FIRE SAFETY STRATEGY

Project:	Minto Logistics Hub Warehouse 4	**Ref No.:**	F202050_FSS_03
Address:	5-9 Culverston Road, Minto	**Date:**	27 March 2024
		Issue:	Updated Final Issue

RE: Fire Safety Strategy – Updated Final Issue

1. INTRODUCTION

1.1 PROJECT OVERVIEW

CORE Engineering Group has been engaged by Tactical Group to prepare a Fire Safety Strategy for the proposed new warehouse and distribution facilities at 5-9 Culverston Road, Minto.

The Section 4.55(2) Modification Application (Mod 6) seeks approval for modifications to Stage 3 of SSD 7500 (as previously modified). Charter Hall is seeking to amend the site allotment, GFA, building setbacks, floor levels, external storage areas, and landscaped area to deliver the proposed warehouse and distribution centre development.

The proposal will divide the site into three allotments, with the addition of two buildings comprising five warehouse units and a private road. This requires the revision of the total GFA to 39,935 sqm which equates to an increase of 5,840 sqm compared to the Mod 5 approval (34,095 sqm). Subsequently, the provision of car parking spaces will also increase.

1.2 SCOPE

The purpose of this report is to document the proposed fire safety strategy for the building, including guidance on the likely fire engineering trial design which has been established based on review of the NCC advice and CORE Engineering Group's previous experience. This 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.

The specific details included are:

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

1.3 SOURCES OF INFORMATION

- Architectural set prepared by Watch this Space Design (Figure 1-1).
- Swept path analysis prepared by ASON Group, provided by Tactical Group via email dated 16/02/24.
- NCC markup of Draft site plan and list of proposed Performance Solutions prepared by McKenzie Group Consulting. Advice provided by Tactical Group via email dated 06/02/24.
- FSS markup of Draft site plan prepared by CORE Engineering Group dated 16/01/24.

DRAWING LIST			
SHEET NO.	SHEET NAME	ISSUE DATE	CURRENT REVISION
A - 00	COVER SHEET	19/02/2024	P1
A - 04	SITE MASTERPLAN – STAGE 1, 2, 3 & 4	23/02/2024	P4
A - 05	SITE ELEVATIONS – STAGE 1, 2, 3 & 4	21/03/2024	P2
A - 06	SITE SECTIONS – STAGE 1, 2, 3 & 4	19/02/2024	P1
A - 0010	SIGNAGE STRATEGY PLAN – STAGE 1, 2, 3 & 4	19/02/2024	P1
A - 0011	AERIAL VIEW 1 – STAGE 1, 2, 3 & 4	19/02/2024	P1
A - 0012	AERIAL VIEW 2 – STAGE 1, 2, 3 & 4	19/02/2024	P1
A - 400	STAGE 3A, 3B, 3C, 3D, 3E - SITE PLAN	21/03/2024	P13
A - 401	STAGE 3A & 3B - SITE AND GROUND FLOOR PLAN	21/03/2024	P2
A - 402	STAGE 3A & 3B - ROOF PLAN	19/02/2024	P1
A - 403	STAGE 3A & 3B - OFFICE PLANS	19/02/2024	P1
A - 405	STAGE 3A & 3B - ELEVATIONS	19/02/2024	P1
A - 406	STAGE 3A & 3B - SECTIONS AA, BB	19/02/2024	P1
A - 407	STAGE 3A & 3B - EXTERNAL FINISHES BOARD	19/02/2024	P1
A - 411	STAGE 3C - SITE AND GROUND FLOOR PLAN	21/03/2024	P2
A - 412	STAGE 3C - ROOF PLAN	19/02/2024	P1
A - 413	STAGE 3C - MAIN OFFICE PLANS	19/02/2024	P1
A - 414	STAGE 3C - DOCK OFFICE PLANS	19/02/2024	P1
A - 415	STAGE 3C - ELEVATIONS	21/03/2024	P2
A - 416	STAGE 3C - SECTIONS AA, BB	21/03/2024	P2
A - 417	STAGE 3C - EXTERNAL FINISHES BOARD	21/03/2024	P2
A - 421	STAGE 3D & 3E - SITE AND GROUND FLOOR PLAN	21/03/2024	P2
A - 422	STAGE 3D & 3E - ROOF PLAN	19/02/2024	P1
A - 423	STAGE 3D & 3E - OFFICE PLANS	19/02/2024	P1
A - 425	STAGE 3D & 3E - ELEVATIONS	19/02/2024	P1
A - 426	STAGE 3D & 3E - SECTIONS AA, BB	19/02/2024	P1
A - 427	STAGE 3D & 3E - EXTERNAL FINISHES BOARD	19/02/2024	P1

Figure 1-1: Drawing List

1.4 LIMITATIONS AND ASSUMPTIONS

- 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 NCC. 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 for pricing should be cognisant that the recommendations are preliminary and subject to detailed analysis and authority approvals.
- The advice herein relates to compliance with the relevant parts of the NCC relating to fire safety and does not take into account insurers requirements, business continuity and other stakeholder objectives which should be reviewed independently by the client as required.

1.5 PROPOSED PERFORMANCE SOLUTIONS

The proposed works will include a total of three new warehouse and distribution facilities. DtS non-conformances have been identified as part of these works. In particular, the fire safety assessment and fire engineering analysis shall be focused on the following identified Performance Solutions.

Table 1-1: Summary of Proposed Performance Solutions

#	DTS PROVISION	TITLE	NON-COMPLIANCE(S)	PROPOSED PERFORMANCE SOLUTION
1	C3D5	Perimeter Access (Section 3.1.2)	For all warehouses, the perimeter vehicular access paths are greater than 18 m from the external wall of the building served in multiple locations.	• Staging available within close proximity to all four corners of the building • Northern car park serving Warehouse 3C relied upon for alternative

#	DTS PROVISION	TITLE	NON-COMPLIANCE(S)	PROPOSED PERFORMANCE SOLUTION
				access for general appliances. • Staging locations remote from transmission easement.
2	D2D5, D2D6, E2D2	Extended Travel Distances and Rationalised Smoke Hazard Management (Section 3.2.1 and 3.4.2)	• Warehouse 3A: Up to 80 m to nearest exit and 160 m between exits • Warehouse 3B: Up to 65 m to nearest exit and 130 m between exits • Warehouse 3C: Up to 80 m to nearest exit and 160 m between exits • Warehouse 3D/3E: Up to 60 m to nearest exit and 120 m between exits • All buildings to be provided with a rationalised automatic smoke exhaust system	• The volume of each warehouse provides a large smoke reservoir. • Sprinkler protection is afforded throughout the facilities. • Automatic smoke exhaust system, achieving a minimum exhaust rate of one enclosure air change per hour. • Detailed CFD analysis.
3	E1D2	Fire Hydrants (Section 3.3.1)	A hydrant system in accordance with AS2419.1:2021 is proposed for all buildings, despite the volume exceeding 108,000 m^3. Hydrants located beneath warehouse awnings shall be treated as external hydrants, thereby allowing two hose lengths for coverage.	• Fall-back hydrants are to be provided on the respective hardstands to provide coverage under the awnings. • External wall in proximity to hydrant booster to collapse inwards. Alternatively, hydrant booster to be located >1.5x height of building served. • Hydrant coverage provided for open yard protection. • Hydrants remote from transmission easement.
4	E1D3	Fire Hose Reels (Section 3.3.2)	50 m fire hose reels are proposed for the warehouse portions of a buildings.	• Coverage to be achieved with no more than two hose bends. • Annual training to familiarise occupants with the use of 50 m hose reels.
5	E1D4, Spec 17	Sprinkler Booster Location (Section 3.3.3)	The sprinkler booster assembly serving Warehouse 3C is not located within site of the main entrance to the building.	• Suitable hardstand available for connection to sprinkler suction point. • External wall in proximity to sprinkler booster to collapse inwards.

#	DTS PROVISION	TITLE	NON-COMPLIANCE(S)	PROPOSED PERFORMANCE SOLUTION
				Alternatively, sprinkler booster located greater than 1.5x height of building. • Location of sprinkler booster to be indicated on block plan at hydrant booster and FCC.

2. PROJECT DESCRIPTION

2.1 SITE CONTEXT

The proposed works form part of the 5-9 Culverston Road industrial development and are located to the southern portion of the site (Lot 3 in DP 817793 and Lot 400 in DP 875711), which occupies a total site area of 296,300 m^2.

The site is accessed via Culverston/Private Road to the west and is otherwise bounded by adjoining industrial development to the north-west, proposed external storage yard to the north-east, existing Sydney Train railway line to the east, Rose Payten Drive to the south and existing drainage channels to the west.

The location of the subject site relative to the remainder of the masterplan is depicted in Figure 2-1 below.

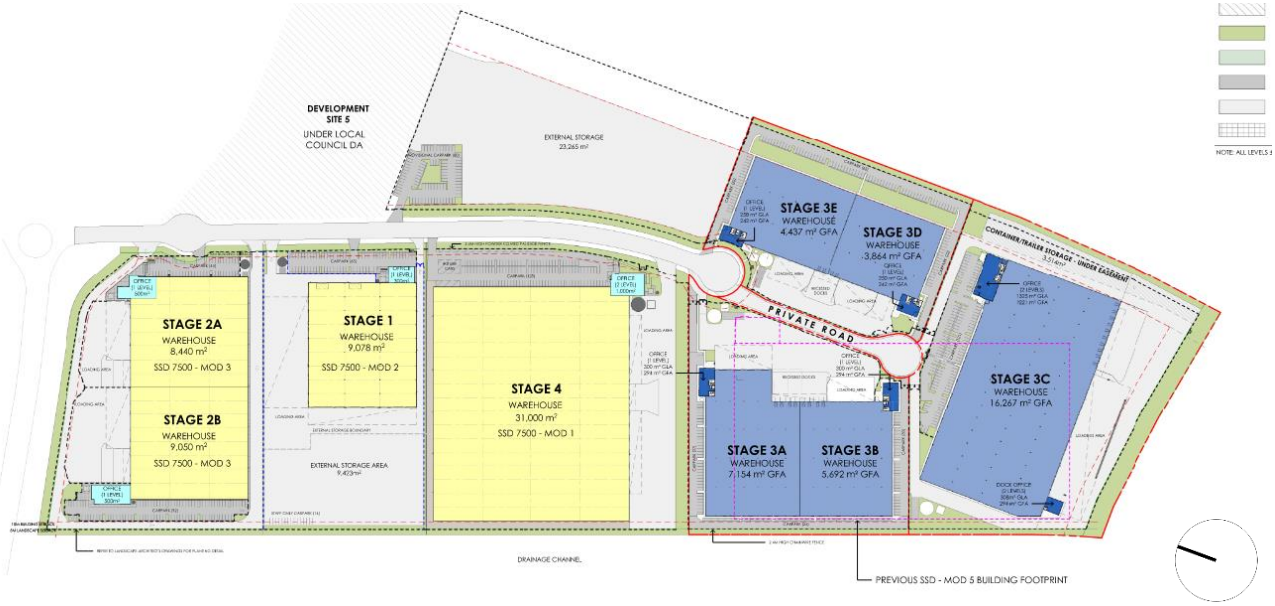


Figure 2-1: Site Plan

2.2 BUILDING DESCRIPTION

The proposed works relate to the construction of three new storage and distribution facilities:

- Warehouse 3A/3B to the north-west, inclusive of the following:
  - Ancillary single storey office spaces serving Warehouse Tenancies 3A/3B, located to the north-east/south-east respectively.
  - Loading docks and associated awnings/hardstand to the east.
- Warehouse 3C to the south, inclusive of the following:
  - Ancillary two storey main and dock offices to the north-east and south-west respectively.
  - Loading docks and associated awnings/hardstand to the south.

- External storage area to the east, which is anticipated to contain shipping containers. It is assumed that containers are empty and will be subject to relevant regulatory requirements from supply authority.

- Warehouse 3D/3E to the north-east, inclusive of the following:
  - Ancillary single storey office spaces serving Warehouse Tenancies 3D/3E, located to the north-west/south-west respectively.
  - Loading docks and associated awnings/hardstand to the west.

Note that along the eastern portion of the Warehouse 3C and 3D/3E sites is a transmission easement. Furthermore, this strategy herein considers each site on a separate allotment and therefore, each warehouse shall be provided with separate fire services infrastructure. No tenant has been identified at this stage.

The area schedule for the proposed development is depicted in Figure 2-3 below. The ridge height of all warehouses is 13.7 m. All buildings shall therefore have a volume greater than 18,000 m^2/108,000 m^3 respectively.

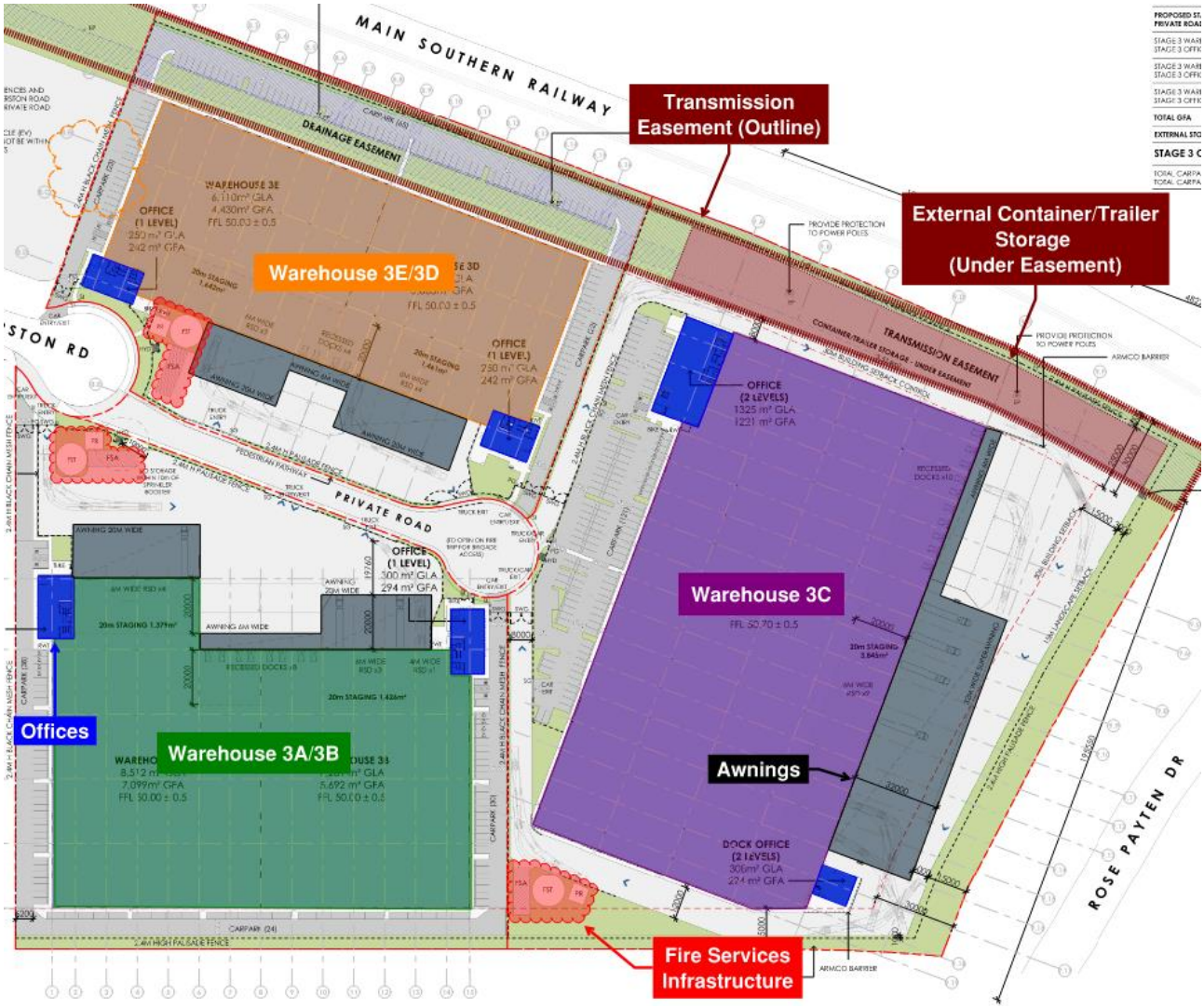
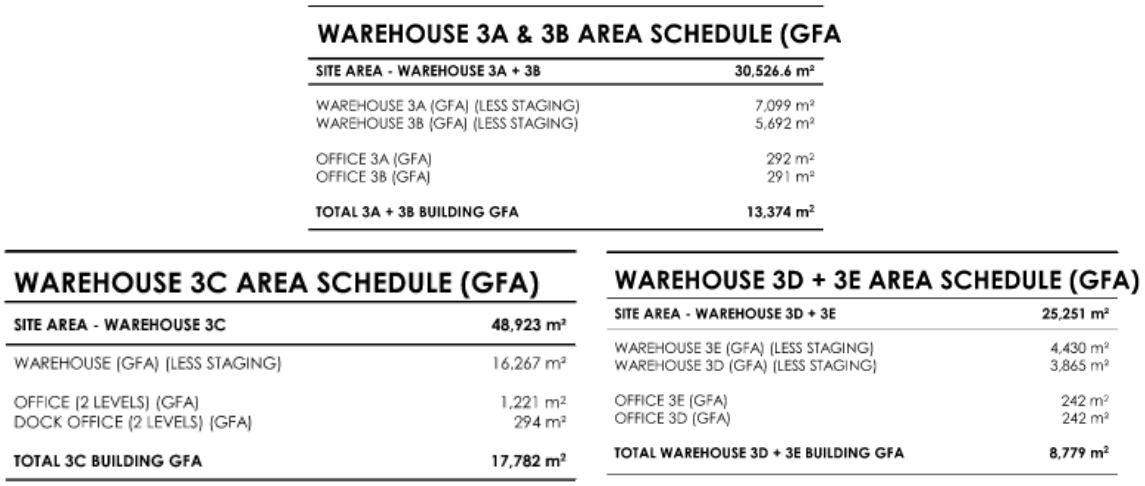


Figure 2-2: Site Layout



WAREHOUSE 3A & 3B AREA SCHEDULE (GFA

SITE AREA - WAREHOUSE 3A + 3B	**30,526.6 m²**
WAREHOUSE 3A (GFA) (LESS STAGING)	7,099 m²
WAREHOUSE 3B (GFA) (LESS STAGING)	5,692 m²
OFFICE 3A (GFA)	292 m²
OFFICE 3B (GFA)	291 m²
TOTAL 3A + 3B BUILDING GFA	**13,374 m²**

WAREHOUSE 3C AREA SCHEDULE (GFA)

SITE AREA - WAREHOUSE 3C	**48,923 m²**
WAREHOUSE (GFA) (LESS STAGING)	16,267 m²
OFFICE (2 LEVELS) (GFA)	1,221 m²
DOCK OFFICE (2 LEVELS) (GFA)	294 m²
TOTAL 3C BUILDING GFA	**17,782 m²**

WAREHOUSE 3D + 3E AREA SCHEDULE (GFA)

SITE AREA - WAREHOUSE 3D + 3E	**25,251 m²**
WAREHOUSE 3E (GFA) (LESS STAGING)	4,430 m²
WAREHOUSE 3D (GFA) (LESS STAGING)	3,865 m²
OFFICE 3E (GFA)	242 m²
OFFICE 3D (GFA)	242 m²
TOTAL WAREHOUSE 3D + 3E BUILDING GFA	**8,779 m²**

Figure 2-3: Floor Area Schedule

2.3 BUILDING BCA CHARACTERISTICS

The following BCA characteristics are assumed for the building.

Table 2-1: Building NCC Characteristics (5-9 Culverston Road)

CHARACTERISTIC	5-9 CULVERSTON ROAD
Classification	Class 7b (warehouse), Class 5 (office)
Rise in Storeys	Warehouses 3A/3B, 3E/3D: One (1) Warehouse 3C: Two (2)
Type of Construction	Type C (Large-isolated building)
Effective height	Less than 12 m
Total building floor area	Warehouses 3A/3B, 3E/3D: Less than 18,000 m^2 Warehouse 3C: Greater than 18,000 m^2*
Total building volume	Greater than 108,000 m^3

3. PROPOSED FIRE ENGINEERING TRIAL DESIGN REQUIREMENTS

The below summarises the proposed fire engineering requirements to satisfy the Performance Requirements of the BCA.

3.1 STRUCTURE AND COMPARTMENTATION

3.1.1 Structure and Compartmentation

All buildings are required to achieve Type C construction as a large-isolated building. Therefore, no specific requirements for fire-resistance of structural elements apply. Furthermore, all buildings constitute a single fire compartment, as a large-isolated building.

3.1.2 Vehicular Perimeter Access

The vehicular perimeter access pathway should be provided around the whole of each building. All paths indicated in Figure 3-1 should be designed and constructed with an all-weather surface capable of supporting all FRNSW appliances in accordance with DtS Provision C3D5 and the FRNSW Fire Safety Guideline '*Access for Emergency Vehicles And Emergency Service Personnel*', available at http://www.fire.nsw.gov.au, with the following exceptions permitted:

- The perimeter access path serving Warehouse 3A/3B is located greater than 18 m from the building at the following locations:
  - North-eastern portion
  - South-eastern portion
- The perimeter access path serving Warehouse 3C is located greater than 18 m from the building at the following locations:
  - Northern portion
- The perimeter access path serving Warehouse 3D/3E is located greater than 18 m from the building at the following locations:
  - Eastern portion
  - North-western portion
  - South-western portion

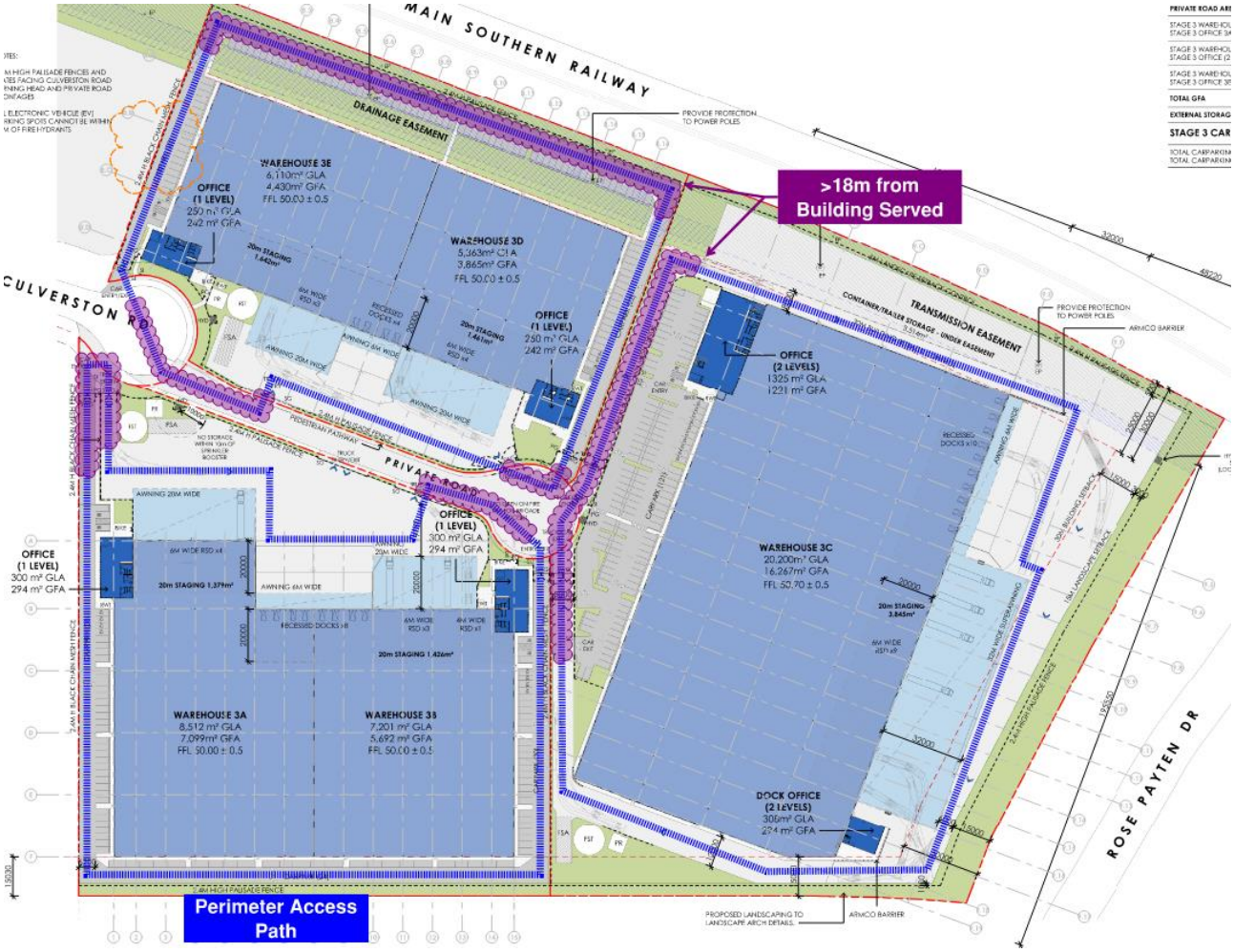


Figure 3-1: Non-Compliant Perimeter Access

To facilitate the perimeter access non-compliances listed above, the following measures should be provided as part of the Performance Solution (Figure 3-2):

- Pedestrian access gate(s) shall be provided to eastern portion of Warehouse 3D/3E to maintain less than 50 m from external hydrant to hardstand.
- All gates, security fencing, and boom gates should be readily openable by the fire authorities. This can be achieved through one, or a combination of, the following:
  - Any vehicle access gate that is required to be locked should be secured with a non-hardened metal chain and lock.
  - All locks fitted to vehicle access gates and security devices are to be keyed alike, and a copy of the key deposited with the two nearest FRNSW fire brigade stations or kept with the site security if 24/7 security is provided for the site.
  - Any electrically operated vehicle access gate or security device should incorporate either mechanical override, fail-safe open mode, or activated by site security so that fire appliances can access the site in the event of fire.
- The load-bearing capacity and vehicle swept path of the vehicular access paths and carparks (as depicted in Figure 3-2) must be compatible with fire brigade vehicle requirements in accordance with FRNSW Guideline.
  - This included general appliance access to northern carpark serving Warehouse 3C.
- Minimum 6 m x 16 m staging locations are available within 18 m of all four corners of each building.
  - Note that no staging locations are permitted beneath the transmission easement.

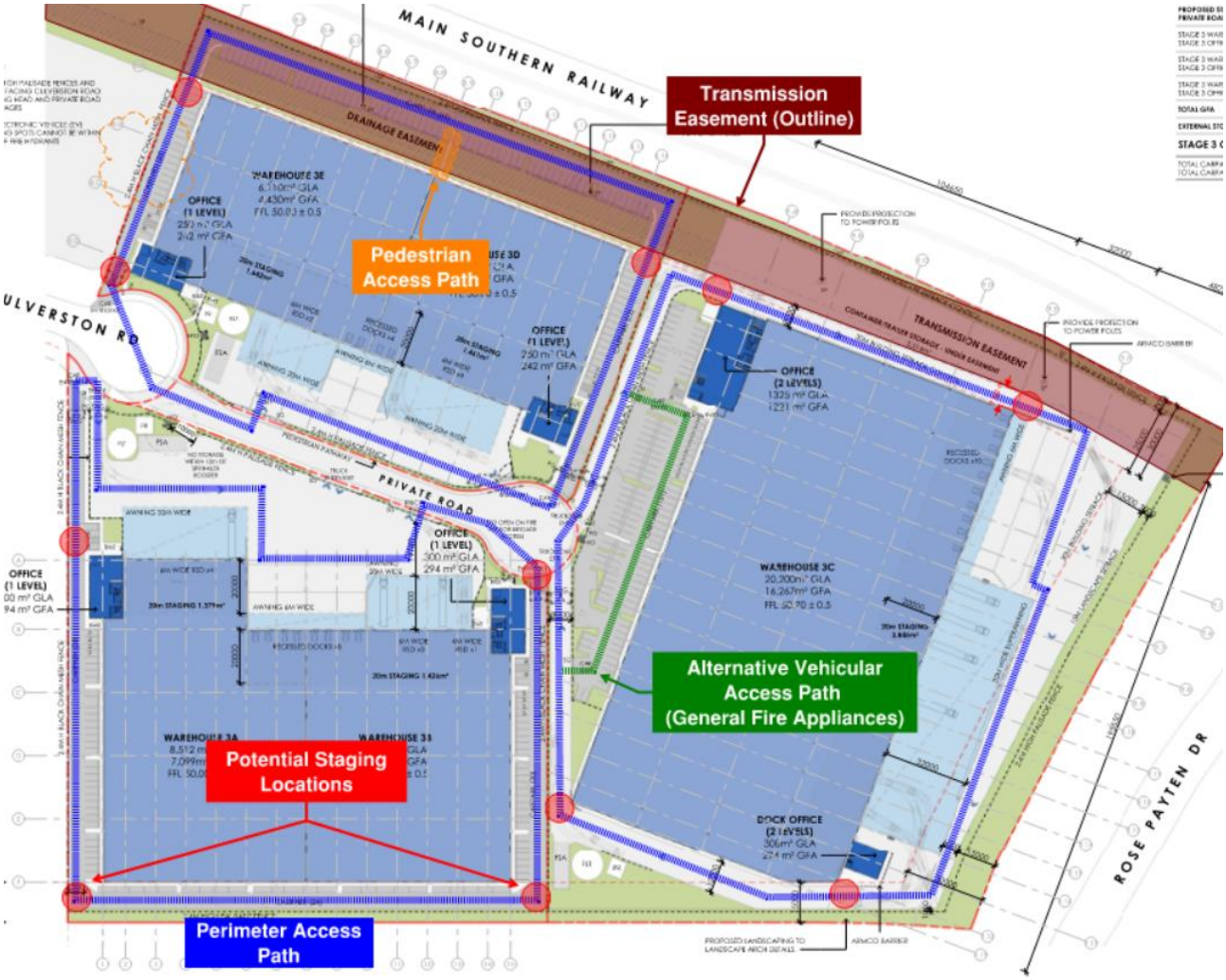


Figure 3-2: Perimeter Access Strategy

3.2 EGRESS

3.2.1 Travel Distances (Warehouse)

In the warehouse, the travel distances to the nearest exit and between alternative exits must be compliant with the DtS requirements with the following exceptions identified (Figure 3-3):

- Warehouse 3A/3B:
  - Warehouse 3A:
    - Up to 80 m to nearest exit
    - Up to 160 m between alternative exits
  - Warehouse 3B:
    - Up to 65 m to nearest exit
    - Up to 130 m between alternative exits
- Warehouse 3C:
  - Up to 80 m to nearest exit
  - Up to 160 m between alternative exits
- Warehouse 3D/3E:
  - Up to 60 m to nearest exit
  - Up to 120 m between alternative exits

It is anticipated that warehouse travel distances can be addressed through a Performance Solution involving detailed computational smoke modelling and evacuation analysis.

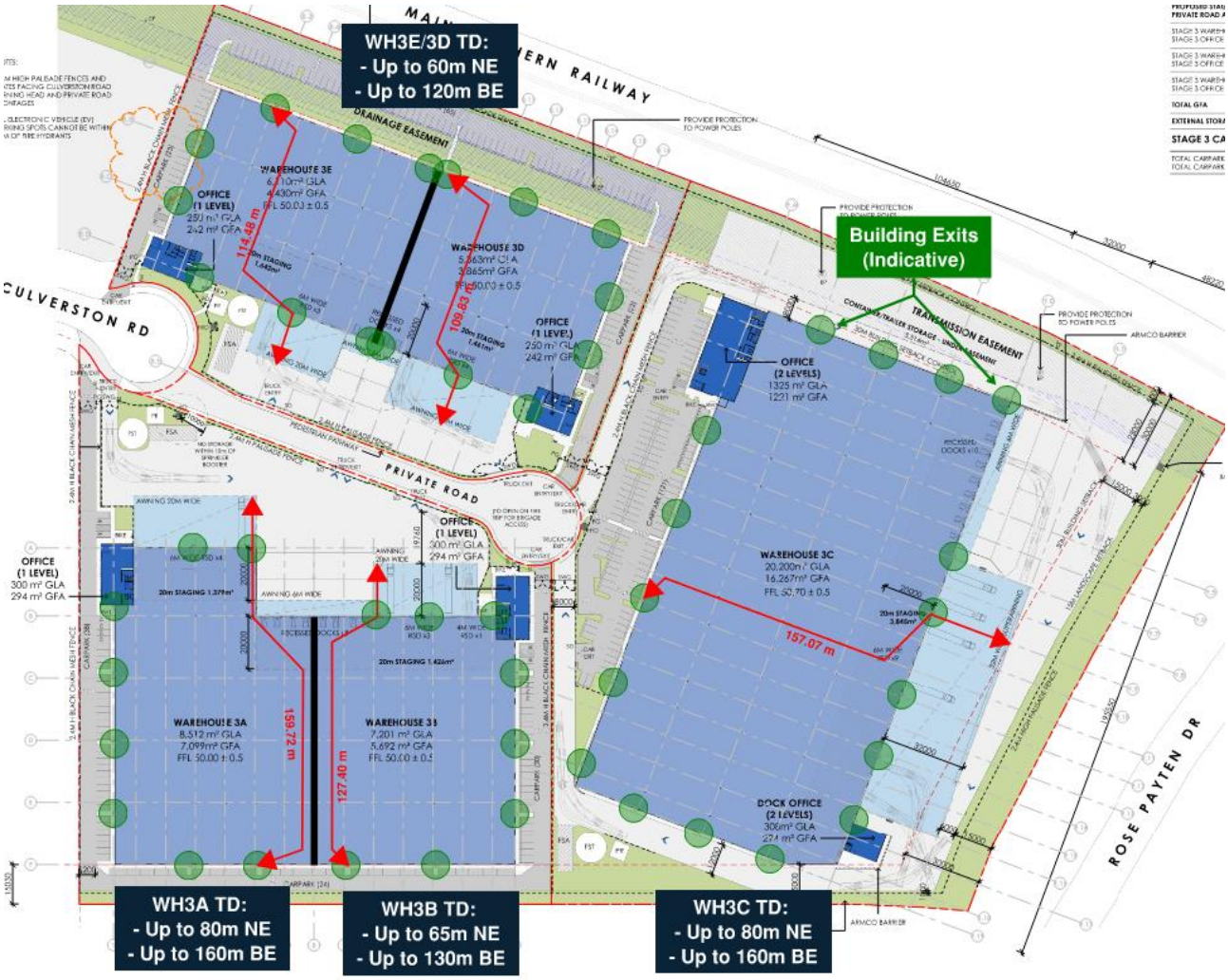


Figure 3-3: Extended Travel Distances (Warehouse)

3.2.2 Travel Distance – Office

DtS travel distances appear to be provided to all offices.

3.2.3 Travel Path Widths

Travel paths shall be no less than 1 m clear throughout (reduced to min. 750 mm at doorways).

3.3 FIRE FIGHTING EQUIPMENT

3.3.1 Fire Hydrants

A separate hydrant system is required to be provided to each building, in accordance with NCC Provision E1D2.

Given that all buildings shall exceed 108,000 m³ in volume, they are not within the scope of AS2419.1:2021. However, an AS2419.1:2021 compliant system is expected to be appropriate, to be addressed as a Performance Solution in consultation with FRNSW, contingent on the following factors:

- All warehouse buildings inclusive of awnings and offices are fully sprinkler protected in accordance with AS2118.1:2017.
- The fire hydrant infrastructure (i.e. hydrant booster) is located within the exclusion zone, being 1.5 times the height of the building.

- Alternatively, the building structural design is to be verified to fail inwards and away from the infrastructure in this location.

- Each hydrant system is designed for at least 3x hydrants operating simultaneously, which in conjunction with the sprinkler system and nature of the stored commodity, is anticipated to be appropriate for the likely fire size.
- Items in Appendix C of AS2419.1:2021 to be considered and implemented by the design team.

For all warehouses, hydrants may be located below awnings (Figure 3-4). It is proposed that these hydrants are fully designed and utilised as external hydrants for coverage purposes which is contrary to AS2419.1:2021 which instead considers these internal hydrants. A Performance Solution is proposed to address this, on the basis that:

- The hydrants below awnings are full designed as external hydrants e.g. dual outlet, having external hydrant hydraulic performance.
- Fall back hydrants located remote from the building footprint are provided. These hydrants are to be located so that full coverage of the awning is achieved.
- The location of the fallback hydrants are to be shown on the hydrant block plan at the hydrant booster assembly and fire pump room.

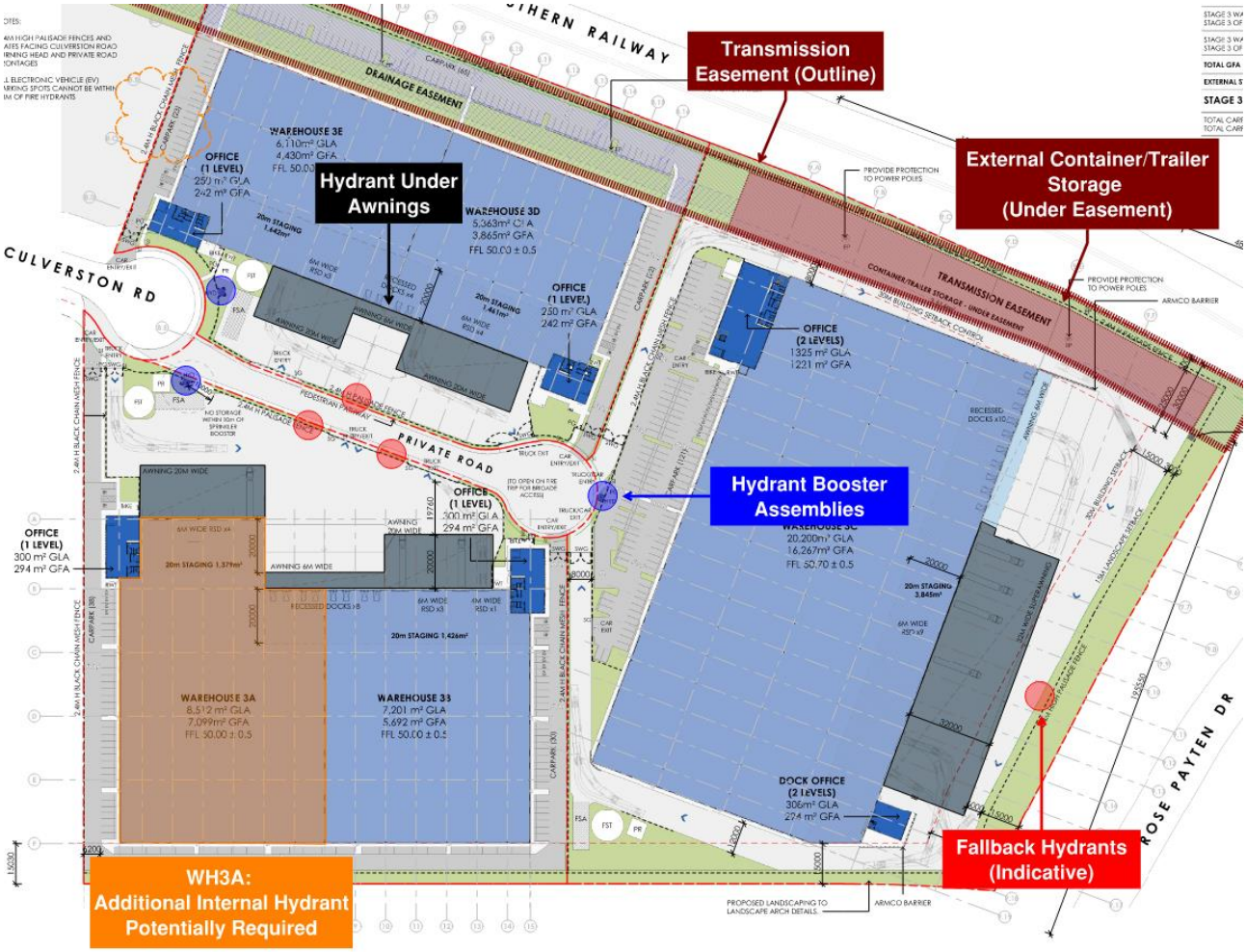


Figure 3-4: Fire Hydrant Strategy

Furthermore, each hydrant system shall achieve the following requirements:

- As far as possible, the hydrant system serving each warehouse enclosure should be designed to achieve full building coverage using external hydrants (or hydrants under the awnings) only.

- If additional internal hydrants are required, this can be assessed as Performance Solution for Warehouse 3A, reliant on the following measures to allow progressive movement of firefighters towards the central parts of the building:
  - When working from an external hydrant, the next additional hydrant should be located into the building not more than 50 m from the external hydrant.
  - When working from an internal hydrant, the next additional hydrant should be located not more than 25 m from that hydrant.
  - 25 m and 50 m distances have been recommended to make allowance for shorter-than-standard hoses (repairs etc.) and unknown variables in the building layout and fixtures etc.
- On the basis that the building is sprinkler protected throughout, hydrant connection points need not be provided with radiant heat shield construction per the requirements of AS2419.1:2021 (i.e. FRL 90/90/90 2 m either side, and 3 m above the hydrant connection point).
- An independent ring main is required to be provided to each building. Ring main isolation valves are to be located external to the building, accessible directly at ground level, 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 maximum distance between an external hydrant and the nearest hardstand shall not exceed 50 m. Where necessary, gates shall be provided such that this distance is achieved. This expected to be applicable to Warehouse 3D/3E, with the general location of these stairs/gates shown in Figure 3-2 above.
- The hydrant booster assemblies are located at the site boundary, adjacent to the principal vehicular access point to the relevant site.
- Hydrant coverage should be provided to the open-yard storage area to the east of Warehouse C of the site as per AS2419.1:2021 for ‘Open yard protection’.
- No external hydrants are permitted beneath the transmission easement. The extent of the easement shall also be depicted on all hydrant block plans serving Warehouse 3C and 3D/3E.

3.3.2 Fire Hose Reels

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

All points on the floor should be within reach of a 4 m 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).

However, should it be desired, it is possible to present a Performance Solution to enable the installation of 50 m fire hose reels – generally to enable hose reels located around the building perimeter only, or to limit the installation of hose reels in cold stores. Additional requirements to permit the use of 50m hose reels are as follows:

- 50 m fire hose reels must be tested and certified to AS/NZS1221.
- The pressure and flow at the nozzle of the 50 m hose reel is to achieve compliance with the pressure and flow requirements of AS2441.1:2005.
- Coverage from 50m FHRs is to be achieved with no more than two bends in the hose.
- Staff 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 each building in accordance with the relevant regulatory requirements. Each lot should have an independent system with dedicated fire pump, water supply tanks and booster assemblies.

- In the offices and beneath the warehouse awnings the system shall comply with NCC Specification 17 and AS2118.1:2017.
- In the warehouse, a sprinkler system shall be provided in accordance with NCC Specification 17, with the sprinkler head location, spacing and design capacity in accordance with AS2118.1:2017. Sprinkler

activation temperature 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).

- The fire services infrastructure (i.e. sprinkler tank, booster and pump room) is located immediately adjacent to the building served. AS2419.1:2021 recommends that the fire services infrastructure is located outside of the exclusion zone, being 1.5 times the height of the building. Therefore, confirmation required from structural engineer that the external wall within the vicinity of the fire services infrastructure will collapse inwards.
- Upon sprinkler activation the building occupant warning alarm shall initiate throughout the building and the direct brigade notification activated. Furthermore, the automatic smoke exhaust system shall initiate within the relevant tenancy where sprinkler activation occurs.

A Performance Solution is feasible to address the proposed location of sprinkler infrastructure for each building. At the fire sprinkler booster, a dedicated hardstand for fire brigade appliances is required. As per FRNSW Guideline for Emergency Vehicle Access, this hardstand should be designed to be 18 m long by 6 m wide, whilst allowing other fire brigade appliances to pass refer to extract in Figure 3-5 below. Vehicle swept paths are to be reviewed to ensure that specialist fire appliances can navigate around the connected appliance. Furthermore, the external wall in proximity to the sprinkler booster assembly is to be designed to collapse inwards.

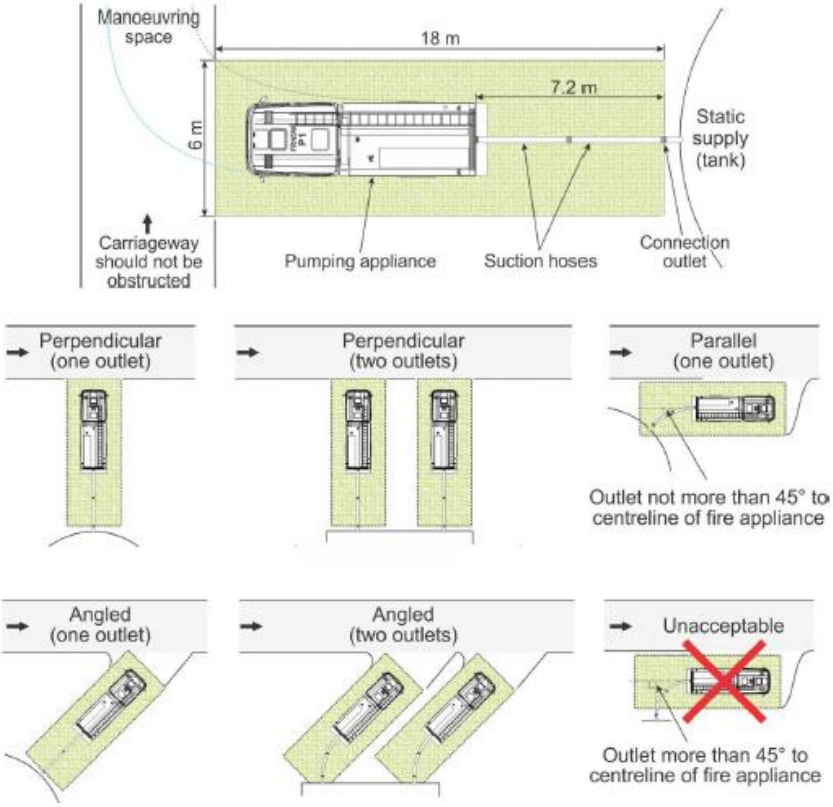


Figure 3-5: Extract from FRNSW Guideline - Rigid Suction Connection Hardstand

3.3.4 Portable Fire Extinguishers

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

3.3.5 Control and Indicating Equipment

All warehouses shall be provided with a Main Fire Indicator Panel (FIP) at the ground floor entry. It is noted that Warehouse 3C requires a compliant Fire Control Centre (FCC), due to the building having a floor area greater than 18,000 m^2.

In each instance, the Main FIP must be installed in accordance with NCC Specification 20 and AS1670.1:2018 and have the following capabilities.

- The FIP panel must be capable of isolating, resetting, and determining the fire location within the building.
- A red strobe shall be installed at the entry door to the FIP to alert arriving fire brigade of the fire alarm origin and FIP location.
- Smoke exhaust fan controls shall be provided at the FIP. If a separate fire fan control panel is provided it shall include a display to indicate the operation or otherwise of the fans.
    - The panel shall include clear signaling of the operational status of the fans. A local fire fan control panel shall include override controls of smoke exhaust and supply fans.
- A mimic panel or sub-FIP may be required in the second office where there are multiple tenancies in the same building. This is subject to consultation with FRNSW and can also facilitate specific functional requirement of tenants (i.e. should an alarm occur during operational hours of 1 tenancy and not the other.) It may also be possible to house the FCC centrally at the pump room in an acoustically sealed enclosure.

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 warehouses due to their large volume, subject to detailed analysis.

In the event of travel distances in excess of the DtS Provisions being present in the building offices, detection will likely be required throughout each affected office in accordance with AS1670.1:2018.

3.4.2 Automatic Smoke Exhaust System

The large floor area and volume of buildings will necessitate the provision of a smoke exhaust system under the DtS Provisions. A Performance Solution is proposed to address the following non-conformances:

- The smoke exhaust rate will be one (1) enclosure air change per hour in lieu of that required by Specification 21.
- The entire warehouse floor plate will comprise of a single smoke reservoir.
- The smoke exhaust system shall be activated from sprinklers only in lieu of smoke detection.
- No exhaust system is proposed for ancillary offices.

Rationalisation of the smoke exhaust system shall be considered holistically in conjunction with the extended travel distances, to be assessed through detailed CFD analysis.

The smoke exhaust system should be designed to achieve the following additional requirements:

- Adequate make-up air should be provided at low level to facilitate the 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. All motors and cables to automatic louvers, vents or supply fans must be fire rated to operate at 200 °C for a period of 60 minutes.
- Override controls should be located at the relevant FIP (or adjacent panel)
- It is recommended that multiple fans be provided and be evenly distributed to otherwise comply with the requirements of Specification 21 of the NCC.
- The exhaust system is to be served by essential power and treated as emergency equipment operating in the emergency mode.

3.4.3 Building Occupant Warning System

A building occupant warning system should be provided throughout all parts of each building. The system should be in accordance with the prescriptive requirements of Specification 17, Specification S20C7 and AS1670.1:2018.

3.4.4 System Monitoring

Automatic signalling equipment should be provided that sends notification to fire brigade on alarm.

3.5 VISIBILITY IN AN EMERGENCY, EXIT SIGNS AND WARNING SYSTEMS

Emergency lighting and exit signage is to be provided throughout the building in accordance with DtS Provisions E4D2 and E4D4 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 AND CONSTRUCTION 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.

3.6.1 Maintenance of Fire Safety Equipment

The fire safety systems should be tested and maintained in accordance with Australian Standard AS1851 or other relevant testing regulatory.

3.6.2 Emergency Plan

An emergency management plan should be developed for the site in accordance with AS3745:2010. Where required, CORE Engineering Group can assist with the development of this document.

4. CONCLUSION

The fire safety strategy presented herein is considered capable of meeting the Performance Requirements of the BCA, 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 Fire Engineering Brief, and ultimately for the Fire Engineering Report for Construction.

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