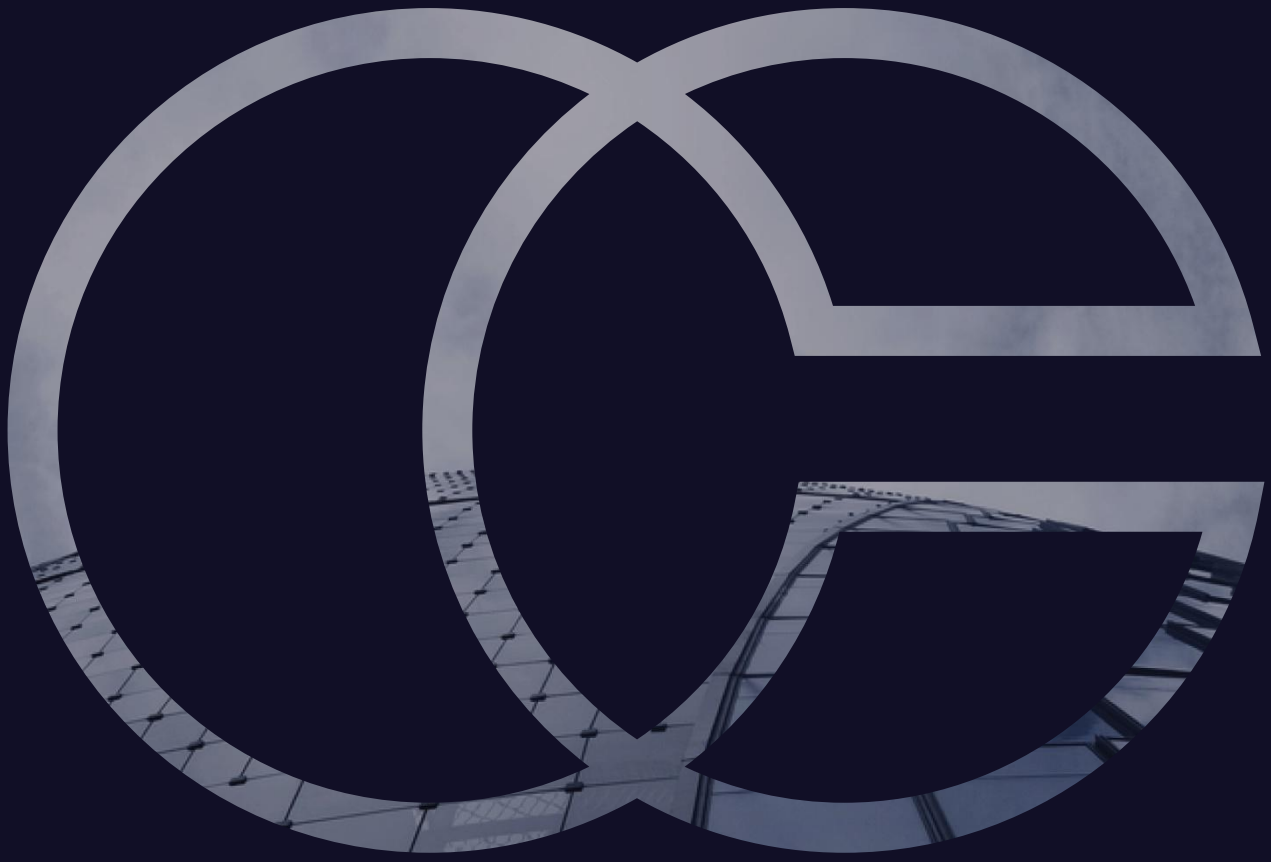

Leading the way with fire safety

Fire Safety Concept Strategy

WH4 Aspect Industrial Estate
826-882 Mamre Road, Kemps Creek NSW

Client:Mirvac

14 November 2025
Draft for Comment
Report No. F202901_FSCS_01

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1. Introduction

1.1 Overview

CORE Engineering Group has been engaged by Mirvac to prepare a Fire Safety Concept Strategy for the WH4 Aspect located at 826-882 Mamre Road, Kemps Creek NSW. The project encompasses the construction of a new 30,000 m² warehouse and distribution centre with an ancillary two-storey office, dock offices and external on-grade carpark.

1.2 Scope

The purpose of this report is to document the proposed holistic fire safety strategy for the building including the likely fire engineering trial design which has been established based on review of the proposed documentation, consultation with the client and relevant stakeholders and CORE Engineering Group's previous experience.

Due to the complexity of the building design, a fully prescriptive approach of complying with the National Construction Code, Volume 1 2022 Amendment 2 (NCC) Deemed-to-Satisfy (DtS) Provisions for occupant egress, fire resisting construction, fire services, and fire brigade intervention would not satisfy the desired architectural, operational and client aspirations.

As such, Performance Solutions to satisfy the Performance Requirements of the NCC have been proposed to account for the identified departures from the DtS Provisions.

1.3 Sources of Information

This following sources of information have been relied upon to develop this FSCS:

- National Construction Code, Volume 1 (2022 Amendment 2).
- Site and Warehouse plan prepared by SBA architects dated 31 October 2025, Revision J.
- SSDA MOD 12 Estate Masterplan prepared by SBA architects dated 5 November 2025, Revision C.

1.4 Limitations, Assumptions and Exclusions

- 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 document has been prepared for guidance only, and any parties relying on this should be cognisant that the recommendations are preliminary and subject to detailed analysis and authority approvals.
- This report does not constitute a fire engineering report (FER) that addresses the Performance Requirements of the BCA.
- This FSCS has been prepared in the absence of a BCA report and therefore is subject to change should this be received.

2. Building Description

2.1 Site Context

The development site is located in Aspect Industrial Estate in Kemps Creek, approximately 40 km west of Sydney's central business district which consists of multiple lots located on Mamre Road Lots 1-5 DP1285305. Access to the site is available via Access Road 3 for both vehicle and pedestrian entry and exit points on this road.

Figure 2-1: Development Site Context (Nearmap)

Figure 2-2: Overall Estate Plan

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 St Marys and Bonnyrigg Heights, approximately 10 km and 11 km from the site respectively.

2.2 Building Description

The proposed site consists of a number of buildings at the development site at 826-882 Mamre Road, Kemps Creek NSW. The development in question for this report consists of a speculative storage and distribution facility, referred to as Warehouse 4, as depicted in Figure 2-3. The subject building is a large-isolated building of Type C construction, and shall have a 13.7 m ridge height. Note that Warehouse 4 includes two two-storey ancillary office on the southwest corner. The building features are summarised as follows:

- Warehouse floor area is 30,095 m^2.
- 2-storey main office with a floor area of 700 m^2, with 2 dock offices adjacent to the recessed loading docks.
- Loading docks and associated hardstands provided along the northern and southern perimeters.
- Fire service infrastructure is provided along the northern perimeter of the site.

Figure 2-3: Site Plan / Ground Floor Plan

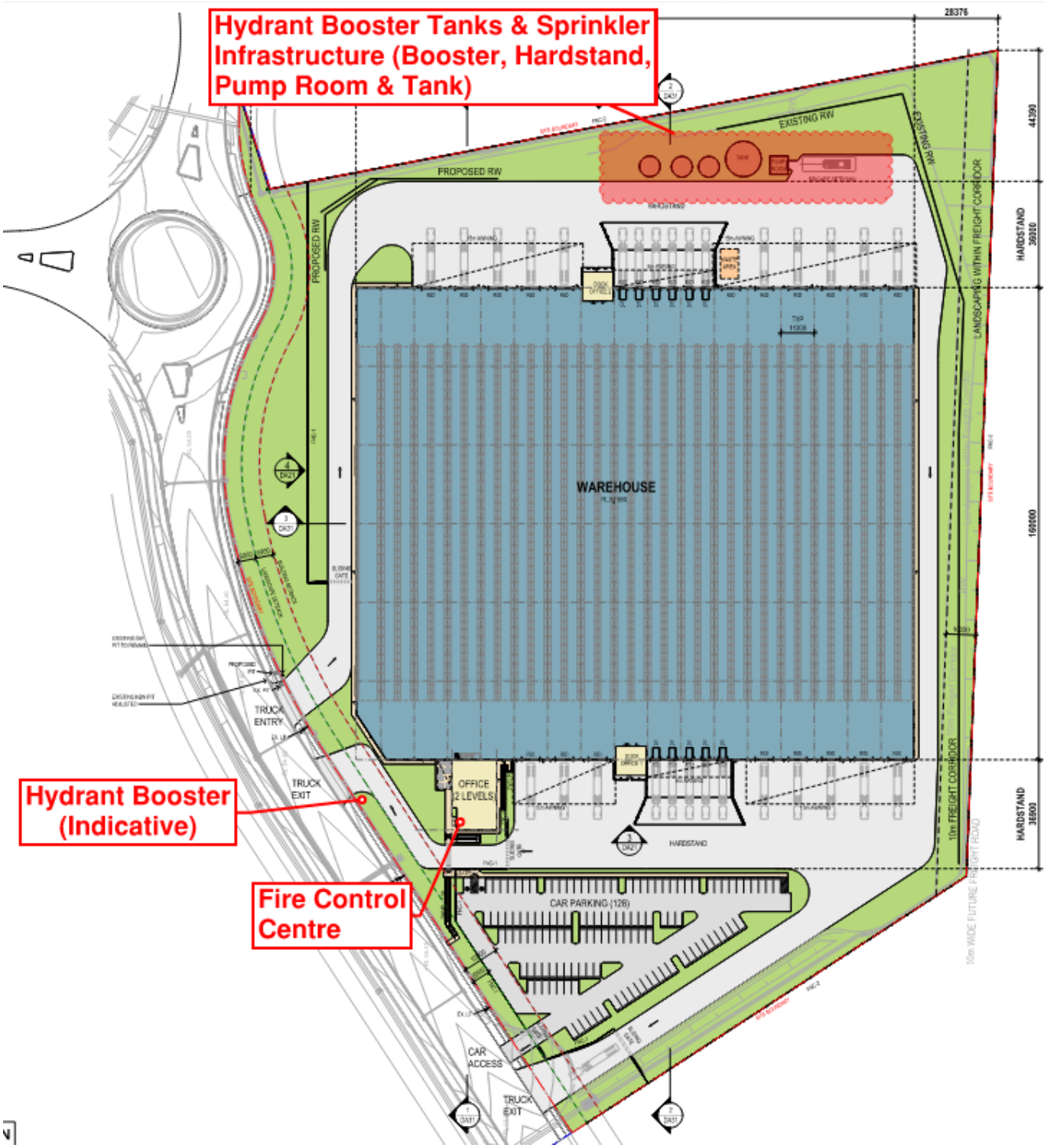

Figure 2-4: Fire brigade infrastructure

2.3 Proposed Building NCC Characteristics

The NCC characteristics of the building influence the fire safety strategy and requirements. These characteristics are summarised in Table 2-1 noting that this has been developed in the absence of a BCA report.

Table 2-1: NCC Building Characteristics

NCC Characteristic	Base Building
Classification(s) :	Class 5 (Office), Class 7b (Storage)
Rise in storeys:	Two (2)
Construction:	Type C* required (Large Isolated Building)
Effective height:	13.7 m

2.4 Potential Fire Hazards Relevant to the Development

The development is likely to contain a number of fire hazards which will influence the fire safety strategy and measures required. These are documented below with the expected requirements to suitably mitigate the hazard. Addressing these hazards is not a Performance Solution however shall form part of the fire safety strategy to be agreed and accepted by the relevant stakeholders. At this preliminary stage the hazards on the following sections are expected, to be further developed through the further stages of the fire engineering approval.

2.4.1 Substation

The location of the substation shall maintain a minimum separation distance of 10 m from all fire brigade infrastructure (e.g. fire hydrants, boosters). The substation shall be constructed in accordance with the requirements of the relevant supply authority.

2.4.2 PV Cells

PV cells are proposed to the roof of the warehouse as proposed in Figure 2-5. The following general design guidance is provided in order to limit electrical exposure to evacuating occupants or attending fire fighters:

- The panels shall be installed in compliance with AS/NZS 5033:2012.
- Solar panel / inverter isolation switches should be accessible from Ground Floor.
- A diagram of the solar installation shall be provided at the FDCIE showing the locations and key infrastructure and confirming whether they do or do not isolate on fire trip.
- Where insulation is proposed below the solar panels, it is recommended to be non-combustible.
- Recommended that panels are located no closer than 1 m from a roof light or other combustible portion of the roof.

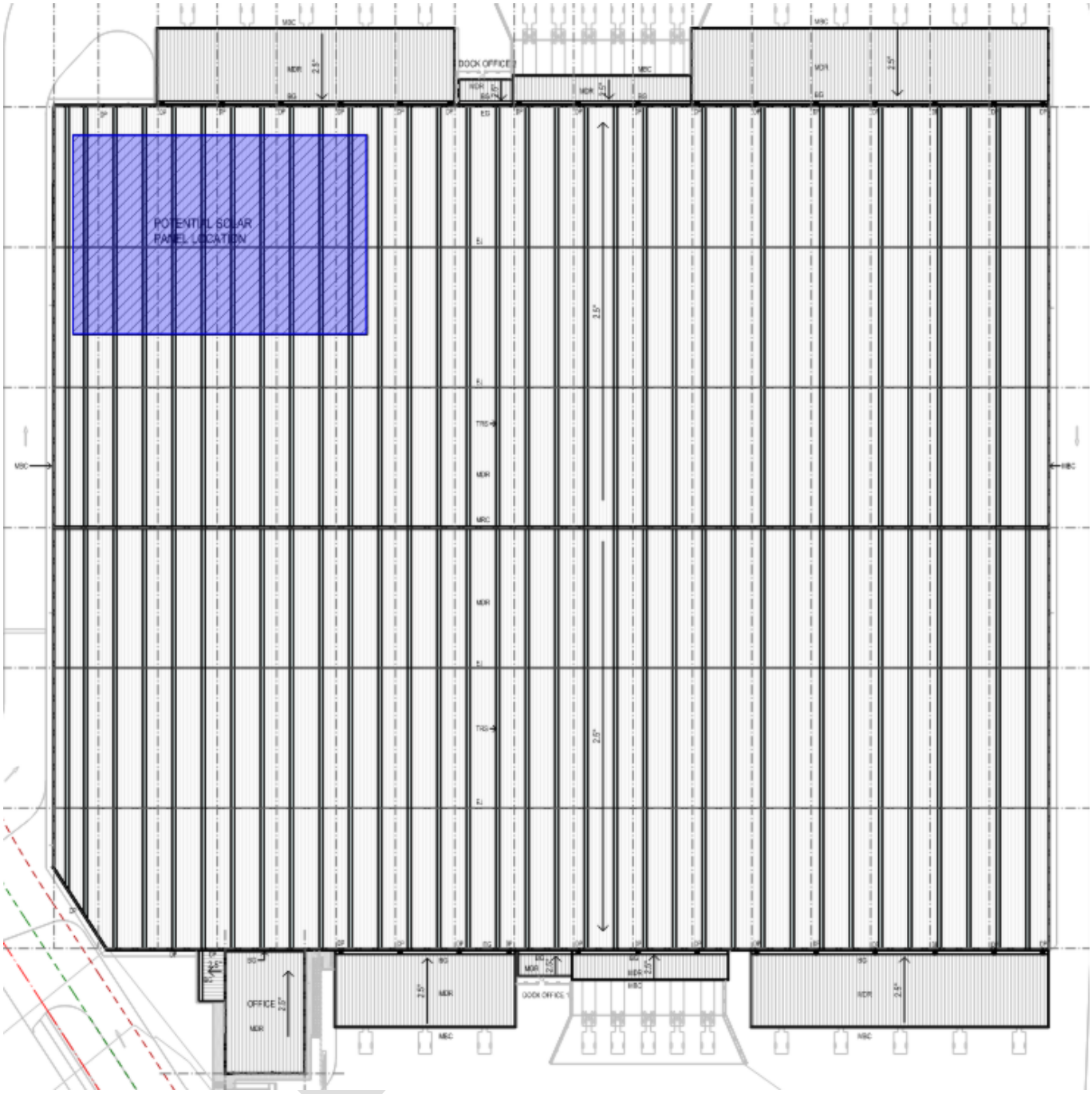

Figure 2-5: Indicative extent of solar panels

2.4.3 External Electric Vehicle Charging

A number of external electric vehicle chargers are anticipated to serve the facility. EVs can pose unique challenges to firefighting and evacuation. Mitigating measures are recommended for these installations, with consideration of industry guidance including ABCB's Advisory Note on EV charging, FRNSW position statement, and AFAC's Position Statement Document entitled "Electric Vehicles and EV Charging Equipment in the Built Environment".

- Where practical, charging bays shall be located greater than 6 m from the building, including any awnings.
- At a minimum, charging bays must be positioned greater than 3 m from building exit points.
- Charging bays must be positioned no closer than 10 m to fire brigade or electrical infrastructure including fire hydrants and substations.

- Charging bays should be within 70 m of the nearest fire hydrant(s) to enable fire brigade intervention.
- Where charging bays are proposed within 6 m of the building, the chargers shall be configured to automatically shut down upon fire detection within the building (e.g. activation of sprinklers or smoke detection system as applicable).
- Chargers shall be installed in accordance with AS3000, shall have RCM tick compliance, and where practical, smart charging shall be incorporated.
- The EV charger(s) should have a manual isolation switch, and the distribution board serving them should also have a shutdown switch, to be indicated on a block plan.
- A block plan clearly identifying the location of each charger on site shall be provided adjacent to the FDCIE.

2.4.4 Internal Material Handling Equipment (MHE) Charging

Forklifts within the building may be powered by Li-Ion batteries, in which case, the guidance relevant to the external EV chargers is also generally applicable, with the following considering the internal location of these:

- Charging bays shall be positioned such that they are not located on any dead-end travel paths, and are greater than 3 m from building exit points.
- Charging bays should be located greater than 6 m from DG storage, BESS, solar panel inverters, gas pipework and the like (or 10 m if non-sprinklered building)
- The chargers shall be configured to automatically shut down upon fire detection within the building (e.g. activation of sprinklers or smoke detection system as applicable).
- The proposed charging bays should be located in an area served by an automatic smoke exhaust system, or manual smoke clearance system; or where the building does not contain either, in a large ventilated compartment.
- Chargers shall be installed in accordance with AS3000, shall have RCM tick compliance, and where practical, smart charging shall be incorporated.
- If multiple chargers are proposed in close proximity to each other, a master isolation switch should be provided in an easily identifiable location, remote from the chargers
- A block plan clearly identifying the location of each charger on site shall be provided adjacent to each fire panel as relevant. This plan should also show the location of master isolation switch and summarise shutdown procedures.

3. Proposed Fire Engineering Design Requirements

The below summarises the proposed fire engineering requirements likely to satisfy the Performance Requirements of the NCC. Where not specifically identified or noted, the remainder of the building elements is assumed to comply with the DtS Provisions of the NCC.

3.1 Fire Resistance

3.1.1 Structure

The building requires Type C construction as a large-isolated building and therefore no FRLs are required for the building's structural elements.

3.1.2 Compartmentation

As a large-isolated building, the building is proposed to be a single fire compartment.

3.1.3 Perimeter Vehicular Access

A vehicle perimeter access pathway is required around the building, constructed with an all-weather surface capable of supporting all FRNSW appliances in accordance with NCC Provision C3D4 and the FRNSW Fire Safety Guideline "*Access for fire brigade vehicles and firefighters*". The pathway must be at least 6 m wide and located within 18 m of the building on all sides, and provide continuous travel in a forwards direction around the building, with the following exceptions:

- The path exceeds 18 m along the southern western corner of the warehouse.

The following measures should be provided as part of the design and layout of the perimeter access pathway:

- The pathway shall have sufficient width, swept paths and loadbearing capacity to support the specialist brigade appliances to appropriately stage, as per FRNSW's Guideline Clause 7 "Vehicle access requirements" and 9 "Weight and loads".
- Areas where the pathway is greater than 18 m from the building is generally along the public road with limited obstructions, barring landscaping, affecting visibility of the building.
- Brigade appliances are provided with a dedicated bay to connect to the available sprinkler tank suction connections and otherwise set up their appliances, such that the circulation of other emergency vehicles is not hindered by the connected appliance. Line marking areas shall be provided for these designated spaces to ensure that they are not otherwise occupied.
- Gates in the perimeter access path to be on loose chain openable by 003 key, auto unlatch on fire trip, or copies of keys and swipes provided to the two local fire brigade stations.
- Staging opportunities greater than 6m wide and within 18m of the building to be provided at all four corners of the building.

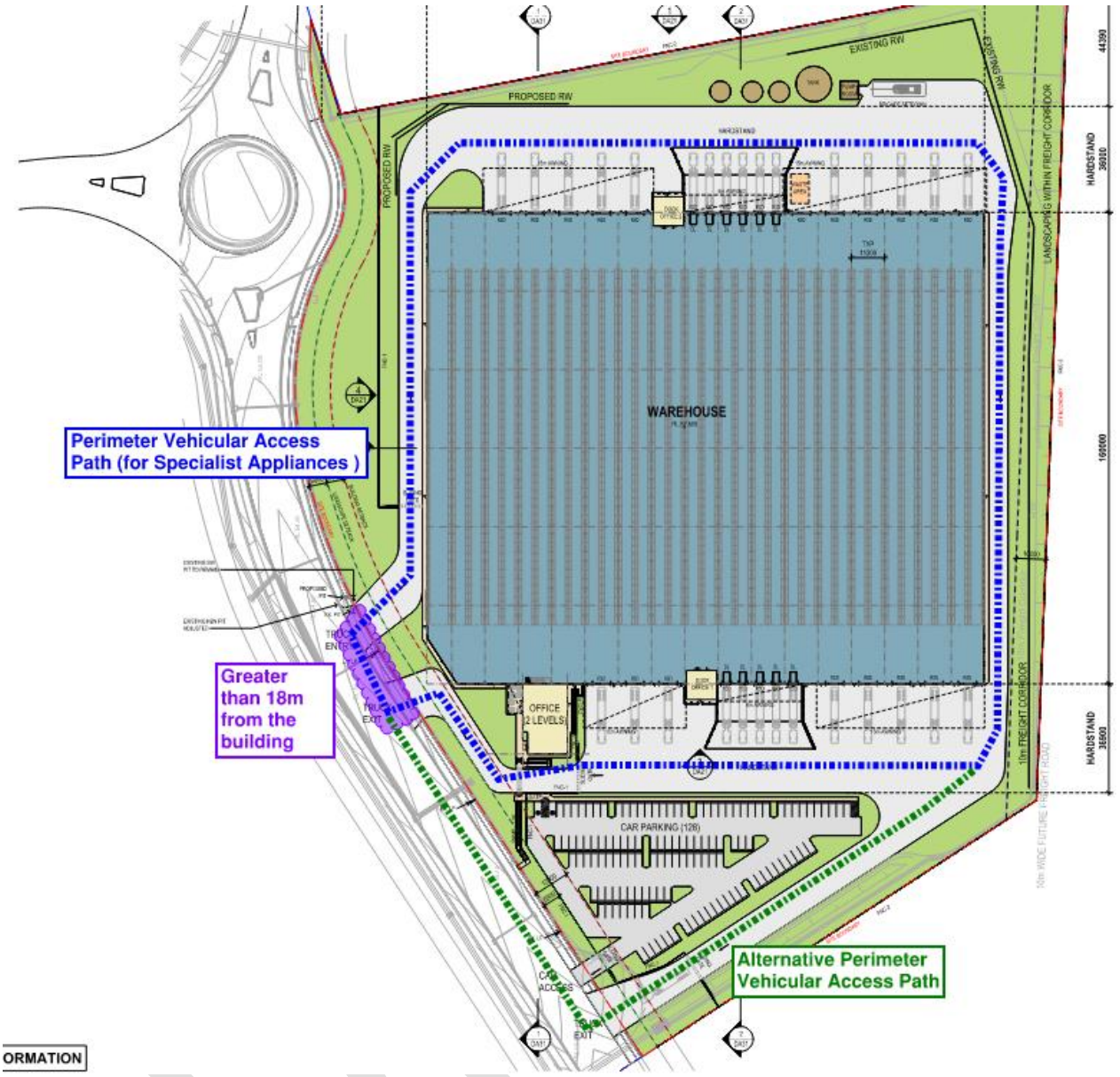

Figure 3-1: Perimeter Vehicular Access

3.2 Egress

3.2.1 Travel Distances (warehouse)

Due to the size of the warehouse, travel distances exceed the DtS limitations of 40 m to the nearest exit and 60 m between alternative exits, being approximately 100 m and 200 m respectively. This includes travel beneath awnings and allows for fitout.

A Performance Solution is proposed, reliant on the large enclosure volume and sprinkler system present to demonstrate despite the extended distances that occupants are provided with tenable conditions for evacuation.

It should be noted that the maximum distance of travel of 100 m internal to the building cannot be exceeded, based on FRNSW's position.

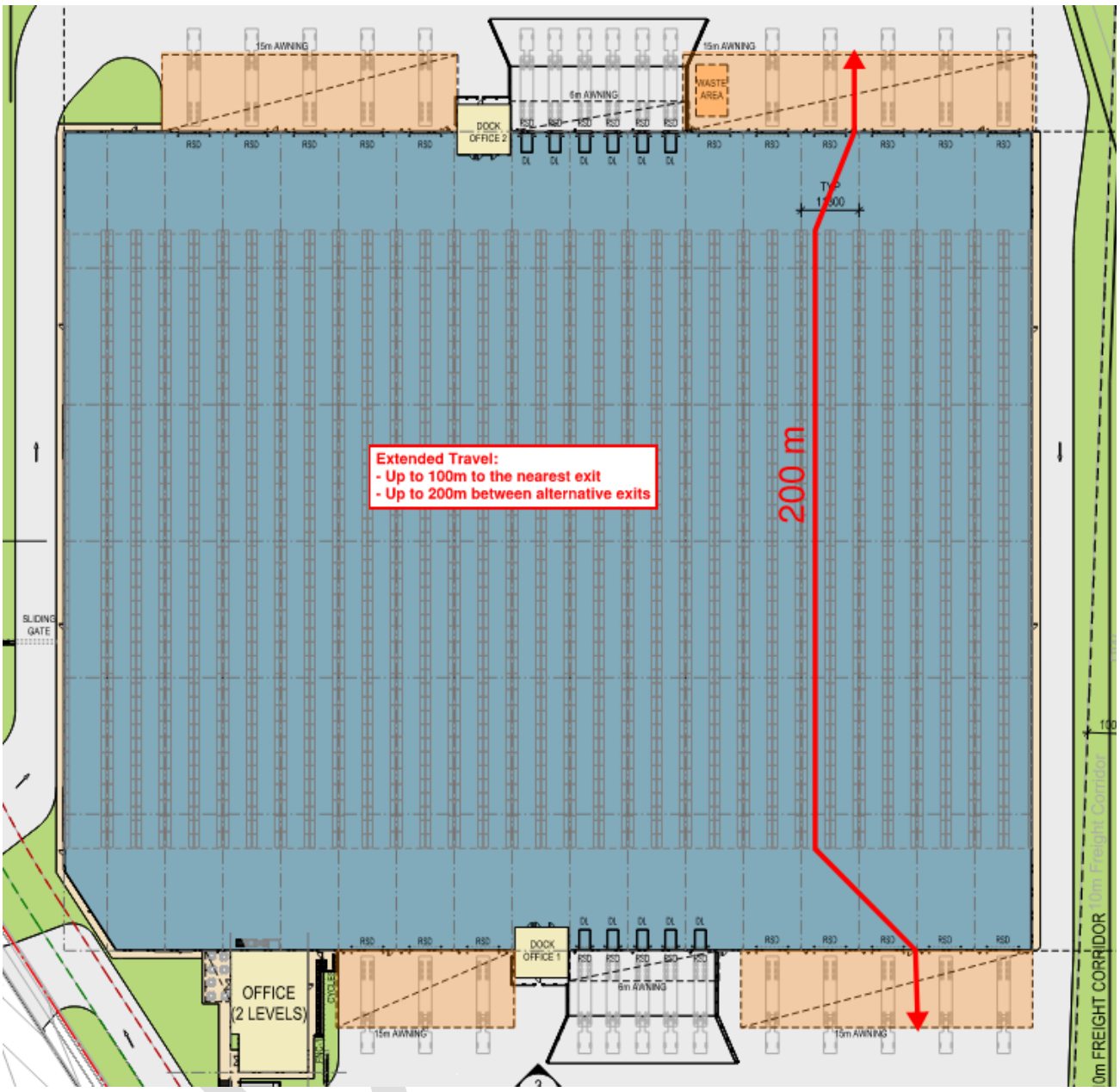

Figure 3-2: Extended Travel Distances - Warehouse

3.2.2 Travel Distances (office)

Travel distances in both levels of the office appear capable of compliance with the DtS Provisions based on the number of exits from the area provided.

3.3 Fire Fighting Equipment

3.3.1 Fire hydrant system

A fire hydrant system must be provided for the subject warehouse in accordance with NCC Provision E1D2 and AS2419.1:2021. As the building exceeds 108,000 m^3, it is not prescriptively within the scope of AS2419.1:2021 and is therefore subject to a Performance Solution.

Wherever possible, the hydrant system should comprise external hydrant points. However, due to the size of the building, internal fire hydrants are also required. These internal hydrants are located more than 4 m from an exit and therefore do not prescriptively comply with Clause 3.6.2 of AS2419.1:2021. Notwithstanding this, this hydrant layout shall facilitate the progressive movement of firefighters towards the central parts of the building.

- The travel distance from an external hydrant to the first internal hydrant in the building shall not exceed 50 m.
- The travel distance from each internal hydrant to the next internal hydrant required for coverage shall not exceed 25 m.
- An external hydrant should be provided adjacent to or within close proximity of each external entry/exit point around the building as required for coverage.

Additional requirements for the design of the fire hydrant system include the following:

- External hydrants must have a travel path to the road, hardstand, or carriageway of less than 50 m.
- Hydrants located beneath the warehouse awnings, although considered internal hydrants in accordance with AS2419.1:2021, shall be designed and treated as external hydrants for coverage of the internal warehouse parts.
- Hydrant coverage of the area below the awnings should be provided by additional, or alternative hydrants which are not located beneath the awnings.
- The system should incorporate a ring main with isolation valves that are external to the building and numbered with the corresponding numbers indicated on the block plan at the booster assembly.
- 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 located at the south-western site entrance (TBC) within the sight of the main building entry, and shall be located at least 10 m away from substations or other electrical hazards.
- Appendix C of AS2419.1:2021 shall be considered and implemented in the hydrant design. This shall include full duty pumps.
- The design capacity of the system shall be capable of allowing minimum 3 hydrants to operate simultaneously (i.e. 30 L/s) as per Appendix C of AS2419.1:2021.

3.3.2 Fire hose reels

Fire hose reel shall be provided throughout the building in accordance with DtS Provision E1D3 of the NCC and AS2441:2005.

If desired, a Performance Solution may be feasible to permit the use of 50 m long fire hose reels, in lieu of 36 m to provide greater flexibility in the design. This would rely on:

- Only the FHRs located within 4 m of an exit shall be 50 m. Where additional on floor FHRs required for coverage, they shall be standard 36 m lengths.
- 50 m fire hose reels must be tested and certified according to AS2441:2005 and Provision E1D3 of the NCC.
- The pressure and flow at the nozzle of the 50 m hose reel are to be achieved based on the requirement of AS2441:2005.
- Coverage using 50 m hose reels is to be achieved with no more than two bends in the hose to reduce friction and snagging.
- Occupant training in the use of the 50 m length fire hose reels is to occur at least every 12 months to maintain occupant familiarity with the increased weight and length of the extended hose reels.

3.3.3 Fire sprinkler system

A fire sprinkler system shall be provided throughout the building in accordance with the DtS Provisions and AS2118.1:2017 with the following considerations:

- Sprinkler activation temperature in the warehouse must be no greater than 101°C and have a Response Time Index (RTI) of less than 50 $m^{1/2}s^{1/2}$ (i.e. fast response type).
- Upon sprinkler activation the building occupant warning alarm shall be initiated throughout the building and the direct brigade notification activated.
- The location of the sprinkler booster assembly has been identified as a DtS departure, with the booster located at the norther perimeter of the site, as depicted in Figure 2-4.

A Performance Solution is expected to be feasible to support the location of the sprinkler booster, reliant on:

- The fixed suction criteria being met, as set out in Clause 4.4 of AS2419.1:2021.
- The fire sprinkler booster and the dedicated hardstand for fire brigade appliances being located as depicted in Figure 3-3. As per FRNSW's Guideline "*Access for fire brigade vehicles and firefighters*", the hardstand should be designed to be 18 m long by 6 m wide, whilst allowing other fire brigade appliances to pass. The hardstand area serving a suction-connection outlet is to be positioned at an angle not greater than 45 degrees from the outlet's longitudinal direction.
- The location of sprinkler booster and FDCIE, shall be indicated on all fire hydrant and fire sprinkler block plans.

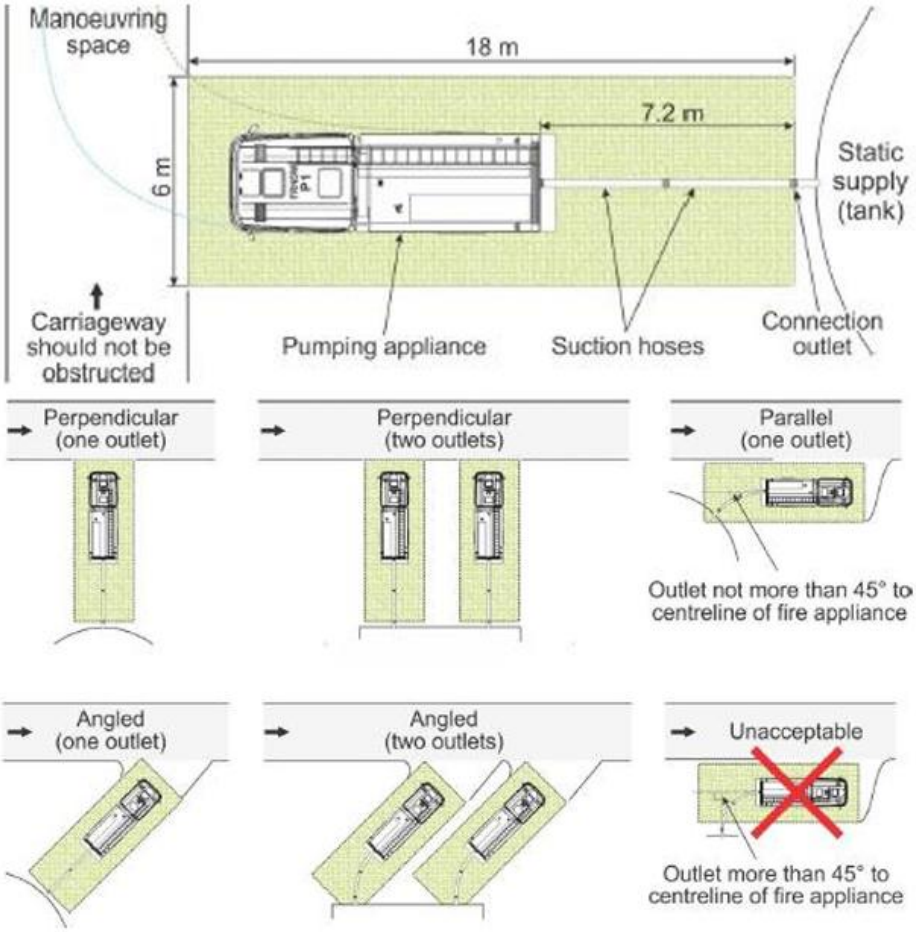

Figure 3-3: Extract from FRNSW Guideline – Rigid Suction Connection Hardstand

3.3.4 Portable Fire Extinguishers

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

3.3.5 Fire Control Centre

As the building exceeds 18,000 m^2, an FCC is required. This is proposed within the main entry of the office, containing the FDCIE with sufficient clearances and spatial provision for mounting of block plans.

3.4 Smoke Hazard Management

3.4.1 Smoke Detection System

A smoke detection system for occupant warning is unlikely to be required throughout the warehouse due to its large volume. However, if the warehouse is subdivided into smaller separate tenancy enclosures, or if complex fit-outs such as automated racking or mezzanine platforms are introduced, smoke detection may be required to support occupant evacuation and fire brigade intervention

As a result of the extended travel distances within the office, a smoke detection system shall be provided beneath ceilings within the office spaces in accordance with Section 5 of AS1670.1:2018.

3.4.2 Smoke Exhaust System

An automatic smoke exhaust system shall be provided to the warehouse area for the subject building complying with Specification 21 and AS1668.1:2015, with the following requirements:

- System capacity must be capable of an exhaust rate of at least one enclosure air change per hour.
- Any mechanical boards or switching boards serving the smoke exhaust system are to be protected by construction achieving an FRL of 120/120/120 if within the building.
- Adequate make-up air should be provided at a low level to facilitate the smoke exhaust system's designed operational capacity. The make-up air should be provided at a low level by:
  - Permanently open natural ventilation louvers; and/or
  - Perforated roller shutters; and/or
  - Mechanically operated louvers that open upon activation of the fans.

Note: smoke exhaust is not required to the offices or other ancillary areas.

3.4.3 Building Occupant Warning System

A building occupant warning system is to be provided throughout all parts of the building. The system should be in accordance with the prescriptive requirements of Specification 17 and Clause 7 of Specification 20 of the NCC 2022, and AS1670.1:2018.

The occupant warning alarm should be sounded throughout all areas of the building upon general fire alarm.

3.5 Visibility in an Emergency, Exit Signs & Warning Systems

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.

Whether through adjudication by the authority having jurisdiction (AHJ) or via a Performance Solution, it is anticipated that the directional signage at the end of the racking aisles and above block storage areas can be installed at a height greater than 2.7 m. Should a Performance Solution be desired, it shall consider the following:

- Exit signs and directional signs shall be "Jumbo size" to increase the visibility to occupants.
- The final height and location of the directional exit signs shall be determined through the fire engineering analysis.

3.6 Building Management Requirements

- The fire safety systems should be tested and maintained in accordance with Australian Standard AS1851.
- An emergency management plan should be developed for the site in accordance with AS3745:2010.
- Ongoing training in 50 m hose reels as required by the Performance Solution.

4. Proposed Performance Solutions

As a result of the concept design review, the Performance Solutions listed in Table 4-1 have been proposed.

Table 4-1: Proposed Performance Solutions

#	DtS Provision	Description	Non-Compliance(s)	Proposed Measures
1	C3D5	Perimeter Vehicular Access	• Vehicular access along the southern perimeter is greater than 18 m from the building	• Continuous perimeter access path • Multiple staging opportunities
2	D2D5 D2D6 E2D10	Extended Travel Distances and Rationalised Smoke Hazard Management	• Up to 100 m to nearest exit and 200 m between alternative exits. • Rationalised smoke exhaust system.	• Large smoke reservoir volume. • Sprinkler protection. • Automatic smoke exhaust system, achieving a minimum exhaust rate of one enclosure air change per hour.
3	E1D2	Fire Hydrant System Design	• AS2419.1:2021 used despite the building exceeding 108,000 m^3. Also: - Hydrants under awnings - Internal on-floor hydrants - Block plan size	• Hydrants beneath awnings designed as external hydrants. • Fall-back hydrants. • Sprinkler system beneath awnings. • Internal hydrant coverage using progressive movement (50/25 rule). • Conformance to Appendix C of AS2419.1:2021.
4	E1D3	50 m Fire Hose Reels	• 50 m fire hose reels are provided within the warehouse, exceeding the maximum 36 m.	• Sprinkler system. • Occupants training in the use of 50 m fire hose reels. • Coverage from 50 m FHRs designed with no more than 2 bends.
5	E1D4	Location of Sprinkler Booster	• The location of the sprinkler booster serving the building is located more than 20 m from the pedestrian entrance.	• Sprinkler booster directly accessible from perimeter vehicular access path. • Location of sprinkler booster and FDCIE to be indicated on fire hydrant block plans.

5. Conclusion

This Fire Safety Concept Strategy 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 fire safety strategy presented herein is considered capable of meeting the Performance Requirements of the NCC, subject to validation and verification of any assumptions made through detailed fire engineering analysis.

Through ongoing design development, the strategy proposed herein shall be amended and adapted based on consultation with the design team to develop the scope for the Performance Based Design Brief, and ultimately for the Fire Engineering Report for Construction.

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