ARUP

NEXTDC

NEXTDC S5 Data Centre

Hazards & Risk Report

Reference: S5-HAZ-00-000-REP-H-DVA-APP-HAZ REPORT

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Job number 296866-13

Arup Austrlia Pty Ltd | ABN 76 625 912 665

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

ARUP

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		Name	Linda Wang, Haydn Buckland & Jaime Cabello Coloma	Lizzie Sieverts	Ben Smith
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		Name	Linda Wang, Haydn Buckland	Lizzie Sieverts	Ben Smith
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		Name	Anna Weekes	Lizzie Sieverts	Lizzie Sieverts
		Signature			
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		Name	Alexandra Cleary	Syed Fahad	Norman Ishak
		Signature			
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		Name	Alexandra Cleary	Anna Weekes	Ken Ma
		Signature			

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Executive Summary

This Hazards & Risk report has been prepared by Arup on behalf of NEXTDC Limited to accompany a detailed State Significant Development Application (SSDA) for the data centre development at 269 Lane Cove Road, Macquarie Park. The legal description of the site is Lot 3 in Deposited Plan (DP) 1129811.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) issued on 8 November 2023 for the project (SSD-63168959). 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	• Details regarding the location and number of any back-up generators, back-up fuel storage tanks and lithium-ion or other battery chemistries (with details of peak discharge rate in MW) to be installed to service the development	Section 2.4
	• A preliminary risk screening completed in accordance with *State Environmental Planning Policy (Resilience and Hazards) 2021* and *Applying SEPP 33* (DoP, 2011), that includes: o a clear indication of class, storage and handling quantities and location of all dangerous goods and hazardous materials associated with the development	Section 3
	• A Preliminary Hazard Analysis (PHA) prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011), should the preliminary risk screening indicate that the project is "potentially hazardous"	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 5.4
	• 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 5.3, Section 5.1 & Section 5.2

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

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.

Other 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. Key mitigation measures to be incorporated into the design are outlined at the end

of each of 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 Findings

Recommendations have been provided to mitigate the risks associated with the gaseous fire suppression stores (Section 5.5) and nitrogen generator and nitrogen within the pre-action sprinkler system (Section 2.4.5).

Other Legislative Requirements

In accordance with the legislative requirements for the WHS Regulation 2017, the quantity of diesel and pressurised gas exceed the manifest and placard quantity thresholds, resulting in the following requirements:

- 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 fire suppression system gas cylinder storeroom 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 pressurised gas 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.

Glossary

Abbreviation	Meaning
AS	Australian Standard
BYDA	Before You Dig Australia
DG	Dangerous Good
DoP	Department of Planning (superseded by Department of Planning and Environment)
FRL	Fire Resistance Level
GFA	Gross Floor Area
IEC	International Electrotechnical Commission
LGA	Local Government Area
kg	Kilogram
kL	Kilolitres
kPa	Kilopascal
MCX	Mission Critical Office
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

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1. Introduction

1.1 Purpose

This Hazards & Risk report has been prepared to accompany a detailed SSDA for the proposed data centre development at 269 Lane Cove Road, Macquarie Park (SSD-63168959).

The application seeks consent for construction and operation of a data centre development and includes site preparation works, bulk earthworks and infrastructure, and construction of the buildings, ancillary facilities, and associated site works. The application also includes the delivery of two internal roads and an urban plaza adjacent to the Macquarie Park Metro Station entrance.

1.2 SEARs Requirements

This report has been prepared in response to the requirements contained within the Secretary's Environmental Assessment Requirements (SEARs) dated 8 November 2023 issued for the SSDA (SSD-63168959). Specifically, this report has been prepared to respond to the Hazards and Risks SEARS requirement, refer Table 1.

Table 1: SEARs compliance

Item	Description of Requirement	Section reference (this report)
Hazards and Risk	• Details regarding the location and number of any back-up generators, back-up fuel storage tanks and lithium-ion or other battery chemistries (with details of peak discharge rate in MW) to be installed to service the development	Section 2.4
	• A preliminary risk screening completed in accordance with *State Environmental Planning Policy (Resilience and Hazards) 2021* and *Applying SEPP 33* (DoP, 2011), that includes: o a clear indication of class, storage and handling quantities and location of all dangerous goods and hazardous materials associated with the development	Section 3
	• A Preliminary Hazard Analysis (PHA) prepared in accordance with Hazardous Industry Planning Advisory Paper No. 6 – Guidelines for Hazard Analysis (DoP, 2011) and Multi-Level Risk Assessment (DoP, 2011), should the preliminary risk screening indicate that the project is "potentially hazardous"	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 5.4
	• 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 5.3, Section 5.1 & Section 5.2

1.3 Stakeholder Engagement

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

1.4 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 a number of 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).

2. Proposal Overview

2.1 Site Context

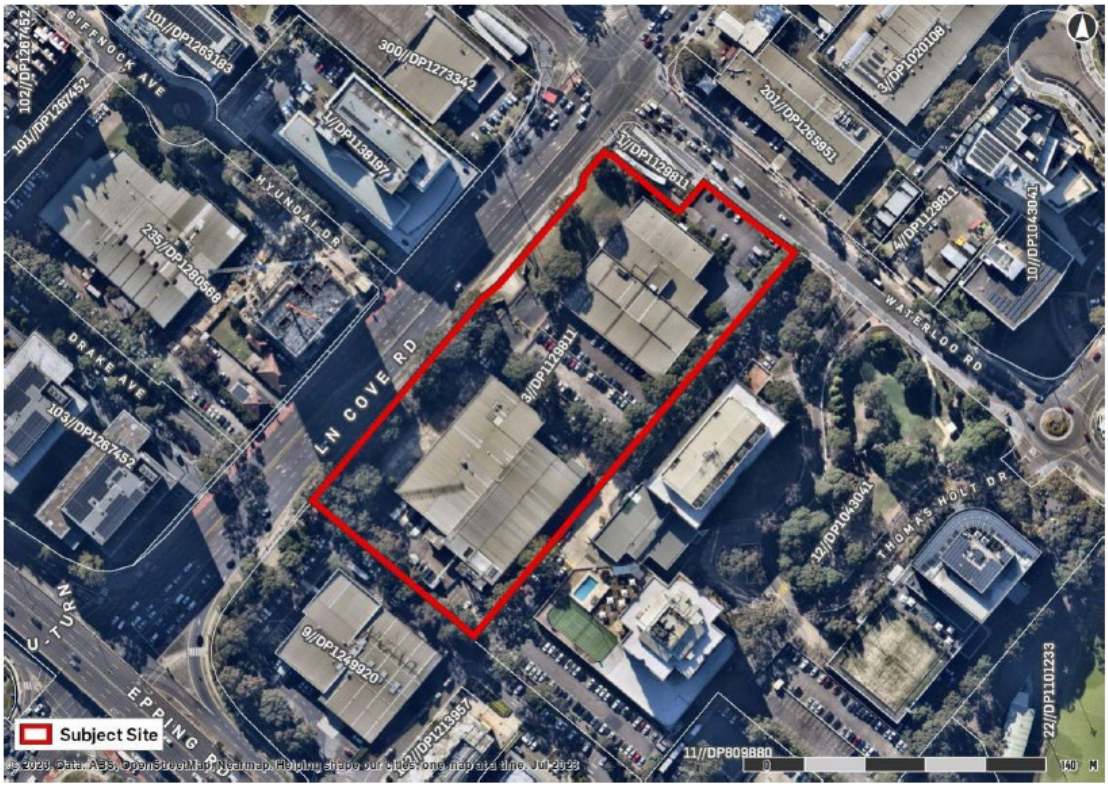
The site is located at 269 Lane Cove Road, Macquarie Park and is legally described as Lot 3 in Deposited Plan (DP) 1129811. It is located on the corner of Lane Cove Road and Waterloo Road and is made up of a single rectangular lot that is approximately 22,381m² in size. An aerial photograph of the site is provided at Figure 1.

The site is located in the City of Ryde Local Government Area (LGA) within the Macquarie Park corridor, an established employment precinct with a particular focus on innovation. Macquarie Park is a nationally significant research and employment centre and includes the head offices for some of Australia's leading companies including Foxtel, Optus and Siemens. The site is approximately 2km southeast of Macquarie University, and 1.5km southeast of Macquarie Shopping Centre.

Existing development includes a two-storey office furniture store (Work Arena) at the northern end of the site and offices and studios associated with Foxtel in the southern portion of the site. Scattered trees exist along the site boundaries, particularly within the western setback to Lane Cove Road, along the southern boundary and the eastern boundary.

Vehicle access to the site is currently provided from Waterloo Road with an internal driveway providing access to several at-grade parking areas. A further vehicle crossover has been constructed along the Lane Cove Road frontage; however, it is not currently in use and barriers have been installed prohibiting access.

The site is well serviced by public transport with several bus routes operating along Lane Cove Road and Waterloo Road. The entrance to Macquarie Park Metro Station is immediately to the north of the site. The site includes a lengthy frontage to Lane Cove Road which provides access to the M2 Hills Motorway and Epping Road.



Source: Urbis GIS 2023

Figure 1: Aerial photograph of site

2.2 Pipelines

A Before You Dig Australia (BYDA) enquiry was conducted on 20 December 2023 to determine if the development is adjacent to or on land in a pipeline corridor. The enquiry found gas mains underneath Lane Cove Rd and Waterloo Rd as shown in Figure 2. There are no licensed pipelines in the vicinity of the site, therefore, no consultation or hazard analysis is required.

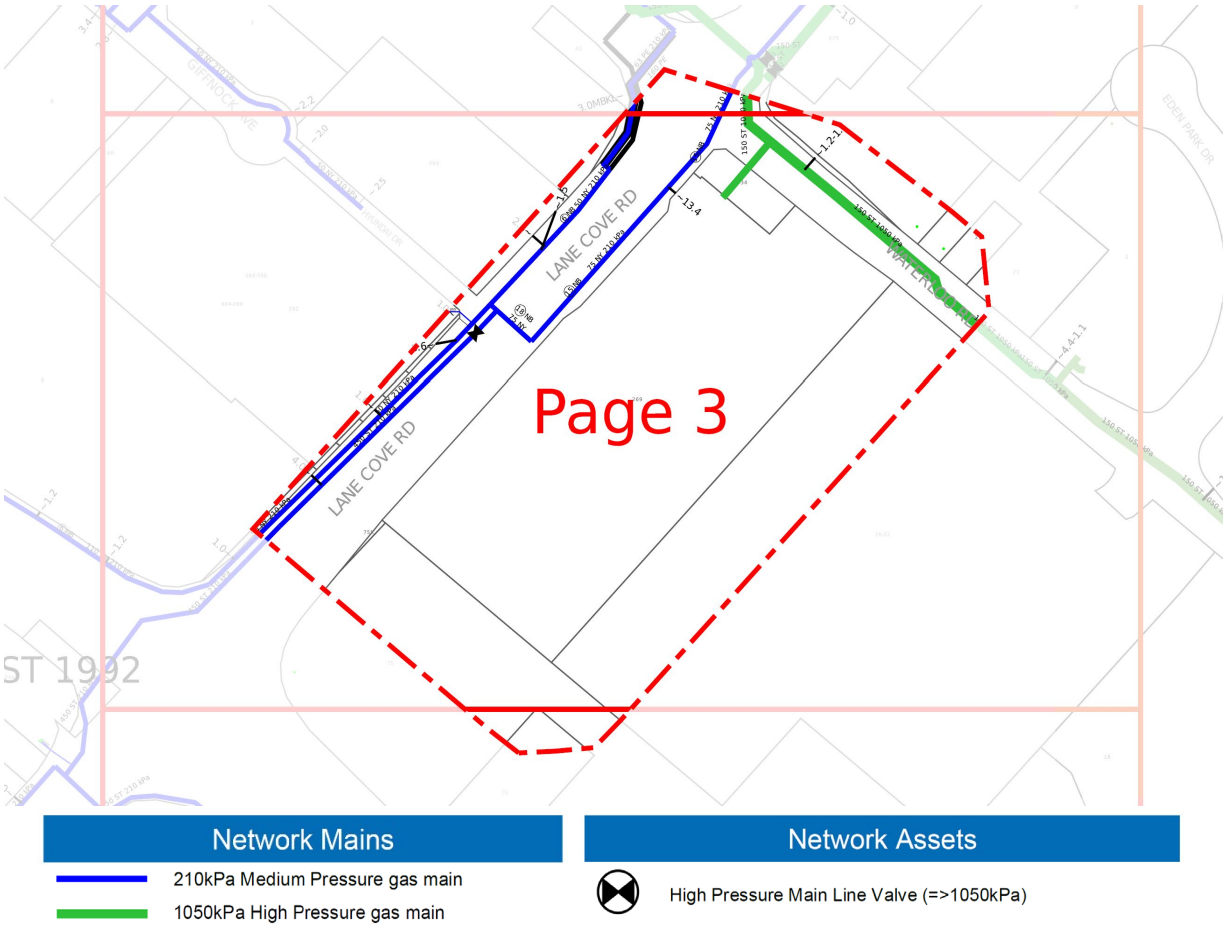


Figure 2: BYDA enquiry map for 210 kPa and 1050 kPa gas mains in the vicinity of the proposed site

2.3 Project Details

Specifically, the Project comprises the redevelopment of the site as summarised below:

- Site preparation works including demolition and removal of existing structures, tree removal and bulk earthworks.
- Staged construction and operation of two connected data centre buildings (Building A and Building B) with a maximum height of 65 metres and a combined total gross floor area (GFA) of 47,285m^2 comprising 33,142m^2 of technical data hall floor space and 14,143m^2 of office, retail and innovation hub floor space.
- Building A will be delivered in Stage 1 and will comprise the following:
    - Basement parking for 51 car spaces including two accessible spaces and 10 EV spaces
    - Seven storeys of technical data floor space accommodating seven data houses: 16,571m^2
    - Utilities including diesel generators (3MWe), above-ground water tanks for industrial water (600kL each), above-ground diesel storage tanks (100kL each) and an aboveground water tank for fire water (400kL each).
    - Business identification signage facing Waterloo Road and Land Cove Road.
    - Integrated 'Building O' component within Building A, comprising:
        - Two retail tenancies at ground level: 326m^2
        - Lobby and innovation hub including auditorium and training rooms: 3,186m^2
        - NEXTDC and ancillary office floor space on upper levels: 10,631m^2
- Building B will be delivered in Stage 2 and will comprise the following:
    - Seven storeys of technical data floor space accommodating seven data halls: 16,571m^2
    - Utilities including diesel generators (3MWe), above-ground water tanks for industrial water (600kL each), above-ground diesel storage tanks (100kL each) and an aboveground water tank for fire water (400kL each).
    - Business identification signage on the western and southern building facades.
- Landscaping across the site in accordance with the project staging, delivering a mix of native and endemic plant species, shrubs and grasses, including 139 additional trees within a total area of 4,959m^2 deep soil and a resultant tree canopy cover of 5,707m^2
- Staged delivery of public domain works including:
    - Stage 1: construction of Road 13 within the subject site and urban plaza.
    - Stage 2: construction of Road 6 (half-width) within the subject site, including provision for a future pedestrian/cycle overbridge (to be delivered by others), and works along Lane Cove Road.
- Delivery of 90 megawatts of power with a 33kV switching station on site, as well as other site services, including stormwater infrastructure.

The key components of the Project are listed in the following table.

Table 2: Project details

Project Area	The site has a total area of approximately 22,381m^2. The entire site area will be disturbed as a result of the Project. The site does not contain any environmental constraints.
Proposed Use	Data centre with ancillary office and innovation space. Two retail premises at ground level.
Project Description	• Demolition of existing buildings and structures. • Site preparation works including tree removal, bulk earthworks, excavation and construction of retaining walls. • Staged construction of the data centre buildings including technical data hall floor space, ancillary office and innovation space and two ground floor retail premises. • Vehicle access via Waterloo Road with on-site car parking and loading within the building footprint. • Associated landscaping including extensive trees, shrubs and grasses. • Business identification signage. • Staged delivery of public domain works via a Planning Agreement, including construction of Road 13, Road 6 and an urban plaza between Building A and Waterloo Road. • Provision of required utilities, including an on-site switching station.
Gross Floor Area	Total GFA of 47,285m^2, broken down as follows: • Data halls/technical: 33,142m2 • Lobby and innovation hub: 3,186m2 • Office Building: 10,631m2 • Retail including BOH: 326m2 • Total number of data houses: 14 data houses
Building Height	• Building A: office and innovation hub – 49 metres over 10-storeys • Building A: data centre – 65 metres over nine-storeys • Building B: data centre – 60 metres over nine-storeys
Proposed Floor Space Ratio	2.11:1
Deep Soil Area	4,959m^2 of deep soil area (22.16% of total site area, 35.6% of future site area)
Car Parking	51 parking spaces, including 10 EV's and 2 accessible spaces
Motorbike Spaces	17 spaces
Bicycle Spaces	20 spaces
Utilities	• Provision of required utilities, combined for both buildings, including:

	• 48 x diesel generators (3MWe). • 16 x above-ground diesel storage tanks (100kL each). • Eight above-ground water tanks for industrial water (600kL each). • One 400kL above-ground water tank for fire water. • 33kV switching station.
Power Consumption	90MW
Operations and Management	The facility will be constructed and operated by NEXTDC. The site will be operated on a 24-hour, 7 day a week basis.
Existing Services and Infrastructure	The site is fully serviced; however, existing services and infrastructure will be extended, adapted and augmented to meet the demands of the Project. A new 33kV switching station will be required to provide power to the site in the event of an emergency blackout to facilitate power to the generators.
Staging/Phasing	The Project will be constructed in two stages: • Stage 1 will include the early works for the entire site, construction of Building A, the urban plaza and Road 13 within the subject site. • Stage 2 will include construction of Building B and Road 6 (half-width) within the subject site, including provision for a future pedestrian/cycle overbridge (to be delivered by others), and works along Lane Cove Road.

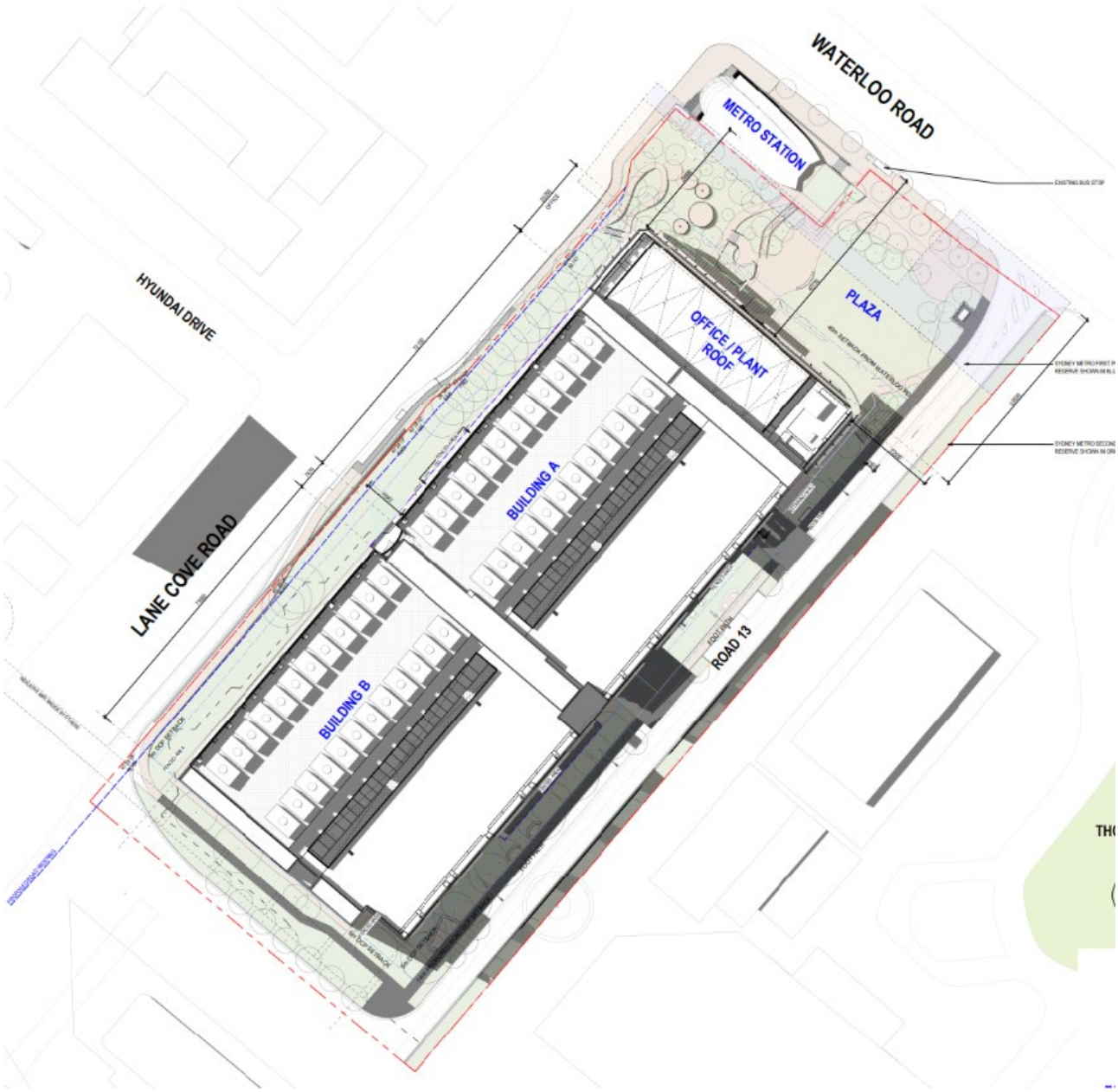


Figure 3: Overall proposed site plan

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 1.2). This section also provides an overview of the Class 2.2 gases stored on the site.

The site is proposed to contain the following:

- 48 x diesel generators;
- 576 x Li-ion battery cabinets;
- 16 x diesel storage tanks;
- Fire suppression system containing IG-541 gas; and
- Pre-action sprinkler system containing nitrogen gas.

The inclusion of hazardous materials is to be incorporated into the fire safety study (currently being prepared by Core Fire Engineering), and the overall fire safety strategy by the project fire engineer.

2.4.1 Diesel Generators

There are 48 diesel generators and an associated 48 x 1kL diesel day tanks proposed in total across the two buildings (refer to Figure 4). The breakdown of the diesel generator arrangement is as follows:

- 48 x 1kL diesel day tanks per generator, totalling 48kL across the two buildings.

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.

In order 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.

2.4.2 Li-ion Batteries

There are 576 Li-ion battery cabinets proposed in total across the two buildings (refer to Figure 3). The breakdown of the Li-ion battery arrangement is as follows:

Table 3: Li-ion battery distribution

Area	Description	Cabinets Qty.	Cabinet Weight (kg)	Total Weight (kg)	Total Weight (t)
Building A					
Electrical Room – 1 string	4 Li-ion battery cabinets for each 1MW UPS, total 3x 1MW UPS in each electrical room	12	900	10800	10.8
Typical level	4 electrical rooms on each level	48	900	43200	43.2
All levels (3 to 8)	Electrical rooms are on levels 3 to 8	288	900	259200	259.2
Building B	Typical to Building A	288	900	259200	259.2
Total on site		**576**	**1800**	**518400**	**518.4**

- Each Li-ion battery has a peak discharge rate of 1MW.

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 5.4.

Figure 4: Typical arrangement of diesel generators and Li-ion batteries for levels 04-05 (Building A & B) – gens = pink highlight, LIBs = green highlight

2.4.3 Diesel Storage Tanks

There are 16 diesel storage tanks proposed in total (refer to Figure 5).

The breakdown of the diesel storage tank arrangement is as follows:

- Diesel storage tanks consist of above ground single skin tanks located in bunded/fire rated fuel tank rooms (8 x diesel storage tanks in each room) on the ground floor;
- 16 x diesel storage tanks located across 2 x diesel tank rooms on ground floor;
- Each diesel storage tank has a capacity of 100kL totalling 1600kL within the storage tanks;
- A total of 1648kL of diesel is stored on site in total including the 48 x 1kL day tanks associated with each generator.

Figure 5: Level 00 arrangement of diesel storage tanks in tank rooms

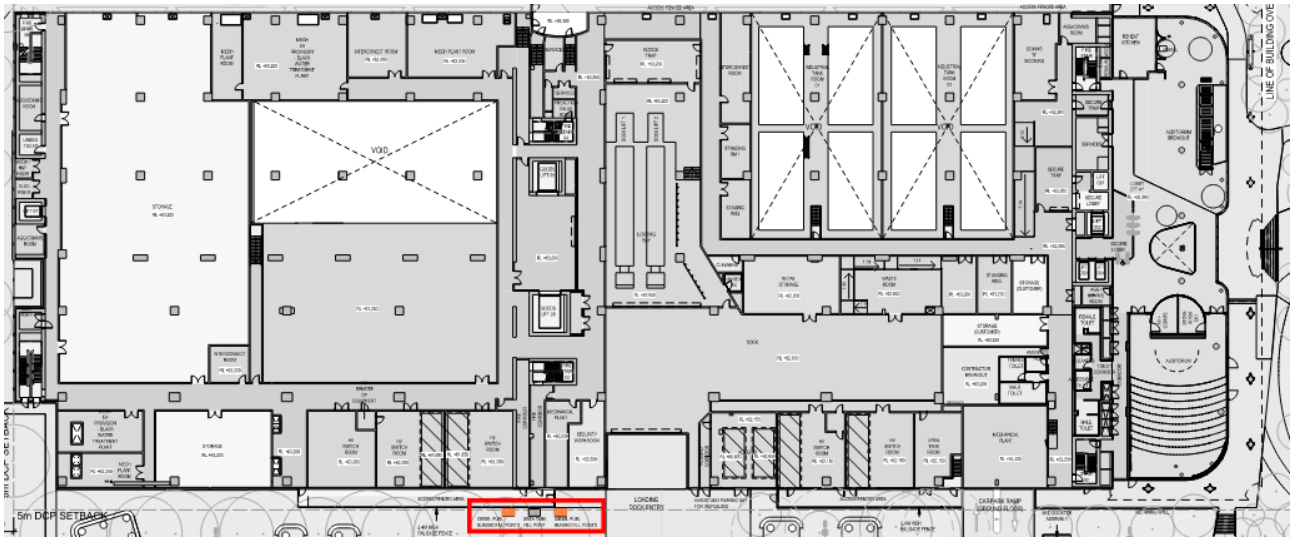


Figure 6: Level 01 arrangement of diesel fill points

2.4.4 Fire Suppression System

The proposed fire suppression system uses IG-541, an inert gas mixture of 52% nitrogen, 40% argon and 8% carbon dioxide. The storage of IG-541 on the site is as follows:

- 2 x gas storage rooms proposed (2 x in Building A on level 2) as highlighted in Figure 7;
- 440 x cylinders storing IG-541 gas (220 in each room);
- Cylinder part number is IG71-080-300-541 with a pressurisation level of 300 bar at 15.6 °C and agent capacity of 23.1m³ (33.2kg);
- 10,164kL of IG-541 gas stored in total on site as per IG71-080-300-541 specifications.

Figure 7: Building A level 02 arrangement of IG-541 gas storage rooms

The risk assessment identified that the risk of asphyxiation is credible in the cylinder stores due to the nature of the cylinders stored, size of stores. In order to mitigate this risk SFAIRP consideration of potential controls have been reviewed in Section 5.5.

2.4.5 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 6,500L of piping;
- Approximately 6,370L of nitrogen to be stored in the sprinkler pipes;
- 4x nitrogen cabinets and 4 x air compressors are to be located in a dedicated generator room on the ground floor.
- 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:

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

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;
- Applying SEPP 33;
- Part 7.1 of the Work Health and Safety Regulation 2017;
- Protection of Environment Operations Act 1997;
- AS 1940-2017: The storage and handling of flammable and combustible liquids;
- AS/NZS 4681-2000: The storage and handling of Class 9 (miscellaneous) dangerous goods and articles;
- AS IEC 62619-2023: Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for secondary lithium cells and batteries, for use in industrial applications; and
- FM Global Property Loss Prevention Data Sheet 5-32 – Data Centres and Related Facilities.

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) remains 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 described in Section 2.1. The following dangerous goods (DG) are proposed to be stored within the site. Note, in accordance with the Australian Dangerous Goods Code, diesel is not classified as a DG for transport but is a C1 combustible liquid.

Table 4: Quantities of dangerous goods stored within the site

Substance	UN Number	DG Class	Quantity
Li-ion batteries	3480/3481	9	518,400kg
Diesel	1202	N/A	1,648kL

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 is shown in Figure 8 below.

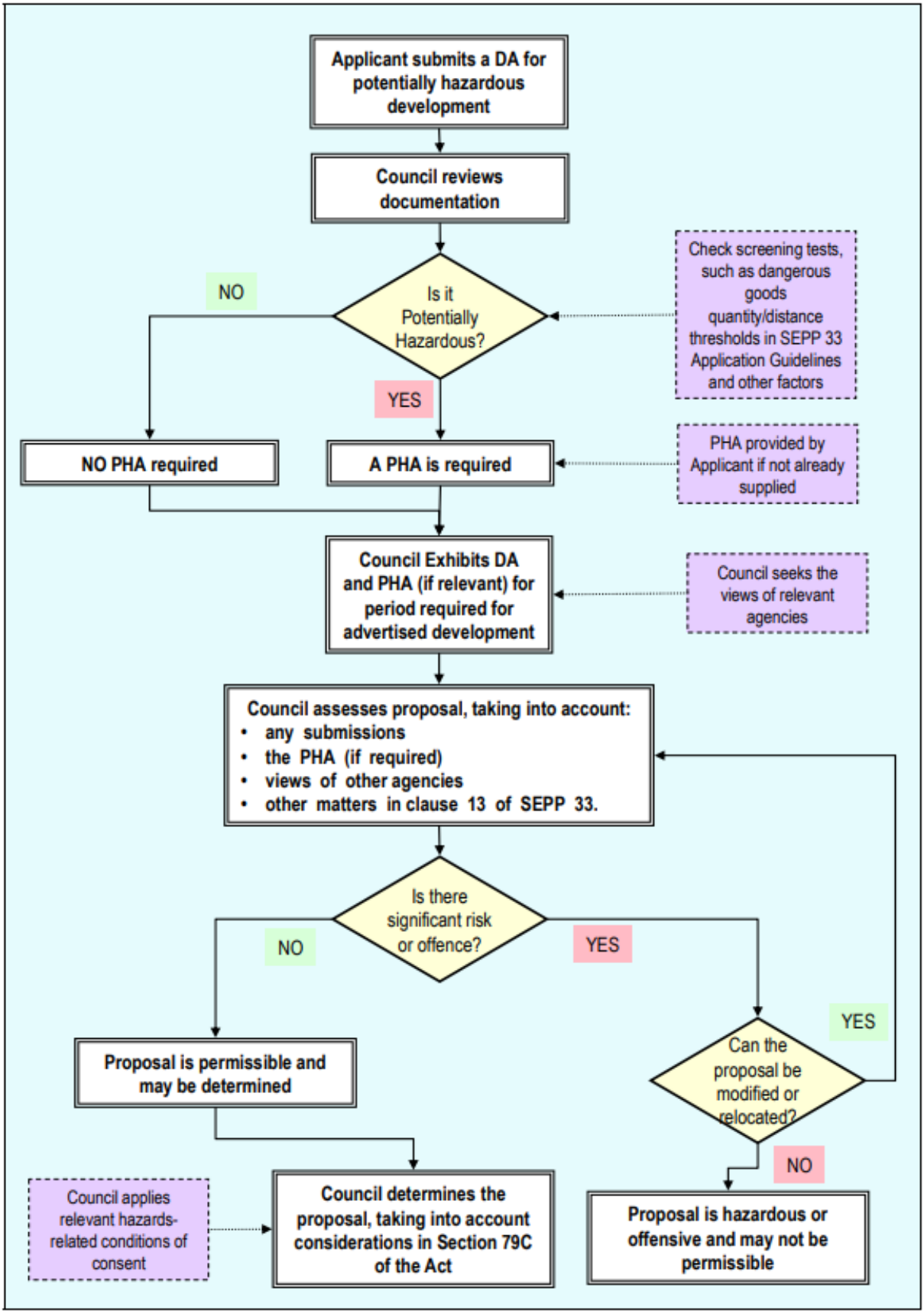


Figure 8: Diagram illustrating the Applying SEPP 33 process

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

As Class 9 dangerous goods, Class 2.2 non-flammable, non-toxic gases and C1 & C2 combustible liquids are excluded, no storage screening is required.

4.2 Resilience and Hazards SEPP Screening: Transportation Threshold

Another component of the SEPP screening covers the transportation of goods within the facility, citing movement thresholds for dangerous goods. The SEPP screening for transportation only considers the movement of Li-ion batteries. The movement threshold for Li-ion batteries is outlined below, in Table 5.

The movement of Li-ion batteries is only expected during the commissioning stage with no movement of Li-ion batteries expected during operation.

During the commission stage, the peak movement of Li-ion batteries is expected to be 5 times per week.

Table 5: SEPP transport screening threshold

Substance	DG Class	Peak Weekly Movements Expected	Weekly Movements Threshold	Threshold Exceeded
Li-ion batteries	9	5	>60	No

As shown in the table, the transportation thresholds 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 Materials

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 6: 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. (ref. S5-CO-01-000-3002)
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.

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).

Table 7: AS 1940:2017 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) are located on levels 2 to 8. The location of the backup battery storage will be determined at later design stages. 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 Clause 5.7.2. Refer to Clause 5.7.2 for specific requirements.
	3.3 Mechanical Equipment and Installations 3.4 Electrical Installations	**Compliance achievable** – To be determined in later design stages

AS 1940:2017 Clause	Requirement	Compliance?
	3.6 Lighting 3.7 Restricted Usage	
	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 tanks are proposed to be 8.5m x 3.8m x 3.8m Category 3 tanks, of mild steel construction, (information provided by the design team).
	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.
	5.2.4 Pipework	**Compliance achievable** – To be determined in later design stages.
5.3 Storage tank fill points	5.3.1 Fill connection 5.3.2 Location of fill point …	**Compliance achievable** – To be determined in later design stages. Where practicable, the fill point for any tank containing a combustible

AS 1940:2017 Clause	Requirement	Compliance?
	(d) Where practicable, the fill point for any tank containing a combustible liquid shall be outside. If it is inside, it shall be not more than 2 m from a building entrance useable by a tank vehicle, and shall not be in a boiler room, furnace room, or an elevated temperature area. NOTE: Fill points located inside a building should not be operated unless the building has sufficient alternative access and egress points to ensure the safe evacuation of personnel in an emergency. … 5.3.3 Liquid level indication 5.3.4 Filling of elevated tanks	liquid shall be outside. If it is inside, it shall be not more than 2 m from a building entrance useable by a tank vehicle, and shall not be in a boiler room, furnace room, or an elevated temperature area. NOTE: Fill points located inside a building should not be operated unless the building has sufficient alternative access and egress points to ensure the safe evacuation of personnel in an emergency.
5.4 Venting	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	**Compliance achievable** – To be determined in later design stages.
5.6 Location and Capacity of Indoor Tanks	5.6.3 Class C1 liquids 5.6.3.1 Tanks having a capacity of 1000L or less Tanks having a capacity of 1000 L or less may be installed anywhere within the building, provided that— (a) such tanks are not interconnected; (b) provision is made to contain the spread of any small leak or spill; and (c) such tanks are separated from each other, and from any other tanks, by at least 3 m.	**Compliance achievable** – To be determined in later design stages. The day tanks located in the generator rooms on levels 03-08 have a capacity of 1000L, each shall comply with Clause 5.6.3.1. Each generator room contains a single generator and day tank, and each room is separated by a distance of greater than 3m.
	5.6.3.2 Tanks having a capacity of greater than 1000L Any tank having a capacity greater than 1000 L capacity shall be— (a) a double-wall tank buried in accordance with Clause 5.12; or (b) installed on or below the lowest floor level of a building, in a tank chamber in accordance with Clause 5.13; or (c) a tank having integral secondary containment with an FRL of 240/240/240 and complying with Clause 5.9. Any such tank shall be installed on or below the lowest floor of the building.	**Compliance achievable** – The single skin diesel storage tanks will be installed on, level 00 in Building B. Secondary containment shall be provided by the tank rooms having an FRL of 240/240/240 and complying with the provisions of clause 5.9.
5.7 Separation of above-ground tanks	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	**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**

<table>
<tr><th>AS 1940:2017 Clause</th><th>Requirement</th><th>Compliance?</th></tr>
<tr><td></td><td>

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><th></th><th></th><th>C1</th><th>C2</th></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

Maximum capacity of any tank, m³ (kL)				Minimum distance
Flammable liquids		Combustible liquids		
PG I, PG II	PG III	C1	C2	m
0.25	0.5	2.5	5	Unrestricted
1	4	10	20	3
2	8	20	40	4
4	16	40	80	5
7	28	70	140	6
10	40	100	200	7
14	56	140	280	8
20	80	200	400	9
26	104	260	520	10
34	136	340	680	11
42	168	420	840	12
52	208	520	1040	13
64	256	640	1280	14
77	306	770	≥1540	15
170	680	1700		20
310	1240	≥3100		25
500	2000			30
750	≥3000			35
1100				40
1500				45
≥2000				50

</td><td>Rooms which contain (Class 9) Li-ion battery rooms are treated as an on-site protected place, a minimum separation distance required by Table 5.4 but need not exceed 7.5m. This can be achieved by measuring around a firewalls and vapour barrier as permitted in Clause 3.8.

The diesel storage tanks, on level 00 in Building B, shall be contained with tanks rooms with an FRL of 240/240/240, therefore there are no restrictions with respect to the separation distance between the diesel tank rooms and the storage of backup Li-ion on these floors.

The diesel generators and day tanks (service tanks) are located in rooms adjacent to the battery rooms. The service tanks have a capacity of <2.5m³ therefore there is an unrestricted minimum distance.

There are no other on-site protected places.

Off-site protected places – Yes

The diesel tanks are proposed to have a capacity of 100 kL each. Based on Table 5.4, a minimum separation distance of 7m is required for a C1 combustible liquid.

The separation distance from the tanks to the site boundary exceeds 7m.

Security fence – Yes

The required separation distance to the security fences is approximately 4m (diameter of the tank).

The separation distance from the tanks to the security fence on the site boundary exceeds 4m thereby complying with this requirement.</td></tr>
<tr><td>5.7.6 Horizontal tanks</td><td>(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.</td><td>Compliance achievable –

To be confirmed in later design stages.

The space proofing on the architectural plans shows the diesel tanks exceed the minimum separation distance of 600mm.</td></tr>
<tr><td>5.8 Bunds and compounds

5.8.1 Requirements</td><td>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.</td><td>Compliance achievable –
Although this clause does not apply as the tanks have integral secondary containment complying with clause 5.9.1, bunding is present through</td></tr>
</table>

AS 1940:2017 Clause	Requirement	Compliance?
	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.	the lower setdown as demonstrated in the latest design.
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.	**Compliance achievable** – Clause 5.9 applies to the tanks rooms as per Clause 5.6.3.2 (c).
	5.9.2 Requirements for all tanks having integral secondary containment. 5.9.5 Additional requirements for tanks with integrated spillage compounds The following requirements apply in addition to those in Clause 5.9.2: (a) The design of the external secondary containment shall comply with Clause 5.8.3 except that the 1 m separation distance given in Figure 5.2 does not apply. However, provision shall be made for inspection of the tank's outer surface. (b) The separation distances given in Clause 5.7 shall apply.	**Compliance achievable** – To be determined in later design stages. As required in (d) Secondary containment shall be adequately designed and constructed, to contain the entire contents of the primary tank. Each tank room contains three identical diesel storage tanks with a capacity of 100m³ per tank. It is recommended that the capacity of containment capacity of the tank rooms considers the requirements in Clause 5.8. Clause 5.8.2 requires 110% of the capacity of a diesel tank is 110m³, and Clause 5.8.7 Consideration in the design of the site shall be given to containment of fire water resulting from the management of a site emergency. NOTE: The design should be such that from a typical spill and fire scenario the management of contaminated fire water can be retained within the site to enable the proper safe clean-up of this effluent. Design of the tank room containment shall comply with Clause 5.8.3, Bunds and Compounds, Design and Construction requirements.
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.

AS 1940:2017 Clause	Requirement	Compliance?
5.14 Service Tanks	5.14.1 Use of service tanks 5.14.2 Service tank higher than storage tank 5.14.3 service tank higher that appliance 5.14.4 Return systems 5.14.5 Service tanks indoor Any service tank located indoors shall be installed in accordance with Clause 5.6 in addition to the requirements of this Clause (5.14).	**Compliance achievable** – To be determined in later design stages. The 1000L day tanks (service tanks) are located in the generator rooms on levels 03-08. All service tanks are located indoors and shall comply with Clause 5.6 and 5.14.
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	11.11 Fire Protection Requirements for Above-Ground Tank Storage of Aggregate Capacity Less Than 60m³ 11.11.1 Tanks within buildings Where a tank containing flammable or C1 liquid is located within a building, but is not in a tank chamber, it shall be provided with at least one powder type extinguisher located within 10 m of the tank and hydrant protection as specified in Clause 11.5.4 and Table 11.4.	**Compliance achievable** – to be determined in later design stages. Generator rooms with service tanks shall be provided with at least one powder type extinguisher located within 10 m of the tank and hydrant protection as specified in Clause 11.5.4 and Table 11.4.
	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. Each tank room shall be provided with: • Coverage to each tank from 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 per diesel tank. The maximum travel distance to access a fire extinguisher shall not exceed 15 m.

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

- The static storage tanks shall be designed and constructed to be compliant with Category 3 tank requirements in accordance with AS 1692:2006 Steel tanks for flammable and combustible liquids.

- The tank fill points shall comply with Clause 5.3, including 5.3.2 (d) Where practicable, the fill point for any tank containing a combustible liquid shall be outside. If it is inside, it shall be not more than 2 m from a building entrance useable by a tank vehicle, and shall not be in a boiler room, furnace room, or an elevated temperature area.

  NOTE: Fill points located inside a building should not be operated unless the building has sufficient alternative access and egress points to ensure the safe evacuation of personnel in an emergency.

- The day tanks located in the generator rooms on levels 03-08 have a capacity of 1000L, each shall comply with Clause 5.6.3.1.

- The single skin diesel storage tanks installed on level 00 in Building B, shall comply with the following:

  – Secondary containment shall be provided by the tank rooms having an FRL of 240/240/240 and complying with the provisions of clause 5.9.

  – The distance between horizontal tanks in the same tank room shall be at least 600 mm.

- Secondary containment shall be adequately designed and constructed, to contain the entire contents of the primary tank. Each tank room contains three identical diesel storage tanks with a capacity of 100m³ per tank.

  It is recommended that the capacity of containment capacity of the tank rooms considers the requirements in Clause 5.8. Clause 5.8.2 requires 110% of the capacity of a diesel tank, which is 110m³, and Clause 5.8.7 requires consideration in the design of the site shall be given to containment of fire water resulting from the management of a site emergency.

  NOTE: The design should be such that from a typical spill and fire scenario the management of contaminated fire water can be retained within the site to enable the proper safe clean-up of this effluent.

- Design of the tank room containment shall comply with Clause 5.8.3, Bunds and Compounds, design and construction requirements.

- Note Clause 6.2.1 (o) requires that design considerations shall take into account, fire resistance, where piping could be exposed to fire, when designing or installing any piping.

- Generator rooms with service tanks shall be provided with at least one powder type extinguisher located within 10 m of the tank and 10L/s hydrant protection.

- Each tank room shall be provided with:

  – Coverage to each tank from 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 per diesel tank.

  The maximum travel distance to access a fire extinguisher shall not exceed 15 m.

It is also recommended the following mitigation measures be implemented:

- The generator rooms be fire separated from adjoining areas.

- Considerations of spill containment around fill points, to address regulation 357 of the WHS Regulation.

5.4 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. The design of S5 Data Centre is not a distributed Li-ion battery system, and there are no Li-

ion batteries proposed other than in the fire separated battery rooms, therefore Arup has also considered FM Global Data Sheet 5-33 – Electrical Energy Storage Systems (FMDS 5-33), which is referenced in FMDS 5-32.

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 S5 Data Centre 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 with '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 site is assessed against the recommendations provided in the relevant clauses of Section 2.0 of FMDS 5-32 in the table below.

Table 8: 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*.	**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 sprinklered or unprotected areas of the building.	**Compliance achievable** – To be determined in later design stages. Building shall be sprinkler protected throughout in accordance with the BCA. In the event sprinklers are omitted from specific areas an assessment of adequacy to be considered against the BCA.
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.
	2.2.3 Doors and Windows 2.2.4 Penetrations	**N/A** – The data centre shall be constructed in accordance with the BCA .
2.2.5 Ceilings	2.2.5.2 Limit the maximum height of ceilings in data centres to 30ft (9m). (See Section 2.4.7.1.3 and Section 3.2.5.1.)	**Yes**

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
		The floor to floor height is documented as 6m in the data halls and 4m in the office. (ref. AR-0000-DRG-NXT-6000)
	2.2.6 Floors 2.2.7 Cables 2.2.8 Cable Raceways and Routing Assemblies 2.2.9 Insulation	**N/A** –The data centre shall be constructed in accordance with the BCA.
2.3 Occupancy	2.3.1 Locate new data processing equipment with packaging 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). 2.3.2 Do not store or stage combustible materials in the data processing equipment room. 2.3.3 Remove cartons and packaging materials from in-process equipment in the data processing equipment room. Metal containers that use combustible packaging materials to protect in-process equipment are tolerable. 2.3.4 Do not store combustible materials in electrical or mechanical equipment rooms. 2.3.5 Protect storage areas in accordance with Data Sheet 8-9, *Storage of Class 1,2,3,4 and Plastic Commodities*.	**Compliance achievable** – Ongoing operational requirement
2.4 Protection 2.4.1 General	2.4.1.1 Provide automatic sprinkler protection throughout all building spaces associated with this occupancy for the appropriate hazard classification in accordance with Data Sheet 3-26, *Fire Protection Water Demand For Non-storage Sprinklered Properties*, and/or the hazard-specific data sheet, in addition to the recommendations in this section.	**Compliance achievable** - Hazard classifications shall be provided in accordance with AS2118.1:2017 and: The back-up Li-ion battery storage areas hazard classification will consider NFPA 855 / FMDS 5-33. The Li-ion battery rooms hazard classification will consider FMDS 5-33 / NFPA 855
	2.4.1.2 Install fire detection in areas that are adjacent to the data processing equipment room and in rooms containing systems or equipment critical to the continued operation of the data processing facility (e.g., offices, hallways, storage areas/rooms, loading docks).	**Yes** – Fire detection shall be installed throughout the building in accordance with the BCA
	2.4.1.3 Install fire detection in accordance with Data Sheet 5-48, *Automatic Fire Detection*.	**N/A** – Fire detection to be installed in accordance with AS 1670.1:2018.
	2.4.1.4 Do not install automatically operated smoke exhaust systems in the data processing equipment rooms. 2.4.1.4.1 Where an automatic operation is required by local code, interlock the activation of the smoke exhaust system with the alarm for operation of the sprinkler system. Do not interlock the smoke exhaust system for activation with the fire detection system.	**Compliance achievable** – To be determined in later design stages.
	2.4.1.5 Establish a formal manual power isolation plan in accordance with Section 2.7.2 for all locations regardless	**Compliance achievable** – To be determined in later design stages.

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
	of the fire protection provided within the data processing equipment room(s).	
	2.4.1.6 Do not use aerosol generator fire extinguishing system units for the protection of the data center, related areas, or electronic equipment.	**Yes** No aerosol generator fire extinguishing system units included in the proposed design.
	2.4.1.7 Do not use oxygen-reduction systems for the protection of the data center, related areas, data processing equipment, or electronic equipment unless the recommendations in Data Sheet 4-13, Oxygen Reduction Systems, can be fully applied in addition to the recommendations in this section.	**N/A -** Gas suppression will be provided to the data halls in accordance with AS 4214:2018.
2.4.2 Portable Fire Extinguishers	2.4.2.1 For energized electrical hazards, provide at least one carbon dioxide or clean agent portable fire extinguisher listed to protect electronic equipment in accordance with Data Sheet 4-5, *Portable Fire Extinguishers*. A. Use a maximum floor area of 3,000 ft² (280 m²) per portable fire extinguisher. B. Use a maximum travel distance of 75 ft (23 m) between each portable fire extinguisher. 2.4.2.2 – 2.4.2.6	**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	Data Processing Equipment Room	**N/A** - Not relevant to this Hazard & Risk report as the data processing equipment rooms do not contain Li-ion batteries.
2.4.4	Li-ion Battery Back-up Units for Distributed Power Systems	**N/A -** The design is not a distributed Li-ion battery system. The proposed Li-ion batteries shall be contained in fire separated battery rooms. FMDS 5-33, Energy Storage Systems
2.4.5	Raised Floor or Above-Ceiling Spaces Containing Combustibles	**N/A** –The data centre shall be constructed in accordance with the BCA.
2.4.6 Detection: Design Specifications	Install fire detection per Data Sheet 5-48, Automatic Fire Detection, in conjunction with the following recommendations. …	**Compliance achievable** – To be determined in later design stages. However, the automatic fire detection shall be provided in accordance with AS 1670.1:2018. Note: All data and electrical plant zones to have multiples of aspirated detection units in A+B configuration for concurrent maintainability. (ref: S5-FI-01-000 series)
	2.4.7 Suppression: Design Specifications The reliability of a protection system is a function of the complexity of the system and the number of interacting components for its operation.	**N/A** - The design consists of the following:

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
	An automatic sprinkler system or water mist system may be used to protect a data processing equipment room with a forced air ventilation cooling system with a maximum nominal upward velocity through perforated floor openings, and a horizontal airflow of maximum 5 ft/sec (1.5 m/sec). Where higher air velocities are required for proper cooling, provide an interlock to reduce the air flow velocity upon fire detection in accordance with Section 2.8.3.B	
	2.4.7.1 Automatic Sprinklers	**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. The data halls will be protected by inert gas (clean agent) fire extinguishing systems. (ref: S5-FI-01-000 series)
	2.4.7.2 Water Mist Systems	**N/A -** not proposed for this site
	2.4.7.3 Halocarbon and Inert Gas (Clean Agent) Fire Extinguishing Systems: Design Specifications	**Compliance achievable** – To be determined in later design stages. However, the inert gas (clean agent) fire extinguishing system shall in accordance with AS 4214:2018 and utilise IG541 suppression agent. The system will utilise A+B cylinder bank configurations to allow for concurrent maintainability. Note the inert gas suppression system is only to be used in the data halls where there are no Li-ion batteries. (ref: S5-FI-01-000 series)
2.6 Inspection, Testing, and Maintenance 2.6.1 Facilities	2.6.1.1 Housekeeping 2.6.1.2 Penetrations	**Compliance achievable** – Ongoing operational requirement
2.6.2 Heating, Ventilation and Air Conditioning (HVAC)	2.6.2 Heating, Ventilation and Air Conditioning (HVAC) 2.6.3 Fire Protection 2.6.4 Electrical Power Distribution	**N/A** – Inspection, testing and maintenance will be in accordance with relevant Australian Standards.
2.7 Human Element 2.7.1 – 2.7.8	2.7.1 Emergency Response Team (ERT) 2.7.2 Power Isolation Plan 2.7.3 Disaster Recovery Plan 2.7.4 Business Continuity Plan 2.7.5 Security 2.7.6 Contingency Plan	**Compliance achievable** – Ongoing operational requirement.

FMDS 5-32 Section 2.0	Loss Prevention Recommendations	Compliance?
	2.7.7 Equipment Contingency Planning (ECP) 2.7.8 Service Interruption Plan	

The design of S5 Data Centre is not a distributed Li-ion battery system, and there are no Li-ion batteries proposed other than in the fire separated battery rooms, therefore Arup has also considered FM Global Data Sheet 5-33 – Electrical Energy Storage Systems (FMDS 5-33), which is referenced in FMDS 5-32.

Table 9: Compliance with FM Global Property Loss Prevention Data Sheet 5-33

FMDS 5-33 Section 2.0	Loss Prevention Recommendations	Compliance?
2.0 Loss Prevention Recommendations		
2.3 Construction and Location	2.3.1 Location Locate energy storage systems in accordance with one of the following, listed in order of preference: … D. In a dedicated interior corner cutoff room that is accessible for manual firefighting and is constructed in accordance with 2.3.4 (Figure 2.3.1, location 4) E. In a dedicated interior cutoff room that is accessible for manual firefighting and is constructed in accordance with 2.3.4 (Figure 2.3.1, location 5)	**Compliance achievable** – The battery rooms are in a combination of D and E locations.
2.3.2 ESS Enclosures	2.3.2.1 Provide a minimum space separation between ESS enclosures and adjacent buildings or critical site utilities or equipment in accordance with Data Sheet 1-20, Protection Against Exterior Fire Exposure, using hazard category 3 for the exposing building occupancy. 2.3.2.2 Provide a minimum space separation of 20 ft (6 m) between adjacent ESS enclosures with non-combustible walls. If the walls are combustible, provide separation between adjacent ESS enclosures in accordance with Data Sheet 1-20. 2.3.2.2.1 If the space separation between ESS enclosures is less than 20 ft (6 m), provide a thermal barrier, rated a minimum 1 hour, on the inside or outside of the enclosure, in accordance with Data Sheet 1-21. See Figure 2.3.2.2.1 for an example of an adequate thermal barrier between adjacent enclosures. 2.3.2.3 Where enclosure vents or other penetrations are provided, ensure they are arranged and directed away from surrounding equipment and buildings. In a fire, these enclosures may have vents or penetrations that could allow hot gas and products of combustion to escape the enclosure, causing an exposure to adjacent equipment or buildings. Penetrations could include electrical cabling, doors, HVAC units, etc.	**Compliance achievable** – To be determined in later design stages. The battery rooms shall be constructed in accordance with the BCA but not less than the FMDS 5-33 recommendations will be provided.
2.3.4 ESS Cutoff Rooms	2.3.4.1 For multiple racks installed in a single row or back-to-back, install solid, non-combustible fire barriers between adjacent racks. 2.3.4.2 Provide a minimum 1-hour fire-rated room, floors, walls, and ceiling in accordance with Data Sheet 1-21. A. Provide FM Approved fire doors with the same room rating. B. Provide FM Approved fire barriers for all floor, ceiling, and wall penetrations. 2.3.4.3 Install ESS with minimum separation in accordance with 2.3.5. 2.3.4.4 Provide mechanical ventilation in an ESS cutoff room at a rate of at least 1 cfm/ft² (0.3 m³/min/m²) of floor area. (See 2.5.5)	**Compliance achievable** – To be determined in later design stages. The construction of the battery rooms shall be in accordance with the BCA but not less than a 1-hour fire rating will be provided.

FMDS 5-33 Section 2.0	Loss Prevention Recommendations	Compliance?
	2.3.4.5 Provide damage-limiting construction. 2.3.4.5.1 Design DLC in accordance with Data Sheet 1-44, Damage-Limiting Construction, using propane as the representative gas.	
2.3.5 Separation Distances	2.3.5.1 Provide 6ft (1.8m) minimum separation from non combustible materials, non combustible construction elements, and between the aisle faces of adjacent racks. 2.3.5.2 Provide 9ft (2.7m) minimum separation from combustibles and combustible construction elements.	**Compliance achievable** – To be determined in later design stages. Separation provided between batteries aisles to be a minimum of 1.8m. No storage or other materials permitted in the battery rooms.
2.4 Protection	2.4.1 Provide automatic sprinkler protection designed to a 0.3gpm/ft² (12mm/min) over 2500 ft² (230m²) or the room area, whichever is larger, with an additional allowance of 250 gal/min (946L/min) for hose streams.	**Yes** The design density of the automatic sprinkler system shall be in line with FMDS 5-33/ NFPA855
	2.4.2 Ensure the water supply is capable of providing sprinkler water and hose stream requirements for the duration of the fire event (see Section 3.2). The expected duration will depend on the number of racks in a single fire area. The fire area is comprised of a row or rows of racks where minimum separation is not provided in accordance with 2.3.5. The duration should be estimated as 45 minutes times the number of adjacent ESS racks.	**Compliance achievable** – To be determined in later design stages.
	2.4.3 Provide a smoke detection system within the enclosure, cutoff room, or ESS area designed and installed in accordance with Data Sheet 5-48, Automatic Fire Detection.	**Yes**. However, automatic fire detection will be provided in accordance with AS 1670.1:2018
2.5	Equipment and Processes	**Compliance achievable** – To be determined in later design stages.
2.5.5	Mechanical Ventilation	**Compliance achievable** – To be determined in later design stages.
2.6	Operation and Maintenance	**N/A** – Inspection, testing and maintenance will be in accordance with relevant Australian Standards.
2.7	Training	**Compliance achievable** – Ongoing operational requirement
2.8	Human Factors	**Compliance achievable** – Ongoing operational requirement
2.9	Utilities	**Compliance achievable** – Ongoing operational requirement.

The basis of design of this data centre and in particular the battery rooms include the following measures:

- Fire separation of the data halls and the battery rooms from adjoining areas.
- Fire detection to be installed in accordance with AS 1670.1:2018, including all data and electrical plant zones to have multiples of aspirated detection units in A+B configuration for concurrent maintainability.
- Automatic sprinkler system to be installed throughout in accordance with AS2118.1:2017 with
  - The building will have both wet systems and pre-action systems.

  - The back-up Li-ion battery storage areas hazard classification and resulting design density will consider NFPA 855.
  - The Li-ion battery rooms hazard classification and resulting design density will consider FMDS 5-33 / NFPA 855

- Inergen gas suppression system to be installed throughout the data halls in accordance with AS 4214:2018. The system will utilise A+B cylinder bank configurations to allow for concurrent maintainability. Note the inert gas suppression system is only to be used in the data halls where there are no Li-ion batteries.

It is recommended the following mitigation measures be implemented with respect to Li-ion battery rooms:

- Fire separation of the back-up battery storage rooms from adjoining areas.
- Provide standoff distances of battery racks from walls, floor, ceiling and other batteries, refer FMDS 5-33 Clause 2.3.5; and
- Provide adequate ventilation and sensors to ensure the combustible gas generated from a battery fire does not exceed the lower explosive limit (LEL). Mechanical ventilation to battery rooms at a rate of at least 0.3 $m^3/min/m^2$ of floor area.
- Provide sufficient water supply such that it is capable of providing sprinkler water and hose stream requirements for the duration of the fire event. The expected duration will depend on the number of racks in a single fire area. The fire area is comprised of a row or rows of racks where minimum separation is not provided in accordance with FMDS 5-33 Clause 2.3.5. The duration should be estimated as 45 minutes times the number of adjacent ESS racks.
- No storage or other materials permitted in the battery rooms.
- Back-up battery storage areas rooms and required fire safety measures should be considered in the overall fire safety strategy by the project fire engineer.

5.5 Fire Suppression System – Gas Cylinders

AS 4332:2004 is the standard for the storage and handling of gases in cylinders. It should be noted that this standard is not applicable to cylinders that form part of a fire suppression system as proposed on the site. As such, the proposal will not be assessed against AS 4332:2004.

The gas suppression system is required to comply with AS 4214:2018 Gaseous fire-extinguishing systems. Clause 6.2.3 notes that: *where storage containers are located in areas where their leakage could lead to the development of a concentration greater than the NOAEL (no observed adverse effect level), a warning notice shall be provided to identify the potential hazard together with adequate ventilation to minimize the hazard*.

Appendix N3 Table N8 provides the physiological information for IG-541. The NOAEL for IG-541 is 43% by volume which corresponds to 12% minimum oxygen for the no effect level. [1]

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

- Signage in accordance with AS 4214:2018, and
- Mechanical ventilation sufficient to maintain the IG-541 volume below the NOAEL in the event of a cylinder release.

It is recommended the following controls to be implemented in the cylinder stores to further reduce the risk associated with accidental discharge of a cylinder:

[1] These values are based on the physiological effects in human subjects in hypoxic atymospheres.

- Locked entries with access restrictions.
- Cylinder leak detection equipment.
- Oxygen depletion alarms (audible and visual) be fitted in each cylinder store; and
- Interlocks on doors to prevent entry in the event of oxygen depletion alarm triggering.

6. Work Health and Safety Regulation

Part 7.1 of the WHS Regulation sets the requirements for the use, handling and storage of hazardous chemicals in a workplace. This report assesses the storage requirements for the dangerous goods stored on site and the requirements should the chemicals exceed the placard and manifest quantities within Division 3 and 4 of Part 7.1.

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 Li-ion batteries at the facility are 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 also excludes 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 good practice to follow the requirements of Part 7.1. Recommendations are therefore made for the storage of diesel as a C1 combustible liquid, equivalent to C4 flammable liquid, in line with Part 7.1 of the WHS Regulation.

The storage of IG-541 gas compressed in cylinders as part of the fire suppression system will be assessed as a Class 2.2 non-flammable and non-toxic gas.

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 10 shows the maximum allowable quantity before a placard is required for the fire suppression (IG-541) gas (gases under pressure – not specified elsewhere in this table) and diesel (flammable liquids – Category 4) as per Schedule 11 of the WHS Regulation.

Table 10: WHS Regulation Schedule 11 placard quantity

Item	Description of hazardous chemical		Placard quantity	Quantity on site
4	Gases under pressure	Not specified elsewhere in this Table	1,000L (1kL)	10,164kL
5	Flammable liquids	Category 4	10,000L (10kL)	1,648kL

As the fire suppression gas and diesel storage totals 10,164kL and 1,648kL, respectively, the placard quantities of 1kL for gases under pressure 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 fire suppression gas storage rooms 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 11 shows the maximum allowable quantity before a placard is required for fire suppression (IG-541) gas (gases under pressure – not specified elsewhere in this table) and diesel (flammable liquids – Category 4) as per Schedule 11 of the WHS Regulation.

Table 11: WHS Regulation Schedule 11 manifest quantity

Item	Description of hazardous chemical		Manifest quantity	Quantity on site
4	Gases under pressure	Not specified elsewhere in this Table	10,000L (10kL)	10,164kL
5	Flammable liquids	Category 4	100,000L (100kL)	1,648kL

The fire suppression gas and diesel storage totals 10,164kL and 1,648kL across the entire respectively, exceeding the manifest quantities of 10kL for gases under pressure as 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 gas 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.

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. Table 12 below shows the threshold criteria for chemical storage and petroleum products storage to be declared a scheduled activity and therefore requiring a licence.

Table 12: Criteria for chemical storage under the POEO Act 1997, Schedule 1 Part 9 Chemical Storage

Activity	Criteria
General chemicals storage	Capacity to store more than: 20 t (pressurised gases) 200 t (liquefied gases) or 2000 t (chemicals in any other form)
Petroleum products storage	Capacity to store more than: 200 t (liquefied gases) or 2000 t (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 13 for total on-site chemical and petroleum product storage.

Table 13: Total on-site general chemical and petroleum product storage

Chemical	Quantity (tonnes)
General chemicals storage	
Class 9 (Li-ion batteries)	518.4 t
Class 2.2 non-toxic and non-flammable pressurised gas (IG-541 fire suppression gas)	10.2 t
Total general chemicals storage	528.6 t
Petroleum products storage	
C1 (diesel)	1,648 t
Total petroleum products storage	1,648 t

The storage quantity of Li-ion 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. The pressurised gas storage totals 10.2t across the site, which falls below the 20t criteria for pressurised gas general chemicals storage.

As such, an environmental protection license will no longer 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 Other 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. Key mitigation measures to be incorporated into the design are outlined at the end of each of 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 Findings

Recommendations have been provided to mitigate the risks associated with the gaseous fire suppression stores (Section 5.5) and nitrogen generator and nitrogen within the pre-action sprinkler (Section 2.4.5).

8.4 Other Legislative Requirements

In accordance with the legislative requirements for the WHS Regulation 2017, the quantity of diesel and pressurised gas exceed the manifest and placard quantity thresholds, resulting in the following requirements:

- 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 fire suppression system gas cylinder storeroom 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 pressurised gas 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.

9. References

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