PRELIMINARY HAZARD ANALYSIS
FOR
SUPER RETAIL GROUP SYDNEY
133-145 LENORE DRIVE, ERSKINE PARK

Prepared for: Super Retail Group Sydney
Xact Solutions

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EXECUTIVE SUMMARY

Benbow Environmental (BE) was commissioned by Xact Solutions to prepare a Preliminary Hazard Analysis (PHA) for the proposed Super Retail Group Sydney Distribution Centre to be located at 133-145 Lenore Drive, Erskine Park NSW. The site will store quantities of Class 2.1, Class 2.2, Class 3 PG II and III, Class 4.1 PG II, Class 6.1 PG III, Class 8 PG II and III, and Class 9 PG III Dangerous Goods. These materials have been assessed using the State Environmental Planning Policy No. 33 (SEPP). The PHA is required as the storage of Class 2.1 flammable solids exceed the SEPP 33 screening threshold.

The Preliminary Hazard Analysis (PHA) has been prepared in accordance with the Multi-Level Risk Assessment and Hazardous Industry Planning Advisory Papers (HIPAPs) guidelines stipulated by the Department of Planning and Infrastructure (DoPI) NSW. The purpose of the PHA is to assess whether the proposed volume of dangerous goods stored and the operations that occur at the site are offensive or hazardous, thereby posing an unacceptable risk to the surrounding community.

Safeguard measures have been considered and included in the design and operation of the facility to ensure that the safety and amenity of the neighbouring premises would not be affected by the proposed development.

The societal risk of the proposed operation was deemed as negligible for the storage of Class 3 and Class 6.1 dangerous goods in accordance with the estimation technique described in the Multi-Level Risk Assessment guidelines. However, the storage of Class 2.1 flammable liquids fell in the ALARP region, thus a Level 2 risk assessment was required to be and was undertaken.

Section 4 of the report has identified and examined a number of potential events/consequence scenarios that could occur on site. The prevention and protection measures designed into the operations of each of the activities associated with each event were listed and discussed in a Hazard Identification Chart.

From the Hazard Identification Chart, the hazardous events were deemed as unlikely to occur due to the proposed prevention and protection measures designed for the SRG warehouse and distribution facility. However, the hazards associated with Class 2.1 dangerous goods, as well as a number of other potentially hazardous events, were examined in greater detail to determine which events may have significant off-site impacts. A number of hazardous events involving the generation of pool fires and toxic emissions have been modelled to determine quantitative impacts.

Given the outcomes of the assessment, the Preliminary Hazard Analysis has found that the operation of the proposed development readily meets the criteria outlined in the HIPAP No. 4 *Risk Criteria for Land Use Safety Planning* and would not cause any risk, significant or minor, to the community, with the recommended safeguards in place.

Throughout the preparation of this PHA, it has been determined that the proposed development meets all the safety requirements stipulated by DoPI and hence would not be considered to be an offensive or hazardous development.

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Attachment 1: MSDS's of Chemicals Stored

1. INTRODUCTION

Benbow Environmental has been commissioned by Xact Solutions to prepare a Preliminary Hazard Analysis (PHA) for Super Retail Group's proposed warehouse and distribution facility to be located at 133-145 Lenore Drive, Erskine Park NSW.

The subject site was previously approved as a printing, warehouse and distribution facility. The proposed modified use of the site involves the development of the SRG warehouse and distribution facility which will not include printing or any other manufacturing or production processes.

The proposed facility will store quantities of Class 2.1, Class 2.2, Class 3 PG II and III, Class 4.1 PG II, Class 6.1 PG III, Class 8 PG II and III, and Class 9 PG III Dangerous Goods.

A Preliminary Hazard Analysis (PHA) has been prepared to ensure that all potential hazards and risks from the proposed site are appropriately identified, managed and controlled (if controls are deemed necessary).

The PHA has been prepared in accordance with the documents entitled *"Multi-Level Risk Assessment"*, "*Hazardous Industry Planning Advisory Paper No. 4 – Risk Criteria for Land Use Safety Planning"* (HIPAP No. 4)" and the "*Hazardous Industry Planning Advisory Paper No. 6 – Guideline for Hazard Analysis"* (HIPAP No. 6), all published by the Department of Planning and Infrastructure (DoPI).

The study includes the following key aspects of the assessment:

- Assessment of the proposed development with consideration to the provisions of SEPP 33 and the compliance with WorkCover requirements.
- Evaluation of any potential hazards imposed by the proposed site operations on the surrounding environment and communities.
- Making recommendations on the relevant prevention/protection strategies necessary to minimise the impact and risk of human fatalities, property damage and environmental pollution.

2. OVERVIEW OF THE DEVELOPMENT

2.1 PROPOSED DEVELOPMENT

The proposal involves the modified use of the previously approved printing, warehouse and distribution facility, located on Lenore Drive, Erskine Park, to a warehouse and distribution facility for Super Retail Group Sydney. The distribution centre will initially operate morning and afternoon shifts but will be designed to operate 24 hours per day, 7 days per week.

The facility will store mostly non-dangerous goods in their warehouses. All dangerous goods stored on site will be stored in a designated Dangerous Goods Store located north-east of the site. This DG store will be 1,800 m^2 in area and contains Class 2, Class 3, Class 4.1, Class 6, Class 8 and Class 9 dangerous goods, and up to 971,712 L of non-dangerous oils and coolants. There will be no storages of Class 1 or Class 5 dangerous goods as these will be transported directly to retail stores. The type and quantity of dangerous goods stored has been based on those classes and volumes as provided by Super Retail Group.

The proposal involves the following changes:

- Warehouse 2 & 3 Building will be a single warehouse with an increase in setback from the northern boundary which results in a "shortening" of the approved floor plate. Warehouse 1 will remain as part of the development.
- The proposed facility will consist of approximately 51,300 m^2 of floor space in comparison to an approved floor space of 58,836 m^2.
- An increase in height of approximately 1m for the SRG warehouse building.

The following provides the list of activities that would occur on site:

- Receipt and despatch of products.
- Transport of goods within warehouses.
- Warehousing and storage of goods.
- Office and administration.
- Packing activities involving warehouse equipments (i.e. pallet dispensers, stretch wrapper, cardboard compactor, general waste compactor and plastic bale press).
- Battery charge.

2.2 SITE DETAILS

2.2.1 Site Location

The proposed site is to be located at Lot 62 DP 1090695 Lenore Drive, Erskine Park, 2759. The proposed site is located within the Penrith City Council Local Government Area. Figure 2-1 shows the location of the site in its local context.

The subject site is located within an industrial zoned area at Erskine Park. A large residential zoned area is located north of the site location, with major overhead power lines shown as the significant feature located between the two zoned areas. Blackwell Primary School is located approximately 1.4 km north-west of the subject site, whilst Erskine Park High School is located approximately 350 m north-east of the site. A second primary School – James Erskine Primary School is situated adjacent and immediately north of Erskine Park High School. In future, it is expected that more industrial premises will be developed and built around the subject site.

2.2.2 Nearest Identified Sensitive Receptors

The site is located at the edge of an industrial zone area bordering residential premises to the north. The following residences were considered as the nearest receptors for the assessment.

Table 2-1: Location of the Nearest Residential Areas

Receptor ID	Residential Areas	Bearing	Approximate Distance (m)
A	5 Tipani Place, Erskine Park, 2759	NW	470
B	4 Toscano Court, Erskine Park, 2759	NW	370
C	6 Ballyleaney Place, Erskine Park, 2759	NW	230
D	38 Swallow Drive, Erskine Park, 2759	NE	200
E	16 Regulus Street, Erskine Park, 2759	N	50
F	76 Swallow Drive, Erskine Park, 2759	NE	320
G	18 Shaula Crescent, Erskine Park, 2759	NE	170
H	96 Swallow Drive, Erskine Park, 2759	NE	370
I	8 Pictor Street, Erskine Park, 2759	NE	500

Figure 2-2 provides an aerial photograph of the site location and shows the nature of existing land use within proximity of the site.

Figure 2-1: Site Plan

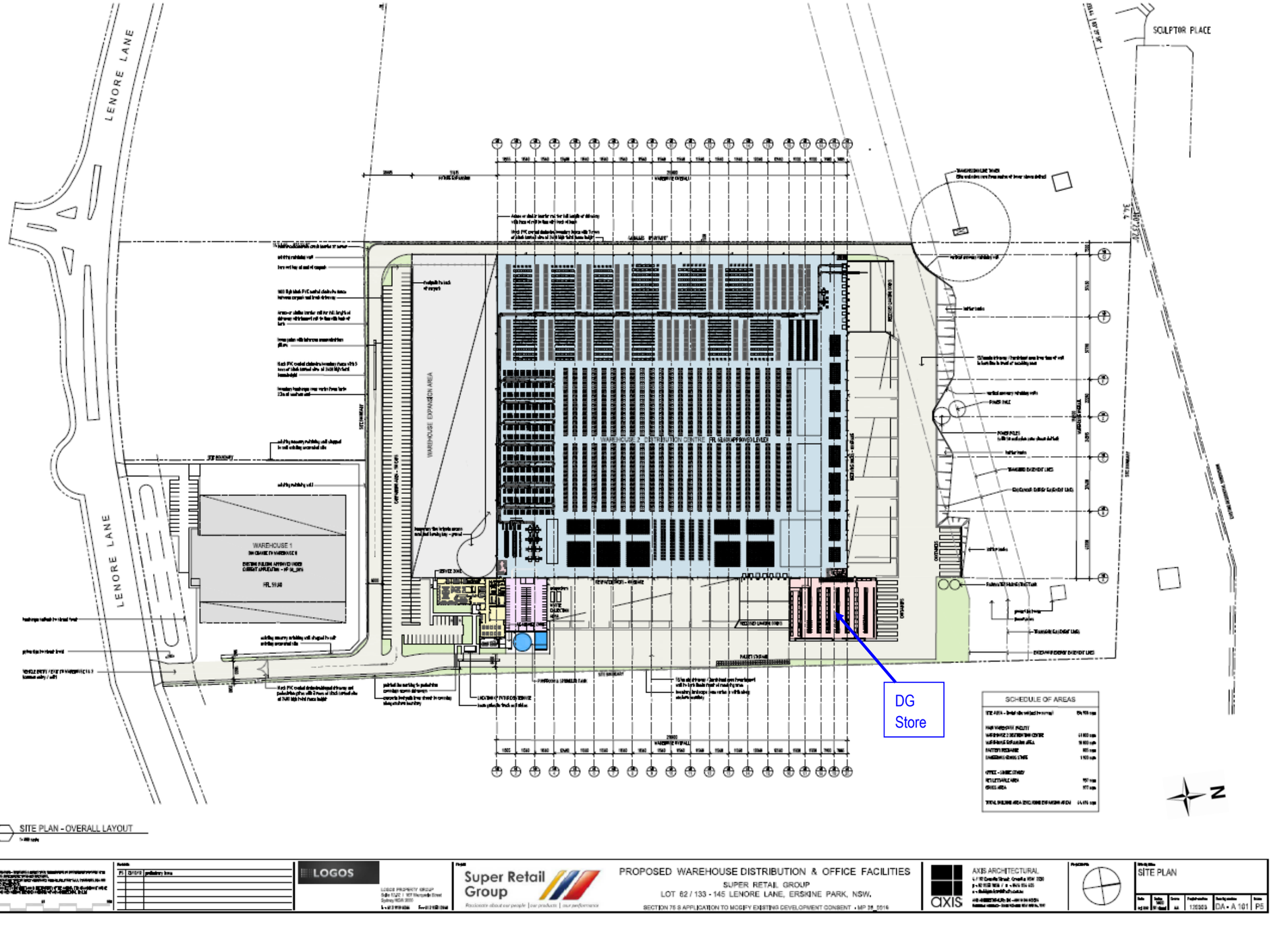
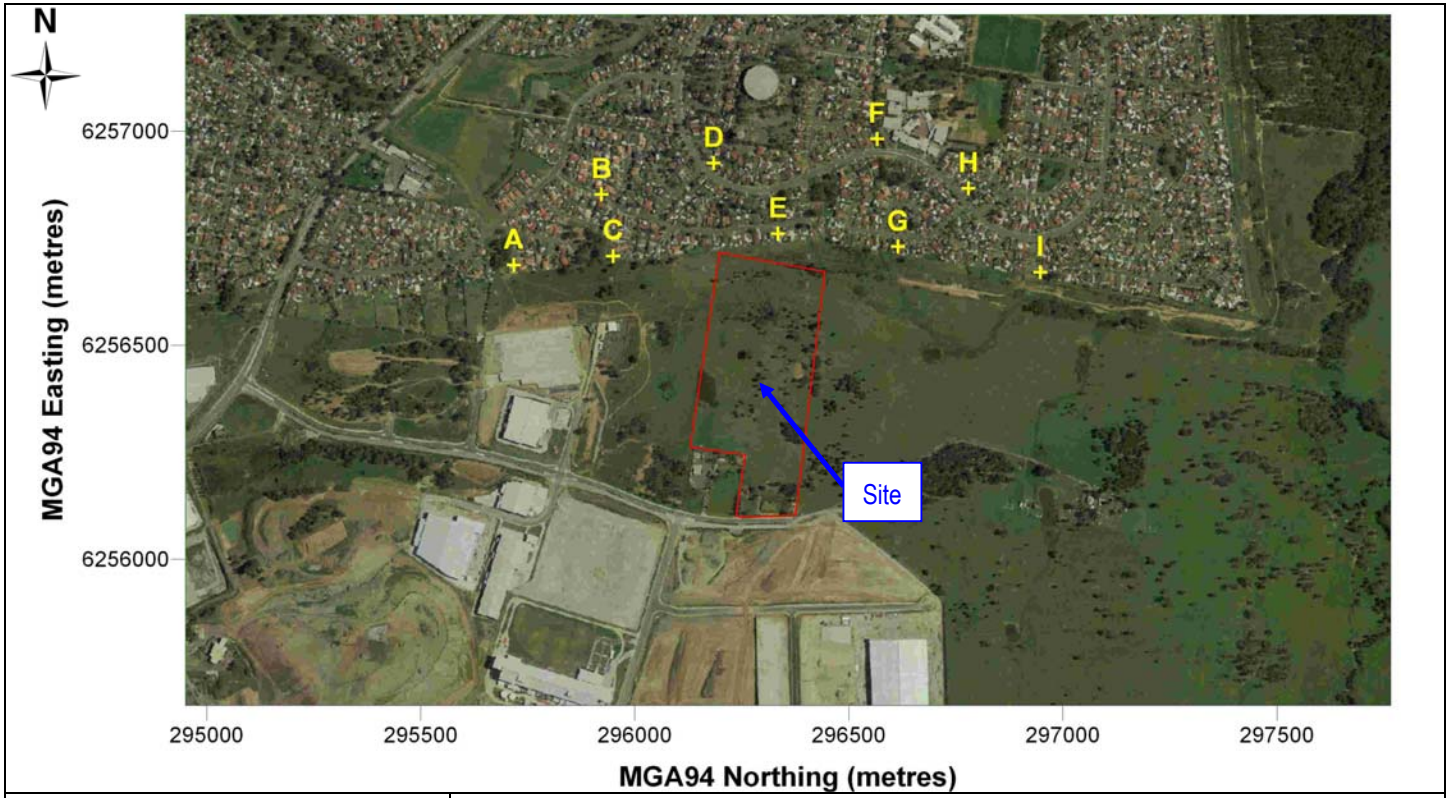


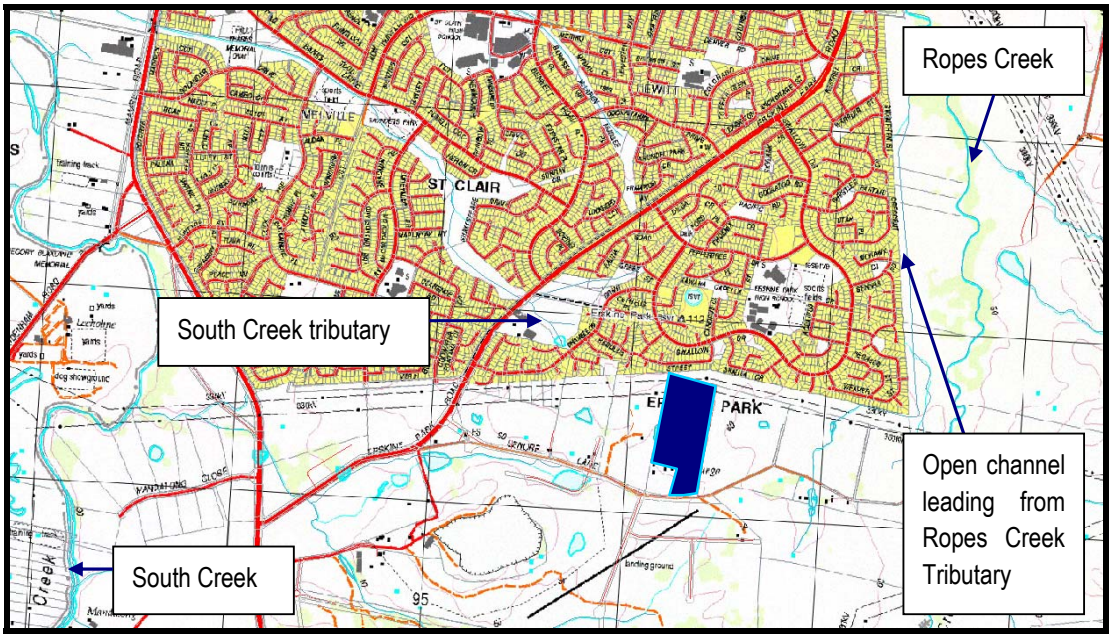
Figure 2-2: Site Location



2.2.3 Nearest Natural Waterway

The site is situated between Ropes Creek to the east, and South Creek, west of the site. Tributaries of both these creeks travel towards the site; the closest open channels are approximately 570 m west and 550 m east of the site boundaries.

Figure 2-3: Nearest Natural Waterways



Source: © Department of Lands

2.2.4 Hours of Operation

It has been proposed that the initial operations at the site will consist of two shifts (day and afternoon) with a thirty minute break between each shift. However, the site will be designed to operate 24 hours per day and 7 days per week.

3. DANGEROUS GOODS STORAGE & HANDLING

3.1 QUANTITIES OF DANGEROUS GOODS

The SRG distribution centre proposes to store mostly non-dangerous goods throughout their warehouses. Those products that are classified as a dangerous good will be stored in a separate Dangerous Goods Store located north-east of the site adjoining the Warehouse 2. Details of the proposed storage of dangerous goods are provided in Table 3-1.

Dangerous goods are now classified as equivalent Global Harmonised System classes and categories under the Work Health and Safety Regulations. These classes are provided in Table 3-1. However, for ease of understanding and for the use of relevant guidelines, the original DG classes have been referred to in this assessment, also provided in Table 3-1.

The DG classes stored on site include Class 2, Class 3, Class 6, Class 8 and Class 9 dangerous goods. The maximum anticipated volumes to be stored are 195,768 L[1] of Class 2 gases and 161,280 L of Class 3 flammable liquids. There will also be up to 300 kg of Class 4.1 flammable solids, 500 L of Class 6.1 toxic substances, 4,032 L of Class 8 corrosive substances, and 8,064 L of Class 9 miscellaneous dangerous substances. In addition, the DG Store will store up to 971,712 L of non-dangerous oils and coolants. There will be no storages of Class 1 or Class 5 dangerous goods as these will be transported directly to retail stores.

As the stored quantities and properties of each dangerous goods product will vary, the main product with the largest quantities of each DG class were used to represent each DG class in this assessment. These main products, along with the other minor products, are listed in Table 3-1. The type and quantity of dangerous goods stored has been based on the information provided by Super Retail Group.

Information on the chemicals being stored on site is provided in Table 3-1 below. The locations of these dangerous goods are described in Figure 3-1.

The chemical stored and handled onsite have been assessed against the screening threshold of SEPP 33 as a preliminary assessment to identify whether or not the proposed operation is considered to be potentially hazardous or offensive.

[1] Water Capacity

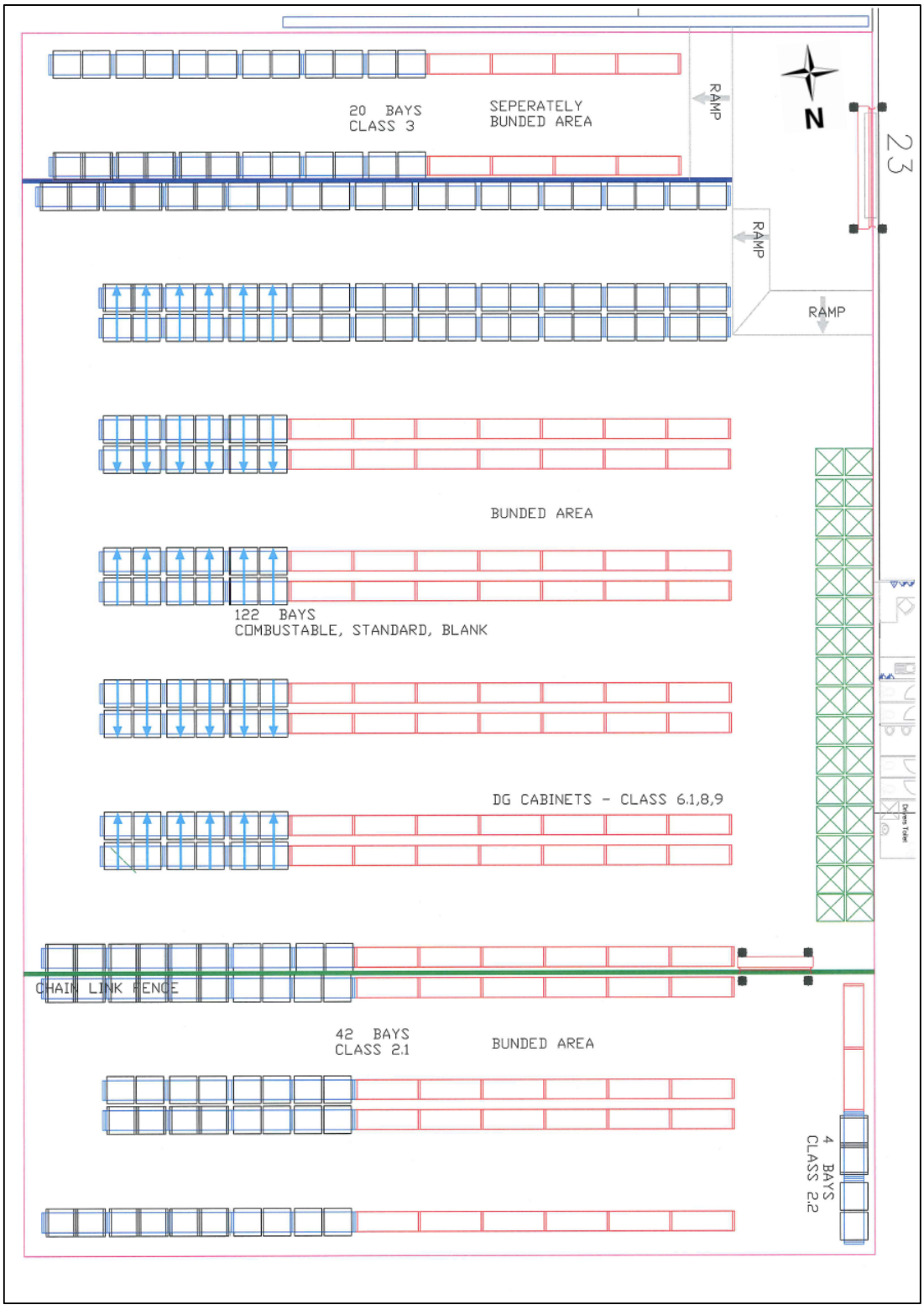
Table 3-1: Maximum Dangerous Goods Quantity On Site

DG Class	Packing Group	GHS Class and Category	Main Product	UN Number	Minor Products	Max Unit Size	Maximum Amount
2.1 – Flammable Gases and aerosols	-	Flammable aerosols category 1 & 2 Flammable gases category 1	Degreaser	1950	Aerosols air freshener/spray greasers e.g. silicone spray Small butane cartridges	600 g	179,640 L[1]
2.2 – Non-flammable, non-toxic gases	-	Gases under pressure not otherwise specified	Fire extinguisher	1044	Carpet/upholstery cleaner	600 g	16,128 L[1]
3 – Flammable liquids	II & III	Flammable liquids category 2 & 3	Thinner	1263	Kerosene, turpentine substitute, acetone, isopropyl alcohol/isopropanol, ethanol solution, paint.	4 L	161,280 L
4.1 – Flammable solids	II	Flammable solids category 1	Polish	3175	-	142 g	300 kg
6.1 – Toxic Substances	II & III	Acute toxicity: Oral category 3, Dermal category 3, Inhalation category 3 (dusts, mists, vapours)	Paint stripper	2927	Dichloromethane	4 L	500 L
8 - Corrosive	II & III	Skin corrosion category 1A & B	Degreaser	1760	Cleaner rim turtlewax, fibreglass repair kit, permatex degreaser, wheel cleaner, rust treatment	1 L	4032 L

Table 3-1: Maximum Dangerous Goods Quantity On Site							
9 – Miscellaneous dangerous substances	III	Class 9 dangerous goods include ecotoxicological hazard classes and categories, and are not mandatory under WHS regulations. They may be used to supplement the GHS classification of a substance or a mixture or to comply with other environmental legislations.	Tyre shine	1268	Environmentally Hazardous Substance, liquid, air care ventilation, ambi pur	700 mL	8,064 L
Oils Non-DG	-	-	Oils and coolants		Engine oil/gear oil, coolants/antifreeze products	20 L	971,712 L

Note: [1] – Water Capacity

Figure 3-1: Dangerous Goods Store Layout



3.2 DANGEROUS GOOD STORAGE REQUIREMENTS

The site will be designed to conform to the *Occupational Health and Safety Amendment (Dangerous Goods) Regulations 2005, Work Health and Safety Regulation 2011,* and relevant Australian Standards.

All dangerous good storage and handling practices would comply with:

- *Work Health and Safety Act 2011*;
- *Work Health and Safety Regulation 2011*;
- *Dangerous Goods (Road and Rail Transport) Act 2008*;
- How to Manage Work Health and Safety Risks Code of Practice 2011;
- AS/NZS 4804:2001 Occupational Health and Safety Management Systems – General Guidelines on Principles, Systems and Supporting Techniques;
- AS/NZS 3833:2007 The Storage and Handling of Mixed Classes of Dangerous Goods in Packages and Intermediate Bulk Containers;
- AS 1940:2004 The Storage and Handling of Flammable and Combustible Liquids;
- AS 2714:2008 The Storage and Handling of Organic Peroxides;
- AS 3780:2008 The Storage and Handling of Corrosive Substances;
- AS 4332:2004 The Storage and Handling of Gases in Cylinders;
- SafeWork Australia – National Standard for the Storage and Handling of Dangerous Goods [NOHSC:1015(2001)];
- SafeWork Australia – National Code of Practice for the Storage and Handling of Dangerous Goods [NOHSC:2017(2001)];
- SafeWork Australia - Approve Criteria for Classifying Hazardous Substances [NOHSC:1008(2004)];
- How to manage risk of hazardous chemicals (N.S.W. Code of Practice provided as guidance until approved in 2012);
- Globally Harmonised System of Classification and Labelling of Chemicals 4th Revised Edition (2011); and
- Australian Dangerous Goods (ADG) Code 7th Edition.

Dangerous goods will be stored based on their compatibilities. Incompatible substances will be segregated in accordance with AS/NZS 3833:2007.

The following classes will be kept separate by at least 3m within the dangerous goods store:

- Class 2.1 flammable gases and Class 2.2 non-flammable/non-toxic gases
- Class 2.2 non-flammable/non-toxic gases and Class 3 flammable liquids
- Class 3 flammable liquids and Class 6 toxic substances
- Class 2 gases and Class 6 toxic substances
- Class 2 gases and Class 8 corrosive substances
- Class 4 flammable solids and Class 3 flammable liquids
- Class 4 flammable solids and Class 6 toxic substances

The following classes will be kept separate by at least 5m within the dangerous goods store:

- Class 2.1 flammable gases and Class 3 flammable liquids; and
- Class 2 gases and Class 4.1 flammable solids.

3.3 HAZARDOUS AREA ZONING

This section outlines the hazardous area zones to be implemented at the proposed facility.

The hazardous area zones are required to enable the protection for electrical equipment to be determined. Specific protection techniques can be one or more of the following:

- Separation distances;
- Enclosures according to relevant Australian Standards;
- Flame proof rated electrical equipment;
- Intrinsically safe electrical equipment;
- Encapsulation of electrical devices;
- Vapour barriers;
- Ventilation; and
- Safety interlocks.

Hazardous areas are classified into one of three zones – Zone 0, Zone 1, and Zone 2. The type of protection required to prevent electrical equipment from being an ignition source depends on the Zone the electrical apparatus is contained within.

The definition of each Zone classification is provided below, as sourced from AS/NZS 60079.10:2004 – Electrical apparatus for explosive gas atmospheres – Classification of hazardous areas.

Zone 0 – A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is present continuously or for long periods or frequently.

Zone 1 – A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is likely to occur in normal operation occasionally.

Zone 2 – A place in which an explosive atmosphere consisting of a mixture with air of flammable substances in the form of gas, vapour or mist is not likely to occur in normal operation but, if it does occur, will persist for a short period only.

3.3.1 Hazardous Zones Applicable to the Site

The DG Store building will have four sides of 240/240/240 fire rated walls. The interior of the DG Store will be classified as a hazardous atmosphere area in accordance with AS/NZS 60079.10.1:2009 Classification of areas – explosive gas atmosphere. The DG store will be designed to meet hazardous area Zone 2 for the interior of the DG Store as well as 3m from the fire door to within the adjoining warehouse. No ignition sources will be allowed in this area and only equipments designed to meet the requirements of a Zone 2 hazardous area, including forklifts, will be allowed in the DG Store.

3.4 DANGEROUS GOODS SCREENING AGAINST SEPP33 THRESHOLDS

Dangerous Goods to be stored onsite have been assessed against the screening threshold limits outlined in *"Applying SEPP 33,"* a guideline published by the Department of Planning and Infrastructure. This initial screening process determines whether the proposal is potentially hazardous, and provides guidance on the level of analysis that is required.

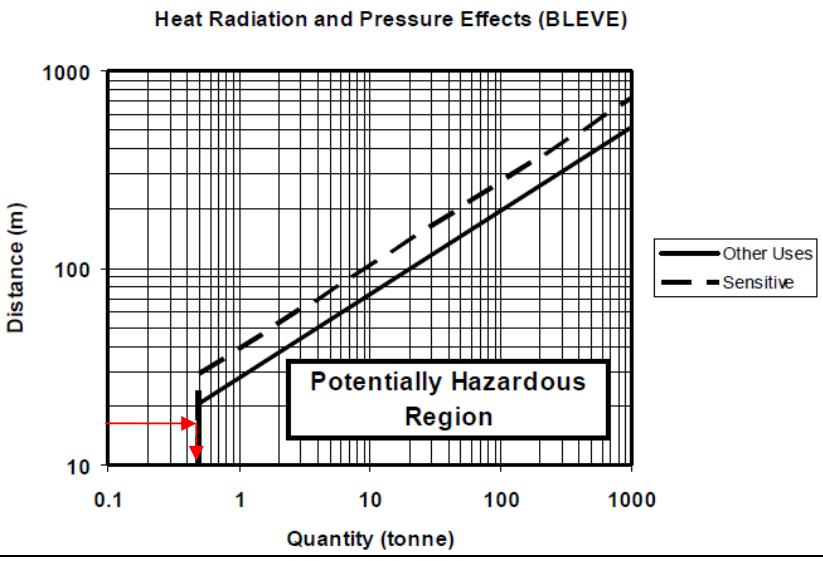
Figure 3-2 outlines the quantities of Class 2.1 dangerous goods to be stored and its comparison to the SEPP 33 limits. In accordance with this figure, the SEPP 33 screening threshold for Class 2.1 flammable gases (excluding LPG) is 0.5 tonne at a distance of 16 m away from the site boundary. Therefore, the maximum storage of 180 kL of Class 2.1 dangerous goods (equivalent to 145 tonnes of Class 2.1 Degreaser) exceeds the SEPP 33 limit and further risk assessment is warranted.

Figure 3-3 below outlines the quantities of Class 3 PG II and III Dangerous Goods to be stored and its comparison to the SEPP 33 limits. This figure shows that the maximum quantities of Class 3 stored on site (161 kL or 129 tonnes of Class 3 Thinner) is below the SEPP 33 limit 260 tonnes at 16 m.

All other classes of dangerous goods stored were well below the SEPP 33 screening threshold limits. Table 3-2 below provides a summary of the amounts of each dangerous goods class on site, and whether the SEPP33 thresholds have been exceeded.

Class 9 dangerous goods are excluded from the risk screening in *"Applying SEPP 33"*.

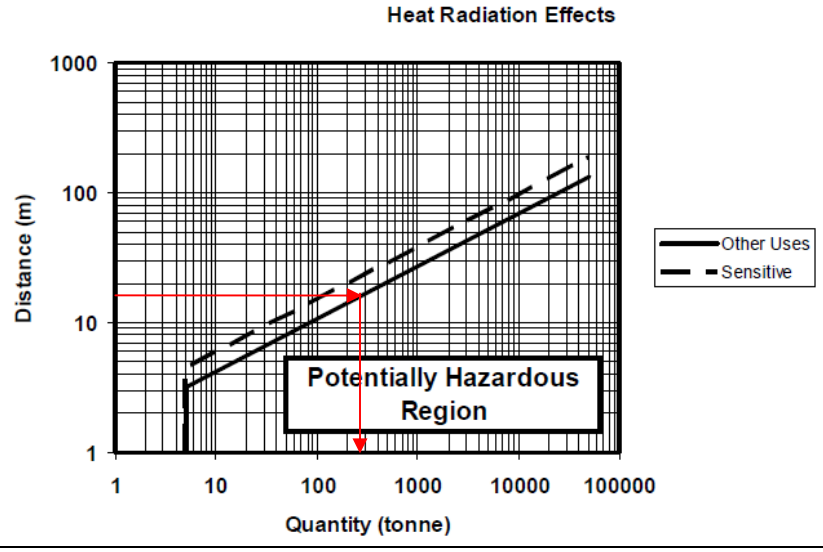
Figure 3-2 Screening Threshold for Class 2.1 Flammable Gases Liquefied Under Pressure (Excluding LPG) (SEPP 33)



Source: DoPI 2011 Multi-Level Risk Assessment

Note: Other uses = Industrial or commercial uses
Sensitive = Residential uses

Figure 3-3 Screening Threshold for Class 3PGIII Flammable Liquids (SEPP 33)



Source: DoPI 2011 Multi-Level Risk Assessment

Note: Other uses = Industrial or commercial uses
Sensitive = Residential uses

Table 3-2: Comparison of Screening Threshold Quantities by SEPP 33

Class	Description	Quantity to be stored	Threshold Quantity	Triggers SEPP33
Class 1.2	Explosives	None	N/A	N/A
Class 1.3	Explosives	None	N/A	N/A
Class 2.1	Flammable Gases	180 kL[1]	0.5 tonne (excluding LPG) at 16 m distance	YES
Class 2.2	Non-Flammable Gases	16 kL[1]	N/A	N/A
Class 2.3	Toxic gases	None	N/A	N/A
Class 3 PGI	Flammable Liquid	None	N/A	N/A
Class 3 PGII and PGIII	Flammable Liquids	161 kL	260 tonne at 16 m distance	NO
Class 4.1	Flammable Solid	300 kg	5 tonnes	NO
Class 4.2	Flammable Solid	None	N/A	N/A
Class 4.3	Dangerous when wet	None	N/A	N/A
Class 5.1	Oxidising Substances	None	N/A	N/A
Class 5.2	Organic Peroxides	None	N/A	N/A
Class 6.1	Toxic Substances	500 L	2.5 tonne	NO
Class 6.2	Infectious Substances	None	N/A	N/A
Class 8 PGI	Corrosive Substances	None	N/A	N/A
Class 8 PGII	Corrosive Substances	< 1 L	25 tonne	NO
Class 8 PGIII	Corrosive Substances	< 1 L	50 tonne	NO
Class 9	Miscellaneous	8 kL	N/A	N/A

Note: [1] – Water Capacity

4. HAZARD IDENTIFICATION

4.1 LEVEL OF ASSESSMENT

The Multi-Level Risk Assessment approach has been developed and recommended by the Department of Planning and Infrastructure (DoPI). It relies on a systematic and analytical approach to the identification and analysis of hazards and the quantification of offsite risks assessing any risk tolerability and landing use safety implications. The DoPI has advocated a merit-based approach, wherein the level and extent of analysis must be appropriate to the hazards present and therefore, need only progress to the extent necessary for the particular case.

There are three levels of assessment specified in the Multi-Level Risk Assessment (DoPI 2011) document and they are listed below.

Level 1 – Qualitative Analysis: primarily based on the hazard identification techniques. A level 1 assessment can be justified if the analysis of the facility demonstrates Societal Risk in the *negligible zone* and there are no potential accidents with significant off-site consequences.

Level 2 – Partially Quantitative Analysis: using hazard identification and the focused quantification of key potential off-site risk contributors. A level 2 assessment can be justified when the Societal Risk estimates fall within the middle *ALARP zone* or if one or more significant risk contributors had been indentified but the frequency of risk contributors having off-site consequences is relatively low.

Level 3 – Fully Quantitative Risk Analysis: based on the full and detailed quantification of risks, consistent with HIPAP No. 6. A level 3 assessment is required where the Societal Risk from the facility estimates fall within the *intolerable zone* or where there are significant off-site risk contributors, and a level 2 assessment is unable to demonstrate that the risk criteria will be met.

4.2 METHODOLOGY

The procedures adopted in assessing hazardous impacts, depending on the level of risk assessment required, may involve the following steps:

Step 1: Hazard identification;
Step 2: Hazard analysis (consequence and probability estimations); and
Step 3: Risk evaluation and assessment against specific criteria.

The following sections of the report discuss the hazard identification process as prescribed by the Department of Planning and Infrastructure (DoPI 2011) in the documents *Multi-Level Risk Assessment* and *Hazardous Industry Planning Advisory Paper No* 4 (*HIPAP No. 6) – Guidelines for Hazard Analysis.*

4.2.1 Hazard Identification

This is the first step in the risk assessment. It involves the identification of all theoretically possible hazardous events as the basis for further quantification and analysis. This does not in any way imply that the hazard identified or its theoretically possible impact will occur in practice. Essentially, it identifies the particular characteristics and nature of hazards to be further evaluated in order to quantify potential risks.

To identify hazards, a survey of operations was carried out to isolate the events which are outside normal operating conditions and which have the potential to impact outside the boundaries of the site. In accordance with HIPAP 6, these events do not include occurrences that are a normal part of the operation cycles of the site but rather the atypical and abnormal, such as the occurrence of a significant liquid spill during product transfer operations.

4.2.2 Hazard Analysis

After a review of the events identified in the hazard identification stage and the identification of prevention/protection measures incorporated into the design of the site, any events which are considered to have the potential to result in impacts offsite or which have the potential to escalate to larger incidents are carried over to the next stage of analysis.

4.2.2.1 Consequence Estimation

This aspect involves the analysis and modelling of the credible events carried forward from the hazard identification process in order to quantify their impacts outside the boundaries of the site. In this case, these events typically include fire and the potential effects on people and/or damage to property.

4.2.2.2 Probability Likelihood Estimation

If necessary, the likelihood of incidents are quantified by adopting probability and likelihood factors derived from published data.

4.2.3 Risk Evaluation and Assessment against Specific Criteria

The risk analysis includes the assessment of consequences for each hazardous event and the frequencies of each initiating failure. The results of these consequence calculations together with the probabilities and likelihood figures estimated were then compared against the accepted criteria, as specified by DoPI. Whether it is considered necessary to conduct the predictions would depend on the probability figures, likelihood estimations, and if the risk criteria are exceeded.

4.3 ASSESSMENT CRITERIA

The risk criteria applied by Department of Planning and Infrastructure are published in the document *Hazardous Industry Planning Advisory Paper No 4* (HIPAP No. 4) - *Risk Criteria for Land Use Safety Planning* (DoPI 2011). The following is a general discussion of the criteria that is used to assess the risk of a development on the surrounding community and environment.

4.3.1 Individual Fatality Risk Levels

The following paragraphs have been reproduced from HIPAP No. 4 to describe individual fatality risk levels:

> *"People in hospitals, children at school or old-aged people are more vulnerable to hazards and less able to take evasive action, if need be, relative to the average residential population. A lower risk than the one in a million criteria (applicable for residential areas) may be more appropriate for such cases. On the other hand, land uses such as commercial and open space do not involve continuous occupancy by the same people.*
>
> *The individual's occupancy of these areas is on an intermittent basis and the people present are generally mobile. As such, a higher level of risk (relative to the permanent housing occupancy exposure) may be tolerated. A higher level of risk still is generally considered acceptable in industrial areas"* (DoPI 2011)."

The risk assessment criteria for individual fatality risk are presented below.

Table 4-1: Individual Fatality Risk Criteria (HIPAP No. 4)

Land Use	Risk Criteria x 10^{-6} (per year)
Hospitals, schools, childcare facilities, old age housing	0.5
Residential, hotels, motels, tourist resorts	1
Commercial developments including retail centres, offices and entertainment centres	5
Sporting complexes and active open space	10
Industrial	50

Figures in the table above have been utilised in the assessment.

4.3.2 Injury Risk Levels

HIPAP No. 4 provides guideline criteria for heat of radiation, explosion overpressure and toxic exposure. The quoted requirements from the referenced document have been summarised as follows:

- Guideline criteria for heat of radiation:

  "Incident heat flux radiation at residential and sensitive use areas should not exceed 4.7 kW/m^2, at frequencies of more than 50 chances in a million per year."

- Guideline criteria for explosion overpressure:

  "Incident explosion overpressure at residential and sensitive use areas should not exceed 7 kPa at frequencies of more than 50 chances in a million per year."

- Guideline criteria for toxic exposure:

  "Toxic concentrations in residential areas should not exceed a level that would be seriously injurious to sensitive members of the community following a relatively short period of exposure at maximum frequency of 10 in a million per year."

  and

  "Toxic concentrations in residential areas should not cause irritation to the eyes or throat, coughing or other acute physiological responses in sensitive members of the community over a maximum frequency of 50 in a million per year."

Please note that a risk hazard assessment only examines events that are considered to have the potential for significant off-site consequences and may not entirely reflect all variations in people's vulnerability to risk.

4.3.3 Risk of Property Damage and Accident Propagation

HIPAP No. 4 indicates that siting of a hazardous installation must account for the potential for propagation of an accident, causing a "domino" effect on adjoining premises. This risk would be expected within an industrial estate where siting of hazardous materials on one site may potentially cause hazardous materials on an adjoining premises to further develop the size of the accident.

The criteria for risk of damage to property and of accident propagation are stated as follows:

"Incident heat flux at neighbouring potentially hazardous installations or at land zones to accommodate such installations should not exceed a risk of 50 in a million per year for the 23 kW/m^2 heat flux level."

and

"Incident explosion overpressure at neighbouring potentially hazardous installations, at land zoned to accommodate such installations or at nearest public buildings should not exceed a risk of 50 in a million per year for the 14 kPa explosion overpressure level."

4.3.4 Criteria for Risk Assessment to the Biophysical Environment

The assessment of the ultimate effects from toxic releases into the natural ecosystem is difficult, particularly in the case of atypical accidental releases. Consequence data is limited and factors influencing the outcome variable and complex. In many cases, it may not be possible or practical to establish the final impact of any particular release. Because of such complexity, it is inappropriate to provide generalised criteria to cover any scenario. The acceptability of the risk will depend upon the value of the potentially affected zone or ecosystem to the local community and wider society.

The suggested criteria for sensitive environmental areas relate to the potential effects of an accidental release or an emission on the long-term viability of the ecosystem or any species within it and are expressed as follows:

> *"Industrial developments should not be sited in proximity to sensitive natural environmental areas where the effects or consequences of the more likely accidental emissions may threaten the long-term viability of the ecosystem or any species within it."*
>
> and
>
> *"Industrial developments should not be sited in proximity to sensitive natural environmental areas where the likelihood or probability of impacts that may threaten the long-term viability of the ecosystem or any species within it is not substantially lower than the existing background level threat to the ecosystem."*

4.4 ASSESSMENT CRITERIA APPLICABLE TO THE PROPOSED DEVELOPMENT APPLICATION

In accordance with *HIPAP No 4 Risk Criteria for Land Use Safety Planning*, the following discussion of the risk assessment criteria considered applicable to the proposed development has been provided.

4.4.1 Heat-Flux Radiation Criteria

As the chemical to be stored on site include Class 2.1 and Class 3 flammable goods, the heat flux radiation criteria have been deemed applicable to the site. Heat radiation models have been conducted to determine compliance with these criteria.

The effects of various heat fluxes (radiation) as a result of a fire incident are given in Table 4-2. The HIPAP No 4 paper (DoPI 2011) suggests a heat flux of 4.7 kW/m^2 and a frequency of 50 in a million per year to be used as the risk injury criterion for thermal effects at residential and sensitive use areas.

Table 4-2: Heat Radiation Impact (DoPI HIPAP No. 4)	
Heat Flux Level	Effect
4.7 kW/m^2	Heat radiation level for possibility of injury to persons exposed. This heat radiation level is regarded to be high enough to potentially cause pain in 15-20 seconds and injury after 30 seconds of exposure
12.6 kW/m^2	Heat radiation level for possibility of fatality at extended exposure and structural failure of nearby affected structures. At this level, injury is highly probable with a significant possibility for fatality to occur. Thin steel may undergo structural failure due to thermal stress and the temperature of wooden structures may increase to a heat where exposure to a naked flame can trigger ignition
23 kW/m^2	Heat radiation level for possibility of fatality at instantaneous exposure and definite structural failure of nearby unprotected structures. The possibility for fatality is likely at this level, with spontaneous ignition of wood after long exposure and structural failure of unprotected steel due to thermal stress.

4.4.2 Explosion Over-Pressure Criteria

Although the Class 2 aerosols do have the potential to explode, they will be stored within and enclosed building and separated from other dangerous goods by a chain link fence. The explosion over-pressure criteria have thus been deemed inapplicable due to the safeguards in place.

4.4.3 Toxic Criteria

The toxic exposure criteria have been deemed applicable due to the storage of Class 6.1 toxic substances. HIPAP No. 4 indicates that citing of potentially hazardous developments also needs to consider the risk from accidental releases into the biophysical environment.

The National Institute for Occupational Safety and Health (NIOSH) and the American Industrial Hygiene Association (AIHA) provides the following 4 categories of health impact criteria which are of relevance during an emergency event:

- Immediately Dangerous to Life or Health (IDLH)
- Emergency Response Planning Guideline 1 (ERPG1)
- Emergency Response Planning Guideline 2 (ERPG2)
- Emergency Response Planning Guideline 3 (ERPG3)

The purpose of the values given for each of these limits for a particular chemical is to assess the capabilities of mitigation safeguards and emergency or accident response plans for the workplace.

The IDLH limit is defined by the Occupational Safety and Health Administration (OSHA) as:

> *"An atmospheric concentration of any toxic, corrosive or asphyxiant substance that poses an immediate threat to life or would cause irreversible or delayed adverse health effects or would interfere with an individual's ability to escape from a dangerous atmosphere."*

The following are definitions for each ERPG level as defined by American Industrial Hygiene Association, 2008 Emergency Response Planning Guidelines (ERPG) and Workplace Environmental Exposure Levels (WEEL) Handbook:

> *"The ERPG-1 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing more than mild, transient adverse health effects or without perceiving a clearly defined objectionable odour.*
>
> *The ERPG-2 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing irreversible or other serious health effects or symptoms that could impair an individual's ability to take protective action.*
>
> *The ERPG-3 is the maximum airborne concentration below which it is believed nearly all individuals could be exposed for up to 1 hour without experiencing or developing life-threatening health effects."*

The ERPG-2 level can be considered synonymous to the IDLH limit, although it has been observed that both slightly vary from each when comparing values for each contaminant. For this reason, both IDLH and ERPG limits were required to be considered in this assessment.

The above needs to comply with the following risk criteria:

- 10 in a million per year at dwellings; and
- 50 in a million per year at industrial premises

The toxic exposure criteria adopted in this assessment for the toxic chemicals potentially emitted from the site are defined in Table 4-3.

Table 4-3: Adopted Health Criteria Based of Potential Pollutants

Chemical	Health Limits (in mg/m^3)			
	IDLH	ERPG-1	ERPG-2	ERPG-3
Dichloromethane	7989.33	1042.09	2605.21	13894.48
Hydrogen Chloride	74.55	4.47	29.82	223.64
Chlorine gas	29.00	2.90	8.70	58.00
Phosgene	8.09	-	2.02	6.07

Note: - indicates that no limits are available for this substance

4.4.4 Biophysical Environment Risk Criteria

The site is located within an established industrial area. The proposed area would be fully paved and sufficiently bunded to accommodate the proposed storage of chemicals and goods.

Any leaks/spills resulting from incidents would be captured within the corresponding bund provided. Spill kits would be provided at all areas that are identified to be prone to spills. A housekeeping inspection would be undertaken regularly to ensure that no leaks or spills would occur on site.

Best practice in housekeeping and operational procedures would be implemented on site. Given this consideration, the proposed development would not introduce any additional risk that may threaten the long-term viability of the development and its effect to the local environment. Consequently, the DoPI-based criteria have been determined to be readily satisfied and no further analyses or discussions were considered necessary.

4.5 RISK CLASSIFICATION AND FREQUENCY ESTIMATION

The consequences of an accident involving a particular hazardous substance depends on the type and quantity of hazardous substance, the type of activity using the substance as well as the exposed population.

Risk classification and societal risk estimation of the proposed storage of dangerous goods have been conducted in accordance with the prescribed *"Multi-Level Risk Assessment"* guideline published by the Department of Planning and Infrastructure (DOPI). The risk classification and frequency estimation is used to determine the level of assessment required for the facility.

The following sections provide summary of the analysis and the results.

4.5.1 Risk Classification and Prioritisation Method

The Department of Planning and Infrastructure document *"Multi-Level Risk Assessment"* (DOPI 2011) outlines a method of risk classification and prioritisation to assist in assessment of risks. The technique is based on the Manual for classification of risks due to major accidents in processes and other related industries (IAEA rev 1, 1996).

The IAEA method was developed to produce a broad estimate of the risks due to major accidents from the production, storage, handling and transport of hazardous materials. This method relies on broad estimations of consequences and likelihood of accidents which outputs can be used to determine the appropriate level of further assessment. The technique involves three stages:

- Estimation of the consequences;
- Estimation of the probability of a major accident happening; and
- Estimation of societal risk.

The risk classification and prioritisation method have been carried out for the proposed storage of Class 2.1, Class 3 and Class 6.1 dangerous goods. These goods were identified to have the potential for significant off-site impacts. The risk classification and prioritisation method does not apply to Class 4, Class 8 and Class 9 dangerous goods. These goods have been assessed in the qualitative analysis provided in Section 4.6.

4.5.1.1 Classification of Type of Activities and Inventories

The classification of the materials stored onsite is provided as Table 4-4 in accordance to the IAEA Table II.

Table 4-4: Estimation and Assessment of the Proposed Development to the IAEA Method

Scenario	Assumptions / Figures Used	IAEA Method Criteria	Scenario Criteria Comparison & Comments
Storage of 180 kL of Class 2.1 flammable gas in aerosols	180 kL = 145 tonnes, liquefied by pressure	IAEA Table IV(a) provides classification of DI	Maximum affected distance is 100-200 m with an effect area of 12 ha
Storage of 161 kL of Class 3 flammable liquids	161 kL = 129 tonnes, vapour pressure <0.3 bar at 20°C	IAEA Table IV(a) provides classification of BI	Maximum affected distance is 25-50 m with an effect area of 0.8 ha
Storage of 500 L of Class 6.1 toxic substances	500 L = 610 kg, very high toxicity	IAEA Table IV(a) provides classification of CIII	Maximum affected distance is 100-200 m with an effect area of 0.3 ha

4.5.1.2 Estimation of Consequences

The consequences of a major accident would depend on the type of substance, activity, the quantities of dangerous goods involved, and the population exposed to the predicted consequence. After excluding substances and activities which neither present a significant offsite risk nor could potentially affect adjacent inventories, the following steps were undertaken:

- Classify the activity;
- Estimate the effect distances and areas;
- Estimate the population distribution; and
- Consider Mitigation Correction Factors, which takes into account possible mitigation actions that people could take in the subject event, such as evacuation and sheltering.

An estimate of the external consequences of a major accident may be calculated using these factors.

For the purpose of being able to construct the Societal Risk Plot that would closely describe the risks associated with the proposed development, the following conservative assumptions and calculations were made:

- The population density of the area of 5 person/ha (Figure 4-1 shows no residences within the 200m radius from the storage area, however a density of 5 is used conservatively to account for the off-site neighbouring industrial premises east of the site);
- The affected neighbouring area is estimated to be 10% of the affected area; and
- Correction factor of 1 for flammables gases is used for mitigation (as per IAEA Table VIII).

The estimation of external consequences is provided as Table 4-5 below.

Table 4-5: Estimation of External Consequences

Scenario	Population Density (people/ha)	Population Correction Factor	Mitigation Correction Factor	The affected area (ha)	External Consequence
Storage of 180 kL of Class 2.1 flammable gas in aerosols	5	0.1	1	12	6
Storage of 161 kL of Class 3 flammable liquids	5	0.1	1	0.8	0.4
Storage of 500 L of Class 6.1 toxic substances	5	1	0.05	0.3	0.075

The table above shows that the estimation of external consequences within the proposed operation would be 6 possible fatalities for the storage of Class 2.1 flammable gases, 0.4 fatalities for the storage of Class 3 flammable liquids, and 0.075 fatalities for the storage of Class 6.1 toxic substances.

Figure 4-1 Estimation of Population Density

Source: © Nearmap 2012

4.5.2 Estimation of Probability of a Major Accident

The method used for estimating probability is based on probability numbers related to the type of installation and hazardous substance used, together with the following probability correction factors:

- Frequency of loading/unloading operations;
- Provision of safety systems associated with the storage and handling of flammable substances;
- A quantitative assessment of the management and safety levels of the organisation; and
- A quantitative assessment of the wind direction towards a populated area.

For the purpose of being able to construct the Societal Risk Plot that would closely describe the risks associated with the proposed development, the following conservative assumptions were made:

- The loading/unloading frequency has been conservatively assumed to be 500-2000 times per year;
- Correction parameters selected for flammable gas included sprinkler system (+0.5);
- Average industry practice was selected; and
- 0-5% of the affected zone is populated (where people are living).

The probability number is calculated as follows:

$$N_{I,S} = N^*_{I,S} + N_L + N_F + N_O + N_P$$

An estimate of the probability of a major accident was calculated using these factors and have been provided in Table 4-6.

Table 4-6: Estimation of Probability of Major Accidents

Scenario	$N^*_{i,s}$	n_l	n_f	n_o	n_p	$N_{i,s}$	P
Storage of 180 kL of Class 2.1 flammable gas in aerosols	6	-2	0.5	0	0	4.5	1×10^{-05}
Storage of 161 kL of Class 3 flammable liquids	8	-2	0	0	0	6	1×10^{-06}
Storage of 500 L of Class 6.1 toxic substances	5	-2	0	0	1.5	4.5	1×10^{-05}

Note: $N^*_{i,s}$ = Average probability number for the installation and the substance
n_l = Probability number correction parameter for loading/unloading operations frequency
n_f = Probability number correction parameter for flammables
n_o = Probability number correction parameter for organisational safety
n_p = Probability number correction parameter for wind direction towards populated area in the affected zone
$N_{i,s}$ = probability number
P = Frequencies (Event/Year)

It can be seen that the frequency of a major accident occurring for the maximum storage of Class 2.1 flammable gas and Class 6.1 toxic substances are 1 incident per 100 thousand years while for Class 3 flammable liquids the frequency is 1 incident per 1 million years. This was used in the estimation of societal risk.

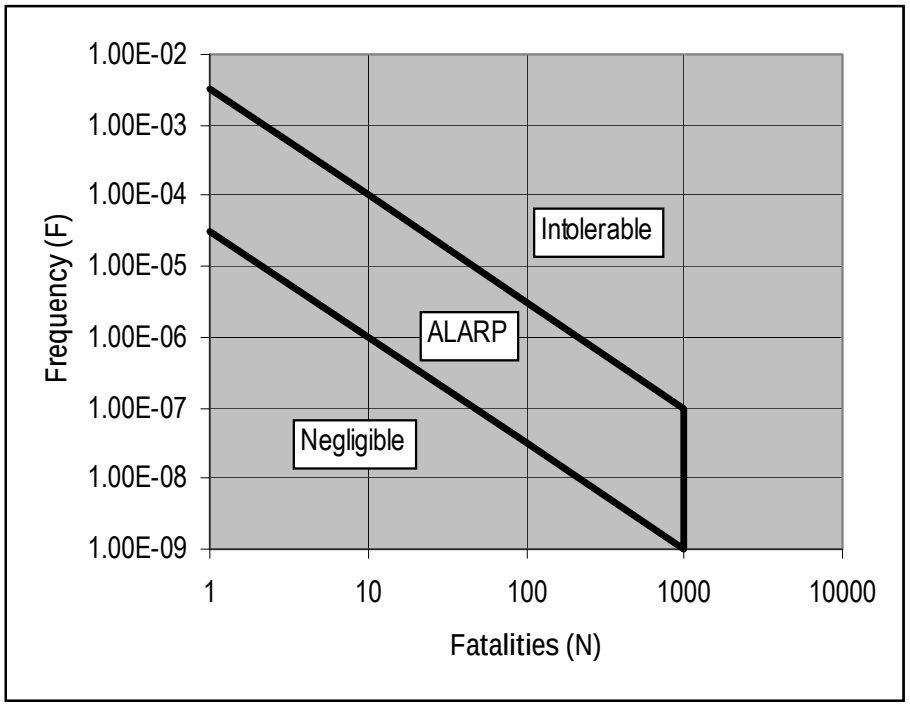
4.5.3 Estimation of Societal Risk

At this stage, pairs of numbers have been calculated for each activity which consists of the number of fatalities per accident and the expected frequency of the accident. The results plotted on a frequency verses consequence (F-N curve) plot and a direct estimate of societal risk can be determined. The F-N curve is divided into three regions:

- Negligible - accidents are not considered to have significant off-site consequences;
- ALARP - while risk of an accident may be tolerable, steps should be taken to reduce the risk level to as low as reasonably possible (ALARP); and
- Intolerable - risk of an accident with the potential for significant off-site consequences is unacceptable.

The F-N curve used to classify societal risk is shown in below.

Figure 4-2: IAEA F-N Curve – Indicative Societal Risk Criteria



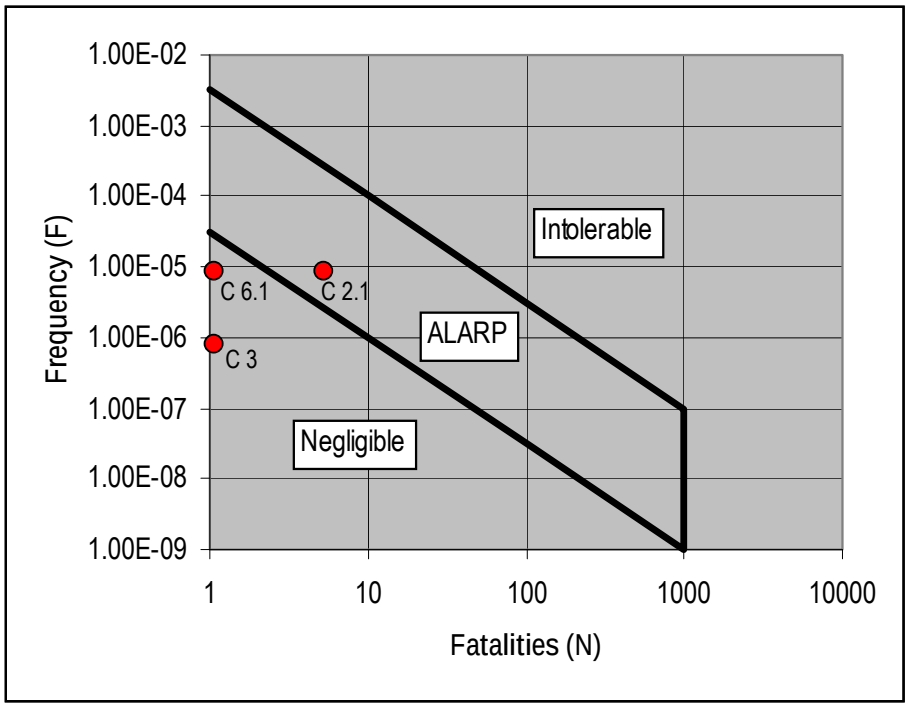
4.5.4 Societal Risk Estimation of the Proposed Facility

The societal risk for the proposed facility has been estimated using the IAEA method and presented as Table 4-7 and Figure 4-3 below.

Table 4-7: Estimation of Societal Risk

Scenario	C (Fatalities/Accident)	P (Accidents/year)
Storage of 180 kL of Class 2.1 flammable gas in aerosols	6	1×10^{-05}
Storage of 161 kL of Class 3 flammable liquids	0.4	1×10^{-06}
Storage of 500 L of Class 6.1 toxic substances	0.075	1×10^{-05}

Figure 4-3: IAEA F-N Curve – Indicative Societal Risk Criteria for the Proposed Operation



Plotting the consequence (C) figures against the frequency (P) values on a graph provided in Figure 4-3 provides plot-to-plot comparison with the IAEA F-N curve provided as Figure 4-2. Comparison shows that the Societal Risk of the proposed operation is negligible for Class 3 and Class 6.1 dangerous goods but falls under the ALARP zone for the storage of Class 2.1 flammable gas. These results are obtained after incorporating all the conservative assumptions necessary to estimate the associated risk.

4.6 HAZARD IDENTIFICATION

The level of assessment required is dependent on a risk-based method which relies on broad estimations of consequences and likelihood of accidents. Based on the risk classification and prioritisation technique used in Section 4.5, it can then be concluded that the hazards associated with the storage of Class 2.1 dangerous goods is in the ALARP zone. This means that off-site risks may be significant but are likely to be well within the quantitative criteria. Therefore a Level 2 Partially Quantitative Risk Assessment has been undertaken to determine the level of risk of the proposed development, in particular the storage of Class 2.1 dangerous goods, to its surroundings.

As Class 4, Class 8 and Class 9 dangerous goods could not be assessed based on the risk classification and prioritisation technique, further analysis may be required if the qualitative analysis could not demonstrate no significant off-site risk.

A level 2 risk assessment involves the hazard identification step, which examines all possible failure scenarios and their consequences to ensure that all incidents with possible off-site consequences are identified. Those events that could contribute to off-site risk will then be examined in further detail of the consequences and likelihood in order to demonstrate that quantitative risk criteria will not be exceeded.

4.6.1 Hazardous Materials

The potentially hazardous chemicals to be stored on site include Class 2, Class 3, Class 4.1, Class 6, Class 8 and Class 9 dangerous goods. A summary of the properties and potential hazards of some of these substances is given below.

4.6.1.1 Class 2.1

Class 2.1 dangerous goods are flammable gases that can be ignited in air. The main product stored on site in this category is the Export Degreaser. It is an aromatic, slightly coloured aerosol used for removing grease and oil. The product is made up of mainly white spirits as well as some hydrocarbon gas, tall oil fatty acid, monoethanolamine and nonyl phenol ethoxilate. This product is classified as hazardous according to the criteria of the NOHSC and as a Class 2.1 dangerous good in accordance with the ADG Code. Its vapours are highly flammable and if combusted, it may produce irritating or poisonous gases. The hazardous combustion products can include carbon dioxide, carbon monoxide and complex hydrocarbons. The product is moderately toxic and may cause eye and skin irritation. Export degreaser should be stored accordance with AS/NZS 3833 or AS 1940 and local regulations.

Other Class 2.1 products stored on site may include aerosol air fresheners, silicone sprays and butane cartridges.

4.6.1.2 Class 2.2

Class 2.2 non-flammable, non-toxic gases are mainly oxidising gases which, although not flammable, can accelerate combustion. The main Class 2.2 products stored on site are powdered fire extinguishers. This product is classified as not hazardous according to the criteria of NOHSC. It can cause slight irritation the eyes, the respiratory tract, and the skin in the presence of humidity. It should be stored in a dry and cool area.

Other Class 2.2 non-flammable, non-toxic gases that can be stored on site include carpet/upholstery cleaner.

4.6.1.3 Class 3

Flammable liquids are classified as Class 3 dangerous goods. These liquids produce vapour that can be ignited in air on contact with a suitable ignition source. The main Class 3 product that will be stored in the DG store is an all purpose thinner used to dissolve paints or thin out its consistency. The thinner is classified as hazardous according to the criteria of NOHSC and dangerous according to the ADG Code. The thinner is a strong oxidising agent in the form of a clear liquid with a strong odour. It is made up of mainly toluene, light aliphatic petroleum solvent and acetone. It is highly flammable, irritating to eyes and skin, harmful if inhaled and toxic to aquatic life. Thinner should be isolated from all sources of heat or ignition, including sparks and naked flames. If combusted, the product may produce carbon monoxide and other organic compounds.

Other Class 3 products stored in smaller quantities include kerosene, turpentine substitute, acetone, isopropanol, ethanol solution and paint.

4.6.1.4 Class 4.1

Class 4.1 dangerous goods are flammable solids that are easily ignited and may cause fire through friction heat or any other ignition sources. The main Class 4.1 goods stored on site is the Eagle One Never Dull Wadding Polish which is used for automotive detailing. The product has a flash point of 63°C and can burn and propagate flames easily. The products of combustion include carbon dioxide, carbon monoxide, and silicon dioxide. It should be stored in an area away from any source of ignition including friction, heat, open flame or sparks, and should be kept away from oxidizing agents.

4.6.1.5 Class 6.1

Class 6.1 toxic substances are those liable to cause death or serious injury or harm from inhalation, ingestion or adsorption through the skin. The main Class 6.1 substance stored on site is a paint stripper designed for the removal of automotive and aircraft paints and some smaller quantities of dichloromethane. This paint stripper is classified as hazardous according to the criteria of NOHSC and non-dangerous according to the ADG Code. However, it is classified as a Class 6.1 dangerous good for transport according to the ACTDG. The product is usually an off-white to light purple viscous liquid or soft gel that turns to dark reddish brown with age and exposure to air. The main component of paint stripper is dichloromethane, which evaporates quickly and can be easily inhaled. Breathing high levels of paint stripper over short periods can irritate the eyes, skin, nose, and lungs. It can also cause dizziness, headache, and lack of coordination. High exposures to dichloromethane for long periods can also cause liver and kidney damage. This chemical may be carcinogenic, as it has linked to cancer of the lungs, liver and pancreas in laboratory animals. This product is not combustible under normal storage and use. However, if it is involved in a fire, it may produce toxic fumes such as phosgene, hydrogen chloride and chlorine fumes.

4.6.1.6 Class 8

Corrosive substances capable of causing the degradation and destruction of living tissue, steel and other materials on contact are classified as Class 8 dangerous goods. The Chemtech CT14 Engine and Bilge degreaser is the main Class 8 product stored on site within the DG Store. It is a degreaser that dissolves water-insoluble substances (such as greases and oils) from hard surfaces. Chemtech CT14 is a corrosive, slightly viscous and alkaline salmon pink liquid with a distinctive solvent odour. Chemicals contained in this product are alkaline salts and complex surfactants such as sodium sodium metasilicate, ethylene glycol monobutyl ether, sodium hydroxide, ingredients and non- hazardous and water. This product is considered as hazardous and dangerous according to criteria of NOHSC and the ADG Code. It is an irritant to the eyes and skin. It is non combustible and is not considered to be a significant fire risk. However, decomposition on heating may produce toxic fumes of carbon monoxide.

Other Class 8 substances that can be stored on site include cleaner rim turtlewax, fibreglass repair kit, permatex degreaser, wheel cleaner, and rust treatment.

4.6.1.7 Class 9

Class 9 dangerous goods are miscellaneous substances that present a danger not offered by other classes. The predominant product stored on site is a tyre dressing called Black Magic Tyre Wet. Smaller quantities of air care products such as Ambi Pur are also stored. Black Magic is a clear liquid with a cherry odour composed of a blend of petroleum distillates and additives. It is classified as a non-hazardous substance according to the criteria of NOHSC and as a dangerous good according to the ADG Code. It is stable under normal conditions but should avoid sources of ignition such as heat or flames. Thermal decomposition may produce toxic and/or irritating fumes and gases including carbon monoxide and carbon dioxide. The product may cause irritation to the eyes and if inhaled or ingested. Prolonged or repeated skin contact may cause skin dryness, cracking and defatting leading to dermatitis. Prolonged inhalation of products vapours may cause central nervous system depression, resulting in headache, dizziness, nausea and unconsciousness.

4.6.2 Hazardous Events

The identification of possible hazardous events for this facility has been prepared with reference to available literature and other similar warehousing facilities. Focus has been placed on the DG Store as all dangerous goods on site will be stored in that single building. A comprehensive list of credible and significant incidents identified for the SRG distribution centre is summarised in a Hazard Identification Chart given below.

4.6.2.1 Hazard Identification Chart

A Hazard Identification Chart has been prepared for the proposed site based on operating scenarios that are relevant to the proposed development. This chart outlines the outcomes from the hazard identification phase of the assessment.

The chart consists of five columns:

Column 1
Heading: Functional/Operation Area
The area of the site involved with the potential event is listed

Column 2
Heading: Possible Initiating Event
The individual events that are considered to be likely or realistic are then listed. Where the possible consequences are similar the events are listed together, each one individually numbered.

Column 3
Heading: Possible Consequences
The outcomes of an event if it occurred are listed.

Column 4
Heading: Prevention/Protection Measures
The measures designed into the functional/operation area and the site are listed. These measures may include for example safeguards, design features, management methods and/or operator training.

The hazard identification chart is presented in Table 4-8.

Table 4-8: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
1. Class 3 Storage Area – Dangerous Goods Store	1. Spill of limited quantity of liquids caused by a leak in a faulty or damaged package of up to 4 L. 2. Spill causes fire. 3. Packaging material ignites, due to arson or other fire. 4. Full-scale warehouse fire as a result of adjacent incidents.	1. Spill is immediately detected and cleaned up without incident. 2. Spillage escapes to stormwater. 3. Spilt flammable liquid is ignited. 4. Spilt flammable liquid forms explosive gas mixture, which finds source of ignition and results in fire or explosion. 5. Fully developed warehouse fire, with other containers spilling to fuel the fire. 6. Heat radiation reaches other areas causing fire. 7. Pollution via fire fighting water	1. The division wall between Class 3 DG from other DG is 240/240/240 fire rated and meet the requirements of the Building Code of Australia. 2. The DG Store will have full height 240/240/240 fire rated walls to all 4 sides of the building. 3. All storage areas of flammable liquids would be in accordance with AS 1940-2004. 4. Flammable liquids will be stored in sealed containers in various volumes of up to 4 L. These are packed in cartons and secured on pallets. 5. The whole interior of the DG Store would be designed as a Hazardous Area Zone 2 in accordance with AS/NZS 60079.10.1:2009. Only forklift and electrical equipment rated for hazardous areas are used in the DG Store. An exclusion zone of 3m will apply for all ignition sources extending from the fire door to the within the warehouse. 6. Flammable fume will be rapidly dispersed due to the ventilation system which complies with AS 4332:2004, AS 1940-2004, and AS/NZS 3833:2007. 7. The DG Store will have the required fire protection including portable powder type fire extinguishers, hire hose reels, fire hydrants, automatic sprinklers and a fire safety study.

Table 4-8: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
			8. DG Store is roofed and bunded to contain spillages in accordance to AS 1940-2004. Class 3 DG will be bunded separately from Class 6 and Class 8 DG. 9. Site stormwater system will be designed in accordance with relevant Australian Standards.
2. Class 2.2 Storage Area – Dangerous Goods Store	1. Fire/heat radiation in Class 2.2 storage area. 2. Forklift accident causes damage to aerosol container. 3. Damaged or faulty aerosol container leaks causing release of non-flammable and non-toxic gas of up to 600 g.	1. Vapours accumulate in bunded area. 2. Heat from fire in the warehouse causes aerosol container to become projectiles within the Dangerous Goods Store. 3. Pollution via fire fighting water.	1. Class 2 gases are stored separately away from other DG classes with a chain link fence separating them to prevent aerosols from becoming projectiles and impacting other DG. 2. Class 2.2 DG are stored separately away from incompatible Class 2.1 and Class 3 DG. 3. Goods are packed in cartons, secured on pallets. Product packaging complies with specifications under the Australian Dangerous Goods Code. 4. The whole interior of the DG Store would be designed as a Hazardous Area Zone 2 in accordance with AS/NZS 60079.10.1:2009. Only forklift and electrical equipment rated for hazardous areas are used in the DG Store. An exclusion zone of 3m will apply for all ignition sources extending from the fire door to the within the warehouse. 5. The DG Store will have the required fire protection including portable powder type fire extinguishers, hire hose reels, fire hydrants, automatic sprinklers and a fire safety study. 6. DG Store is roofed and bunded to contain spillages in accordance to AS 1940-2004.

Table 4-8: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
			7. Flammable and non-flammable fumes will be rapidly dispersed due to the ventilation system which complies with AS 4332:2004, AS 1940-2004, and AS/NZS 3833:2007. 8. The DG Store will have full height 240/240/240 fire rated walls to all 4 sides of the building. 9. Site stormwater system will be designed in accordance with relevant Australian Standards.
3. Class 2.1 Storage Area – Dangerous Goods Store	1. Fire/heat radiation in Class 2.1 storage area. 2. Forklift accident causes damage to cartridge or aerosol container. 3. Damaged or faulty cartridge or aerosol container leaks causing release of flammable gas	1. Flammable gas finds ignition source causing an explosion. 2. Explosion ignites flammable materials in the Dangerous Goods Store causing a fire. 3. Heat from fire in the warehouse causes aerosol container to become projectiles within the Dangerous Goods Store. 4. Fire spreads to adjacent areas. 5. Pollution via fire fighting water.	1. Class 2 gases are stored separately away from other DG classes with a chain link fence separating them to prevent aerosols from becoming projectiles and impacting other DG. 2. Class 2.2 DG are stored separately away from incompatible Class 2.1 and Class 3 DG. 3. Goods are packed in cartons, secured on pallets. Product packaging complies with specifications under the Australian Dangerous Goods Code. 4. The whole interior of the DG Store would be designed as a Hazardous Area Zone 2 in accordance with AS/NZS 60079.10.1:2009. Only forklift and electrical equipment rated for hazardous areas are used in the DG Store. An exclusion zone of 3m will apply for all ignition sources extending from the fire door to the within the warehouse. 5. The DG Store will have the required fire protection including portable powder type fire extinguishers, hire hose reels, fire hydrants, automatic sprinklers and a fire safety study. 6. DG Store is roofed and bunded to contain spillages in

Table 4-8: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
			accordance to AS 1940-2004. 7. Flammable fumes will be rapidly dispersed due to the ventilation system which complies with AS 4332:2004, AS 1940-2004, and AS/NZS 3833:2007. 8. The DG Store will have full height 240/240/240 fire rated walls to all 4 sides of the building. 9. Site stormwater system will be designed in accordance with relevant Australian Standards.
4. Combustibles and Class 4.1, 6.1, 8 and 9 Storage Area – Dangerous Goods Store	1. Spill of limited quantity of liquids caused by a leak in a faulty or damaged package of up to 20 L for combustible liquids, 142 g for Class 4.1, 4 L for Class 6, 1 L for Class 8, and 0.7 L for Class 9. 2. Full-scale warehouse fire as a result of adjacent incidents.	1. Spill is immediately detected and cleaned up without incident. 2. Material escapes to stormwater. 3. Spilt material forms vapour. 4. Toxic combustion vapours from Class 6 substances impacts on personal health and safety. 5. Combustible materials add fuel to fire. 6. Pollution via fire fighting water.	1. The division wall between Class 3 DG from other DG is 240/240/240 fire rated and meet the requirements of the Building Code of Australia. 2. Vapours from spilt materials will be rapidly dispersed due to the ventilation system which complies with AS 4332:2004, AS 1940-2004, and AS/NZS 3833:2007. 3. Site stormwater system will be designed in accordance with relevant Australian Standards. 3. These goods will be stored in small containers of up to 20 L for combustible liquids, 142 g for Class 4.1, 4 L for Class 6, 1 L for Class 8, and 0.7 L for Class 9. The impact from spills will be reduced. 4. The DG Store will have the required fire protection including

Table 4-8: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
			portable powder type fire extinguishers, hire hose reels, fire hydrants, automatic sprinklers and a fire safety study. 5. The DG Store will have full height 240/240/240 fire rated walls to all 4 sides of the building
5. Battery Charging Area	1. Forklift accident, causing spillage of limited corrosive substance. 2. Leak of corrosive substance due to faulty or damaged batteries.	1. Spill is immediately detected and cleaned up without incident. 2. Spillage of corrosive substance escapes to stormwater. 3. Spilt materials come into contact with incompatible substance.	1. Battery Recharge Room is located away from the DG Store and meets the requirements of the Building Code of Australia. 2. Site stormwater system will be designed in accordance with relevant Australian Standards. Water supply with flow valve and isolation cock. 3. Incompatible substances not stored within the same areas. 4. Batteries would be stored in accordance with AS 3011-1992 and AS 2676.1-1992. 5. Procedures, facilities and absorbent materials for spillage control are maintained on site. 6. Safety shower and eye wash installed
6. Loading/Receiving Docks	1. Packaging damage during product transfer	1. Spill of material. 2. Material escapes to stormwater. 3. Spilt material forms vapour. 4. Vapour impacts on employee's personal health and safety. 5. Material finds an ignition source	1. All product transfer operations are supervised by experienced operators trained in safe operating procedures. 2. No dangerous materials are stored in bulk. Maximum volume of packaging would be 20 L. 3. Site stormwater system will be designed in accordance

Table 4-8: Event/Consequence Analysis Table

Functional/Operational Area	Possible Initiating Event	Possible Consequences	Prevention/Protection Measures
		resulting in a fire.	with relevant Australian Standards. 4. Spill control equipment is provided near the loading dock area. Employees are in regular attendance to implement spill control procedures. 5. Strict control of ignition sources including a hot work permit system will operate. No smoking will be permitted in the loading dock area. 6. Fire services are located near the loading dock area.

The events identified above are unlikely to occur due to the prevention and protection measures proposed for the SRG warehouse and distribution facility. However, a Level 2 partially quantitative assessment of potential events with the most significant potential off-site impacts have been undertaken to assess the risks to off-site receptors. These hazards have been examined below.

4.6.3 Hazards Identified for Further Analysis

The potential hazards identified for further analysis have been analysed in a scenario based risk assessment. These significant hazards involve Class 2.1, Class 3 and Class 6.1 dangerous goods.

Class 4 dangerous goods generally have a lower potential for off-site impact than the dangerous goods of classes 1-3 and 6.1. The significance of the risk is highly dependent on the quantity stored or handled and the storage locations. As the maximum storage quantity of Class 4 flammable solids is only 300 kg, and sufficient prevention and protection measures will be in place, further analysis is not required.

Class 8 dangerous goods have limited potential for off-site harm provided that appropriate controls are implemented. Therefore further analysis for Class 8 corrosive substances have not been undertaken.

As Class 2 aerosols will be stored within the DG Store building and separated behind a chain link fence, pressure explosions of aerosol cans will not be likely and was therefore excluded from further analysis.

The hazards identified for further analysis are described below:

Scenario 1: Fire incident where 180,000 L of Class 2.1 flammable gas in aerosols are combusted in a warehouse fire.
Scenario 2: Fire incident where 160,000 L of Class 3 flammable liquid are combusted in a warehouse fire.
Scenario 3: Toxic emissions from a spill of 500 L of Class 6.1 toxic substances
Scenario 4: Toxic combustion emissions from 500 L of Class 6.1 toxic substances

Further detailed assessments of each of these areas have been provided in the following section.

4.7 HAZARD ANALYSIS

4.7.1 Scenario 1: Class 2.1 Flammable Gas Fire

The storage of Class 2.1 dangerous goods require further quantitative analysis as it fell under the ALARP zone during the societal risk estimation process using the IAEA method in Section 4.5.4. This scenario describes the event where the maximum amount of Class 2.1 flammable gas stored on site is accumulated inside the warehouse building and combusted in a fire event.

The following calculations and assumptions were considered in the modelling of effects using TNO Effects:

- 180,000 L of degreaser will burn in the fire;
- The pool fire surface area is equal to the area of the Class 2 bunded storage area of 438 m^2;
- The use of the chemical ethyleneimine as a substitute input for degreaser due to similar heat of combustion and physical properties; and
- No control measures in place such as fire-rated walls and fire-fighting equipment and devices.

The heat radiation distances obtained from TNO Effects and heat radiation contours are presented in Table 4-9 and Figure 4-4 respectively. These results represent a fire with flammable gas accumulated inside the warehouse building with no controls in place i.e. no firewalls and no fire fighting prevention. These heat radiation distances may be achieved in the unlikely event that the DG Store firewalls fail and the fire fighting protection measures were ineffective.

Table 4-9: Heat Radiation Distances for Scenario 1

Level	Heat Radiation Distance from Fire Boundary (m)
4.7 kW/m^2	53.2
12.6 kW/m^2	37.5
23 kW/m^2	29.6

The modelling software, TNO Effects, predicted a radiation distance of 53.2 m from the edge of the pool fire for a heat flux of 4.7 kW/hr. The nearest resident is located approximately 200 m from the DG Store and will not be affected by this heat radiation. Therefore, further estimations of the likelihood of this event have not been carried out.

However, the nearest industrial neighbour is located 16 m from the DG Store and will be impacted if this event were to occur. Nevertheless, with the firewalls and fire protection measures in place, the consequence and likelihood of this event is minimal.

4.7.2 Scenario 2: Class 3 Flammable Liquids Fire

Although the societal risk of the storage of Class 3 flammable liquids was deemed as negligible in accordance with the IAEA method, further analysis have been undertaken to determine the consequence of this hazard. This scenario assesses the unlikely chance that the maximum amount of Class 3 flammable liquids stored on site are ignited.

The following calculations and assumptions were considered in the modelling of effects using TNO Effects:

- 160,000 L of thinner will burn in the fire;
- The pool fire surface area is equal to the area of the Class 3 bunded storage area of 170 m^2;
- The use of the chemical cyclohexane as a substitute input for thinner due to similar heat of combustion and physical properties; and
- No control measures in place such as fire-rated walls and fire-fighting equipment and devices.

The heat radiation distances obtained from TNO Effects and heat radiation contours are presented in Table 4-10 and Figure 4-5 respectively. Again, these results represent a fire with no controls in place i.e. no firewalls and no fire fighting prevention.

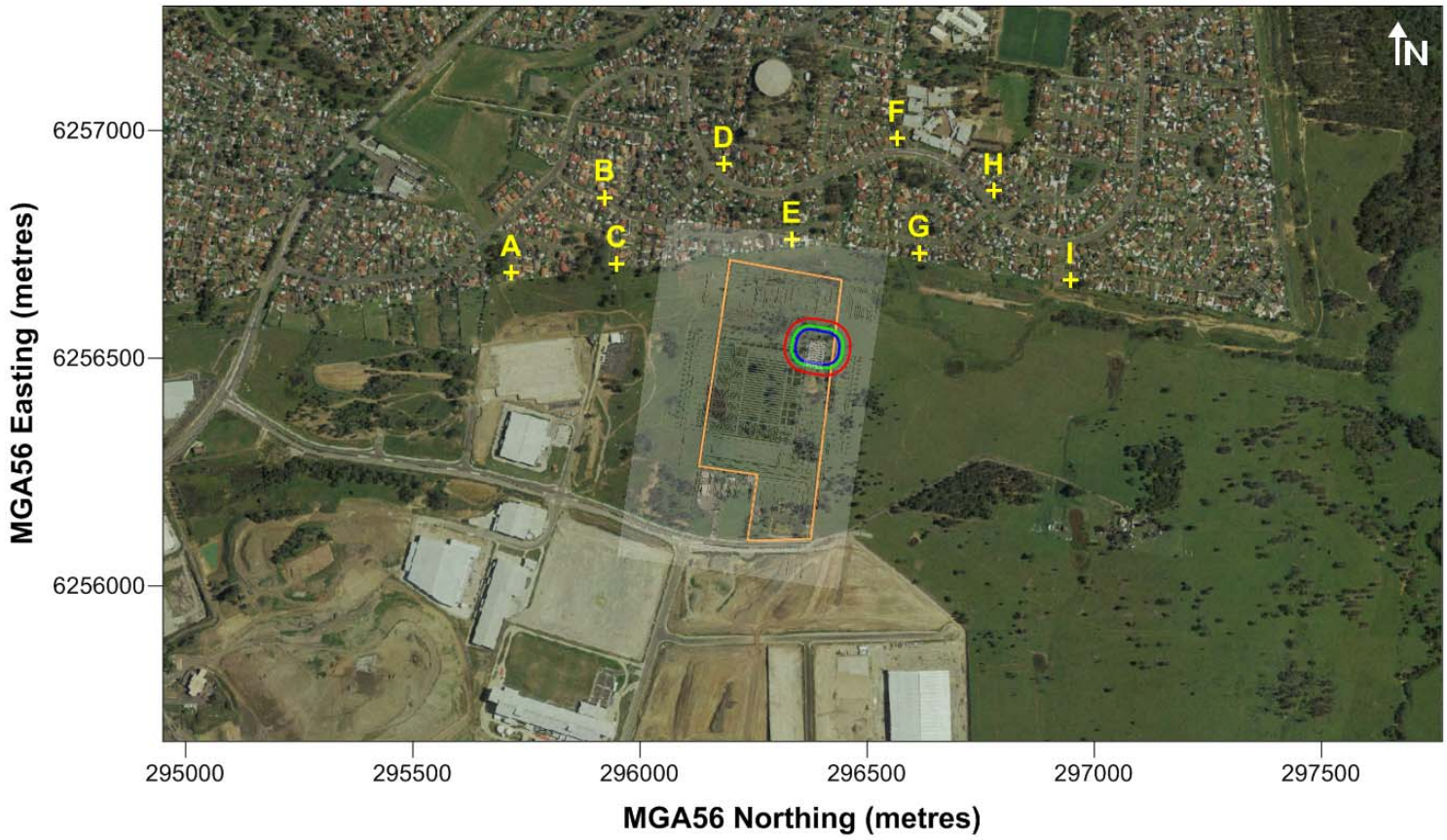
Table 4-10: Heat Radiation Distances for Scenario 6

Level	Heat Radiation Distance from Fire Boundary (m)
4.7 kW/m^2	54.4
12.6 kW/m^2	37.5
23 kW/m^2	28.8

The modelling results given by TNO Effects for this scenario show that a heat radiation level of 4.7 kW/m^2 would extend 54.4 m from the pool fire perimeter. The duration of fire is estimated to be 2.4 hrs if not extinguished. This hazardous event will not impact the nearest sensitive receptors as they are located at least 200 m away from the DG Store.

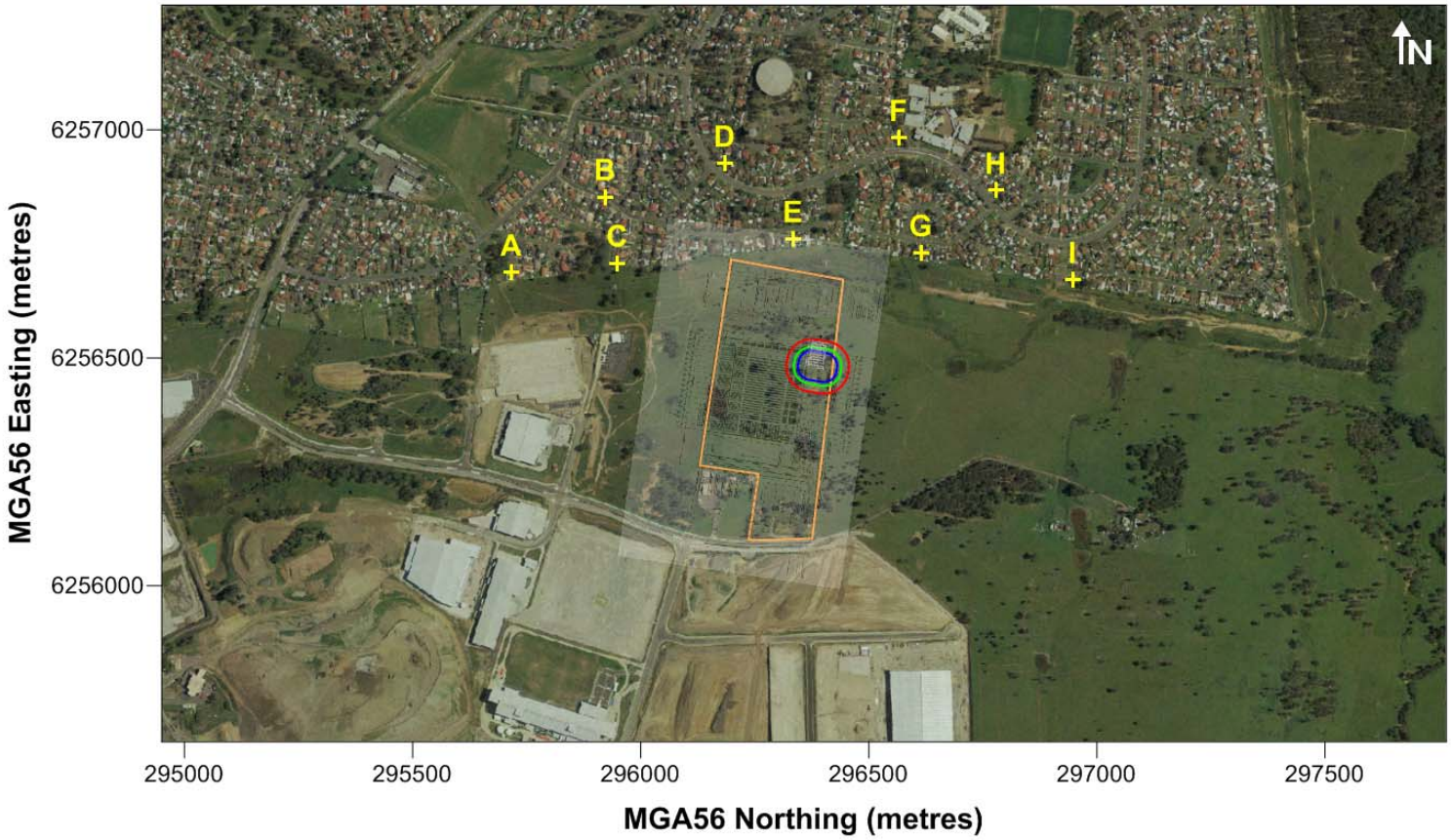
Although the nearest industrial neighbour east of the site will be affected in the event of this fire, the firewalls and fire protection measures will greatly reduce the impact and likelihood of this event.

Figure 4-4 : Heat Radiation Contours for Scenario 1: Worst Case Class 2.1 DG Fire (assuming no fire controls)



Note: Isopleths illustrate the heat of radiation contours: Red = 4.7 kW/m^2; Green = 12.6 kW/m^2; Blue = 23 kW/m^2.

Figure 4-5 : Heat Radiation Contours for Scenario 2: Worst Case Class 3 DG Fire (assuming no fire controls)



Note: Isopleths illustrate the heat of radiation contours: Red = 4.7 kW/m^2; Green = 12.6 kW/m^2; Blue = 23 kW/m^2.

4.7.3 Scenario 3: Class 6.1 Toxic Emissions from a Large Spill

Although the societal risk of the storage of Class 6.1 toxic substances was also deemed as negligible, further examination of consequences has been carried out. This section examines the worst-case scenario involving a large spill of 500 L of paint stripper, which is classified as Class 6.1 toxic substance. As this product contains 60-100% of dichloromethane, our modelling has assumed a spill of 500 L of dichloromethane. Dichloromethane is known to evaporate fairly quickly if released as a liquid. This scenario assesses the extent of the dichloromethane emissions at the nearest sensitive receptors.

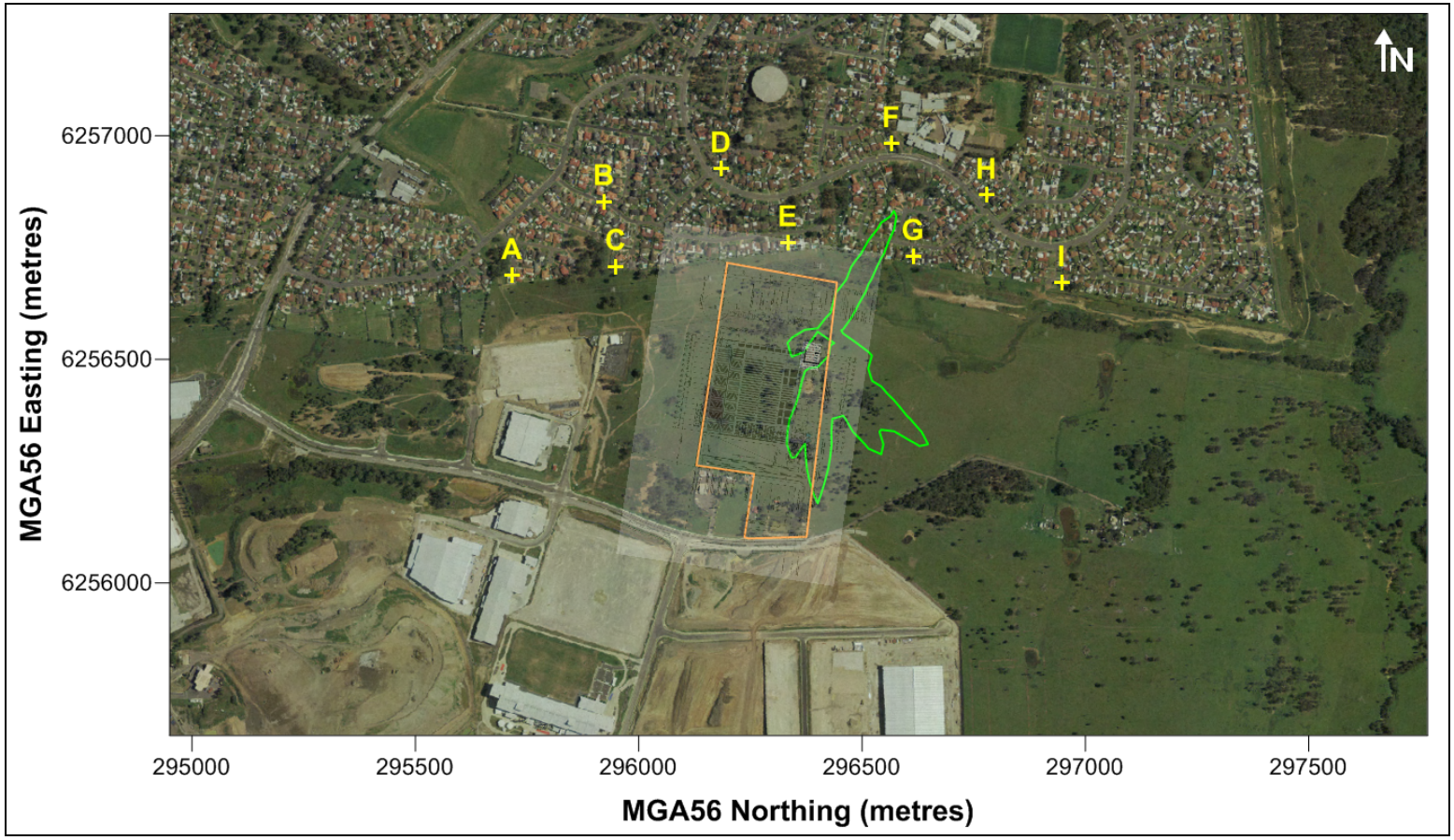
The following calculations and assumptions were considered in the modelling of effects using AUSPLUME:

- 500 L of dichloromethane will be spilt in the DG Store;
- A maximum pool surface area of 20 m^2 was used due to bunding;
- The spill remains exposed for 1 hour before being removed;
- Meteorological data file of the nearest weather monitoring station (Horsley Park AWS) for the year 2011 was used;
- An evaporation rate of 136.27 g/s was generated from the Pool Evaporation model in TNO;
- A vent size of 0.1 m^2 and ventilation flow rate of 0.83 m/s was used (estimated from AS 1940:2004);
- The emission source was modelled as a single stack located above the DG Store with a height of 11 metres;
- The event was modelled to occur at various times of 9am, 2pm and 5pm; and
- No control measures in place such as fire-rated walls and fire-fighting equipment and devices.

The results for this scenario revealed that the 9am incident resulted in the highest emission concentrations. These emission results are illustrated in Figure 4-6. From this figure, it can be seen that the limits are not exceeded at the nearest identified sensitive receptors. However, the dichloromethane concentration at a small number of residents may exceed the ERPG1 limit of 1042 mg/m^3. These residents are located north of the subject site.

This event was determined to be negligible and below the ALARP region in accordance with the IAEA method. The likelihood of this level of impact is minimal as these Class 6.1 toxic substances will be stored in small packages of up to 4 L. The goods will be stored in bunded areas with spill kits nearby. Staff will be trained in spill procedures where any spillages will be cleaned up immediately and appropriately. The results of this event has been discussed further is Section 4.8.

Figure 4-6: Air Emission Impacts from Scenario 3 – Class 6.1 Toxic Emissions from a Large Spill at 9am



Note: Isopleths illustrate the following limits for dichloromethane emissions: Green = ERPG1. IDLH, ERPG2 and ERPG3 limits are not shown as this level is not reached in these conditions.

4.7.4 Scenario 4: Class 6.1 Toxic Emissions from Fire

As mentioned above, the societal risk of the storage of Class 6.1 toxic substances was deemed as negligible. However, further examination of the consequence has been carried out. The combustion of dichloromethane may produce a number of toxic fumes including phosgene, hydrogen chloride and chlorine gas. The exact composition of combustion products could not be determined due to lack of data as it will depend on a number of variables. There are three possible combustion reactions for dichloromethane and these are listed below.

1. The production of chlorine gas

   $2CH_2Cl_2 + 3O_2 \rightarrow 2CO_2 + 2H_2O + 2Cl_2$

2. The production of phosgene gas

   $2CH_2Cl_2 + 2O_2 \rightarrow 2COCl_2 + 2H_2O$

3. The production of hydrogen chloride gas

   $CH_2Cl_2 + O_2 \rightarrow CO_2 + 2HCl$

Assuming that these three reactions are equally likely to occur, and complete combustion was obtained, the emission rates of chlorine, phosgene and hydrogen chloride were estimated and used to predict emission impacts.

The combustion of dichloromethane was modelled in TNO effects using the following assumptions:

- 500 L of dichloromethane will be combusted in the DG Store; and
- A maximum pool surface area of 20 m^2 was used due to bunding provided.

TNO effects estimated a dichloromethane combustion rate of 560.57 g/s for a burning duration of 18 minutes. This emission rate was used to calculate the rates of emission for chlorine, phosgene and hydrogen chloride based on molar ratios.

The following calculations and assumptions were considered in the modelling of effects using AUSPLUME:

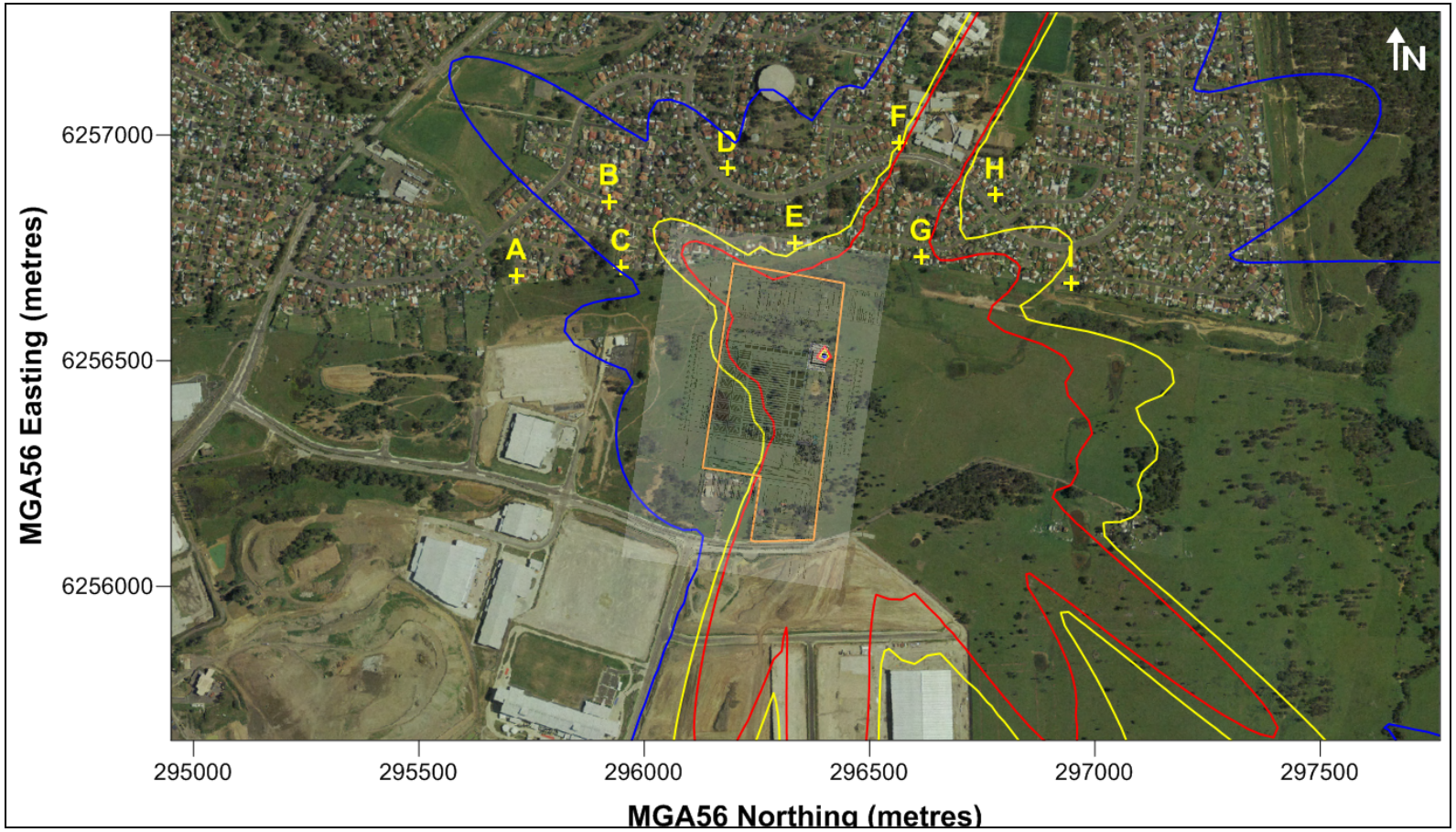
- Meteorological data file of the nearest weather monitoring station (Horsley Park AWS) for the year 2011 was used;
- The emission source was modelled as an area source to represent the rising flumes from the DG Store with a height of 20 metres;
- The event was modelled to occur at various times of 9am, 2pm and 5pm; and
- No control measures in place such as fire-rated walls and fire-fighting equipment and devices.

Again the results for 9am scenario resulted in the highest emission impacts compared with the 2pm and 5pm. The 9am results for these emissions are illustrated in Figure 4-7 for phosgene emissions, Figure 4-8 for chlorine gas emissions, and Figure 4-9 for hydrogen chloride emissions.

From these figures, it can be seen that the limits are exceeded at the nearest identified sensitive receptors including a large area of residents located north of the subject site. However, this event was determined to be negligible and below the ALARP region in accordance with the IAEA method. The proposed prevention and protection measures such as hazardous area zoning of the entire dangerous goods store, fire-rated walls, fire extinguishers, fire hose reels, fire hydrants, automatic sprinklers and appropriate bunding will also significantly reduce the likelihood and consequence of this scenario.

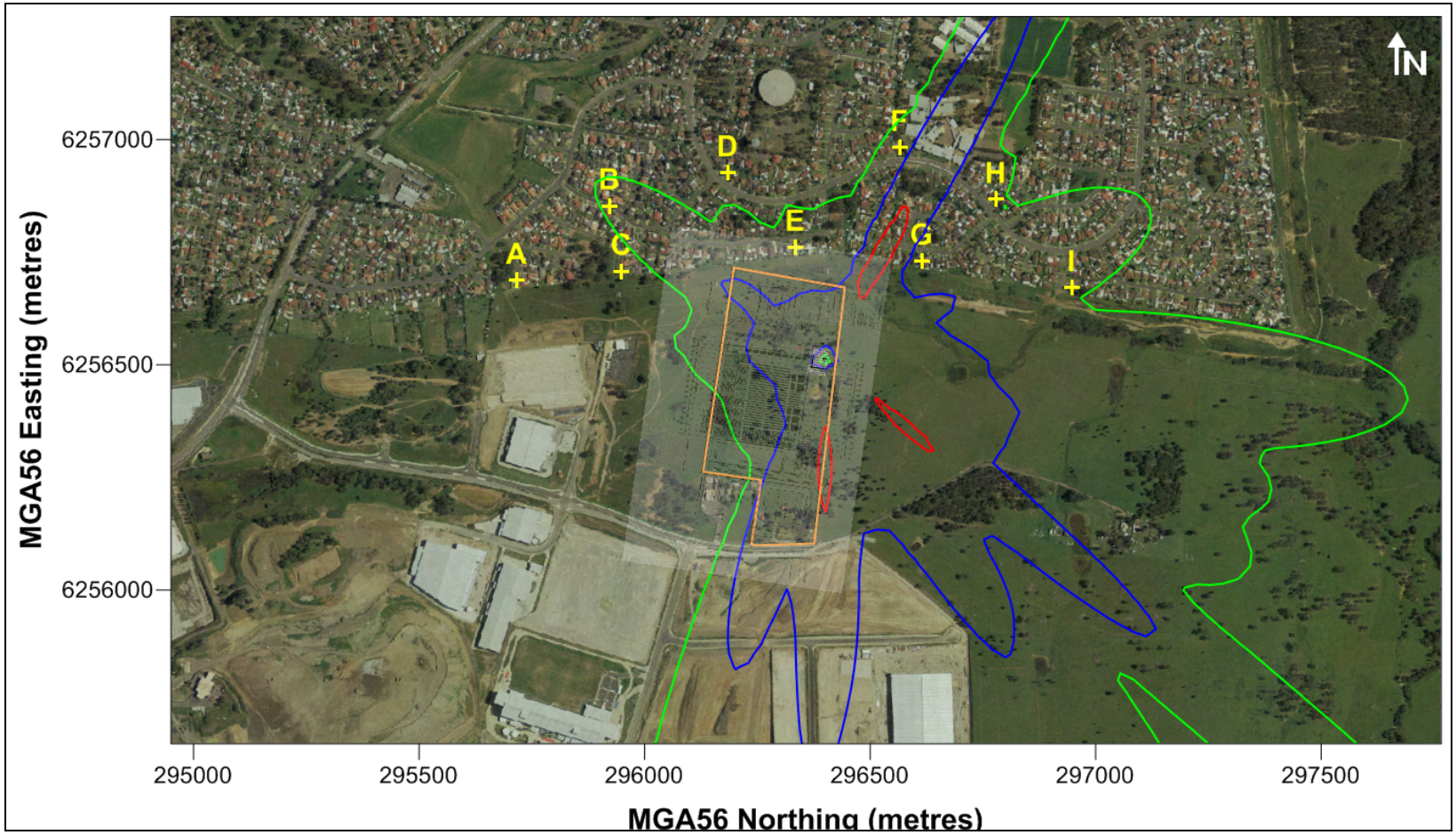
The results of this event has been discussed further is Section 4.8.

Figure 4-7: Air Emission Impacts for Scenario 4 – Class 6.1 Toxic Emissions from a Fire (Phosgene emissions at 9am)



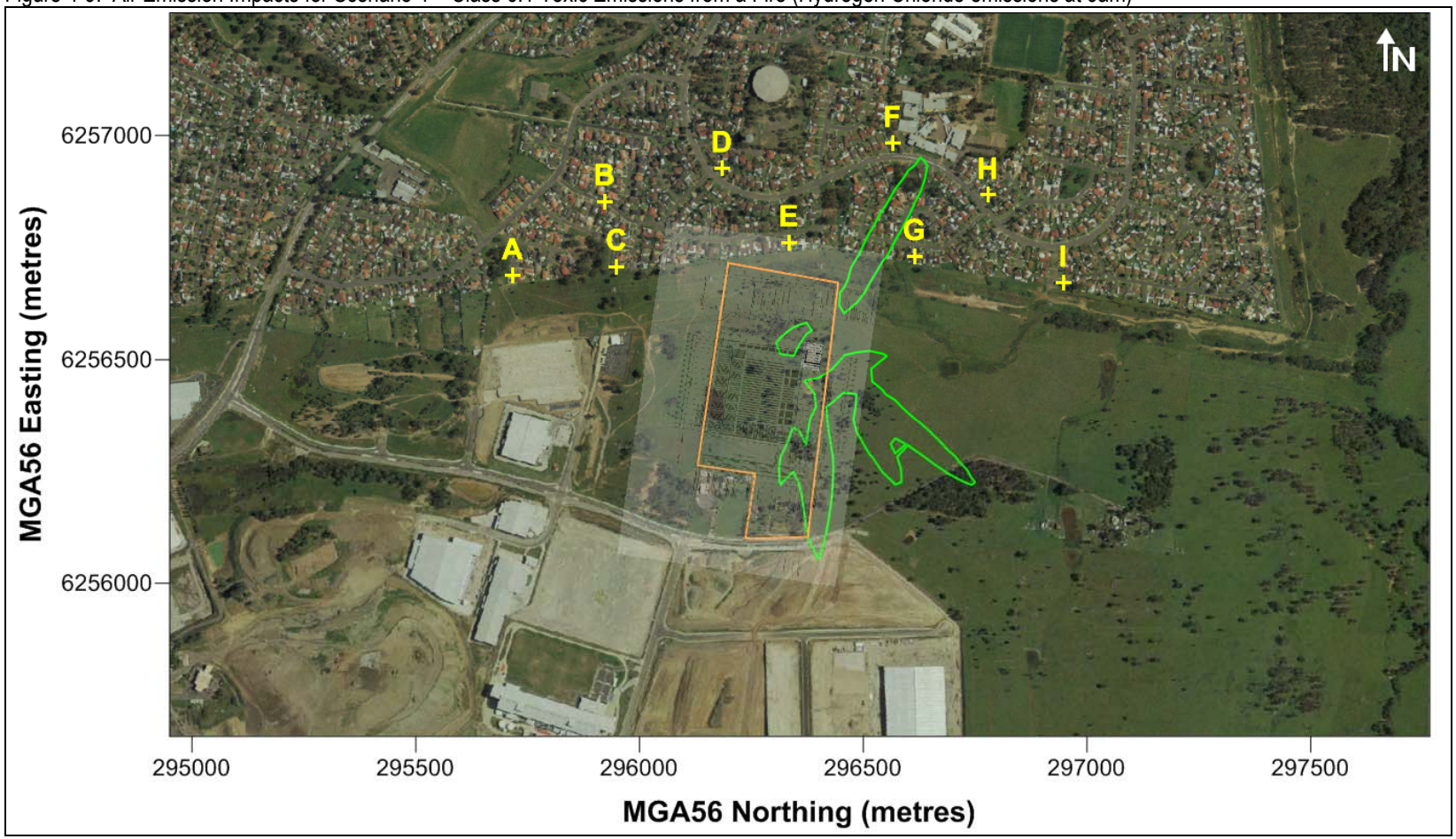
Note: Isopleths illustrate the following limits for phosgene emissions: Red = IDLH; Yellow = ERPG3; Blue = ERPG2. ERPG1 limits are not shown as this level extends beyond the site aerial.

Figure 4-8: Air Emission Impacts for Scenario 4 – Class 6.1 Toxic Emissions from a Fire (Chlorine emissions at 9am)



Note: Isopleths illustrate the following limits for chlorine emissions: Red = IDLH; Blue = ERPG2; Green = ERPG1. ERPG3 limits are not shown as this level is not reached in these conditions.

Figure 4-9: Air Emission Impacts for Scenario 4 – Class 6.1 Toxic Emissions from a Fire (Hydrogen Chloride emissions at 9am)



Note: Isopleths illustrate the following limits for chlorine emissions: Green = ERPG1. IDLH, ERPG2 and ERPG3 limits are not shown as this level is not reached in these conditions.

4.8 DISCUSSION

The storage of Class 3 and Class 6.1 dangerous goods were determined to be below the ALARP region, as illustrated in Figure 4-3. This means that these identified hazardous events are unlikely to happen not only due to the predictions provided by the IAEA method, but also given that proposed prevention and protection measures have been included and designed for the SRG facility (which have not been accounted for as part of the IAEA method, which may lower the corresponding frequency-consequence ratings). However, the storage of Class 2.1 flammable gas fell in the ALARP region which means while the risk of an accident may be tolerable, the risk level should be reduced to as low as reasonably possible (ALARP). Further analysis on the storage of Class 2.1 dangerous goods as well as other events with the most significant off-site impacts have been examined quantitatively, of which its data could be utilised for future reference.

Heat of radiation impact results from the worst-case fire scenarios (1 and 2) will not affect the nearest sensitive receptors. However, the adjacent industrial facility to the east may be affected from the heat radiation. Therefore, the proposed 240/240/240 fire rated walls and fire protection measures for the DG Store is warranted and will greatly reduce the likelihood and severity of such events.

The results from an incident involving a large spill of Class 6.1 toxic substances (Scenario 3) showed that a small number of residents may be exposed to dichloromethane emissions that exceed the ERPG1 limit. The emissions will not exceed the IDLH, ERPG 2 or ERPG 3 limits. This incident was modelled as a worse-case scenario assuming that the large spillage would be left unattended for an hour. These dangerous goods will be kept in small packages of up to 4 L reducing the likelihood of a large spill. Although the event is unlikely to occur, as suggested by the IAEA method, it is necessary for SRG Sydney to ensure that any spillages of Class 6.1 dangerous goods be cleaned up appropriately and immediately according to this predictive result.

Scenario 4 involving the combustion of the maximum amount of Class 6.1 toxic substances is likely to have the worst off-site impacts, if it were to occur. The results show that phosgene emissions at the nearest residents would exceed the IDLH, ERPG1, ERPG2 and ERPG 3 limits. The predicted chlorine emissions would also exceed the IDLH, ERPG1 and ERPG2 limits at the nearest residents but not the ERPG 3 criteria. Hydrogen chloride emissions would be less significant with exceedances of the ERPG1 limit only. This scenario assumes that the entire 500 L of Class 6.1 toxic substances are spilled and combusted altogether in the same bunded area. However, given the results from the IAEA method as shown in Figure 4-3, the likelihood/consequence effect of storing this dangerous good on site is minimal and well below the ALARP region. The proposed prevention and protection measures such as hazardous area zoning of the entire dangerous goods store, fire-rated walls, fire extinguishers, fire hose reels, fire hydrants, automatic sprinklers and appropriate bunding will significantly reduce the likelihood and consequence of this scenario.

SRG should ensure that the proposed prevention and protection measures for the site are maintained and enforced. The importance of fire prevention measures such as hazardous area zoning and fire fighting facilities and equipments should be emphasised. All electrical equipment used within the hazardous area zones would be intrinsically safe, as required by hazardous zoning, therefore limiting ignition sources. The DG Store will be constructed with 240/240/240 fire rated walls with sprinklers and fire extinguishers system readily accessible by SRG employees. Any chemical spills should be cleaned up immediately and appropriately. Dangerous and hazardous materials are stored within bunded walls, with spill kits nearby, thus the possibility of it escaping to the stormwater drain would be minimal.

The site should maintain records of contact details for neighbouring facilities and residences and these should be included in the site emergency plan. This is important for notification and evacuation purposes in the event of a major hazard.

5. ENVIRONMENTAL SAFEGUARD PROCEDURES

The proposed design and operation of the facility would include environmental safeguards to provide sufficient protection to the site such that if a pollution incident occurred, there would be minimal impact to the natural environment or nuisance caused to the amenity of adjacent occupiers of neighbouring premises.

These safeguards would enable the majority of the untoward events associated with storage, handling and process operations to be contained avoiding pollution incidents or off-site hazards. This section of the report provides a summary of these environmental safeguards.

All of the procedures and environmental safeguards outlined would be implemented as part of the site's operational activities.

Procedures would be prepared for the following:

- Identification of flammable and combustible liquids;
- Storage and handling of flammable and combustible liquids;
- Use of fire fighting equipment;
- Safe forklift operating procedure;
- Use of static earth straps;
- Safety inspections;
- Spill Procedure;
- General emergency procedures;
- Fire and explosion emergency procedures;
- Evacuation procedure;
- Medical emergency procedure;
- Environmental housekeeping; and
- Operation of the fire fighting water containment system.

As part of these procedures, it is essential that hardware is provided on-site in close proximity to the dangerous good storage areas. This would include:

- Means of isolating a spill would be held in designated areas and clearly signposted;
- Fire protection would rely heavily on the use of fire extinguishers and hose reels;
- Location of dangerous goods to assist in reducing the hazard to fire fighters and to maximise the ability to control fires;
- Site declared non-smoking areas and clearly signposted;
- Signposting of each bunded area includes the Hazchem sign, depot number, and necessary warning signs and location of the spill control kits;
- Marking boundaries of the hazardous area zone; and
- It is recommended that an emergency response plan with chemical register and manifest be prepared and located at the entrance to the general office.

The manifest is now usual practice and aids the fire brigades by providing the following information:

- Manifest plan;
- Material Safety Data Sheets; and
- Products stored in each bunded area.

5.1 ENVIRONMENTAL MANAGEMENT PROCEDURES

The following environmental management safeguards would be in use on site. Some of the procedures also achieve safety objectives:

- Spill Control Procedure;
- Use of Chemical Spill Kits;
- Personnel Entering Hazardous Area Zones;
- Site Isolation from Stormwater;
- Ventilation of Work Areas;
- Reporting Environmental Incident;
- Preventative Maintenance on Environmental Management Equipment;
- Fire Management;
- Emergency Response Procedure;
- Emergency Evacuation Procedure;
- Environmental housekeeping; and
- Training of a first response fire crew.

As part of these procedures, the essential hardware would be provided on-site in close proximity to the appropriate areas.

6. CONCLUDING COMMENTS

This risk assessment evaluation has found that the operation of the proposed development exceed the SEPP 33 Screening Thresholds. Hence further assessments have been carried out on the proposed facility in accordance with the Multi-Level Risk Assessment and Hazardous Industry Planning Advisory Papers (HIPAPs) guidelines. The results from this assessment determined that the site's proposed operations are not an offensive or hazardous industry.

The subject site is located within the Erskine Park Employment Area. Due to the nature of the operations and the hazard prevention and protection measures proposed for the subject site, it is expected that there would be no increase in hazardous risks to the existing or future residents in the subject area or to the occupants of the industrial area.

In the unlikely chance that a fire was to occur within the Dangerous Goods Store, the surrounding neighbours must be notified immediately (in particular the facility to the east of the site). Any fire should be put out immediately to prevent toxic combustion emissions from Class 6.1 dangerous goods. Contact details of neighbouring facilities must be recorded in the site's emergency plans so prompt notification and evacuation (if required) could occur. The air emission isopleths for the potential hazardous scenarios in Section 4.7 should also be included in the site's emergency plans to inform fire brigade of the possible affected areas.

We recommend that the assembly point during the case of emergency needs to be located in front of the site at Lenore Drive, outside the warehouse area.

It is the conclusion of this assessment that the proposed site and its operations would meet all the safety requirements stipulated by the Department of Planning. Hence, this facility would not be considered to be an offensive or hazardous development.

This concludes the risk assessment evaluation.

Prepared by:

Jenny Bo	RT Benbow
Environmental Engineer	Principal Consultant

7. LIMITATIONS

Our services for this project are carried out in accordance with our current professional standards for site assessment investigations. No guarantees are either expressed or implied.

This report has been prepared solely for the use by Super Retail Group Sydney as per our agreement for providing environmental assessment services. Although all due care has been taken in the preparation of this study, no warranty is given, nor liability accepted (except that required by law) in relation to the information contained within this document.

Super Retail Group Sydney is entitled to rely upon the findings in the report within the scope of work described in this report. No responsibility is accepted for the use of any part of the report in any other context or for any other purpose.

Opinions and judgements expressed herein, which are based on our understanding and interpretation of current regulatory standards, should not be construed as legal opinions.

ATTACHMENTS

Attachment 1: MSDS's of Chemicals Stored

Materials Safety Data Sheet
ABE High Performance Powder
Dated: 10th July 2007

High Performance Powder
This data is based on our present knowledge. However, it shall not constitute a guarantee for any specific product featured and shall not establish a legally valid contractual relationship.

1. Identification of the Product and the Company
1.1. Identification of the Product:
Designation: FIREBOX ABE High Performance Powder.
Use: Dry chemical fire fighting agent.
1.2. Identification of the Companies:
Manufacture: Suzhou Wuyue Synthetic Chemical Factory
Address: Mudu Xikuatang, Suzhou China. 315137.
Distributor Address: FIREBOX AUSTRALIA PTD LTD
LOT 5/19 BALOOK DRIVE
BERESFIELD NSW 2322 AUSTRALIA
2. Composition and Information on the Ingredients
51-80% Monoammoniumphosphate
0-40% Ammoniumsulphate
1-5% Different Silicates and Silica
0.1-1% Silicon Oil
No dangerous composition in a higher w/w percentage than these defined in clause 6 of the article 5 of the EEC directive dd January 11, 1993.
3. Identification of the Hazards for People and Environment
This product is not hazardous according to the criteria of the National Occupational Health and Safety Commission.
- Can slightly irritate the skin in presence on humidity.
- Can slightly irritate the eyes.
- Can slightly irritate the respiratory tract to consider as dust.

4. First Aid Measures
Eyes: There might be a slight irritation which fades soon. Irrigate with water or eyewash solution.
Skin: Wash off with water and soap. No serious effect.
Inhalation: If inhaled-remove to fresh air. No serious effect.
Ingestion: Wash mouth with water and give plenty of water to drink. Induce vomiting.
5. Fire Fighting Measures
It is an extinguishing agent. No special measure required.

6. Accidental Release Measures

People Precautions: Use a dust mask and gloves.

Precautions of the Environment: Do not evacuate through sewers.

Cleaning Methods: Sweep up or use a vacuum cleaner.

7. Handing and Storage

7.1. Handing Precautions: Dry, cool, absence of vibration. Avoid production of dust. When the powder passes through plastic pipes electrostatic charge can occur.

7.2. Storage Precautions: No danger.

8. Exposure Controls and Personal Protection

Installations and Precautions to Advice: In case of regular it is recommended to install a dust aspirator system.

Type of People Protection: The usual precautionary measures should be adhered to in handling Chemicals. Gloves and goggles may be used.

9. Physical and Chemical Properties

Form: Powder

Odour: None

Dye: Blue

Melting: >100°C

Flame Point: N/A

Solubility in Water: >90% after several hours

PH50% SOL: 5

10. Stability and Reactivity

Conditions to Avoid: Humidity

Substances to Avoid: Strongly caustic material

Hazardous Decomposition Products: Ammonia (>100°C)

In case of use the material on fire, the odour of NH3 is difficult to notice.

11. Toxicological Information

Eye Contact: Minor irritant. Possibility of transient irritation. No chronic effect known. No classification.

Skin Contract: Minor Irritant. Possibility of transient irritation. No chronic effect known.

Inhalation: To consider as dust. Irritation of the respiratory tract. No chronic effect known. No classification.

Ingestion: Irritation of the stomach. No chronic effect known. No classification.

12. Ecological Information

Not hazardous.

Contains no heavy metal salts.

Contains monoammoniumphosphate which is a soil fertilizer.

13. Disposal Considerations

Recovery: By brushing and aspiration.

Neutralisation: Not necessary.

Disposal: Normally as fertilizer though an approved specialized company.

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME
CHEMTECH CT14 ENGINE & BILGE DEGREASER

PROPER SHIPPING NAME
CORROSIVE LIQUID, N.O.S.(contains sodium hydroxide)

PRODUCT USE
Vehicle, engine and general purpose degreaser.

SUPPLIER

Company: ITW AAMTech
Address:
100 Hassall Street
Wetherill Park
NSW, 2164
Australia
Telephone: +61 2 9828 0900
Emergency Tel:**1800 039 008 (24 hours)**
Emergency Tel:**+61 3 9573 3112 (24 hours)**
Fax: +61 2 9725 4698

Company: Wynn' s New Zealand
Address:
Unit 2, 38 Trugood Drive
East Tamaki
Auckland, 2013
New Zealand
Telephone: +64 9272 1940
Emergency Tel:**+800 2436 2255 (24hours)**
Emergency Tel:**+613 9573 3112 (24hours)**
Fax: +64 9272 1949

Section 2 - HAZARDS IDENTIFICATION

STATEMENT OF HAZARDOUS NATURE
HAZARDOUS SUBSTANCE. DANGEROUS GOODS. According to NOHSC Criteria, and ADG Code.

RISK

Risk Codes	Risk Phrases
R36/38	• Irritating to eyes and skin.

SAFETY

Safety Codes	Safety Phrases
S23	• Do not breathe gas/fumes/vapour/spray.
S53	• Avoid exposure - obtain special instructions before use.
S40	• To clean the floor and all objects contaminated by this material, use water.
S26	• In case of contact with eyes, rinse with plenty of water and contact Doctor or Poisons Information Centre.
S46	• If swallowed, IMMEDIATELY contact Doctor or Poisons Information Centre. (show this container or label).
S60	• This material and its container must be disposed of as hazardous waste.

Section 3 - COMPOSITION / INFORMATION ON INGREDIENTS

NAME	CAS RN	%
sodium metasilicate	1344-09-8	<10
ethylene glycol monobutyl ether	111-76-2	<10
sodium hydroxide	1310-73-2	<1
ingredients non- hazardous, including water	7732-18-5	>60

continued...

Section 4 - FIRST AID MEASURES

SWALLOWED
• For advice, contact a Poisons Information Centre or a doctor at once.
• Urgent hospital treatment is likely to be needed.
• If swallowed do NOT induce vomiting.
• If vomiting occurs, lean patient forward or place on left side (head-down position, if possible) to maintain open airway and prevent aspiration.

EYE
■ If this product comes in contact with the eyes:
• Immediately hold eyelids apart and flush the eye continuously with running water.
• Ensure complete irrigation of the eye by keeping eyelids apart and away from eye and moving the eyelids by occasionally lifting the upper and lower lids.
• Continue flushing until advised to stop by the Poisons Information Centre or a doctor, or for at least 15 minutes.
• Transport to hospital or doctor without delay.

SKIN
■ If skin contact occurs:
• Immediately remove all contaminated clothing, including footwear.
• Flush skin and hair with running water (and soap if available).
• Seek medical attention in event of irritation.

INHALED
• If fumes or combustion products are inhaled remove from contaminated area.
• Lay patient down. Keep warm and rested.
• Prostheses such as false teeth, which may block airway, should be removed, where possible, prior to initiating first aid procedures.
• Apply artificial respiration if not breathing, preferably with a demand valve resuscitator, bag-valve mask device, or pocket mask as trained. Perform CPR if necessary.

NOTES TO PHYSICIAN
■ Treat symptomatically.

Section 5 - FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA
• Water spray or fog.
• Foam.
• Dry chemical powder.
• BCF (where regulations permit).

FIRE FIGHTING
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear full body protective clothing with breathing apparatus.
• Prevent, by any means available, spillage from entering drains or water course.
• Use fire fighting procedures suitable for surrounding area.
When any large container (including road and rail tankers) is involved in a fire, consider evacuation by 800 metres in all directions.

FIRE/EXPLOSION HAZARD
• Non combustible.
• Not considered to be a significant fire risk.
• Expansion or decomposition on heating may lead to violent rupture of containers.
• Decomposes on heating and may produce toxic fumes of carbon monoxide (CO).
Decomposition may produce toxic fumes of: carbon dioxide (CO_2), other pyrolysis products typical of burning organic material.

FIRE INCOMPATIBILITY
■ Reacts with aluminium / zinc producing flammable, explosive hydrogen gas.

HAZCHEM
2X

Personal Protective Equipment
Breathing apparatus.
Gas tight chemical resistant suit.
Limit exposure duration to 1 BA set 30 mins.

continued...

Section 6 - ACCIDENTAL RELEASE MEASURES

MINOR SPILLS
■ Slippery when spilt.
• Clean up all spills immediately.
• Avoid breathing vapours and contact with skin and eyes.
• Control personal contact by using protective equipment.
• Contain and absorb spill with sand, earth, inert material or vermiculite.

MAJOR SPILLS
■ Slippery when spilt.
• Clear area of personnel and move upwind.
• Alert Fire Brigade and tell them location and nature of hazard.
• Wear full body protective clothing with breathing apparatus.
• Prevent, by any means available, spillage from entering drains or water course.

Personal Protective Equipment advice is contained in Section 8 of the MSDS.

Section 7 - HANDLING AND STORAGE

PROCEDURE FOR HANDLING
• DO NOT allow clothing wet with material to stay in contact with skin.
• Limit all unnecessary personal contact.
• Wear protective clothing when risk of exposure occurs.
• Use in a well-ventilated area.
• Avoid contact with incompatible materials.

SUITABLE CONTAINER
• Lined metal can, lined metal pail/ can.
• Plastic pail.
• Polyliner drum.
• Packing as recommended by manufacturer.

STORAGE INCOMPATIBILITY
• Avoid strong acids, acid chlorides, acid anhydrides and chloroformates.

STORAGE REQUIREMENTS
• Store in original containers.
• Keep containers securely sealed.
• Store in a cool, dry, well-ventilated area.
• Store away from incompatible materials and foodstuff containers.

Section 8 - EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE CONTROLS

Source	Material	TWA ppm	TWA mg/m³	STEL ppm	STEL mg/m³	Peak mg/m³	Notes
Australia Exposure Standards	ethylene glycol monobutyl ether (2-Butoxyethanol)	20	96.9	50	242		Sk
Australia Exposure Standards	sodium hydroxide (Sodium hydroxide)					2	

The following materials had no OELs on our records
• sodium metasilicate: CAS:1344- 09- 8
• water: CAS:7732- 18- 5

PERSONAL PROTECTION

RESPIRATOR
Type A-P Filter of sufficient capacity

continued...

EYE
- Safety glasses with side shields; or as required,
- Chemical goggles.
- Contact lenses may pose a special hazard; soft contact lenses may absorb and concentrate irritants. A written policy document, describing the wearing of lens or restrictions on use, should be created for each workplace or task. This should include a review of lens absorption and adsorption for the class of chemicals in use and an account of injury experience. Medical and first-aid personnel should be trained in their removal and suitable equipment should be readily available. In the event of chemical exposure, begin eye irrigation immediately and remove contact lens as soon as practicable. Lens should be removed at the first signs of eye redness or irritation - lens should be removed in a clean environment only after workers have washed hands thoroughly. [CDC NIOSH Current Intelligence Bulletin 59].

HANDS/FEET
■ Wear chemical protective gloves, eg. PVC.
Wear safety footwear.

OTHER
- Overalls.
- Eyewash unit.

ENGINEERING CONTROLS
■ General exhaust is adequate under normal operating conditions. Local exhaust ventilation may be required in specific circumstances.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE
Salmon pink, slightly viscous, alkaline liquid with a distinctive solvent odour; mixes with water.

PHYSICAL PROPERTIES
Mixes with water.
Corrosive.

State	LIQUID	Molecular Weight	Not Applicable
Melting Range (℃)	Not Available	Viscosity	Not Available
Boiling Range (℃)	Not Available	Solubility in water (g/L)	M iscible
Flash Point (℃)	Not Applicable	pH (1% solution)	Not Availab le
Decomposition Temp (℃)	Not Available	pH (as supplied)	~12. 7
Autoignition Temp (℃)	Not Applicable	Vapour Pressure (kPa)	Not Available
Upper Explosive Limit (%)	Not Applicable	Specific Gravity (water=1)	1.06
Lower Explosive Limit (%)	Not Applicable	Relative Vapour Density (air=1)	Not Available
Volatile Component (%vol)	Not Available	Evaporation Rate	Not Available

ethylene glycol monobutyl ether
log Kow (Prager 1995): 0.83
log Kow (Sangster 1997): 0.8

Section 10 - STABILITY AND REACTIVITY

CONDITIONS CONTRIBUTING TO INSTABILITY
- Presence of incompatible materials.
- Product is considered stable.
- Hazardous polymerisation will not occur.

For incompatible materials - refer to Section 7 - Handling and Storage.

Section 11 - TOXICOLOGICAL INFORMATION

POTENTIAL HEALTH EFFECTS
ACUTE HEALTH EFFECTS
■ Irritating to eyes and skin.

CHRONIC HEALTH EFFECTS
• Generally not applicable.

continued...

TOXICITY AND IRRITATION
■ unless otherwise specified data extracted from RTECS - Register of Toxic Effects of Chemical Substances.

SODIUM HYDROXIDE:
SODIUM METASILICATE:
■ Asthma-like symptoms may continue for months or even years after exposure to the material ceases. This may be due to a non-allergenic condition known as reactive airways dysfunction syndrome (RADS) which can occur following exposure to high levels of highly irritating compound.

SODIUM HYDROXIDE:
ETHYLENE GLYCOL MONOBUTYL ETHER:
■ The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

ETHYLENE GLYCOL MONOBUTYL ETHER:
SODIUM METASILICATE:
■ The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) and swelling epidermis.

CHEMTECH CT14 ENGINE & BILGE DEGREASER:
■ Not available. Refer to individual constituents.

SODIUM METASILICATE:

TOXICITY	IRRITATION
Oral (rat) LD50: 1153 mg/kg	Skin (human): 250 mg/24h SEVERE
	Skin (rabbit): 250 mg/24h SEVERE

■ The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

ETHYLENE GLYCOL MONOBUTYL ETHER:

TOXICITY	IRRITATION
Oral (rat) LD50: 470 mg/kg	Skin (rabbit): 500 mg, open; Mild
Dermal (rabbit) LD50: 220 mg/kg	Eye (rabbit): 100 mg/24h- Moderate
Inhalation (human) TCLo: 100 ppm	Eye (rabbit): 100 mg SEVERE
Inhalation (human) TCLo: 195 ppm/8h * [Union Carbide]	
Inhalation (Rat) LC50: 450 ppm *	

■ For ethylene glycol:
Ethylene glycol is quickly and extensively absorbed through the gastrointestinal tract. Limited information suggests that it is also absorbed through the respiratory tract; dermal absorption is apparently slow.
For ethylene glycol monoalkyl ethers and their acetates (EGMAEs):
Typical members of this category are ethylene glycol propylene ether (EGPE), ethylene glycol butyl ether (EGBE) and ethylene glycol hexyl ether (EGHE) and their acetates.
EGMAEs are substrates for alcohol dehydrogenase isozyme ADH-3, which catalyzes the conversion of their terminal alcohols to aldehydes (which are transient metabolites).
Acute Toxicity: Oral LD50 values in rats for all category members range from 739 (EGHE) to 3089 mg/kg bw (EGPE), with values increasing with decreasing molecular weight.
Exposure of pregnant rats to ethylene glycol monobutyl ether (2-butoxyethanol) at 100 ppm or rabbits at 200 ppm during organogenesis resulted in maternal toxicity and embryotoxicity including a decreased number of viable implantations per litter. Slight foetoxicity in the form of poorly ossified or unossified skeletal elements was also apparent in rats.
At least one researcher has stated that the reproductive effects were less than that of other monoalkyl ethers of ethylene glycol.
NOTE: Changes in kidney, liver, spleen and lungs are observed in animals exposed to high concentrations of this substance by all routes.

SODIUM HYDROXIDE:

TOXICITY	IRRITATION
	Skin (rabbit): 500 mg/24h SEVERE
	Eye (rabbit): 0.05 mg/24h SEVERE
	Eye (rabbit):1 mg/24h SEVERE
	Eye (rabbit):1 mg/30s rinsed- SEVERE

■ The material may produce severe skin irritation after prolonged or repeated exposure, and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterised by skin redness (erythema) thickening of the epidermis.<</>.

WATER:
■ No significant acute toxicological data identified in literature search.

continued...

Section 12 - ECOLOGICAL INFORMATION

This material and its container must be disposed of as hazardous waste.

Ecotoxicity

Ingredient	Persistence: Water/Soil	Persistence: Air	Bioaccumulation	Mobility
ethylene glycol monobutyl ether	LOW	LOW	LOW	HIGH
sodium hydroxide	LOW		LOW	HIGH

Section 13 - DISPOSAL CONSIDERATIONS

- Recycle wherever possible.
- Consult manufacturer for recycling options or consult local or regional waste management authority for disposal if no suitable treatment or disposal facility can be identified.
- Treat and neutralise at an approved treatment plant.
- Treatment should involve: Neutralisation with suitable dilute acid followed by: burial in a land-fill specifically licenced to accept chemical and / or pharmaceutical wastes or Incineration in a licenced apparatus (after admixture with suitable combustible material).

Section 14 - TRANSPORTATION INFORMATION

Labels Required: CORROSIVE

HAZCHEM:
2X (ADG7)

ADG7:

Class or Division:	8	Subsidiary Risk:	None
UN No.:	1760	Packing Group:	III
Special Provision:	223, 274	Limited Quantity:	5 L
Portable Tanks & Bulk Containers - Instruction:	T7	Portable Tanks & Bulk Containers - Special Provision:	TP1, TP28
Packagings & IBCs - Packing Instruction:	None	Packagings & IBCs - Special Packing Provision:	P001, IBC03, LP01

Name and Description: CORROSIVE LIQUID, N.O.S. (contains sodium hydroxide)

Land Transport UNDG:

Class or division:	8	Subsidiary risk:	None
UN No.:	1760	UN packing group:	III

Shipping Name:CORROSIVE LIQUID, N.O.S. (contains sodium hydroxide)

Air Transport IATA:

ICAO/IATA Class:	8	ICAO/IATA Subrisk:	None
UN/ID Number:	1760	Packing Group:	III
Special provisions:	A3		

Shipping Name: CORROSIVE LIQUID, N.O.S. *(CONTAINS SODIUM HYDROXIDE)

Maritime Transport IMDG:

IMDG Class:	8	IMDG Subrisk:	None
UN Number:	1760	Packing Group:	III
EMS Number:	F- A , S- B	Special provisions:	223 274
Limited Quantities:	5 L		

Shipping Name: CORROSIVE LIQUID, N.O.S. (contains sodium hydroxide)

continued...

Section 15 - REGULATORY INFORMATION

POISONS SCHEDULE S5

REGULATIONS

Regulations for ingredients

sodium metasilicate (CAS: 1344-09-8) is found on the following regulatory lists;
"Australia High Volume Industrial Chemical List (HVICL)","Australia Inventory of Chemical Substances (AICS)","GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","IMO MARPOL 73/78 (Annex II) - List of Noxious Liquid Substances Carried in Bulk","International Council of Chemical Associations (ICCA) - High Production Volume List","OECD Representative List of High Production Volume (HPV) Chemicals"

ethylene glycol monobutyl ether (CAS: 111-76-2) is found on the following regulatory lists;
"Australia Exposure Standards","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)", "Australia Inventory of Chemical Substances (AICS)","IMO MARPOL 73/78 (Annex II) - List of Other Liquid Substances", "International Agency for Research on Cancer (IARC) - Agents Reviewed by the IARC Monographs","International Fragrance Association (IFRA) Survey: Transparency List","OECD Representative List of High Production Volume (HPV) Chemicals"

sodium hydroxide (CAS: 1310-73-2,12200-64-5) is found on the following regulatory lists;
"Australia Exposure Standards","Australia Hazardous Substances","Australia High Volume Industrial Chemical List (HVICL)", "Australia Illicit Drug Reagents/Essential Chemicals - Category III","Australia Inventory of Chemical Substances (AICS)", "Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix C","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix E (Part 2)","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Appendix F (Part 3)","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 5","Australia Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP) - Schedule 6","CODEX General Standard for Food Additives (GSFA) - Additives Permitted for Use in Food in General, Unless Otherwise Specified, in Accordance with GMP", "GESAMP/EHS Composite List - GESAMP Hazard Profiles","IMO IBC Code Chapter 17: Summary of minimum requirements","International Council of Chemical Associations (ICCA) - High Production Volume List","International Fragrance Association (IFRA) Survey: Transparency List","OECD Representative List of High Production Volume (HPV) Chemicals"

water (CAS: 7732-18-5) is found on the following regulatory lists;
"Australia Inventory of Chemical Substances (AICS)","IMO IBC Code Chapter 18: List of products to which the Code does not apply", "International Fragrance Association (IFRA) Survey: Transparency List","OECD Representative List of High Production Volume (HPV) Chemicals"

No data for Chemtech CT14 Engine & Bilge Degreaser (CW: 23-4528)

Section 16 - OTHER INFORMATION

INGREDIENTS WITH MULTIPLE CAS NUMBERS

Ingredient Name	CAS
sodium hydroxide	1310- 73- 2, 12200- 64- 5

■ Classification of the preparation and its individual components has drawn on official and authoritative sources as well as independent review by the Chemwatch Classification committee using available literature references.
A list of reference resources used to assist the committee may be found at:
www.chemwatch.net/references.

■ The (M)SDS is a Hazard Communication tool and should be used to assist in the Risk Assessment. Many factors determine whether the reported Hazards are Risks in the workplace or other settings.

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Issue Date: 17-Mar-2011
Print Date: 17-Mar-2011

This is the end of the MSDS.

MMP Industrial Pty Ltd

MATERIAL SAFETY DATA SHEET

Issue date 18th January 2010

1. Material and Supply Company Identification

Product Name:	**EXPORT DEGREASER, EXPORT BONUS DEGREASER**
Other Names/Code:	**EX001**
Recommended Use:	Degreasing substance in aerosol form
Supplier Name:	MMP Industrial Pty Ltd ABN 38 406 606 021
Address:	3-5 Hannabus Place, Mulgrave NSW 2756, Australia
Web Address:	www.mmpindustrial.com.au
Telephone:	02 4577 6977 Facsimile: 02 4577 6969
Emergency Telephone:	02 4577 6977 or 0412 881 997 Technical Support: 02 4577 6977

2. Hazards Identification

Hazards Category:

This product is hazardous according to the criteria of the NOHSC. Classed as a Schedule 5 Poison according to the SUSDP. Classsed as UN1950 Class 2.1 Aerosol. All components are listed on the AICS.

Risk Phrase(s):

R36/37/38 Irritating to Eyes, respiratory system and the skin
R49: May cause cancer
R65: May cause lung damage if swallowed
R66: Repeated exposure may cause drying and cracking of the skin.
WARNING: Inhaling concentrated vapours (“chroming”) may prove fatal.

Safety Phrase(s):

S2: Keep out of reach of children
S14: Keep away from heat, ignition sources and oxidisers
S23: Do not breathe vapour
S24/25: Avoid contact with skin and eyes
S36/37/39: Wear suitable protective clothing, gloves and eyeface protection.
S60:This material and its container must be disposed of as hazardous waste.

3. Composition Information

Chemical Entity:	CAS No.	Proportion
White Spirits	8052-41-3	>60%
Hydrocarbon Gas	68476-86-8	10-30%
Tall Oil Fatty Acid	8002-26-4	<10%
Monoethanolamine	141-43-5	<10%
Nonyl Phenol Ethoxylate	9016-45-9	<10%
Non Hazardous ingredients	n.a.	Balance
		100%

Product Name: **EXPORT DEGREASER, BONUS DEGREASER**
Other Names/Code: **EX001**
Hazardous Substance, Dangerous Goods

4. First Aid Measures

4.1 Symptoms of Exposure by Route
If poisoning occurs, contact a Doctor or Poisons Information Centre (Phone Australia 131 126, New Zealand 0800 764 766).
Swallowed: Moderately toxic. May cause chemical pneumonia if aspirated into the bronchial system during vomiting. White spirits may cause lung damage if ingested.
Eye Contact: Irritant. Solvent vapours will cause irritation to eyes. Temporary clouding of the vision may be experienced but is transient.
Skin Contact: Irritant.Can be slightly absorbed through skin. Repeated exposures may cause drying and cracking of the skin.
Inhaled:High concentration of solvent vapours can be harmful in enclosed spaces. Excessive inhalation of vapours can affect the central nervous system leading to a loss of coordination and impaired judgment. Prolonged exposure can lead to stupor or unconsciousness. Deliberate inhalation of concentrated vapours, commonly known as “chroming”, may prove fatal.
4.2 First Aid Instructions
Swallowed: Do not induce vomiting. Rinse mouth with water and give two 300 ml glasses of water to drink. If patient involuntarily vomits encourage to lean forward from the hips to avoid aspiration. If symptoms persist seek prompt medical assistance.
Eye Contact: Immediately: Hold eye open and flush with clean water for at least 15 minutes. While flushing, gently pull upper and lower eyelids away from eyes and ensure carefully flushed. If symptoms persist seek prompt medical attention.
Skin Contact:Remove contaminated clothing and footwear (while under safety shower if appropriate). Flush affected area with water for 3-5 minutes followed by washing gently with soap and water for a further 5 minutes. Rinse well and pat dry. If symptoms persist seek prompt medical attention.
Inhaled:Remove patient (while wearing SCBA if concentrations are high) to fresh air. Allow to rest. Rinse mouth and nose with water. Provide artificial respiration if breathing stops. Seek prompt medical attention unless recovery is virtually immediate. Cases of “chroming” must be medically examined even if patient has apparently recovered).
First Aid Facilities: Provide normal industrial first aid facilities including eye-wash stations and safety showers as appropriate.
Notes to Physician: (for symptoms of over-exposure to this product see above)
Possible Symptoms of Chronic Health Effects: Prolonged or repeated skin exposure may lead to dermatitis. Prolonged exposure to high vapour concentrations may lead to CNS effects and liver or kidney disorders. “Chroming” may cause heart failure or damage and brain damage through CNS effects.
Possible Aggravated Pre-existing Conditions: Asthmatics and sufferers of other bronchial disorders should exercise particular care when working with aerosols.
Suggested Treatment for Acute Symptoms, Known Antidotes: Provide supportive care and treatment based on the patient’s reactions to the exposure. For further information contact the Poisons Information Centre (Phone Australia 131 126, New Zealand 0800 764 766).

5. Fire Fighting Measures

Flammability and Explosion Hazards: Vapour highly flammable. Fire may produce irritating or poisonous gases. Heat may cause violent rupture of containers. Vapours may travel significant distances to a source of ignition and flash back to the point of origin. Vapours may “pool” in low-lying areas. In storage fires aerosol cans may “bleve” spreading burning liquid in their travel thus spreading fires.
Hazardous Combustion Products: Carbon dioxide, carbon monoxide, complex hydrocarbons may be formed on combustion.
Suitable Extinguishing Media: Hazchem Code 3[Y]. Foam, dry chemical, water delivered as fine spray or fog. NB: water may be ineffective due to low flash point of material.
Precautions for Firefighters and Special Equipment: Where SCBA and full turn out clothing. Avoid bodily contact with substance or run-off. Contain run-off for later collection and controlled disposal. Be aware of potential for mini “bleves”.

Product Name: **EXPORT DEGREASER, BONUS DEGREASER**
Other Names/Code: **EX001**
Hazardous Substance, Dangerous Goods

6. Accidental Release Measures

Emergency Procedures - Spills and Leaks (see Section 13 for disposal considerations): Switch off or remove all potential ignition sources. Prevent material entering drains or waterways. Send unnecessary personnel out of area. Wear full protective clothing including rubber boots and respirator. If ventilation is poor use SCBA. Spread sand, soil or other inert absorbent over liquid. When saturated collect into pails or drums, fit lids, label and place in a safe area to await disposal.
Collect undamaged cans for return to store. Collect damaged or leaking cans, place in recovery drums for return to supplier or disposal under local authority approval.

7. Handling and Storage

Handling: Wear suitable protective clothing (see below). Ensure appropriate fire prevention measures are in place.
Storage: Store in accordance with AS/NZS 3833-98 or AS 1940 and local regulations. Note that many authorities require that aerosols are housed in caged enclosures to prevent the travel of “bleves” Keep away from incompatibles in accordance with the Australian Standards.

8. Exposure Controls/Personal Protection

Exposure Standards: The NOHSC has not established an exposure standard for this product. The standard for some of the ingredients has been set:

SUBSTANCE	TWA	STEL
Hydrocarbon Gas	1800 mg/m^3	n.all
White Spirits	790 mg/m^3	n.all

Engineering Control Methods: Use in well ventilated areas and ensure ventilation is adequate to maintain air concentrations below TWA’s. Use local exhaust ventilation (flame-proof) in enclosed areas if necessary.
Personal Protective Equipment:
Respiratory Protection: Not usually required. If exposure standards may be exceeded use an organic vapour respirator to AS 1715 & 1716. Use SCBA in confined spaces.
Eye Protection: Use safety glasses with side shields or goggles to AS 1337 if spraying in a confined space or directly overhead.
Gloves: Not usually required but if redness or soreness is experienced use rubber or PVA gloves to AS 2161
Clothing: Wear Tyvec or cotton coveralls fastened at the neck and wrists. Supplement with PVA apron if required.

9. Physical and Chemical Properties

Form/Colour/Odour: Aromatic slightly coloured aerosol spray

Freezing/Melting Point:	not applicable	Boiling Point: -0.5 to -43.20°C (Gas)
Density:	0.76-0.79	Vapour Pressure: 1820 mm Hg @ 25°C (Gas)
Solubility in Water:	Insoluble (Gas is soluble @ 61.2 mg/L)	Volatiles Percent: 85% w/w
Flash Point:	-60°C (Gas)	Flammability Limites: 1.9 to 8.5% (Gas)
Auto Ignition Point	287°C (Gas)	

Other Properties: Incompatible with oxidising substances, heat and ignition sources

Product Name: **EXPORT DEGREASER, BONUS DEGREASER**
Other Names/Code: **EX001**
Hazardous Substance, Dangerous Goods

10. Stability and Reactivity

Under all normal conditions of use at normal temperatures and pressure the product is stable. Avoid contact with incompatibles including heat and ignition sources

11. Toxicological Information

Hydrocarbon Gas: LC50 Inhal Rat 4 hr 658 g/m^3

12. Ecological Information

Will adversely affect water quality for potable and industrial (cooling water) supplies. May be toxic to many forms of aquatic organism.

13. Disposal Considerations

Refer to State/Territory Land Waste Management Authority.

14. Transport Information

Transport as UN 1950 Class 2.1 Aerosol in accordance with the ADG Code, the IMDG Code or the IATA DG Regulations as appropriate for the mode of transport. Appropriate EPG Guide 49 SAA/SNZ HB 76:97

15. Regulatory Information

Label as a Schedule 5 Poison in accordance with the SUSDP: the word “WARNING” on the first line of the label in bold sans serif capital letters not less than 5mm tall. On the second line immediately below the word “warning” the phrase “KEEP OUT OF REACH OF CHILDREN” in bold san serif capitals not less than 2.5 mm tall. Under the trade name the phrase “Contains Hydrocarbon Gas 30 - 60 %” must appear. Label in accordance with the “National Code of Practice for the Labelling of Workplace Substances” [NOHSC: 2012(1994)] with the Risk and Safety Phrases displayed on page 1 of this MSDS. Label as a Dangerous Goods substance in accordance with the ADG Code with Class 2.1 Diamond, UN 1950 and the shipping name: Aerosol. Label with Consumer Advice in accordance with AS 2278.

16. Other Information

Date Prepared/Amended: 18/01/10. Revised Version 1.1 to comply with National Code of Practice for the Preparation of Material Safety Data Sheets 2nd Edition NOHSC: 2011 (2003).

Data Sources used: in the preparation of this MSDS include: “Chempendium” and “Cheminfo” published in CD format by CCOHS Canada 2003 - 4.“TOMES” a CD database published by Micromedex, USA, “Hazardous Properties of Industrial Materials” Van Nostrand Rheinhold NY, USA . “List of Designated Hazardous Substances” NOHSC 10005:1999, “National Exposure Standards” NOHSC 1003:1995 . Abbreviations used: n.d = not determined, n.a = not applicable, n.all =not allocated, n.est = not established, SUSDP = Standard for the Uniform Scheduling of Drugs and Poisons, ADG = Australian Dangerous Goods (Code), IATA = International Air Transport Association, (Dangerous Goods Regulations), IMDG = International Maritime Dangerous Goods (Code.)

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Infosafe No™ HXOPT Issue Date : July 2012 DRAFT by RITTCODI

Product Name **BLACK MAGIC TIRE WET**

Not classified as hazardous

1. IDENTIFICATION OF THE MATERIAL AND SUPPLIER

Product Name	BLACK MAGIC TIRE WET
Product Code	BM23
Company Name	RITTCO DISTRIBUTING
Address	PO BOX. 23 CONCORD NSW 2137 Australia
Emergency Tel.	13 11 16
Recommended Use	Tire dressing

2. HAZARDS IDENTIFICATION

Hazard Classification	Not classified as hazardous DANGEROUS GOODS. NON-HAZARDOUS SUBSTANCE. Dangerous goods classification according to the Australian Dangerous Goods Code. Hazard classification according to the criteria of NOHSC.
Risk Phrase(s)	Not classified as hazardous R51/53 Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment. R66 Repeated exposure may cause skin dryness and cracking. R67 Vapours may cause drowsiness and dizziness
Safety Phrase(s)	S29 Do not empty into drains. S61 Avoid release to the environment. Refer to special instructions/safety data sheet.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	Name	CAS	Proportion
	Blend of petroleum distillates and additives		100 %

4. FIRST AID MEASURES

Inhalation	If inhaled, remove affected person from contaminated area. Keep at rest until recovered. If symptoms persist seek medical attention.
Ingestion	Do not induce vomiting. Wash out mouth thoroughly with water. If symptoms develop seek medical attention.
Skin	Wash affected area thoroughly with soap and water. If symptoms develop seek medical attention.
Eye	If in eyes, hold eyelids apart and flush the eyes continuously with running water. Continue flushing for several minutes until all contaminants are washed out completely. If symptoms develop and persist seek medical attention.
First Aid Facilities	Eyewash and normal washroom facilities.
Advice to Doctor	Treat symptomatically
Other Information	For advice in an emergency, contact a Poisons Information Centre (Phone Australia 13 1126; New Zealand 0800 POISON / 0800 764 766) or a doctor at once.

5. FIRE FIGHTING MEASURES

Suitable Extinguishing Media	Use carbon dioxide, dry chemical, foam, water mist or water spray.
Hazards from Combustion Products	Under fire conditions this product may emit toxic and/or irritating fumes and gases including carbon monoxide and carbon dioxide.
Specific Hazards	Combustible liquid. This product will readily burn under fire conditions.
Hazchem Code	•3Z
Precautions in connection with Fire	Fire fighters should wear Self-Contained Breathing Apparatus (SCBA) operated in positive pressure mode and full protective clothing to prevent exposure to

	vapours or fumes. Water spray may be used to cool down heat-exposed containers. Fight fire from safe location. This product should be prevented from entering drains and watercourses.
Other Information	Do not use water jet.

6. ACCIDENTAL RELEASE MEASURES

Emergency Procedures	Wear appropriate personal protective equipment and clothing to prevent exposure. Extinguish or remove all sources of ignition and stop leak if safe to do so. Increase ventilation. Evacuate all unprotected personnel. If possible contain the spill. Place inert absorbent, non-combustible material onto spillage. Use clean non-sparking tools to collect the material and place into suitable labelled containers for subsequent recycling or disposal. Dispose of waste according to the applicable local and national regulations. If contamination of sewers or waterways occurs inform the local water and waste management authorities in accordance with local regulations.

7. HANDLING AND STORAGE

Precautions for Safe Handling	Use only in a well ventilated area. Keep containers sealed when not in use. Prevent the build up of mists or vapours in the work atmosphere. Avoid inhalation of vapours and mists, and skin or eye contact. Do not use near ignition sources. Do not pressurise, cut, heat or weld containers as they may contain hazardous residues. Maintain high standards of personal hygiene i.e. Washing hands prior to eating, drinking, smoking or using toilet facilities.
Conditions for Safe Storage	Store in a cool, dry, well-ventilated area away from sources of ignition, oxidising agents, strong acids, foodstuffs, and clothing. Keep containers closed when not in use and securely sealed and protected against physical damage. Inspect regularly for deficiencies such as damage or leaks. Have appropriate fire extinguishers available in and near the storage area. Take precautions against static electricity discharges. Use proper grounding procedures. For information on the design of the storeroom, reference should be made to Australian Standard AS1940 - The storage and handling of flammable and combustible liquids. Reference should also be made to all applicable local and national regulations.
Storage Regulations	Classified as a Class C1 (COMBUSTIBLE LIQUID) for the purpose of storage and handling, in accordance with the requirements of AS1940. This product should be stored and used in a well-ventilated area away from naked flames, sparks and other sources of ignition.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

National Exposure Standards	No exposure standards have been established for this material by Safe Work, Australia. However, over-exposure to some chemicals may result in enhancement of pre-existing adverse medical conditions and/or allergic reactions and should be kept to the least possible levels. As with all chemicals, exposure should be kept to the lowest possible levels.
Biological Limit Values	No biological limit allocated.
Engineering Controls	Provide sufficient ventilation to keep airborne levels below the exposure limits. Where vapours or mists are generated, particularly in enclosed areas, and natural ventilation is inadequate, a flameproof exhaust ventilation system is required. Refer to AS 1940 - The storage and handling of flammable and combustible liquids and AS/NZS 60079.10.1:2009 Explosive atmospheres - Classification of areas - Explosive gas atmospheres, for further information concerning ventilation requirements.
Respiratory Protection	If engineering controls are not effective in controlling airborne exposure then an approved respirator with a replaceable organic vapour filter should be used. Reference should be made to Australian/New Zealand Standards AS/NZS 1715, Selection, Use and Maintenance of Respiratory Protective Devices; and AS/NZS 1716, Respiratory Protective Devices, in order to make any necessary changes for individual circumstances.
Eye Protection	Safety glasses with side shields or chemical goggles should be worn. Final choice of appropriate eye/face protection will vary according to individual circumstances. Eye protection devices should conform with Australian/New Zealand Standard AS/NZS 1337 - Eye Protectors for Industrial Applications.
Hand Protection	Wear gloves of impervious material. Final choice of appropriate gloves will

Body Protection	vary according to individual circumstances i.e. methods of handling or according to risk assessments undertaken. Reference should be made to AS/NZS 2161.1: Occupational protective gloves - Selection, use and maintenance. Suitable protective work wear, e.g. cotton overalls buttoned at neck and wrist is recommended. Chemical resistant apron is recommended where large quantities are handled

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance	Clear liquid
Odour	Cherry
Melting Point	Not available
Boiling Point	176.7°C
Solubility in Water	Insoluble
Specific Gravity	0.84 at 20°C
pH Value	Not available
Vapour Pressure	Not available
Vapour Density (Air=1)	Not available
Colour	Colourless
Volatile Component	(Organic carbon): <1%
Flash Point	82.23°C
Flammability	Combustible liquid
Auto-Ignition Temperature	Not available
Flammable Limits - Lower	Not available
Flammable Limits - Upper	Not available
Kinematic Viscosity	22.23 mm^2/sec at 40°C

10. STABILITY AND REACTIVITY

Chemical Stability	Stable under normal conditions of storage and handling.
Conditions to Avoid	Heat, flames and other sources of ignition.
Incompatible Materials	Strong oxidizing agents.
Hazardous Decomposition Products	Thermal decomposition may result in the release of toxic and/or irritating fumes and gases including carbon monoxide and carbon dioxide.
Hazardous Polymerization	Will not occur.

11. TOXICOLOGICAL INFORMATION

Toxicology Information	Acute toxicity data for product is given below:
Inhalation	May cause irritation to the mucous membrane and upper airways, especially where vapours or mists are generated. Symptoms include sneezing, coughing, wheezing, shortness of breath, headache, dizziness, drowsiness, nausea and vomiting.
Ingestion	Ingestion of this product may irritate the gastric tract causing nausea and vomiting.
Skin	Repeated exposure may cause skin dryness and cracking.
Eye	May be irritating to eyes. The symptoms may include redness, itching and tearing.

Not classified as hazardous

Chronic Effects	Prolonged or repeated skin contact may cause defatting leading to dermatitis. Prolonged inhalation of product vapours may cause central nervous system depression resulting in headaches, dizziness, nausea and unconsciousness.
Acute Toxicity - Oral	LD50 (Rat): >2000 mg/kg
Acute Toxicity - Dermal	LD50 (Rabbit): >2000 mg/kg
Acute Toxicity - Inhalation	LC50 (Rat): >20 mg/L

12. ECOLOGICAL INFORMATION

Ecotoxicity	Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
Persistence / Degradability	Not available
Mobility	Disperses in water.
Bioaccumulative Potential	Not available
Environ. Protection	Do not allow product to enter drains, waterways or sewers.

13. DISPOSAL CONSIDERATIONS

Disposal Considerations	Dispose of in accordance with relevant local legislation.

14. TRANSPORT INFORMATION

Transport Information	This material is classified as Dangerous Goods Class 9 Miscellaneous substances according to The Australian Code for the Transport of Dangerous Goods by Road and Rail (7th edition). Class 9 Dangerous Goods are incompatible in a placard load with any of the following: - Class 1, Explosives (when the class 9 substance is a fire risk substance), - Division 5.1, Oxidising substances (when the class 9 substance is a fire risk substance), and - Division 5.2, Organic peroxides (when the class 9 substance is a fire risk substance). Note: Special Provision AU01 Environmentally Hazardous Substances meeting the descriptions of UN 3077 or UN 3082 are not subject to this Code when transported by road or rail in: a) packagings; b) IBCs; or c) any other receptacle not exceeding 500 Kg(L).
U.N. Number	3082
Proper Shipping Name	ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. - (Contains: Petroleum distillates)
DG Class	9
Hazchem Code	•3Z
Packing Group	III
EPG Number	9C1
IERG Number	47
IMDG Marine Pollutant (MP)	Yes

15. REGULATORY INFORMATION

Regulatory Information	Not classified as Hazardous according to criteria of National Occupational Health & Safety Commission (NOHSC), Australia. Classified as a Scheduled Poison according to the Standard for the Uniform Scheduling of Medicines and Poisons (SUSMP).
Poisons Schedule	S5

Infosafe No™ HXOPT	Issue Date : July 2012	DRAFT by RITTCODI

Product Name : **BLACK MAGIC TIRE WET**

Not classified as hazardous

Hazard Category Dangerous for the environment

16. OTHER INFORMATION

Date of preparation or last revision of MSDS

MSDS Reviewed: July 2012
MSDS Supersedes: August 2010

...End Of MSDS...

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