Core Engineering Group • Fire • Risk • Emergency Management

Goodman Property Services (AUS) Pty Ltd
1-11 Hayes Rd,
Rosebery, NSW, 2018

1 May 2024 | SSD Submission | Report No. F202073_FSCS_RevA

Fire Safety Concept Strategy

Lanceley Place Data Centre, Artarmon

2-8 Lanceley Place, Artarmon

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Report Details

Project: Lanceley Place Data Centre, Artarmon
2-8 Lanceley Place, Artarmon

Document: Fire Safety Concept Strategy

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Report Revision History

REV	DATE ISSUED	COMMENT	PREPARED BY	REVIEWED BY	VERIFIED BY
01	16/03/24	Draft Issue for comment	**Rex Huang** *BEng (Mechanical)*	**Alex Chubb** *GrapDip Fire Safety,* *BEng Mech* *MIEAust*	**Graham Morris** *MEng (Structural and Fire Safety)* *CPEng MIEAust NER* *Registered Certifier – Fire Safety (BDC3200)*
A	30/04/24	SSD Submission	**Alex Chubb** *GrapDip Fire Safety,* *BEng Mech* *MIEAust)*	**Graham Morris** *MEng (Structural and Fire Safety)* *CPEng MIEAust NER* *Registered Certifier – Fire Safety (BDC3200)*	**Graham Morris** *MEng (Structural and Fire Safety)* *CPEng MIEAust NER* *Registered Certifier – Fire Safety (BDC3200)*

EXECUTIVE SUMMARY

CORE Engineering Group have been engaged by Goodman Property Services (AUS) Pty Ltd to develop a Fire Safety Concept Strategy (FSCS) to accompany a State Significant Development Application (SSDA) for a proposed data centre at 2-8 Lanceley Place and 14 Campbell Street, Artarmon (Lanceley Place Data Centre, Artarmon). The site comprises 5 individual allotments totalling 14,024m^2 in area, is zoned E4 General Industrial and has road frontages to both Lanceley Place and Campbell Street.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (**SEARs**) and accompanying cover letter issued for the Lanceley Place Data Centre project (SSD-66777221) dated 23 January 2024.

This report provides an overview of the construction and management requirements considered necessary to achieve an acceptable level of life safety within the building.

Due to the complexity of the building design, a fully prescriptive approach of complying with the National Construction Code, Volume 1 2022 (NCC) [1] Deemed-to-Satisfy (DtS) Provisions for occupant egress, fire resisting construction, fire services, and fire brigade intervention is unlikely to satisfy the desired architectural and client aspirations. As such, Performance Solutions to satisfy the Performance Requirements of the NCC have been proposed to account for the following issues which have been identified in the NCC Compliance Report not to comply with the DtS Provisions:

- C2D2 – Rationalised FRL of separating elements.
- C4D6 – Lockable bolts fitted to inactive leaf of fire rated doorsets.
- D2D5 – Extended travel distances to a point of choice and nearest exit.
- D2D6 – Extended travel distances between alternative exits.
- D2D8 – Reduced width of paths of travel to exits.
- D2D12 – Internal discharge of fire isolated exit serving the office.
- E1D2 – Internal hydrants requiring 2 hose lengths for coverage.
- E1D2 – Hydrant system design and location of hydrant and sprinkler booster
- E1D3 – Omission of fire hose reels.
- E1D4 – Use of water mist system in lieu of sprinklers to the generator enclosures and location of sprinkler booster.
- E2D4 – Omission of automatic stair pressurisation to fire-isolated stairs
- E2D6 – Omission of zone pressurisation to data halls.

This FSCS provides a holistic summary of the fire and life safety measures anticipated to be necessary in developing the above listed Performance Solutions. These measures include passive and active fire protection systems, egress provisions, occupant first aid firefighting, fire brigade intervention, and future building management provisions.

The complete fire engineering analysis will be included within the Fire Engineering Report (FER), undertaken in accordance with the Australian Fire Engineering Guidelines (AFEG), and as such is not documented herein.

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1 INTRODUCTION

OVERVIEW

A State Significant Development Application (SSDA) has been prepared in support of a proposed data centre at 2-8 Lanceley Place and 14 Campbell Street, Artarmon (Lanceley Place Data Centre, Artarmon). The site comprises 5 individual allotments totalling 14,024m^2 in area, is zoned E4 General Industrial and has road frontages to both Lanceley Place and Campbell Street.

The proposal will include:

1.1

- Site preparation works including demolition, bulk excavation and removal of existing structures on the site, tree and vegetation clearing, and bulk earthworks;
- Construction, fit out and operation of a ten-storey, 80MVA data centre with a maximum building height of 51.479m (RL 124.5) ridge height (street wall height of 50m) and total gross floor area of 26,769m2 comprising:
  - At-grade parking for 39 car parking spaces and 2 accessible car parking spaces
  - Two (2) 12.5m long vehicle loading dock spaces
  - Five (5) levels of technical data hall floor space with four (4) data halls per floor
  - Ancillary office space
  - A lobby, offices and amenities located on the ground floor
- Provision of required utilities, including:
- Eight (8) 95,000L above-ground diesel storage tanks
- Four (4) 1,100kL above-ground water tanks
  - Three (3) 33kV switch-rooms on site.
- Vehicle access provided via Campbell Street and Lanceley Place
- Pedestrian access provided via Campbell Street and Lanceley Place
- Associated landscaping and site servicing
- Installation of services and drainage infrastructure
- A floor space ratio of approximately of 1.91:1. Given this exceeds the Willoughby Local Environmental Plan 2012 (WLEP) control, a request to vary the control for the development under Clause 4.6 of the WLEP will be included with the SSDA.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (**SEARs**) and accompanying cover letter issued for the Lanceley Place Data Centre project (SSD-66777221) dated 23 January 2024.

Specifically, this report has been prepared to respond to the SEARs requirement issued below (please include all relevant SEAR and SEAR cover letter requirements in this table)

ITEM	DESCRIPTION OF REQUIREMENT	SECTION REFERENCE (THIS REPORT)
4. Built Form and Urban Design	• Explain and illustrate the proposed built form, including a detailed site and context analysis to justify the proposed site planning and design approach. • Demonstrate how the proposed built form (layout, height, bulk, scale, separation, setbacks, interface and articulation) addresses and responds to the context, site characteristics, streetscape and existing and future character of the locality. • Demonstrate how the building design will deliver a high-quality development, including consideration of façade design, articulation, materials, finishes, colours, any signage and integration of services. • Assess how the development complies with the relevant accessibility requirements.	Section 7 - Proposed Fire Safety Strategy

The purpose of this FSCS is to outline the fire engineering principles that will be utilised in ensuring that the prescriptive DtS non-compliances identified in the NCC report are resolved in order to conform to the building regulations and permit development approval.

The complete fire engineering analysis will be included within the FER, and as such is not documented herein. This document does however outline the construction and management requirements considered necessary to achieve an acceptable level of life safety within the building as a result of the Performance Solution and to satisfy the Performance Requirements of the NCC.

SCOPE

The purpose of this report is to document the proposed fire safety concept strategy for the building, including guidance on the likely fire engineering trial design which has been established based on review of the NCC report, proposed design, and CORE Engineering Group's previous experience. This document is intended to be a guidance document for the design team to inform detailed design documentation and shall be further developed as necessary through ongoing consultation.

1.2

The specific details included are:

- The proposed Performance Solutions to address identified non-compliances.
- The proposed fire engineering requirements.

RELEVANT STAKEHOLDERS

This Performance Solution has been developed collaboratively with the relevant stakeholders as identified below:

1.3

Table 1-1: Relevant Stakeholders

ROLE	NAME	ORGANISATION
Development Manager	Cameron Rubenach Athena Vercoe	Goodman
NCC Consultant	George Panagiotlari Aleks Cvetkovic Heath McNab	MBC
Design Lead	David McKay	HDR
Architect	Alex Wessling Phylis Dam	
Fire Services Engineer	Jamie Guajardo	
Fire Safety Engineer	Alex Chubb Rex Huang	CORE Engineering Group
Registered Certifier – Fire Safety	Sandro Razzi	
Risk Engineer	Renton Parker Ezra Bagaskara	Riskcon Engineering
Structural Engineer	Ucok Dedy Wystan Alexander	TTW Engineers

1.4 *It should be noted that at times some parties may have a vested interest in the outcome of the Fire Engineering assessment. Such parties can include local fire brigades, insurers, Environmental Protection Authority (EPA), project control groups, end users and community representatives. Although not always a legislative requirement, the design team should give due consideration to their inclusion in the Fire Engineering process. Where not required by legislation it is the client's decision to involve such parties, especially local fire brigade, to ensure a transparent and adequate fire safety solution for all. Where we are not notified of the inclusion of such parties it is assumed the client / representative has given due consideration to the above.*

SOURCES OF INFORMATION

The following sources of information have been provided by the design team:

- NCC Compliance report prepared by MBC Group, project no. 23000500, Rev A dated 29/04/2024.
- Architectural plans provided by HDR, as indicated in Table 1-2.

Table 1-2: Drawings

DRAWING NO.	DESCRIPTION	ISSUE	DATE
EOS-AR-DRG 11003	SITE PLAN	A	01/05/2024
EOS-AR-DRG-21001	GA PLANS GROUND LEVEL	K	23/04/2024
EOS-AR-DRG-21002	GA PLANS LEVEL 1	K	23/04/2024
EOS-AR-DRG-21003	GA PLANS LEVEL 2	K	23/04/2024
EOS-AR-DRG-21004	GA PLANS LEVEL 3	K	23/04/2024
EOS-AR-DRG-21005	GA PLANS LEVEL 4	K	23/04/2024
EOS-AR-DRG-21006	GA PLANS LEVEL 5	K	23/04/2024
EOS-AR-DRG-21007	GA PLANS LEVEL 6	K	23/04/2024
EOS-AR-DRG-21008	GA PLANS LEVEL 7	K	23/04/2024
EOS-AR-DRG-21009	GA PLANS LEVEL 8	K	23/04/2024
EOS-AR-DRG-21010	GA PLANS LEVEL 9	K	23/04/2024
EOS-AR-DRG-21011	GA PLANS ROOF LEVEL	K	23/04/2024
EOS-AR-DRG-21012	GA PLANS TOP OF SCREEN LEVEL	K	23/04/2024
EOS-AR-DRG-30000	ELEVATIONS SHEET 1 OF 4	G	23/04/2024
EOS-AR-DRG-30001	ELEVATIONS SHEET 2 OF 4	G	23/04/2024
EOS-AR-DRG-30002	ELEVATIONS SHEET 3 OF 4	G	23/04/2024
EOS-AR-DRG-30003	ELEVATIONS SHEET 4 OF 4	G	23/04/2024

1.5 LIMITATIONS AND ASSUMPTIONS

In this instance the FSCS is developed based on applicable limitations and assumptions for the development which are listed as follows:

- This document represents the opinions of CORE Engineering Group based on the information known at the time of preparation of this document. Opinions, findings, and recommendations detailed in this document are based on our understanding and interpretation of current statutory and regulatory obligations and standards and should not be construed as legal opinions.
- This report does not constitute a fire engineering report (FER) that addresses the Performance Requirements of the BCA. Any recommendations herein are subject to detailed fire engineering analysis, and the relevant approval process.
- This document has been prepared as a guidance document only, and any parties relying on this should be cognisant that the recommendations herein are preliminary and subject to detailed analysis and authority approvals.

2 PRINCIPAL BUILDING CHARACTERISTICS

OVERVIEW

Building characteristics are assessed as part of the fire engineering assessment due to the following:

1. The location can affect the time for fire brigade intervention and potential external fire exposure issues.
2. The structure will impact on the ability to resist a developing fire and support condition to allow occupants to escape the building and the fire brigade to undertake firefighting to the degree necessary.
3. The floor area determines the potential fire size and area required to be evacuated in the event of a fire.
4. NCC details such as Type of Construction, Class and Height will dictate passive and active fire safety systems.

2.1

SITE LOCATION

The site is located on Cammeraygal Land and is in the Artarmon industrial area within the Willoughby Local Government Area (LGA). It is bounded by Campbell Street to the north and Lanceley Place to the east and has immediate frontages with a concrete batching plant to the south-east, and several buildings including the NextDC Data Centre to the west.

2.2

Artarmon Industrial Precinct comprises relatively new commercial and industrial developments and has been subject to several separate DAs which have increased the densities in the area. Other notable nearby land uses include the Home HQ shopping centre, the Artarmon Bunnings Warehouse, the Royal North Shore Hospital and the North Shore Private Hospital.

The site comprises 14,024 m^2 and consists of five separate lots. It was most recently occupied by film and television studios tenanted by the Australian Broadcasting Corporation (ABC) which sold the site in 2021. The site was subject to a SSDA application in 2023 which proposed an industrial warehouse and distribution centre (SSD-48478458). The site is currently vacant.

The closest residential uses include residential flat building on the western side of Pacific Highway (approximately 300 m west from the site) and in Artarmon (approximately 500 m north of the site).

The site is well serviced by transport, and is within close proximity of the Pacific Highway, M1, M2 and the Lane Cove tunnel with bus services linking the area with North Sydney and the Sydney CBD. St Leonards

Station, which provides T9 Northern Line and T1 North Shore and Western Line train services, is within a 1 km walk of the site.

The future Crows Nest Metro station is located approximately 1.4 km from the site which will deliver high frequency metro services across Sydney and is expected to be opened in 2024.

Figure 2-1: Site Ariel (Source: Urbis)

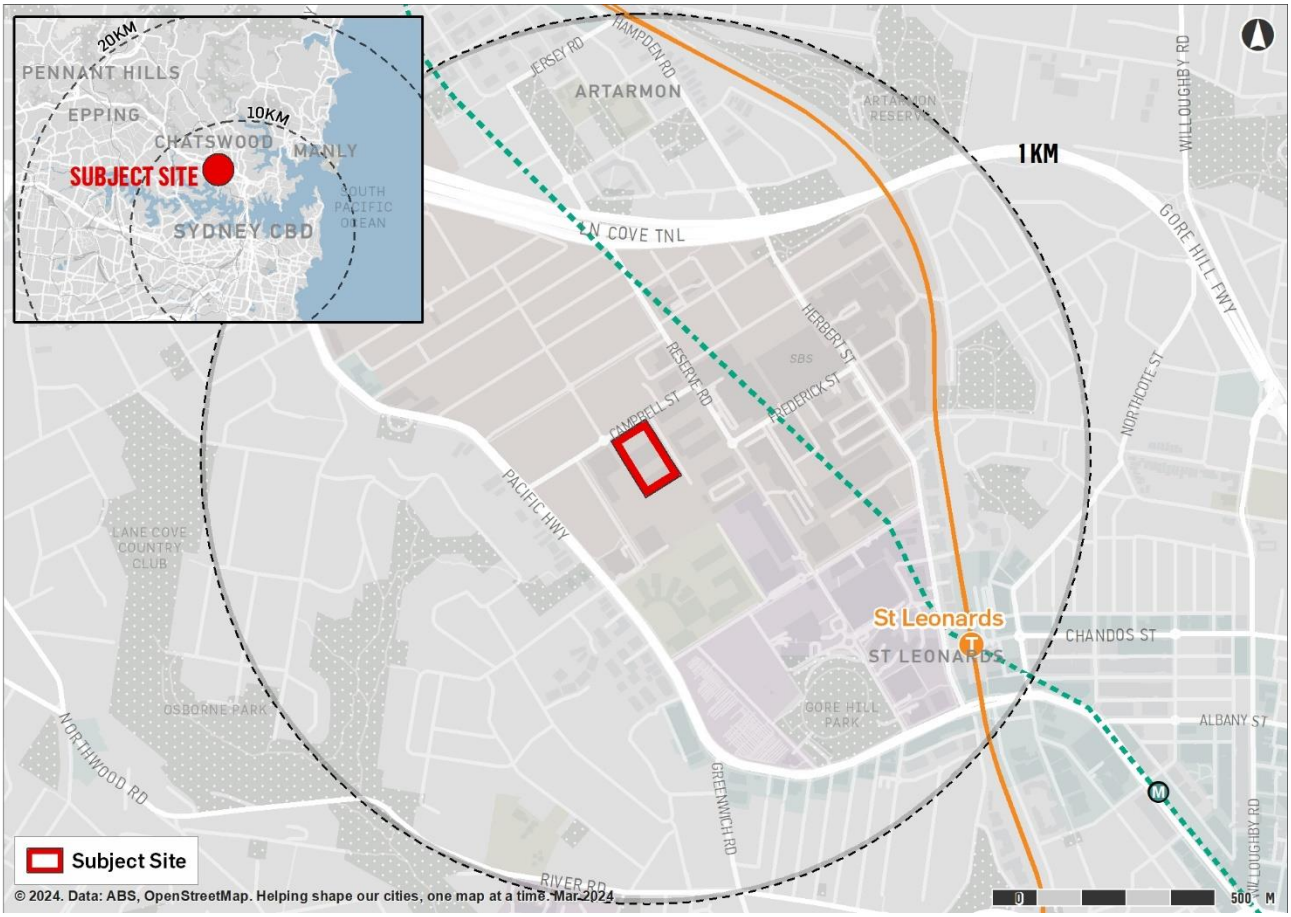


Figure 2-2: Local Context (Source: Urbis)

The building site influences the likely fire brigade intervention times, and given the close proximity to the nearest fire station is expected to facilitate a relatively convenient and expedient fire brigade response. The two nearest fire brigade stations provided with permanent staff are Lane Cove and Crows Nest, approximately
2.3 0.75 km and 2.6 km from the site respectively.

SITE LAYOUT

The Goodman site is approximately 14,000 m² and is proposed to be a data centre building with ancillary offices at the north-eastern corner on separate levels from the data halls. Due the varied slab-to-slab spacing of the different areas, there are more office levels than data hall levels. A security kiosk is also positioned adjacent to the main vehicular entrance.

The building has a total floor area and volume of approximately 59,000 m² and 340,000 m³ respectively.

The data centre portion of the building contains 6 floors and a roof level, while the offices (although extending to a lower height) contains 8 levels and therefore constitutes the rise-in-storey of 8 for the building. The data centre portion of the building is up to 42 m roof slab, and the office floors only extend up to a height of 29 m.

The generator gantries at the north-western corners of the data centre levels have their own separate floor slabs from the rest of the building.

Onsite external parking is available on the north side of the building. The loading dock entrance and the associated hardstands are located on the eastern side of the building.

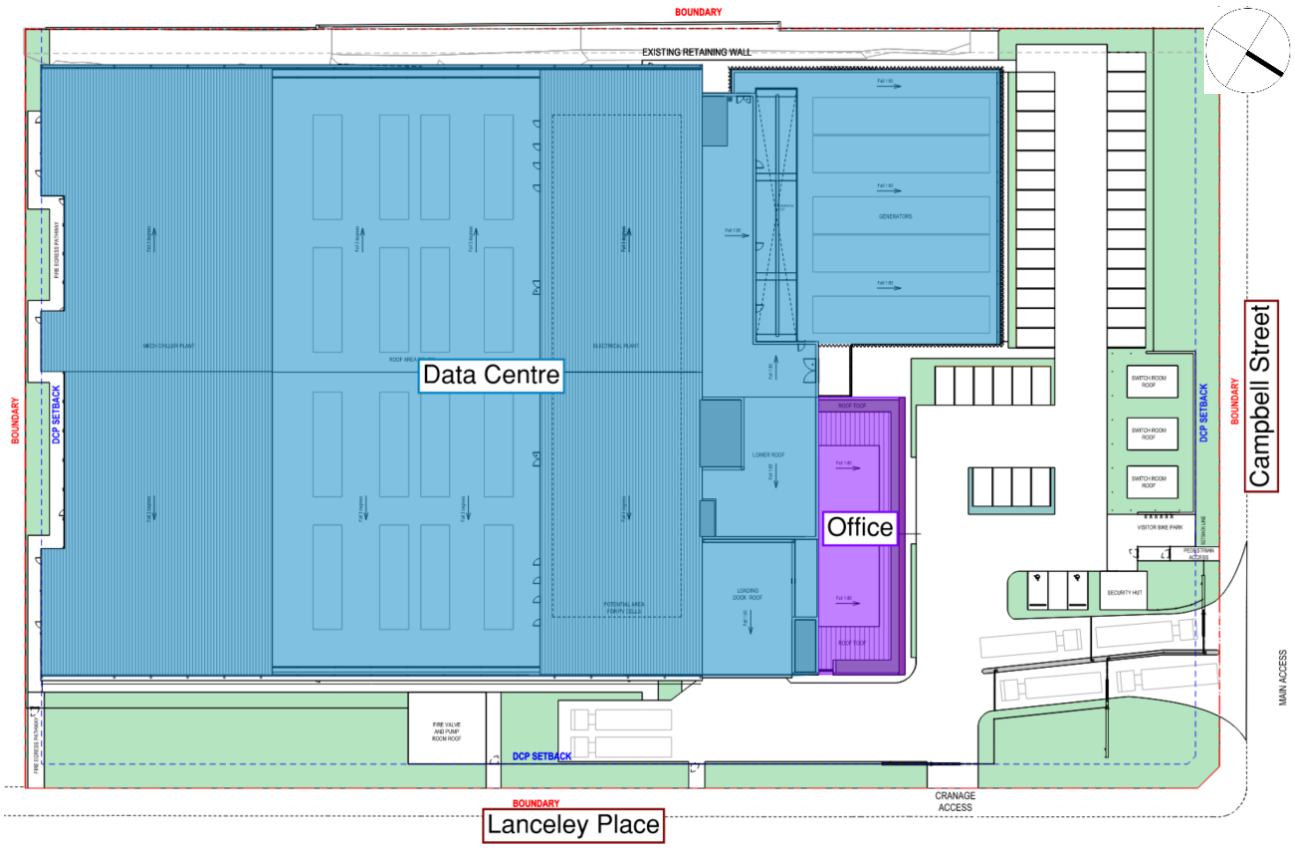


Figure 2-3: Site Plan

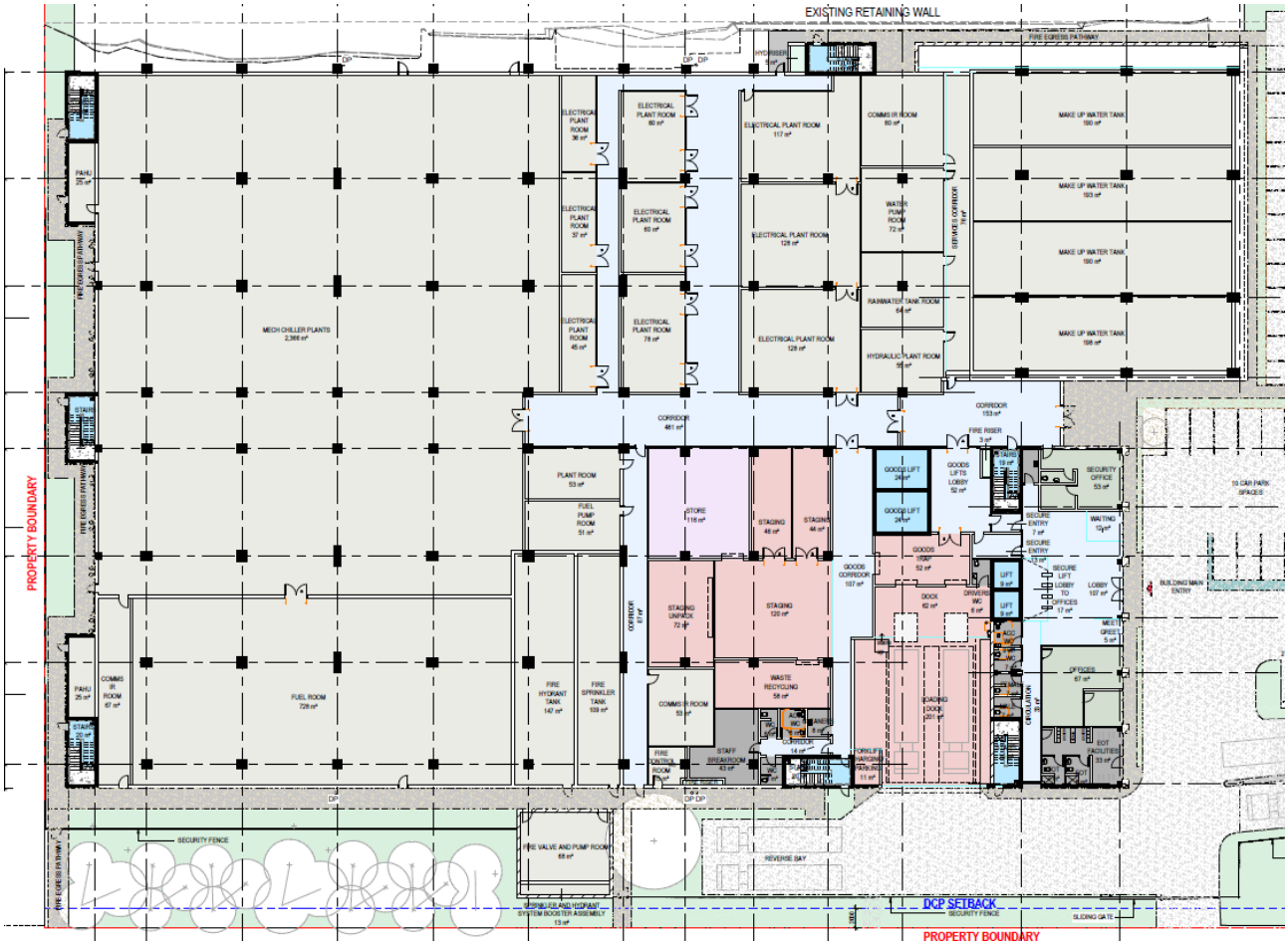


Figure 2-4: Ground Floor Plan

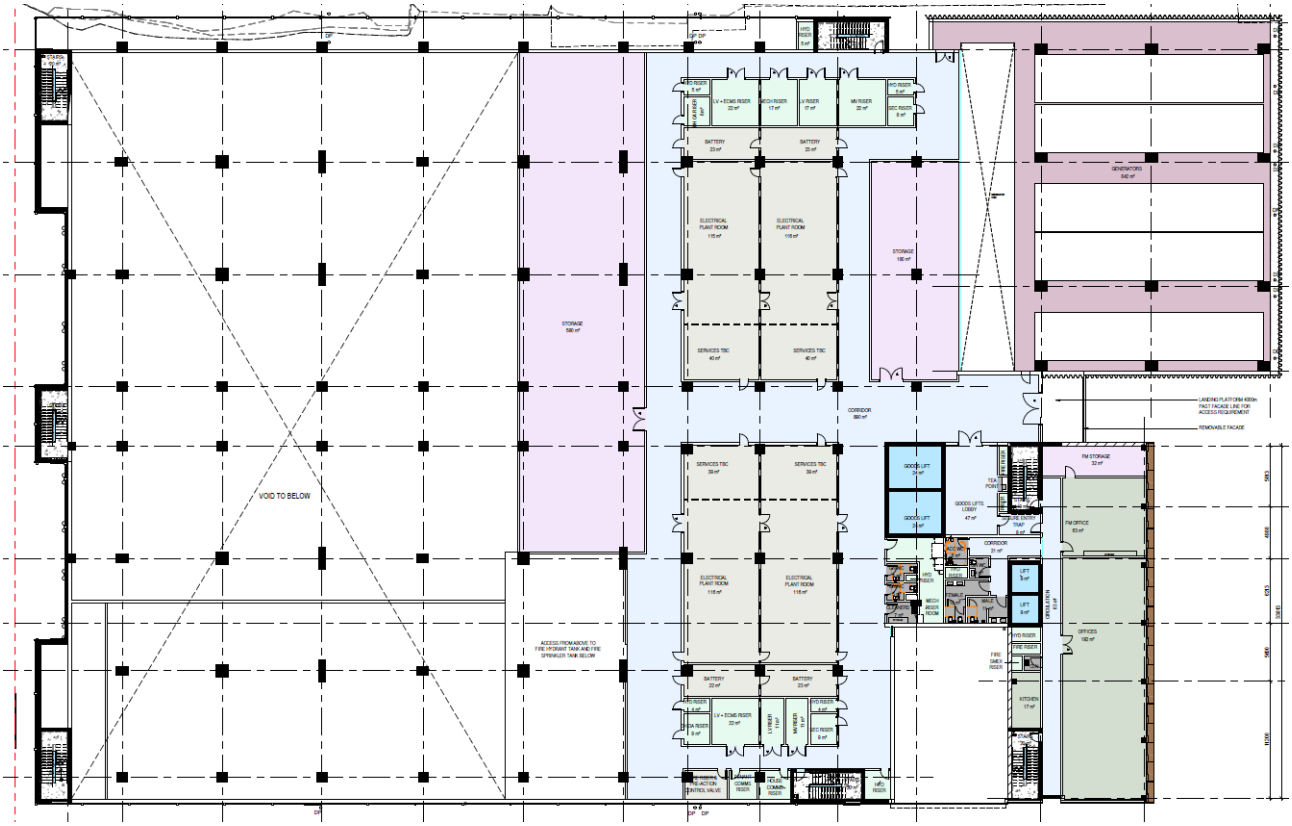


Figure 2-5: Level 1 Plan

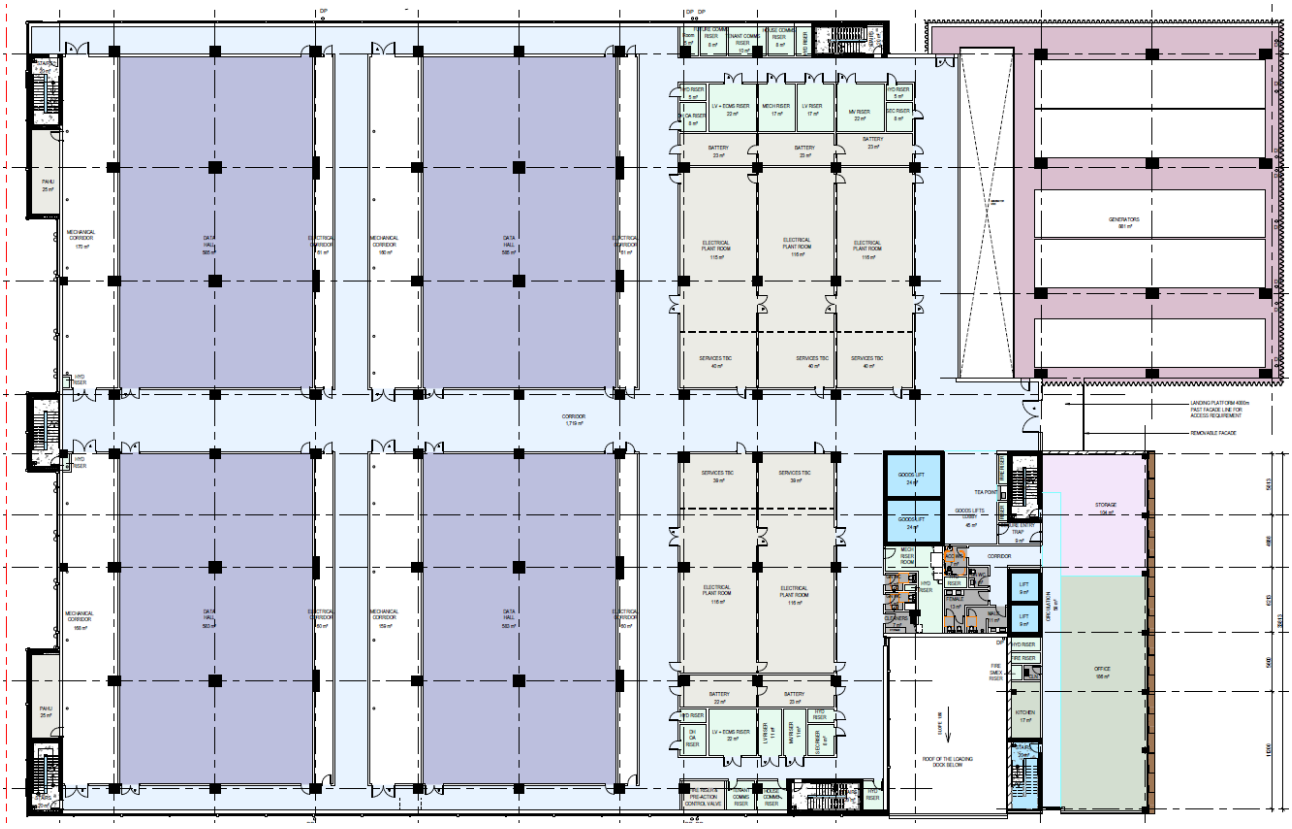


Figure 2-6: Level 2 Plan (Typical for Levels 4 and 6)

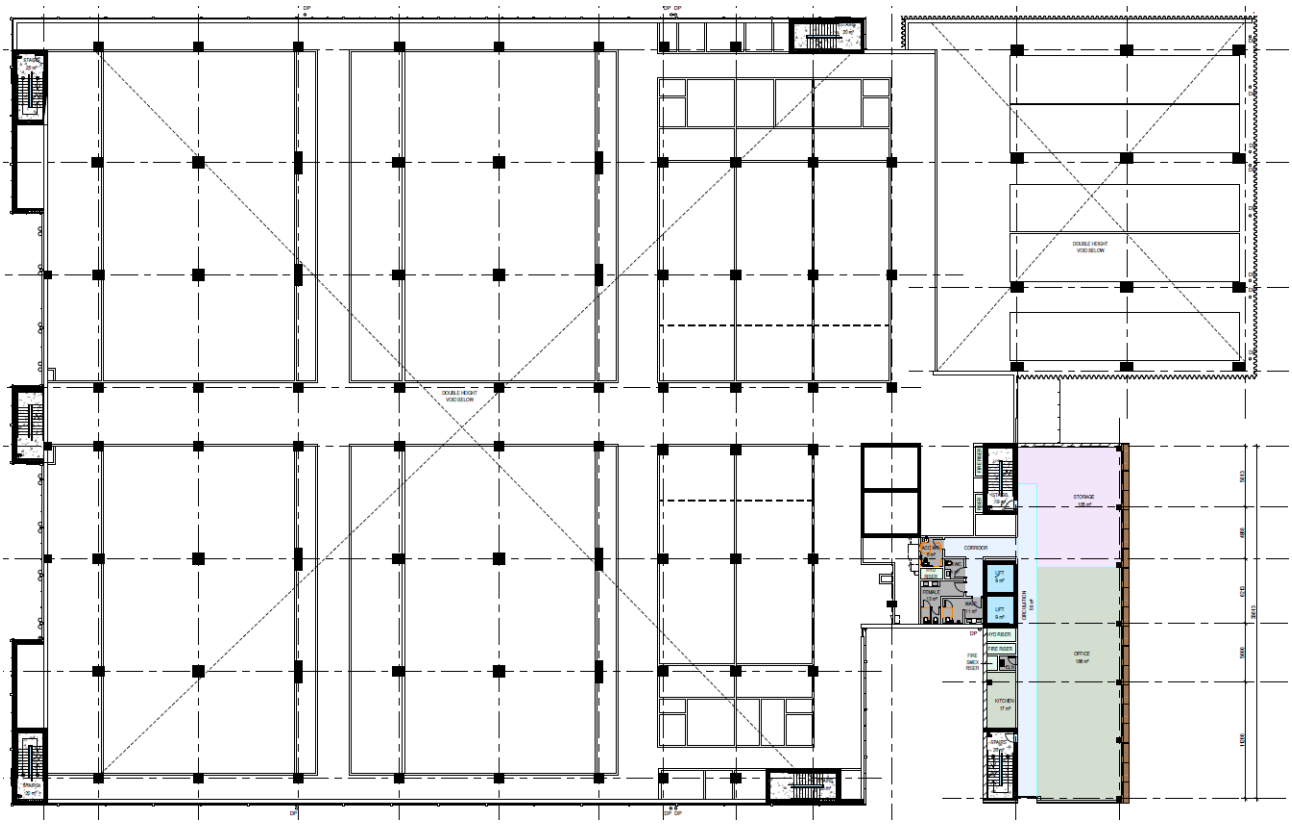


Figure 2-7: Level 3 Plan (Typical for Levels 5 and 7)

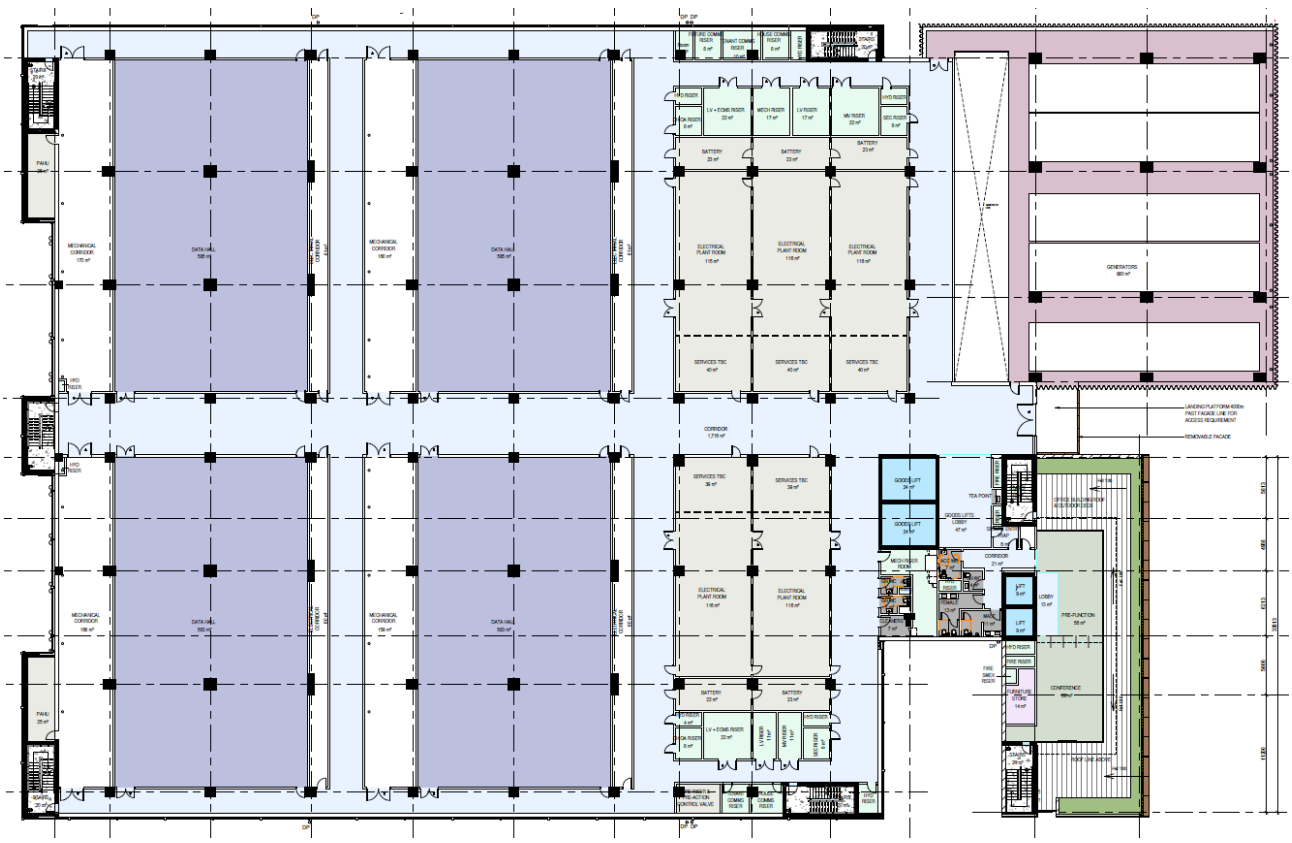


Figure 2-8: Level 8 Plan

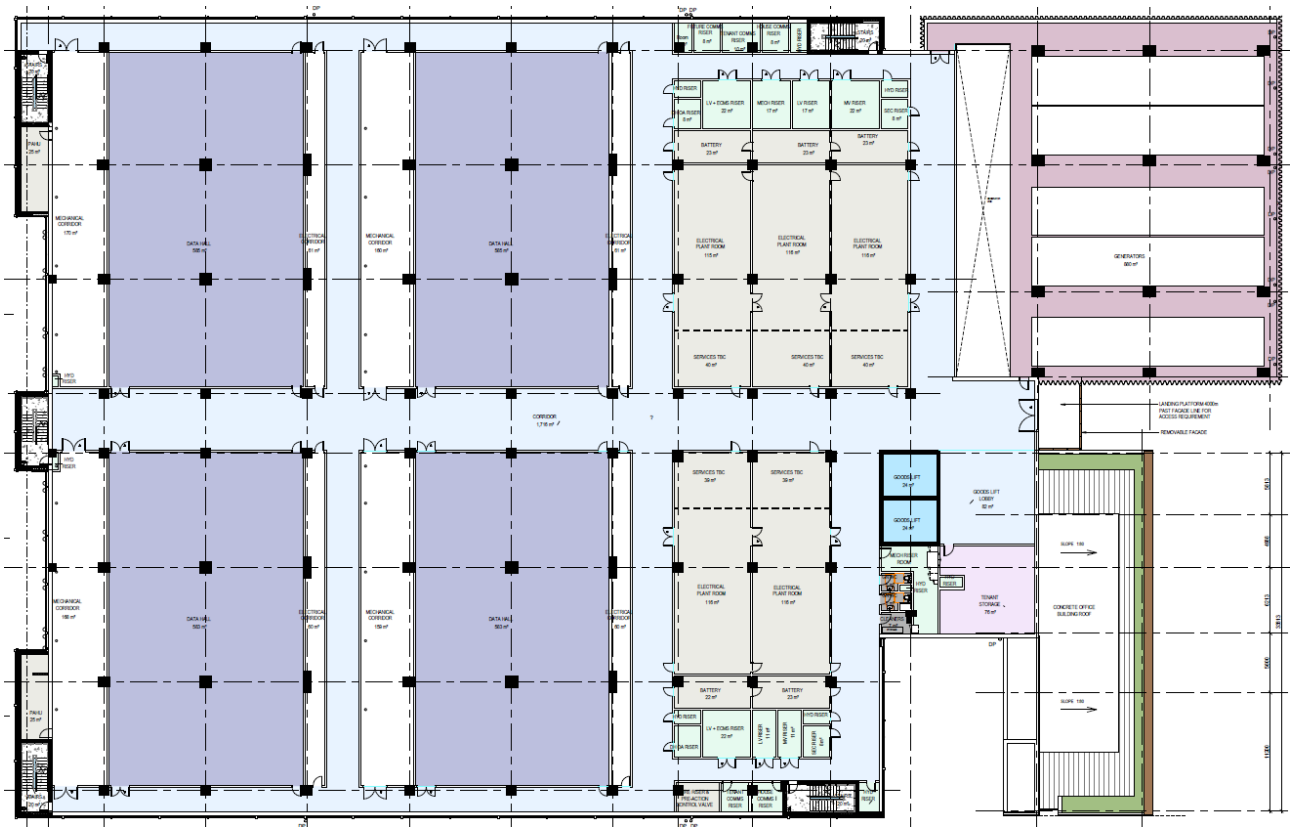


Figure 2-9: Level 9 Plan

Figure 2-10: Roof Plan

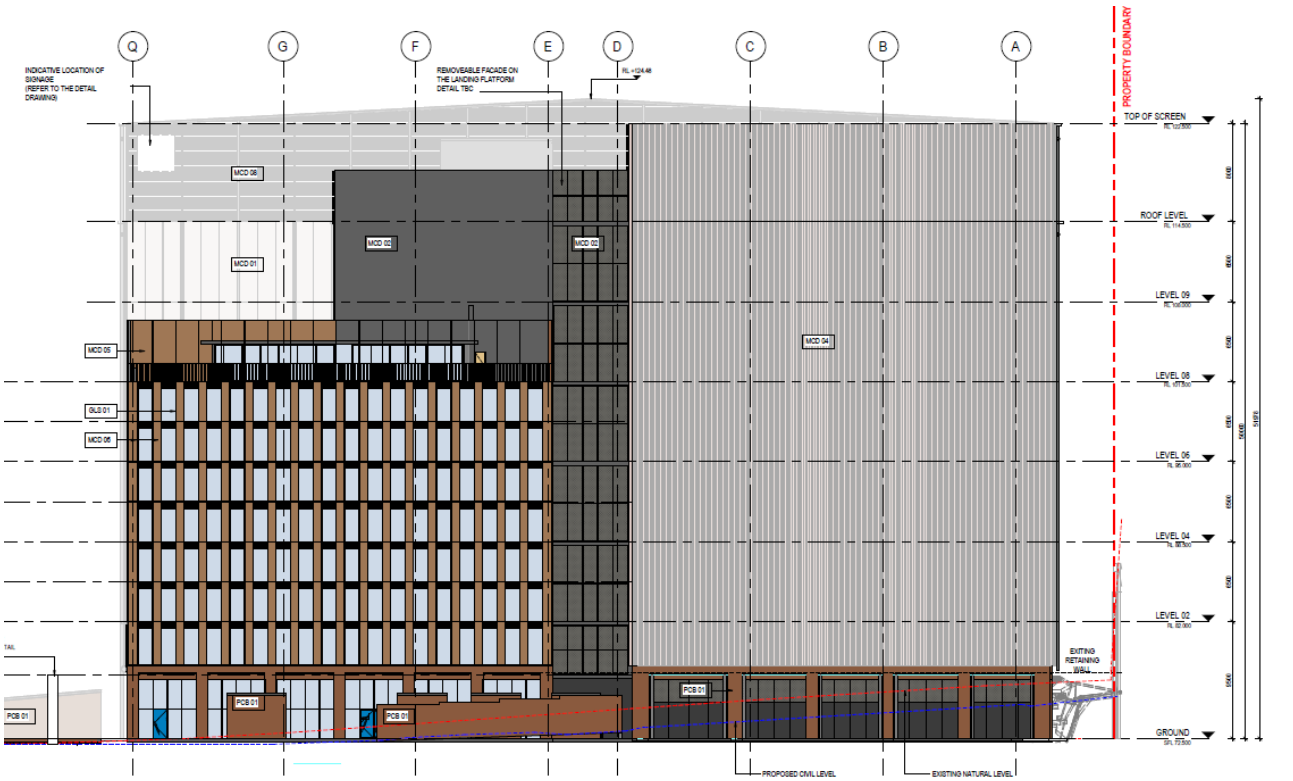


Figure 2-11: North Elevation

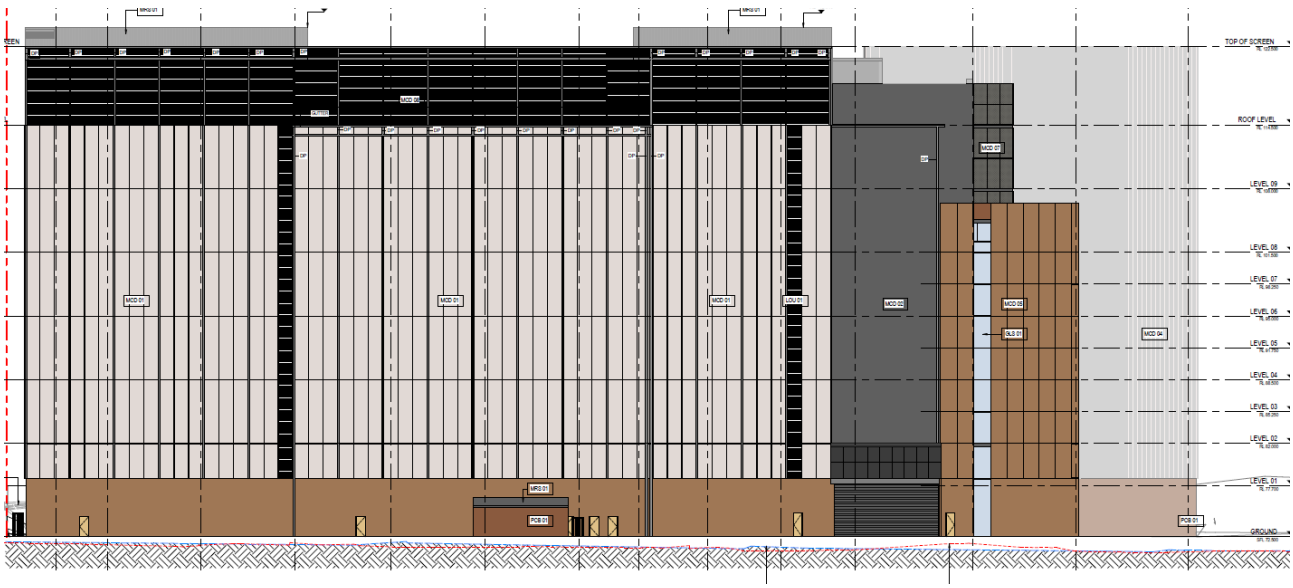


Figure 2-12: East Elevations

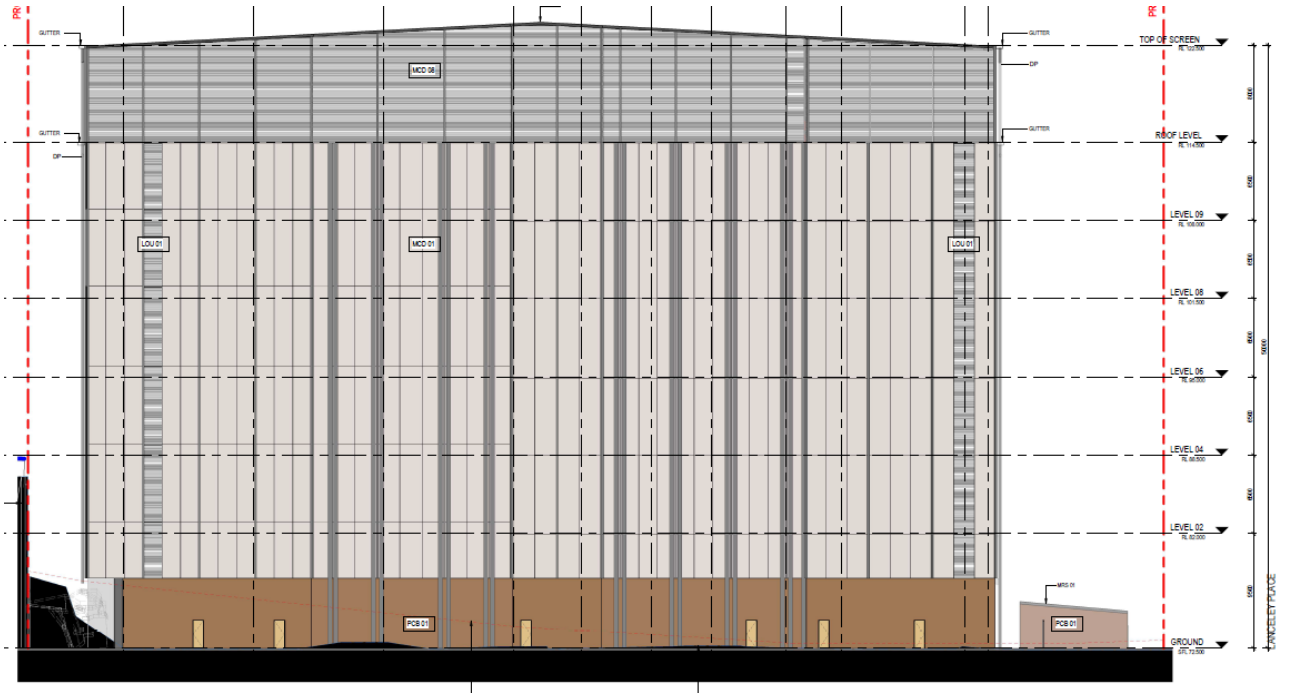


Figure 2-13: South Elevations

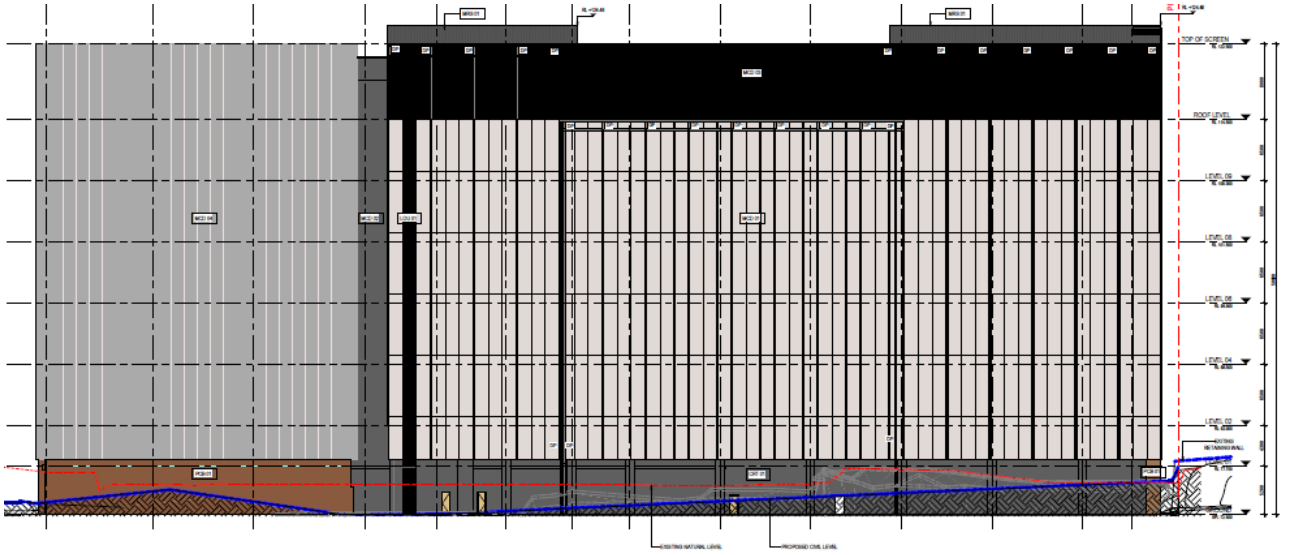


Figure 2-14: West Elevations

BUILDING STRUCTURE

2.5 The building structure shall be constructed from a concrete frame with post tensioned beams to support generator rooms. The office floors and low levels of the building will have external precast brick panels with glazed curtain wall panels on the northern elevation. The data centre floors will have a metal cladding façade, the generator rooms and the roof will have either perforated or batten aluminium screens.

All materials and elements should achieve the requisite Fire Resistance Levels (FRL) and fire hazard properties associated with Type A construction.

NCC ASSESSMENT SUMMARY

Table 2-1: NCC Building Characteristics

CHARACTERISTIC	DESCRIPTION
Classification	Class 7b (Data Centre), Class 5 (Office)

CHARACTERISTIC	DESCRIPTION	
Construction Type	Type A	
Rise in Storeys	Eight (8)	
Effective Height	35.5 m	
Floor Area *Approximate for information only*	Ground Floor	8,000 m²
	Level 1	4,100 m²
	Level 2	7,800 m²
	Level 3	430 m²
	Level 4	7,800 m²
	Level 5	430 m²
	Level 6	7,800 m²
	Level 7	430 m²
	Level 8	7,800 m²
	Level 9	7,300 m²
	Roof	7,300 m²
	Building Total	**59,190 m²**

Note, the above areas reflect the estimated gross floor areas on each floor of the building.

3 DOMINANT OCCUPANT CHARACTERISTICS

OVERVIEW

The occupant characteristics are assessed within the Fire Safety Concept Strategy due to the following:

1. Population numbers can dictate the time required to evacuate the building and the required life safety systems to be provided due to evacuation times.
2. Physical and mental attributes affect the occupants' capacity to respond to various fire cues and react accordingly.

3.1

3. Familiarity of occupants can affect the time taken to evacuate the building and subsequent active / passive requirements.

OCCUPANT NUMBERS AND DISTRIBUTION

Table D2D18 of the NCC provides a means of estimating the population of an area based on the use of that area and its size. The following occupant densities are considered applicable to each area in this building:

3.2

- Data halls (based on warehouse / plant): 30 m² per person
- Office: 10 m² per person

These values result in the following estimated populations shown in Table 3-1 based on the floor areas provided in Section 2.5.

Table 3-1: Estimated Building Population (DtS Table D2D18)

BUILDING PART	FLOOR AREA	ESTIMATED POPULATION
Ground Level	1,299 m²	81
Level 1	2,147 m²	114
Level 2	4,543 m²	194
Level 3	426 m²	43
Level 4	4,543 m²	194
Level 5	426 m²	43
Level 6	4,545 m²	194
Level 7	426m²	43
Level 8	4,322 m²	187
Level 9	4,218 m²	141
Roof**	Ancillary	Ancillary
	Total	**1234**

**The above floor areas have been adjusted by a factor of 0.8 to account for ancillary areas (i.e. sanitary facilities, corridors, shelving / racking in storage areas) as per the BCA report by MBC Group.*

***The roof level is exclusively ancillary plant space and is therefore not considered for estimation of the building population.*

3.3

In the absence of specific occupant numbers provided by the tenant, the population estimated from Table D2D18 of the NCC DtS Provisions will be utilised in the analysis, therefore providing a conservative population throughout the data centre. These figures are considered conservative, as data halls are generally unattended.

It is noted that these numbers are only listed at this stage to provide conservative inputs to the fire engineering analysis and do not form the requirements for amenities and the like.

OCCUPANT ATTRIBUTES

Occupants in the building may be of mixed age, although the elderly and children are generally not expected to be present. The population is therefore expected to be that of the general working public and be adults between the ages of 16 to 70. Due to the expected nature of the work conducted the majority of occupants are

assumed to be able bodied people with a small number of less mobile occupants requiring assistance during an evacuation.

All occupants are expected to be awake and alert adults or in the direct company of an adult, capable of entering the leaving the building under their own volition. Occupants in all of these areas are not expected to be adversely impaired by drugs, alcohol, fatigue or other adverse conditions to degrees greater than in other office buildings.

- ***Staff and Security*** are expected to be mobile with normal hearing and visual abilities, and occupants in this group are considered to take and implement decisions independently, and require minimal assistance during evacuation in a fire emergency. This occupant group is expected to be awake and fully conscious at all times when inside the building; and
- ***Clients / Visitors*** are expected to be mobile with normal hearing and visual abilities, this occupant group are expected to be capable of making and implementing decisions independently however may require assistance in locating the nearest and safest egress path in an emergency.

OCCUPANT FAMILIARITY

The majority of occupants within the building are expected to be staff and therefore the population in general are likely to react favourably in an emergency situation.

3.4

- ***Staff, Maintenance and Security*** can be expected to have a good familiarity with the building and the fire safety systems provided and may be trained in emergency procedures; and
- ***Clients and /or Visitors*** may or may not be familiar with the layout of the building and may require assistance in locating the exits.

EMERGENCY TRAINING

3.5 Occupants should be familiar with escape procedures through fire drills and designated fire wardens being appointed to mitigate risks under Workplace Health and Safety legislation (AS 3745:2010). Clear escape routes should be maintained with doors unlocked, and no obstructions or rubbish to hinder evacuation.

Staff and visitors are not expected to have fire suppression training and such training is not relied upon for this building population; however, staff may attempt to extinguish a fire or limit fire spread by removing objects in the vicinity of the fire in order to defend their belongings.

4 FIRE BRIGADE CHARACTERISTICS

OVERVIEW

Fire brigade characteristics are assessed within the FSCS as brigade characteristics can dictate the time required for fire brigade intervention including search and rescue, and fire attack.

FIRE BRIGADE ASSESSMENT

Figure 4-1 illustrates the site plan with fire services provided on the site. The fire panel located at the Fire
4.1 Control Centre is on the eastern side of the building away from the main site entrance. Similarly, the fire hydrant booster, sprinkler booster, and fire pump room are also located at this location, external to the building. The location of the FCC and booster assemblies (not within sight of the designated building entry point) are
4.2 proposed to be addressed by a Performance Solution.

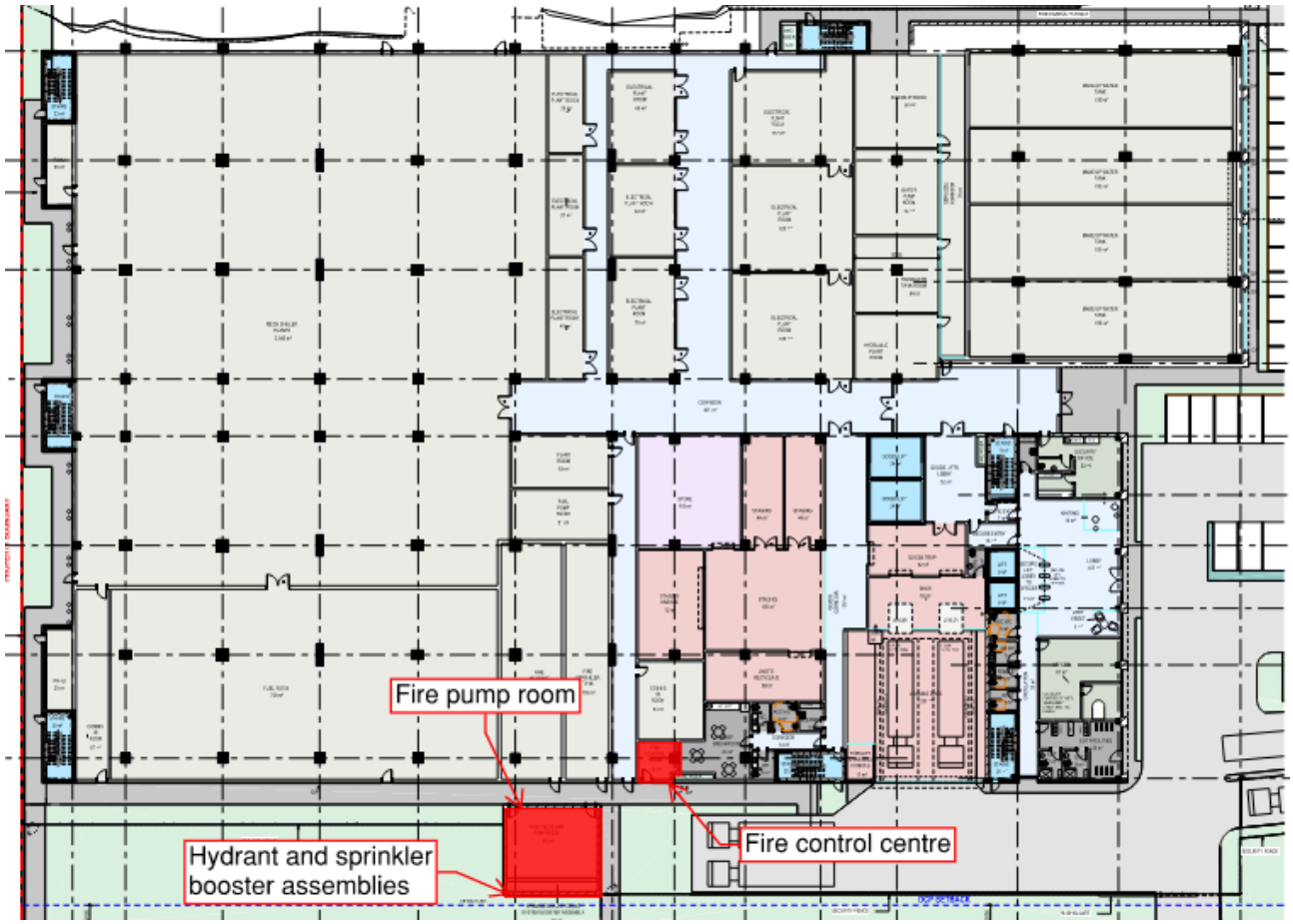


Figure 4-1: Fire Brigade Access and Site Facilities

The building is located within the Fire and Rescue New South Wales (FRNSW) jurisdictional turnout area. The closest two fire stations to the site that are provided with permanent staff are located in Lane Cove and Crows Nest, approximately 0.75 km and 2.6 km from the site respectively.

5 IDENTIFIED FIRE HAZARDS

OVERVIEW

The fire hazard analysis forms the basis for the review of non-compliances within the building. In assessing expected and statistically validated hazards, preventative and protective measures are developed commensurate with those expected risks. The following section reviews applicable hazards and recommends possible measures to address those risks. Furthermore, the hazards identified can form a justified basis for selected scenarios.

5.1

FIRE HAZARDS

Subsequent to a review of the relevant documentation, the fire hazards specific to this building are summarised below.

Combustible External Cladding

5.2

As the building require Type A construction, external walls of the building are required to be of non-combustible construction. This includes any ancillary elements affixed, installed or attached to the external wall.

5.2.1 Combustible external signage not considered DtS under the NCC 2022 concessions may be feasible under a Performance Solution subject to detailed review and engineering assessment.

Photovoltaic Cells

5.2.2 No PV cells have been identified at this stage. The following general design guidance is provided in order to limit any electrical exposure to evacuating occupants or attending fire fighters:

- The panels shall be installed in compliance with Standards Australia guideline AS/NZS 5033: Installation and safety requirements for photovoltaic (PV) arrays 2012.
- A schematic diagram (minimum A4 in size) must be provided at the FDCIE. This diagram must include:
  - The location of the panels
  - The location of all associated isolation switches, AC & DC isolated for the shut-off of generated electricity.
  - A statement of whether the system automatically isolates on fire trip.
  - A statement in 8 mm font stating (or similar): “Photovoltaic (PV) panels present. PV panels are mechanically fixed to the roof as depicted”.

5.2.3

Substation

The size and location of any proposed substations serving the site presents additional electrical hazards that

5.2.4 must be considered. Substations must be located not less than 10 m from external fire hydrants and brigade booster assemblies on the site to separate brigade operations from any high voltage main electrical distribution equipment.

Dangerous Goods

At this stage of the project, a draft DG report has been produced by Riskcon Engineering dated 20th March 2024 with the following Dangerous Goods identified as being present within the facility:

- Bulk Diesel Tank
- Power Transformers
- Day Tanks (Indoor Diesel Generator Tanks)
- Lithium-Ion Batteries (UPS)

5.2.5 These Dangerous Goods must be in accordance with the relevant workplace health and safety regulations which will apply governing storage allowances (quantity) and requirements, as well as complying with recommendations with Riskcon’s report. The presence of DGs can also impact on the fire safety concept strategy and therefore must be reviewed in the context of fire spread, occupant evacuation and fire brigade intervention. Lithium batteries have been identified in the BCA report as a special hazard to be addressed in accordance with E1D17 & E2D21 and are discussed in Section 5.2.5.

Lithium-ion Batteries

Lithium-ion batteries are proposed to be utilised within the facility. The primary hazard associated with lithium-ion batteries is the potential for thermal runaway of the battery cells, leading to ignition of a fire and emission

of flammable lithium-ion fluid. This can also lead to emission of toxic and hazardous gases such as HF. Lithium-ion batteries, if subjected to adverse conditions such as excessive heat, over charging or mechanical damage, can suffer from thermal runaway and cell rupture.

It is understood that Lithium-ion batteries are proposed in the data hall levels both within dedicated battery rooms, and within the data halls themselves as 'in-rack' battery UPS systems.

To address the hazards associated with the presence of Li-ion Batteries, the following measures are proposed to be implemented in the facility:

- Lithium-ion batteries stored within the facility must be UL9540A tested, with results showing no module-to-module fire propagation, no external flaming nor flying debris and no re-ignitions.
- An appropriate fire suppression system will be required to control the development of a fire involving Lithium-ion batteries. The sprinkler system design within the Data Halls shall be compliant with AS2118.1. Note that a pre-action fire sprinkler system may be implemented.
- To enable early detection and recognition of the thermal runaway process, off-gas detection sensors (Li-ion Tamer by Xtralis) shall be provided to serve each battery room containing lithium-ion batteries. Li-ion Tamer sensors are designed to be sensitive to gaseous compounds released by lithium-ion batteries during the initial cell venting stage of battery abuse and failure.
- It is understood to be the intent for the Battery Management System to interlock with Li-ion Tamer system to control the battery system on off-gas detection. The Li-ion Tamer will output a signal to the Battery Management System once battery failure is detected which will then trip off the battery units in the corresponding sector.
- An automatic mechanical ventilation system shall be provided to the Data Halls enclosures and battery rooms containing Li-ion Batteries for ventilation of smoke and noxious gases. The system capacity and design shall be determined as part of the detailed design development.
- The water run-off from sprinkler activation and brigade hydrant operation shall be considered for containment within the facility due to potential contaminants. The majority of the water run-off is expected to be retained to the floor plate due to the lack of drainage proposed within the Data Halls and surrounding service corridors. Any water escaping the facility shall be retained within the Onsite Stormwater Detention (OSD) up to its permitted capacity. The automatic outflow from the OSD shall automatically isolate on building alarm.
- Access shall be provided to the stormwater storage tank, with a plan provided at the FIP to alert attending emergency service personnel of its presence should they elect to test the run off water for contaminants.

6 NCC DTS NON-COMPLIANCE ASSESSMENT

OVERVIEW

In this instance the NCC DtS non-compliances have been formulated based on the regulatory review as provided by the NCC Consultant. Where not listed herein the building is required to achieve compliance with relevant DtS provisions or if existing, comply with relevant codes, reports and / or Standards approved at the time of consideration.

6.1 The following table lists the departures from the DtS Provisions of the NCC for the proposed building.

NCC DTS NON-COMPLIANCE ASSESSMENT

Table 6-1: Summary of Proposed Performance Solutions

6.2 NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
Rationalisation of FRL – Separating Elements **NCC DtS Provisions** Provision C2D2: Type of construction required **Performance Requirements** C1P1 and C1P2	**Relevant NCC DtS Provisions** Provision C2D2: The building must achieve the minimum fire resisting construction as specified in Specification 5. Specification 5: For a Class 7b building requiring Type A construction, the minimum FRLs prescriptively required are generally 240 minutes. **Proposed DtS Variation** Separating elements of the building structure (i.e. non-loadbearing elements) are proposed to achieve a minimum FRL of --/120/120 in lieu of --/240/240. This does not include building elements of the generator gantries or fuel storage rooms. Loadbearing elements are also proposed to have reduced FRL from 240/240/240 to 240/120/120. **Proposed Performance Solution** • Fire suppression and control systems (fire sprinkler, pre-action system, water mist fire suppression) provided throughout the building. • Increased level of horizontal fire compartmentation above of that required for Type A construction. • The use of the building is considered to be dissimilar to typical Class 7b uses which is defined by the BCA, and commodities stored in data centres are more aligned with a lower fire rating.
Lockable Bolts Fitted to Inactive Leaf of Fire Rated Doorsets **NCC DtS Provisions** Provision C4D6: Doorways in fire walls **Performance Requirements** C1P2	**Relevant NCC DtS Provisions** Provision C4D6 & Specification 12: Required fire doors within the building must be installed to comply with AS1905.1. AS1905.1: Fire rated doorsets must be self-closing and self-latching. **Proposed DtS Variation** Lockable bolts are fitted to the top and bottom of the inactive leaf of fire rated double doorsets. If these lockable bolts are engaged when the inactive leaf is not in the closed position, then it is possible for this hardware to inhibit the self-closure of this door leaf. **Proposed Performance Solution** The Performance Solution is reliant on implementation of building management procedures and security measures to ensure the inactive leaf remains in the closed position when not in use.
Extended Travel Distances – Generator Gantry	**Relevant NCC DtS Provisions** Provision D2D5: Where more than one exit is available, travel distances to the point of choice must not exceed 20 m and the travel distances to the nearest exit must not exceed 40 m.

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
NCC DtS Provisions Provision D2D5: Distance to the nearest exit Provision D2D6: Distance between alternative exits **Performance Requirements** D1P4 and E2P2	Provision D2D6: Travel distances between alternative exits must not exceed 60 m. **Proposed DtS Variation** Travel distances in the generator gantries extend up to 30 m to a point of choice, 50 m to the nearest exit and 95 m between alternative exits. **Proposed Performance Solution** • Fire suppression system provided throughout the building. • Gantry levels have perforated screen external façade on approx. 3 sides allowing venting of smoke, heat, and toxic fumes. • Occupants reach a temporary safe refuge by exiting the generator gantries. • Increased fire and smoke compartmentation within the building
Extended Travel Distances – Ground Floor and Level 1 **NCC DtS Provisions** Provision D2D5: Distance to the nearest exit Provision D2D6: Distance between alternative exits **Performance Requirements** D1P4 and E2P2	**Relevant NCC DtS Provisions** Provision D2D5: Where more than one exit is available, travel distances to the point of choice must not exceed 20 m and the travel distances to the nearest exit must not exceed 40 m. Provision D2D6: Travel distances between alternative exits must not exceed 60 m. **Proposed DtS Variation** Extended travel distances estimated to be: • Ground floor northern corridors: up to 50 m to the nearest exit and 95 m between alternative exits in lieu of 60 m. • Ground floor south-western mechanical chiller plant room: up to 75 m between alternative exits. • Level 1: up to 50 m to the nearest exit and 100 m between alternative exits. **Proposed Performance Solution** • Fire suppression system provided throughout the building. • Smoke detection system provided throughout ground floor in accordance with Section 5 of AS1670.1:2018 in lieu of DtS Section 7 spacing. • Increased compartmentation.
Extended Travel Distances – Roof Plant **NCC DtS Provisions** Provision D2D5: Distance to the nearest exit Provision D2D6: Distance between alternative exits **Performance Requirements** D1P4 and E2P2	**Relevant NCC DtS Provisions** Provision D2D5: Where more than one exit is available, travel distances to the point of choice must not exceed 20 m and the travel distances to the nearest exit must not exceed 40 m. Provision D2D6: Travel distances between alternative exits must not exceed 60 m. **Proposed DtS Variation** Extended travel distances are present on the roof level (not considering generator gantry on this level) of up to 55 m to the nearest exit 110 m between alternative exits. **Proposed Performance Solution** The Performance Solution is reliant on the openness of the roof space facilitating the free venting of smoke, heat, and toxic fumes. Travel distances to exit roof level enclosures to reach a fire-isolated exit or a temporary safe refuge (outside area that is open to space) is within the limitations of DtS provisions, noting that all outside roof areas have access to atheist two separate fire-isolated exits.
Extended Travel Distances – Data Halls	**Relevant NCC DtS Provisions** Provision D2D5: Where more than one exit is available, travel distances to the point of choice must not exceed 20 m and the travel distances to the nearest exit must not exceed 40 m.

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
NCC DtS Provisions Provision D2D5: Distance to the nearest exit Provision D2D6: Distance between alternative exits **Performance Requirements** D1P4 and E2P2	Provision D2D6: Travel distances between alternative exits must not exceed 60 m. **Proposed DtS Variation** The data halls on Levels 2-9 contains extended travel distances of up to: • 55 m to the nearest exit in lieu of 40 m. • 110 m between alternative exits in lieu of 60 m. Additionally, security measures prevent any re-entry into data halls such that travel back through the point of choice may not be available for occupants that have exited these rooms. **Proposed Performance Solution** • AS1670.1 fire detection system provided throughout including discrete zoning for corridors bounding the subject data halls. Where point-type detection is utilised, it shall be in accordance with spacing requirements in Section 5 of AS1670.1 in lieu of the DtS required spacing for smoke control systems (AS1668.1-Section 7). • On floor fire and smoke compartmentation (120/120/120 or --/120/120) of public corridors bounding the data halls. • Access to multiple exits from the floor plate (5 fire isolated exits on each level).
Width of paths of travel to exits **NCC DtS Provisions** Provision D2D8: Width of exits and paths of travel to exits, **Performance Requirements** D1P6	**Relevant NCC DtS Provisions** Provision D2D8: Travel paths to an exit must have an unobstructed width of no less than 1 m, except at doorways where 750 mm is permitted. **Proposed DtS Variation** The travel paths within the building contain momentary pinch points down to a minimum width of 750 mm in the data halls. **Proposed Performance Solution** The Performance Solution is reliant on the anthropometric data and precedent in the BCA for doorways that occupants are able to traverse 750 mm wide pinch points.
Internal discharge of fire isolated exit serving the office **NCC DtS Provisions** Provision D2D12 Travel via fire-isolated exits. **Performance Requirements** D1P4 and D1P5	**Relevant NCC DtS Provisions** Provision D2D12: Each fire isolated stairway or fire-isolated ramp must provide independent egress from each storey served and discharge directly or by way of its own fire isolated passageway to a road or open space. **Proposed DtS Variation** The western fire isolated stair (central stair) serving the office levels shall discharge into the data hall lobby (internal the building). **Proposed Performance Solution** • The lobby into which the stair discharges is sterile, and fire/smoke separated from the remainder of the ground floor plate with (120/120/120 or --/120/120) construction. • Mechanical air relief provided to the lobby to provide relief for the automatic stair pressurisation system which serves the subject stair • Main doors from the lobby to the open space swing in the direction of egress and have compliant door hardware (NCC D3D26) • Re entry to the floor plate from the fire stair permitted in accordance with NCC D3D27

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
Hydrants Requiring 2 Hose Lengths for Coverage **NCC DtS Provisions** Provision E1D2: Fire hydrants **Performance Requirements** E1P3	**Relevant NCC DtS Provisions** Provision E1D2: A hydrant system must be provided to serve a building with a floor area greater than 500 m². The hydrant system must be in accordance with AS2419.1. AS2419.1:2021: Where internal hydrants are provided for coverage, all parts of the floor must be within 40 m of an internal hydrant (30 m hose + 10 m spray). **Proposed DtS Variation** All levels above Ground Floor require 2 hose lengths from internal hydrants to achieve hydrant coverage to data halls and associated plant areas. This shall avoid the placement of hydrants and associated infrastructure within criteria operational parts of the building. DtS compliant coverage is provided to office parts. **Proposed Performance Solution** • Automatic fire suppression systems provided throughout. • Additional signage and floor specific block plans located at all internal hydrants and at the fire brigade booster assembly. • Increased fire and smoke compartmentation, providing flexibility in brigade operations when attacking a fire from a hydrant within a stair.
Hydrant System Design **NCC DtS Provisions** Provision E1D2: Fire hydrants **Performance Requirements** E1P3	**Relevant NCC DtS Provisions** Provision E1D2: A hydrant system must be provided to serve a building with a floor area greater than 500 m². The hydrant system must be in accordance with AS2419.1. **Proposed DtS Variation** The AS2419.1:2021 standard is not applicable to Class 7b buildings greater than 108,000 m³ in volume. **Proposed Performance Solution** Hydrant system shall be designed and demonstrated as suitable for the specific building and application in accordance with the guidance in Appendix C of AS2419.1:2021 which pertains to hydrant system design for buildings exceeding 108,000 m³ in volume.
Booster Assembly Locations **NCC DtS Provisions** Provision E1D2: Fire hydrants Provision E1D4: Sprinklers **Performance Requirements** E1P3 and E1P4	**Relevant NCC DtS Provisions** Provision E1D2: A hydrant system must be provided to serve a building with a floor area greater than 500 m². The hydrant system must be in accordance with AS2419.1. Provision E1D4 & Specification 17: A sprinkler system provided to the building must comply with AS2118.1. AS2118.1:2017 & AS2419.1:2021: If the hydrant or sprinkler booster assembly is located remote from the building, it must be within sight of the of principal pedestrian entrance to the building and either: • Adjacent to the site boundary and principal vehicular entrance for brigade appliances; or • Not more than 20 m from façade and main pedestrian entrance of the building. **Proposed DtS Variation** The hydrant and sprinkler booster assemblies are not within sight of the principal pedestrian entrance or adjacent to the main vehicular entrance. **Proposed Performance Solution** The Performance Solution is reliant on the booster assemblies being positioned in an appropriate and accessible location adjacent to a public road. Block plans indicating the booster location are to be provided at key fire infrastructure to assist in brigade wayfinding.

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
Omission of FHRs **NCC DtS Provisions** Provision E1D3: Fire hose reels **Performance Requirements** E1P1	**Relevant NCC DtS Provisions** Provision E1D3: A fire hose reel system is required to serve a building with internal fire hydrants or serve fire compartments greater than 500 m² in floor area. **Proposed DtS Variation** Fire hose reels are proposed to be omitted from all levels of the building above Ground Floor. **Proposed Performance Solution** The Performance Solution is reliant on low occupant numbers in data halls, and associated corridors and plant areas, and the provision of appropriate means of fire suppression for occupants (i.e. fire extinguishers). Electrical equipment is present throughout the building, and therefore presents a significant life safety risk if an occupant attempts to suppress a fire with water. It is noted that fire hose reels are not required in Class 5 office spaces.
Use of Water Mist System In lieu of Sprinklers to the Generator Enclosures **NCC DtS Provisions** Provision E1D4: Sprinklers **Performance Requirements** E1P4	**Relevant NCC DtS Provisions** Provision E1D4 & Specification 17: A sprinkler system provided to the building must comply with AS2118.1. **Proposed DtS Variation** The generator enclosures within the north-western gantries are proposed to be provided with alternative fire suppression by a high-pressure water mist system. **Proposed Performance Solution** The Performance Solution is reliant on the fire suppression capabilities of the water mist system to be equivalent to or no less effective than a DtS sprinkler design. Notwithstanding, the generator gantries housing these enclosures shall be provided with DtS compliant sprinkler protection.
Omission of Automatic Air Pressurisation System to Fire Isolated Stairs. **NCC DtS Provisions** Provision D2D13: External stairways or ramps in lieu of fire-isolated exits Provision E2D4: Fire-isolated exits **Performance Requirements** E2P2	**Relevant NCC DtS Provisions** Provision D2D13: External stairways may serve as a required exit in lieu of fire-isolated stairs for storeys below an effective height of 25 m. Provision E2D4: Fire-isolated stairways serving storeys above an effective height of 25 m must be provided with an automatic air pressurisation system in accordance with AS1668.1. **Proposed DtS Variation** A Performance Solution is proposed to omit automatic stair pressurisation to the five (5) stairs serving the data hall portion of the building. Note, the 2x northern fire-isolated stairs serving the offices shall be provided with DtS compliant pressurisation systems. **Proposed Performance Solution** External louvres shall be relied upon to facilitate the dispersion of any smoke or toxic gas ingress into the stair, thereby maintaining occupant tenability. Louvres shall be configured to reduce the risk of occupants experiencing vertigo or similar height related affects. All fire doors within the external stairs shall be provided with medium temperature smoke seals.

NCC DTS PROVISIONS	DETAILS OF PERFORMANCE BASED SOLUTION
Omission of Zone Pressurisation System – Data Halls **NCC DtS Provisions** Provision E2D6: Buildings more than 25 m in effective height: Class 5, 6, 7b, 8 and 9b buildings **Performance Requirements** E2P2	**Relevant NCC DtS Provisions** Provision E2D6: A Class 7b building more than 25 m in effective height must be provided with a zone pressurisation system between vertically separated fire compartments in accordance with AS1668.1. **Proposed DtS Variation** Zone pressurisation systems are proposed to be omitted from all areas of the building except Class 5 office spaces. **Proposed Performance Solution** • Low occupant presence in Class 7b areas and increased compartmentation (data halls, battery storage and generator room are all fire separated) such that smoke spread within the building is delayed and tenability is maintained for longer periods of time during a fire event. Noting additionally this increased compartment would make zone smoke control practically difficult to implement. • AS1670.1 compliant point type smoke detection throughout the building, and on a reduced spacing grid or Aspirated Smoke Detection (ASD). • Fire and smoke sealing of all services penetrations through the intermediate floors. • Extensive fire and smoke compartmentation to the data halls and corridors. • HVAC to data halls and cooling plant corridors shall be dedicated to each individual data hall and associated cooling plant corridor, thereby preventing smoke spread via HVAC systems across the floor plate and between levels.

7 PROPOSED FIRE SAFETY STRATEGY

OVERVIEW

The Fire Safety Strategy outlined below has been proposed to satisfy the fire and life safety objectives specified for this project by the relevant stakeholders. In addition, the FSCS is required to adequately address the specific fire and life safety hazards identified for the proposed development, and as such have been generally derived from the preventative and protective measures outlined within the NCC, and fire engineering literature and research. Where items of non-compliance have not been identified by the design team in the concept design phase, it is expected that those items will be DtS solutions.

7.1

This section provides guidance for the design and application of fire safety measures. It highlights specific design considerations for a range of fire safety measures that will undergo analysis as part of the FER to ascertain whether the relevant Performance Requirements of the NCC are satisfied. Design guidance (general informative details and specific requirements) for a range of specific fire safety measures is provided. This list is not exhaustive and the use of other fire safety measures including new technologies will require additional review.

FIRE RESISTING CONSTRUCTION

Type of Construction Required

7.2

The building shall be built in accordance with the NCC DtS provisions for Type A fire-resisting construction,

7.2.1

except that all separating elements in the building shall be permitted to achieve --/120/120 and 240/120/120 in lieu of the prescriptive --/240/240 and 240/240/240 FRL, subject to a Performance Solution to rationalise fire resistance of separating elements in the building structure.

Fire Compartmentation

7.2.2

For a building requiring Type A construction, the building must have the following maximum fire compartment sizes as per the DtS provisions of the NCC:

- Class 7b parts – 5,000 m² in floor area and 30,000 m³ in volume.
- Class 5 parts – 8,000 m² in floor area and 48,000 m³ in volume.

The data halls and its surrounding corridors shall have further discretisation of fire zones above that of prescriptive requirements to provide increased fire compartmentation with -/120/120 separation and -/120/30 door sets. This reduces fire and smoke spread through the floor and in the building ameliorating occupant tenability during egress.

The battery rooms within the building shall be fire-separated in accordance with Provision C3D13 of NCC 2022 irrespective of the capacity of the battery system.

7.2.3

The fuel storage rooms shall be fire-separated from the building to achieve minimum 240 min FRL in accordance with the requirements of the DG report.

Fire Rated Doorsets

7.3

Where protection is required within the building, fire doors must comply with DtS provisions of the NCC and

7.3.1

AS1905.1. This is to the exception of fire-rated double door sets where a Performance Solution is proposed (if desired by the design team) to address the DtS non-compliant lockable bolts installed on the inactive leaf possibly inhibiting the self-closure of the door leaf.

EGRESS PROVISIONS

7.3.2

Evacuation Strategy

Activation of any suppression or detection system in the building should initiate the building alarm. The evacuation strategy shall be the subject of further review and determination through detailed design in collaboration with the relevant stakeholders, including the Emergency Control Organisation for the building – as appropriate.

Egress Widths

The widths of exits and paths of travel to exits within the building must comply with DtS provisions of the NCC, i.e. not less than 1 m wide except at doorways where 750 mm is permitted. A Performance Solution may be feasible to support isolated instances of reduced widths down to 750 mm in the path of travel such as pinch

points between columns and data racks within the data halls, however the majority of the building shall comply with DtS requirements.

Travel Distances

In the building, travel distances to the nearest exit and between alternative exits must be compliant with the NCC DtS requirements (maximum of 20 m to the point of choice, 40 m to the nearest exit and 60 m between alternative exits) with the following exceptions identified and illustrated in Figure 7-1 to Figure 7-5:

- Ground Floor Northern Corridors – travel distances extend up to 50 m to the nearest exit and 95 m between alternative exits.
- Ground Floor South-Western Plant Room – travel distances extend up to 75 m between alternative exits.
- Level 1 – travel distances extend up to 50 m to the nearest exit and 100 m between alternative exits.
- Generator Gantries (On levels 1, 2, 4, 6, 8, 9) – travel distances extend up to 30 m to a point of choice, 50 m to the nearest exit and 95 m between alternative exits.
- Data Halls (On levels 1, 2, 4, 6, 8, 9) – travel distances extend up to 55 m to the nearest exit and 110 m between alternative exits.
- Roof – travel distances extend up to 55 m to the nearest exit and 110 m between alternative exits.
- Security provisions may prevent re-entry into the data halls or their associated cooling plant corridor. Thus, travel back through the original point of choice between alternative exits will not be available for occupants that originally exit from these rooms/areas.

7.3.3

These non-conformances shall be addressed through the following Performance Solutions.

- Ground Floor and Level 1:
  - Additional fire and smoke separation to be implemented to reduce travel distances to reach a safe refuge (passing fire-rated wall) to be within DtS limitations of 40 m to the nearest and 60 m in between. This is proposed to be achieved by addition of fire and smoke doors to corridors on Ground and Level 1 as depicted in Figure 7-1 and Figure 7-2. The exact location and configuration of these corridors shall be determined during the detailed design phase.
  - If the Ground Floor south-western plant room is proposed to be further compartmentalised, then the strategy shall adopt the same method of achieving DtS travel distances between fire and smoke separated compartments within the plant room.
  - However, if an open plan space is proposed for the plant room, a quantitative travel distance assessment may be feasible contingent on smoke modelling results of the open compartment. The strategy in this case will be reliant on the large reservoir volume of the plant room to maintain tenable conditions on the occupant level during the timescale of evacuation.
  - In addition to the above, a DtS compliant smoke detection system shall also be provided throughout Ground and Level 1, with spacing requirements in accordance with Section 5 of AS1670.1:2018. The reduced detector spacing shall assist in offsetting the extended travel time in these areas.
- Generator Gantries:
  - The perforated façade on approx. 3 sides of the generator gantries is relied on to naturally ventilate the space of any smoke and noxious fumes from the fire. This prevents the accumulation of hazardous gases maintaining egress tenability in this space.
  - The generator gantries shall also be separated from the rest of the building by fire-resisting construction achieving minimum --/240/240 or 240/240/240 FRL such that occupants are considered to have reached a temporary safe refuge after exiting from the gantry.
- Data Halls:
  - Increased compartmentation is proposed to the data halls by addition of fire and separation at the end of corridors as depicted in Figure 7-3, effectively reducing the travel distance to a safe refuge. The exact location and configuration of these corridors shall be determined during the detail design phase.
  - Due to the security restrictions in data halls, occupants may not be able to re-enter the data halls after exiting and therefore are not able to return to the point of choice as required in the DtS provision for travel to an alternative exit. The proposed increased compartment in combination with the sterile nature of the corridors shall allow occupants to safely navigate to an alternative exit should the first exit be unavailable.

- Roof:
  - Travel distances within roof enclosures to reach a fire-isolated exit or an area open to space shall be maintained within the DtS limitations (20 m to POC, 40 m to the nearest and 60 m between alternatives). Once occupants reach an open roof area, they are considered to be remote from the harmful effects of a fire within the building.
  - All open roof areas shall be provided with access to two separate fire-isolated exits, allowing occupants to evacuate without re-entering the building floor plate.
- In all cases, the building shall be provided with a compliant sprinkler system throughout (with exception to generator enclosures) in accordance with AS2118.1 with the expectation that the suppression system will control the spread and development of an internal fire within the building.

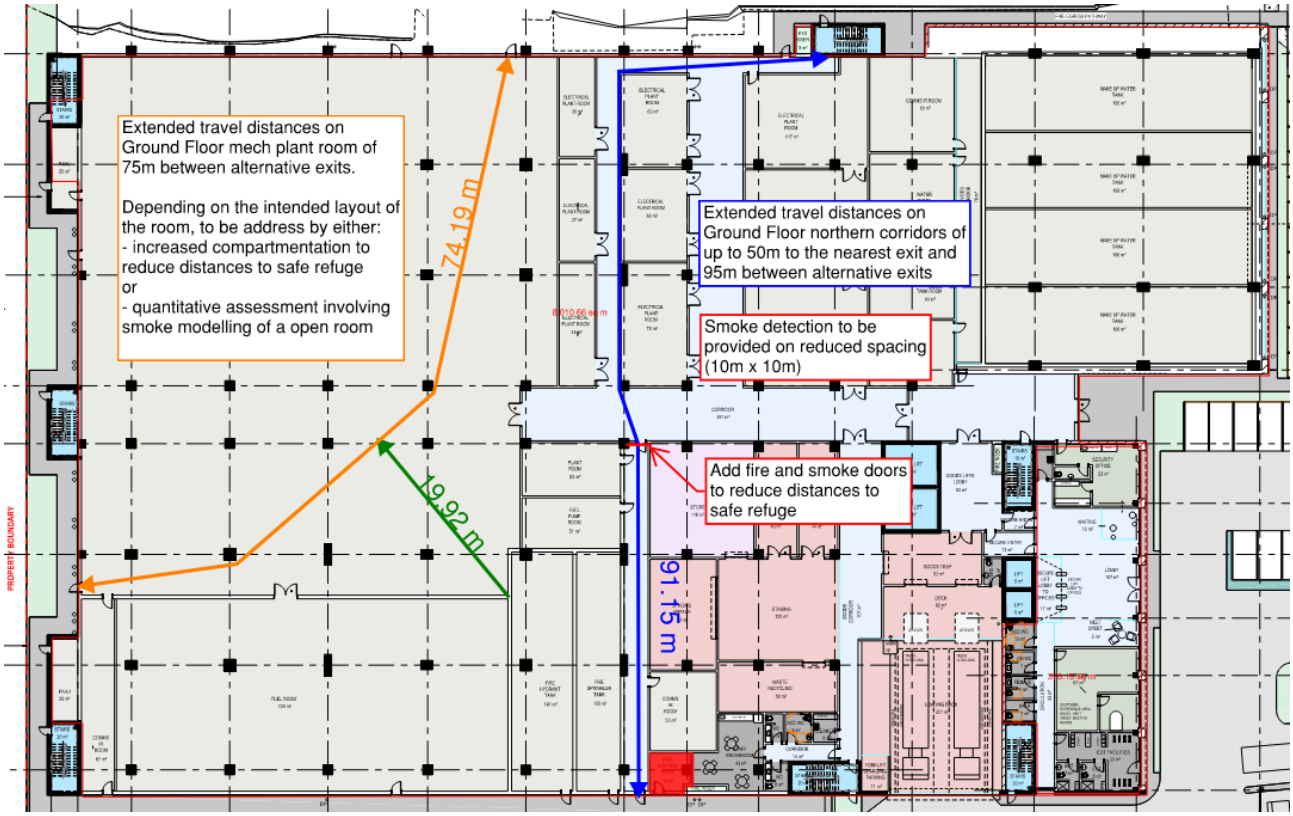


Figure 7-1: DtS non-compliant travel distances – Ground Floor

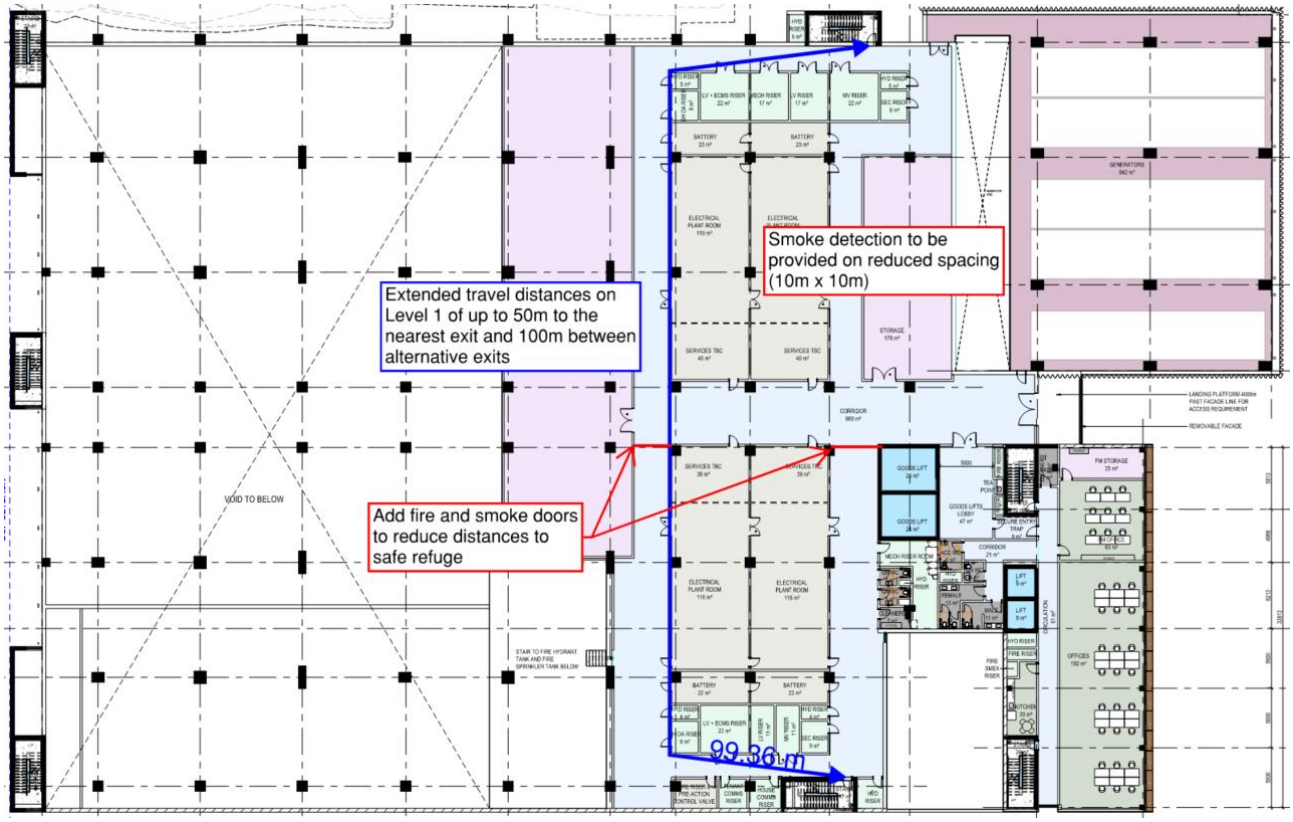


Figure 7-2: DtS non-compliant travel distances – Level 1

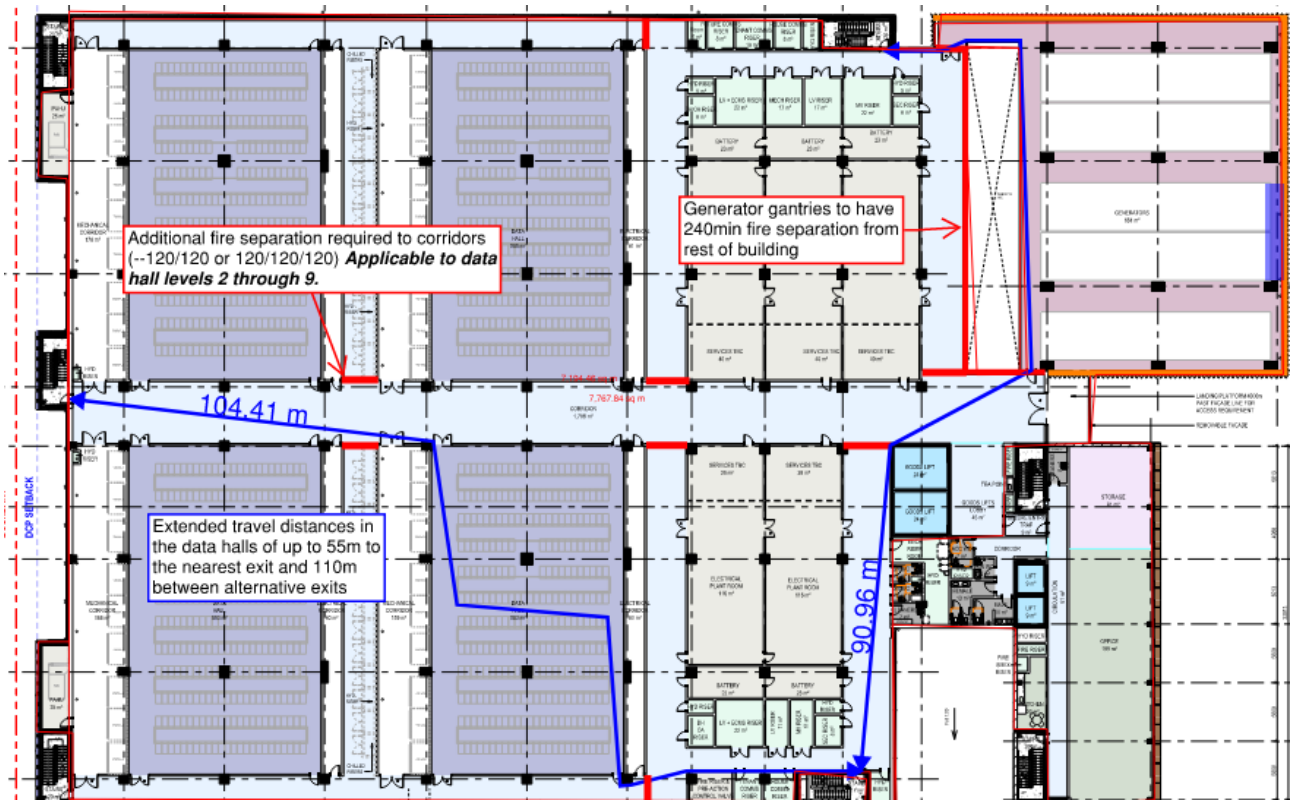


Figure 7-3: DtS non-compliant travel distances – Data Halls (typical on all applicable levels)

Note, exact location and configuration of the additional corridor separation as shown in Figure 7-3 *to be determined during the detailed design phase.*

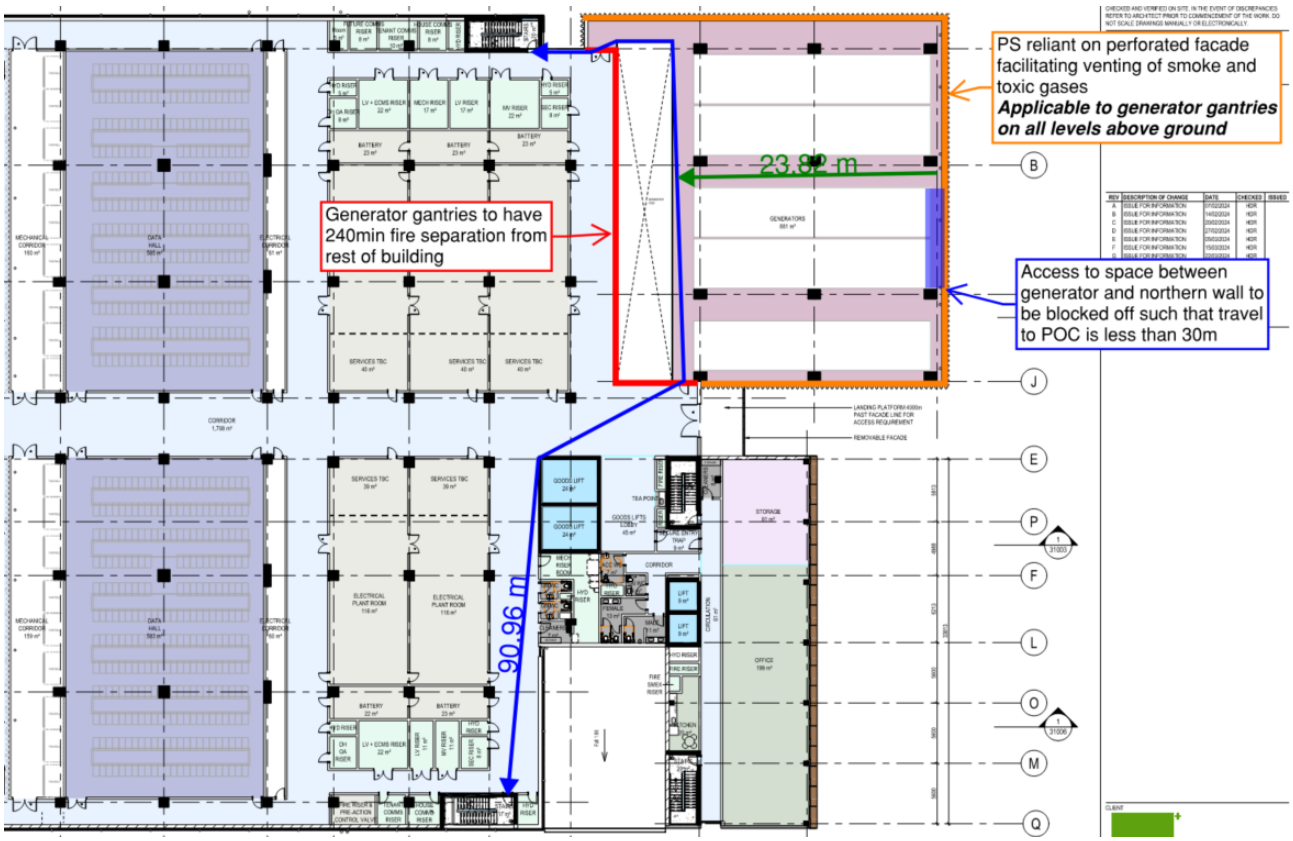


Figure 7-4: DtS non-compliant travel distances – Generator Gantries (typical on all applicable levels)

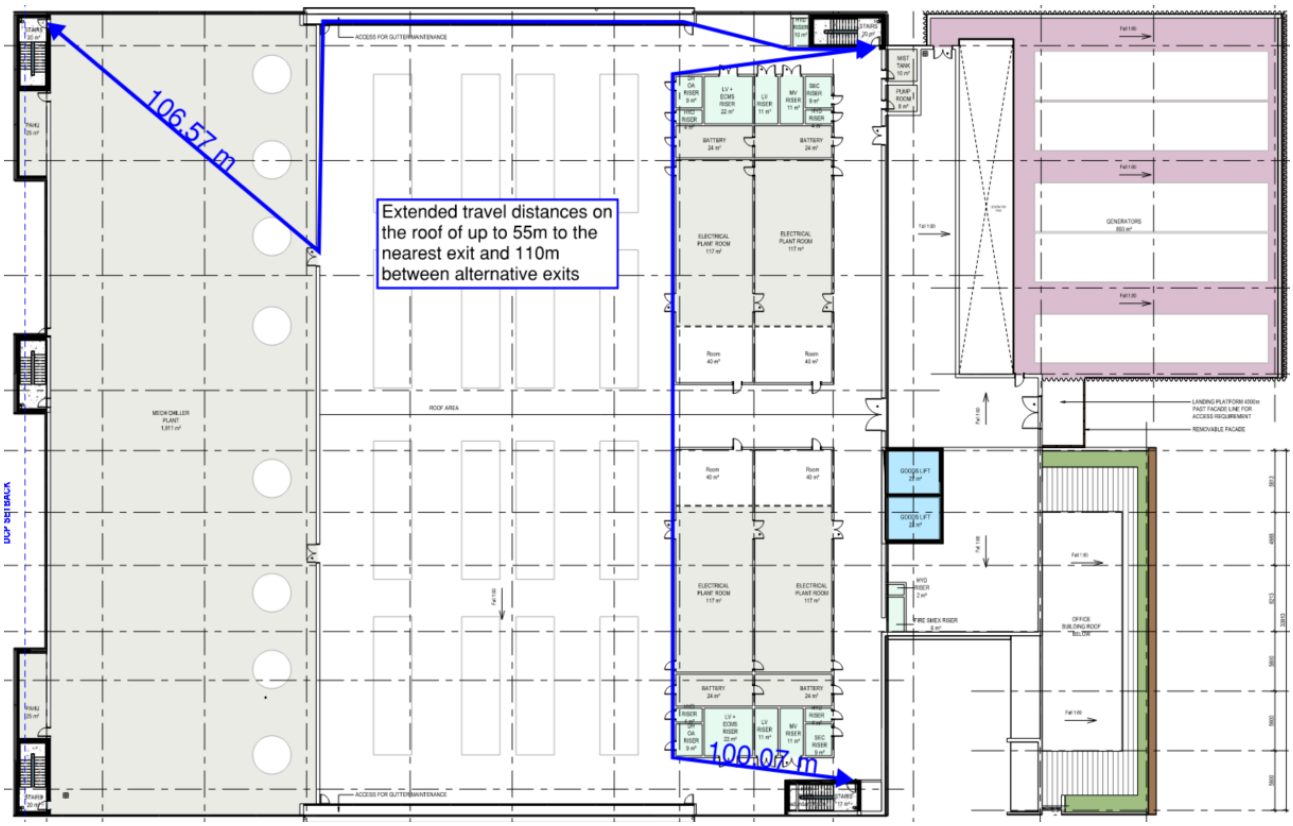


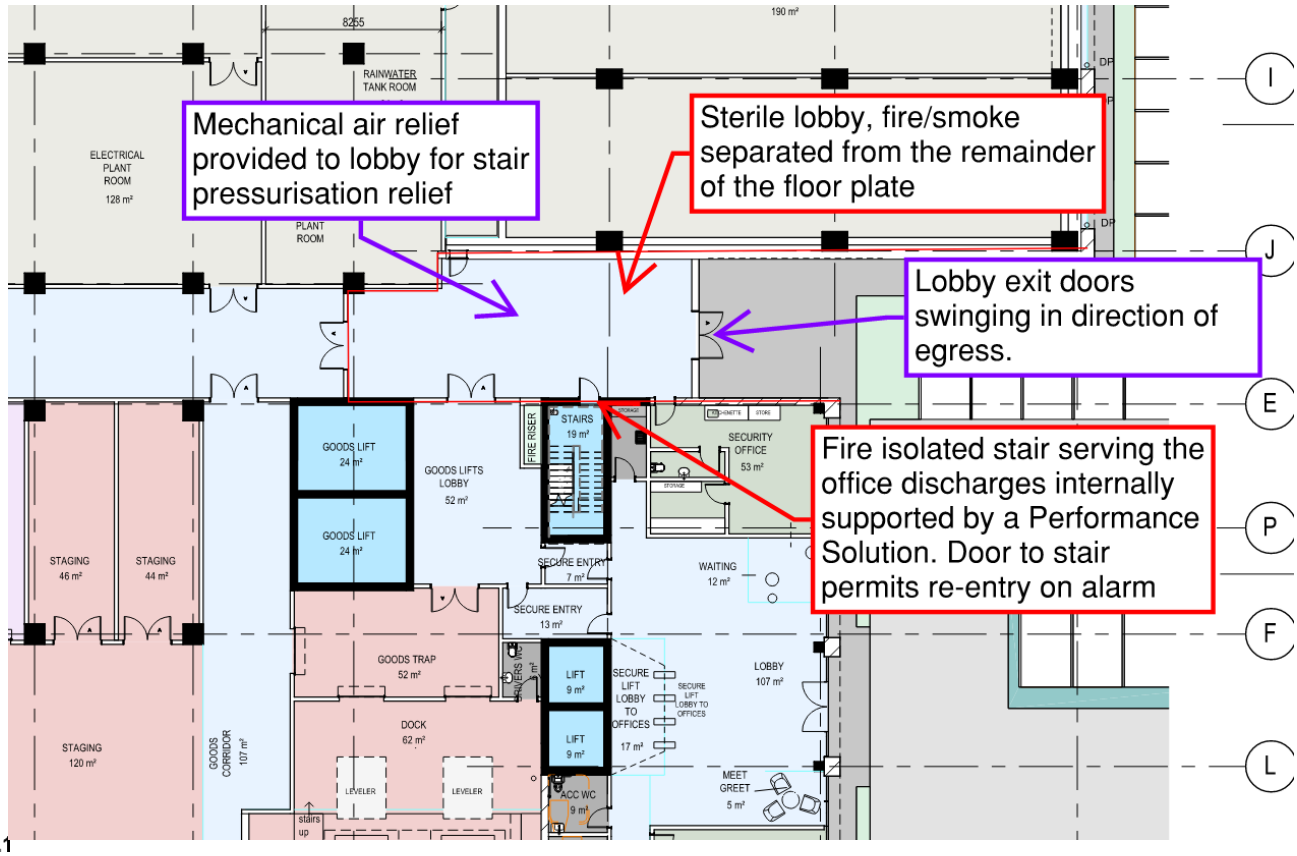
Figure 7-5: DtS non-compliant travel distances – Roof

Fire Isolated Exits

The building shall be provided with five (5) fire isolated exits serving the data hall portion of the building and two (2) fire isolated exits serving the office portion of the building. All exits shall comply with the DtS requirements of D2D12, except the western (central) stair serving the office, which shall internally discharge into the lobby space, in lieu of directly to the open space or the other permitted configurations by this Clause. The proposed Performance Solution to permit this discharge configuration shall be reliant on the following:

7.3.4

- The lobby into which the stair discharges is sterile, and fire/smoke separated from the remainder of the ground floor plate with (120/120/120 or --/120/120) construction.
- Mechanical air relief provided to the lobby to provide relief for the automatic stair pressurisation system which serves the subject stair
- Main doors from the lobby to the open space swing in the direction of egress and have compliant door hardware (NCC D3D26)
- Re-entry to the floor plate from the fire stair on the levels above the ground floor is permitted in accordance with NCC D3D27, along with re-entry into the stair on ground floor. This shall allow occupants to re-enter the floor and navigate to the alternative office stair which discharges directly to outside if required.



7.4

7.4.1

Figure 7-6: Fire isolated stair serving the office discharges internally supported by a Performance Solution

FIREFIGHTING EQUIPMENT

Fire Hydrants

A dedicated hydrant system with independent booster assembly must be provided to serving the building in accordance with NCC Provision E1D2 and AS2419.1:2021 with the following specifications:

- Internal fire hydrants shall be provided within fire-isolated stairways to serve all levels above ground. A Performance Solution is proposed to permit hydrant coverage to these levels to be achieved by 2 hose lengths from an internal hydrant (70 m) in lieu of the DtS prescriptive maximum of 40 m.

- All hose connections in the system are to be fitted in accordance with FRNSW Technical information sheet – FRNSW compatible hose connections (available at firesafety.fire.nsw.gov.au). These couplings should be tested as part of the system when the commissioning tests are undertaken.
- The hydrant booster assembly is proposed to be located on the eastern side of the building, adjacent to the public road. The non-compliant location of the booster assembly shall be addressed by a Performance Solution.
- Additional hydrant flowrate of 30 L/s in lieu of the minimum prescriptive 20 L/s is understood to be proposed to offset the risks associated with the presence of Lithium-ion batteries within the facility.

Fire Hose Reels

Fire hose reels shall be provided throughout ground floor only in accordance with Provision E1D3 of the NCC and AS2441:2005. A Performance Solution shall be presented to omit the provision of FHRs in data hall areas due to presence of electrical equipment susceptible to water damage. It is noted that FHRs are not prescriptively required in Class 5 office spaces.

7.4.2 FHR locations on Ground Floor should be signposted and readily accessible to occupants. Where necessary, the use of internal fire hydrants necessitates the installation of hose reels adjacent to the hydrants in accordance with AS2441:2005 and Provision E1D3 of the NCC. All points on the floor should be within reach of a 4m hose stream issuing from a nozzle at the end of the hose laid on the floor with a hose length not exceeding 36 m (i.e. a maximum of 40 m from the hydrant location).

Fire Sprinkler System

7.4.3 A fire sprinkler system shall be provided throughout the building in accordance with the DtS Provisions and AS2118.1:2017. It has been advised by the fire services engineer for the project that the proposed system shall be designed to an Ordinary Hazard 3 (OH3) classification.

- In the office spaces, generator gantries and Ground Floor of the building, a wet sprinkler system shall be provided in compliance with NCC Specification 17 and AS2118.1:2017.
- In the data halls, a pre-action sprinkler system shall be provided in accordance with NCC Specification 17 and AS2118.1:2017.
- The generator enclosures on the gantries shall be provided with a water mist system in lieu of a DtS compliant sprinkler system, to be addressed via a Performance Solution.

7.4.4 The DtS non-compliant location of the sprinkler booster at the eastern side of the building is proposed to be addressed by a Performance Solution.

Portable Firefighting Equipment

Portable fire extinguishers are to be provided throughout the building in accordance with Provision E1D14 of the NCC and selected, located, and distributed in accordance with AS2444:2001.

7.4.5 The data halls areas shall be provided with additional PFEs in appropriate locations to afford personal fire suppression opportunities in lieu of FHRs.

Control and Indicating Equipment

7.5 The building shall be provided with a Main Fire Indicator Panel (FIP) within a compliant fire control centre accessed from the eastern side of the building, in proximity to the fire pump room and brigade boosters.

7.5.1 A Performance Solution is proposed to address the DtS non-compliant location of the Main FIP away from the principal building entry.

The fire panel must be installed in accordance with NCC Specification 20 and AS1670.1:2018.

SMOKE HAZARD MANAGEMENT

Smoke Detection System

A smoke detection system shall be provided throughout the building in accordance with AS1670.1.

- Smoke detection shall be provided throughout the data hall areas (Class 7b) of the building with reduced spacing in accordance with Section 5 of AS1670.1 (i.e. 10 m x 10 m). Noting that the data halls themselves are understood to be provided with Aspirated Smoke Detection systems.
- The smoke detection system on Ground Floor shall be provided on reduced spacing in accordance with Section 5 of AS1670.1 (i.e. 10 m x 10 m) to offset extended travel distances.

Activation of detectors in any part of the building must initiate the EWIS system.

Fire-Isolated Exits

Fire-isolated stairways are required to serve storeys of the building greater than 25 m in effective height. Further, these stairs are required to be provided with stair pressurisation system in accordance with AS1668.1.

- A Performance Solution is proposed to omit stair pressurisation to the five (5) stairs serving the data hall portion of the building based on:
  - Louvres shall be installed in the external walls of these stairs in lieu of providing stair pressurisation. The external louvres shall facilitate the dispersion and natural ventilation of smoke and toxic gases maintaining occupant tenability within the stair.

7.5.2

  - All fire doors to these stairs shall be provided with medium temperature smoke seals.
- The 2x northern fire-isolated stairs serving the offices shall be provided with DtS compliant pressurisation systems.

All fire stairs are to discharge directly to outside, as required by the DtS Provisions except the western stair serving the office portion which shall be address as part of a Performance Solution discussed in Section 7.3.4. Re-entry provisions are to be made available.

Emergency Warning and Intercommunication System

As the building has an effective height of more than 25 m. An emergency warning and intercommunication system (EWIS) shall be provided throughout all parts of the building. The system should be in accordance with the prescriptive requirements of Provision E4D9 of NCC 2022 and AS1670.4.

7.5.3

VISIBILITY IN AN EMERGENCY

7.6 Emergency lighting is to be provided throughout the building in accordance with DtS Provisions E4D2 and E4D4 of the NCC 2022 and AS2293.1:2018.

Exit signage is to be provided throughout the building in accordance with the DtS Provisions E4D5, E4D6, E4D8 of the NCC 2022 and AS2293.1:2018.

7.7 BUILDING MANAGEMENT PROCEDURES

The ongoing management of the building is as important in maintaining a high level of life safety as the provisions recommended during the design phase of the building.

7.7.1 Maintenance of Fire Safety Equipment

7.7.2 The fire safety systems should be tested and maintained in accordance with Australian Standard AS1851.

Evacuation Plan

An emergency management plan should be developed for the site in accordance with AS3745:2010.

8 NOMENCLATURE

ACRONYM	EXPANSION
ABCB	Australian Building Codes Board
AFEG	Australian Fire Engineering Guidelines
AFSS	Annual Fire Safety Statement
CFD	Computational Fluid Dynamics
DtS	Deemed-to-Satisfy
EPA	Environmental Protection Authority
FCC	Fire Control Centre
FER	Fire Engineering Report
FHR	Fire Hose Reel
FIP	Fire Indicator Panel
FRL	Fire Resistance Level
FRNSW	Fire Rescue NSW
FSCS	Fire Safety Concept Strategy
IFEG	International Fire Engineering Guidelines
NCC	National Construction Code
NFPA	National Fire Protection Association
OSD	Onsite Stormwater Detention
PFE	Portable Fire Extinguisher
RTI	Response Time Index
WHS	Workplace health and safety

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