Riskcon engineering

Dangerous Goods Report

Lot 1 DP 1306448, Badgerys Creek

DHL Supply Chain (Australia) Pty Ltd
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DHL Supply Chain (Australia) Pty Ltd

Prepared by

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Rev	Date	Remarks	Prepared By	Reviewed By
A	27 April 2023	Draft issue for comment	Renton Parker	Jason Costa
0	6 July 2023	Issued Final		
1	23 September 2024	Updated based on new SSDA	Jason Costa	Steve Sylvester

Executive Summary

Background

DHL Supply Chain (Australia) Pty Ltd (DHL) has proposed to develop a warehouse to enable the storage and handling of materials classified as Dangerous Goods (DGs) at Lot 1 DP 1306448, Badgerys Creek.

As DGs are stored the facility is subject to the NSW Work Health and Safety Regulation 2017 (WHS, Ref. [1]) which requires the risks associated with the storage and handling of DGs to minimised to ensure safety for personnel working within the warehouse. Compliance with the Regulation may be achieved by using an applicable design standard applicable to the materials being stored.

DHL has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare a DG assessment of the facility to ensure compliance with the applicable DG standards and thus the Regulation. This document represents the assessment of the DG storages for the DHL warehouse at Badgerys Creek.

Conclusions

A review of the quantities of DG storage areas for the proposed DHL warehouse was conducted to identify the storage areas and provide design guidance to ensure the storage areas comply with the applicable standard. The warehouse was assessed using a combination of AS 1940:2017 and AS/NZS 3833:2007 based on compartmentation goods with similar properties.

The report was developed to assist the project team to design the DG storages with the aim of minimising the risk of the storages as required by the NSW WHS Regulation. It is concluded that if the advice documented in this report is followed the DG storages at the warehouse will comply with the standard and thus the NSW WHS Regulation.

Recommendations

The following recommendations have been made for the facility:

- The design requirements detailed within this report shall be adhered to in the development of the design for the facility.

DG Documents:

Ensure the following documentation is supplied on-site in accordance with the Work Health and Safety Regulation 2017 (Ref. [1]):

- A Dangerous Goods Register, indicating the type of chemical, any notations that may be required from the risk assessment and the Safety Data Sheet for the chemical.
- A Manifest.
- A DG Risk Assessment of the storage and handling area.
- A Placard Schedule.
- An Emergency Response Plan (ERP).
- Emergency Services Information Pack (ESIP).
- A Hazardous Area Classification (HAC).

- Hazardous Area Verification Dossier (HAVD).

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Abbreviations

Abbreviation	Description
AQR	Aggregate Quantity Ratio
CBD	Central Business District
DGs	Dangerous Goods
ERP	Emergency Response Plan
ESIP	Emergency Services Information Pack
IBC	Intermediate Bulk Container
HAC	Hazardous Area Classification
HAVD	Hazardous Area Verification Dossier
LPG	Liquefied Petroleum Gas
WHS	Work Health and Safety

1.0 Introduction

1.1 Background

DHL Supply Chain (Australia) Pty Ltd (DHL) has proposed to develop a warehouse to enable the storage and handling of materials classified as Dangerous Goods (DGs) at Lot 1 DP 1306448, Badgerys Creek.

As DGs are stored the facility is subject to the NSW Work Health and Safety Regulation 2017 (WHS, Ref. [1]) which requires the risks associated with the storage and handling of DGs to minimised to ensure safety for personnel working within the warehouse. Compliance with the Regulation may be achieved by using an applicable design standard applicable to the materials being stored.

DHL has commissioned Riskcon Engineering Pty Ltd (Riskcon) to prepare a DG assessment of the facility to ensure compliance with the applicable DG standards and thus the Regulation. This document represents the assessment of the DG storages for the DHL warehouse at Badgerys Creek.

1.2 Objectives

The objectives of the study are to provide a design document for the DG storages at the warehouse to assist the project team to design compliant DG storages.

1.3 Scope of Services

The scope of work is to prepare a DG design assessment of the DG storages at the DHL site located at Lot 1 DP 1306448, Badgerys Creek. The assessment does not include any other DHL sites nor additional work which may be identified in the course of the assessment.

2.0 Methodology

The following methodology was used:

- The manifest provided was reviewed to identify the classes and quantities that will be stored within the warehouse.
- The applicable design standards were identified based upon the class review.
- The design requirements for the warehouse were detailed to assist the project team.
- A draft report was submitted to the project team for review and comment with comments incorporated into the final document.

3.0 Site Description

3.1 Site Location

The subject site is located within part of Lot 1 in Deposited Plan 1306448, at 1953-2109 Elizabeth Drive, Badgerys Creek. The site is approximately 25 hectares in size and situated north of the new Western Sydney Airport. It is located within the Penrith local government area (**LGA**) and is approximately 12.5km from Penrith Central Business District (**CBD**), 27km from Parramatta CBD, and 47km from Sydney CBD. The site is owned by Roberts Jones Development Pty Ltd. **Figure 3-1** shows the regional location of the site. Provided in **Figure 3-2** is the layout of the site.

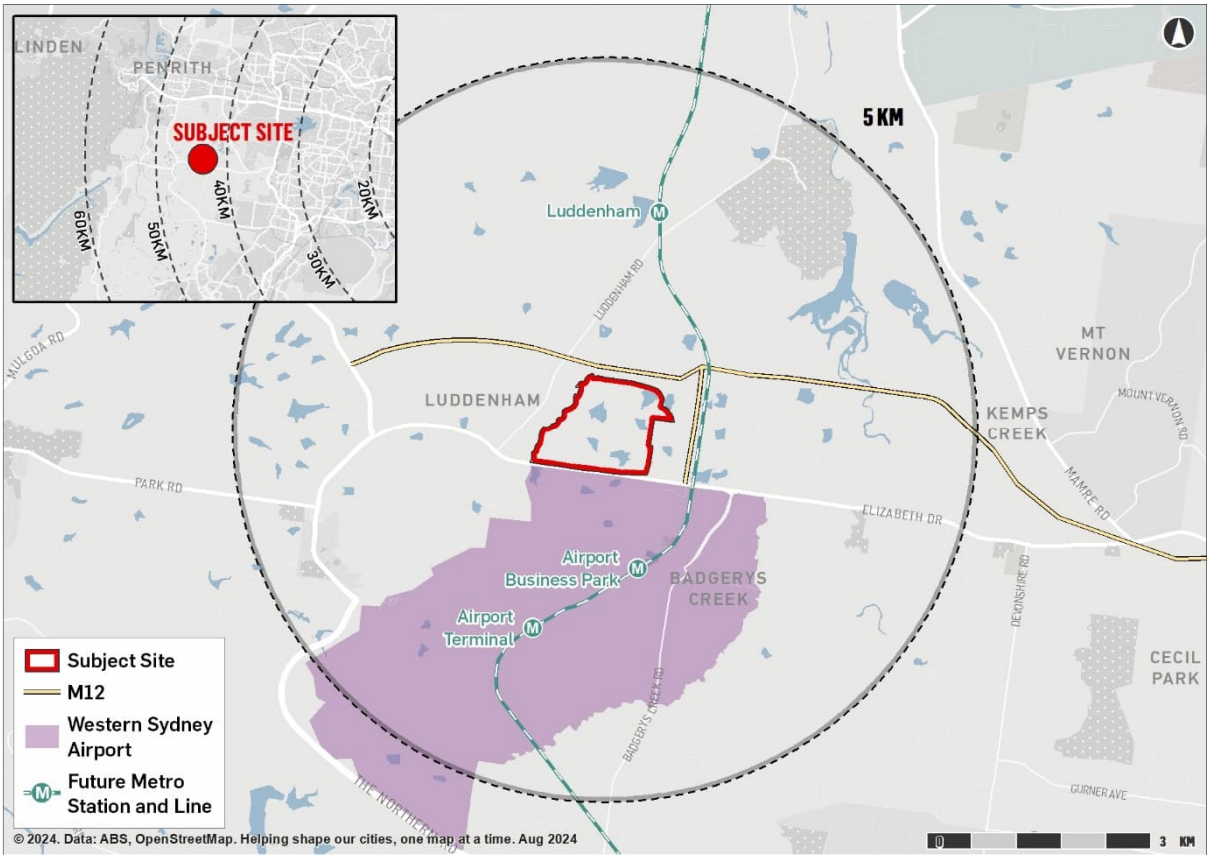

Figure 3-1: Site Location

3.2 Adjacent Land Uses

The land is located in an enterprise area which may have a diverse range of developments; however, it has been assumed that the following land uses are likely to be around the site:

- North – Industrial warehousing
- South – Industrial warehousing
- East – Industrial warehousing
- West – Industrial warehousing

3.3 Site Description

The warehouse is being developed as a speculative warehouse to cater toward potential customers that require large quantities of DGs to be stored. As the exact nature of the products is unknown, the warehouse is being developed to enable full flexibility of DG products including packages exceeding retail storage volumes (i.e. 205 L drums and 1,000 L Intermediate Bulk Containers – IBCs). Based upon the DG classes, a combination of AS 1940:2017 (Ref. [2]) and AS/NZS 3833:2007 (Ref. [3]) have been used.

The DGs will be separated into two (2) bunkers purpose built for the product suite to be stored within. The flammable gases and liquids and miscellaneous DGs (which typically have a combustible element to the product) will be stored in one bunker which will be subject to AS 1940:2017 design requirements while the other bunker will contain the remaining products and will be assessed using AS/NZS 3833:2007.

The flammable liquid bunker will have the typical design requirements from AS 1940:2017 including bunding to contain a portion of the flammable liquid stored in addition to 20 minutes of fire water storage, mechanical ventilation system, hazardous area rated equipment in accordance with the classification per AS/NZS 60079.10.1:2022 (Ref [4]) and AS/NZS 60079.14:2022 (Ref. [5]), foam hose reels, etc. In addition, the sprinkler system will be designed in accordance with AS 2118.1:2017 (Ref. [6]) which requires a combined in-rack and ceiling mounted sprinkler system. The bunker will have walls having an FRL of 240/240/240 with parapets for internal walls to a height of 0.5 m above ceiling height to prevent incident propagation between bunkers. Any doors or entrances to the bunker will have an FRL of -/120/30 per the standard.

The mixed class DG bunker will be designed according to AS/NZS 3833:2007 and will include walls having an FRL of 60/60/60 along with ventilation and bunding for a portion of goods stored and 20 minutes of sprinkler discharge. As flammable products are not stored in this bunker, ceiling mounted sprinkler protection will be adequate.

The whole site will be capable of containing at least 90 minutes of potentially contaminated fire water as required by AS/NZS 3833:2007 (Ref. [3]) and the NSW "*Best Practice Guidelines for Contaminated Water and Retention Systems*" (Ref. [7]).

3.4 Quantities of Dangerous Goods Stored and Handled

The dangerous goods stored at the warehouse are for various customers and may fluctuate with customer requirements. The classes and quantities to be approved in the facility are summarised **Table 3-1**. The proposed DG storage locations are shown in **Figure 3-2.**

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

Storage Location	Class	Description	PG	Quantity (kg)
DG Bunker 1	2.1	Flammable gases (aerosols)	n/a	100,000 / 25,000*
	2.2	Non-toxic, non-flammable gases	n/a	200,000
	3	Flammable liquids	II & III	1,000,000
	4.1	Flammable solids	II & III	100,000
	C1/C2	Combustible Liquids	n/a	10,000
DG Bunker 2	5.1	Oxidising agents	II & III	40,000
	8	Corrosive substances	II	20,000

Storage Location	Class	Description	PG	Quantity (kg)
			III	
	9	Miscellaneous DGs	III	10,000
Cabinet	6.1	Toxic substances	II	10

*Note: This refers to the quantity of propellant within the aerosols and not the total package weight. The propellant content within the cannisters is typically around 25% of product weight.

3.5 Aggregate Quantity Ratio

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

$$AQR = \frac{q_x}{Q_x} + \frac{q_y}{Q_y} + [\dots] + \frac{q_n}{Q_n}$$ **Equation 3-1**

Where:

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

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

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

Where the ratio AQR exceeds a value of 1, the site would be considered a Major Hazard Facility (MHF). The threshold quantity for each class is taken from Schedule 15 of the Work Health and Safety (WHS) Regulation 2017 (Ref. [1]). These are summarised in **Table 3-2** noting Classes 4.1, 8 and 9 are not subject to MHF legislation.

Table 3-2: Major Hazard Facility Thresholds

Class	Packing Group	Quantity (tonnes)		AQR
		Threshold	Stored	
2.1	n/a	200	25.0	0.25
2.2	n/a	Not subject to MHF	200	0
3	II & III	50,000	1,000	0.02
4.1	II & III	Not subject to MHF	100	0
5.1	II & III	200	40	0.2
6.1	II & III	200	0.01	0
8	II & III	Not subject to MHF	20	0
9	III	Not subject to MHF	10	0
C1/C2	n/a	Not subject to MHF	10	0
			Total	**0.47**

The AQR is less than 1; hence, the facility would not be classified as an MHF. The site will exceed 10% of the MHF; hence, a notification to SafeWork would be required.

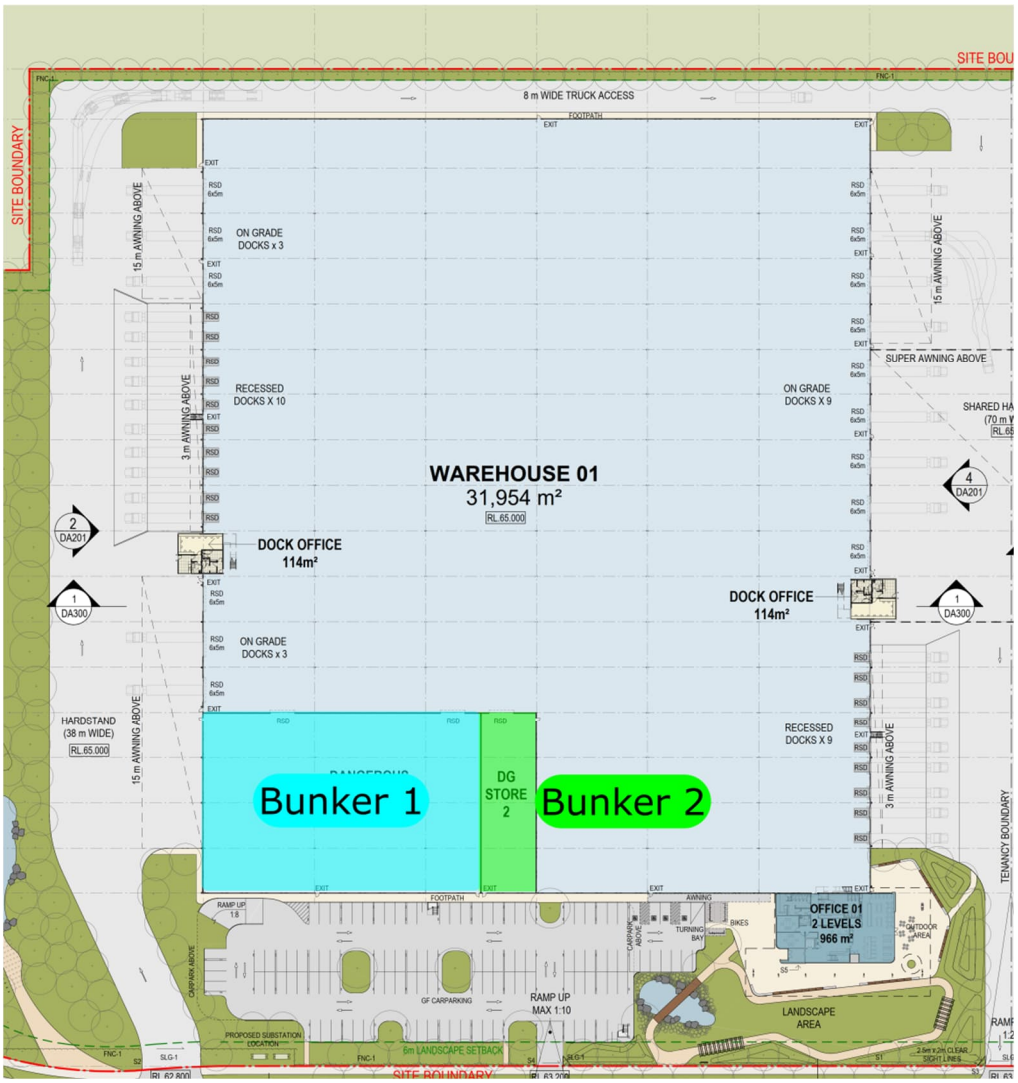

Figure 3-2: Site Layout

4.0 Dangerous Goods Design Requirements

4.1 Introduction

The following sections outline the design requirements for each DG storage. The relevant design standards were identified, and the design requirements were outlined for the following stores:

- Bunker 1 (Flammable Material Bunker)
- Bunker 2 (Mixed Class Bunker)
- Toxic Substances

4.2 Bunker 1 (Flammable Material Bunker)

4.2.1 Introduction

Bunker 1 will house flammable materials as summarised in **Table 4-1**. Where flammable materials are stored the most conservative standard for providing design requirements is AS 1940:2017 (Ref. [2]).

Table 4-1: Materials Stored within Bunker 1

Storage Location	Class	Description	PG	Quantity (kg)
DG Bunker 1	2.1	Flammable gases (aerosols)	n/a	100,000 / 25,000*
	2.2	Non-toxic, non-flammable gases	n/a	200,000
	3	Flammable liquids	II & III	1,000,000
	4.1	Flammable solids	II & III	100,000
	C1/C2	Combustible Liquids	n/a	10,000
			Total	1,410,000

4.2.2 Design

The design requirements for a package store based on AS 1940:2017 have been summarised in **Table 4-2.**

Table 4-2: Bunker 1 Design Requirements per AS 1940:2017

Item	Requirement
Construction	• The store and its surrounds shall be constructed of non-combustible materials • Exit doors: FRL -/120/30 • Rolling Shutter Doors (RSD): FRL -/120/30 which closes automatically upon fire trip (i.e. door is electromagnetically held open. During fire trip, the electromagnet is de-energised allowing the door to slide closed on rollers). The -/-/30 rating may be provided by inclusion of drenchers on both sides of the RSD. • Fire walls with an FRL of 240/240/240. • Internal fire walls shall extend 0.5 m through the roof.
Electrical Equipment	• All electrical equipment shall be installed in accordance with AS/NZS 3000:2018 (Ref. [8])

<table>
<tr><th>Item</th><th>Requirement</th></tr>
<tr><td></td><td>

Electrical equipment with a hazardous area rating as required by hazardous area zoning per AS/NZS 60079.10.1:2022 (Ref. [4]).
Electrical equipment installed per the requirements of AS/NZS 60079.14:2022 (Ref. [5]).
Electrical equipment installed by an appropriate qualified/certified hazardous area electrician.
Hazardous area verification dossier prepared documenting all hazardous area equipment.

</td></tr>
<tr><td>Spillage Containment</td><td>

A spill containment system such as a bund or a means of diverting any spill into a compound is required.

The bunding volume for the store shall be 198.1 m^3 as summarised in the following table.
<table>
<tr><th>Requirement</th><th>Volume (m^3)</th></tr>
<tr><td>Volume of the largest container</td><td>1</td></tr>
<tr><td>25% up to 10 m^3</td><td>2.5</td></tr>
<tr><td>10% from 10 m^3 to 100 m^3</td><td>9</td></tr>
<tr><td>5% beyond 100 m^3</td><td>65.6</td></tr>
<tr><td>20 minutes of sprinkler discharge (assumed 6 m^3/min).</td><td>120</td></tr>
<tr><td>Total</td><td>198.1</td></tr>
</table>
</td></tr>
<tr><td>Ventilation</td><td>
Ventilation will be required; it is recommended that is achieved by mechanical means. Provided below are requirements for mechanical ventilation:

The ventilation system shall exhaust at a rate of 0.3 m^3 per square metre of floor area per minute.
The velocity of the air at the entry point must exceed 300 m/min.
Ventilation ducts to be located at low level (i.e. immediately above the top of the bund).
Inlet and outlet ducts to be located on opposing walls.
The distance between any two inlets/outlets shall not be less than 5 m.
Where inlet air is provided via louvres through a fire wall, the louvres shall have an FRL of -/240/-.
Any exhaust duct (i.e. discharge point external to the building) shall terminate in the open air at least 2 m from any opening into the building and at least 3 m above ground.
The external termination of any inlet duct shall be at least 5 m from the termination of any external exhaust duct.
Ventilation fans are to be constructed of non-sparking materials.
An airflow failure warning device shall be installed. The warning shall be able to be detected from outside the store.

</td></tr>
<tr><td>Separation Distances</td><td>
The following minimum separation distances are required.
<table>
<tr><th>Receptor</th><th>Distance (m)</th></tr>
<tr><td>To property boundary</td><td>3</td></tr>
<tr><td>To onsite protected places: 15 m (as per Table 4.1 of AS 1940:2017 and Clause 4.3.1(bii) and Clause 4.3.1(j))</td><td>15</td></tr>
</table>
</td></tr>
</table>

Item	Requirement	
	To offsite protected places	44
	To achieve compliance with the minimum distance for on- and off-site protected places, the walls of the store shall have an FRL of 240/240/240. The fire walls required for the flammable material bunker are shown in **Figure 4-1**.	
Aerosols	• Aerosol racking shall be protected by a mesh cage to prevent cans rocketing in a fire scenario. • Aerosol cage protecting aerosols ensuring no gaps occur within the cage structure (i.e. mesh to be taken to roof height, walls where applicable, etc.) • The cage mesh shall have a maximum aperture of 50 mm. • The thickness of cage wiring shall be a minimum of 3 mm. • The aerosol cage shall have a sliding gate which loses upon fire detection (i.e. gate is held open by electromagnetic link which deenergises upon fire trip).	
Fire Protection	As per Table 11.3 in the standard, the store shall be protected by: • One powder type extinguisher located at each doorway (i.e. RSD, emergency exit). • Powder type extinguishers located internally of the store to achieve a maximum 15 m travel distance to an extinguisher. • Fire hose reel coverage to all parts of the store – Fire hose reels are to be provided with foam making capabilities. Note: Foam is provided via a trolley containing foam concentrate with a T-branch pipework which is attached to the hose reel and inserted into the concentrate. • Fire hydrant coverage to all parts of the store. • Automatic sprinkler system (Note: consultation with sprinkler designer required for detailed sprinkler design. DG standards only indicate if a system is required and provides no detailed guidance on the system). Note, In-rack sprinklers may be required for some of the products in accordance with AS 2118.1:2017 (Ref. [6]). Consultation with a sprinkler design will provide correct guidance on this requirement. • 40 L/s of hydrant flow in excess of the AS 2419.1 requirements (i.e. AS 2419.1 requirements + 40 L/s). • Based upon the quantity of combustible liquids stored, a Fire Safety Study is required.	
Placarding	The store shall be placarded in accordance with the WHS Regulation.	

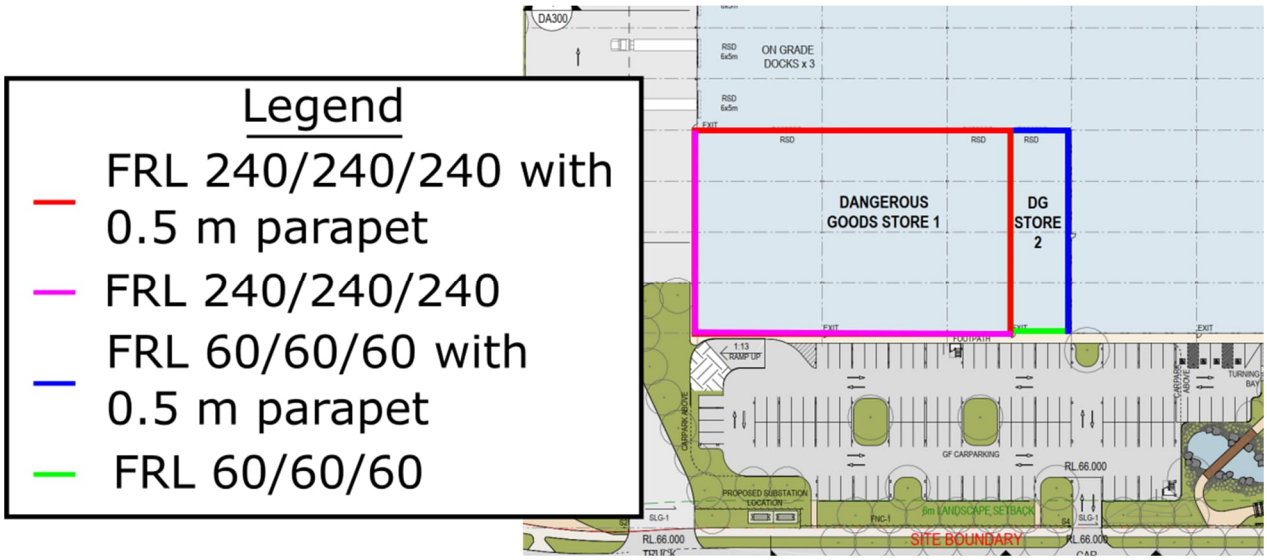

Figure 4-1: Fire Wall Requirements

4.3 Bunker 2 (Mixed Class Bunker)

4.3.1 Introduction

Bunker 2 will house mixed classes of Dangerous Goods as summarised in **Table 4-3**. As mixed classes of goods are stored the most applicable standard is AS/NZS 3833:2007 (Ref. [3]).

Table 4-3: Materials Stored within the Bunker 2

Storage Location	Class	Description	PG	Quantity (kg)
DG Bunker 2	5.1	Oxidising agents	II & III	40,000
	8	Corrosive substances	II	20,000
			III	
	9	Miscellaneous DGs	III	10,000
			Total	70,000

4.3.2 Design

The design requirements for a package store based on AS/NZS 3833:2007 have been summarised in **Table 4-4.**

Table 4-4: Bunker 2 Design Requirements per AS/NZS 3833:2007

Item	Requirement
Construction	• The store and its surrounds shall be constructed of non-combustible materials • Exit doors: FRL -/60/30 • Rolling Shutter Doors (RSD): FRL -/60/30 which closes automatically upon fire trip (i.e. door is electromagnetically held open. During fire trip, the electromagnet is de-energised allowing the door to slide closed on rollers). The -/-/30 rating may be provided by inclusion of drenchers on both sides of the RSD. • Fire walls with an FRL of 60/60/60 • Internal fire walls shall extend 0.5 m through the roof.

<table>
<tr><th>Item</th><th>Requirement</th></tr>
<tr><td>Electrical Equipment</td><td>

All electrical wiring and lighting within the store shall comply with IP 65 in accordance with AS 60529
All electrical equipment shall be installed in accordance with AS/NZS 3000:2018 (Ref. [8])

</td></tr>
<tr><td>Spillage Containment</td><td>
A spill containment system such as a bund or a means of diverting any spill into a compound is required.

Each class shall have a 50 mm high angle iron bund beneath the racked storage area.
The bunding shall have a sealant to prevent leaks between the slab and the bund.
Materials of construction shall be compatible with the materials stored.

The bunding volume for the store shall be 129.5 m^3 as summarised in the following table.
<table>
<tr><th>Requirement</th><th>Volume (m^3)</th></tr>
<tr><td>Volume of the largest container</td><td>1</td></tr>
<tr><td>25% up to 10 m^3</td><td>2.5</td></tr>
<tr><td>10% from 10 m^3 to 100 m^3</td><td>6</td></tr>
<tr><td>20 minutes of sprinkler discharge (assumed 6 m^3/min).</td><td>120</td></tr>
<tr><td>Total</td><td>129.5</td></tr>
</table>
</td></tr>
<tr><td>Ventilation</td><td>
Ventilation will be required; it is recommended that is achieved by mechanical means. Provided below are requirements for mechanical ventilation:

The ventilation system shall exhaust at a rate of 0.3 m^3 per square metre of floor area per minute.
The velocity of the air at the entry point must exceed 300 m/min.
Ventilation ducts to be located at low level (i.e. immediately above the top of the bund).
Inlet and outlet ducts to be located on opposing walls.
The distance between any two inlets/outlets shall not be less than 5 m.
Where inlet air is provided via louvres through a fire wall, the louvres shall have an FRL of -/60/-.
Any exhaust duct (i.e. discharge point external to the building) shall terminate in the open air at least 2 m from any opening into the building and at least 3 m above ground.
The external termination of any inlet duct shall be at least 5 m from the termination of any external exhaust duct.
Ventilation fans are to be constructed of non-sparking materials.
An airflow failure warning device shall be installed. The warning shall be able to be detected from outside the store.

</td></tr>
<tr><td>Separation Distances</td><td>
The following minimum separation distances are required.
<table>
<tr><th>Receptor</th><th>Distance (m)</th></tr>
<tr><td>To property boundary</td><td>3</td></tr>
<tr><td>To onsite protected places</td><td>14.5</td></tr>
</table>
</td></tr>
</table>

Item	Requirement	
	To offsite protected places	14.5
	To achieve compliance with the minimum distance for on- and off-site protected places, the walls of the store shall have an FRL of 60/60/60 The fire walls required for the mixed class bunker are shown in **Figure 4-1**.	
Aerosols	• Aerosol racking shall be protected by a mesh cage to prevent cans rocketing in a fire scenario. • Aerosol cage protecting aerosols ensuring no gaps occur within the cage structure (i.e. mesh to be taken to roof height, walls where applicable, etc.) • The cage mesh shall have a maximum aperture of 50 mm. • The thickness of cage wiring shall be a minimum of 3 mm. • The aerosol cage shall have a sliding gate which loses upon fire detection (i.e. gate is held open by electromagnetic link which deenergises upon fire trip).	
Fire Protection	As per Table 9.3 in the standard, the store shall be protected by: • Powder type extinguishers • Fire hose reel coverage to all parts of the store • Fire hydrant coverage to all parts of the store.	
Placarding	The store shall be placarded in accordance with the WHS Regulation.	

4.4 Toxic Substances

4.4.1 Introduction

Toxic substances will be stored as summarised in **Table 4-5**. Where toxic substances are stored, the storage is subject to AS 4452-1997 (Ref. [9]).

Table 4-5: Toxic Substances Stored

Storage Location	Class	Description	PG	Quantity (kg)
Cabinet	6.1	Toxic Substances	II & III	10
			Total	10

4.4.2 Design

Based upon the quantity of toxic substances stored, these may be safely and compliantly stored by providing a toxic substance cabinet provided by a reputable supplier (i.e. Storemasta). Based upon the low quantity of product stored, the cabinet may be located anywhere within the general warehouse.

5.0 NSW Work Health and Safety Requirements

5.1 Introduction

In addition to the requirements of the relevant standards, a Person Conducting a Business or Undertaking (PCBU) must also satisfy several obligations outlined in Chapter 7 of the Work Health and Safety (WHS) Regulation 2017 (Ref. [1]). The relevant requirements are dependent on the quantities of DGs stored on site. The DG quantities and the placard and manifest thresholds have been outlined in **Table 5-1**. As the DG stores exceed the manifest threshold, the site is classified as a Manifest site.

Table 5-1: Manifest and Placard DG quantities

Class	Description	PG	Stored (kg or L)			Classification
			Stored	Placard	Manifest	
2.1	Flammable gases (aerosols)	n/a	100,000	5,000	10,000	Manifest
2.2	Non-toxic, non-flammable gases	n/a	200,000	5,000	10,000	Manifest
3	Flammable liquids	II & III	1,000,000	250	2,500	Manifest
4.1	Flammable solids	II & III	100,000	1,000	10,000	Manifest
C1/C2	Combustible Liquids	n/a	10,000	10,000	100,000	Placard
5.1	Oxidising agents	II & III	40,000	250	2,500	Manifest
8	Corrosive substances	II & III	20,000	250	2,500	Manifest
9	Miscellaneous DGs	III	10,000	n/a	n/a	n/a
6.1	Toxic Substances	II & III	10	250	2,500	n/a

*Based upon 25% of the aerosol being an LPG propellant

5.2 Applicable WHS Clauses

The applicable clauses for a manifest site from the WHS Regulation 2017 (Ref. [1]) have been outlined in **Table 5-2**.

Table 5-2: Relevant WHS clauses and requirements

Clause	WHS Requirement
346	A Hazardous Chemicals [*Dangerous Goods*] register shall be prepared which must include; • A list of hazardous chemicals stored, used or handled • The current Safety Data Sheet (SDS) for DGs stored, used or handled, unless the hazardous chemical is a consumer product (e.g. hand sanitiser). The register must be readily accessible to workers involved in handling or storing the chemicals, and anyone who is likely to be affected by the chemicals.
347	A manifest of chemicals stored on site shall be prepare in accordance with Schedule 11 and Schedule 12 of the regulation. The manifest shall be kept in a place determine in agreement with the primary emergency service organisation (Fire and Rescue NSW). It must be readily accessible to emergency service organisation and be available for inspection.

Clause	WHS Requirement
348	A notification shall be made to the regulator of the DGs that exceed the manifest quantities detailed in Schedule 11 of the Regulation. Notice must also be given after the DGs are no longer used, stored, or handled on site
349 & 350	PCBU shall ensure placards are displayed for all chemicals which exceed placard quantity of Schedule 11, and that placards comply with Schedule 13, as shown in **Figure 5-1** and **Figure 5-2**. A Placard Schedule shall be prepared to indicate the placard requirements. A PCBU shall ensure an outer warning placard shall is prominently displayed at the site. The placard is to show the words "HAZCHEM" in red lettering on white or silver background and shall have minimum dimensions 120 mm x 600 mm, in compliance with Schedule 13, as shown in **Figure 5-3.**
351 & 354	A PCBU must manage the risk to health and safety associated with using and storing a hazardous chemical [*Dangerous Good*] and have regard of the following: • Hazardous properties of the chemical • Reactions between chemicals (physical) or between the chemical and other substances/materials; • The nature of the work to be carried out with the hazardous chemical; • Any structure, plant or system of work used in the handling, generation or storage of the hazardous chemical [Dangerous Good] or that could react with the hazardous chemical [Dangerous Good] at the workplace. In order to comply with this requirement, it is necessary to conduct a risk assessment and to identify those hazards and risks associated with the storage and handling of the hazardous chemicals [*Dangerous Goods*]. The following recommendation has been made: • A risk assessment of the hazardous chemical [*Dangerous Good*] storage areas be conducted, including the use of the chemicals in the manufacturing areas; or • If there is an existing risk assessment, it should be reviewed.
353	A PCBU must display safety signs required to control an identified risk in relation to using, handling or storing hazardous chemicals. The safety signs must warn of a particular hazard associated with the hazardous chemical, and be located next to hazard, clearly visible to a person approaching the hazard.
355	A PCBU must ensure ignition sources are not introduced to areas which where there is a possibility of fire or explosion in a hazardous area. In the flammable liquids containers, there is potential for vapours to accumulate and ignite. Therefore, the following recommendation has been made: • A Hazardous Area Classification (HAC) report and associated drawings should be prepared for flammable liquid in accordance with AS/NZS 60079.10.1:2022 (Ref. [4]). • A Hazardous Area Dossier shall be prepared prior to occupation in accordance with AS/NZS 3000:2018 (Ref. [8]).
357	A PCBU must ensure, SFARP, that where there is a risk from a spill or leak of a hazardous chemical, a spill containment system contains the resulting effluent within the workplace. • The containment system must not create a hazard by bringing together incompatible chemicals. The containment system must provide for the clean-up and disposal of hazardous chemicals.
358	A PCBU must ensure containers of hazardous chemicals are protected against impact damage and damage from excessive load.

Clause	WHS Requirement
359	A PCBU shall ensure that a workplace is provided with fire protection and firefighting equipment that is designed and built for the types of hazardous chemicals at the workplace. • The PCBU shall have regard to the fire load of the hazardous chemicals and from other sources, and the compatibility of the hazardous chemicals with other substances on site. • The equipment shall be compatible with firefighting equipment used by Fire and Rescue NSW Fire protection and firefighting equipment shall be properly installed, tested and maintained, and a dated record shall be kept of the latest testing results.
361 & 360	A PCBU shall prepare an emergency response plan (ERP) and submit it to the primary service organisation (Fire and Rescue NSW). A PCBU must ensure that emergency equipment is always available for use in an emergency.
364	A PCBU must ensure that containers in which hazardous chemicals are used, handled, or stored in bulk shall have stable foundations and supports, and be secured to the foundations and supports to prevent movement and subsequent damage to the container.

Figure 5-1: DG Placards

Figure 5-2: Combustible Liquid Placard

Figure 5-3: HAZCHEM Placard

5.3 Summary of Requirements

In summary, the site will require the following:

- A Dangerous Goods Register, indicating the type of chemical, any notations that may be required from the risk assessment and the Safety Data Sheet for the chemical.
- A Manifest.
- A DG Risk Assessment of the storage and handling area.
- A Placard Schedule.
- An Emergency Response Plan (ERP).
- Emergency Services Information Pack (ESIP).
- A Hazardous Area Classification (HAC).
- Hazardous Area Verification Dossier (HAVD).

6.0 Conclusion and Recommendations

6.1 Conclusions

A review of the quantities of DG storage areas for the proposed DHL warehouse was conducted to identify the storage areas and provide design guidance to ensure the storage areas comply with the applicable standard. The warehouse was assessed using a combination of AS 1940:2017 and AS/NZS 3833:2007 based on compartmentation goods with similar properties.

The report was developed to assist the project team to design the DG storages with the aim of minimising the risk of the storages as required by the NSW WHS Regulation. It is concluded that if the advice documented in this report is followed the DG storages at the warehouse will comply with the standard and thus the NSW WHS Regulation.

6.2 Recommendations

The following recommendations have been made for the facility:

- The design requirements detailed within this report shall be adhered to in the development of the design for the facility.

DG Documents:

Ensure the following documentation is supplied on-site in accordance with the Work Health and Safety Regulation 2017 (Ref. [1]):

- A Dangerous Goods Register, indicating the type of chemical, any notations that may be required from the risk assessment and the Safety Data Sheet for the chemical.
- A Manifest.
- A DG Risk Assessment of the storage and handling area.
- A Placard Schedule.
- An Emergency Response Plan (ERP).
- Emergency Services Information Pack (ESIP).
- A Hazardous Area Classification (HAC).
- Hazardous Area Verification Dossier (HAVD).

7.0 References

[1] SafeWork NSW, “Work Health and Safety Regulation,” SafeWork NSW, Lisarow, 2017.

[2] Standards Australia, AS 1940:2017 - Storage and Handling of Flammable and Combustible Liquids, Sydney: Standards Australia, 2017.

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

[4] Standards Australia, AS/NZS 60079.10.1:2022 - Explosive Atmospheres Part 10.1: Classification of Areas, Explosive Gas Atmospheres, Sydney: Standards Association of Australia, 2022.

[5] Standards Australia, AS/NZS 60079.14:2022 - Explosive Atmospheres Part 14: Electrical Installations, Design, Selection and Erection, Sydney: Standards Australia, 2022.

[6] Standards Australia, “AS 2118.1:2017 - Automatic Fire Sprinkler Systems General Systems,” Standards Australia, Sydney, 2017.

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

[8] Standards Australia, “AS/NZS 3000:2018 - Wiring Rules,” Standards Australia, Sydney, 2018.

[9] Standards Australia, “AS 4452-1997 - The Storage and Handling of Toxic Substances,” Standards Australia, Sydney, 1997.