vent stack;
- h) the maximum emission rate of Phosphine emitted from any one vent; and
- i) the minimum velocity of Phosphine emitted from any one vent stack.

NOTE: recorded data must be kept by the licensee in compliance with the requirements specified in condition M1.2

7 General Conditions

G1 Copy of licence kept at the premises or plant

- G1.1 A copy of this licence must be kept at the premises to which the licence applies.
- G1.2 The licence must be produced to any authorised officer of the EPA who asks to see it.
- G1.3 The licence must be available for inspection by any employee or agent of the licensee working at the premises.

G2 Other general conditions

G2.1 Completed Programs

Program	Description	Completed Date
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Review of Methyl Bromide and Phosphine Emissions	The intent of this PRP is to determine whether the licensee's standard operating criteria for methyl bromide and phosphine purging meet contemporary impact assessment criteria set out in the EPA's Approved Methods for the Modelling and Assessment of Air Pollutants in NSW.	13-March-2015
Revised Air Quality Impact Assessment	The intent of this PRP is to determine the pollution caused or likely to be caused by the operation of the boiler, the likely impact of that pollution on the environment and the practical measures that could be taken to prevent, control, abate or mitigate that pollution.	27-February-2015
Fumigation Audit	The Licensee reported 145 separate fumigation non-compliances during 2016/2017 to the EPA. EPA directed the Licensee to undertake an independent audit into the adequacy & suitability of fumigation procedures, systems, operations, plant & equipment at the premises; identify any deficiencies; identify reasonable & feasible controls; and include appropriate implementation timeframes. The Audit identified 8 Corrective Actions and 10 Areas Of Improvement. These were added to the licence as Special Conditions along with the requirement for another independent audit to confirm implementation.	13-April-2018

G2.2 Completed Special Conditions

Special Condition	Description	Completed Date
Boiler Post Commissioning Air Emissions Report	The intent of this Special Condition is to assess compliance with the air concentration limits for the boiler installed at the premises.	27 February 2015
Fumigation Emissions Report	The intent of this Special Condition is to submit a report detailing the results of fumigation emission monitoring for the period of 1 to 31 March 2016	12 April 2016
Audit Findings Implementation	Implement the 8 "Corrective Actions" & 10 "Areas of Improvement" identified in the "Port Kembla Grain Terminal Fumigation Audit, June 2018" by May 2020. Engage an Independent Auditor to undertake Performance Specification Check to determine compliance with "corrective actions" and "improvement opportunities" by 2 October 2020.	2 October 2020

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8 Pollution Studies and Reduction Programs

U1 Pollution Reduction Study 4 - Investigations to prevent or minimise the release of methyl bromide to the atmosphere

Note: Background

Methyl bromide is used as a fumigant at the premises to treat grains prior to export to market.

Methyl bromide is a neurotoxic gas with acute and chronic health effects. Methyl bromide also damages the ozone layer once released into the atmosphere and is a controlled substance under the 'Montreal Protocol on Substances that Deplete the Ozone Layer'.

The licensee has a statutory obligation under the Act to carry out any activity by such practicable means to prevent or minimise the release of the air pollutant methyl bromide to the atmosphere.

The EPA understands that methods for the minimisation, capture and/or destruction of methyl bromide have progressed in recent years. The EPA considers that there are likely to be practicable means available to the licensee to prevent or minimise the release of methyl bromide to the atmosphere.

U1.1 Deliverable

The licensee must undertake an investigation of practicable means to prevent or minimise the release of methyl bromide to the atmosphere at the premises. This must include investigation of practicable means for the capture or destruction of methyl bromide prior to release from the premises' vent stack(s).

A report detailing the investigation and the identification of practicable means to prevent or minimise the release of methyl bromide, including timeframes for the implementation of any identified measures, must be provided to the EPA at info@epa.nsw.gov.au.

COMPLETE

The report required above has been provided to the EPA. The report provided various options which are being further investigated by the Licensee. The Licensee will now undertake a trial of methyl bromide destruction technology at its Carrington premises (EPL 1296). The outcome of this trial will determine the preferred option for the Licensee moving forward. Based on the results of the trial, the EPA may include Licence condition(s) requiring the implementation of enhanced methyl bromide mitigation measures where identified.

9 Special Conditions

E1 Prohibition on fumigant ventilation from grain silos during cruise ship visits at AAT

E1.1 Effective from the date of this notice and until further notice, the ventilation of methyl bromide or phosphine is strictly prohibited while cruise ships are berthed at Australian Amalgamated Terminals.

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NOTE: The EPA will review this requirement as 'Special Condition - Audit Findings Implementation' requirements are progressed and completed.

NOTE: Cruise ship means a vessel classified as a passenger vessel and identified as vessel type 'PASS' in the schedule of vessel movements for Port Kembla published by the Port Authority of NSW.

E2 Special Condition NSW Drought Grain Imports

- E2.1 Trucks and Trains entering and/or leaving the premises that are carrying loads of dust generating materials, must have their loads covered at all times, except during loading and unloading.
- E2.2 Dust emissions must be minimised during the loading, unloading, transfer, or handling of grain products at the premises.
- E2.3 The licensee must have in place and implement procedures to ensure that road vehicles, containers and trains exiting the premises are free from external grain deposits, and are in a condition to ensure that grains are not carried or tracked beyond the premises boundary.
- E2.4 NOTE: GrainCorp advised EPA that ship unloading will occur at berth 104, being the GrainCorp berth. Ship unloading will also occur at either berth 103, or 105/106/107 which are on the licence held by Australian Amalgamated Terminals (AAT) EPL 3578.

E3 Cement Terminal - Air Quality Verification

- E3.1 1. By six months following the commissioning of the Cement Terminal, the licensee must submit an Air Quality Verification Report (Report) confirming the findings of the Cement Terminal Air Quality Impact Assessment.
2. The assessment must:
- a) be prepared in consultation with the EPA
 - b) be prepared by a suitably qualified consultant, and
 - c) undertake baghouse / bag filter emissions monitoring in accordance with the *EPA Approved Methods for the Sampling and Analysis of Air Pollutants in NSW* for total solid particulates, PM 10 and PM2.5 from all baghouses installed through the project.
3. The methodology for the Air Quality Verification must be approved in advance by the EPA. The methodology must consider the relevant sections of the *POEO (Clean Air) Regulation 2010*.
4. If the Air Quality Verification Program identifies any emissions in excess of those reported in the AQIA, the Licensee must detail what additional measures could be implemented to achieve the AQIA levels, clearly indicate who could implement these measures, when these measures could be implemented, and how the effectiveness of these measures could be measured and reported to the EPA.



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Dictionary

General Dictionary

3DGM [in relation to a concentration limit]	Means the three day geometric mean, which is calculated by multiplying the results of the analysis of three samples collected on consecutive days and then taking the cubed root of that amount. Where one or more of the samples is zero or below the detection limit for the analysis, then 1 or the detection limit respectively should be used in place of those samples
Act	Means the Protection of the Environment Operations Act 1997
activity	Means a scheduled or non-scheduled activity within the meaning of the Protection of the Environment Operations Act 1997
actual load	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
AM	Together with a number, means an ambient air monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
AMG	Australian Map Grid
anniversary date	The anniversary date is the anniversary each year of the date of issue of the licence. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
annual return	Is defined in R1.1
Approved Methods Publication	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
assessable pollutants	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
BOD	Means biochemical oxygen demand
CEM	Together with a number, means a continuous emission monitoring method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .
COD	Means chemical oxygen demand
composite sample	Unless otherwise specifically approved in writing by the EPA, a sample consisting of 24 individual samples collected at hourly intervals and each having an equivalent volume.
cond.	Means conductivity
environment	Has the same meaning as in the Protection of the Environment Operations Act 1997
environment protection legislation	Has the same meaning as in the Protection of the Environment Administration Act 1991
EPA	Means Environment Protection Authority of New South Wales.
fee-based activity classification	Means the numbered short descriptions in Schedule 1 of the Protection of the Environment Operations (General) Regulation 2009.
general solid waste (non-putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997

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flow weighted composite sample	Means a sample whose composites are sized in proportion to the flow at each composites time of collection.
general solid waste (putrescible)	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
grab sample	Means a single sample taken at a point at a single time
hazardous waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
licensee	Means the licence holder described at the front of this licence
load calculation protocol	Has the same meaning as in the Protection of the Environment Operations (General) Regulation 2009
local authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
material harm	Has the same meaning as in section 147 Protection of the Environment Operations Act 1997
MBAS	Means methylene blue active substances
Minister	Means the Minister administering the Protection of the Environment Operations Act 1997
mobile plant	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
motor vehicle	Has the same meaning as in the Protection of the Environment Operations Act 1997
O&G	Means oil and grease
percentile [in relation to a concentration limit of a sample]	Means that percentage [eg.50%] of the number of samples taken that must meet the concentration limit specified in the licence for that pollutant over a specified period of time. In this licence, the specified period of time is the Reporting Period unless otherwise stated in this licence.
plant	Includes all plant within the meaning of the Protection of the Environment Operations Act 1997 as well as motor vehicles.
pollution of waters [or water pollution]	Has the same meaning as in the Protection of the Environment Operations Act 1997
premises	Means the premises described in condition A2.1
public authority	Has the same meaning as in the Protection of the Environment Operations Act 1997
regional office	Means the relevant EPA office referred to in the Contacting the EPA document accompanying this licence
reporting period	For the purposes of this licence, the reporting period means the period of 12 months after the issue of the licence, and each subsequent period of 12 months. In the case of a licence continued in force by the Protection of the Environment Operations Act 1997, the date of issue of the licence is the first anniversary of the date of issue or last renewal of the licence following the commencement of the Act.
restricted solid waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
scheduled activity	Means an activity listed in Schedule 1 of the Protection of the Environment Operations Act 1997
special waste	Has the same meaning as in Part 3 of Schedule 1 of the Protection of the Environment Operations Act 1997
TM	Together with a number, means a test method of that number prescribed by the <i>Approved Methods for the Sampling and Analysis of Air Pollutants in New South Wales</i> .



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TSP	Means total suspended particles
TSS	Means total suspended solids
Type 1 substance	Means the elements antimony, arsenic, cadmium, lead or mercury or any compound containing one or more of those elements
Type 2 substance	Means the elements beryllium, chromium, cobalt, manganese, nickel, selenium, tin or vanadium or any compound containing one or more of those elements
utilisation area	Means any area shown as a utilisation area on a map submitted with the application for this licence
waste	Has the same meaning as in the Protection of the Environment Operations Act 1997
waste type	Means liquid, restricted solid waste, general solid waste (putrescible), general solid waste (non-putrescible), special waste or hazardous waste
Wellhead	Has the same meaning as in Schedule 1 to the Protection of the Environment Operations (General) Regulation 2021.

Ms Debbie Maddison

Environment Protection Authority

(By Delegation)

Date of this edition: 01-December-2000



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End Notes	
1	Licence varied by notice 1027077, issued on 03-Jul-2003, which came into effect on 04-Jul-2003.
2	Licence varied by change to DEC Region allocation, issued on 16-Mar-2006, which came into effect on 16-Mar-2006.
3	Condition A1.3 Not applicable varied by notice issued on <issue date> which came into effect on <effective date>
4	Licence varied by notice 1505625 issued on 30-Apr-2012
5	Licence varied by notice 1516427 issued on 30-Sep-2013
6	Licence varied by notice 1522588 issued on 07-Oct-2014
7	Licence varied by notice 1525644 issued on 24-Oct-2014
8	Licence varied by notice 1527747 issued on 22-Jan-2015
9	Licence varied by notice 1528561 issued on 23-Feb-2015
10	Licence varied by notice 1532676 issued on 23-Feb-2016
11	Licence varied by notice 1539176 issued on 29-Mar-2016
12	Licence varied by notice 1540754 issued on 23-May-2016
13	Licence varied by notice 1561876 issued on 21-Feb-2018
14	Licence varied by notice 1562541 issued on 12-Mar-2018
15	Licence varied by notice 1566012 issued on 30-Aug-2018
16	Licence varied by notice 1569218 issued on 19-Sep-2018
17	Licence varied by notice 1570240 issued on 13-Nov-2018
18	Licence varied by notice 1573270 issued on 15-Feb-2019
19	Licence varied by notice 1579752 issued on 27-May-2019
20	Licence varied by notice 1580623 issued on 25-Jun-2019
21	Licence varied by notice 1584217 issued on 27-Sep-2019
22	Licence varied by notice 1595694 issued on 26-Jun-2020
23	Licence varied by notice 1597540 issued on 17-Jul-2020
24	Licence varied by notice 1601670 issued on 20-May-2021
25	Licence varied by notice 1610559 issued on 12-Aug-2021
26	Licence varied by notice 1615091 issued on 13-Dec-2021



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27	Licence varied by notice	1618165 issued on 13-Apr-2022
28	Licence varied by notice	1623852 issued on 01-Feb-2023

B

Appendix B – Fire Safety Study

Port Kembla Proposed Bulk Liquids Storage Terminal

Fire Safety Study

For Pacific Terminals Pty Ltd

7 November 2013



Doc. No.: J-000048-03

Revision: 1



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Prepared by: Joel Leonard

Date: 31 October 2013

Reviewed by: Philip Skinner

Date: 31 October 2013

Approved by: Joel Leonard

Date: 31 October 2013

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Issue	Date	Changes
A	28/10/2013	Draft for client comment
0	31/10/2013	Incorporated client comments
1	7/11/2013	Incorporated updated layout, deleted recommendation 7

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Summary of Main Findings and Recommendations

The proposed fire protection system is adequate to maintain two hydrants each supplying 300 L/min of firewater unassisted and two additional foam branchpipes each supplying 240 L/min of foam provided the Port Kembla fire system can supply at least 1080 L/min at 711 kPa. Furthermore, a total of 1680 L/min assisted by fire brigade pumper is achievable if 735 kPa can be achieved at the supply to the Bulk Liquid Terminal hydrant system. The placement of the ten hydrants proposed can cover all parts of the storage compounds via a 10m stream issuing from two lengths of 30m hose, consistent with AS 2419.1 requirements.

Recommendation 1: As per AS 1940 Clause 11.13.7, provide sixteen 9 kg powder type extinguishers having a rating of at least 2A 60B€ located strategically around the storage. Some extinguishers may be located at product pumps and fill points to cover requirements for these areas as well as serving to protect combustible liquid storage.

Recommendation 2: The distance from the tank shells to the inside of the bund walls is much less than half the tank height, and therefore does not satisfy AS 1940 clause 5.8.3 without further consideration. Provide shielding from the top of the tank down to approximately 6 m height to deflect any spills into the compound.

Recommendation 3: Install a 600mm high intermediate bund within the compound for stage 1 storage in such a manner so that not more than 10,000 m³ are stored in the either of the two section created by the intermediate bund. A suggestion is to have an intermediate bund separating tanks 1 to 4 from tanks 5 to 10. This is required as the aggregate capacity of the stage one compound is greater than 10,000 m³.

Recommendation 4: Ensure suitable treatment is available for the condensate that is returned to the boiler from the heating coil in Tank 01 so that boiler water is not contaminated with hydrocarbons, as required by AS 1940 clause 6.5.2.

Recommendation 5: Provide one 9 kg powder-type extinguisher at each pump installation. These extinguishers may also be counted amongst extinguishers required to protect other areas, such as pumps and tanks that are nearby (refer recommendations 1 and 8).

Recommendation 6: Provide one 9 kg powder-type extinguisher at each hose connection / fill point. These extinguishers may also be counted amongst extinguishers required to protect other areas, such as pumps and tanks that are nearby (refer recommendations 1 and 5).

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Glossary and Abbreviations

Abbreviation	Description
AS/NZS	Australian Standard/ New Zealand Standard
DOP	Department of Planning, NSW
kW/m ²	kilo-Watts per square metre
L / min	Litres per minute
m	metres
m ³	Cubic metres
mm	Millimetres
HIPAP	Hazardous Industry Planning Advisory Paper
PTA	Pacific Terminals Australia Pty Ltd

1 SCOPE OF REPORT

The purpose of this report is to analyse the bulk liquids storage terminal at Port Kembla proposed by Pacific Terminals Australia (PTA) with regard to the fire protection required. The analysis is consistent with the NSW Department of Planning Hazardous Industry Planning Advisory Paper No 2 [1], AS1940-2004 The Storage and Handling of Flammable and Combustible Liquids [2], and AS 2419.1 Fire hydrant installations Part 1: System design, installation and commissioning [3], were referenced.

A fire safety study and compliance with AS 1940 are two criteria that must be satisfied for bulk liquid storage tank developments to be approved under the complying development provisions of the State Environmental Planning Policy SEPP (Ports) [4].

2 DESCRIPTION OF FACILITY

2.1 Facility Location and Surrounding Land Uses

The facility is located on Tom Thumb road at Port Kembla, within land owned by NSW Ports. It will be to the North and West of existing GrainCorp facilities.

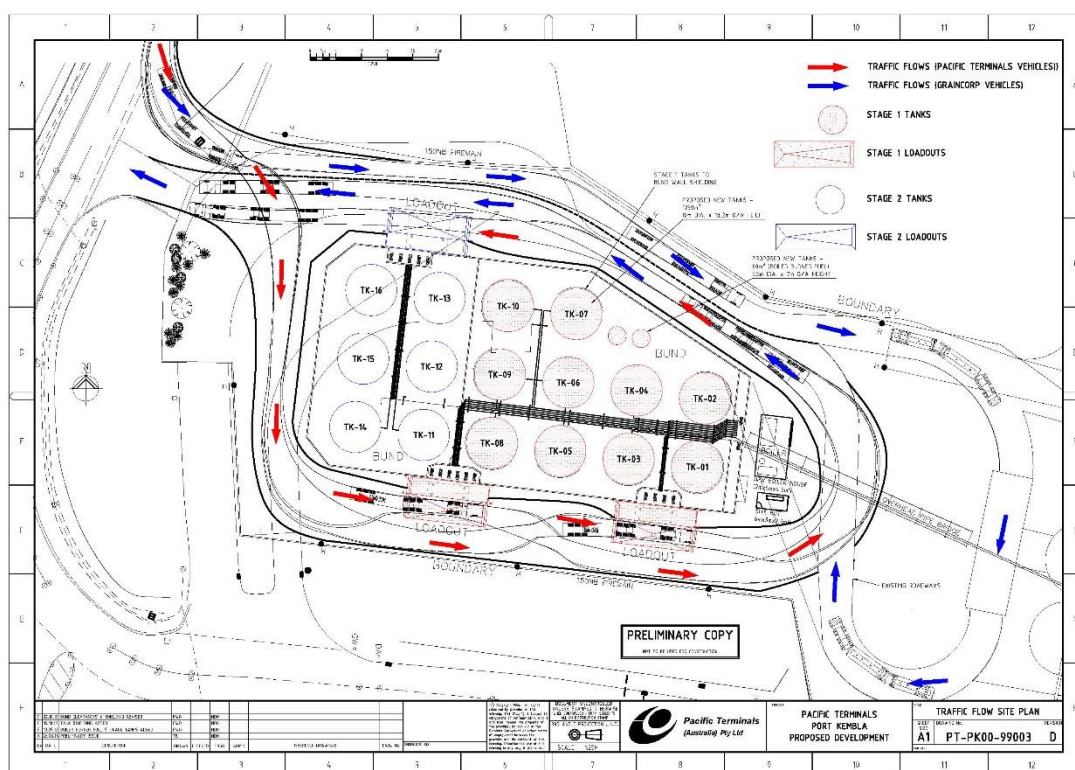


Figure 1: Proposed Bulk Liquid Storage Layout

The Terminal will store combustible hydrocarbon liquids (Class C1 and C2). No flammables will be stored. The development will be completed in two stages.

Stage 1 Development:

- Construction of 10 x 1,250m³ Carbon Steel Storage Tanks 10mt Diameter x 17.62 meters high and associated Pipe Work. The tanks are designed to API 650 standard.
- Install a 200NB Stainless Steel Shipping Line from the facility to Berth 104. The proposed shipping line will run aboveground from Berth 104 to Tom Thumb Road; from there it will run under Tom Thumb Road to the proposed new facility where it will again rise up above ground.
- Install a 150NB Carbon Steel Fire Ring Main.
- Install site specific Fire Equipment including hydrants and associated equipment.
- Construct bunding for stage 1 tanks.
- Construct 2 x Road Tanker Load Out Gantries
- Install Gantry Load Out Pumps and associated pipe work
- Construction of a Facility Shed to facilitate Steam/Hot water Boiler, Air Compressor and associated equipment.
- Install a small prefab operator office
- Construct road works for stage 1 with entry from Tom Thumb Road on the Northern side.

Stage 2 Development:

- Construction of 6 x 1,250m³ Carbon Steel Storage Tanks 10 meter Diameter x 17.62 meters High and associated Pipe Work.
- Install a second 200NB Stainless Steel Shipping Line from the facility to Berth 104. The proposed Shipping Line will run aboveground from Berth 104 to Tom Thumb Road; from there it will run under Tom Thumb Road to the proposed new facility where it will again rise up above ground.
- Install site specific Fire Equipment including, extra Fire Hydrants as required along with associated equipment.
- Construct bunding for stage 2 tanks.
- Construct 1 x Road Tanker Load Out Gantries
- Install Gantry Load Out Pumps and associated pipe work
- Construct required road works for stage 2.

2.2 Fire Protection System

A conceptual plan of the fire protection system is also shown in Figure 1. The fire protection system consists of:

- Six fire hydrants surrounding the two compounds that make up the proposed bulk liquids storage terminal. The hydrants are supplied from a 150 mm NB main.
- Fire water is supplied from the existing Port Kembla fire water system (out of scope)

3 HAZARDS IDENTIFIED

3.1 Materials Present

PTA propose to store a number of different materials at the terminal. While only details of Combustible Liquids C2 are available at present, this study has assumed Combustible Liquids C1 will also be stored. Materials associated with the bulk liquids storage for which details are presently available are presented in Table 1

Table 1: Inventory of Dangerous Goods in Proposed Bulk Liquids Storage Terminal

Name	Class	UN No.	HAZCHEM Code	Inventory
Distillates, hydrotreated heavy paraffinic	Combustible liquid (C2)	N/A	N/A	Up to 12,500 kL in stage 1. Up to 20,000 kL including stage 1 and 2
Residual oils (petroleum) solvent-refined	Combustible liquid (C2)	N/A	N/A	Up to 12,500 kL in stage 1. Up to 20,000 kL including stage 1 and 2

The total storage capacity of the terminal is 12,500 kL in stage 1, and 20,000 in stage 2.

Under fire conditions the products may emit toxic and/or irritating fumes and gases including carbon monoxide, carbon dioxide, aldehydes, ketones combustion products of nitrogen and sulfur.

3.2 Hazard Identification

The first step of the risk assessment was hazard identification. The activities involved in hazard identification included:

- A review of materials stored, handled and processed on the facility. None of the materials are classified as class 3 flammable goods.
- A desktop review of process and storage information (e.g. P&IDs, etc.) to identify the distribution and location of tanks in the facility.
- A hazard and operability study (HAZOP) [5] for the proposed development.
- A review of historic loss of containment events in bulk liquids storage terminals.

The hazards identified in the facility have been screened for potential impact on land use safety.

The consequences from accident events could result in the following final events:

- Fires (pool fires in the bund) from leaks into the bund;
- Tank roof fires. This is unlikely for combustible liquids storage in fixed roof tanks as described by AS 1940-2004 [2].
- Pump seal leak and fire
- Road tanker loading hose failure and pool fire at the loading gantry

There are no explosion events or toxic gas events in the facility.

3.2.1 Corrosion

The distillate products to be stored are clean liquids and non-corrosive. Therefore, the chance of internal corrosion is negligible. The tanks are externally painted with a corrosion resistant surface coating, and inspected regularly.

All pipework is either stainless steel or painted with a corrosion resistant paint, and inspected externally on a regular basis.

The chance of a major failure of tanks and pipework due to corrosion is considered negligible.

3.2.2 Mechanical Failure

The site is protected by a security gate, and normally there is no vehicular access to the storage tanks.

The system does not require frequent maintenance, and any crane access to the site is rare. Even then no heavy objects are moved in the tankfarm, and hence the chance of a mechanical damage due to impact is low.

The pipework has minimum flanged connections, and is mostly welded. No instruments are provided on the piping.

3.2.3 Failure of Flange Gaskets

A gasket failure would vary from a weeping leak to a small section of gasket being blown away (typically the section between two adjacent bolts). The maximum possible hole size for such failures was postulated as 9 mm, based on the distance between bolts and the gasket thickness.

3.2.4 Tanker Loading Hose Failure

The likelihood of this incident is low due to the following reasons:

The hoses are pressure tested to 1.5 times the maximum operating pressure.

Terminal provided hoses are used and not tanker's hoses. The Terminal hoses are regularly inspected for integrity.

There has been no reported cases in Australia, of a petroleum product hose failure or failure of the joint between the rubber hose and the metal casing in the last 20 years.

3.3 Operational Failures

The following Operational failures have been identified:

- Overfilling of tank when product is received from ship
- Road tanker overfill
- Tanker drive-away while connected

These operational scenarios have been discussed and assessed in detail in Table 1.

3.4 Fires

The only type of incident that could occur at the facility is a pool fire. The probability of ignition is very low. High energy ignition source such as welding would be required to ignite a potential spill as the flash point of the materials are high ($> 60^{\circ}\text{C}$), and no vapour would be generated from the spill even under hot summer conditions.

3.5 List of Incident Scenarios

Table 2 provides a list of incident scenarios modelled in the hazard analysis.

.

Table 2: Hazard Identification

Hazardous Event	Causes	Possible Consequences	Prevention/Protection Measures
1 Leak of product from tanks, pipework	Corrosion failure Impact Overpressure	Product spill. Bund fire if ignited. Thermal radiation impact	Product non-corrosive. Corrosion resistant surface coating on tanks and pipework. Integrity inspections Tank vent sized for transfer flows Ignition control (permit to work system, no smoking on site) High flash point material, hard to ignite Fire protection system including portable foam
2 Tank overfilling during ship/ shore transfer	Human error Level transmitter failure	Product leak into bund through vent and bund fire if ignited Thermal radiation impact	Independent high high alarm Regular calibration and maintenance of level sensors Ignition control (permit to work system, no smoking on site) High flash point material, hard to ignite Fire protection system including portable foam
3 Tank top fire	Internal explosion, roof failure and ignition	Potential for escalation of fire to other tanks	Tank top fire is not considered possible for fixed roof tanks containing combustible liquids. No vapour above the liquid level. This is supported by AS 1940-2004.

Hazardous Event		Causes	Possible Consequences	Prevention/Protection Measures
4	Product spill during tanker loading.	Transfer hose failure Tanker overfill Driveaway while connected	Possible pool fire if ignited. Possible runoff to environment	Driver is constantly in attendance during loading. Pressure tested hoses. Scully system protection to prevent overfill. Microloader software for loading control that stops automatically after preset quantity is reached Mechanical brake interlock of truck to enable loading. Driveaway is possible only after the disconnection of hose. Extinguishers (dry chemical and foam). Site fire protection system.
5	Tanker runs into filling gantry.	Excessive speed Tanker backs into gantry when reversing	Damage to filling gantry and pipework. Potential for pipework leak. Product spill. Fire if ignited.	Speed limit on site. One-way traffic flows. Product hard to ignite. Spill containment at loading gantry.
6	Pump seal failure.	Mechanical failure during transfer operations	Spillage of product. Pool fire if ignited.	Maintenance program include regular inspection of pump system. Pumps located inside the bund and hence spill is collected in the sump within the bund.

Table 3: Hazardous Scenarios Anlased

Scenario No.	Scenario	Material	Event Location
1	Release from Tanks 1-10 from small bore fitting failure and bund fire	Distillate	Tankfarm (Tanks 1-10)
2	Tank rupture (Tk1-10) and product release into bund, bund fire	Distillate	Tankfarm (Tanks 1-10)
3	Release from Tanks 11-16 from small bore fitting failure and bund fire	Distillate	Tankfarm (Tanks 11-16)
4	Tank rupture (Tk11-16) and product release into bund, bund fire	Distillate	Tankfarm (Tanks 11-16)
5	Product release from seal failure of Loading Pump No.1 and pool fire at pump slab	Distillate	Loading gantry No.1
6	Product release from seal failure of Loading Pump No.2 and pool fire at pump slab	Distillate	Loading gantry No.2
7	Product release from seal failure of Loading Pump No.3 and pool fire at pump slab	Distillate	Loading gantry No.3
8	Product release from hose failure at Loading gantry No.1 and pool fire	Distillate	Loading gantry No.1
9	Product release from hose failure at Loading gantry No.2 and pool fire	Distillate	Loading gantry No.2
10	Product release from hose failure at Loading gantry No.3 and pool fire	Distillate	Loading gantry No.3

4 CONSEQUENCES OF INCIDENTS

Consequences of pool fires were modelled in PhastRisk 6.7 software. The results are provided in Table 4.

The consequence analysis performed in the previous section has shown that not all the events would contribute to risk. Events such as pump seal leaks have localised effect only.

Table 4: Extent of Hazardous Scenarios

Scenario No.	Scenario	Pool Diameter, m	Flame height, m	Distance to heat radiation, m			
				3 kW/m ²	4.7 kW/m ²	12.6 kW/m ²	23 kW/m ²
1	Release from Tanks 1-10 from small bore fitting failure and bund fire	6.8	10.5	34	28	18.5	14
2	Tank rupture (Tanks 1-10) and full bund fire	51.9	43.2	182	150	100	76
3	Release from Tanks 11-16 from small bore fitting failure and bund fire	6.8	10.5	34	28	18.5	14
4	Tank rupture (Tanks 11-16) and full bund fire	39.7	35.9	147	121	80	61
5	Product release from seal failure of Loading Pump No.1 and pool fire at pump slab	2	4.4	12.4	10.7	8	6.2
6	Product release from seal failure of Loading Pump No.2 and pool fire at pump slab	2	4.4	12.4	10.7	8	6.2
7	Product release from seal failure of Loading Pump No.3 and pool fire at pump slab	2	4.4	12.4	10.7	8	6.2
8	Product release from hose failure at Loading gantry No.1 and pool fire	10	13.8	48	26	20	15.7
9	Product release from hose failure at Loading gantry No.2 and pool fire	10	13.8	48	26	20	15.7
10	Product release from hose failure at Loading gantry No.3 and pool fire	10	13.8	48	26	20	15.7

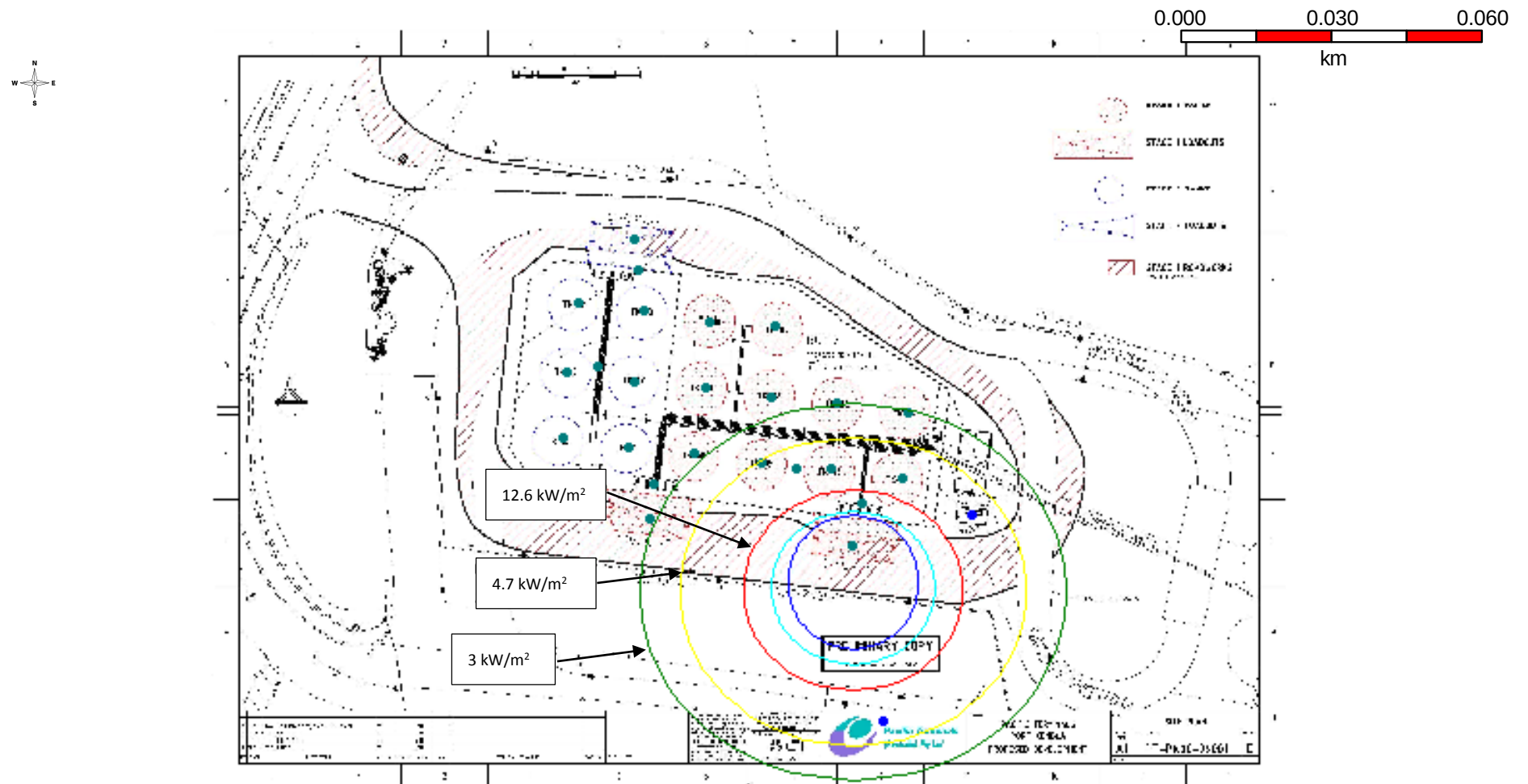


Figure 2: Heat Radiation Contours of Loadout Bay 1 Spill and Fire

5 FIRE PREVENTION AND PROTECTION STRATEGIES

5.1 Prevention

The proposed Bulk Liquids Storage Terminal will store C1 and C2 combustible liquids. These have flash points greater than 60°C and are therefore difficult to ignite. Fire prevention methods will focus on preventing escalation from hot work or other fire sources.

Access to the site is controlled, limiting the potential for unauthorised lighting of fires.

No hazardous areas will be classified within the storage terminal as the materials stored are combustible, and therefore do not generate explosive atmospheres.

5.2 Protection

Fire protection strategies are based upon the requirements of AS 1940 for C1 combustible liquids and the requirements for protection open yards from AS 2419.1.

6 DETAILS OF DETECTION AND PREVENTION

6.1 Detection

No fire detection is proposed for the bulk liquids storage terminal.

6.2 Prevention

The proposed Bulk Liquids Storage Terminal will store C1 and C2 combustible liquids. These have flash points greater than 60°C and are therefore difficult to ignite. Fire prevention methods will focus on preventing escalation from hot work or other fire sources.

Access to the site is controlled, limiting the potential for unauthorised lighting of fires. All non-routine maintenance or new works is controlled by issuing work permits, including hot-work permits where applicable, following a review of the work scope, site hazards and precautions in place.

No hazardous areas will be classified within the storage terminal as the materials stored are combustible.

7 DETAILED HYDRAULIC CALCULATIONS FOR FIRE-FIGHTING

Detailed hydraulic calculations are presented in Appendix A. The fire hydrant supply is from the Port Kembla fire protection system.

The maximum firewater demand is 1,680 L/min, based upon two hydrants discharging 600 L/min each and two foam branchpipes discharging 240 L/min each. These are based upon AS 2419 requirements for an open protected yard between 3,000 and 9,000 m² and AS 1940 requirements for branchpipes supplied where a hydrant system is provided with trained crews are available.

With a 150 NB fire main and assuming a 150m run of hydrant main, the Port Kembla fire system will need to provide unassisted 1080 L/min at 711 kPa to the Proposed Bulk Liquids Storage Terminal.

Table 5: Flow and Pressure Requirements for Supply of Firewater to Bulk Liquids Terminal

	Flow (L/min)	Pressure (kPa g)
Unassisted	1080	711
Assisted by Fire Brigade Pumper	1680	735

8 ARRANGEMENTS FOR CONTAINING CONTAMINATED FIRE FIGHTING WATER

The capacity of the storage compound is 1,375 m³. This exceeds the capacity of the largest tank (1,250 m³), plus 20 minutes firewater (33.6 m³). Contaminated firewater will be contained within the storage compound.

9 FIRST AID FIRE PROTECTION ARRANGEMENTS AND EQUIPMENT

9.1 Portable Fire Extinguishers

Recommendation 1: As per AS 1940 Clause 11.13.7, provide sixteen 9 kg powder type extinguishers having a rating of at least 2A 60B(E) located strategically around the storage. Some extinguishers may be located at product pumps and fill points to cover requirements for these areas as well as serving to protect combustible liquid storage.

9.2 Hose Reels

No hose reels are provided. This is consistent with no trained site fire crew.

9.3 Site Fire Crews

There are no trained site fire crews. Fire fighting philosophy is to muster, evacuate to a safe location and await the fire brigade.

10 CODES AND REFERENCE

10.1 Standards Referenced

AS 1940 – 2004 Storage and Handling of Flammable and Combustible Liquids

AS 2419.1 – 2005 Fire hydrant installations. Part 1: System design, installation and commissioning

10.2 Deviations from Standards

10.2.1 AS1940

5.8.3 Design and construction

(h) The location of a bund relative to the closest tank shall be such that the top inside perimeter of the bund is not inside the crest locus limit specified in Figure 5.2, except where it can be demonstrated that a reduced distance would be appropriate due to viscosity or other considerations.

Recommendation 2: The distance from the tank shells to the inside of the bund walls is much less than half the tank height, and therefore does not satisfy AS 1940 clause 5.8.3 without further

consideration. Provide shielding from the top of the tank down to approximately 6 m height to deflect any spills into the compound.

5.8.4 Compound subdivision

Where the aggregate capacity of the tanks in any compound exceeds 10 000 m³, intermediate bunds of at least half of the average height of the main bunds or 600 mm, whichever is the lesser, shall be provided so that any subdivision so created contains tanks having an aggregate capacity not exceeding 10 000 m³, or a single tank if such tank exceeds that capacity.

Recommendation 3: Install a 600mm high intermediate bund within the compound for stage 1 storage in such a manner so that not more than 10,000 m³ are stored in the either of the two section created by the intermediate bund. A suggestion is to have an intermediate bund separating tanks 1 to 4 from tanks 5 to 10. This is required as the aggregate capacity of the stage one compound is greater than 10,000 m³.

6.5.2 Condensate

Condensate from a steam heater that might be contaminated with flammable or combustible liquid should not be returned to a boiler feed without treatment to ensure that it is suitable as feed water.

Recommendation 4: Ensure suitable treatment is available for the condensate that is returned to the boiler from the heating coil in Tank 01 so that boiler water is not contaminated with hydrocarbons, as required by AS 1940 clause 6.5.2.

11.6.1 Product pumps

A pump installation for handling flammable or combustible liquids shall be provided with at least one powder-type extinguisher not less than 3 m nor more than 10 m from each risk being protected.

Recommendation 5: Provide one 9 kg powder-type extinguisher at each pump installation. These extinguishers may also be counted amongst extinguishers required to protect other areas, such as pumps and tanks that are nearby (refer recommendations 1 and 6).

11.6.2 Manifolds and hose connection points

Except as otherwise required by this Section, a powder-type extinguisher shall be provided within 10 m of a hose connection point or a manifold.

Recommendation 6: Provide one 9 kg powder-type extinguisher at each hose connection / fill point. These extinguishers may also be counted amongst extinguishers required to protect other areas, such as pumps and tanks that are nearby (refer recommendations 1 and 5).

11.13.7 Combustible liquids

Where only combustible liquids are stored, the installation shall be provided with at least the following:

- (a) A hydrant system comprising at least one hydrant riser per tank, which is capable of reaching all parts of all compounds.

- (b) Accessories and foam concentrate, as applicable.
- (c) One powder-type extinguisher per tank, with a minimum of three powder-type extinguishers for the storage area, strategically located around the storage.

Ten hydrants will be provided, but at the completion of stage 2, there will be 16 storage tanks. However, using AS 2419 as a guide, the ten hydrants ensure all parts of the storage compound are within reach of a 10m hose stream issuing from a nozzle at the end of two lengths of 30m hose.

11 REFERENCES

- [1] NSW Department of Planning and Infrastructure, "Hazardous Industry Planning Advisory Paper No 2, Fire Safety Study Guidelines," 2011.
- [2] Standards Australia, "The Storage and Handling of Flammable and Combustible Liquids," SAIGlobal Limited, 2004.
- [3] Standards Australia, "Fire Hydrant Installations - Part 1: System Design, Installation and Commissioning," SAIGlobal Limited, 2005.
- [4] NSW Department of Planning & infrastructure, "State Environmental Planning Policy (Port Botany and Port Kembla) 2013 (Ports SEPP)," 2013.
- [5] Arriscar Pty Limited, "Hazard and Operability Study of Pacific Terminals Port Kembla Bulk Liquids Facility," 2013.

Appendices

Appendix A Detailed Hydraulic Calculations

A.1 Assisted Performance

DESIGN DATA AND SUMMARY RESULTS

Page 1 of 1 - Job No.

Designer :	DATE :28 OCT 2013
Client :	TIME : 7:48
Project :	

Maximum unbalanced head loss is = 0.00000 kPa
Maximum node unbalanced flow is = 0.00024 l/m and occurs at node 22
Maximum loop unbalanced flow is = 0.00047 l/m and occurs in Pipe Loop 1

Fittings Specified as AS2118
Design Point Calculation With Min Flow

Hazen-Williams formula used

Number of Nozzles Operating : 1
Total water flow for Nozzles : 600 l/m

Number of Fixed Discharges : 2
Total water flow for Discharges : 1080 l/m

Required Flow & Pressure, Input Node 1 : 1680 l/m at 732 kPa

Specified available pressure at input node 1: 800 kPa
Available pressure minus required pressure is : 68.2 kPa

Calculated Total Pipe Volume is : 2851 Litres

Authourising Company :
Certification Number :

Input data file name : C:/PROGRAM FILES (X86)/HYENA6102/DATA/PORT KEMBLA ASSIS
.. TED WITH FOAM.DAT
Results file name : C:/PROGRAM FILES (X86)/HYENA6102/DATA/PORT KEMBLA ASSIS
.. TED WITH FOAM.OUT

PIPE CHARACTERISTICS

Page 1 of 1 - Job No.

Designer : DATE :28 OCT 2013
Client : TIME : 7:48
Project :

Pipe No.	Pipe node Numbers	Flow (l/m)	Pipe diam. Nom (mm)	Pipe diam. Actual (mm)	Pipe & Ftg. CODE #	Pipe Length (m)	TOTAL Length (m)	Loss Per m (KPa)	Loss Over pipe (KPa)	Static Loss (KPa)	TOTAL Loss (KPa)	H&W Co-eff	Water Vel. (m/s)	Vel. Press (KPa)
11	1 22	1680.32	150	155	ASAM	100.0	109.1	0.173	18.831	0.000	18.831	120	1.48	1.097
			150		1TT	9.1								
12	22 23	600.32	150	155	ASAM	25.0	25.0	0.0257	0.642	0.000	0.642	120	0.53	0.140
			150		1TN	0.0								
31	22 2	600.00	100	105	ASAM	1.0	30.0	0.171	5.109	7.836	12.946	120	1.15	0.663
			100		2TT	12.2								
			100		1NV	16.8								
32	23 3	600.32	100	105	ASAM	1.0	30.0	0.171	5.114	7.836	12.951	120	1.15	0.664
			100		2TT	12.2								
			100		1NV	16.8								
41	22 4	480.00	150	155	ASAM	25.0	25.0	0.0170	0.424	7.836	8.260	120	0.42	0.0895

LEGEND - Fittings and Pipe Materials used in this run

TT = Tee Branch

NV = Angle Valve

TN = Tee 90 deg Turn

ASAM = Medium Steel Tube to AS1074 -1989 & BS 1387

Maximum unbalanced head loss is = 0.00000 kPa

Maximum loop unbalanced flow is = 0.00047 l/m and occurs in Pipe Loop 1

Maximum node unbalanced flow is = 0.00024 l/m

NODE CHARACTERISTICS

Page 1 of 1 - Job No.

Designer :	DATE :28 OCT 2013
Client :	TIME : 7:48
Project :	

SPRINKLER/NOZZLE (N) POINTS				REFERENCE POINTS			DEMAND POINTS				Entered	K-Factor
Node	Discharge	P-TOTAL	P-NET	Node	Fixed	Pressure	Node	Demand	Pressure	Elevation	Discharge	
No.	l/m	kPa	kPa	No.	l/m	kPa	No.	l/m	kPa	(mm)	(l/m)	
3	600.32	699.377	698.713				1	1680.32	731.801	0		
				2	600.00	700.024				800	600.00	
										800	600.00	22.700
				4	480.00	704.709				800	480.00	
				22		712.969				0		
				23		712.328				0		

ADDITIONAL PRESSURE INFORMATION

Page 1 OF 1 - Job No.

Designer :	DATE :28 OCT 2013
Client :	TIME : 7:48
Project :	

Pipe No.	Pipe Numbers	Node	Flow (l/min)	Pipe Diam.		Pipe & Ftg.		TOTAL Length (m.)	Loss Per m. (kPa)	Loss For Pipe (kPa)	Static Loss (kPa)	TOTAL Loss (kPa)	Pressure	
				Nom (mm)	Actual (mm)	Code #	Length (m.)						1st Node (kPa)	2nd Node (kPa)
11	1	22	1680.32	150	155	ASAM	100.0	109.1	0.173	18.831	0.000	18.831	731.801	712.969
				150		1TT	9.1							
12	22	23	600.32	150	155	ASAM	25.0	25.0	0.0257	0.642	0.000	0.642	712.969	712.328
				150		1TN	0.0							
31	22	2	600.00	100	105	ASAM	1.0	30.0	0.171	5.109	7.836	12.946	712.969	700.024
				100		2TT	12.2							
				100		1NV	16.8							
32	23	3	600.32	100	105	ASAM	1.0	30.0	0.171	5.114	7.836	12.951	712.328	699.377
				100		2TT	12.2							
				100		1NV	16.8							
41	22	4	480.00	150	155	ASAM	25.0	25.0	0.0170	0.424	7.836	8.260	712.969	704.709

LEGEND - Fittings and Pipe Materials used in this run

TT = Tee Branch

NV = Angle Valve

TN = Tee 90 deg Turn

ASAM = Medium Steel Tube to AS1074 -1989 & BS 1387

Input Data

LABL1=Authourising Company
 TEXT1=
 LABL2=Certification Number
 TEXT2=
 OCC=High Hazard Process Risks
 DENS=
 AREA=
 ORIF=
 COVER=
 NOPLOT
 PLEN=M
 PDIAM=MM
 PRESSURE=KPA
 FLOW=L/MIN
 ELEV=MM
 FITTING=AS2118
 REPORT
 EQ
 FDESPT
 VEL
 MAXV=10
 Fitting Type =Comm
 Defaults for Elbows=SE
 Defaults for Tees=TT

Pipes

Pipes Mtr and Coef: Defaults= MCASAM HW120

P 11 1 22 100 150 ASAM120 1TT
 P 12 22 23 25 150 ASAM120 TN
 P 31 22 2 1 100 ASAM120 2TT NV
 PS 31 32 23 3
 P 41 22 4 25 150 ASAM120
 Default=

Nozzles

N 3 800 600 22.7

Fixed Discharge

R 2 800 600
 R 4 800 480

Reference Points

Point Default= ED0

R 22 0
R 23 0

InputPoints
IF 1 0 800
END

UNITS BEING USED: LENGTH DIAMETER FLOW HEAD ELEVATION PRESSURE
 METERS MM l/m CM MM KPA

ITERATION STOPS WHEN GREATEST FLOW CHANGE IS 0.168 IN ANY PIPE

THERE ARE 1 SPRINKLERS AND 0 BOOSTER PUMPS

THERE ARE 5 PIPES AND 4 REFERENCE POINTS

THE NUMBER OF INPUT POINTS IN SYSTEM IS 1

NODE NO.	NO. OF PUMPS IN PARALLEL	PUMP ELEVATION	INPUT FRACTION	PUMP PARAMETERS OR X-Y COORDINATES
1	1	0.00	1.00	800.00 0.0000E+00 0.0000E+00 0.0000E+00

Initial estimate of demand on the system is 1680.00

NET UNBALANCED DEMAND ON THE SYSTEM IS 0

LOOP INFORMATION

LOOP	PIPES
1	32 12 11

BANDWIDTH = 1

A.2 Unassisted Performance

DESIGN DATA AND SUMMARY RESULTS

Page 1 of 1 - Job No.

Designer :
Client :
Project :

DATE :28 OCT 2013
TIME : 7:57

Maximum unbalanced head loss is = 0.00000 kPa
Maximum node unbalanced flow is = 0.00000 l/m
Maximum loop unbalanced flow is = 0.00015 l/m and occurs in Pipe Loop 1

Fittings Specified as AS2118
Design Point Calculation With Min Flow

Hazen-Williams formula used

Number of Nozzles Operating : 1
Total water flow for Nozzles : 300 l/m

Number of Fixed Discharges : 2
Total water flow for Discharges : 780 l/m

Required Flow & Pressure, Input Node 1 : 1080 l/m at 711 kPa

Specified available pressure at input node 1: 800 kPa
Available pressure minus required pressure is : 89.0 kPa

Calculated Total Pipe Volume is : 2851 Litres

Authourising Company :
Certification Number :

Input data file name : C:/PROGRAM FILES (X86)/HYENA6102/DATA/PORT KEMBLA UNASS
.. ISTED WITH FOAM.DAT
Results file name : C:/PROGRAM FILES (X86)/HYENA6102/DATA/PORT KEMBLA UNASS
.. ISTED WITH FOAM.OUT

PIPE CHARACTERISTICS

Page 1 of 1 - Job No.

Designer : DATE :28 OCT 2013
Client : TIME : 7:57
Project :

Pipe No.	Pipe node Numbers	Flow (l/m)	Pipe diam. Nom (mm)	Pipe diam. Actual (mm)	Pipe & Ftg. CODE #	Pipe Length (m)	TOTAL Length (m)	Loss Per m (KPa)	Loss Over pipe (KPa)	Static Loss (KPa)	TOTAL Loss (KPa)	H&W Co-eff	Water Vel. (m/s)	Vel. Press (KPa)
11	1 22	1080.16	150	155	ASAM	100.0	109.1	0.0762	8.308	0.000	8.308	120	0.95	0.453
			150		1TT	9.1								
12	22 23	300.16	150	155	ASAM	25.0	25.0	0.00711	0.178	0.000	0.178	120	0.26	0.0350
			150		1TN	0.0								
31	22 2	300.00	100	105	ASAM	1.0	30.0	0.0472	1.416	7.836	9.252	120	0.58	0.166
			100		2TT	12.2								
			100		1NV	16.8								
32	23 3	300.16	100	105	ASAM	1.0	30.0	0.0473	1.417	7.836	9.253	120	0.58	0.166
			100		2TT	12.2								
			100		1NV	16.8								
41	22 4	480.00	150	155	ASAM	25.0	25.0	0.0170	0.424	7.836	8.260	120	0.42	0.0895

LEGEND - Fittings and Pipe Materials used in this run

TT = Tee Branch

NV = Angle Valve

TN = Tee 90 deg Turn

ASAM = Medium Steel Tube to AS1074 -1989 & BS 1387

Maximum unbalanced head loss is = 0.00000 kPa

Maximum loop unbalanced flow is = 0.00015 l/m and occurs in Pipe Loop 1

Maximum node unbalanced flow is = 0.00000 l/m

NODE CHARACTERISTICS

Page 1 of 1 - Job No.

Designer :	DATE :28 OCT 2013
Client :	TIME : 7:57
Project :	

SPRINKLER/NOZZLE (N) POINTS				REFERENCE POINTS			DEMAND POINTS				Entered	K-Factor
Node	Discharge	P-TOTAL	P-NET	Node	Fixed	Pressure	Node	Demand	Pressure	Elevation	Discharge	
No.	l/m	kPa	kPa	No.	l/m	kPa	No.	l/m	kPa	(mm)	(l/m)	
							1	1080.16	710.996	0		
				2	300.00	693.436				800	300.00	
3	300.16	693.257	693.091	4	480.00	694.428				800	300.00	11.400
				22		702.688				800	480.00	
				23		702.510				0		

ADDITIONAL PRESSURE INFORMATION

Page 1 OF 1 - Job No.

Designer :	DATE :28 OCT 2013
Client :	TIME : 7:57
Project :	

Pipe No.	Pipe Node Numbers	Flow (l/min)	Pipe Diam.		Pipe & Ftg.		TOTAL Length (m.)	Loss Per m. (kPa)	Loss For Pipe (kPa)	Static Loss (kPa)	TOTAL Loss (kPa)	Pressure		
			Nom (mm)	Actual (mm)	Code #	Length (m.)						1st Node (kPa)	2nd Node (kPa)	
11	1	22	1080.16	150	155	ASAM	100.0	109.1	0.0762	8.308	0.000	8.308	710.996	702.688
				150		1TT	9.1							
12	22	23	300.16	150	155	ASAM	25.0	25.0	0.00711	0.178	0.000	0.178	702.688	702.510
				150		1TN	0.0							
31	22	2	300.00	100	105	ASAM	1.0	30.0	0.0472	1.416	7.836	9.252	702.688	693.436
				100		2TT	12.2							
				100		1NV	16.8							
32	23	3	300.16	100	105	ASAM	1.0	30.0	0.0473	1.417	7.836	9.253	702.510	693.257
				100		2TT	12.2							
				100		1NV	16.8							
41	22	4	480.00	150	155	ASAM	25.0	25.0	0.0170	0.424	7.836	8.260	702.688	694.428

LEGEND - Fittings and Pipe Materials used in this run

TT = Tee Branch

NV = Angle Valve

TN = Tee 90 deg Turn

ASAM = Medium Steel Tube to AS1074 -1989 & BS 1387

Input Data

LABL1=Authourising Company
 TEXT1=
 LABL2=Certification Number
 TEXT2=
 OCC=High Hazard Process Risks
 DENS=
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 ORIF=
 COVER=
 NOPLOT
 PLEN=M
 PDIAM=MM
 PRESSURE=KPA
 FLOW=L/MIN
 ELEV=MM
 FITTING=AS2118
 REPORT
 EQ
 FDESPT
 VEL
 MAXV=10
 Fitting Type =Comm
 Defaults for Elbows=SE
 Defaults for Tees=TT

Pipes

Pipes Mtr and Coef: Defaults= MCASAM HW120

P 11 1 22 100 150 ASAM120 1TT
 P 12 22 23 25 150 ASAM120 TN
 P 31 22 2 1 100 ASAM120 2TT NV
 PS 31 32 23 3
 P 41 22 4 25 150 ASAM120
 Default=

Nozzles

N 3 800 300 11.4

Fixed Discharge

R 2 800 300
 R 4 800 480

Reference Points

Point Default= ED0

R 22 0
R 23 0

InputPoints
IF 1 0 800
END

UNITS BEING USED: LENGTH DIAMETER FLOW HEAD ELEVATION PRESSURE
 METERS MM l/m CM MM KPA

ITERATION STOPS WHEN GREATEST FLOW CHANGE IS 0.108 IN ANY PIPE

THERE ARE 1 SPRINKLERS AND 0 BOOSTER PUMPS

THERE ARE 5 PIPES AND 4 REFERENCE POINTS

THE NUMBER OF INPUT POINTS IN SYSTEM IS 1

NODE NO.	NO. OF PUMPS IN PARALLEL	PUMP ELEVATION	INPUT FRACTION	PUMP PARAMETERS OR X-Y COORDINATES
1	1	0.00	1.00	800.00 0.0000E+00 0.0000E+00 0.0000E+00

Initial estimate of demand on the system is 1080.00

NET UNBALANCED DEMAND ON THE SYSTEM IS 0

LOOP INFORMATION

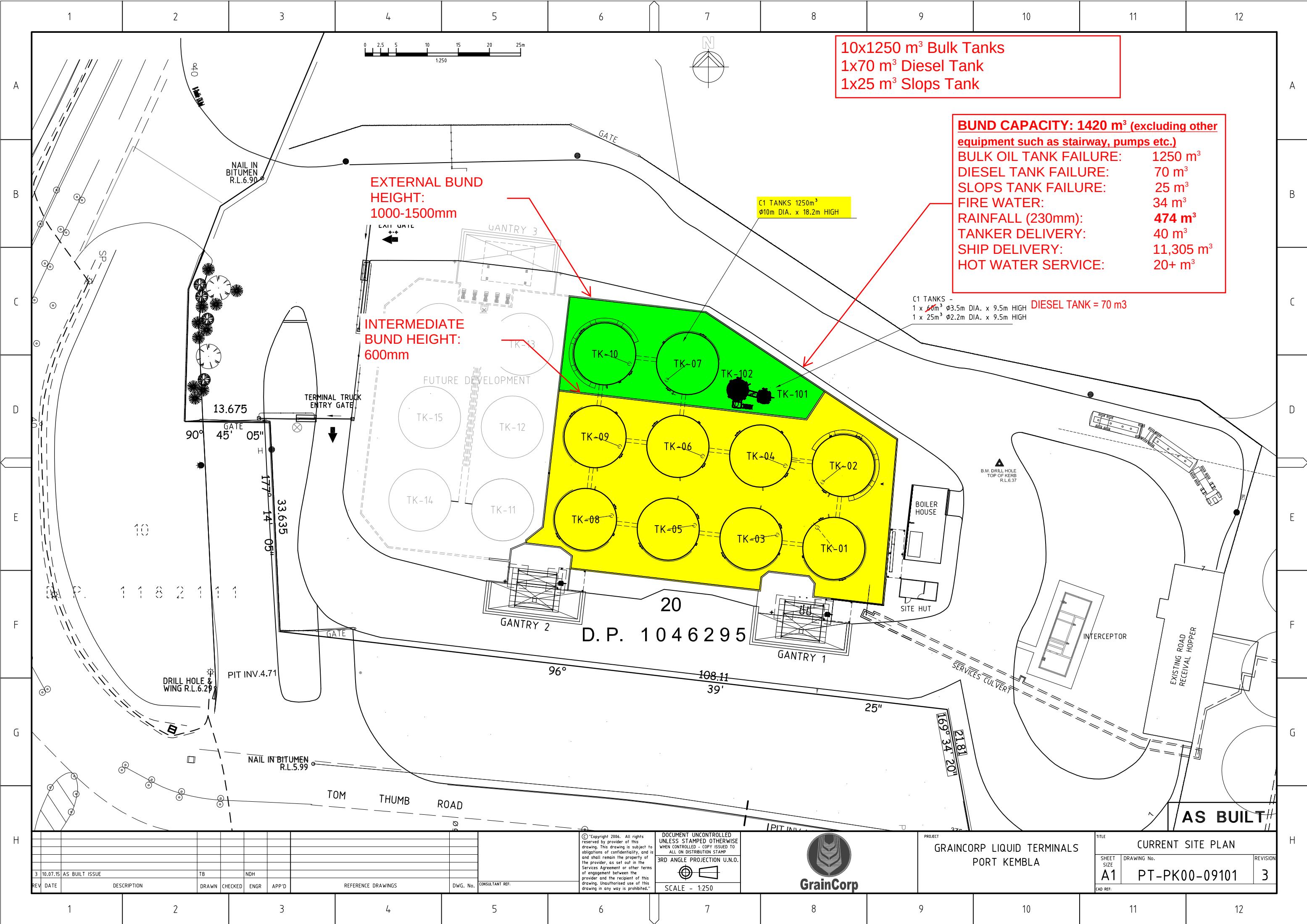
LOOP	PIPES
1	32 12 11

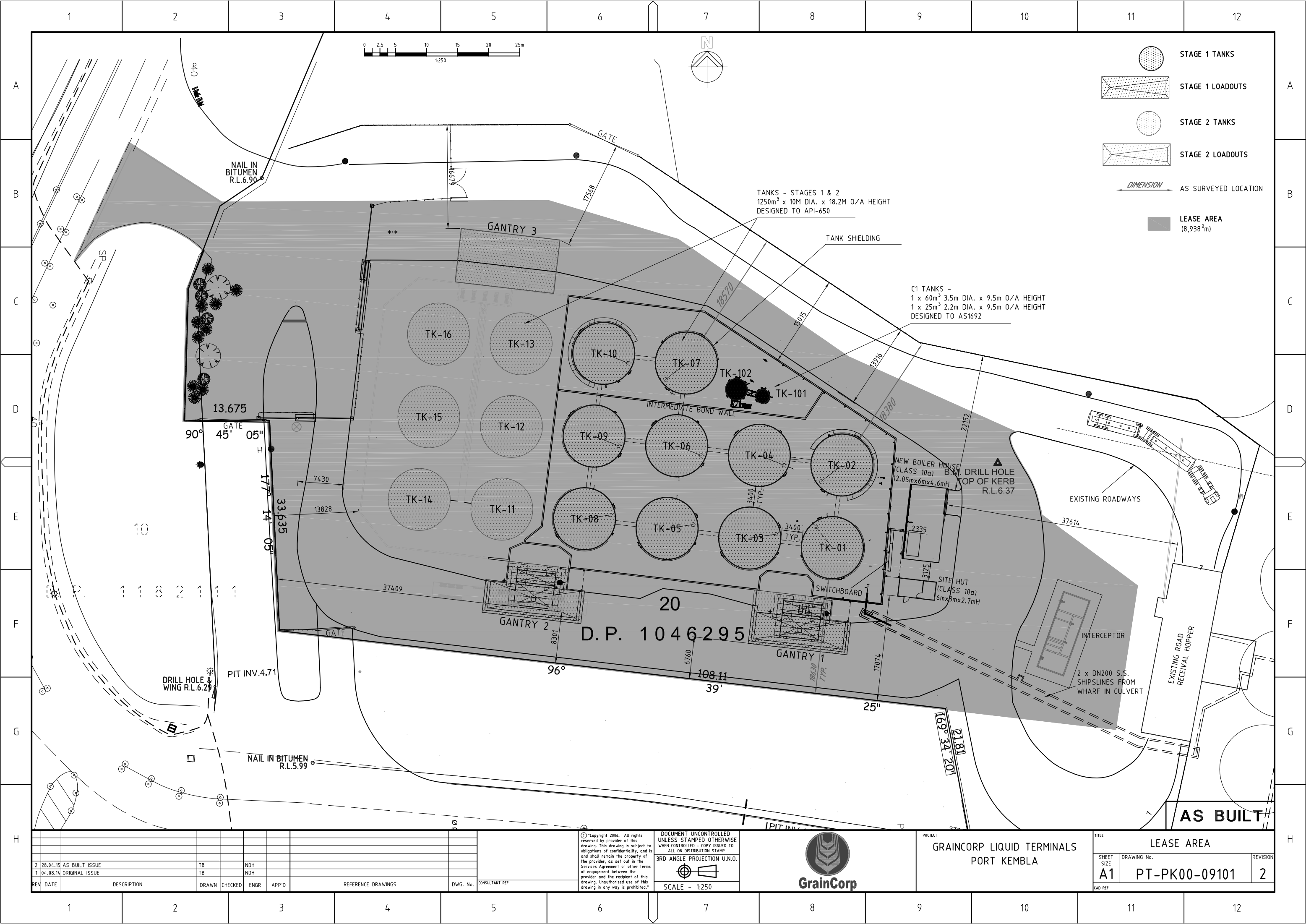
BANDWIDTH = 1



Appendix C – Port Kembla Site Layout





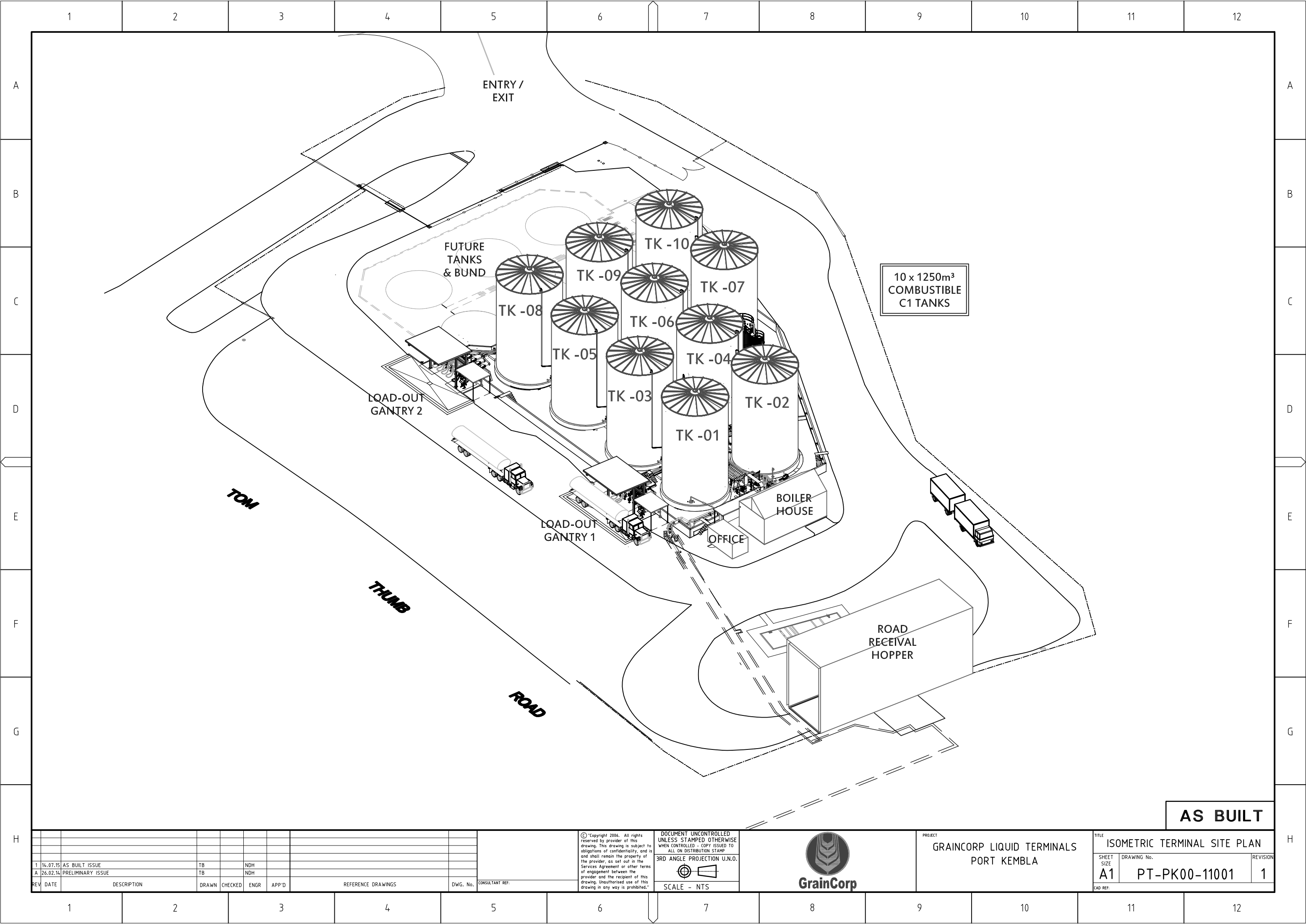


REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENGR	APP'D	REFERENCE DRAWINGS	DWG. No.	CONSULTANT REF.
2	28.04.15	AS BUILT ISSUE	TB			NDH			
1	04.08.14	ORIGINAL ISSUE	TB			NDH			

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SCALE - 1:250

PROJECT		TITLE		
GRAINCORP LIQUID TERMINALS PORT KEMBLA		LEASE AREA		
SHEET SIZE		DRAWING No.		REVISION
A1		PT-PK00-09101		2
CAD REF:				



AS BUILT

REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENGR	APP'D	REFERENCE DRAWINGS	DWG. No.	CONSULTANT REF.
1	14.07.15	AS BUILT ISSUE	TB		NDH				
A	26.02.14	PRELIMINARY ISSUE	TB		NDH				

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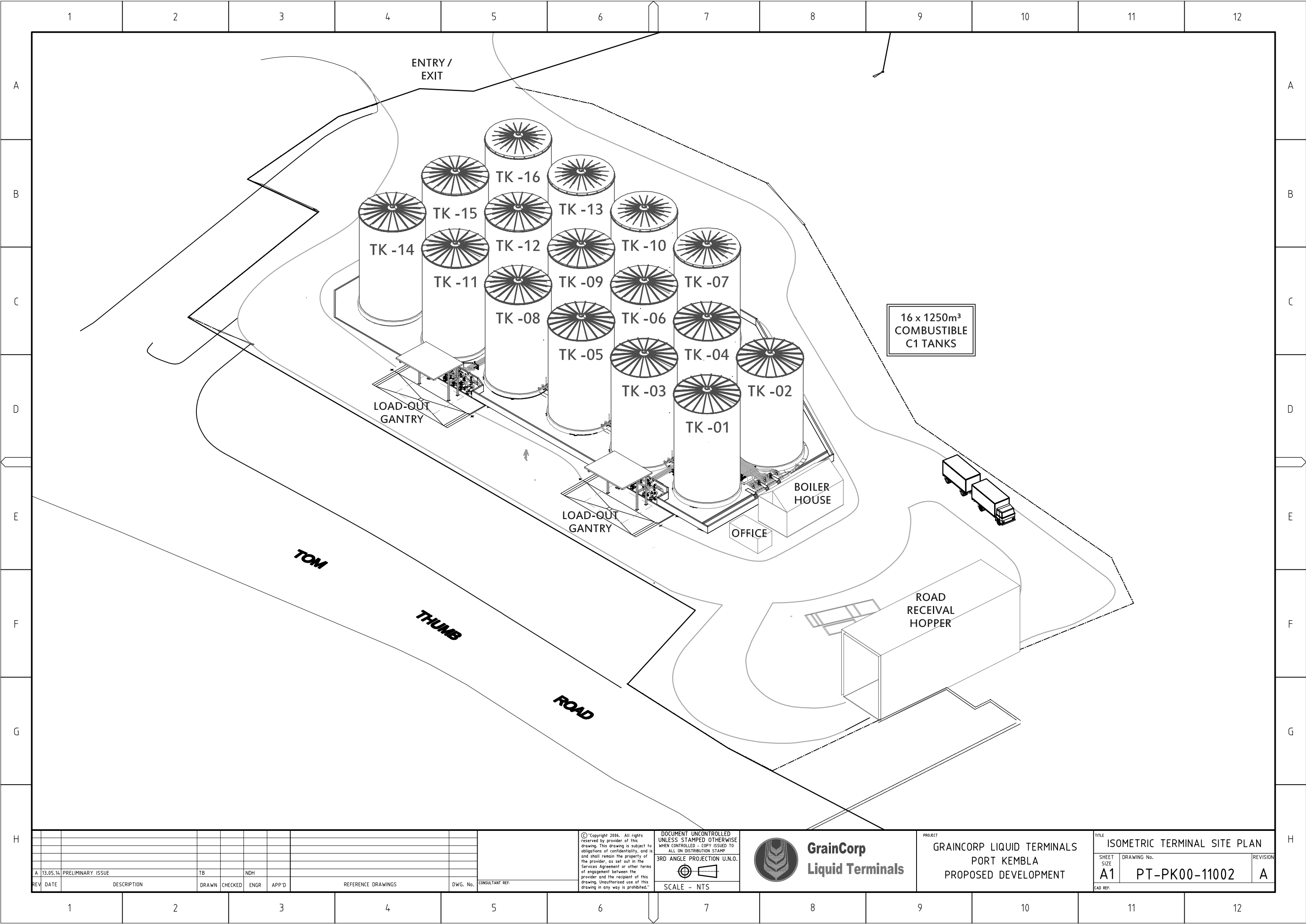
3RD ANGLE PROJECTION U.N.O.

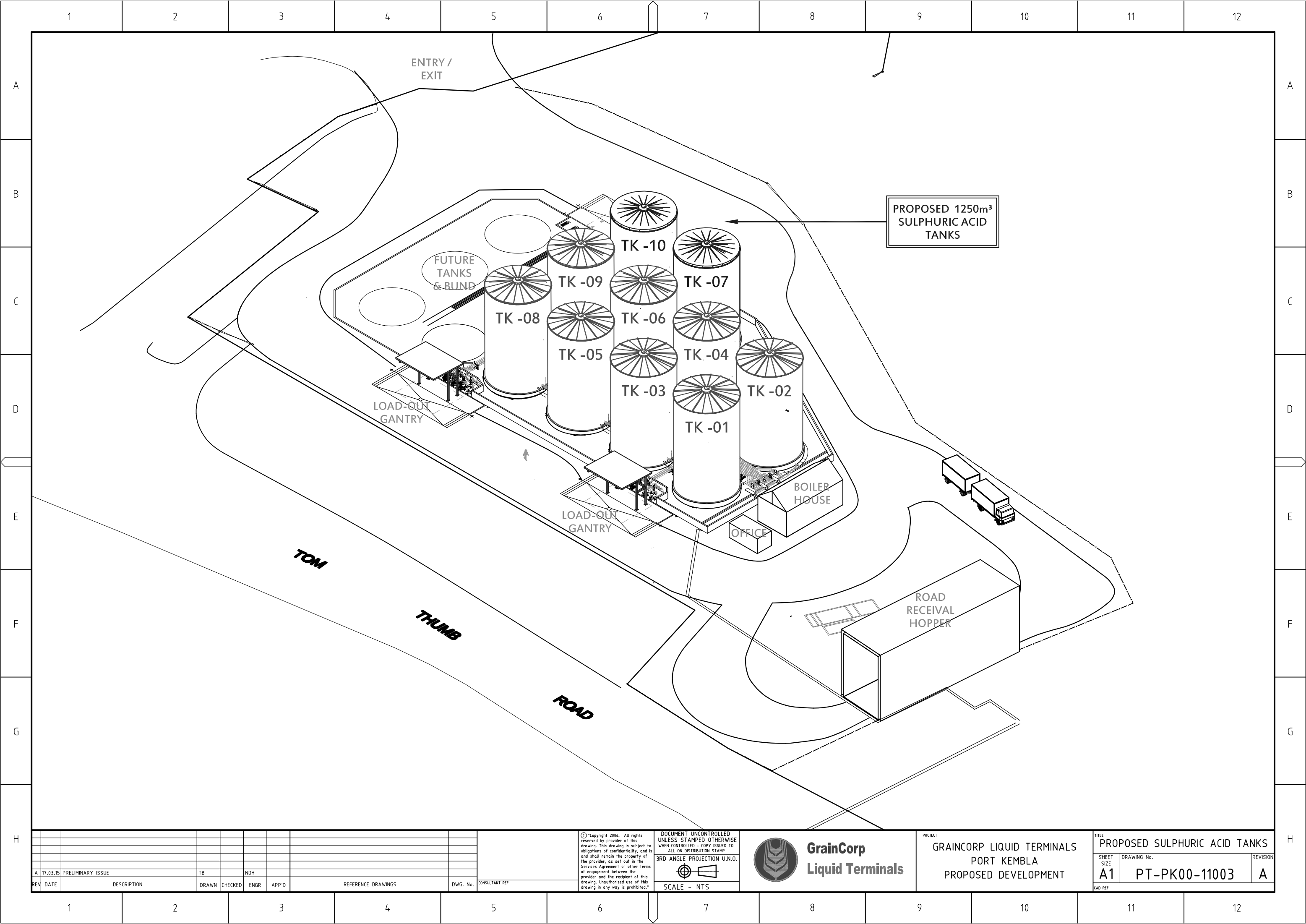
SCALE - NTS



PROJECT
GRAINCORP LIQUID TERMINALS
PORT KEMBLA

TITLE			ISOMETRIC TERMINAL SITE PLAN
SHEET SIZE	DRAWING No.	REVISION	
A1	PT-PK00-11001	1	
CAD REF:			





A 17.03.15 PRELIMINARY ISSUE				TB		NDH									
REV	DATE	DESCRIPTION			DRAWN	CHECKED	ENGR	APP'D	REFERENCE DRAWINGS			DWG. No.	CONSULTANT REF.		

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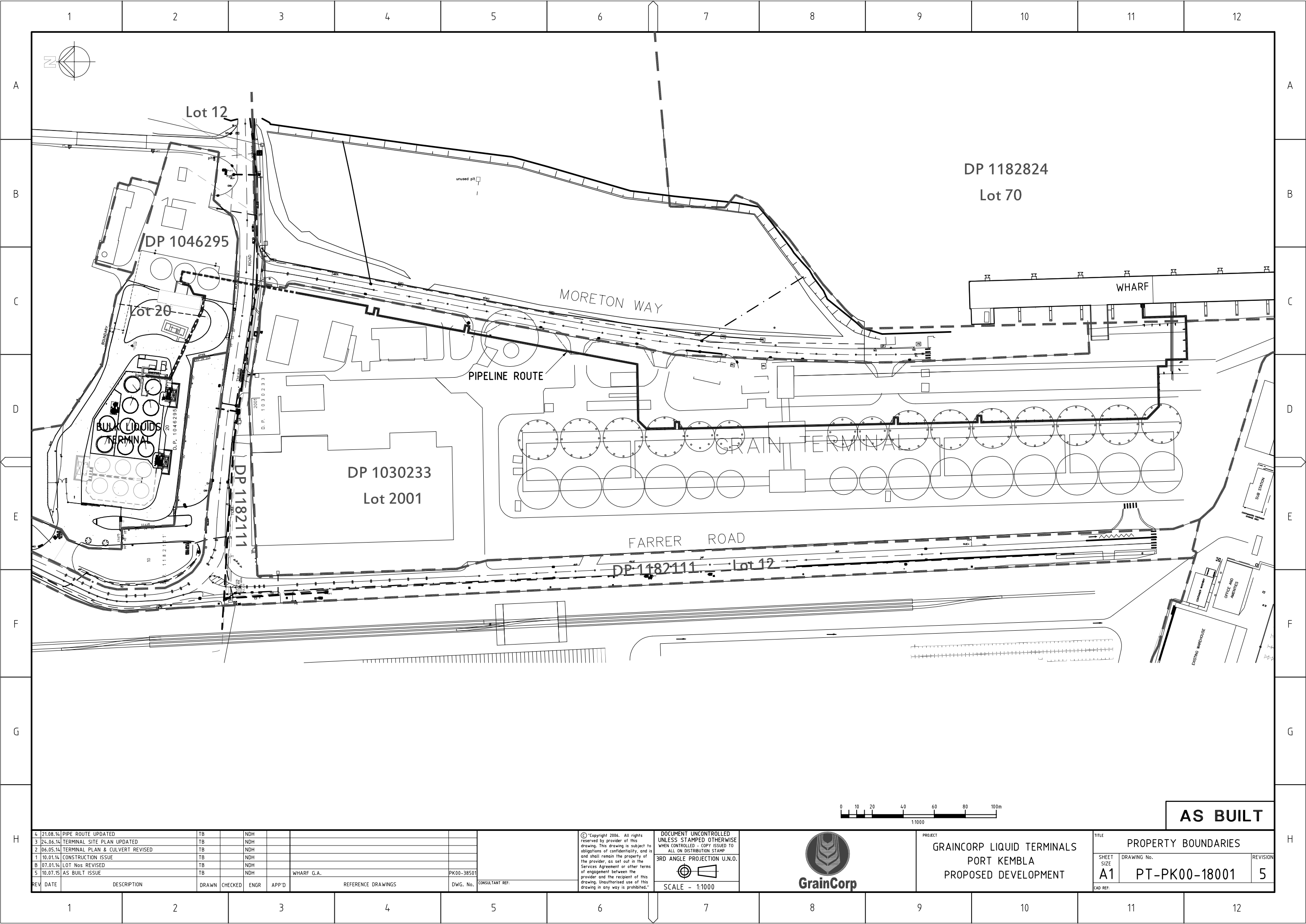
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SCALE - NTS

 **GrainCorp**
Liquid Terminals

PROJECT
GRAINCORP LIQUID TERMINALS
PORT KEMBLA
PROPOSED DEVELOPMENT

TITLE PROPOSED SULPHURIC ACID TANKS		
SHEET A1	DRAWING No. PT-PK00-11003	REVISION A
CAD REF:		



REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENGR	APP'D	REFERENCE DRAWINGS	DWG. No.	CONSULTANT REF.
4	21.08.14	PIPE ROUTE UPDATED	TB		NDH				
3	24.06.14	TERMINAL SITE PLAN UPDATED	TB		NDH				
2	06.05.14	TERMINAL PLAN & CULVERT REVISED	TB		NDH				
1	10.01.14	CONSTRUCTION ISSUE	TB		NDH				
B	07.01.14	LOT Nos REVISED	TB		NDH				
5	10.07.15	AS BUILT ISSUE	TB		NDH		WHARF G.A.	PK00-38501	

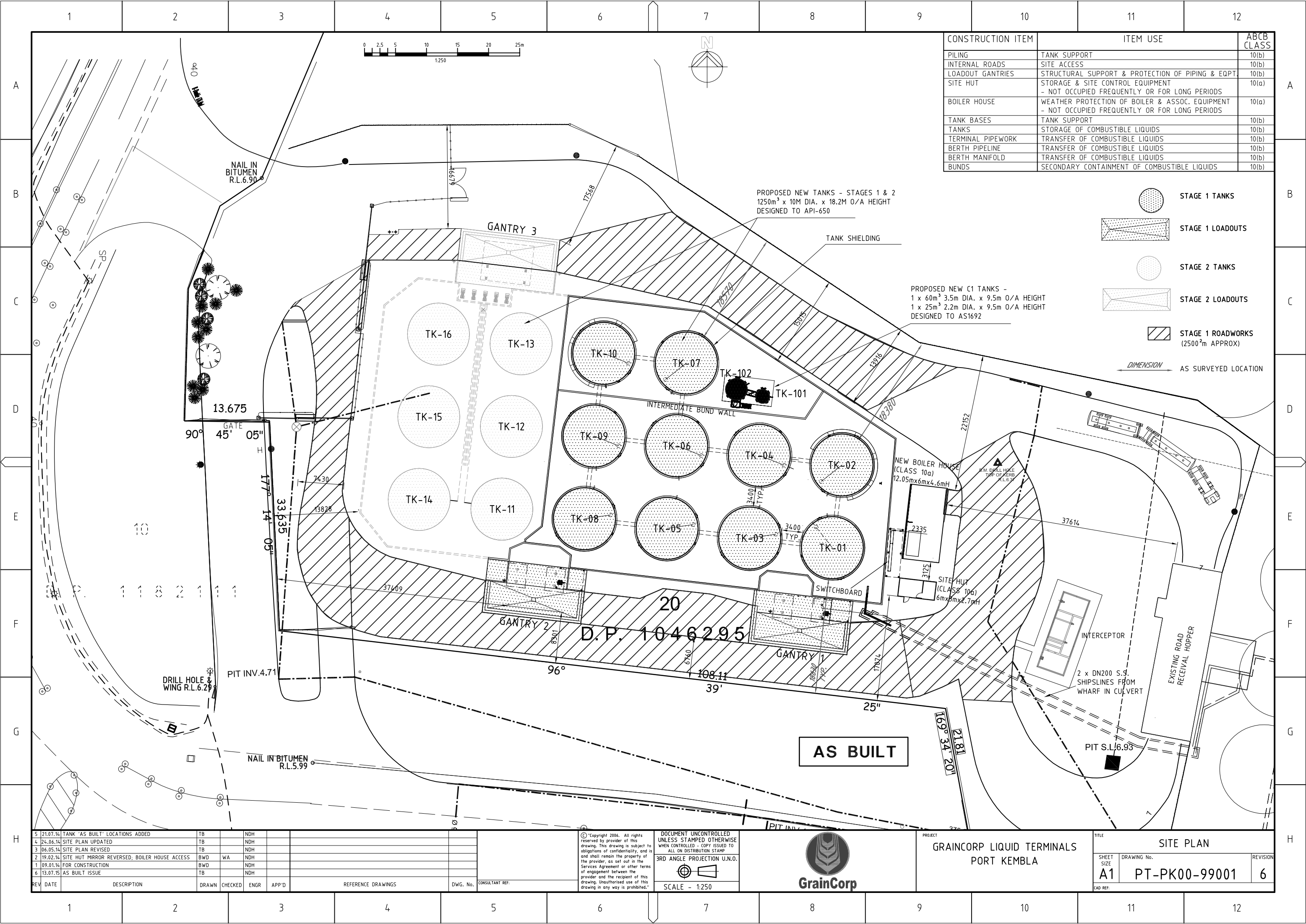
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PROJECT
GRAINCORP LIQUID TERMINALS
PORT KEMBLA
PROPOSED DEVELOPMENT

TITLE PROPERTY BOUNDARIES		
SHEET SIZE A1	DRAWING No. PT-PK00-18001	REVISION 5
CAD REF:		



CONSTRUCTION ITEM	ITEM USE	ABC/B CLASS
PILING	TANK SUPPORT	10(b)
INTERNAL ROADS	SITE ACCESS	10(b)
LOADOUT GANTRIES	STRUCTURAL SUPPORT & PROTECTION OF PIPING & EQPT.	10(b)
SITE HUT	STORAGE & SITE CONTROL EQUIPMENT - NOT OCCUPIED FREQUENTLY OR FOR LONG PERIODS	10(a)
BOILER HOUSE	WEATHER PROTECTION OF BOILER & ASSOC. EQUIPMENT - NOT OCCUPIED FREQUENTLY OR FOR LONG PERIODS	10(a)
TANK BASES	TANK SUPPORT	10(b)
TANKS	STORAGE OF COMBUSTIBLE LIQUIDS	10(b)
TERMINAL PIPEWORK	TRANSFER OF COMBUSTIBLE LIQUIDS	10(b)
BERTH PIPELINE	TRANSFER OF COMBUSTIBLE LIQUIDS	10(b)
BERTH MANIFOLD	TRANSFER OF COMBUSTIBLE LIQUIDS	10(b)
BUNDS	SECONDARY CONTAINMENT OF COMBUSTIBLE LIQUIDS	10(b)

- STAGE 1 TANKS
- STAGE 1 LOADOUTS
- STAGE 2 TANKS
- STAGE 2 LOADOUTS
- STAGE 1 ROADWORKS
(2500m APPROX)
- DIMENSION
AS SURVEYED LOCATION

5	21.07.14	TANK 'AS BUILT' LOCATIONS ADDED	TB		NDH						
4	24.06.14	SITE PLAN UPDATED	TB		NDH						
3	06.05.14	SITE PLAN REVISED	TB		NDH						
2	19.02.14	SITE HUT MIRROR REVERSED; BOILER HOUSE ACCESS	BWD	WA	NDH						
1	09.01.14	FOR CONSTRUCTION	BWD		NDH						
6	13.07.15	AS BUILT ISSUE	TB		NDH						
REV	DATE	DESCRIPTION	DRAWN	CHECKED	ENGR	APP'D	REFERENCE DRAWINGS	DWG. No.	CONSULTANT REF.		

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SCALE - 1:250



PROJECT
GRAINCORP LIQUID TERMINALS
PORT KEMBLA

TITLE SITE PLAN		
SHEET SIZE A1	DRAWING No. PT-PK00-99001	REVISION 6
CAD REF:		

D

Appendix D – Tank Bunding Risk Register



Tank Bunding Project Risk Assessment Register

Author (Role):Amy Loan

Approved By:John Shehadie

Revision:Project Name:

Job No:2442746

Date:16 December 2025

Stage of Design / Project:

(Note: minimum of 2 reviews per project)

RISKS ASSOCIATED WITH EXCEEDING BUND CAPACITIES						Risk Matrix			PROPOSED & APPROVED MITIGATION MEASURES				Mitigated Risk & Resolution				RESIDUAL RISK		
Ref	Scenario	Cause & Outcome	Existing controls, if any	L	C	LR	(1 Eliminate, 2 Substitute, 3 Reduce, 4 Control)				L	C	LR	Risk Owner	Client Approved	Design Status	Date	Risk Owner	Action Required
A Tank Farm																			
A.1	Failure of Individual Tank	Tank failure due to mechanical damage, structural fatigue, seal deterioration, faulty level controls and/or environmental stress. Leads to spillage of 1 tank's content. Potential risk of failure at heating coil nozzle connections due to increased thermal stress from temperature differential.	Tank inlet and outlet can be isolated close to tank body, limiting risk of loss from external piping. Bund volume exceeds the tank capacity Daily, monthly, quarterly visual external inspections for small leaks or signs of damage Ten-yearly detailed internal inspection Scheduled preventative maintenance works Bund release procedure for discharging wastewater - release valve is padlocked closed during normal operation, permission required to empty bund post inspection, area is manned at all times during discharge Dual radar level detection installed on all tanks 12 hour manning shift pattern planned for the site Bund designed as a water retaining structure. Inspected visually as part of monthly and quarterly inspections	1	1	VL					1	1	VL	GNC					
A.2	Failure of Multiple Tanks	Multiple Tank Failure due fire/explosion, catastrophic environmental issues and/or failure of common piping. Leads to spillage of 2 or more tank's contents. Only scenario identified is catastrophic failure of two tanks simultaneously.	All bulk tanks are able to be isolated from the header by manual and automatic valves No single point of release that would allow multiple tanks to lose their entire contents upstream of tank isolation valves Tanks are only loaded or unloaded one at a time. The only time multiple tanks are open is during ship unloading when one tank is full and it is being switched over to a second tank to prevent deadheading the ship's pump. This process will cease when terminal becomes export only. Two different access points into the bund to access manual valves for tank isolation Escalation procedure for oil emergencies is in place at the site Bund has capacity for volume of one bulk oil tank and any of the other smaller tanks on site Tank automatic isolation valves are fail closed	1	5	M					1	5	M	GNC					
A.3	Overfilling from External Sources	Overfilling of the bund due to failure occuring during heavy rainfall event	If operating during heavy rainfall event, one operator is assigned to monitor bund level and release as required This risk would only occur if there was a complete tank failure during a heavy rainfall event During rainfall events water level in the bund is monitored and maintained at low level to maintain operator access	1	5	M					1	5	M	GNC					
A.4	Failure during ship unloading	Not applicable, importing will cease after project completion				##													
A.5	Failure during ship loadout	Failure of a tank, pipeline or component during ship loading	Only one tank open to loadout at a time. No additional risks identified from single tank failure scenario.	1	1	VL													
A.6	Failure during road tanker unloading	No additional risks	Separate drive over bund, tanker volume directed to triple interceptor if failure occurs at tanker. Bund capacity exceeds bulk tank + tanker volume, no additional risk if failure occurs within bund during unloading.	1	1	VL													
A.7	Failure during road tanker loadout	Not applicable, road tanker loadout will cease after project completion. No additional risks identified.		1	1	VL													
A.8	Failure during diesel delivery	No additional risks	Separate drive over bund, tanker volume directed to triple interceptor Bund capacity exceeds bulk tank + tanker volume	1	1	VL													
A.9	Pool fire within bund	Fire within bulk tank farm	Fire safety study has been undertaken and recommendations adopted	1	1	VL								GNC					

Key;

C=Consequence1) Negligible 2) Minor 3) Moderate 4) Major 5) Extreme

L=Likelihood1) Rare 2) Unlikely 3) Possible 4) Likely 5) Almost Certain

LR =Level of Risk:VL) Very Low L) Low M) Medium H) High

Notes: Hazards / risks considered are those that are project / site specific, non-standard / bespoke designs, special processes, high hazard risks (e.g. non 'business as usual' hazards) that have been identified at the time of the review(s). Other risks will continue to appear during the design life of the project and should be assessed and managed by appropriate parties.