

TNT Warehouse and Distribution Facility  
Lockwood Road, Erskine Park

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5 September 2013 | Final Issue | Report No. sr13009\_TNT Warehouse and Distribution Facility\_RER\_01



# Environmental Risk Assessment

## TNT Warehouse and Distribution Facility

### Lockwood Road, Erskine Park NSW

**RAW RiSK**  
Engineering



## Report Details

Project: TNT Warehouse and Distribution Facility, Lockwood Road, Erskine Park

Document: Risk Engineering Report

Report No.: sr13009\_TNT Warehouse and Distribution Facility\_RER\_01

## Report Revision History

REV	DATE ISSUED	COMMENT	PREPARED BY	REVIEWED BY	VERIFIED BY
01	05/09/13	Draft Issue for comment	Steve Sylvester	Sandro Razzi	Sandro Razzi

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## EXECUTIVE SUMMARY

### Introduction, Objectives and Scope

Commercial & Industrial Property Pty Ltd (CIP) is the proponent of an application for a TNT Warehouse and Distribution Facility at Lockwood Road, Erskine Park, NSW. As the site will store a number of Dangerous Goods, the Director Generally requires the proposed TNT facility to be assessed for environmental risk. CIP has commissioned RAW Risk Engineering (RRE) to conduct the environmental risk assessment and to prepare a report for inclusion in the Development Application (DA) submission. This document provides the results of the environmental risk assessment of the TNT Warehouse and Distribution Facility at Lockwood Road, Erskine Park, NSW prepared by RRE.

### Methodology

The methodology selected for the Environmental Risk Assessment of the TNT Facility is that prescribed in AS31000 – Risk Management – Principle and Guidelines (Ref.2) and Hazardous Industry Planning Advisory Paper No.3 – Risk Assessment Guidelines (Ref.1).

### Brief Description of the Proposed TNT Facility

The development proposes the construction of a purpose built warehouse/distribution centre and transport terminal. The facility will be operated by TNT Australia P/L and will operate as the Sydney Basin Freight Transport facility for TNT.

The facility comprises a central warehouse building, of 29,740 m<sup>2</sup> area, designed to maximise vehicle access for unloading and loading of parcels received and sorted on site prior to delivery. The warehouse is a single level high clearance structure with raised loading dock to accommodate the specialised sorting and loading machinery.

Small two (2) level office spaces are accommodated within the main warehouse building. The main administration office is a two (2) level office building with a two (2) level decked car park to the north.

The facility is projected to generate 450 full time employment positions across staggered start and finish times. The peak operational periods will be between 5.00am and 9.00am and 17.00pm and 22.00pm.

### Hazard Analysis and Risk Assessment Results

A detailed hazard identification and risk assessment table has been prepared and is included at Appendix A. The hazard identification assessment conducted for the TNT facility identified the following potential environmental hazards:

- Delivery truck – fuel or oil leak leading to contamination of the stormwater systems;
- Delivery truck – accident (collision) involving chemical release;
- LPG Deliveries – release of LPG as a result of equipment failure;
- Diesel Fuel Deliveries (main fuel tanks, emergency diesel, fire pumps) - release of diesel fuel as a result of equipment failure;
- Chemical Transfers – dropped receptacles, forklift tines impact receptacles, chemical release/spill;
- LPG Transfer (forklift refuelling) – equipment leak during transfer operation (e.g. hoses, flanges, pipework, etc.);
- Diesel Fuel Transfer (vehicle refuelling) - equipment leak during transfer operation (e.g. bowser hoses, flanges, pipework, etc.);
- Transit Storage Area – leaking containers, forklift tine pierces receptacles, release/spill of chemicals;
- LPG Storage – vessel/fitting leak (e.g. pipework connections, vessel nozzles, shell), LPG release;



- Diesel Storage – tank/fitting leak (e.g. pipework connections, tank nozzles, tank shell), diesel fuel spill/release;
- Truck Wash Bay – contaminated water release from water treatment facility, release to stormwater;
- Emergency Generator/Fire Pump – fuel tank or fitting leak (e.g. pipework connections, tank shell, flanges), diesel fuel release;
- Emergency Generator/Fire Pump – lubricating oil release (sump failure, hole, gasket leak), oil release;
- Substation – oil filled electrical equipment failure (e.g. switchgear, transformers), oil release in the substation;
- Waste Materials – failure to separate recyclable waste, contaminated waste collected and sent offsite.

Each hazard was assessed in detail and the proposed safeguards to prevent, detect, protect and mitigate against potential environmental incidents were reviewed to determine the risk of environmental impact from the identified incidents. A risk analysis was conducted using the risk matrix approach (see Appendix B) and it was identified that all assessed risks were low, due to the safeguards proposed at the site. The results of the risk assessment are included at Appendix A.

### Conclusions

The analysis conducted in this study has identified a number of environmental hazards at the proposed TNT Warehouse and Distribution facility, Erskine Park, NSW. The environmental risk assessment conducted as part of the study has identified that the proposed safeguards would ensure the all environmental risk associated with the identified hazards are low.

Hence, it is concluded that the environmental risks associated with the TNT Warehouse and Distribution facility, Erskine Park, NSW are low. However, notwithstanding the fact that the study has identified the environmental risks to be low, a number of recommendations are made to ensure the risks are maintained within the as low as reasonably practicable (ALARP) range.

### Recommendations

Based on the analysis conducted in this study, and to ensure the risks are maintained within the low range, the following recommendations are made:

1. **Vehicle Fuel/Oil Leaks** – It was identified that vehicles visiting the site to deliver or collect goods may leak oils or fuels to the pavement areas on site. Whilst the assessment conducted in this study identified that the risk of environmental impact was low, to ensure risks are maintained within the low range, it is recommended that an audit/checklist and procedure be developed for vehicle inspection and applied at random to vehicles attending the site. The checklist should include condition of fuel and oil systems and identification of any leaks. Where leaks are identified, these should be recorded and a copy of the inspection sheet provided to the driver and forwarded to their management.
2. **Diesel fuel tanks** – it was identified that in the event of a spill of diesel, ignition and fire, appropriate fire fighting medium would be required. Hence, for combustible liquids, fire fighting foam is the most effective medium. It is therefore recommended that a hose reel with a foam attachment be installed on the closest hose reel to the diesel fuel tanks.
3. **Packages and receptacles** – It was identified that Dangerous Goods packages, held in storage within the transit storage area, may enter the site in a damaged state and may leak contents into the storage location. To minimise the potential for the storage of damaged containers, it is recommended that TNT develop a storage inspection procedure that includes the inspection of all DGs stored within the transit area to identify potential package or receptacle damage. The procedure should also include the management of damaged packages/receptacles (i.e. separation/quarantine in a safe area at the site) and the disposal of the damage products.



4. **Transit area bund** – It was identified that in the event of a package/receptacle leak within the transit storage area, there is a potential for released DG liquids to escape beyond the immediate transit storage depot. Hence, it is recommended that the transit area be banded with a “speed-hump” type bund. The bund height need only be small ( $\approx 50\text{mm}$ ), as the total quantity of release product would be  $<1,000\text{ L}$ , based on the largest receptacle size in the storage (e.g. Immediate Bulk Container).
5. **Hose Reel in Transit Area** – It was identified that in the event of flammable or combustible liquid leak into the transit area there is a potential for ignition and fire. Whilst it is recognised that sprinkler systems are installed in the transit storage area, sprinkler water would not be the most effective fire fighting medium. Hence, to assist in first attack fire fighting, and to minimise the potential for sprinkler system activation, it is recommended that a foam attachment be installed on the fire hose reel closest to the transit store. This will assist in controlling the fire and minimise the potential for sprinkler activation. It is also recommended that the emergency response team members be trained in first attack fire fighting equipment use (e.g. extinguishers and hose reels, including foam attachments)
6. **Fire Pump Pad** – It was identified that fuel and oil leaks in the fire pump area could result in release of combustible liquids beyond the fire pump area (i.e. into the adjacent environment). It is therefore recommended that the diesel fire pump concrete pad be constructed with a small bund (50mm high) around the edge of the pad to retain any spills that may occur from the diesel tank or oil sump in the engine.
7. **Fuel Tank Refilling (fire pumps/Emergency Generator.)** – It was identified that the refuelling of the fire pump and emergency generator fuel tanks have the potential for spills. Hence, it is recommended that a fire pump and emergency generator diesel tank fuel refilling procedure be developed, including response in the event of a spill. The procedure should be laminated and held in a box adjacent to the engines, along with the engine test procedures and test records.



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## ABBREVIATIONS

Abbreviation	Description
DGR	Director Generals Requirements
DA	Development Application
RRE	Raw Risk Engineering
AS	Australian Standard
HIPAP	Hazardous Industry Planning Advisory Paper
SEPP	State Environmental Planning Policy
DG	Dangerous Goods
CIP	Commercial & Industrial Property
PG	Packaging Group
L	Litres
EPA	Environmental Protection Authority
m <sup>3</sup>	cubic metres
LPG	Liquefied Petroleum Gas
ADG	Australian Dangerous Goods Code
IBC	Intermediate Bulk Container
mm	Millimetres
kph	kilometres per hours
m	metres
ALARP	as low as reasonably practicable
ESD	Emergency Shut Down
ESFR	Early Suppression Fast Response
BLEVE	Boiling Liquid Expanding Vapour
JSEA	Job Safety and Environmental Analysis
SWMS	Safe Work Method Statement



# 1 INTRODUCTION

## 1.1 OVERVIEW

Commercial & Industrial Property Pty Ltd (CIP) is the proponent of an application for a TNT Warehouse and Distribution Facility at Lockwood Road, Erskine Park, NSW. As the site will store a number of Dangerous Goods, the Director Generally requires the proposed TNT facility to be assessed for environmental risk. CIP has commissioned RAW Risk Engineering (RRE) to conduct the environmental risk assessment and to prepare a report for inclusion in the Development Application (DA) submission. This document provides the results of the environmental risk assessment of the TNT Warehouse and Distribution Facility at Lockwood Road, Erskine Park, NSW prepared by RRE

### Objectives

The objectives of the study are to:

- conduct an environmental risk assessment of the TNT Warehouse and Distribution Facility at Lockwood Road, Erskine Park, NSW (TNT Facility); and
- Prepare an environmental risk assessment report for submission to the Department of Planning & Infrastructure support of a DA.

## 1.2 SCOPE OF WORKS

The scope of work is for the preparation of an environmental risk assessment for the TNT Facility only. The risk assessment scope includes the identification of environmental hazards, the assessment of risks associated with the identified hazards and the identification of risk control measures that may be implemented to reduce the risks to as low as reasonably practicable.

The risk assessment does not include the impacts to people on adjacent land uses, which is the scope of a Preliminary Hazard Analysis, should this study be required as part of the development planning requirements.



## 2 METHODOLOGY

The methodology used in the assessment of environmental risk, associated with the operations at the TNT Facility, was that prescribed in Hazardous Industry Planning Advisory Paper (HIPAP) No.3 – Risk Assessment (Ref.1). The risk assessment process detailed in HIPAP No.3 complies with the requirements of AS31000 – Risk Management (Ref.2). It is noted that the DGRs make reference to AS4360-2004, Risk Management (Ref.3). This document was superseded in 2009 by AS31000-2009, Risk Management (ref.2). Hence, the more recent standard is referenced in this proposal and any other documents associated with this project.

The following methodology, which is commensurate with HPAP No.3, AS31000 and the Multi-Level Risk Assessment approach (Ref.1), has been used:

- Project Familiarisation – a review of the project documentation and description to identify the proposed operations at the site.
- Hazard Identification – a review of the site processes was conducted to identify environmental hazards that may occur as a result of operations. A hazard identification table was developed detailing the hazard cause, consequence and safeguards implemented to manage the hazard. The hazard analysis identified significant incident scenarios that could lead to severe impact to the environment. Those incidents identified to have the potential to result in significant environmental impact were assessed for consequence impact. Incident scenarios identified to be effectively managed were not assessed further.
- Risk Analysis - The risk analysis was then conducted qualitatively. This was based on guidance from the documents Applying SEPP33 (Ref.4) and Multi Level Risk Assessment (Ref.5). These documents indicate that where DGs are in lower quantities (i.e. where SEPP33 does not apply), a thorough qualitative assessment would be an acceptable approach.

The risk analysis was first conducted by identifying the hazard consequences and then the likelihood. These parameters were discussed and explained for each hazard and a final assessment of risk made based on the effectiveness of the safeguards to minimise both consequence and frequency. The risk associated with each hazard was then recorded as part of the hazard identification table (**Appendix A**). Three columns were added to the table to record the consequence value, frequency value and risk. A copy of the methodology used for this approach and the consequence/frequency tables and risk matrix used in the study is included at **Appendix B**.

A final review of the risks associated with each hazard was then conducted using the semi-quantitative risk matrix approach.

- Reporting – on completion of the study a draft report was developed for review and comment by CIP. Comments on the draft report for points of fact were then incorporated and a final report issued for submission to the Regulator in support of the DA.



## 3 BRIEF DESCRIPTION OF THE TNT TRANSPORT & WAREHOUSE FACILITY

### 3.1 TNT WAREHOUSE AND DISTRIBUTION FACILITY LOCATION AND OVERVIEW

The TNT Facility is located at Lockwood Road, Erskine Park, NSW. Figure 3.1 shows the regional location of the TNT Facility in the Erskine Park Area. Figure 3.2 shows the location of the facility in Erskine Park. It can be seen from this figure that the proposed site is located in a light industrial area, and surrounded by similar facilities.

The development proposes the construction of a purpose built warehouse and distribution centre and transport terminal. The facility will be operated by TNT Australia P/L and will operate as the Sydney Basin Freight Transport facility for TNT.

The facility comprises a central warehouse building designed to maximise vehicle access for unloading and loading of parcels received and sorted on site prior to delivery.

The total building area proposed is 31,902m<sup>2</sup> comprising:

- 29,740m<sup>2</sup> Warehouse and raised dock
- 500m<sup>2</sup> Main operations office
- 200m<sup>2</sup> Operations office 2 (2 levels)
- 300m<sup>2</sup> Operations office 3 (2 levels)
- 1,000m<sup>2</sup> Main office / administration (2 levels)
- 30m<sup>2</sup> Gatehouse
- 132m<sup>2</sup> Truck wash and maintenance

Of the site area of 78,189m<sup>2</sup>, paved areas for vehicle circulation and parking is proposed comprising 35,521m<sup>2</sup>. A paved outdoor staff area of 180m<sup>2</sup> is proposed to the south of the main office building. Car parking for staff is a combination of at grade and decked parking accommodating a total of 350 spaces, including four (4) accessible spaces. A total of 24 bicycle parking spaces are also provided.

On-site vehicle storage comprises accommodation for:

- 18 – prime movers;
- 60 – trailer parking spaces;
- 85 – 5 tonne trucks; and
- 60 – 8 tonne trucks.

The warehouse is a single level high clearance structure with raised loading dock to accommodate the specialised sorting and loading machinery. Small two (2) level office spaces are accommodated within the main warehouse building. The main administration office is a two (2) level office building with a two (2) level decked car park to the north.

### 3.2 TNT WAREHOUSE AND DISTRIBUTION FACILITY LAYOUT

**Figure 3.3** shows a site layout, and the location of the DG Transit Area at the site. The facility will be located between Lenore Drive and Lockwood Road at Erskine Park. The warehouse will be constructed from steel metal frames with a sheet metal cladding. A concrete floor will be laid within the warehouse building and on external areas where transport vehicles will operate. A two storey office building will be constructed on the western side of the main warehouse building with an adjoining car park. Prime mover, trailer and container parking will be provided on the western end of the site.



### 3.3 BRIEF DESCRIPTION OF THE DGS STORED AND HANDLED AT THE PROPOSED TNT FACILITY

The proposed storage and handling of DGs will occur as a transit operation only. General goods and DGs will arrive at the site in containers and will be unpacked and re-packed for dispatch offsite.

The DGs will be unpacked and transferred to a specific Transit Storage Area that will be designed in accordance with AS3833-2007 (Ref.6), the mixed DG storage standard. Based on the DG deliveries to the site, and the repackaging and despatch offsite, the following DG classes and maximum quantities would be stored within the Transit Storage Area.

- |  |           |
|--|-----------|
| ▪ Class 2.1 & 2.2 (flammable and non-flammable gas - bulk aerosols)          | 7 tonnes  |
| ▪ Class 3 (flammable liquids PGII & PGIII):                                  | 20 tonnes |
| ▪ Class 1.4s (explosives): (mainly party poppers and bullets for Winchester) | 2 tonnes  |
| ▪ Class 8 (corrosives - PGII):   | 10 tonnes |
| ▪ Class 6.1 (toxic): (medical consignments only):                            | 500 kg    |
| ▪ Class 5.1 (oxidising):   | 4 tonnes  |
| ▪ Class 9 (miscellaneous): perfumes, dry ice with medical consignments       | 5 tonnes  |
| ▪ Class 4 (flammable solids – Class 4.1):                                    | 1 tonne   |

DGs held permanently on site:

- |   |              |
|---|--------------|
| ▪ Class 2.1 (flammable gas – forklift fuel):<br>tonnes) | 5,000 L (2.8 |
| ▪ Class C1 (Combustible liquid - Diesel) –              | 160,000 L    |

### 3.4 SAFEGUARDS INSTALLED AT THE TNT WAREHOUSE AND DISTRIBUTION FACILITY

A number of safeguards will be installed and used as part of the TNT Facility construction and operation. The following safeguards are proposed:

- All vehicles will be regularly maintained and checked to identify any potential leaks from fuel tanks and engine sumps;
- All DG drivers will be experienced and licenced by the EPA;
- Spill kits will be located around the site and all personnel will be trained in the effective application of spill control;
- A site bio-retention system will be constructed, all stormwater drains on site will flow to the bio-retention pit that will have the capacity to store up to 2,200 m<sup>3</sup> of potentially contaminated materials;
- Vehicle Speed Limits will be controlled on site to minimise the risk of truck collisions or roll over;
- There will be no decanting on site, all containers will remain closed at all times (i.e. minimising the potential for liquid release and potential environmental impact)
- A site emergency response plan will be developed, including emergency response procedures for identified hazards at the site;
- Emergency response equipment will be installed throughout the site including -
  - Fire Extinguishers (to AS2444, Ref.7);
  - Hose Reels (to AS2441, Ref.8);
  - Sprinklers (to AS2118, Ref.9);
  - Fire Main and Hydrants (to AS2419, Ref.10)



- LPG delivery operators/drivers will be in attendance during all LPG transfer operations;
- LPG Tanks will be designed to comply with the requirements of AS1596 (Ref.11), including excess flow valves, non-return valves, isolation valves, etc.;
- LPG transfer hoses will be tested in accordance with the Australian Dangerous Goods Code (Ref.12) requirements;
- Emergency isolation valves installed at the LPG transfer points (air operated valves that activate when emergency stop buttons are pressed or when fire breaks the plastic air lines);
- Diesel delivery operators/drivers will be in attendance during all LPG transfer operations;
- Diesel delivery area is bunded (capacity sufficient to contain at least 1 tanker compartment, as per requirements of AS1940, Ref.13);
- Diesel delivery area is covered by an awning (prevents rain-water ingress to the bund and potential bund overflow with potential impact to the environment);
- Diesel tanks are designed to comply with AS1692 (Ref.14) and AS1940 (Ref.13), tanks will be designed with an integral bund to comply with the spill retention requirements of AS1940.
- Transit DG storage is located under a roofed area, preventing rain-water from entering the storage depot;
- Chemicals within the Transit DG Store will be segregated to minimise the potential for simultaneous leaks resulting in a potential dangerous reaction (e.g. acid and alkali, acid and hypochlorite).

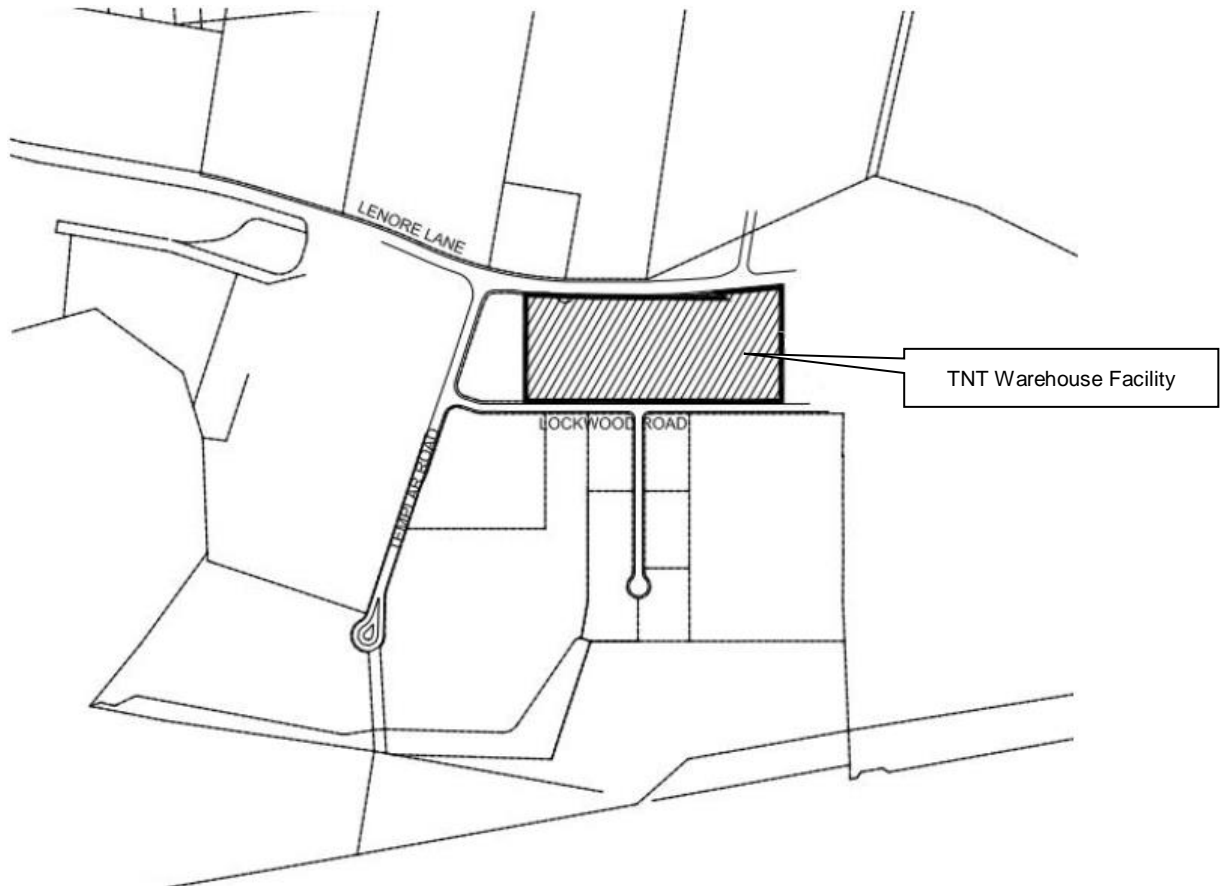
It can be seen from the list above that there are a considerable number of safeguards proposed at the facility for the safe management and implementation of transport and warehousing operations to minimise the potential for impact to the environment.



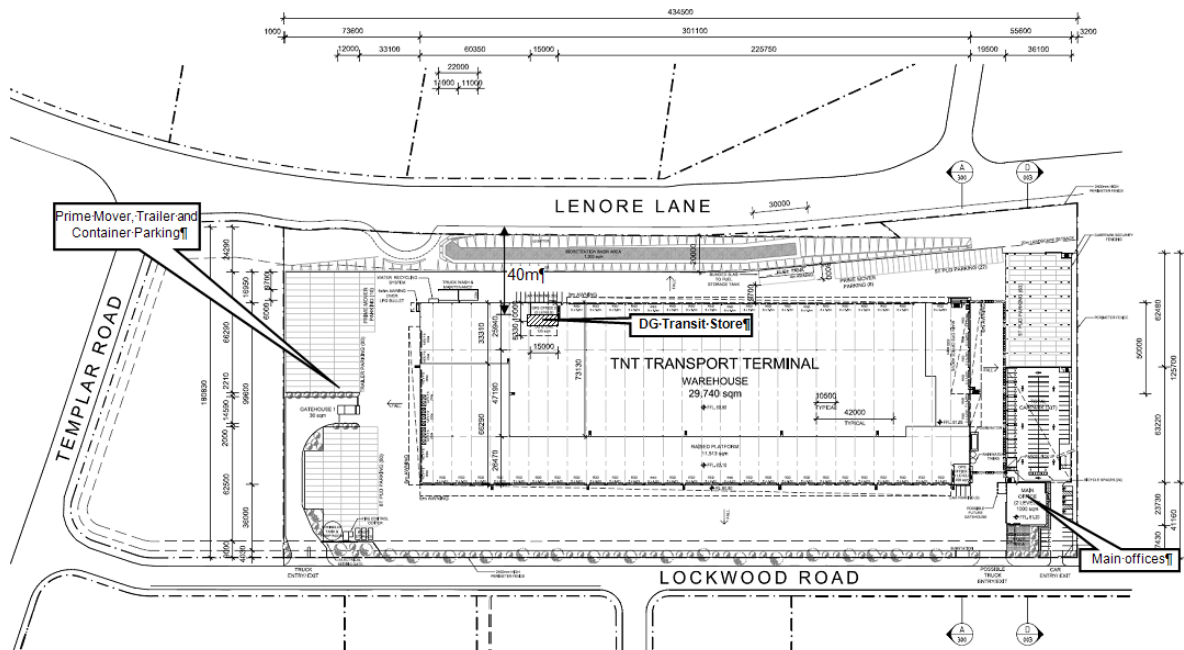
FIGURE 3.1



### LOCATION OF THE PROPOSED TNT FACILITY IN WESTERN SYDNEY REGION



**FIGURE 3.2**  
**LOCATION OF THE TNT FACILITY IN ERSKINE PARK**



**Figure 3.3**



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## SITE LAYOUT – TNT FACILITY, ERSKINE PARK



## 4 HAZARD ANALYSIS & RISK ASSESSMENT RESULTS

The environmental hazard analysis has been based on the type of operations conducted at the TNT Warehouse and Distribution Facility, and the hazardous and dangerous materials proposed for storage and handling at the site.

A review of the hazards associated with the site operations was conducted and it was identified that the majority of potential hazards and risks to the environment relate to the type of materials proposed for storage and handling at the site and the use of transport vehicles that may carry hazardous materials as fuel and lubricant.

The type of materials proposed for storage and handling at the site and the characteristics of these materials is provided in the following section.

### 4.1 DANGEROUS GOODS PROPOSED FOR STORAGE AND HANDLING AT THE TNT FACILITY

As noted in Section 3, the site will store and handle a number of DGs that are listed in the Australian Dangerous Goods Code (ADG, Ref.12). Table 4.1 lists the DGs and hazardous materials proposed for storage and handling at the TNT facility and those that may be carried in trucks delivering/despatching materials to and from the site or operating within the confines of the site.

**TABLE 4.1  
DANGEROUS GOODS AND HAZARDOUS MATERIALS AT THE TNT WAREHOUSE AND  
DISTRIBUTION FACILITY, ERSKINE PARK, NSW**

Area/Operation	Chemical Name/Material Examples	Class	PG	Quantity	Storage Type
Delivery/Despatch & Transit Storage	Explosives (e.g. party poppers & sparklers)	1.4s		2 tonnes	Palletised packages
	Aerosols (UN1950) containing flammable and non-flammable/non-toxic gases	2.1	-	9.8 tonnes	Palletised aerosol canisters on outer packaging
	Flammable liquids (e.g. acetones, paints, turpentine, xylene, toluene)	3	II & III	20 tonnes	Palletised Packages & drums, IBCs
	Flammable Solids (e.g. matches, fire lighters)	4	II & III	1 tonne	Palletised packages
	Oxidising Agents (e.g. ammonium nitrate, hydrogen peroxide)	5.1	II & III	4 tonnes	Palletised packages
	Toxic Substances (medical consignments only)	6.1	II & III	500 kg	Palletised packages & boxes
	Corrosive Substances (caustic soda, acids)	8	II & III	10 tonnes	Palletised packages & drums, IBCs
	Miscellaneous DGs (perfumes, dry ice with medical consignments)	9	III	5 tonnes	Palletised packages
Truck Delivery/	Fuel (Diesel)	C1	-	500 L	Fuel tanks of



**TABLE 4.1  
DANGEROUS GOODS AND HAZARDOUS MATERIALS AT THE TNT WAREHOUSE AND  
DISTRIBUTION FACILITY, ERSKINE PARK, NSW**

Area/Operation	Chemical Name/Material Examples	Class	PG	Quantity	Storage Type
Despatch					vehicles
	Lubricating Oil	C2	-	100 L	Oil sump in engines
Fuel Storage	Diesel (trucks)	C1	-	160,000 L	Two above ground integrally bonded tanks
Fuel Storage	LPG (forklifts)	2.1	-	5,000 L	Above ground pressurised vessel

The materials proposed for storage and handling, and those carried in trucks and vehicles at the site, have the potential to impact the environment if released from the storage containers and spill retention facilities at the site. Impacts to the environment are based on the material characteristics, which are provided in **Table 4.2**.

**TABLE 4.2  
HAZARDOUS PROPERTIES OF DANGEROUS GOODS AND HAZARDOUS MATERIALS AT THE  
TNT WAREHOUSE AND DISTRIBUTION FACILITY, ERSKINE PARK, NSW**

Chemical/Material Name	Class	PG	Hazardous Properties
Explosives (party poppers, sparklers, etc.)	1.4s	-	<p>Party poppers and sparklers are classified as 1.4s explosives, which are considered a lower risk. These materials are not subject to State Environmental Planning Policy No.33 – Hazardous and Offensive Developments, due to their lower risk category.</p> <p>Due to the large bulk mass of products when stored on pallets, fires are difficult to extinguishing as water is difficult to apply to the seat of the fire due to the packaging.</p> <p>In solid form, and when stored on pallets within the warehouse, these materials have little if any environmental hazards. However, in the event of a fire, application of fire water could result in water contamination and offsite impact should water reach drains and escape offsite.</p>
Aerosols (LPG) containing potentially hazardous materials that are propelled by LPG	2.1 & 2.2	-	<p>The LPG in aerosols does not result in any contamination to the ground or environment surrounding a storage area. On release, LPG will evaporate leaving no residue on the ground. It is noted that all contents within aerosol cans are released to the environment as part of the can use.</p> <p>In the event of a fire in an aerosol storage, there is a potential for the heat to burst cans, releasing</p>



**TABLE 4.2  
HAZARDOUS PROPERTIES OF DANGEROUS GOODS AND HAZARDOUS MATERIALS AT THE  
TNT WAREHOUSE AND DISTRIBUTION FACILITY, ERSKINE PARK, NSW**

Chemical/Material Name	Class	PG	Hazardous Properties
			LPG which burns as part of the fire incident. The release of other contents in the can (e.g. flammable liquids, toxic substances, corrosives, etc.) may lead to contamination of fire water, which could impact the environment if released offsite through stormwater systems.  Land contamination may also occur if stormwater contacts unprotected soil
Flammable Liquids & Combustible liquids	3	II & III	Flammable liquids would impact the environment if released directly to drains and stormwater systems, which drain off-site. There is a potential for soil contamination if the Class 3 liquids contact unprotected soil.
Flammable Solids	4	II & III	In solid form, and when stored on pallets within the warehouse, these materials have little if any environmental hazards. However, in the event of a fire, application of fire water could result in water contamination and offsite impact should water reach drains and escape offsite.
Oxidising Agents	5.1	II & III	Contact with incompatible materials such as acids, alkalis, halides (fluorides, chlorides, bromides and iodides), combustible materials, most metals and heavy metals, oxidisable materials, other oxidizers, reducing agents, cleaners, and organic or carbon containing compounds can result in a material decomposition or other uncontrolled reactions.  Release to the environment could result in contact with acidic soils causing reactions and environmental damage. Plant and animal life would be impacted by oxidising agent contact.
Toxic Substances	6.1	II & III	Whilst medical consignments only will be handled, releases of toxic materials may result in localised contamination should releases contact unprotected soils. Toxic materials could impact the environment and plant/animal life as a result of larger releases.
Corrosive Substances	8	II & III	Many acids and alkalis are colourless liquids or granular solids. In solid form, spills and releases have little impact on the environment. Liquid releases may result in the contamination of stormwater systems and the rising or lowering of the pH within the stormwater. This could result in impact and damage to the environment and animal life, where releases escape offsite.
Miscellaneous DGs	9	III	Class 9 miscellaneous DGs are predominantly classified as materials that are harmful to the environment. Hence, release of these materials



**TABLE 4.2**  
**HAZARDOUS PROPERTIES OF DANGEROUS GOODS AND HAZARDOUS MATERIALS AT THE**  
**TNT WAREHOUSE AND DISTRIBUTION FACILITY, ERSKINE PARK, NSW**

Chemical/Material Name	Class	PG	Hazardous Properties
			would have some impact on the environment, depending on the quantity released and whether this escaped offsite.
LPG	2.1	-	LPG is not classified by the Australian Dangerous Goods Code as a toxic gas. Releases evaporate and have no impact on the extended environment, however, released gas may cool and liquefy for a short period resulting in damage to the immediate release area due to freezing. The gas eventually heats and evaporates with no further damage to the environment.

The hazards associated with each storage and handling operation and for hazardous substances held in vehicles or other locations at the site are discussed in detail in the following sub-section.

#### 4.2 HAZARD ANALYSIS AND RISK ASSESSMENT

A detailed hazard identification table has been developed (**Appendix A**) to identify those facilities and operations that pose a hazard and risk to the environment. A review of the properties of the materials stored and handled and the hazard identification table (**Appendix A**) indicates that a range of DGs and hazardous materials have the potential to impact the environment. However, where these materials are effectively contained, there is no environmental risk. Hence, the risk assessment has focused on the effectiveness of safeguards and systems at the site that prevent DG and hazardous materials release or fail to control an incident in the unlikely event of a release.

The hazards and risks associated with each operation are described in the following sections.

##### 4.2.1 List of Identified Hazards

The detailed hazard identification table provided in **Appendix A** has listed a number of hazard causes and scenarios that could lead to impact to the environment. A summary of the hazardous incidents and scenarios is provided below:

- Delivery truck – fuel or oil leak leading contamination of the stormwater systems;
- Delivery truck – accident (collision) involving chemical release;
- LPG Deliveries – release of LPG as a result of equipment failure;
- Diesel Fuel Deliveries (main fuel tanks, emergency diesel, fire pumps) - release of diesel fuel as a result of equipment failure;
- Chemical Transfers – dropped receptacles, forklift tines impact receptacles, chemical release/spill;
- LPG Transfer (forklift refuelling) – equipment leak during transfer operation (e.g. hoses, flanges, pipework, etc.);
- Diesel Fuel Transfer (vehicle refuelling) - equipment leak during transfer operation (e.g. bowser hoses, flanges, pipework, etc.);
- Transit Storage Area – leaking containers, forklift tine pierces receptacles, release/spill of chemicals;
- LPG Storage – vessel/fitting leak (e.g. pipework connections, vessel nozzles, shell), LPG release;



- Diesel Storage – tank/fitting leak (e.g. pipework connections, tank nozzles, tank shell), diesel fuel spill/release;
- Truck Wash Bay – contaminated water release from water treatment facility, release to stormwater;
- Emergency Generator/Fire Pump – fuel tank or fitting leak (e.g. pipework connections, tank shell, flanges), diesel fuel release;
- Emergency Generator/Fire Pump – lubricating oil release (sump failure, hole, gasket leak), oil release;
- Substation – oil filled electrical equipment failure (e.g. switchgear, transformers), oil release in the substation;
- Waste Materials – failure to separate recyclable waste, contaminated waste collected and sent offsite.

Each of the above hazards and risks is assessed in detail in the following sub-sections.

#### 4.2.2 Delivery Truck – Fuel/Oil Leak

Trucks deliver and pick-up a range of goods at the site (including Dangerous Goods) and access various locations for the loading and unloading operations. Each truck carries fuel in tanks, located on the underside of the vehicle, and lubricating oil in the engine sump.

Fuel and oil leaks may occur as a result of faulty equipment, pipelines or engine oil seals, pooling under the leak point. Minor leaks would result in small pools of oil that would not spread significantly beyond the leak area. Larger leaks may continue until all fuel/oil has discharged from the fuel tank or oil sump.

Fuel/oil releases that occur during delivery/dispatch would be identified by the truck driver or site operator. It is understood that spill kits will be provided around the TNT facility and therefore these may be accessed to commence spill containment and clean-up.

A review of the typical fuel tank or oil sump capacity indicates that less than 200 L would be held in a single full tank/sump. Hence, a spill on the concrete apron of the loading/unloading area would spread under the vehicle, having the potential to escape off site where loading/unloading is conducted close to the site boundary. A review of the potential spread area of a large leak was conducted. For a leak of 200 L of fuel, the depth of pool on a concrete surface would be 5mm (Ref.15). Hence, the diameter of the spill area =  $[(4/\pi) \times 0.2/0.005]^{0.5} = 7.14$  m. Based on this, the trucks would need to be closer to the boundary than 3.57 m for a spill to escape off-site. A review of the loading/unloading areas on site indicates that none of these areas is within 3.57 m of the site boundary. Hence, there is no immediate potential for a major fuel/oil spill from a truck to escape offsite and the application of spill kits and spill clean-up systems would ensure the risk of release off-site is low.

In the event of a spill during a rain event, or in the event of a spill near a stormwater drain, there is a potential for the release to enter the drains and to escape offsite via the stormwater system. However, it is noted that the site stormwater systems all report to the bio-retention basin, which has a capacity to hold up to 2,200 m<sup>2</sup>. Hence, for a release of 200 L, there is little or no potential for escape of fuel or oil leaks from fuel tanks or oil sumps in delivery/dispatch vehicles at the site and the risk of such a release is low if not negligible.

The results of the risk assessment conducted using the risk matrix approach (see Appendices A & B) indicates that the environmental risks associated with truck fuel/oil leaks are low.

Notwithstanding the assessment conducted above indicating that the risk is low, to ensure risks are maintained within the low range, **it is recommended that an audit/checklist & procedure be developed for vehicle inspection and applied at random to vehicles attending the site. The checklist should include condition of fuel and oil systems and identification of any leaks. Where leaks are identified, these should be recorded and a copy of the inspection sheet provided to the driver and forwarded to their management.**



### 4.2.3 Delivery Truck Accident - Collision

Vehicles access the site via the main entry gate on Lockwood Road and travel to the unloading/loading point where the goods are loaded or unloaded to/from the trucks using forklifts. Once the trucks are loaded/unloaded they travel to the exit gate, also on Lockwood Road, where they leave the site.

As a number of trucks use the site simultaneously, there is a potential for collision to occur leading to load damage, truck roll over and loss of load. This could lead to receptacle damage, spill of chemicals around the collision area and release of chemicals to drains.

To minimise the risk of collision or truck roll over, the site has implemented a speed limit of 15 kilometres per hour (kph). In addition, the site entry and exit gates are in different locations at the site. This minimises the risk of vehicle interactions and potential collisions. Dedicated drivers are also used to transport DGs and hazardous materials, DG drivers must obtain a special DG drivers licence, which includes training on the care when transporting DGs.

In the event of a spill of flammable liquids, ignition and fire, it will be necessary to apply fire water to extinguish the fire. The fire water may contact the chemicals resulting in contamination of the fire water and potential for release offsite resulting in environmental impact.

A site emergency plan will also be developed including the response to incidents involving truck accident and roll over. Site emergency teams will be established to respond to incidents and minimise the potential for spill and release beyond the immediate accident area. In the event spills/releases reach the drainage/stormwater systems there is a potential for release offsite, however, the site will be constructed with a bio-retention system that has the capacity to retain up to 2,200 m<sup>3</sup> of potentially contaminated liquids. This prevents release offsite and permits the containment of liquids for collection and treatment without environmental contamination.

The risk of initial collision is considered to be low based on the speed limits and driver training/awareness and licensing, the risk of rollover and significant chemical spill is considered to be negligible also due to the limited speed and driver awareness/training/licensing. The site containment systems (bio-retention system) reduces the risk of chemical release offsite to negligible.

The results of the risk assessment conducted using the risk matrix approach (see Appendices A & B) indicates that the environmental risks associated with truck collisions and hazardous materials release is low.

### 4.2.4 LPG Deliveries – Equipment Failure & LPG Leak

LPG is delivered to site by road tanker and is transferred from the tanker to the LPG tank using a flexible hose. In the event of failure of the transfer components (hose, connections, fittings or pipework) there is a potential for a gas release (liquefied and gas phases). The discharge nozzles on the tank on the tanker truck are fitted with excess flow valves, which activate automatically and close the discharge nozzle in the event of high flow (which may occur as a result of a pipeline or hose rupture). To prevent the release of gas from the delivery pipework, a non-return valve is fitted on the nozzle entry to the storage tank. A non-return valve is also fitted on the delivery pipework immediately downstream of the flexible hose connection.

In addition to the excess flow and non-return valves, automatic isolation valves are installed on the tanker delivery line (tanker side of the flexible hose) and on the pipework on the stationary tank side of the flexible hose. In the event of a flexible hose failure, the air operated valves (i.e. air open and spring closed) can be closed by activation of the emergency stop button. The operator can activate the stop button in the event of a gas release (i.e. hose failure) from the tanker location or adjacent to the tank filling point.

In the event of a release of gas from a ruptured hose, and immediate ignition, a gas jet fire would occur. The air operated valves are supplied with air from plastic tubing, which melts in the presence of heat, releasing the air and closing the valve. The isolation of gas supply to the release point extinguishes the flame.

In the event of release of liquefied gas before isolation can be effected, the gas would pool under the release point, heat and evaporate. There will be no contamination to ground as a result of an LPG release. Hence, there is negligible environmental risk as a result of LPG storage.



The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with LPG delivery incidents are low.

#### 4.2.5 Diesel Fuel Deliveries – Equipment Failure & Diesel Leak

Diesel is delivered to site by road tanker and transferred to the above ground tanks using a flexible hose. Tankers park adjacent to the diesel storage tanks within the delivery bunded area. The operator connects the tanker delivery pipework to the tanker filling lines using the flexible hose. A tanker mounted pump then transfers the diesel fuel to the tanks.

In the event of a hose connection failure, leak or rupture, diesel fuel would be released in the area around the truck. The tanker driver would immediately stop the tanker pump using the emergency stop buttons located on the tanker. Material released would pool around the release point and be contained within the bunded area, there would be no release to the environment beyond the bund.

In the event of a release during rain, there is a potential that contaminated rainwater may escape the bund (i.e. bund overflow). However, the tanks and bunded delivery area are covered by an awning, which prevents the rain from entering the containment section of the bund. Hence, there is no potential for bund overflow and discharge beyond the spill containment.

In the unlikely event of a spill beyond the bunded area, the release may reach a drain, which could direct the spill offsite. However, all stormwater drains report to the bio-retention basin, which has the capacity to store up to 2,200 m<sup>3</sup> of contaminated water. Hence, there would be no release offsite.

Based on the protection systems installed at the site, the risk of release to the environment would be negligible.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with diesel fuel deliveries are low.

#### 4.2.6 Chemical Transfers – Dropped/Damaged Receptacles

As part of the operations at the site, it is necessary to transfer materials from containers to the storage areas within the warehouse and for the repacking of containers or the loading of trucks for dispatch off-site. All materials brought to site will be palletised, so that forklift trucks may be used to lift and transfer goods from one location to another.

The use of forklift trucks to access palletised goods may result in forklift tines impacting receptacles (e.g. packages, drums, IBCs, etc.), leading to release of chemicals or other hazardous materials. During the transfer of goods between locations, there is a potential for receptacles to fall from the pallets, striking the ground and splitting open releasing the receptacle contents. Where a solid material spill occurs, the material would not project beyond the immediate spill area and clean up would be effected without consequence. However, where a liquid is spilled, the spill would spread around the dropped container with the potential to reach drains within the site operational areas.

In the event of a spill, personnel would be present as the spill would have occurred as a result of a transfer operation. Hence, spill kits could be applied and the spill contained to the immediate area of the incident. A review of the largest container that may be impacted indicates that an IBC release (full contents) is the worst case incident. An IBC holds around 1,000 L, hence, the spill spread diameter (D), based on a spill thickness of 5mm, is  $D = [4/ \pi(1\text{m}^3/0.005\text{m})]^{0.2} = 16\text{m}$ . A review of site transfer operations indicates that no operations occur closer than 8m to the site boundary, hence, there would be no impact of a spill beyond the site boundary and no environmental impact.

In the event a spill occurs close to a site drain, application of a spill response kit may minimise the quantity of liquid that enters the drain, however, some material may enter the drain, having the potential to escape off-site. To prevent such an incident occurring, the site is constructed with a bio-retention system capable of retaining up to 2,200 m<sup>3</sup> of potentially contaminated liquids. Hence, as a maximum of 1,000 L would be spilled there is no potential for release of contaminated liquid offsite and hence, no impact to the environment.

In the case of a spill during a rain event, there is a potential for chemicals to be carried into the drains with the rainwater, overflowing at the bio-retention basin should the basin be full. It is recommended that a control mechanism be installed on the discharge of the bio-retention basin that can be closed in the event of a spill, preventing release of potentially contaminated water offsite. The control



mechanism could consist of a flap or slide valve that closes on command from an emergency button located at selected points around the site. This would ensure this risk is maintained within the as low as reasonably practicable (ALARP) range.

In summary, it is considered that there is negligible risk of release of chemicals beyond the site boundary, and subsequent impact to the environment, from spills as a result of receptacle damage from forklift impact of dropped receptacles.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with dropped or damaged receptacles (e.g. packages, drums, IBCs) are low.

#### 4.2.7 LPG Transfers (forklift refuelling)

Forklifts are refuelled from the 5,000 L LPG tank located on the north western corner of the main warehouse building. The Forklift drivers will be trained in forklift refuelling using standard operating procedures. The operator will connect the flexible hose to the forklift fuel tank and transfer the fuel under pressure into the empty tank. The fuel connection hose is small diameter ( $\approx 12.5\text{mm}$ ), hence, in the event of hose leak/rupture, the release would be considerably smaller than the earlier assessed hose leak/rupture for delivery incidents (**Section 4.2.4**).

Minor releases of LPG, as a result of hose leaks and ruptures, would not result in any impact to the surrounding land uses, as the LPG would quickly vaporise without contact with the ground. Larger leaks may result in some liquefied gas pooling under the leak point, however, this area is concrete and the gas would quickly evaporate, causing no environmental impact to areas beyond the immediate leak point.

Immediate ignition of a release would result in a jet fire at the leak point. As this incident occurs in the presence of an operator, the operator would isolate the gas at the vessel, extinguishing the fire. Larger releases, such as hose ruptures, that may result in more significant incidents would activate the excess flow valve installed at the discharge nozzle on the vessel. This would automatically isolate the gas and stop the leak or extinguish the fire (should ignition have occurred).

Emergency response plans and procedures will also be developed for the site, including responses to LPG incidents. This will assist in formulating the correct response to LPG incidents.

The risk of environmental impact as a result of LPG leaks during refuelling incidents is considered to be low and adequate safety and protection systems are in place, including hardware (e.g. isolation valves) and software (procedures, emergency plans, etc.).

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with LPG refuelling of forklift trucks are low.

#### 4.2.8 Diesel Fuel Transfers (Vehicle Refuelling)

Vehicles will be refuelled using bowzers located close to the diesel fuel tanks adjacent to the northern boundary of the site (i.e. adjacent to the bio-retention basin). The truck drivers will be trained in truck refuelling using standard operating procedures. Drivers will park trucks adjacent to the bowzers, which are located within the refuelling bund. The drivers will then activate the bowser using a key code or swipe card, which will identify the driver and record the fuel transfer.

A fuel spill could occur during the refuelling operation as a result of the fuel nozzle falling from the filling pipe on the vehicle or as a result of a broken hose. In the event the fuel nozzle falls from the fuel tank filling pipe, the nozzle is designed to automatically shut off fuel, minimising the quantity of fuel release from the nozzle. Bowser hoses will be tested as part of the system commissioning and regularly inspected as part of the site maintenance systems. In the event of hose rupture, an operator is present to activate emergency shut-down (ESD) via the emergency buttons located adjacent to the bowser refuelling points. ESD buttons are required as part of AS1940 (Ref.13) and as the facility complies with this standard, these buttons will be installed.

Based on the analysis conducted above, the quantity of fuel released as a result of a fuel spill would be small (<50 L) and releases of this magnitude would be contained within the bunded area of the refuelling point. There would be no release to the environment and the environmental risk would be negligible.



In the unlikely event of a fuel ignition and fire, the fire would initially be contained within the spill area. It is noted that the fuel used in the trucks is diesel, which is a Class C1 combustible liquid and not a flammable liquid. The main difference is the flash point of the fuel. Diesel has a flash point  $>60.5^{\circ}\text{C}$ , which makes it very hard to ignite as vapours do not form from the fuel surface at ambient temperature. Notwithstanding this, should a fire occur, it would be necessary to apply first attack fire fighting (e.g. extinguishers and hose reels) to minimise fire growth and extinguish the fire where possible. To assist in effective fire fighting, **it is recommended that a hose reel with a foam attachment be installed**. This complies with the requirements of Clause 11.13 of AS1940 (Ref.13) for fuel storages in the range between  $60\text{ m}^3$  and  $2000\text{ m}^3$ . The quantity of fire water/foam applied using a hose reel would be contained within the bunded area of the refuelling point. Hence, there would be no release to the environment and the risk of environmental impact would be negligible.

In the event it is not possible to control a fire using first attack fire equipment, the NSW Fire & Rescue (NSWF&R) may attend the fire and apply considerably more fire water to the incident. The quantity of water applied to the fire could result in bund overflow, with the potential for contaminated fire water discharge offsite. However, the overflow from the refuelling area bund to the bio-retention basin, which has the capacity to retain around 2,200 L of contaminated water. The AS2419 (Ref.10) requires the application of 3 fire hoses, each with a capacity of 600 L/minute for a period of 90 minutes. This would apply around  $162\text{ m}^3$  of water to the fire. This is considerably less than the basin capacity of  $2,200\text{ m}^3$ , hence, there would be no release offsite.

Based on the analysis conducted above, the risk of environmental impact as a result of diesel truck refuelling is considered to be negligible due to the safety system proposed for installation at the TNT facility.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with truck refuelling operations are low.

#### 4.2.9 Transit Storage Area

The transit storage area will be used for holding DGs for short periods whilst awaiting dispatch offsite. The area will not contain DGs at all times and goods will be held no longer than 1 to 2 days, which falls within the permissible storage period detailed in Section 4 of AS3833 (Ref.6)

Packages and receptacles, held in storage within the transit storage area, may enter the site in a damaged state and may leak contents into the storage location. To minimise the potential for the storage of damaged containers, **it is recommended that TNT develop a storage inspection procedure that includes the inspection of all DGs stored within the transit area to identify potential package or receptacle damage. The procedure should also include the management of damaged packages/receptacles (i.e. separation/quarantine in a safe area at the site) and the disposal of the damage products.**

In addition to the potential for package and receptacle leaks, there is also a potential for forklift truck to strike packages/receptacles, resulting in piercing and release of contents. Solid materials, released within the storage area, would remain within the immediate location of the release and would be readily cleaned-up using spill kits. However, release of liquid materials has the potential to spread considerable distance from the release point (up to 7m, based on the worst case incident of a full IBC contents release). To minimise the potential for spreading of release liquid DGs, **it is recommended that the transit area be bunded with a “speed-hump” type bund. The bund height need only be small ( $\approx 50\text{mm}$ ), as the total quantity of release product would be  $<1,000\text{ L}$ , based on the largest receptacle size in the storage (e.g. IBC).** This complies with the bunding requirements of transit storage required under the provisions of AS3833 (Ref.6). It is noted that the transit storage is located within the main warehouse building, under the main building roof. Hence, in the event of rainfall, there is no potential for rainwater to fill the bund, resulting in overflow in the event of liquid DG release.

In the event of a flammable liquid release, ignition and fire, there is a potential for incident growth and a large fire inside the warehouse. However, to prevent fire growth, the building will be constructed with an Early Suppression Fast Response (ESFR) sprinkler system. This will prevent fire growth and contain the fire within the transit store area. It is noted that application of fire water (sprinklers) to the transit storage could result in bund overflow, carrying potentially contaminated fire water away from the transit storage bund. In the event the potentially contaminated fire water reaches stormwater



drains, there is a potential for the contaminated fire water to be carried offsite in the drainage system, however, all stormwater drains at the TNT facility to the bio-retention system, which holds the water onsite until tested and released (if no contamination is found).

To assist in first attack fire fighting, and to minimise the potential for sprinkler system activation, **it is recommended that a foam attachment be installed on the fire hose reel closest to the transit store. This will assist in controlling the fire and minimise the potential for sprinkler activation. It is also recommended that the emergency response team members trained in first attack (extinguishers and hose reels, including foam attachments) fire fighting equipment use.**

Based on the above analysis, and the recommendation for additional fire first attack fighting equipment, the risk of environmental impact is considered to be low.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with the storage of DGs in the transit storage area are low.

#### 4.2.10 LPG Storage

The LPG is stored in a 5,000 L pressure vessel, which is located externally on the north-west corner of the main warehouse building. Whilst LPG is contained within the tank there is little to no risk, however, in the event the tank leaks there is a potential for LPG to escape and pool on the concrete under the leak point. Leaks may occur at flanges, valves and fittings, which are attached to the tank nozzles, with the potential for the LPG to pool under the tank. The LPG would eventually heat and evaporate, resulting in no impact to the ground under the vessel as this area is covered by concrete.

In the event of an ignition of LPG, there is a potential for fire in the vicinity of the vessel. The application of cooling water would ensure the vessel does not overheat resulting in failure and release of full tank contents (Boiling Liquid Expanding vapour Explosion or BLEVE). Fire hose reels and hydrants are installed in close proximity to the tank, hence, there is adequate fire fighting equipment provided for at the site.

It is noted that the LPG does not result in contamination to the ground surrounding the tanks, as this material evaporates with no impact to the area surrounding the leaks. Hence, based on the analysis conducted above, the risk is considered to be low.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with the storage of LPG for forklift truck refuelling is low.

#### 4.2.11 Diesel Storage

Diesel is stored in two 80,000 L integrally bunded tanks, located on the northern side of the TNT facility. The tanks are located within a "speed-hump" type bund that will be constructed to contain any leaks that may occur from the main storage tanks. However, it is noted that the storage tanks are integrally bunded (i.e. internal and external tank shells) with both shells having no penetrations below liquid level as all tank pipework is connected at the top of the tank.

Hence, in the event of a leak from the internal tank shell, the leak will flow into the interstitial space between the tanks and not escape to the environment. The tanks will be fitted with a level detector in the interstitial space such that an alarm will be raised indicating leak detection. The likelihood of double shell leak is extremely low, if not negligible.

In the highly unlikely event of a double tank shell leak, the spill would be contained within the concrete bunded area of the tanks. Rainwater would not impact the area as the tanks are constructed with an awning, preventing rainwater ingress into the bund. Hence, there is no impact to the environment beyond the tank storage and the risk of release of diesel fuel from the fuel tanks to the environment is considered low, if not negligible.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with diesel storage are low.



#### 4.2.12 Truck Wash Bay

The truck wash bay will be used for the cleaning of vehicles, which may dislodge potential contaminants such as oil, grease, soil, etc. These materials could enter drainage systems and eventually report offsite, however, the dedicated truck wash bay is a self-contained area where all cleaning water is retained within the wash bay and recycled. Contaminants (e.g., sediments, oils, etc.) are separated from water and retained in a contaminated materials tank. The wash water is then held in a “clean-recycled” water tank for re-use in the washing process. Contaminated materials are retained for collection by a licensed waste contractor and removed offsite for authorised disposal. Make up water for the wash bay is sourced from the site potable water systems.

Whilst it is recognised that the wash bay is self-contained and designed to prevent contamination reaching drainage systems, in the event of overspray, there is a potential for contamination to escape the immediate wash bay area. However, to prevent this, the wash bay is fitted with sheet metal sides that contain all wash water and sprays, eliminating the potential for escape of contaminated water beyond the immediate bay area. Further, it is noted that the area surrounding the wash bay is paved with concrete, which can be washed down with water, directing the flow back to the wash bay sump. This reduces the potential for any contaminants escaping into the stormwater system.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with truck wash bay are low.

#### 4.2.13 Emergency Generator/Diesel Fire Water Pumps

A small quantity of diesel fuel (<1,000 L) is held in the emergency diesel generator and diesel fire pumps area. Lubricating oil is also held within the engine sumps as part of the engine lubricating system.

In the diesel fire pumps, the fuel is held in small tanks directly adjacent to the diesel driven fire pump. In the event of a leak of diesel from the tanks or engine, the fuel could escape beyond the fire pump concrete pad, resulting in environmental damage to the ground surrounding the pump area. Hence, **it is recommended that the diesel fire pump concrete pad be constructed with a small bund (50mm high) around the edge of the pad to retain any spills that may occur from the diesel tank or oil sump in the engine.**

The fuel tank associated with the diesel generator will be an integral tank constructed within the engine frame (i.e. under the engine). The tank will be constructed with an integral bund (i.e. double shell tank), hence, any leaks from the main tank will be retained within the interstitial space between tanks. There will be no penetrations of the outer tank shell below liquid level. This minimises potential for release of fuel from the tank leaks at fittings and as a result of shell failure. The engine frame/fuel tank of the emergency diesel generator also forms a “save-oil” collection point, preventing minor oil leaks from escaping beyond the immediate area.

Fuel will be delivered to the tanks by a small tanker (8,000 L). The number of fuel deliveries to these facilities will be small as these engines are only used in an emergency and tested only once per week, hence, fuel use is low. The tanks will be refuelled using a bowser type hose with delivery nozzle. The tanker driver/operator will manually fill the tank using the bowser nozzle. The fuel will be transferred using a tanker mounted pump.

In the event of a hose leak/rupture, pump leak or fill error, there is a potential for spill of fuel in the area adjacent to the fire pumps/emergency generator. However, it is noted that the driver/operator is in attendance and can immediately shut down transfer operations, minimising the leak quantity. Spill response can then be initiated to retain and clean-up the spill. The area in which the tanker parks would be concrete, eliminating the potential for contamination of soil in the area. It is understood that spill kits will be located adjacent to the fire pump area and emergency diesel generator so that response to spills can be rapid.

In the event a spill reaches a stormwater drain, there is a potential for contaminated stormwater to escape offsite, however, all stormwater drains report to the site bio-retention basin, preventing discharge offsite. Further, the diesel driven fire pumps and emergency diesel generator are located with enclosed structures, preventing ingress of rainwater and potential carry-over of contaminants in rainwater to the stormwater system.

Notwithstanding the safeguards listed above, **it is recommended that a fire pump and emergency generator diesel tank fuel refilling procedure be developed, including response in the event of**



**a spill. The procedure should be held in a box adjacent to the engines, along with the engine test procedures and test records.**

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with the operation of the diesel fire pumps and emergency generator are low.

#### **4.2.14 Substation**

The substation contains electrical components that predominantly do not contain any materials that could leak and escape to drains. However, some components have oil filled insulators that contain small quantities of oil that may leak into the area around the component.

The substation will be installed within a roofed and walled structure that will prevent any rainwater ingress. Leaks from oil filled electrical components may pool around the area under the components, however, as noted above, the quantity of oil is small and the spill would be very localised. There would be no impact beyond the immediate area of the spill and as the sub-station is located within a protected structure, there would be no impact to the environment beyond the sub-station.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with the substation are low.

#### **4.2.15 Waste Materials**

As an operating transport depot and warehouse, a number of solid waste materials may be generated. The accumulation of these materials at the site will require removal of wastes by a licensed waste contractor. The risk to the environment is that all wastes enter the landfill waste stream, causing excessive quantities of materials entering landfill facilities causing a burden to these sites.

It is understood that TNT will develop a waste management plan that will include a recycling process whereby all wastes will be categorised and placed in separate recycling streams for collection by the waste contractor. The waste management plan will establish the recycling streams in all areas of the facility, with each stream, being collected on site and stored in a dedicated waste collection area adjacent to the main site entry gate. The waste materials will be held in covered waste bins that prevent the ingress of water, minimising the potential for rainwater to become contaminated by dissolved solid materials.

In addition to the potential for excessive land fill waste, there is a potential for the solid wastes to be carried around the site by wind or to dissolve into rainwater if left unprotected. As noted above, waste will be held in covered bin, preventing wind from blowing the waste around and off site.

The establishment of a waste management system, at the TNT facility, minimises the potential for environmental impact.

The results of the risk assessment conducted using the risk matrix approach (see **Appendices A & B**) indicates that the environmental risks associated with the waste materials are low.



## 5 CONCLUSIONS AND RECOMMENDATIONS

### 5.3 CONCLUSIONS

The analysis conducted in this study has identified a number of hazards at the proposed TNT Warehouse and Distribution Facility, Erskine Park, NSW. The risk assessment conducted as part of the study has identified that the proposed safeguards would ensure the all environmental risk associated with the identified hazards are low.

Hence, it is concluded that the environmental risks associated with the TNT Warehouse and Distribution Facility, Erskine Park, NSW are low. However, notwithstanding the fact that the study has identified the environmental risks to be low, a number of recommendations are made to ensure the risks are maintained within the low range

### 5.4 RECOMMENDATIONS

Based on the analysis conducted in this study, and to ensure the risks are maintained within the low range, the following recommendations are made:

- 1. Vehicle Fuel/Oil Leaks** – It was identified that vehicles visiting the site to, deliver or collect goods may leak oils or fuels to the pavement areas on site. Whilst the assessment conducted in this study identified that the risk of environmental impact was low, to ensure risks are maintained within the low range, it is recommended that an audit/checklist & procedure be developed for vehicle inspection and applied at random to vehicles attending the site. The checklist should include condition of fuel and oil systems and identification of any leaks. Where leaks are identified, these should be recorded and a copy of the inspection sheet provided to the driver and forwarded to their management.
- 2. Diesel fuel tanks** – it was identified that in the event of a spill of diesel, ignition and fire, appropriate fire fighting medium would be required. Hence, for combustible liquids, fire fighting foam is the most effective medium. It is therefore recommended that a hose reel with a foam attachment be installed on the closest hose reel to the diesel fuel tanks.
- 3. Packages and receptacles** – It was identified that Dangerous Goods packages, held in storage within the transit storage area, may enter the site in a damaged state and may leak contents into the storage location. To minimise the potential for the storage of damaged containers, it is recommended that TNT develop a storage inspection procedure that includes the inspection of all DGs stored within the transit area to identify potential package or receptacle damage. The procedure should also include the management of damaged packages/receptacles (i.e. separation/quarantine in a safe area at the site) and the disposal of the damage products.
- 4. Transit area bund** – It was identified that in the event of a package/receptacle leak within the transit storage area, there is a potential for released DG liquids to escape beyond the immediate transit storage depot. Hence, it is recommended that the transit area be bunded with a “speed-hump” type bund. The bund height need only be small ( $\approx 50\text{mm}$ ), as the total quantity of release product would be  $<1,000\text{ L}$ , based on the largest receptacle size in the storage (e.g. IBC).
- 5. Hose Reel in Transit Area** – It was identified that in the event of flammable or combustible liquid leak into the transit area there is a potential for ignition and fire. Whilst it is recognised that sprinkler systems are installed in the transit storage area, sprinkler water would not be the most effective fire fighting medium. Hence, to assist in first attack fire fighting, and to minimise the potential for sprinkler system activation, it is recommended that a foam attachment be installed on the fire hose reel closest to the transit store. This will assist in controlling the fire and minimise the potential for sprinkler activation. It is also recommended that the emergency response team members be trained in first attack fire fighting equipment use (e.g. extinguishers and hose reels, including foam attachments)



6. **Fire Pump Pad** – It was identified that fuel and oil leaks in the fire pump area could result in release of combustible liquids beyond the fire pump area (i.e. into the adjacent environment). It is therefore recommended that the diesel fire pump concrete pad be constructed with a small bund (50mm high) around the edge of the pad to retain any spills that may occur from the diesel tank or oil sump in the engine.
7. **Fuel Tank Refilling (fire pumps/Emergency Gen.)** – It was identified that the refuelling of the fire pump and emergency generator fuel tanks may potentially lead to spills. Hence, it is recommended that a fire pump and emergency generator diesel tank fuel refilling procedure be developed, including response in the event of a spill. The procedure should be laminated and held in a box adjacent to the engines, along with the engine test procedures and test records.



## 6 REFERENCES

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4. Applying SEPP 33 (2011), “Hazardous and Offensive Development Application Guidelines”, NSW Department of Planning and Infrastructure.
5. Multi-Level Risk Assessment (1997), Department of Infrastructure, Planning and Natural Resources, NSW.
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11. AS1596-2002, “The Storage and Handling of LP Gas”, Standards Association of Australia, Sydney
12. The Australian Dangerous Goods Code (ADG) (2007), 7<sup>th</sup> ed., “The Australian Code for the Transport of Dangerous Goods by Road and Rail”, Federal Office of Road Safety, Canberra, ACT
13. AS1940-2004, the storage and handling of flammable and combustible liquids, Standards Association of Australia, Sydney.
14. AS1692-2006, Steel tanks for flammable and combustible liquids, Standards Association of Australia
15. Cox A.W., Lees F.P. & Ang M.L. (1991), “Classification of Hazardous Locations”, Institution of Chemical Engineers (IChemE), Rugby, UK (Note: Section 12.3 Page 46 – pool thickness; 5mm concrete, 10mm gravel)



## APPENDIX A HAZARD IDENTIFICATION TABLE & RISK ASSESSMENT

Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
				C	L	R
<b>Truck Deliveries/Despatch</b>				<b>1</b>	<b>C</b>	<b>L</b>
Truck on site delivering or despatching goods and materials	Truck fuel or oil leak during delivery operation	Oil/fuel spill to the ground surrounding the spill point (i.e. prime mover)  Ignition of spill and fire, application of fire water resulting in contaminated fire water escaping the incident area	<ul style="list-style-type: none"> <li>- Vehicle maintenance and roadworthy checks</li> <li>- Spill kits located around the site</li> <li>- First attack fire fighting equipment (extinguishers and hose reels)</li> <li>- Limited spill quantities (i.e. fuel and oil systems have limited storage capacity)</li> <li>- Site bio-retention systems (capacity – 2200 m<sup>3</sup>)</li> <li>- Emergency response plan and teams at the facility Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>	1	C	L
Delivery/despatch of chemicals to the facility by truck	Truck accident when entering/ leaving the site, potential truck roll over	Potential damage to receptacles and release of chemicals inside the container  Chemicals escape	<ul style="list-style-type: none"> <li>- Speed limits when entering and travelling on site</li> <li>- All chemicals are located within sealed receptacles (e.g. drums, IBCs, etc.)</li> <li>- All receptacles are located within shipping</li> </ul>	2	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
		beyond spill area into drains and potential impact offsite	containers (minimal spill beyond the container) <ul style="list-style-type: none"> <li>- Dedicated roadways and directions provided by site security at the entry gate</li> <li>- Experienced and licenced DG drivers (i.e. drivers aware of hazards associated with loads which are being carried)</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility</li> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>			
LPG Deliveries to the LPG tank	Equipment leak during transfer (e.g. hose leak, connection failure, pipework component leak)	Release of liquefied gas to area around the LPG tank (gas flashes and release of gas to atmosphere)  Immediate ignition and jet fire  Delayed ignition and explosion	<ul style="list-style-type: none"> <li>- LPG delivery operator/driver in attendance during all transfer operations (emergency stop buttons available on tanker to shut down transfer in the event of an emergency)</li> <li>- Storage and transfer operations comply with AS1596-2008 (The Storage and Handling of Liquefied Petroleum Gas)</li> <li>- Transfer components designed, tested and inspected in accordance with Australian Dangerous Goods Code</li> </ul>	1	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			<ul style="list-style-type: none"> <li>- Excess flow valves installed on tanker (prevent major release in event of hose rupture)</li> <li>- Non-return valve installed on site LPG tank (prevent backflow from tank in event of release in pipework/fittings)</li> <li>- Emergency isolation valves at the LPG transfer point (activated by operator or in event of fire detection)</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility</li> <li>- No impact to the land (environment) surrounding the site (i.e. LPG evaporates)</li> <li>- Area surrounding the LPG tank is open, hence, explosion would not occur, more likely incident is a flash fire</li> </ul>			
Diesel fuel deliveries to main diesel fuel storage	Equipment leak during transfer (e.g. hose leaks, connection failure, pipework component leak)	<p>Release of diesel fuel to the area surrounding the tanks, potential release to drains and offsite impact</p> <p>Rainwater carries diesel leaks into drains</p> <p>Ignition of release and</p>	<ul style="list-style-type: none"> <li>- Diesel has a high flash point (&gt;60.5°C) low if not negligible chance of ignition</li> <li>- Diesel delivery area is bunded to prevent spills escaping to the surrounding areas</li> <li>- The diesel tanks and delivery area is covered by an awning (car port style) cover</li> <li>- Operator in attendance during all transfer</li> </ul>	1	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
		fire	operations (emergency stop buttons available on tanker to shut down transfer in the event of an emergency) - Loading/unloading procedures, operator training, safe work method statement (SWMS), job safety and environmental analyses (JSEAs) - Emergency response plan and teams at the facility - Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.) - Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m <sup>3</sup> )			
Diesel fuel delivery to emergency generator and diesel fire pumps	Equipment leak during transfer (e.g. hose leaks, connection failure, pipework component leak)	Release of diesel fuel to the area surrounding the tanks, potential release to drains and offsite impact  Rainwater carries diesel leaks into drains  Ignition of release and fire	- Diesel transfers conducted infrequently due to the diesel use in emergency situations only and fore weekly tests - Diesel has a high flash point (>60.5°C) low if not negligible chance of ignition - Operator in attendance during all transfer operations (emergency stop buttons available on tanker to shut down transfer in the event of an emergency) - Loading/unloading procedures, operator	2	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			training, safe work method statement (SWMS), job safety and environmental analyses (JSEAs) <ul style="list-style-type: none"> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.)</li> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>			
<b>Loading/Unloading Operations</b>						
Loading/Unloading of materials (including chemicals) from shipping containers using forklift trucks	Potential dropped receptacles from pallets, dropped drums or IBC falls from forklift  Forklift tine pierces receptacle in the shipping container	Potential damage to receptacles and release of chemicals inside the container  Chemicals escape beyond spill area into drains and potential impact offsite  Ignition of flammable/combustible liquids, application of fire water & contaminated fire	<ul style="list-style-type: none"> <li>- Loading/unloading procedures, operator training, safe work method statement (SWMS), job safety and environmental analyses (JSEAs)</li> <li>- Personnel in attendance alarm can be raised and emergency response enacted</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.)</li> <li>- Relatively small package sizes transferred</li> </ul>	2	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
		water release off site	(spill limited to receptacle drop zone) - Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m <sup>3</sup> )			
LPG transfers to LPG forklifts and vehicles	Equipment leak during transfer (e.g. hose leak, connection failure, pipework component leak)	Release of liquefied gas to area around the LPG tank (gas flashes and release of gas to atmosphere)  Immediate ignition and jet fire  Delayed ignition and explosion	- Forklift operator/driver in attendance during all transfer operations (emergency stop buttons available adjacent to the transfer point to shut down transfer in the event of an emergency) - Storage and vehicle fuelling operations comply with AS1596-2008 (The Storage and Handling of Liquefied Petroleum Gas) - Transfer components designed, tested and inspected in accordance with Australian Dangerous Goods Code - Excess flow valves installed on LPG tank (prevent major release in event of hose rupture) - Emergency isolation valves at the LPG delivery point (activated by operator or in event of fire detection) - Emergency response plan and teams at the facility - Emergency response equipment installed throughout the facility	1	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			<ul style="list-style-type: none"> <li>- No impact to the land (environment) surrounding the site (i.e. LPG evaporates)</li> <li>- Area surrounding the LPG tank is open, hence, explosion would not occur, more likely incident is a flash fire</li> </ul>			
Diesel transfers tank to trucks using bowsers (i.e. truck refuelling)	Equipment leak during transfer (e.g. hose leaks, connection failure, pipework component leak)	Release of diesel fuel to the area surrounding the tanks, potential release to drains and offsite impact  Rainwater carries diesel leaks into drains  Ignition of release and fire	<ul style="list-style-type: none"> <li>- Diesel has a high flash point (&gt;60.5°C) low if not negligible chance of ignition</li> <li>- Truck refuelling area is bunded to prevent spills escaping to the surrounding areas</li> <li>- The diesel tanks and refuelling area is covered by an awning (car port style) cover</li> <li>- Vehicle driver/Operator in attendance during all refuelling operations (emergency stop buttons available on the tank adjacent to the bowsers to shut down refuelling in the event of an emergency)</li> <li>- refuelling procedures, operator training, safe work method statement (SWMS), job safety and environmental analyses (JSEAs)</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants,</li> </ul>	1	C	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			sprinklers, etc.) - Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m <sup>3</sup> )			
<b>Storage Areas</b>						
Transit storage area	Leaking container  Forklift tine pierces receptacle in the shipping container	Leak into the transit store area  Chemicals escape beyond spill area into drains and potential impact offsite  Ignition of flammable/combustible liquids, application of fire water & contaminated fire water release off site  Potential incompatible chemicals mixing and resulting in hazardous reaction	<ul style="list-style-type: none"> <li>- Loading/unloading procedures, operator training, safe work method statement (SWMS), job safety and environmental analyses (JSEAs)</li> <li>- Bunded transit storage area (spill retention)</li> <li>- Personnel in attendance during transfers to and from the storage area (alarm can be raised in event of a spill)</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.)</li> <li>- Segregation of chemicals within the store as per AS3833 (Ref.6)</li> <li>- Simultaneous failures required (i.e. receptacle leaks must occur in two separate containers of incompatible chemicals at the same time)</li> </ul>	1	C	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			<ul style="list-style-type: none"> <li>- Transit storage area is located under the main roof structure eliminating potential for rainwater to carry spills to drains</li> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>			
LPG Storage	Tank or fitting leaks (e.g. nozzles, flanges, shell, etc.)	<p>Release of liquefied gas to area around the LPG tank (gas flashes and release of gas to atmosphere)</p> <p>Immediate ignition and jet fire</p> <p>Delayed ignition and explosion</p>	<ul style="list-style-type: none"> <li>- Tanks are designed to AS1596-2008 (Ref.11)</li> <li>- Tanks are hydrostatically tested at commissioning to identify any leaks and potential failure points (tested as per AS1596)</li> <li>- Tanks are inspected annually under the requirements of the pressure vessel codes</li> <li>- Excess flow valves or non-return valves installed on LPG filling/discharge lines (prevent major release in event of pipeline or fitting rupture)</li> <li>- No impact to the land (environment) surrounding the site (i.e. LPG evaporates)</li> <li>- Area surrounding the LPG tank is open, hence, explosion would not occur, more likely incident is a flash fire</li> </ul>	1	D	L
Diesel storage	Tank or fitting leaks (e.g. pipework)	Release of diesel fuel to the area surrounding the tanks, potential release to	<ul style="list-style-type: none"> <li>- Tank designs and installation comply with the requirements of AS1692 (Ref.14) and</li> </ul>	1	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
	connections to the tank shell, flanges, shell, etc.)	drains and offsite impact  Rainwater carries diesel leaks into drains  Ignition of release and fire	AS1940 (Ref.13)  - Tanks are integrally bunded, eliminating discharge to the environment in the event of a tank leak  - All pipework is connected at the top of the tank, external tank skin is not penetrated by pipework or fittings;  - Interstitial space between tanks is fitted with level detection and alarms  - Area surrounding the tanks is bunded to contain any releases (bund capacity 9,000 L min)  - Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m <sup>3</sup> )			
<b>Truck Wash &amp; Maintenance</b>						
Truck-Wash Bay	Contaminated water released from washing of vehicles – potential for contaminated water to reach drains	Potential for contaminated water to escape offsite via drainage systems – impact to environment surrounding the site (i.e. stormwater drainage areas offsite)	- Truck-Wash Bay is self-contained to retain any wash water  - Wash water treatment system is installed to extract potential contamination, containing the contaminated water in a retention tank  - Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m <sup>3</sup> )	1	C	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			<ul style="list-style-type: none"> <li>- Contaminated water collected within the wash water treatment system is held within a retention tank for collection &amp; disposal by a waste contractor.</li> <li>- Water treatment system is maintained regularly (scheduled maintenance as per manufacturer's requirements)</li> </ul>			
<b>Diesel Generator</b>						
Diesel storage	Tank or fitting leaks (e.g. pipework connections to the tank shell, flanges, shell, etc.)	<p>Release of diesel fuel to the area surrounding the tanks, potential release to drains and offsite impact</p> <p>Rainwater carries diesel leaks into drains</p> <p>Ignition of release and fire</p>	<ul style="list-style-type: none"> <li>- Tank designs and installation comply with the requirements of AS1692 (Ref.14) and AS1940 (Ref.13)</li> <li>- Tank is an integrally banded design to eliminate the potential for discharge to the environment in the event of leak</li> <li>- All pipework is connected at the top of the tank, external tank skin is not penetrated by pipework or fittings;</li> <li>- Interstitial space between tanks is fitted with level detection and alarms</li> <li>- Area surrounding the tanks is banded to contain any releases (bund capacity 9,000 L min)</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed</li> </ul>	1	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.) - Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m <sup>3</sup> )			
Diesel engine oil storage (engine sump)	Sump or casing leak, oil line leak or failure	Release of oil to the area under the engine, potential escape of oil beyond the engine enclosure into drains  Oil spray onto hot engine parts, ignition and fire	- Engine operations would only occur with personnel present (i.e. the engine is an emergency component and tests/ running operations would require an attending operator) - Engine is provided with an acoustic enclosure and a “save-oil” spill retention system to contain any minor leaks and spills that may occur - Engine acoustic enclosure is provided with fire detection and alarms - Engine and generator is inspected and tested on a weekly basis (i.e. inspection for leaks and releases around the engine unit) - Emergency response plan and teams at the facility - Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.)	1	D	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			<ul style="list-style-type: none"> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>			
<b>Substation</b>						
Oil filled transformers, switchgear and electrical components in the substation	Potential overload of transformers, switchgear and oil filled components  Oil leak from transformers	Release of oil into the area surrounding the switchgear  Potential for oil to reach drains and discharge into the stormwater system	<ul style="list-style-type: none"> <li>- Transformers are banded to contain any spills within the transformer area</li> <li>- Oil contents in switchgear is minor (small quantities), spills would not escape beyond the switch-room area</li> <li>- No drains installed within the switch-room itself</li> <li>- Overload trips installed on all electrical switchgear</li> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>	1	D	L
<b>Offices &amp; Warehouse Operations</b>						
Waste from offices and warehouse operations	A range of waste products will be generated at the facility, including recyclable materials	Potential for wastes to become mixed and failure to recycle wastes correctly	<ul style="list-style-type: none"> <li>- Waste management plan for the site</li> <li>- Separation of wastes at the waste generation points (recycling waste facilities are provided, e.g. separate bins)</li> <li>- Separate waste areas provided for landfill vs recyclable wastes</li> <li>- Dedicated waste collection contractors</li> </ul>	1	C	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
			employed for waste collection services - Training and site inductions indicating waste management requirements at the site			
<b>Diesel Fire Pumps</b>						
Diesel storage	Tank or fitting leaks (e.g. pipework connections to the tank shell, flanges, shell, etc.)	Release of diesel fuel to the area surrounding the tanks, potential release to drains and offsite impact  Rainwater carries diesel leaks into drains  Ignition of release and fire	<ul style="list-style-type: none"> <li>- Tank designs and installation comply with the requirements of AS1692 (Ref.14) and AS1940-minor storage requirements (Ref.13)</li> <li>- Fire pumps are located within a fire pump “house” that prevents weather impact on the pump units</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.)</li> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>	2	D	L
Diesel engine oil storage (engine sump)	Sump or casing leak, oil line leak or failure	Release of oil to the area under the engine, potential escape of oil beyond the engine enclosure into drains	<ul style="list-style-type: none"> <li>- Engine operations would only occur with personnel present (i.e. the engine is an emergency component and tests/ running operations would require an attending operator)</li> </ul>	1	C	L



Area/Operation	Hazard Cause	Consequence	Safeguards	Envir. Risk (see App.B)		
		Oil spray onto hot engine parts, ignition and fire	<ul style="list-style-type: none"> <li>- Engine is provided with a fire pump “house” and a “save-oil” spill retention system to contain any minor leaks and spills that may occur</li> <li>- Engine and pumps are inspected and tested on a weekly basis (i.e. inspection for leaks and releases around the engine unit)</li> <li>- Emergency response plan and teams at the facility</li> <li>- Emergency response equipment installed throughout the facility (e.g. spill kits, fire extinguishers, hose reels, hydrants, sprinklers, etc.)</li> <li>- Site bio-retention basin is installed to collect any releases that may reach drains with the potential to impact offsite (retention basin capacity is 2200m<sup>3</sup>)</li> </ul>			



## APPENDIX B HAZARD IDENTIFICATION TABLE & RISK ASSESSMENT

### RISK ASSESSMENT METHODOLOGY

The risk assessment methodology described below is based on the Australian Standard AS31000-2009, "Risk Management-Principles and Guidelines" (Ref.2). This methodology is normally used due to its wide acceptance in industry, legal circles and by regulatory authorities (e.g. WorkCover NSW). The methodologies presented in AS31000 range from full quantitative to full qualitative. A semi-quantitative methodology is normally used for low to medium range risk assessment, and early phase analyses, and uses the risk matrix approach. This approach uses a series of tables to assess the consequence severity and likelihood of an identified hazard (to cause harm to people, property or the environment), see **Tables B1** and **B2**, and uses a risk matrix (**Figure B1**) to assess the risk level of the identified hazard. The results indicate the level of risk associated with the hazard. These risks are then reviewed and re-assessed with consideration of any controls additional controls where required. This process continues until the risk is as low as reasonably practicable (ALARP).

A brief risk assessment methodology is given below:

- **Hazard Identification** – an integral part of any risk assessment is the identification of hazards. Without the hazard first being identified it will not be possible to assess the risk and, where required, apply risk reduction measures.

It is necessary to obtain a reasonable understanding of the operation under assessment and to use experienced people to assist in identifying the hazards. This can be done by individuals or in a workshop situation.

- **Risk Assessment** –the risk assessment can take the form of a semi-quantitative study, which is performed to address the potential hazards identified with the observed tasks. The study can be a workshop style of individual assessment. For a workshop style study, the workshop is normally facilitated by an experienced analyst who reviews the operations and potential hazards and assessed the risks in conjunction with the workshop participants. Identified hazards are systematically worked through identifying consequences, likelihoods and risks. For an individual assessment, the experienced risk analyst assesses each risk in turn and applies the risk matrix to the hazard using the detailed qualitative risk assessment details assessed as part of the study.

For the TNT environmental risk assessment and individual risk analysis was conducted by an experienced risk engineer. The assessment was conducted as part of the hazard identification table development and risk results were included as additional columns on the right of the table.

- **Risk Review and Reduction** – Once the risk has been assessed the risk level is reviewed and risk reduction measures sought where required. These are then recorded and the risk reassessed to estimate the residual risk. The residual risk indicates the effectiveness of the proposed risk reduction measures and whether further risk reduction is required to reach the ALARP level.
- **Reporting** – on completion of the study a report is normally developed listing the objectives, scope of work, methodology, results, conclusions and recommendations.



**TABLE B1  
ENVIRONMENTAL HAZARD CONSEQUENCE TABLE USED IN THE RISK ASSESSMENT**

Consequence		CONSEQUENCE DESCRIPTION
Score	Indicator	Environment
<b>1</b>	Insignificant	Localised spill contained in a bund or in the immediate spill area Fugitive emissions
<b>2</b>	Minor	Spill contained on site, no release beyond the site boundary, no impact to soil or land on site, Short term emissions occur as a result of a fault condition
<b>3</b>	Moderate	Spill escapes to stormwater or groundwater system and reports offsite Some complaints received over environmental issue, minor reversible release
<b>4</b>	Major	Major spill to the stormwater system offsite Prosecution from continuous emissions to atmosphere Numerous neighbour complaints and local media attention
<b>5</b>	Catastrophic	Large media coverage of environmental incident, Irreversible impacts to environment beyond the site boundary Severe Fines from Environmental Regulator

**TABLE B2  
ENVIRONMENTAL HAZARD LIKELIHOOD TABLE USED IN THE RISK ASSESSMENT**

Likelihood Indicator		LIKELIHOOD DESCRIPTION
Score	Indicator	
<b>A</b>	Almost Certain	Has occurred many times at the site (or similar sites), repeated occurrence at the organisations other facilities
<b>B</b>	Likely	Occurs annually at the site, has happened & will re-occur at the site or similar sites within the company
<b>C</b>	Occasional	Has occurred once in the past at the site, may occur some-time at the site (or other similar sites within the company network)
<b>D</b>	Unlikely	Has occurred in other sites (not associated with the company), but within the company under assessment, <10% chance of happening during the facility life
<b>E</b>	Rare	Has not occurred at in the industry, has the potential to occur, <1% chance of happening but only in exceptional circumstances



LIKELIHOOD	CONSEQUENCE				
	Insignificant 1	Minor 2	Moderate 3	Major 4	Catastrophic 5
A (almost certain)	S	S	H	H	H
B (likely)	M	S	S	H	H
C (moderate)	L	M	S	H	H
D (unlikely)	L	L	M	S	H
E (rare)	L	L	M	S	S

<b>H</b>	High Risk – Requires both hardware and procedures to mitigate
<b>S</b>	Significant Risk – Review hardware requirements and develop new procedures
<b>M</b>	Moderate Risk – review existing procedures for adequacy, additional procedures where required
<b>L</b>	Low Risk – Managed mainly with existing procedures

FIGURE B1  
RISK MATRIX USED IN RISK ASSESSMENT