ARUP

SSDA

43-61 Turner Road Data Centre

Hazards and Risk Report

Reference: EIS Appendix

Issue 01 | 11 October 2024

Job number 299816-18

Arup Australia Pty Ltd | ABN 76 625 912 665

Arup Australia Pty Ltd
Level 5
151 Clarence Street
Sydney
NSW, 2000
Australia
arup.com

Executive Summary

This Hazards & Risk report has been prepared by Arup on behalf of the client to accompany a detailed State Significant Development Application (SSDA) for the data centre development at Turner Road, Gregory Hills, NSW 2557. The legal description of the site is Lot 14, 15, 16, and 17 in Deposited Plan (DP) 2802.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) Industry Specific for Data Centres and additional requirements in the accompanying cover letter issued on 1 March 2024 for the project (SSD-68013714). This report aims to demonstrate compliance with the relevant aspects of the following legislation, regulations, policies, and standards outlined in the Hazards and Risk SEARs, specifically regarding storage requirements relating to off-site hazards and risk:

SEARs Compliance

Item	Description of Requirement	Section reference (this report)
Hazards and Risk	• Where there are dangerous goods and hazardous materials associated with the development provide a preliminary risk screening in accordance with Chapter 3 of SEPP (Resilience and Hazards) 2021.	Section 4
	• Where required by SEPP (Resilience and Hazards) 2021, provide a Preliminary Hazard Analysis prepared in accordance with Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis and Multi-Level Risk Assessment	Not required
	• If the development is adjacent to or on land in a pipeline corridor, report on consultation outcomes with the operator of the pipeline, and prepare a hazard analysis.	Not required
	• Demonstration that the relevant aspects of the FM Global Property Loss Prevention Data Sheet 5-32 – Data Centres and Related Facilities have been considered and could be implemented as part of the development	Section 5.5
	• Demonstration that the development would comply with the relevant aspects of the following standards: o AS/NZS 4681 – Storage and handling of Class 9 (miscellaneous) dangerous goods and articles o AS IEC 62619 – Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications. o AS 1940 – Storage and handling of flammable and combustible liquids.	Section 5.1, Section 5.2, Section 5.3

The requirements of the following Acts and Regulations have also reviewed, and recommendations made for hazardous substances stored on-site:

- Part 7.1 of the Work Health and Safety (WHS) Regulation 2017; and
- Protection of Environment Operations (POEO) Act 1997.

Resilience and Hazards SEPP Screening

The Resilience and Hazards SEPP screening in Section 4 outlines that neither the storage quantities nor transportation thresholds are exceeded for the dangerous goods on-site. It has been determined that the facility is not deemed "potentially hazardous" per the Resilience and Hazards SEPP and a PHA is not required.

SEARs Requirements

Overall, the current design is capable of achieving compliance with standards and guidelines outlined in the Hazards and Risk SEARs, as identified in section 3.1. An initial review of the current SSDA stage design is undertaken in section 5. A compliance review of the current design are outlined in each of the tables in sections 5.1 to 5.5, compliance is achievable subject to the implantation of the findings in the review.

It is noted that at this stage of the project there are a number of elements of the design that have not yet been finalised, as such this does not constitute a comprehensive review of compliance against the Australian Standards and other guidelines outlined in the SEARs. Compliance will need to be determined as the design progresses. Arup recommend compliance to the relevant clauses of these standards and guidelines be verified prior to commencement of construction.

Other Legislative Requirements

In accordance with the legislative requirements for the WHS Regulation 2017, the quantity of diesel is in excess of both the manifest and placard quantity, and the following recommendations are made.

- An outer warning placard shall be prominently displayed at workplace entrances where emergency services may enter in accordance with Regulation 349. The placard shall be clearly legible, separate from other signs and otherwise compliant with Schedule 13.
- Placards shall be prominently displayed on or near the diesel storage tanks in accordance with Regulation 350. The placards shall be clearly legible, separate from other signs and otherwise compliant with Schedule 13.
- A manifest of all Schedule 11 chemicals shall be prepared in accordance with Regulation 347 and Schedule 12 of the WHS Regulation.
- SafeWork NSW shall be notified of diesel storage exceeding manifest quantities in accordance with Regulation 348 of the WHS Regulation.
- An emergency plan shall be prepared for the Site and provided to Fire and Rescue NSW as per the requirements of Regulation 361 and Division 4 of Part 3.2 of the WHS Regulation.

The POEO Act 1997 describes the requirements whereby an environmental protection license is required, where this is relevant to the diesel quantity stored on-site. The combined diesel storage quantity for the Site falls below the 2000 t of chemical and petroleum product storage requirement, thus an environmental protection license is not required for chemical and petroleum product storage.

Contents

Tables

Figures

Glossary

Abbreviation	Meaning
AS	Australian Standard
BYDA	Before You Dig Australia
CUPS	Critical Uninterruptible Power Supply
DG	Dangerous Good
DoP	Department of Planning (superseded by Department of Planning and Environment)
FRL	Fire Resistance Level
GFA	Gross Floor Area
HUPS	House Uninterruptible Power Supply
IEC	International Electrotechnical Commission
LGA	Local Government Area
kg	Kilogram
kL	Kilolitres
kPa	Kilopascal
MW	Megawatt
NZS	New Zealand Standard
PHA	Preliminary Hazard Analysis
POEO	Protection of the Environment Operations
SEARs	Secretary's Environmental Assessment Requirements
SEPP	NSW State Environmental Planning Policy
SSDA	State Significant Development Application
t	Tonne
WHS	Work Health and Safety

1. Introduction

1.1 Purpose

This Hazards & Risk report has been prepared to support State Significant Development Application (SSD-68013714). The purpose of this report is to address the relevant Secretary's Environmental Assessment Requirements (SEARs) requirements for Hazards and Risk.

Specifically, this report assesses the development against the State Environmental Planning Policy (Resilience and Hazards) (Resilience and Hazards SEPP) to determine if a development is a potentially hazardous industry due to the quantity of dangerous goods stored on site and therefore if a preliminary hazard analysis (PHA) is required as part of the development application documentation.

1.2 Development Overview

Arup on behalf of the Proponent is seeking development consent to construct and operate a data centre (the Proposal) at 43-61 Turner Road, Gregory Hills, NSW 2557 (the Site). The Site comprises of four lots (Lot 14, 15, 16, and 17, DP 2802) as shown on Figure 1.

The site is approximately 9.74 hectares (ha) and is located within the Camden Council Local Government Area (LGA). The Site is located approximately 45 kilometres southwest of the Sydney CBD, and about three kilometres northeast from the Narellan Town Centre.

The proposal includes the construction of a building with an approximate height of 25m, including lift shaft and all significant plant and rooftop equipment. The Proposal will include data hall space and supporting plantrooms, and supporting administrative spaces incorporating secure entry facilities, security gatehouse, loading dock, storage rooms, staff offices and the like. The back-up generators will occupy an external equipment yard to the west of the main building, and some mechanical equipment will be located on the roof. The Proposal will be served from a private on-site substation located at the north-eastern corner of the Site.

Landscaped areas are proposed along the frontage of Turner Road which shall be used to improve aesthetics and amenity for local businesses.

On-site car parking spaces will be provided for staff and visitors, including disabled and electric vehicle parking.

Figure 1-1: Site Location

1.3 SEARs requirements

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) Industry Specific for Data Centres and additional requirements in the accompanying cover letter issued on 1 March 2024 for the project (SSD-68013714). Specifically, this report has been prepared to respond to the Hazards and Risks SEARS requirement, refer Table 1-1.

Table 1-1: SEARs Compliance

Item	Description of Requirement	Section reference (this report)
Hazards and Risk	• Where there are dangerous goods and hazardous materials associated with the development provide a preliminary risk screening in accordance with Chapter 3 of SEPP (Resilience and Hazards) 2021.	Section 4
	• Where required by SEPP (Resilience and Hazards) 2021, provide a Preliminary Hazard Analysis prepared in accordance with Hazardous Industry Planning Advisory Paper No.6 – Guidelines for Hazard Analysis and Multi-Level Risk Assessment	Not required
	• If the development is adjacent to or on land in a pipeline corridor, report on consultation outcomes with the operator of the pipeline, and prepare a hazard analysis.	Not required
	• Demonstration that the relevant aspects of the FM Global Property Loss Prevention Data Sheet 5-32 – Data Centres and Related Facilities have been considered and could be implemented as part of the development	Section 5.5
	• Demonstration that the development would comply with the relevant aspects of the following standards: ○ AS/NZS 4681 – Storage and handling of Class 9 (miscellaneous) dangerous goods and articles ○ AS IEC 62619 – Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications. ○ AS 1940 – Storage and handling of flammable and combustible liquids.	Section 5.1, Section 5.2, Section 5.3

1.4 Stakeholder Engagement

This report will be provided to all relevant stakeholders for review.

1.5 Assumptions & Limitations

The outcomes of this report are based on the following assumptions and limitations:

- That information, reports, drawings, and specifications provided by others, upon which this assessment is based, are accepted as accurate.
- At this stage of the project there are several elements of the design that have not yet been finalised, as such this does not constitute a comprehensive compliance review and compliance will need to be determined as the design progresses.
- The relevant designers/ suppliers/ contractors are responsible for the compliance of their systems against the relevant clauses of the Standards and Guidelines.

Arup recommend compliance to the relevant clauses of these standards and guidelines be verified prior to commencement of construction. Demonstration of compliance will be a key mitigation measure in a Fire Safety Study (where one is required).

1.6 Other Appliable Legislative Requirements

This report, in addition to assessing the Site against Resilience and Hazards SEPP, also assesses the applicability of the *Work Health and Safety Regulation 2017* (WHS Regulation) and the *Protection of the Environment Operations Act 1997* (POEO Act 1997) for the entire site.

2. Proposal Overview

2.1 Site Context

The site is located at 43-61 Turner Road, Gregory Hills, NSW 2557 and is made up of 4 individual lots (Lot 14, 15, 16, and 17, DP 2802). It is located on the corner on Turner Road, with both White Cliff Avenue and Central Hills Drive bordering the site for future road access to the site. The site is approximately 9.74ha in size. An aerial photograph of the site is provided at Figure 2-1.

Source: Nearmap 2024

Figure 2-1: Aerial Photograph of Site

2.2 Pipelines

A Before You Dig Australia (BYDA) enquiry was conducted on the 2nd of April 2024 to determine if the development is adjacent to or on land in a pipeline corridor. The enquiry found no gas mains located underneath the site property (43-61 Turner Road, Gregory Hills, NSW 2557). There are gas mains are located adjacent to the site below Turner Road, White Cliffs Avenue and Central Hills Drive as shown in Figure 2-2. As there are no licensed pipelines in the vicinity of the Site, no consultation or hazard analysis is required.

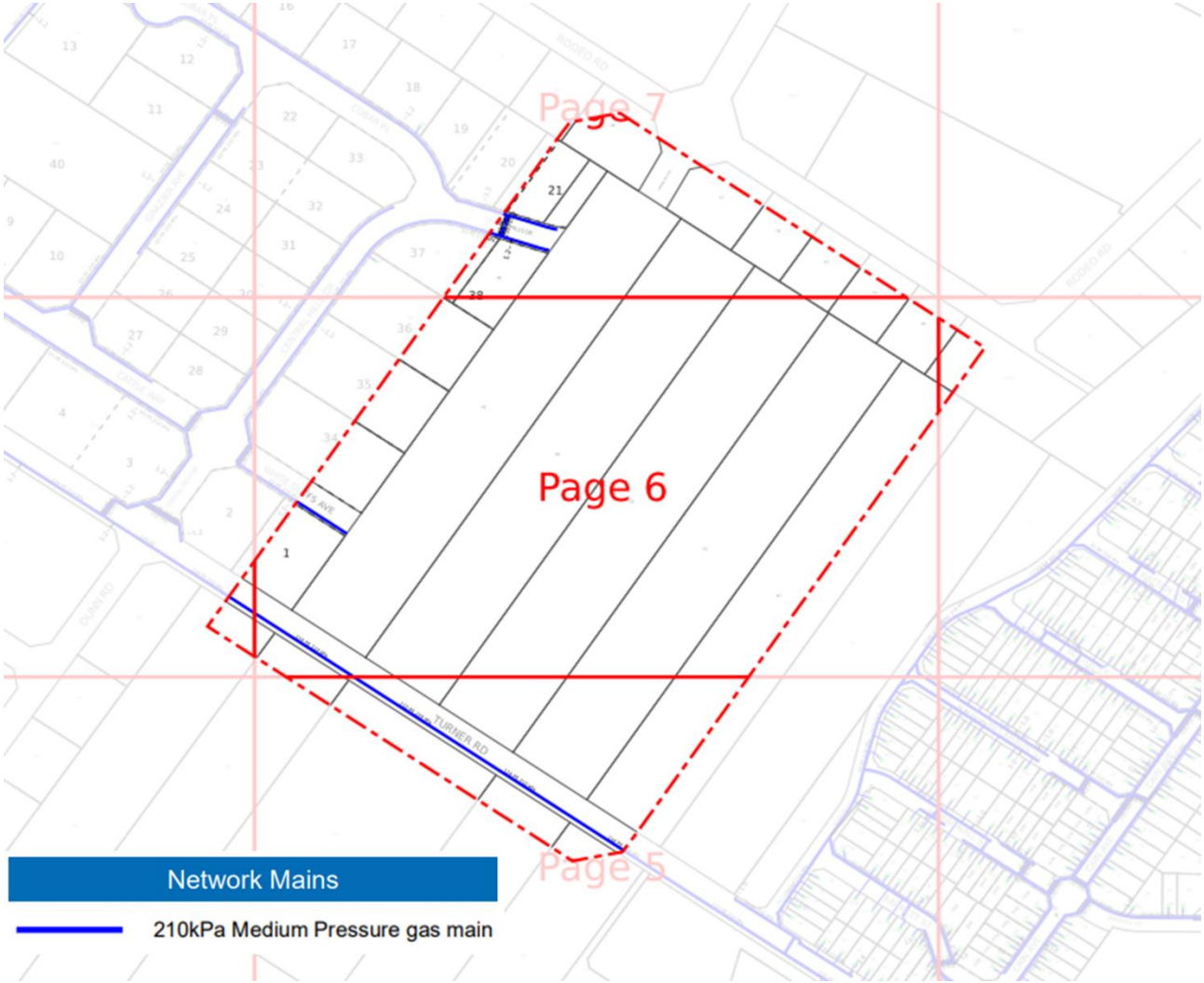

Figure 2-2: BYDA enquiry map for gas mains in the vicinity of the proposed Site

2.3 Project Details

The key components of the Project are listed in Table 2-1.

Table 2-1: Proposal Overview

Term	Definition
The Proposal	The construction of a data storage centre at 43-61 Turner Road, Gregory Hills, NSW 2557 (the Site). The Proposal will comprise of 12 data halls, mechanical and electrical equipment rooms, offices, substation, security gatehouse, other ancillary support spaces, and external/rooftop mechanical and electrical equipment.
The Site	The Proposal is located at 43-61 Turner Road in the suburb of Gregory Hills, NSW 2557. The Site (Lot 14, 15, 16, and 17, DP 2802) is approximately 9.74 hectares (ha) and is located within the Camden Council Local Government Area (LGA). The Site is located approximately 45 kilometres southwest of the Sydney CBD, and about three kilometres northeast from the Narellan Town Centre.
Physical layout and design	Overall dimensions | A split-level building with associated parking, loading zones and landscaping areas. The Proposal would be approximately 25 metres high, including stair and lift overrun. Internal fit-out | It would comprise of servers, racks, storage devices and other networking equipment and would be supplemented with additional electrical and cooling equipment. Vegetation removal | Minor vegetation removal is required due to the presence of riparian vegetation surrounding the five (5) dams and in the north-east corner of the Site. Landscaping | Local tree species would be planted at intervals to improve aesthetics and amenity and provide amenity passive cooling. The species composition would align with species on Camden City Council's flora species list.
Proposal site coverage	The building has a total footprint of 9520 square metres comprising one data floor and a half floor. The building would occupy about 39 percent of the Lot.
State Significant Development (SSD) Trigger	The proposed data centre building will have a capacity of over 15 MW (estimated at 53 MW), which triggers the proposal as a State Significant Development under the Schedule 1 of the State Environmental Planning Policy (Planning Systems) 2021. The Site is zoned IN1 General Industrial under State Environmental Planning Policy (Precincts – Western Parkland City) 2021 (SEPP WPC) and the Turner Road Precinct Development Control Plan (2018).
Power, back-up power supply, and cooling	Construction of a new substation to service the facility. Offsite works to connect the substation to Endeavour Energy's network would be undertaken under a separate approval. Primary mains power | Primary mains power would be supplied from the Endeavour Energy network via a private onsite substation. Back-up generator power | The data centre would require approximately 26 back-up diesel generators holding approximately 650 kilolitres of diesel fuel. The back-up diesel generators would operate for less than 200 hours per annum. Fuel storage | There would be about 650 kL of diesel fuel stored onsite to power the back-up generators. Battery Storage | There would be lithium-ion batteries in the data halls which would operate as back-up power in the event of a power outage to keep security systems, computers, and other electronic equipment running while the back-up generators start. Small uninterruptible power systems would also provide battery backup to various other critical systems. Cooling | Cooling would be delivered by fresh air free-cooling systems in winter and evaporative cooling in summer.
Access, circulation and parking	Access | Access to the data centre would be via the proposed driveways from Turner Road and White Cliffs Avenue. The proposed driveway and internal road network being built are under the Concept Design Approval. Circulation | The internal roads would be designed and built to separate heavy vehicles, light vehicles and pedestrians. They have been designed to allow heavy vehicles to move safely around the Site without needing to reverse.

Term	Definition
	Parking | There would be shared regular parking spaces, car parking spaces compliant with the Disability Discrimination Act 1992, and shared bicycle parking spaces. Additionally, there would be EV charging spaces.
Other infrastructure	Other infrastructure required to service the Site include necessary stormwater, wastewater, telecommunications and electricity pipes, pits, conduits and nodes.
Site preparation works	Groundwater dewatering | Dewatering of the existing five (5) dams located across the Site would be required. Vegetation clearing | Minor vegetation clearing would be needed due to the presence of riparian vegetation located around the dams and in the northeast corner of the Site. Earthworks | There would be some localised earthworks to create the required levels, landscaping profiles and install utility connections. Stormwater | Stormwater connection will be installed via Central Hills Drive.
Land uses and activities	The Site would only be used to support the operation of the data centre. There would be occasional maintenance and delivery vehicles movements. There would also be movement of the workforce arriving and leaving at the start and end of each shift. Essential site and security staff would be working at night, however most operations would occur during the day.
Hours of operation	24 hours a day, 7 days a week.
Employment	The Proposal would support up to 100 construction jobs and 50 full-time operational jobs.
Phases	The Proposal would be built in a single stage (in planning terms) however would cover 3 build phases: Phase 1 | Site establishment Phase 2 | Initial construction and initial fit out Phase 3 | Remaining fit out

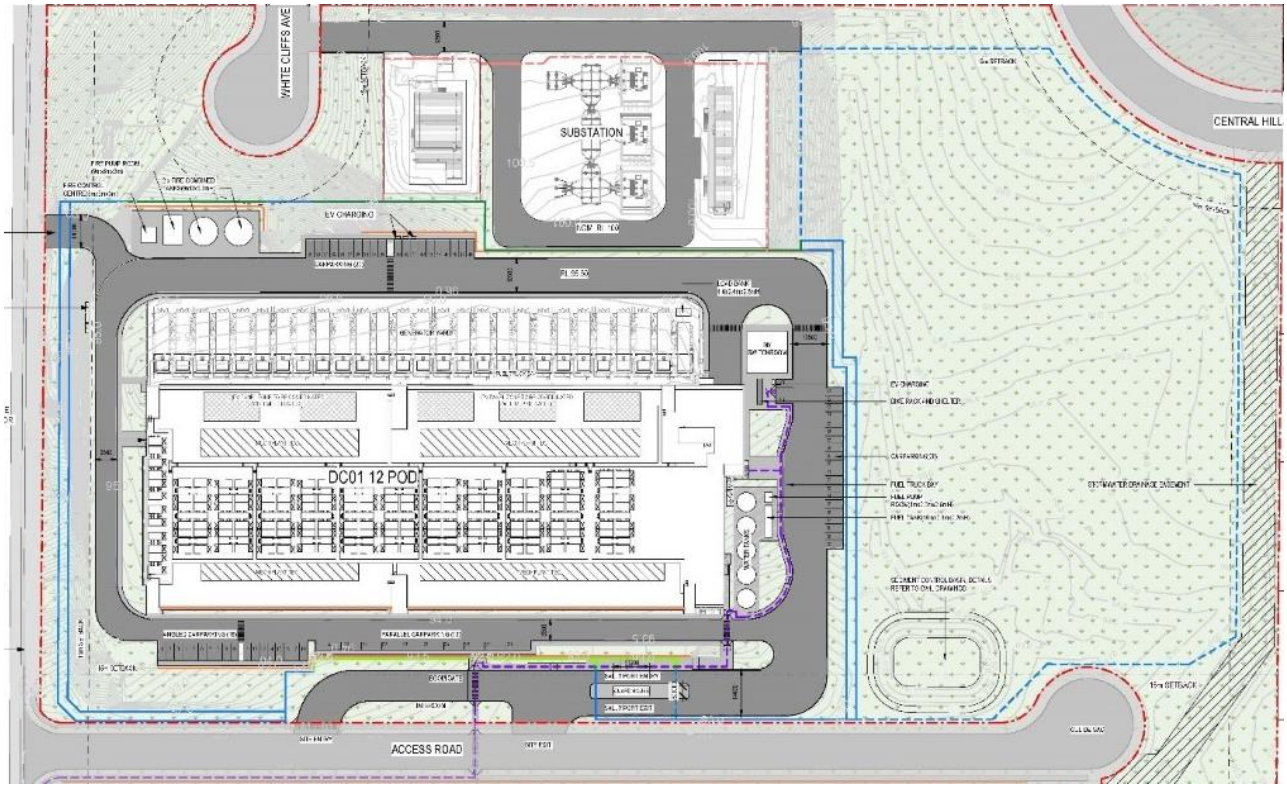

Figure 2-3: Site Plan

2.4 Hazardous Materials on Site

This section provides details with respect to the SEARs requirement regarding the location and number of any back-up generators, back-up fuel storage tanks and lithium-ion (Li-ion) battery chemistries (with details of peak discharge rate in MW) to be installed to service the development (see Section 1.3). This section also provides an overview of the Class 2.2 gases stored on the site.

The site is proposed to contain the following:

- 27 x diesel generators (26 x critical data centre generators, 1 x house generator);
- 2 x diesel fire pumps;
- 30 x diesel tanks;
- Li-ion batteries;
- VRLA batteries;
- Pre-action sprinkler system containing nitrogen gas.

The inclusion of hazardous materials is to be incorporated into, a fire safety study (if required) by the dangerous goods consultant, and the overall fire safety strategy by the project fire engineer.

2.4.1 Diesel

Generators and Pumps

There are 27 x diesel generators, each with an associated diesel tank, proposed in total within the site (refer to Figure 2-6). The breakdown of the diesel generator arrangement is as follows:

- 26 x critical diesel generators for the data centre located within the ground floor of the data centre;
- 26 x 21800L (21.8kL) diesel belly tanks (critical generators), totalling 566.8kL;
- 1 x house diesel generators located within the ground floor of the data centre;
- 1 x 6800L (6.8kL) diesel belly tank (house generator)
- 2 x fire pumps located within the fire pump room.
- 2 x 100L[1] (0.1kL) day tanks (fire pumps), totalling 0.2kL.

There is a total of 573.8kL[2] of diesel stored across all generator belly and pump day tanks.

While diesel is not classified as a dangerous good by the ADGC, it is a Class C1 combustible liquid. If there is a pre-existing fire, then diesel will be an additional source of fuel for that fire.

To mitigate this potential loss of control, the diesel storage is to comply with AS 1940-2017: *The storage and handling of flammable and combustible liquids*, refer section 5.3.

Note [1]: The total quantity of 100L diesel tanks located within the fire pump room is to be confirmed in future design. The conservative proposed maximum of 2 x 100L tanks has been used.

Note [2]: The total quantity of diesel located on site has been calculated based on the assumption noted in Note [1].

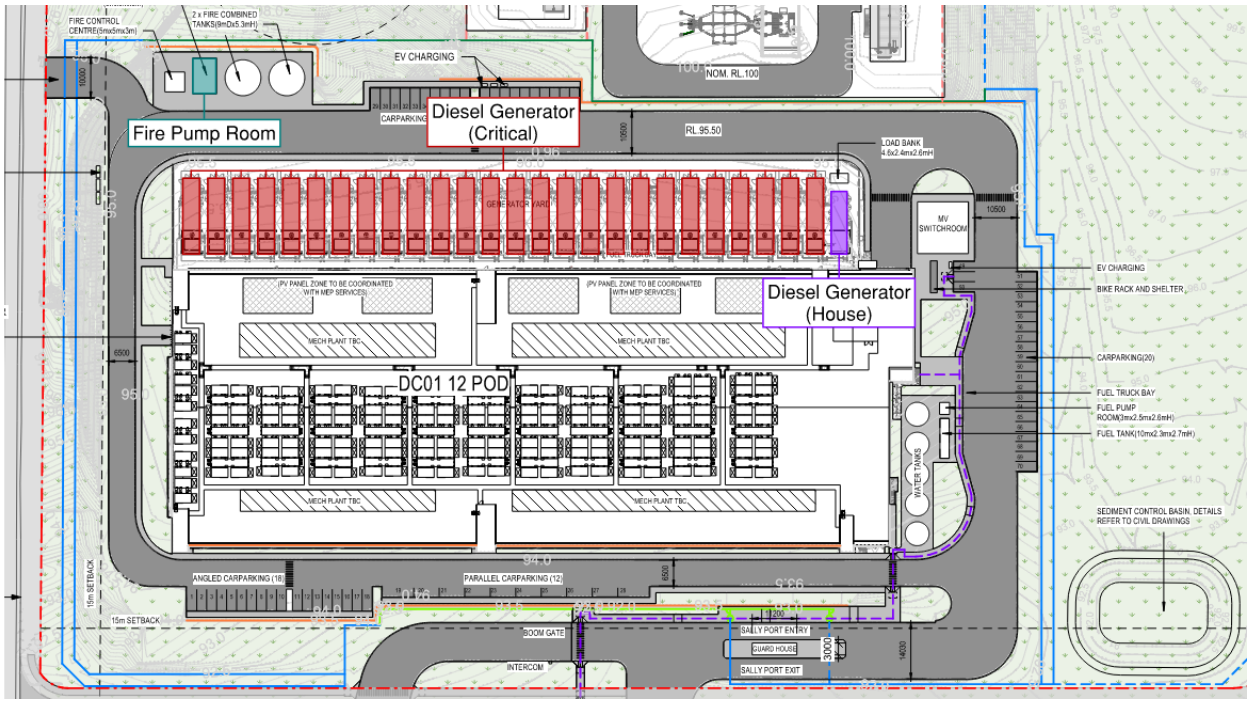

Figure 2-4: Diesel Generator and Pump Locations

Stand-alone Diesel Storage Tank

There is a single specific diesel storage location proposed in total across the site (refer to Figure 2-5).

The diesel storage tank arrangement is as follows:

- 1 x 62,100L (62.1kL) Diesel storage tank

There is a total of 62.1kL of diesel stored within specified storage tanks on site.

Therefore, the total proposed diesel on site (including generator belly tanks and storage tanks) is 635.9kL.

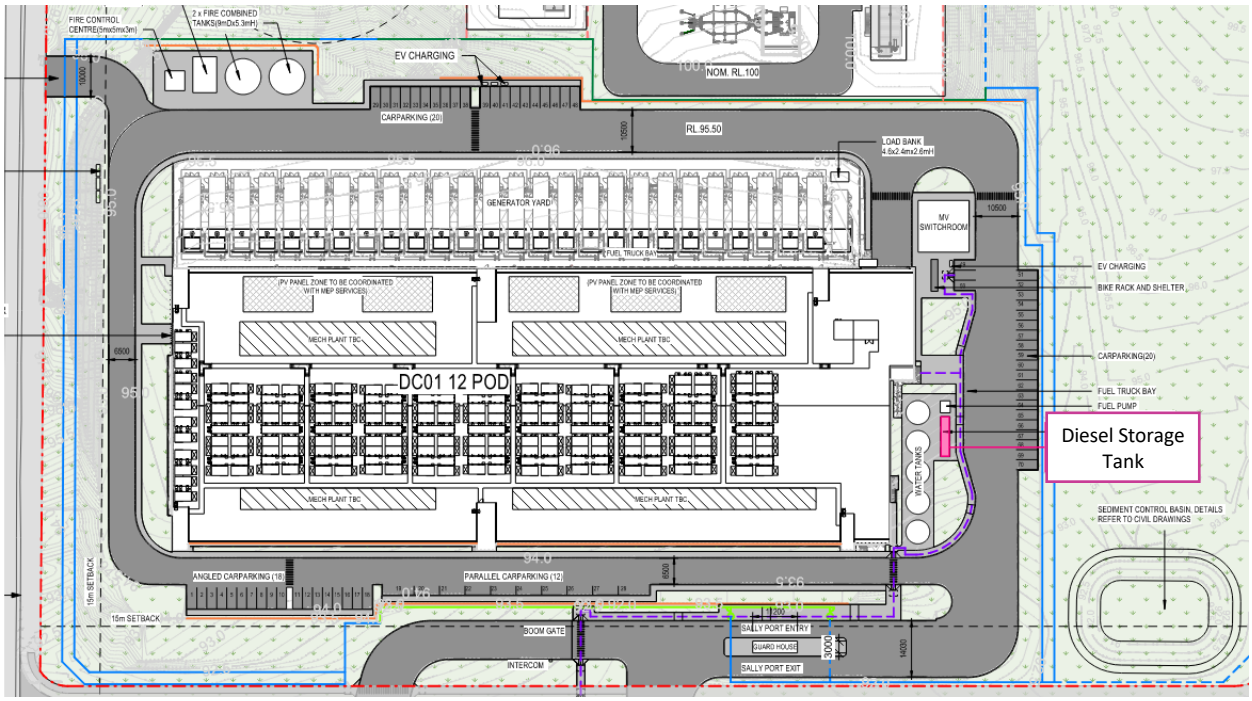

Figure 2-5: Location of diesel storage tanks.

While diesel is not classified as a dangerous good by the ADGC, it is a Class C1 combustible liquid. If there is a fire event, then diesel will be an additional source of fuel for that fire.

To mitigate this potential loss of control, the diesel storage is to comply with AS 1940-2017, refer section 5.3.

2.4.2 Li-ion Batteries

Li-ion batteries are proposed throughout the data centre building (refer to Figure 2-6). The breakdown of the Li-ion battery arrangement is as follows:

- Li-ion batteries in racks located across data halls (battery back-up units) on the ground floor;
- Li-ion batteries stored within battery storage rooms on the ground floor;
- Li-ion batteries in racks located across data halls (battery back-up units) on the level 1;
- Li-ion batteries stored within battery storage rooms on level 1;
- The peak discharge rate for the Li-ion battery is to be confirmed.

As the quantity of Li-ion batteries on site is dependent on the client, a nominal quantity of 205,000kg will be used for this report [3]. It is noted that Li-ion batteries within the data halls are in-use and are not considered a stored Dangerous Good.

Li-ion batteries have the potential for thermal runaway. In order to mitigate this risk SFAIRP consideration of potential controls in line with standards and guidelines have been reviewed in sections 5.1, 5.2 and (c)5.5.

Note [3]: The nominal value of 210,000kg has been derived based on the number of data racks on each floor and the assumed weight of Li-ion batteries. This number includes batteries stored within battery storage rooms on each floor. As this value is nominal, all clauses dependant on this value must be reassessed when an actual value is obtained.

Figure 2-6: Location of Li-ion batteries on the ground floor.

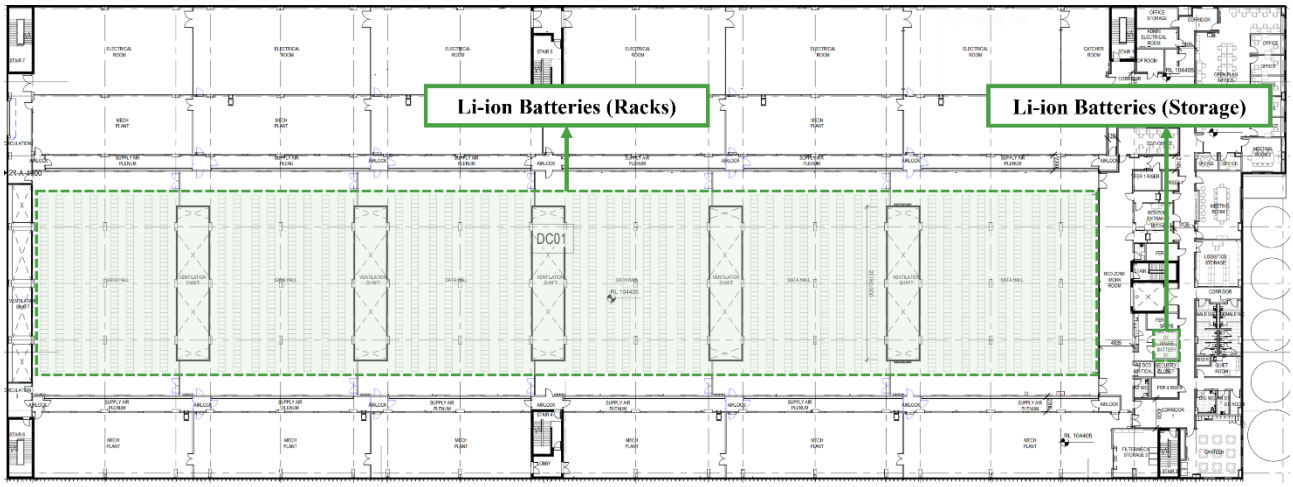

Figure 2-7: Location of Li-ion batteries on level 1.

2.4.3 VRLA Batteries

VRLA batteries are proposed throughout the data centre building (refer to Figure 2-6). The VRLA batteries are used at back-up power and will be in-use and are not considered a stored Dangerous Good. As the quantity of VRLA batteries on site is to be confirmed in a later design stage, a nominal quantity of 12,000kg will be used for this report [4].

Note [4]: The nominal value of 12,000kg has been derived based on the number of locations and estimated quantity of batteries on each floor alongside the assumed weight of VRLA batteries. As this value is nominal, all clauses dependant on this value must be reassessed when an actual value is obtained.

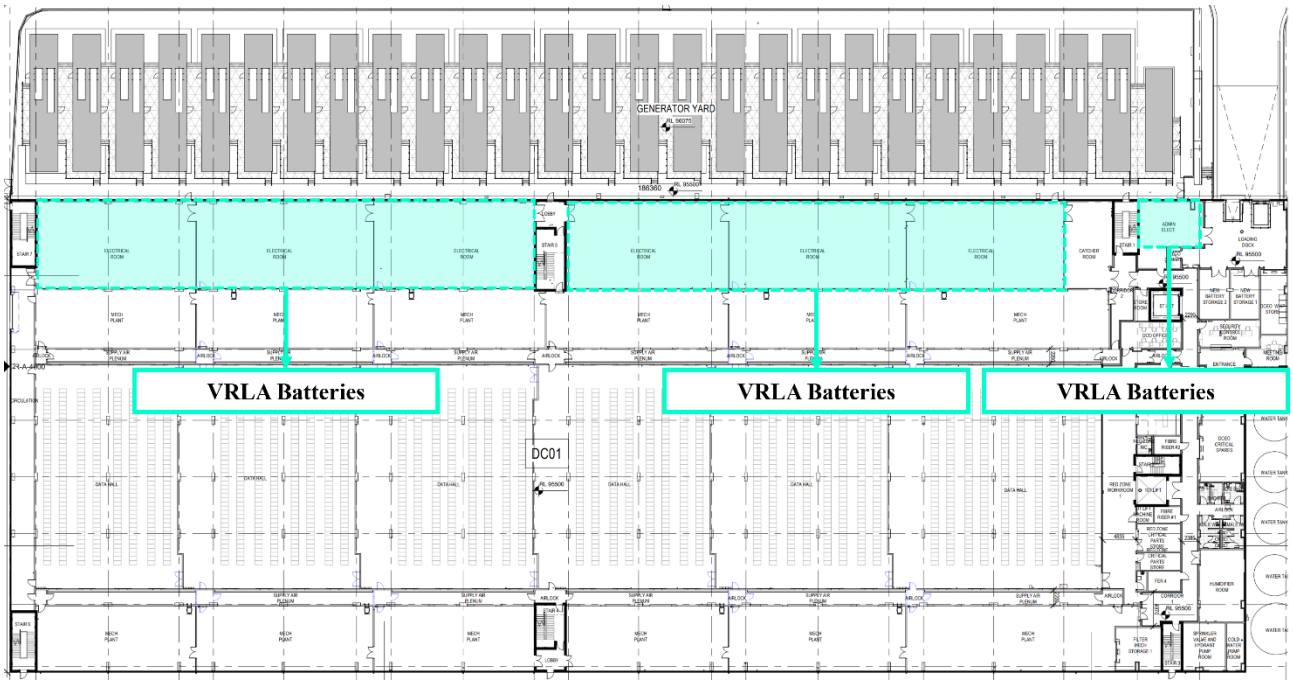

Figure 2-8: Location of VRLA batteries on ground floor.

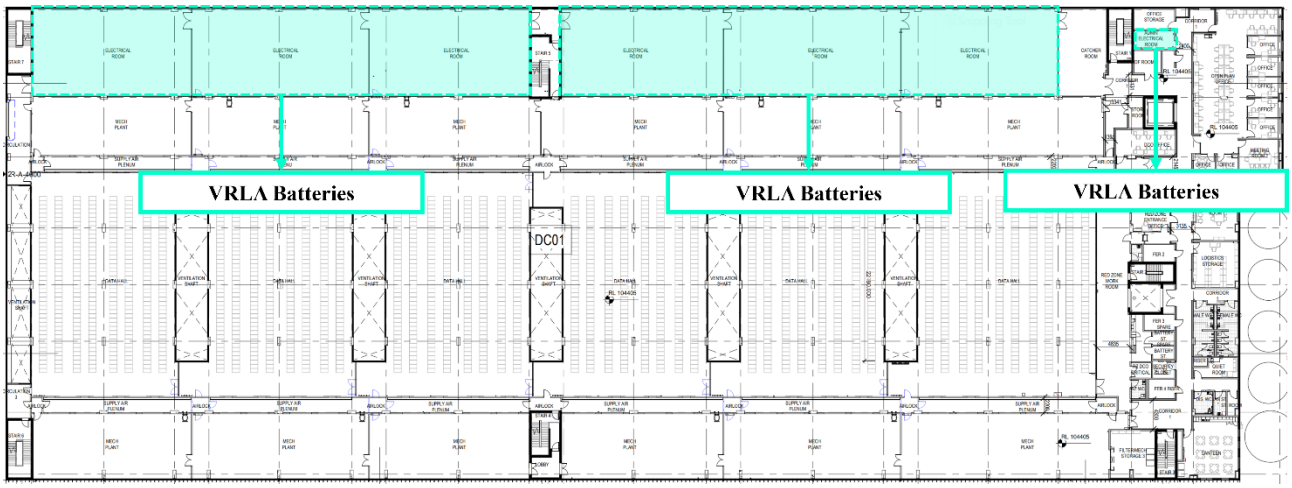

Figure 2-9: Location of VRLA batteries on level 1.

2.4.4 Pre-action Sprinkler System

The pre-action sprinkler pipes will be supplied with nitrogen generated from an onsite nitrogen generator plant to prevent corrosion:

- Benchmark of 98% nitrogen in piping is used;
- Final quantities of piping and nitrogen stores are to be confirmed at a later design stage.

Consideration shall be given to any exhaust location of nitrogen given the high concentrations and associated asphyxiate risk. It is recommended that:

- The exhaust is sufficiently distanced from areas in which personnel or public have access;
- The exhaust location is of sufficient height to provide effective dispersion of gas; and
- The exhaust location is of sufficient distance from building openings, including intake and exhaust vents.

2.4.5 Transformers oil for the 132/22kV transformers

There will be three transformers in the substation, each containing 30000L of transformer oil. Each transformer will be designed to AS/NZS 60076-2014: Power Transformers and installed as per AS 2067-2016: Substations and high voltage installations exceeding 1kV a.c. (AS 2067).

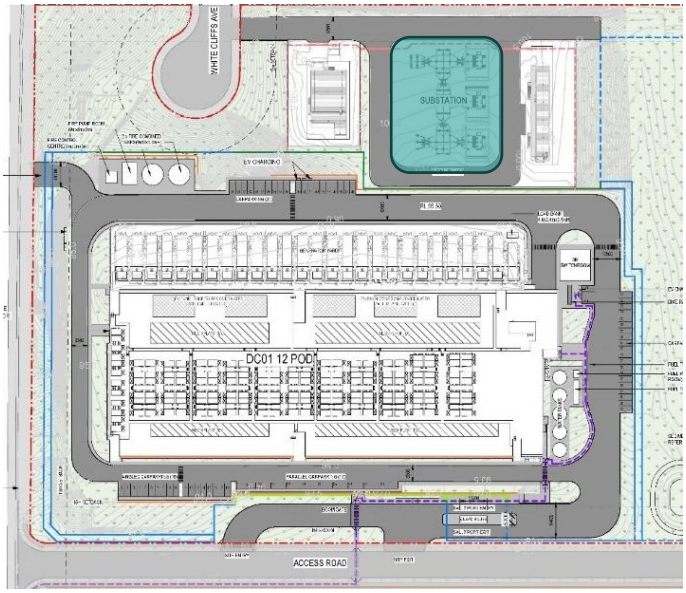

Figure 2-10: Location of Substation

3. Assessment Methodology

3.1 Relevant Legislation and Policies

The legislation, regulations, policies and standards listed below form the basis of this document and assessment:

- *State Environmental Planning Policy (Resilience and Hazards) 2021* [1];
- *Applying SEPP 33 guidelines* [2];
- *Hazardous Industry Planning Advisory Paper No. 6 - Guidelines for Hazard Analysis* [3];
- *Multi-level Risk Assessment* [4];
- Part 7.1 of the *Work Health and Safety Regulation 2017* [5];
- *Protection of Environment Operations Act 1997* [6];
- AS 1940-2017: *The storage and handling of flammable and combustible liquids* [7];
- AS/NZS 4681-2000: *The storage and handling of Class 9 (miscellaneous) dangerous goods and articles* [8];
- AS 3780-2023: *The storage and handling of corrosive substances* [9]
- AS IEC 62619-2017: *Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications* [10]; and
- FM Global Property Loss Prevention Data Sheet 5-32 – *Data Centres and Related Facilities* [11].

3.2 Resilience and Hazards SEPP

The New South Wales State Environmental Planning Policy (SEPP) (Resilience and Hazards) 2021 commenced on 1 March 2022.

The screening process is used to assess whether a development is “potentially hazardous” or “potentially offensive”. Hence, the *Applying SEPP 33* (2011) remain relevant. *Applying SEPP 33* outlines the screening process used to assess whether the Resilience and Hazards SEPP applies (in the context of potentially hazardous or potentially offensive industry).

Any references to SEPP 33, particularly in extracts from *Applying SEPP 33*, should be taken as references to the Resilience and Hazards SEPP.

3.3 The Resilience and Hazards SEPP Study Area

The preliminary risk screening covers the entire Site as illustrated in Table 3-1. The following dangerous goods (DGs) are proposed to be stored within the Site. Note, in accordance with the *Australian Dangerous Goods Code*, diesel is not classified as a DG, but is a C1 combustible liquid.

Table 3-1: Total DG quantities across the Site

Substance	UN Number	DG Class	Quantity
Lithium-ion batteries	3480/3481	9	210,000 kg
Diesel	1202	N/A	635.9 kL
VRLA batteries	2800	8 PGIII	12,000 kg

3.4 The Resilience and Hazards SEPP Screening Process

The SEPP 33 process describes the process to be followed to assess whether a development is considered potentially hazardous. The SEPP 33 process can be found in Figure 3-1 below.

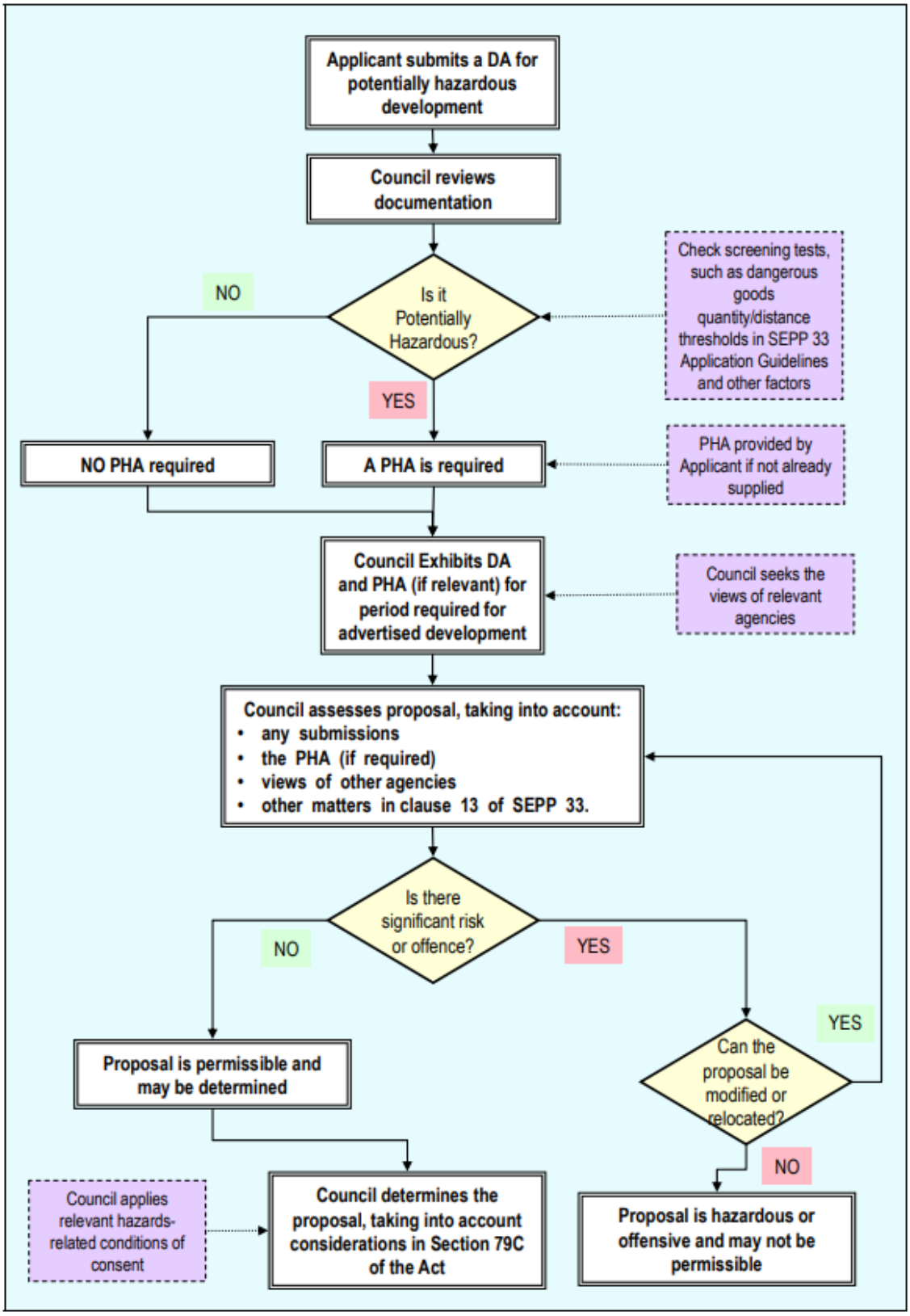

Figure 3-1: The Resilience and Hazards SEPP Process (extract from Applying SEPP 33 [12])

3.5 Storage of Hazardous Materials

The hazards associated with the hazardous materials being stored and used across the entire site, as identified in section 2.4, must still be managed appropriately, regardless of the outcome of the Resilience and Hazards SEPP screening.

The potential risks that may arise as a result of the storage of these hazardous materials can be mitigated by achieving compliance with/ taking into account guidance from relevant international guidelines and Australian Standards, this has been detailed in section 5.

3.6 Section 7.1 of the WHS Regulations

Section 7.1 of the *Work Health and Safety Regulations 2011* (WHS) is applicable to the use, handling and storage of hazardous chemicals at a workplace. Section 6 below sets out the WHS requirements for workplaces that exceed the manifest and placard quantities of hazardous chemicals.

3.7 Protection of the Environment Operations Act

The *Protection of the Environment Operations Act 1997* (PoEO) sets out the conditions that would necessitate the issuance of an environment protection licence. Section 7 below assesses whether any of these conditions are met and therefore if the site would require an environment protection licence.

4. Resilience and Hazards SEPP Screening Results

4.1 Resilience and Hazards SEPP Screening: Storage Threshold

Table 3-1 below shows the total storage of hazardous substances covered in the Applying SEPP 33 process on-Site. Note, Class 9 (lithium-ion batteries) and C1 combustible liquids (diesel) are excluded from this screening process.

Table 3-1: SEPP screening storage threshold

Substance	UN Number	DG Class	Quantity	Threshold	Threshold Exceeded?
VRLA Batteries	2800	8 PGIII	12.0t	50.0t	No

The total nominal quantity of VRLA batteries is below the threshold [5].

Note [5]: As a nominal quantity of VRLA batteries has been used, the SEPP screening storage threshold must be reassessed if the quantity of VRLA batteries is altered in later design stages.

4.2 Resilience and Hazards SEPP Screening: Transportation Threshold

This SEPP screening also covers the transportation of hazardous substances within the facility, citing movement thresholds for hazardous substances classes. The SEPP screening for transportation considers only the VRLA and lithium-ion batteries where the movement thresholds are shown in Table 4-1 below.

During operation, the batteries are not expected to move and expected movements are only relevant to the commissioning stage. During commissioning and operation, the peak movements expected are only five times per week during peak movement periods.

Table 4-1: SEPP transport screening threshold

Substance	DG Class	Peak Weekly Movements Expected	Weekly Movements Threshold	Threshold Exceeded
Lithium-ion batteries	9	5	>60	No
VRLA batteries	8 PGIII	5	>30	No

Table 4-1 shows that transportation thresholds set out in Table 2 of *Applying SEPP 33* **are not exceeded**.

4.3 Resilience and Hazards SEPP Screening: Conclusion

The SEPP screening results show that neither the storage nor transportation thresholds are exceeded for the dangerous goods considered for the development, thus the facility is not considered “potentially hazardous” in reference to the Resilience and Hazards SEPP.

Therefore, this report satisfies the relevant SEARs requirements, and demonstrates a preliminary hazard analysis (PHA) is not required.

5. Storage of Hazardous Goods

The hazards associated with the materials being stored and used across the entire site must still be managed appropriately, regardless of the outcome of the Resilience and Hazards SEPP screening. The following Standards and Guidelines have either been specifically identified in the SEARs or are relevant to the hazardous materials identified on this site.

The relevant designers/ suppliers/ contractors are responsible for the compliance of their systems against the relevant clauses of the Standards and Guidelines. Demonstration of compliance will be a key mitigation measure in a Fire Safety Study (if required).

5.1 AS/NZ 4681-2000 Compliance

This standard specifies the requirements for the storage and handling of Class 9 (miscellaneous) dangerous goods and articles. Li-ion batteries are classified as a Class 9 (miscellaneous) dangerous good. This standard only provides general advice around storage and handling and is not suitable for bulk Li-ion batteries as the sole guiding standard for large facilities like data centres.

The table below provides an assessment of the backup Li-ion batteries stored on Site against AS/NZ 4681-2000.

Table 5-1: AS/NZ 4681-2000 compliance

AS/NZS 4681-2000 Clause	Requirement	Compliance?
Section 3 – Location, design and construction of package stores 3.2 Planning 3.2.2 Separation distances to boundaries and protected spaces	3.2.2.1 General Stores for Class 9 Dangerous shall be separated from protected places and boundaries by at least 3 m.	**Yes** All Li-ion batteries are located inside the building and separated from protected places and boundaries by a distance greater than 3m.
Section 5 – General safety requirements for Class 9 dangerous goods and articles 5.2 Housekeeping requirements for the storage of Class 9 dangerous goods	5.2.1 General The dangerous goods and articles shall not be kept near substances with which they are incompatible. The dangerous goods and articles shall be kept away from sources of heat.	**Compliance achievable** – Back-up Li-ion batteries should be stored in rooms with no other substances and with no sources of heat.

To achieve compliance with this standard the following measures are required to be implemented:

- Back-up Li-ion batteries shall not be kept near substances with which they are incompatible and shall be kept away from sources of heat.
- Back-up Li-ion batteries should be stored in rooms with no other substances and with no sources of heat.

It is also recommended that the following be considered:

- Back-up battery storage areas and the required fire safety measures associated with them should be considered in the overall fire safety strategy by the project fire engineer.

5.2 AS IEC 62619-2023 Compliance

This standard specifies the performance and testing requirements for usage of secondary lithium cells and batteries for industrial applications, including stationary applications. Specifically, it provides guidelines for the testing and evaluation of the performance characteristics of these types of batteries, including their capacity, internal resistance, cycle life, and safety. The standard also includes recommendations for the marking and labelling of batteries, as well as guidelines for their transportation and disposal.

This standard does not provide specific requirements around safe storage, such as separation distances between batteries or other storage guidelines, nor does this standard directly address off-site populations or facilities.

The equipment for the data centre is yet to be procured in future design stages, but compliance is achievable. To achieve compliance with this standard the following measures are required to be implemented:

The Li-ion batteries shall be compliant with AS IEC 62619-2023 where we appropriate.

5.3 AS 1940-2017 Compliance

AS 1940-2017 is applicable to the handling and storage of Class 3 dangerous goods and/or combustible liquids.

The risks associated with the storage and handling of the diesel, a C1 combustible liquid stored on site can be mitigated by compliance with this standard. Relevant clauses have been summarised in the table below (note this is not an exhaustive list of applicable clauses, the relevant designers are responsible for the compliance with their relevant sections this standard).

Due to the small quantity of diesel located in the two fire pump day tanks (100L each), both tanks are deemed minor storage and not included within the assessment below.

Table 5-2: AS 1940 compliance

AS 1940-2017 Clause	Requirement	Compliance?
Section 3 – General Requirements	3.1 Scope of Section This Section provides general requirements and recommendations that apply to stores of flammable or combustible liquids, in quantities greater than those classified as minor storage in Section 2. Additional requirements that are specific to particular types of installation are given in other sections of this Standard. NOTE: Recommendations for blending plants are given in Appendix B. 3.2 General design and construction requirements	**Compliance achievable** – To be determined in later design stages
	3.2.5.5 On-site storage of other dangerous goods The on-site storage of other classes of dangerous goods may require differing separation distances, as specified in the relevant Australian Standards or by legislation, or both. Where no such distances are specified, the storage containing the other dangerous goods should be considered as an on-site protected place and the relevant distance specified in this Standard applied.	**Compliance achievable** – Li-ion batteries (Class 9 dangerous goods) within the data centre on both ground floor and level 1. The location of the backup battery storage will be within designated storage rooms, separated from other dangerous goods. There are no minimum separation distances specified in AS/NZ 4681-2000. As such, the Li-ion battery rooms will be treated as an on-site protected place, requiring minimum separation distances as required by

AS 1940-2017 Clause	Requirement	Compliance?
		Clause 5.7.2. Refer to Clause 5.7.2 for specific requirements.
	3.3 Mechanical Equipment and Installations 3.4 Electrical Installations 3.6 Lighting 3.7 Restricted Usage	**Compliance achievable** – To be determined in later design stages
	3.8 Firewalls and vapour barriers 3.8.1 Conditions of Use Separation distances may be measured in a horizontal plane around the end of any intervening vapour barrier, provided that the barrier complies with the following: (a) For separation from protected places and on-site protected places, such a vapour barrier is also a firewall. (b) Building walls may be treated as being firewalls or vapour barriers provided that they qualify as such. A wall on an adjacent property shall not be used as a firewall unless an agreement similar to that described in Clause 3.2.5.4 is in place. Firewalls and vapour barriers may be used to achieve the separation distances in Tables 4.1, 4.2, 5.3 and 5.4 to protected places, public places and security fences.	**Compliance achievable** – Where firewalls and vapour barriers are used as per Clause 3.8.1 they shall comply with the construction requirements of Clauses 3.8.2 and 3.8.3
	3.9 Security, signs and notices	**Compliance achievable** – to be determined in a later design stage.
Section 5 – Storage in tanks 5.2 General requirements	5.2.1 Design and construction of static storage tanks A static storage tank shall be designed and constructed to comply with AS 1692 or an equivalent Standard for the category of tank appropriate to the application. NOTE: Where the filling pressure, static head or vapour pressure in the ullage space exceeds 35 kPa, the tank plate thickness and end design should be stress-checked in accordance with API Std 620 or Other recognized Standards. A Category 1 tank shall not be used for flammable liquid. NOTES: 1 AS 1692 requires that certain essential information be provided by the purchaser to enable the correct tank to be supplied. 2 In some circumstances it may be necessary to use a pressure vessel that complies with AS 1210.	**Compliance achievable** – To be determined in later design stages. A static storage tank shall be designed and constructed to comply with AS 1692-2006 or an equivalent Standard for the category of tank appropriate to the application. The storage tank proposed is to be a 10m x 2.3m x 2.7m Category 3 tank (as per ASK007).
	5.2.2 Markings Each tank in an installation shall be distinguished from any other tank by individual identification numbers or letters as part of a system for verifying the contents of each tank at any time and shall meet the following criteria: …	**Compliance achievable** – To be determined in later design stages.
	5.2.3 Changes of tank contents Where there is a change of contents, the requirements of this Standard applicable to the new contents apply	**Compliance achievable** – Ongoing operational requirement.

<table>
<tr><th>AS 1940-2017 Clause</th><th>Requirement</th><th>Compliance?</th></tr>
<tr><td></td><td>5.2.4 Pipework</td><td>Compliance achievable – To be determined in later design stages.</td></tr>
<tr><td>5.3 Storage tank fill points</td><td>5.3.1 Fill connection
5.3.2 Location of fill point
5.3.3 Liquid level indication
5.3.4 Filling of elevated tanks</td><td>Compliance achievable – To be determined in later design stages.</td></tr>
<tr><td>5.4 Venting</td><td>5.4.1 General requirements
5.4.2 Vent capacity
5.4.3 Vent piping
5.4.4 Vent outlet location
5.4.5 Vent terminals
5.4.6 Application of pressure-vacuum vents
5.4.7 Setting of pressure-vacuum vents</td><td>Compliance achievable – To be determined in later design stages.</td></tr>
<tr><td>5.7 Separation of above-ground tanks</td><td>5.7.2 Separation distance from tank to protected places, security fences or to on-site protected places
A tank or tanks shall be located so that the following minimum separation distances are maintained:
(a) To security fences and on-site protected places, Table 5.3
TABLE 5.3
SEPARATION DISTANCES FOR TANKS TO SECURITY FENCES AND ON-SITE PROTECTED PLACES
<table>
<tr><th rowspan="2">Separation required from tank to</th><th colspan="3">Minimum distance, m*</th></tr>
<tr><th>Flammable liquid</th><th colspan="2">Combustible liquid</th></tr>
<tr><td></td><td></td><td>C1</td><td>C2</td></tr>
<tr><td>Fill points†, platforms or package storage</td><td>Diameter of the tank or 15 m, whichever is less, but not less than 6 m</td><td>Diameter of the tank or 7.5 m, whichever is less, but at least 3 m</td><td rowspan="3">Unrestricted, determined by the compound</td></tr>
<tr><td>Office buildings, warehouses, manufacturing and processing areas, workshops or amenities blocks on the same premises</td><td>Distance required by Table 5.4, but need not exceed 15 m</td><td>Distance required by Table 5.4 but need not exceed 7.5 m</td></tr>
<tr><td>Security fence‡</td><td>Diameter of the tank or 15 m, whichever is less, but not less than 6 m or the distance obtained from Table 5.4, whichever is the lesser</td><td>Diameter of the tank or 7.5 m, whichever is less, but at least 3 m</td></tr>
</table>
* Refer to the various rules for alternative distances when vapour barriers are used.
† Points for filling packages, drums or tank vehicles and not the fill point into the storage. Where the liquid being transferred and the liquid in the adjacent storage under consideration are of different classes, determine the separation as if both were of the lower flash point of the two.
‡ For distance to boundaries, see Clause 3.2.5.2.
(b) To a protected place beyond the Site boundary, Table 5.4
TABLE 5.4
SEPARATION DISTANCES FOR TANKS TO OFF-SITE PROTECTED PLACES
<table>
<tr><th colspan="4">Maximum capacity of any tank, m³ (kL)</th><th rowspan="3">Minimum distance</th></tr>
<tr><th colspan="2">Flammable liquids</th><th colspan="2">Combustible liquids</th></tr>
<tr><th>PG I, PG II</th><th>PG III</th><th>C1</th><th>C2</th><th>m</th></tr>
<tr><td>0.25</td><td>0.5</td><td>2.5</td><td>5</td><td>Unrestricted</td></tr>
<tr><td>1</td><td>4</td><td>10</td><td>20</td><td>3</td></tr>
<tr><td>2</td><td>8</td><td>20</td><td>40</td><td>4</td></tr>
<tr><td>4</td><td>16</td><td>40</td><td>80</td><td>5</td></tr>
<tr><td>7</td><td>28</td><td>70</td><td>140</td><td>6</td></tr>
<tr><td>10</td><td>40</td><td>100</td><td>200</td><td>7</td></tr>
<tr><td>14</td><td>56</td><td>140</td><td>280</td><td>8</td></tr>
<tr><td>20</td><td>80</td><td>200</td><td>400</td><td>9</td></tr>
<tr><td>26</td><td>104</td><td>260</td><td>520</td><td>10</td></tr>
<tr><td>34</td><td>136</td><td>340</td><td>680</td><td>11</td></tr>
<tr><td>42</td><td>168</td><td>420</td><td>840</td><td>12</td></tr>
<tr><td>52</td><td>208</td><td>520</td><td>1040</td><td>13</td></tr>
<tr><td>64</td><td>256</td><td>640</td><td>1280</td><td>14</td></tr>
<tr><td>77</td><td>306</td><td>770</td><td>≥1540</td><td>15</td></tr>
<tr><td>170</td><td>680</td><td>1700</td><td></td><td>20</td></tr>
<tr><td>310</td><td>1240</td><td>≥3100</td><td></td><td>25</td></tr>
<tr><td>500</td><td>2000</td><td></td><td></td><td>30</td></tr>
<tr><td>750</td><td>≥3000</td><td></td><td></td><td>35</td></tr>
<tr><td>1100</td><td></td><td></td><td></td><td>40</td></tr>
<tr><td>1500</td><td></td><td></td><td></td><td>45</td></tr>
<tr><td>≥2000</td><td></td><td></td><td></td><td>50</td></tr>
</table></td><td>Fill point – N/A
The fill points are intended as fill points for storage and are not considered in the separation distance requirement as per the footnote in Table 5.3
On-site protected places – Compliance achievable
Rooms which contain (Class 9) Li-ion battery storage rooms are treated as an on-site protected place, a minimum separation distance required by Table 5.4 but need not exceed 7.5m.As all rooms that contain Li-ion batteries are located inside the data centre building and the that the building is also considered a protected place, the minimum separation distances required for the building in both Table 5.3 and 5.4 will also satisfy the required separation distance for the Li-ion battery storage rooms.
The separation distance between the diesel tank and building of 4m is required for the critical diesel generator belly tanks, and 3m for the house diesel generator tanks, as specified in Table 5.3 & 5.4
The diesel fire pump tanks have a capacity of <2.5m³ therefore there is an unrestricted minimum distance.
The diesel storage tank has a proposed capacity of 62.1kL. Based on Table 5.4, a minimum separation distance of 6m is required for a C1 combustible liquid between the diesel storage</td></tr>
</table>

AS 1940-2017 Clause	Requirement	Compliance?
		tank and the belly tanks associated with the critical diesel generators. **Off-site protected places – Yes** The diesel storage tank has a proposed capacity of 62.1kL. Based on Table 5.4, a minimum separation distance of 6m is required for a C1 combustible liquid. Any off-site protected places are beyond the site boundary and the security fence. The separation distance from the tanks to the site boundary exceeds 6m. **Security fence – Yes** The separation distance to the security fences is required to be no greater than 7.5m. The separation distance from the tanks to the security fence on the site boundary exceeds 7.5m thereby complying with this requirement.
5.7.6 Horizontal tanks	(a) Horizontal tanks must comply with AS 1692 and the requirements of this Standard. (b) The distance between horizontal tanks shall be at least 600 mm. (c) Tanks shall not be arranged end-to-end unless the potential for end failure and the resulting exposure hazard has been taken into account when determining the tank's location. NOTE: Tanks may be arranged in parallel (side-by-side) in a row.	**Compliance Achievable** The minimum spacing of the belly tanks associated with the generators shall have a separation distance of at least 600mm.
5.8 Bunds and compounds 5.8.1 Requirements	Provision shall be made to contain any leakage or spillage from the tank storage facility and to prevent it from contaminating the surrounding soil or from entering any watercourse or water drainage system. Any above-ground tank shall be installed within a compound, except where the quantity of liquid stored is within that allowable as minor storage in Table 2.1, or where the tank has integral secondary containment complying with Clause 5.9.	**Storage Tank** **Compliance achievable** – To be determined in later design stages. The diesel storage tank bunding shall be compliant with clause 5.8 or the tank shall be compliant with secondary containment requirements of clause 5.9. **Generator tanks** **N/A** Compliance with clause 5.9
5.9 Requirements for Above-Ground Tanks with Integral Secondary Containment	5.9.1 General A tank complying with this Clause (5.9) shall be one of the following: (a) A double-walled tank. (b) A tank having secondary containment and an external, fire-rated covering. (c) A tank with an attached or integrated spillage compound.	**Storage Tank** **Compliance achievable** – To be determined in later design stages. The diesel storage tank bunding shall be compliant with clause 5.8 or the tank shall be compliant with secondary containment requirements of clause 5.9. **Generator tanks** **Yes –** All generator belly tanks are double walled tanks.

AS 1940-2017 Clause	Requirement	Compliance?
	5.9.2 Requirements for all tanks having integral secondary containment. 5.9.3 Additional requirements for double-walled tanks	**Compliance achievable** – To be determined in later design stages.
5.11 Installation methods for above-ground tanks	5.11.1 Foundations 5.11.2 Supporting structures 5.11.3 Tank bearing area	**Compliance achievable** – To be determined in later design stages.
Section 6	Systems for piping, valves, pumps and tank heating	**Compliance achievable** – To be determined in later design stages. Note Clause 6.2.1 The following general design considerations shall be taken into account when designing or installing any piping: … (o) Fire resistance, where piping could be exposed to fire
Section 9	Operational and personnel safety	**Compliance achievable** – Ongoing operational requirement
Section 10	Emergency Management	**Compliance achievable** – Ongoing operational requirement
Section 11 – Fire protection	11.12 Fire protection requirements for above-ground tank storage of aggregate capacity 60m³ to 2000m³ 11.12.4 Class C1 liquid Where Class C1 liquid is stored without flammable liquid but with or without Class 2 liquid, the installation shall be provided with: • A hose reel and foam-making equipment complying with Clause 11.5.3, for use where the water supply is adequate; or • Two powder-type extinguisher plus additional sets of fire extinguishers shall be provided for multiple installations, as required. The maximum travel distance to access a fire extinguisher shall not exceed 15 m.	**Compliance achievable** – to be determined in later design stages. All diesel tanks shall be protected by clause 11.12.4 with two powder-type extinguishers and the maximum travel distance to access a fire extinguisher shall not exceed 15 m.

5.4 AS 3780-2023 Compliance

AS 3780-2023 is applicable to the handling and storage of corrosive substances i.e. substances that meet the Class 8 classification criteria for ADG Code.

The risks associated with the storage and handling of the VRLA batteries, a Class 8 corrosive substance stored on site can be mitigated by compliance with this standard. Relevant clauses have been summarised in the table below (note this is not an exhaustive list of applicable clauses, the relevant designers are responsible for the compliance with their relevant sections this standard).

Operational VRLA batteries are not assessed as part of AS 3780-2023. Therefore, only the storage quantity of VRLA batteries will be considered.

AS 3780-2023 Clause	Requirement	Compliance?
Section 2 – Minor Storage	2.3 Precautions for minor storage The following requirements apply to minor storage:	**Compliance achievable** – Ongoing operational requirement

AS 3780-2023 Clause	Requirement	Compliance?
	a) A supply of water shall be available at a nearby location. b) Ventilation shall be provided for package storage and handling areas to allow work to be carried out without risk to health and safety. c) Packages shall not be kept near incompatible substances or substances with which they will react dangerously. d) Packages shall be kept away from sources of heat. e) Packages shall be kept securely closed when not in use. f) Packages shall be kept so as to avoid spillage. g) Packages shall be kept on surfaces which, in the event of spillage, are resistant to damage by the contents of the packages. h) Spillage-retention measures shall be provided at locations where packages are likely to be opened or their contents transferred. Spillage retention shall be based on the loss of contents of the largest package size. i) The contents of a package shall not be transferred to any other container for storage unless the latter is intended for the storage of the corrosive substance and is clearly marked to indicate the identity and hazard potential of that substance. NOTE I Where the contents of a package have been transferred into another container, and the resultant package is to be used for transportation, refer to the relevant authority for requirements relating to packaging conforming to the ADG Code. j) Personal protective equipment shall be worn by any person involved in product transfer operations, e.g. decanting or filling in accordance with the SDS. k) Any spills or leaks shall be cleaned up immediately and disposed of in accordance with Section 9. l) Wastes shall be disposed of in accordance with Section 11. m) Storage areas shall be secured against unauthorized entry. n) Means shall be implemented to prevent liquids entering drains, sewers and neighbouring lands. NOTE 2 Sections_9and 10 of this document deal with safety matters that may be pertinent to minor storage but which, for the purposes of such, may be regarded as being advisory.	
Section 8	Operational and personnel safety	**Compliance advised**– This section is not required for minor storage, but the principles stated may be applied to achieve a greater measure of safety
Section 9	Emergency management	**Compliance advised** – This section may be regarded as advisory for minor storage
Section 10 – Fire protection	10.3 Fire protection measures Fire protection is an important consideration in storage and handling locations for dangerous goods. Fire protection	**Compliance advised** – This section may be regarded as advisory for minor storage

AS 3780-2023 Clause	Requirement	Compliance?
	requirements for the premises shall be obtained from, and be implemented in conjunction with. the relevant regulatory authorities, including the fire authority. These requirements shall include the following: a) All firefighting equipment and fire-protection systems shall be designed. installed. operated, tested and maintained in accordance with relevant Australian Standards. If a corrosive liquid meets the classification for combustible liquids, the requirements of AS 1940 apply. NOTE 1 Other regulatory requirements exist for firefighting equipment and fire-protection systems b) All firefighting equipment shall be kept readily accessible at all times. c) All firefighting connectors and booster connections shall be compatible with those of the local fire authority. d) Where portable fire extinguishers of the appropriate type, number and capacity are required in any store or handling area for corrosive substances, they shall be installed in accordance with AS 2444. A greater number may be specified by another relevant Australian Standard or the relevant regulatory authority. e) All firefighting media provided in storage and handling areas for corrosive substances shall be compatible with the specific corrosive substances being kept or handled. NOTE 2 Appropriate media for use in mixed dangerous goods stores should be selected in consultation with the fire authority.	
Section 11	Waste storage and disposal	**Compliance achievable** – Ongoing operational requirement

5.5 FM Global Property Loss Prevention Compliance

While current Australian regulations do not adequately address the risks of Li-ion battery systems, guidance from international codes/standards may be followed/considered to address specific risks identified.

The FM Global Property Loss Prevention Data Sheet 5-32 – *Data Centres and Related Facilities* (FMDS 5-32) contains property loss prevention recommendations for data centres and their critical systems and equipment.

It is however noted that first and foremost, the building design must comply with the Australian regulations (NCC BCA) and relevant Australian Standards. Arup does not deem it appropriate to reference an international code for the design and construction of the Proposal in their entirety, particularly within the parameters of this Hazard & Risk report.

Note within the tables below, where reference is made to compliance in accordance to ‘the BCA’, this is in reference to the NCC BCA deemed to satisfy provisions or the performance requirements. Where requirements are not covered by the BCA or FMDS 5-32 requirements are more onerous, the FMDS 5-32 requirements will be considered on a case-by-case basis by the design team in later design stages.

The Proposal is assessed against the recommendations provided in the relevant clauses of Section 2.0 of FMDS 5-32.

Table 5-3: FM Global Property Loss Prevention 5-32 Compliance

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
2.2 Construction and Location 2.2.1 General	2.2.1.1 Construct data centres of non-combustible materials. Plastic materials, including those of fire-retardant composition, can produce large quantities of smoke and should not be used.	**N/A** – The data centre shall be constructed in accordance with the BCA deemed to satisfy provisions or performance requirements (herein referred to as the BCA).
	2.2.1.3.1 Protect data centres from exterior exposure from: • Transformers in accordance with Data Sheet 5-4, Transformers. • Diesel generators in accordance with Data Sheet 5-23, Design and Protection For Emergency and Standby Power Systems. • Diesel fuel tanks and unloading stations in accordance with Data Sheet 7-88, Outdoor Ignitable Liquid Storage Tanks.	**N/A** – There are no transformers proposed on the site. Diesel generators and associated diesel storage are located within the building envelope and shall be fire separated from the from adjoining areas in accordance with the BCA and AS1940:2017.
	2.2.1.5.1 Do not locate data centres in multistorey buildings that have inadequately protected or unprotected areas of the building.	**Compliance achievable** – To be determined in later design stages.
2.2.2 Walls	2.2.2.1 Provide one-hour fire-rated interior walls, partitions, and floors in accordance with Data Sheet 1-21, Fire Resistance of Building Assemblies, for all of the following: • data processing equipment rooms • battery power rooms, uninterruptible power supply (UPS) rooms • network/fibre optic rooms	**Compliance achievable** – To be determined in later design stages. The interior walls, partitions and floors shall be in accordance with the BCA but not less than a one-hour fire rating will be provided.
2.2.5 Ceilings	2.2.5.2 Limit the maximum height of ceilings in data centres to 30ft (9m). (See Section 2.4.4.2.1 and Section 3.3.3.1).)	**Compliance achievable** – To be determined in later design stages.
2.3 Occupancy	This section summarizes typical areas of a data centre and the general protection recommendations that apply to these areas. Guidance is provided for attributes that can impact the effectiveness of fire protection and to identify specifications (e.g., air flow, cable type) that permit that protection option. Recommendations on how to provide specific detection and protection for the various equipment and occupancy areas in a data center are included in Section 2.4, Protection. 2.3.1 General Data Center Areas (Offices, Lobby, Security) 2.3.2 Data Processing Equipment Room 2.3.3 Tape Cartridge Storage Rooms 2.3.4 Storage and Maintenance Areas 2.3.5 Utilities and Support System	**Compliance achievable** – There are a number of design recommendations with respect to fire safety systems that the design team should consider.
2.3.1 General Data Center Areas (Offices, Lobby, Security)	2.3.1.3 Provide fire alarm systems in accordance with Data Sheet 5-40, Fire Alarm Systems.	**N/A** - Fire detection to be installed in accordance with AS 1670.1:2018.

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
2.3.2.7 Li-ion Battery Back-up Units for Distributed Power Systems	2.3.2.7.1 Where Li-ion battery back-up units (BBU) are installed in a server rack as a distributed power system,the recommendations in this section are to be applied if the following conditions exist: Maximum power capacity of 20 kWh per server rack as a distributed power configuration. (Refer to Section 3.2.6 for calculating power capacity.) No more than two shelves containing BBU modules located together in the same area of the rack. Aisle spacing between server rows is a minimum of 4 ft (1.2 m). Ceiling height is a maximum 30 ft (9 m). (Refer to Section 3.3.3.1.) No limitation on the building/room size (area in ft2/m2) 2.3.2.7.2 Server racks with distributed Li-ion battery back-up units (BBU) exceeding the maximum capacity of 20Wh per rack should be considered Energy Storage Systems ESS); and the recommendations identified in Data Sheet 5-33, Lithium-Ion Battery Energy Storage Systems, should be followed. 2.3.2.7.3 Provide vertical barriers in all server rack rows here Li-ion distributed power systems are used or expected to be used, regardless of the power capacity. Provide vertical barriers as follows (see Figure 2.3.2.7.3) 2.3.2.7.4 Provide one of the following automatic protection options throughout all building areas associated with this hazard: FM Approved quick-response (QR) sprinklers in accordance with Data Sheet 2-0, Installation Guidelines for Automatic Sprinklers, and having the following specifications: Minimum density 0.2 gpm/ft2 (8 mm/min). Sprinkler deflector distance from the ceiling (min: 1.75in. [44 mm]; max: 4 in. [100 mm]). For wet, non-interlock or single interlock preaction systems, use a demand area of 2500 ft2 (230 m2) For double interlock preaction systems, use a demand area of 3,500 ft2 (320 m2). Provide a maximum linear spacing of 12 ft (3.6 m) and area spacing of 144 ft2 (13.4 m2), or a reduced spacing and area for clearance from obstructions, in accordance with Data Sheet 2-0, Installation Guidance for Automatic Sprinklers Use FM Approved automatic water mist systems with the following specifications: Approved for protection of non-storage, Hazard Category (HC-2) occupancies. Provided in accordance with Sections 2.4.4.3.2 through 2.4.4.3. 2.3.2.7.5 Provide a water supply duration of 60 minutes. 2.3.2.7.6 Do not use halocarbon or inert gas (clean agent) fire extinguishing systems to provide protection for data processing equipment rooms with distributed Li-ion battery back-up units. (See Section 3.4.1.2.)	**Compliance achievable** – There are a number of design restriction and recommendations with respect to Li-ion Battery Back-up Units for Distributed Power Systems that the design team should consider.

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
2.3.4 Storage and Maintenance Areas	2.3.4.1 Protect storage areas in accordance with Data Sheet 8-9, Storage of Class 1, 2, 3, 4 and Plastic Commodities. 2.3.4.2 Locate new, packaged data processing equipment awaiting installation in storage and staging areas separate from data processing equipment rooms (i.e., where fire involving the storage will not expose critical equipment). 2.3.4.3 Do not store combustible materials in electrical or mechanical equipment rooms	**Compliance achievable** – Ongoing operational requirement.
2.3.5 Utilities and Support Systems	2.3.5.2 Electrical Distribution System 2.3.5.2.6.4 Provide fire detection and protection in accordance with recommendations for fuel storage, fuel piping, and diesel generator protection in Data Sheet 5-23, Design and Protection for Emergency and Standby Power Systems. 2.3.5.2.7 Uninterruptible Power Supply (UPS)	**N/A** – The data centre shall be constructed in accordance with the BCA deemed to satisfy provisions or performance requirements (herein referred to as the BCA).
	2.3.5.3 Heating, Ventilation, and Air Conditioning (HVAC) 2.3.5.4 Power Isolation of Data Processing Equipment and HVAC Systems	**Compliance achievable** – Ongoing operational requirement.
2.4 Protection 2.4.1 General	2.4.1.1 Establish a formal manual power isolation plan in accordance with Section 2.3.5.4 and Section 2.7.3 for all locations regardless of the type of fire protection being provided. Do not use aerosol generator fire extinguishing system units for the protection of the data center, related areas or electronic equipment.	**Compliance achievable** – To be determined in later design stages.
2.4.2 Portable Fire Extinguishers	2.4.2.1 For energized electrical hazards, provide carbon dioxide or clean agent portable fire extinguishers listed to protect electronic equipment in accordance with Data Sheet 4-5, Portable Extinguishers. (See Section 3.3.1.1) A. Use a maximum floor area of 3,000 ft2 (280 m2) for each portable fire extinguisher. B. Use a maximum travel distance of 75 ft (23 m) between each portable fire extinguisher.	**Compliance achievable** – To be determined in later design stages. Fire extinguishers (FE) shall be constructed in accordance with the BCA and AS 2444-2000 FE coverage to consider FMDS 5-32 recommendation.
2.4.3 Detection: Design Specifications	2.4.3.1 Install fire detection per Data Sheet 5-48, Automatic Fire Detection, in conjunction with the following recommendations (2.4.3.2-2.4.3.6) 2.4.3.7 - 2.4.3.12	**Compliance achievable** – To be determined in later design stages. However, the automatic fire detection shall be provided in accordance with AS 1670.1:2018.
2.4.4 Suppression: Design Specifications	2.4.4.2 Automatic Sprinklers Provide automatic sprinkler protection throughout all building areas associated with this hazard as follows: 2.4.4.2.3 Preaction systems. When using a preaction type automatic sprinkler system for a non-interlock single-interlock, or double-interlock system throughout the data centre, provide it in accordance with the following recommendations. Install in accordance with the applicable recommendations for a preaction sprinkler system in	**Compliance achievable -** To be determined in later design stages. However, the automatic sprinkler system shall be installed in accordance with AS2118.1:2017. The building will have both wet systems and pre-action systems.

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
	Data Sheet 2-0, Installation Guidelines for Automatic Sprinklers and in addition to the following: When using a non-interlock or single-interlock preaction sprinkler system arrangement, base the sprinkler demand on a wet system. In a double-interlock configuration, design the sprinkler system based on a dry system. Provide a maximum water delivery delay of 30 seconds to the most remote sprinkler. Provide a sectional valve above the preaction valve in accordance with Item D to allow proper inspection, testing, and maintenance to be conducted in accordance with Data Sheet 2-81, Fire Protection System Inspection, Testing and Maintenance. Activate the preaction valve with smoke detectors and control panel in accordance with Data Sheet 5-48, Automatic Fire Detection, in addition to the following: Provide one of the following VEWFD detection methods in accordance with Section 2.4.3: Air-aspirating smoke detection Intelligent high-sensitivity spot detection If both a preaction sprinkler system and clean agent fire extinguishing system are installed, provide two independent VEWFD smoke detection systems. Provide the fire alarm threshold for the halocarbon or inert gas (clean agent) fire extinguishing system lower than that for the preaction automatic sprinkler system. In a double-interlock preaction system, do not cross-zone detection for activation of the pre-action system valve. Use the initiating signal of only one detector or detection system zone in the protected area with detection at the air return. In data halls with containment panels reaching up to the ceiling level a cross-zoned detection adds another interlock level due to isolation of the smoke. This configuration will lead to a “triple” interlock situation if applied to FM Approved double interlock preaction systems. Annunciate an alert, pre-alarm and alarm condition in a constantly attended location when the VEWFD detection has activated. Provide a local visual and/or audible alarm within the protected area when an alarm condition is activated. Provide an alarm signal to the building fire alarm control panel area when an alarm condition is activated. Arrange the control valve for all preaction types of sprinkler systems to actuate upon: the pre-alarm level or earlier for air-aspirating detection. the pre-alarm for intelligent high-sensitivity spot detection Install an alarm valve for the sprinkler systems protecting the data center equipment room separate from other sprinkler systems. For a sprinkler system with a preaction valve, provide a 2 in. (50 mm) diameter test discharge line located above (downstream from) the preaction sprinkler valve	

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
	assembly (see Figure 2.4.4.2.3.D) for trip testing of the preaction valve. Install a normally closed indicating valve with supervision on the test discharge line. . Install a normally open indicating valve with supervision on the system riser above (downstream from) the intake for the test discharge line. Install the fire alarm control panel for the preaction sprinkler in accordance with the applicable recommendations in Data Sheet 5-40, Fire Alarm Systems. 2.4.4.2.4 Data Processing Equipment Rooms Design the protection for hot/cold aisle containment systems in accordance with Section 2.3.2.4. Design the protection for Li-ion battery back-up units in accordance with Section 2.3.2.7. The protection recommendations included in this section are based upon Li-ion batteries not being present in the data processing equipment room as distributed battery back-up units in server racks or a UPS.	
	2.4.4.3 Water Mist Systems	**N/A**- not proposed.
	2.4.4.4 Halocarbon and Inert Gas (Clean Agent) or Hybrid (Water and Inert Gas) Fire Extinguishing Systems: Design Specifications	**N/A**- not proposed.

6. Work Health and Safety Regulation

Part 7.1 of the WHS Regulation sets out the requirements for the use, handling, and storage of hazardous chemicals at a workplace. Specifically, this report assesses requirements for exceeding manifest and placard quantities found in Division 3 and 4 of Part 7.1, respectively.

Regulation 328(4) sets out the exclusions from Part 7.1 for hazardous chemicals in certain circumstances. Regulation 328(4)(a) excludes “hazardous chemicals in batteries when incorporated in plant”. As such, the use of lithium-ion and VRLA batteries at the facility is considered to be excluded from the requirements of Part 7.1.

It should be noted that Regulation 328(4)(b) excludes “fuel, oils or coolants in a container fitted to a vehicle, vessel, aircraft, mobile plant, appliance or other device, if the fuel, oil or coolant is intended for use in the operation of the device”. This would also exclude diesel stored in tanks with connecting pipework to the generators from the requirements of Part 7.1. However, due to the large total quantity of diesel present at the facility, it is considered best practice to follow the requirements of Part 7.1. Recommendations have therefore been made for the storage of diesel in line with Part 7.1 of the WHS Regulation.

The assessment against the WHS Regulation applies to the total quantity of hazardous chemicals on the Site.

6.1 Placard Quantities

The placard quantity refers to a quantity of hazardous chemicals to be stored on site where exceeded, specific regulations and requirements apply. If the total quantity of a Schedule 11 hazardous chemical or group of Schedule 11 hazardous chemicals used, handled or stored at the workplace exceeds the placard quantity as described in Schedule 11, outer warning placards must be predominantly displayed at the workplace.

Table 6-1 shows the maximum allowable quantity before a placard is required for diesel (Flammable liquids – Category 4) as per Schedule 11 of the WHS Regulation.

Table 6-1: WHS Regulation Schedule 11 Placard quantity

Item	Description of hazardous chemical		Placard quantity	Quantity on Site
5	Flammable liquids	Category 4	10,000L (10kL)	635.9kL

As diesel storage totals 635.9kL, the placard quantity of 10kL is exceeded. Thus, the following is required by the NSW Government:

- An outer warning placard shall be prominently displayed at workplace entrances where emergency services may enter in accordance with Regulation 349. In addition, the placard shall be clearly legible, separate from other signs and otherwise compliant with Schedule 13.f.
- Placards shall be prominently displayed on or near the diesel storage tanks in accordance with Regulation 350. In addition, the placard shall be clearly legible, separate from other signs and otherwise compliant with Schedule 13.

6.2 Manifest Quantities

The manifest quantity refers to a quantity of hazardous chemicals to be stored on site where exceeded, specific regulations and requirements apply.

Table 6-2 shows the maximum allowable quantity before a placard is required for diesel (Flammable liquids – Category 4) as per Schedule 11 of the WHS Regulation.

Table 6-2: WHS Regulation Schedule 11 Manifest quantity

Item	Description of hazardous chemical		Manifest quantity	Quantity on Site
5	Flammable liquids	Category 4	100,000L (100kL)	635.9kL

The diesel storage totals 635.9kL across the entire site, exceeding the manifest quantities of 100kL prescribed in Schedule 11.

As such, the following is required by the NSW Government:

- A manifest of the hazardous chemicals referenced in Schedule 11 shall be prepared in accordance with Regulation 347 and Schedule 12 of the WHS Regulation.
- SafeWork NSW shall be notified of diesel exceeding manifest quantities in accordance with Regulation 348 of the WHS Regulation.
- An emergency plan shall be prepared for the site and provided to Fire and Rescue NSW as per the requirements of Regulation 361 and Division 4 of Part 3.2 of the WHS Regulation.

7. Protection of the Environment Operations Act

The Protection of the Environment Operations Act 1997 (POEO Act 1997) sets out the scheduled activities for which a licence is required. Figure 7-1 below shows the threshold criteria for chemical storage and petroleum products storage to be declared a scheduled activity and therefore requiring a licence.

Figure 7-1 Criteria for chemical storage under the POEO Act 1997, Schedule 1 Part 1-9 Chemical Storage

Activity	Criteria
General chemicals storage	Capacity to store more than: 20t (pressurised gases) 200t (liquefied gases) or 2000t (chemicals in any other form)
Petroleum products storage	Capacity to store more than: 200t (liquefied gases) or 2000t (chemicals in any other form)

General chemical storage is defined to include all chemical substances classified as dangerous goods by the *Transport of Dangerous Goods Code.* Refer to Table 7-1 for total on-site chemical and petroleum product storage.

Table 7-1: Total on-site general chemical and petroleum product storage

Chemical	Quantity (tonnes)
General chemicals storage	
Class 8 (VRLA batteries)	12t
Class 9 (Lithium-ion batteries)	210t
Total general chemicals storage	**222t**
Petroleum products storage	
C1 (diesel)	529t
Total petroleum products storage	**529t**

The aggregate storage quantity of both Li-ion and VRLA batteries for the site is below the 2000t allowance for chemicals in any other form. The diesel storage quantity is below the 2000t allowance for petroleum products storage.

As such, an environmental protection license will not be required as per the requirements of section 48 and Schedule 1 Part 9 of the POEO Act.

8. Findings and Recommendations

8.1 Resilience and Hazards SEPP Screening

The Resilience and Hazards SEPP screening in Section 4 outlines that neither the storage quantities nor transportation thresholds are exceeded for the dangerous goods on-site. It has been determined that the facility is not deemed “potentially hazardous” per the Resilience and Hazards SEPP and a PHA is not required.

8.2 SEARs Requirements

Overall, the current design is capable of achieving compliance with standards and guidelines outlined in the Hazards and Risk SEARs, as identified in section 3.1. An initial review of the current SSDA stage design is undertaken in section 5. A compliance review of the current design are outlined in each of the tables in sections 5.1 to 5.5, compliance is achievable subject to the implantation of the findings in the review.

It is noted that at this stage of the project there are a number of elements of the design that have not yet been finalised, as such this does not constitute a comprehensive review of compliance against the Australian Standards and other guidelines outlined in the SEARs. Compliance will need to be determined as the design progresses. Arup recommend compliance to the relevant clauses of these standards and guidelines be verified prior to commencement of construction.

8.3 Other Legislative Requirements

In accordance with the legislative requirements for the WHS Regulation 2017, the quantity of diesel is in excess of both the manifest and placard quantity, and the following recommendations are made.

- An outer warning placard shall be prominently displayed at workplace entrances where emergency services may enter in accordance with Regulation 349. The placard shall be clearly legible, separate from other signs and otherwise compliant with Schedule 13.
- Placards shall be prominently displayed on or near the diesel storage tanks in accordance with Regulation 350. The placards shall be clearly legible, separate from other signs and otherwise compliant with Schedule 13.
- A manifest of all Schedule 11 chemicals shall be prepared in accordance with Regulation 347 and Schedule 12 of the WHS Regulation.
- SafeWork NSW shall be notified of diesel storage exceeding manifest quantities in accordance with Regulation 348 of the WHS Regulation.
- An emergency plan shall be prepared for the Site and provided to Fire and Rescue NSW as per the requirements of Regulation 361 and Division 4 of Part 3.2 of the WHS Regulation.

The POEO Act 1997 describes the requirements whereby an environmental protection license is required, where this is relevant to the diesel quantity stored on-site. The combined diesel storage quantity for the Site falls below the 2000t of chemical and petroleum product storage requirement, thus an environmental protection license is not required for chemical and petroleum product storage.

9. References

[1] NSW Government, *Chapter 3 of SEPP (Resilience and Hazards)*, 2021.

[2] *Applying SEPP33*, NSW Government, 2011.

[3] N. Government, "Hazardous Industry Planning Advisory Paper No. 6," 2011.

[4] NSW Government, *Multi-level Risk Assessment*, 2011.

[5] *Work Health and Safety Regulation*, 2011.

[6] NSW Government, *Protection of Environment Operations Act*, 1997.

[7] Standards Australia, *AS 1940-2017: The storage and handling of flammable and combustible liquids.*, 2017.

[8] Standards Australia, *AS/NZS 4681-2000: Storage and handling of Class 9 (miscellaneous dangerous goods and articles)*, 2000.

[9] Standards Australia, *AS 3780-2023: The Storage and Handling of Corrosive Substances*, 2023.

[10] Standards Australia, *AS IEC 62619-2017: Secondary Cells and Batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications;*, 2017.

[11] FM Global, *Property Loss Prevention Data Sheet 5-32 - Data Centres and Related Facilities*, 2023.