Preliminary Hazard Analysis

Precinct 3, Oakdale East Industrial Estate

Goodman Property Services (Aust.) Pty Ltd
Document No. RCE-21232_Goodman_PHA_Final_12Nov22_Rev(2)
Date 12/11/2022

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Precinct 3, Oakdale East Industrial Estate

Goodman Property Services (Aust.) Pty Ltd

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Quality Management

Rev	Date	Remarks	Prepared By	Reviewed By
A	14 March 2022	Draft issue for comment	Renton Parker	Jason Costa
0	13 April 2022	Issued Final		
1	6 June 2022	Updated quantities and assessments		
2	12 November 2022	Changed proposed tenant		

Executive Summary

Background

A Goodman Property Services (Aust.) Pty Ltd (Goodman) has proposed to develop a warehouse for a tenant who will store materials classified as Dangerous Goods (DG) within a warehouse at Precinct 3, Oakdale East Industrial Estate (OEIE), Horsley Park. Secretary's Environmental Assessment Requirements (SEARs) have been issued for the site which require the preparation of Chapter 3 of the State Environmental Planning Policy (SEPP, Ref. [1]) assessment and if the thresholds are exceeded a Preliminary Hazard Analysis (PHA) is required to be prepared.

A review of the DG quantities indicates they will exceed the thresholds; hence, a PHA has been prepared to assess the risks associated with the development as part of the State Significant Development Application (SSDA) in accordance with the Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 and No. 6 (Ref. [2] & [3]) for submission with the Development Application (DA).

Goodman has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare the PHA for the facility. This document represents the PHA study for the site located within Precinct 3 of the OEIE, Horsley Park.

Conclusions

A hazard identification table was developed for the warehouse facility to identify potential hazards that may be present at the site as a result of operations or storage of materials. Based on the identified hazards, scenarios were postulated that may result in an incident with a potential for offsite impacts. Postulated scenarios were discussed qualitatively and any scenarios that would not impact offsite were eliminated from further assessment.

Due to the location of the warehouse and the design of the refrigeration system it was identified that it was unlikely that there would be any offsite impacts; hence, the potential for injury or fatality over the site boundary would be unlikely and the risk of the site would subsequently be below the acceptable criteria published in HIPAP No. 4 (Ref. [2]).

Based on the analysis conducted, it is concluded that the risks at the site boundary are not considered to exceed the acceptable risk criteria; hence, the facility would only be classified as potentially hazardous and would be permitted within the current land zoning for the site.

Recommendations

Notwithstanding the conclusions following the analysis of the facility, the following recommendations have been made to provide flexibility for how the warehouse can be used in the future based upon the tenant that uses the facility:

- The warehouse and/or site boundaries shall be capable of containing 702 m^3 which may be contained within the warehouse footprint, site stormwater pipework and any recessed docks or other containment areas that may be present as part of the site design.
- The civil engineers designing the site containment shall demonstrate the design is capable of containing at least 702 m^3.

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Abbreviations

Abbreviation	Description
AS	Australian Standard
CBD	Central Business District
DA	Development Application
DGs	Dangerous Goods
DPIE	Department of Planning, Industry and Environment
HIPAP	Hazardous Industry Planning Advisory Paper
OEIE	Oakdale East Industrial Estate
PHA	Preliminary Hazard Analysis
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy

1.0 Introduction

1.1 Background

A Goodman Property Services (Aust.) Pty Ltd (Goodman) has proposed to develop a warehouse for a tenant who will store materials classified as Dangerous Goods (DG) within a warehouse at Precinct 3, Oakdale East Industrial Estate (OEIE), Horsley Park. Secretary's Environmental Assessment Requirements (SEARs) have been issued for the site which require the preparation of Chapter 3 of the State Environmental Planning Policy (SEPP, Ref. [1]) assessment and if the thresholds are exceeded a Preliminary Hazard Analysis (PHA) is required to be prepared.

A review of the DG quantities indicates they will exceed the thresholds; hence, a PHA has been prepared to assess the risks associated with the development as part of the State Significant Development Application (SSDA) in accordance with the Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 and No. 6 (Ref. [2] & [3]) for submission with the Development Application (DA).

Goodman has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare the PHA for the facility. This document represents the PHA study for the site located within Precinct 3 of the OEIE, Horsley Park.

1.2 Objectives

The objectives of the PHA project include:

- Complete the PHA according to the Hazardous Industry Planning Advisory Paper (HIPAP) No. 6 – Hazard Analysis (Ref. [3]),
- Assess the PHA results using the criteria in HIPAP No. 4 – Risk Criteria for Land Use Planning (Ref. [1]), and
- Demonstrate compliance of the site with the relevant codes, standards and regulations (i.e. NSW Planning and Assessment Regulation 1979, WHS Regulation, 2011 Ref. [4]).

1.3 Scope of Services

The scope of work is to complete a PHA study for the Warehouse located at Precinct 3, OEIE, Horsley Park, required by the Planning Regulations. The scope does not include any other assessments at the site nor any other facilities.

2.0 Methodology

2.1 Multi-Level Risk Assessment

The Multi-Level Risk Assessment approach (Ref. [4]) published by the NSW Department of Planning and Environment, has been used as the basis for the study to determine the level of risk assessment required. The approach considered the development in context of its location, the quantity and type (i.e. hazardous nature) Dangerous Goods stored and used, and the facility's technical and safety management control. The Multi-Level Risk Assessment Guidelines are intended to assist industry, consultants and the consent authorities to carry out and evaluate risk assessments at an appropriate level for the facility being studied.

There are three levels of risk assessment set out in Multi-Level Risk Assessment which may be appropriate for a PHA, as detailed in **Table 2-1**.

Table 2-1: Level of Assessment PHA

Level	Type of Analysis	Appropriate If:
1	Qualitative	No major off-site consequences and societal risk is negligible
2	Partially Quantitative	Off-site consequences but with low frequency of occurrence
3	Quantitative	Where 1 and 2 are exceeded

The Multi-Level Risk Assessment approach is schematically presented in **Figure 2-1**.

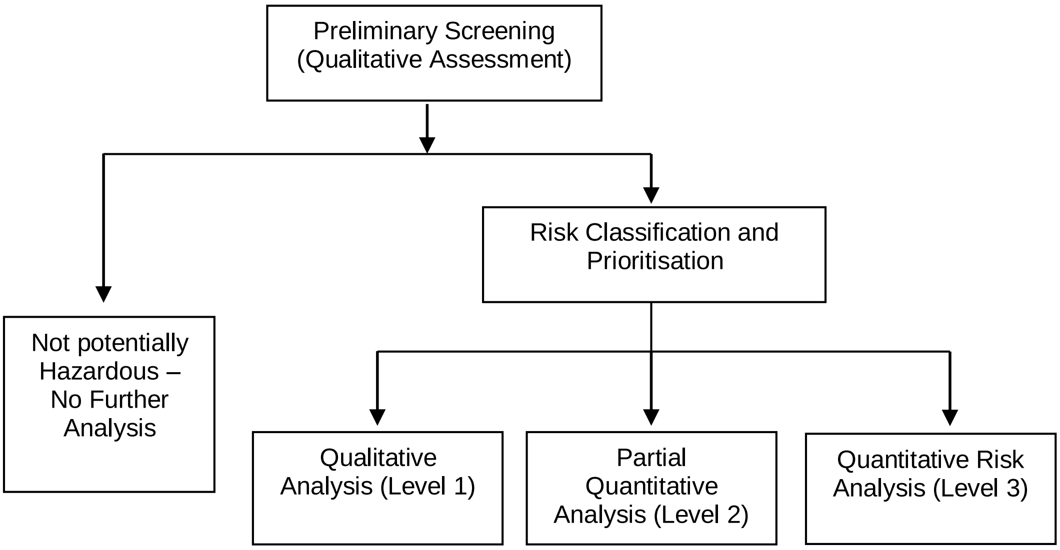

Figure 2-1: The Multi-Level Risk Assessment Approach

Based on the type of DGs to be used and handled at the proposed facility, a **Level 2 Assessment** was selected for the Site. This approach provides a qualitative assessment of those DGs of lesser quantities and hazard, and a quantitative approach for the more hazardous materials to be used on-site. This approach is commensurate with the methodologies recommended in "Applying SEPP 33's" Multi Level Risk Assessment approach (DPE, 2011).

2.2 Risk Assessment Study Approach

The methodology used for the PHA is as follows;

Hazard Analysis – A detailed hazard identification was conducted for the site facilities and operations. Where an incident was identified to have a potential off-site impact, it was included in the recorded hazard identification word diagram (**Appendix A**). The hazard identification word diagram lists incident type, causes, consequences and safeguards. This was performed using the word diagram format recommended in HIPAP No. 6 (Ref. [3]).

Each postulated hazardous incident was assessed qualitatively in light of proposed safeguards (technical and management controls). Where a potential offsite impact was identified, the incident was carried into the main report for further analysis. Where the qualitative review in the main report determined that the safeguards were adequate to control the hazard, or that the consequence would obviously have no offsite impact, no further analysis was performed. **Section 3.1** of this report provides details of values used to assist in selecting incidents required to be carried forward for further analysis.

Consequence Analysis – For those incidents qualitatively identified in the hazard analysis to have a potential offsite impact, a detailed consequence analysis was conducted. The analysis modelled the various postulated hazardous incidents and determined impact distances from the incident source. The results were compared to the consequence criteria listed in HIPAP No. 4 (Ref. [2]). The criteria selected for screening incidents is discussed in **Section 3.1**.

Where an incident was identified to result in an offsite impact, it was carried forward for frequency analysis. Where an incident was identified to not have an offsite impact, and a simple solution was evident (i.e. move the proposed equipment further away from the boundary), the solution was recommended, and no further analysis was performed.

Frequency Analysis – In the event a simple solution for managing consequence impacts was not evident, each incident identified to have potential offsite impact was subjected to a frequency analysis. The analysis considered the initiating event and probability of failure of the safeguards (both hardware and software). The results of the frequency analysis were then carried forward to the risk assessment and reduction stage for combination with the consequence analysis results.

Risk Assessment and Reduction – Where incidents were identified to impact offsite and where a consequence and frequency analysis was conducted, the consequence and frequency analysis for each incident were combined to determine the risk and then compared to the risk criteria published in HIPAP No. 4 (Ref. [2]). Where the criteria were exceeded, a review of the major risk contributors was performed, and the risks reassessed incorporating the recommended risk reduction measures. Recommendations were then made regarding risk reduction measures.

Reporting – on completion of the study, a draft report was developed for review and comment by Goodman. A final report was then developed, incorporating the comments received by Goodman for submission to the regulatory authority.

3.0 Site Description

3.1 Site Location

The site is located at Precinct 3, OIEI, Horsley Park which is approximately 43 km west of the Sydney Central Business District (CBD). **Figure 3-1** shows the regional location of the site in relation to the Sydney CBD. Provided in **Figure 3-3** is the layout of the site in Horsley Park.

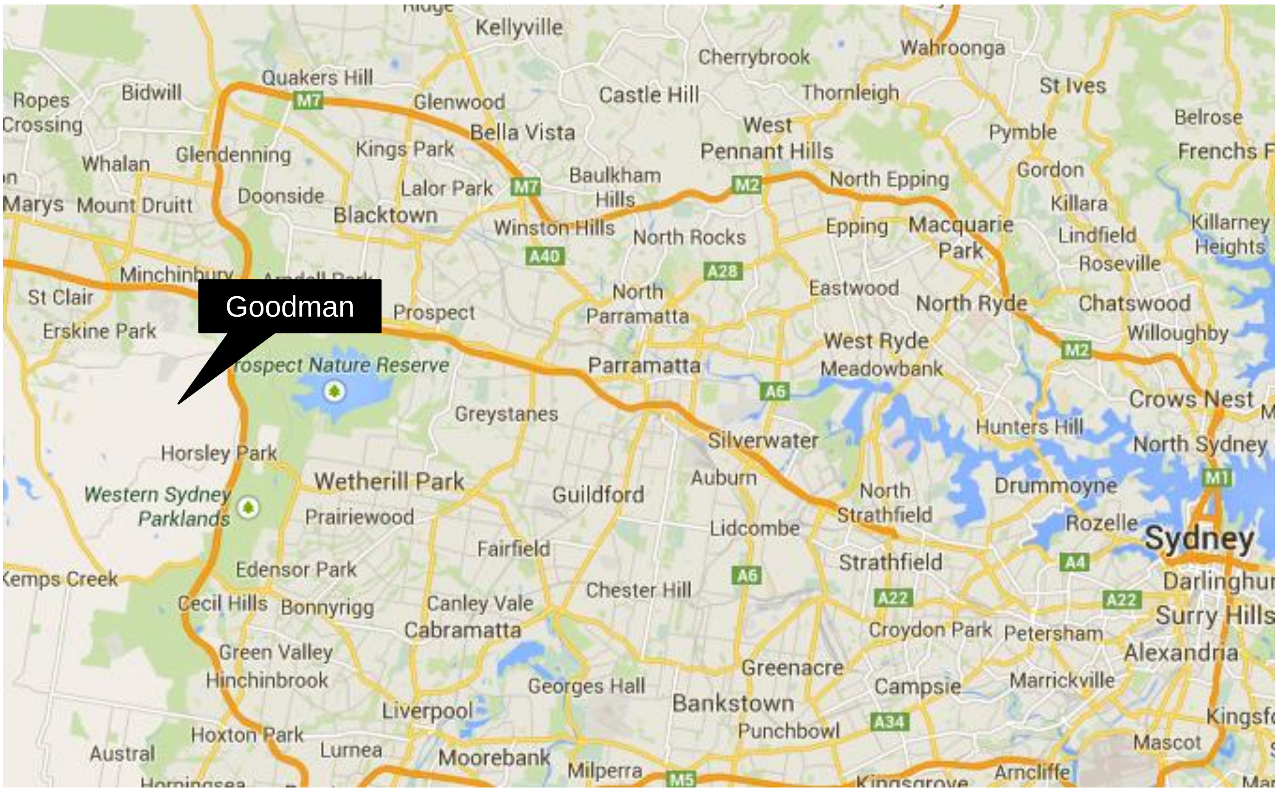

Figure 3-1: Site Location

3.2 Adjacent Land Uses

The land is located in an industrial area surrounded by the following land uses, which are adjacent to the site:

- North – Future freight corridor.
- South – Undeveloped land to be warehouses
- East – Undeveloped land to be warehouses
- West – Undeveloped land to be warehouses

3.3 Site Description

The warehouse will operate as a standard warehouse with a combination of high and low bay racking for the storage and handling of a range of non-dangerous goods.

The warehouse will be protected by an automatic sprinkler system involving ceiling mounted sprinklers designed to protect the commodities stored. The sprinklers which will activate upon fire detection which will suppress and control any fire that may occur. The warehouse will be naturally ventilated for occupation purposes which will provide adequate ventilation flow for preventing accumulation of any vapours released from packages in storage as required by AS/NZS 3833:2007 (Ref. [5]).

To future proof the warehouse it will be designed to contain at least 90 minutes of potentially contaminated fire water as required by AS/NZS 3833:2007 (Ref. [5]) and the NSW "*Best Practice Guidelines for Contaminated Water and Retention Systems*" (Ref. [6]). The water will be contained via isolation of the stormwater system which is performed by the actuation of a penstock valve upon fire detection or other means as necessary.

The warehouse will have the capability to have a chiller / freezer system which will utilise anhydrous ammonia as the working fluid. A brief description of how the refrigeration system operates is provided in **Section 3.4**.

3.4 Refrigeration System Description

The main hazards associated with chilled and frozen storage arise from the refrigeration system which uses an ammonia/direct expansion system. A refrigeration system contains four essential components:

1. Compressor
2. Expansion valve
3. Refrigerant
4. Heat exchanging pipework

Figure 3-2 has been provided to aid in the description of how the refrigeration system operates to cool a specific area. The refrigeration system at the facility contains approximately 2.5 tonnes of ammonia which is constantly cycled through the system. The system is a multi-stage refrigeration system with ammonia providing cooling to glycol which is transported around the facility.

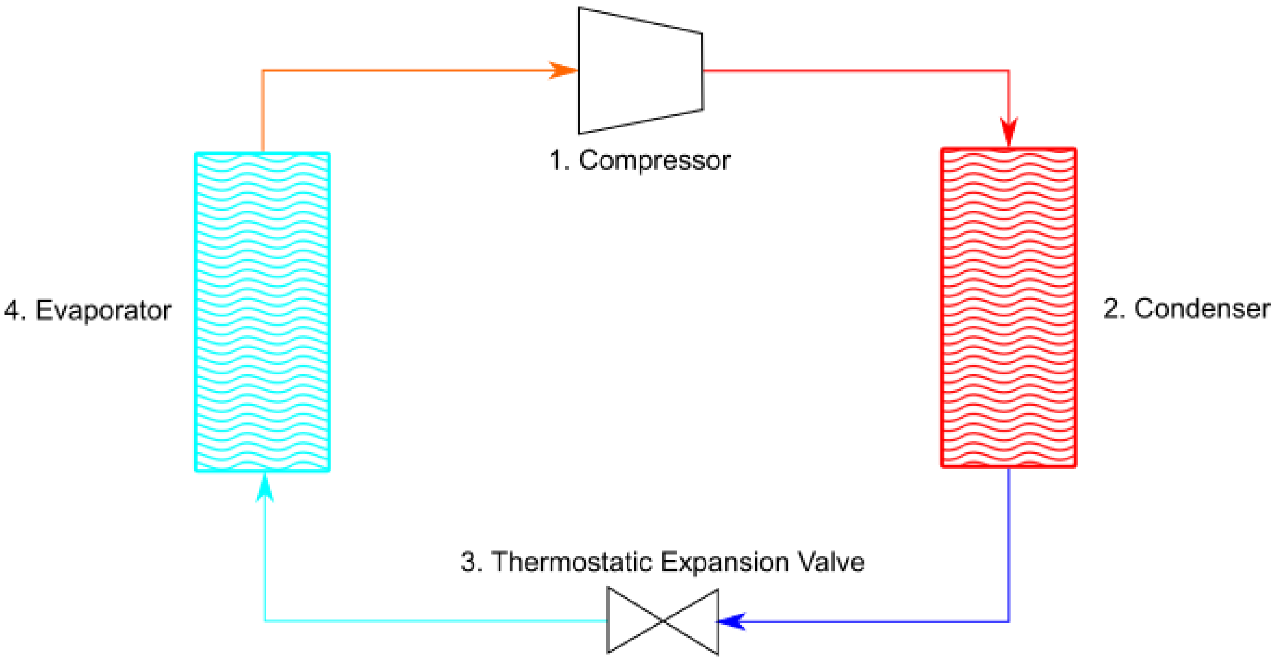

Figure 3-2: Refrigeration Flow Diagram

1. Ammonia gas from the evaporator enters the compressor where it is pressurised (red) which increases the temperature of the ammonia gas. The gas travels along the pipework to the condenser.
2. The condenser is coiled to provide a large surface area to allow the hot ammonia gas to dissipate heat. As the gas releases heat through the coils, the gas condenses into a pressurised liquid (dark blue).
3. The pressurised liquid enters the thermostatic expansion valve where it expands across the valve seat, resulting in a sudden drop of pressure of the liquid ammonia and rapid expansion which cools the liquid (light blue).
4. The cooled ammonia enters the evaporator which is coiled to provide a large surface area to facilitate exchange of heat from the warehouse into the ammonia. As the ammonia absorbs heat it boils into a gaseous state.
5. On completion of the cycle, the ammonia gas is drawn into the compressor and the cycle repeats.

3.5 Quantities of Dangerous Goods Stored and Handled

The classes and quantities to be approved in the facility are summarised **Table 3-1**.

Table 3-1: Maximum Classes and Quantities of Dangerous Goods Stored

Class	Packing Group	Description	Quantity (kg)
2.3	n/a	Anhydrous Ammonia	6,200

3.6 Aggregate Quantity Ratio

Where more than one class of dangerous goods are stored and handled at the site an AQR exists. This ratio is calculated using **Equation 3-1:**

$$AQR = \frac{q_x}{Q_x} + \frac{q_y}{Q_y} + [\ldots] + \frac{q_n}{Q_n}$$

Equation 3-1

Where:

x,y […] and n are the dangerous goods present

q_x, q_y, […] and q_n is the total quantity of dangerous goods x, y, […] and n present.

Q_x, Q_y, […] and Q_n is the individual threshold quantity for each dangerous good of x, y, […] and n

Where the ratio AQR exceeds a value of 1, the site would be considered a Major Hazard Facility (MHF). The threshold quantity for each class is taken from Schedule 15 of the Work Health and Safety (WHS) Regulation 2017 (Ref. [7]). These are summarised in **Table 3-2**.

Table 3-2: Major Hazard Facility Thresholds

Class	Packing Group	Threshold (tonnes)	Storage (tonnes)
2.3	III	200	6.2

A review of the thresholds and the commodities and packing groups listed in **Table 3-1** indicates only Class 2.3 is assessable against the MHF thresholds. Therefore, substituting the storage masses into **Equation 3-1** the AQR is calculated as follows:

$$AQR = \frac{6.2}{200} = 0.031$$

The AQR is less than 1; hence, the facility would not be classified as an MHF. In addition, the site is below 10% of the MHF threshold therefore no additional notification to SafeWork NSW is required.

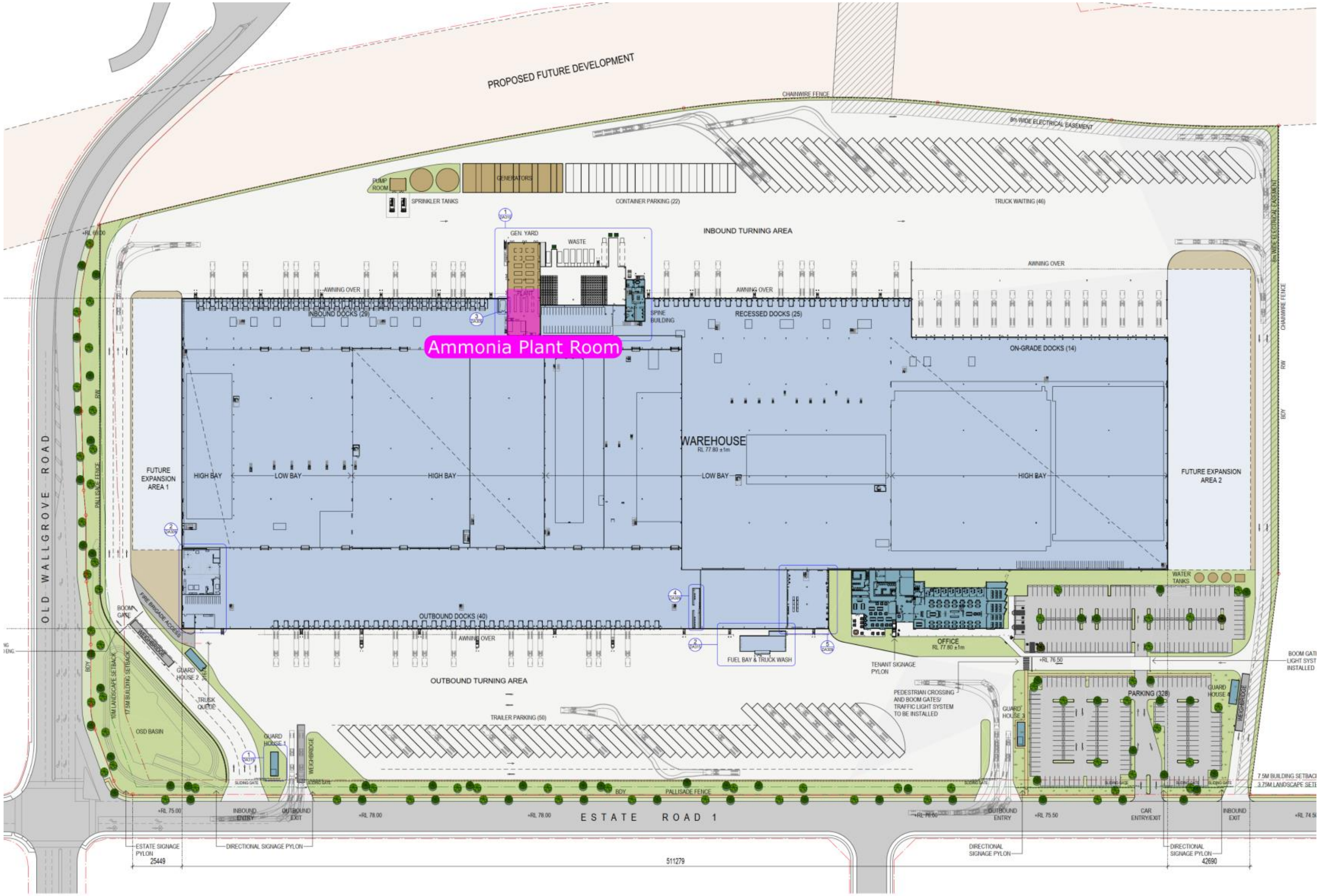

Figure 3-3: Site Layout

4.0 Hazard Identification

4.1 Introduction

A hazard identification table has been developed and is presented at **Appendix A**. This table has been developed following the recommended approach in Hazardous Industry Planning Advisory Paper No .6, Hazard Analysis Guidelines (Ref. [3]). The Hazard Identification Table provides a summary of the potential hazards, consequences and safeguards at the site. The table has been used to identify the hazards for further assessment in this section of the study. Each hazard is identified in detail and no hazards have been eliminated from assessment by qualitative risk assessment prior to detailed hazard assessment in this section of the study.

In order to determine acceptable impact criteria for incidents that would not be considered for further analysis, due to limited impact offsite, the following approach has been applied:

- *Fire Impacts* - It is noted in Hazardous Industry Planning Advisory Paper (HIPAP) No. 4 (Ref. [2]) that a criterion is provided for the maximum permissible heat radiation at the site boundary (4.7 kW/m^2) above which the risk of injury may occur and therefore the risk must be assessed. Hence, to assist in screening those incidents that do not pose a significant risk, for this study, incidents that result in a heat radiation less that at 4.7 kW/m^2, at the site boundary, are screened from further assessment.

  Those incidents exceeding 4.7 kW/m^2 at the site boundary are carried forward for further assessment (i.e. frequency and risk). This is a conservative approach, as HIPAP No. 4 (Ref. [2]) indicates that values of heat radiation of 4.7 kW/m^2 should not exceed 50 chances per million per year at sensitive land uses (e.g. residential). It is noted that the closest residential area is more than several hundred meters from the site, hence, by selecting 4.7 kW/m^2 as the consequence impact criteria (at the adjacent industrial site boundary) the assessment is considered conservative.

- *Explosion* - It is noted in HIPAP No. 4 (Ref. [2]) that a criterion is provided for the maximum permissible explosion over pressure at the site boundary (7 kPa) above which the risk of injury may occur and therefore the risk must be assessed. Hence, to assist in screening those incidents that do not pose a significant risk, for this study, incidents that result in an explosion overpressure less than 7 kPa, at the site boundary, are screened from further assessment. Those incidents exceeding 7 kPa, at the site boundary, are carried forward for further assessment (i.e. frequency and risk). Similarly, to the heat radiation impact discussed above, this is conservative as the 7 kPa value listed in HIPAP No. 4 relates to residential areas, which are over more than several hundred meters from the site.

- *Toxicity* – Toxic substances are proposed to be stored and have been assessed as part of the assessment based upon the toxicological effects of the products stored.

- *Property Damage and Accident Propagation* - It is noted in HIPAP No. 4 (Ref. [2]) that a criterion is provided for the maximum permissible heat radiation/explosion overpressure at the site boundary (23 kW/m^2/14 kPa) above which the risk of property damage and accident propagation to neighbouring sites must be assessed. Hence, to assist in screening those incidents that do not pose a significant risk to incident propagation, for this study, incidents that result in a heat radiation heat radiation less than 23 kW/m^2 and explosion over pressure less than 14 kPa, at the site boundary, are screened from further assessment. Those incidents exceeding 23 kW/m^2 at the site boundary are carried forward for further assessment with respect to incident propagation (i.e. frequency and risk).

- *Societal Risk* – HIPAP No. 4 (Ref. [2]) discusses the application of societal risk to populations surrounding the proposed potentially hazardous facility. It is noted that HIPAP No. 4 indicates that where a development proposal involves a significant intensification of population, in the vicinity of such a facility, the change in societal risk needs to be taken into account. In the case of the facility, there is currently no significant intensification of population around the proposed site; however, the adjacent land has been rezoned residential; hence, there will be housing located approximately more than several hundred meters from the site. Therefore, societal risk has been considered in the assessment.

4.2 Properties of Dangerous Goods

The type of DGs and quantities stored and used at the site has been described in **Section 3**. **Table 4-1** provides a description of the DGs stored and handled at the site, including the Class and the hazardous material properties of the DG Class.

Table 4-1: Properties* of the Dangerous Goods and Materials Stored at the Site

Class	Hazardous Properties
2.3 – Toxic gases (Anhydrous Ammonia)	Ammonia is a colourless toxic gas which is highly hydroscopic (i.e. water soluble). At an ammonia concentration of 0.5% (5,000 ppm, Ref. [8]) a fatality will occur within minutes of exposure. Within concentration limits of 15% – 33.6% (150,000 – 336,000 ppm, Ref. [9]) ammonia can ignite given the right conditions, resulting in fire and/or explosion. It is noted that ignition of ammonia is difficult and can only be achieved by a high-energy source. In addition, sustained ignition of ammonia (i.e. burning) rarely occurs as the heat of the flame is less than the heat of ignition. Ammonia is used as a raw material for the synthesis of fertilisers, cleaning agent or refrigeration.

* The Australian Code for the Transport of Dangerous Goods by Road and Rail (Ref. [10]).

4.3 Hazard Identification

Based on the hazard identification table presented in **Appendix A**, the following hazardous scenarios have been developed:

- Ammonia loss of containment, and toxic gas dispersion.

Each identified scenario is discussed in further detail in the following sections.

4.4 Ammonia Loss of Containment and Toxic Gas Dispersion

The proposed refrigeration system will utilise ammonia which is a Class 2.3 toxic gas. In the event of loss of containment (i.e. ruptured vessel, pipework, seals, etc.) there is the potential for ammonia to be released which would disperse downwind from the release point. Depending upon the flow rate of the release, the dispersion may have sufficient concentration to impact over the site boundary which may result in an injury or fatality.

The proposed quantity of ammonia to be stored is 6,200 kg which exceeds SEPP 33; however, the plant room is located centrally within the site with the shortest distance to the site boundary being approximately 90 m allowing substantial time for dispersion. The ventilation exhaust point from the plant room would be approximately 16 m above ground which would provide substantial vertical distance for dispersion in addition to the 90 m lateral distance. Therefore, it is considered that the majority of release scenarios from the plant room would be dispersed prior to impact ground level over the site boundary. Large releases (i.e. vessel failure) may result in sufficient concentration to impact over the site boundary and at ground level; however, these are low frequency events and would fall below the acceptable criteria.

The refrigeration system will be designed in accordance with AS 2022:2003 (Ref. [8]) which provides the design requirements to minimise the risks associated with an ammonia system by ensuring appropriate isolations and protections are incorporated into the design.

Based upon the location of the plantroom and the release height, it is considered that there would be sufficient distance and height to result in sufficient dispersion to prevent unacceptable impacts at the site boundary; hence, this incident has not been carried forward for further analysis.

5.0 Conclusion and Recommendations

5.1 Conclusions

A hazard identification table was developed for the warehouse facility to identify potential hazards that may be present at the site as a result of operations or storage of materials. Based on the identified hazards, scenarios were postulated that may result in an incident with a potential for offsite impacts. Postulated scenarios were discussed qualitatively and any scenarios that would not impact offsite were eliminated from further assessment.

Due to the location of the warehouse and the design of the refrigeration system it was identified that it was unlikely that there would be any offsite impacts; hence, the potential for injury or fatality over the site boundary would be unlikely and the risk of the site would subsequently be below the acceptable criteria published in HIPAP No. 4 (Ref. [2]).

Based on the analysis conducted, it is concluded that the risks at the site boundary are not considered to exceed the acceptable risk criteria; hence, the facility would only be classified as potentially hazardous and would be permitted within the current land zoning for the site.

5.2 Recommendations

Notwithstanding the conclusions following the analysis of the facility, the following recommendations have been made to provide flexibility for how the warehouse can be used in the future based upon the tenant that uses the facility:

- The warehouse and/or site boundaries shall be capable of containing 702 m^3 which may be contained within the warehouse footprint, site stormwater pipework and any recessed docks or other containment areas that may be present as part of the site design.
- The civil engineers designing the site containment shall demonstrate the design is capable of containing at least 702 m^3.

6.0 References

[1] NSW Department of Planning and Environment, "Applying SEPP33 – Hazardous and Offensive Developments," NSW Department of Planning and Environment, Sydney, 2011.

[2] Department of Planning, "Hazardous Industry Planning Advisory Paper No. 4 - Risk Criteria for Land Use Safety Planning," Department of Planning, Sydney, 2011.

[3] Department of Planning, "Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis," Department of Planning, Sydney, 2011.

[4] Department of Planning, Multi-Level Risk Assessment, Sydney: Department of Planning, 2011.

[5] Standards Australia, "AS/NZS 3833:2007 - Storage and Handling of Mixed Classes of Dangerous Goods, in Packages and Intermediate Bulk Containers," Standards Australia, Sydney, 2007.

[6] NSW Department of Planning, "Best Practice Guidelines for Contaminated Water Retention and Treatment Systems," NSW Department of Planning, Sydney, 1994.

[7] SafeWork NSW, "Work Health and Safety Regulation," SafeWork NSW, Lisarow, 2017.

[8] Standards Australia, "AS/NZS 2022:2003 - Anhydrous Ammonia - Storage and Handling," Standards Australia, Sydney, 2003.

[9] Standards Australia, "AS/NZS 60079.20.1:2012 - Material characteristics for gas and vapour classification - test methods and data," Standards Australia, Sydney, 2012.

[10] Road Safety Council, The Australian Code for the Transport of Dangerous Goods by Road and Rail Edition 7.7, Canberra: Road Safety Council, 2020.

[11] Standards Australia, "AS/NZS 5149:2016 - Refrigerating systems and heat pumps - Safety and environmental requirements Definitions, classification and selection criteria," Standards Australia, Sydney, 2016.

[12] Standards Australia, AS/NZS 60079.10.1:2009 - Explosive Atmospheres Part 10.1: Classification of Areas, Explosive Gas Atmospheres, Sydney: Standards Association of Australia, 2009.

Appendix A

Hazard Identification Table

Appendix A

A1. Hazard Identification Table

ID	Area/Operation	Hazard Cause	Hazard Consequence	Safeguards
1	Anhydrous Ammonia (Refrigeration Plant)	• Loss of containment of anhydrous ammonia refrigeration system • Leaking flanges / valves / pipes / pumps • Loss of containment of compressors • Failure of pumps • Loss of containment of heat exchangers / condensers	• Potential for release of toxic ammonia gas • Potential for injuries and/or fatalities (onsite and offsite)	• Ammonia system to comply with AS/NZS 5149 (Ref. [11]) • Gas detection and alarms • Safety interlocks and SCADA system • Emergency Response and Evacuation Plans • Wind sock • Emergency shutdown system • Fire detection and suppression (dilution of ammonia gas with fire water) • Appropriate ventilation system for plant room
2	Anhydrous ammonia (refrigeration plant)	• Loss of containment of NH_3 above LEL • Presence of ignition sources	• Fire and / or explosion resulting in potential injuries onsite and potentially offsite	• Ammonia system to comply with AS/NZS 5149 (Ref. [11]) • HAC in accordance with AS/NZS 60079.10.1:2009 (Ref. [12]) • Exclusion of ignition sources in hazardous areas