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Concept fire safety strategy

Marrickville Metro Shopping Centre Pty Limited

Marrickville Metro Shopping Centre –
Stage 1b redevelopment

SY160340

Revision CFSS1.2 | 13 October 2017

Amendment schedule

Version	Date	Information relating to report			
SY100052 CFSS3.0	12/12/2012	Reason for issue	Draft report issued to Lend Lease, AMP, FJMT and Steve Watson and Partners for review and comment. This report supersedes all previous reports issued by Defire for the building.		
			Prepared by	Reviewed by	Approved by
		Name	Kevin Longwill	Micael Lundqvist	-
		Signature			
SY100052 CFSS3.1	14/12/2012	Reason for issue	Report updated to incorporate comments from Lend Lease. Report issued to Lend Lease, AMP, FJMT and Steve Watson & Partners for inclusion in Section 75W application.		
			Prepared by	Reviewed by	Approved by
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			Prepared by	Reviewed by	Approved by
		Name	Genevieve Fick	Greg Leach	Greg Leach
		Signature			
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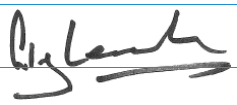
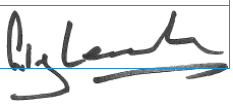
			Prepared by	Reviewed by	Approved by
		Name	Genevieve Fick	Greg Leach	Greg Leach
		Signature			
SY160340 CFSS1.2	13/10/2017	Reason for issue	Report updated to incorporate revised drawings. Report issued to TCB Project Management and Steve Watson & Partners.		
			Prepared by	Reviewed by	Approved by
		Name	Genevieve Fick	Greg Leach	Greg Leach
		Signature			

Contents

1. Introduction

This concept fire safety strategy is prepared on behalf of AMP Capital Investors (AMP) in support of a Section 75W Modification Application of the Major Project Approval MP09_0191, for the expansion of the Marrickville Metro Shopping Centre (the Site).

The Major Project was granted Approval by the Minister of Planning on 19th March 2012 for the carrying out of the following development:

- Demolition of existing warehouse buildings and associated structures on the Edinburgh Road site;
- Refurbishments and construction of a first-floor addition to the existing retail building on the Victoria Road site and the construction of a new building with two levels of retail on Edinburgh Road site comprising:
    - A discount department store (5,000sqm), supermarket (4,500sqm), mini-major (1,791sqm) and speciality retail (4,464sqm) [as amended];
    - An additional 21,780sqm GFA (16,767sqm GLFA) to provide a total of 50,705sqm GFA (39,700sqm GLFA)
- Authorise the use of 1606 car parking spaces comprising 1100 existing spaces and 506 additional car parking spaces [as amended].

The content of this report responds to the Secretary's Environmental Assessment Requirements (SEARs), and is intended to assist with the assessment of the modification proposal against the relevant considerations under of the Environmental Planning and Assessment Act 1979 (EP&A Act).

The purpose of this report is to identify and document the fire safety measures relating to the proposed performance solutions that are likely to be required for the building to achieve compliance with the performance requirements of the National Construction Code 2016 Volume One – Building Code of Australia (BCA)1.

Should the detailed fire safety engineering assessment reveal that the proposed systems do not satisfy the identified performance requirements of the BCA, additional fire safety systems or modifications to the fire safety strategy may be required. This may also require further assessment.

2. The Site

The Site subject to this modification application comprises three principal land parcels:

1. Marrickville Metro Shopping Centre located at 34 Victoria Road, Marrickville. This land has an area of approximately 3.57 hectares (Lot 100 DP 715231).
2. 13-55 Edinburgh Road, which has an area of approximately 8,800sqm and is located to the south of Marrickville Metro, with frontage to Smidmore Street, Murray Street and Edinburgh Road. An industrial warehouse development currently occupies this land and this is the site of the approved shopping centre expansion (Lot 1 DP 612551).
3. The section of Smidmore Street immediately to the south of Marrickville Metro, between Murray Street to the east and Edinburgh Road to the west. This is located between the existing shopping centre and the expansion site.

Marrickville Metro is a subregional shopping centre, approximately 7km from the Sydney CBD. The shopping centre consists of the major tenants of Kmart, Woolworths and Aldi and a range of speciality stores. The shopping centre is the largest retail shopping centre in the local region and attracts in the order of five million visitations per annum.

[1] National Construction Code 2016, Volume One – Building Code of Australia, Australian Building Codes Board, Australia.

The current shopping centre is a substantially enclosed and internalised with pedestrian entries from Victoria Road to the north and Smidmore Street to the south. Pedestrian access is also provided from the rooftop car parking areas down into the centre. Existing open loading dock areas exist along the frontage of Murray Street and from Smidmore Street. Two vehicle access ramps accessed off Smidmore and Murray Street provide car access to the roof top parking.

Located on site adjoining the shopping centre is the “Mill House”, which is a listed heritage item and currently used as the Centre Management Office. In addition, remnants of the ‘Old Vickers Mill’ façade remain along the Victoria Road frontage of the site.

The expansion to the shopping centre is consented on the 13-55 Edinburgh Road site, which is located on the opposite side of Smidmore Street to the south. The site is presently occupied by a two-storey factory/warehouse building that is built to the street frontages. Open grade car parking is located on the western side of the site.

An aerial photograph of the site is provided below as Figure 1.

Figure 1 Aerial Photograph of the Site

AMP Capital Investors (AMP) are the managers of the Shopping Centre and 13-55 Edinburgh Road on behalf of the owners Marrickville Metro Pty Ltd.

Smidmore Street which bisects the two properties is a public road vested in Inner West Council as the local road authority. The reason that this land forms part of the proposal is that there is proposed to be modifications to the road layout and street activation, whilst a new pedestrian bridge is proposed to span the road to connect the two parts of the shopping centre.

At the time of preparing this report, AMP and Inner West Council are in the process of finalising terms associated with the Agreement to Lease/Lease of the proposed bridge stratum.

3. The proposed modification

The proposed modifications are illustrated on the Architectural Plans and will comprise the following:

- A revised retail layout within the new shopping centre building proposed under Stage 1B (Edinburgh Road site), including amended travellator locations, new food and beverage uses at ground level, reconfigured shop units and alterations to the upper floor parking layout.
- Alterations to the building façade on Smidmore Street, amendments to materials used in elevations and minor increase in height of the new shopping centre building to facilitate upper floor parking, along with rooftop plant and equipment.
- Extending operating hours for a limited number of shops on the ground floor to encourage night time activation for the food and beverage shops.
- Erection of a new pedestrian bridge linking Level one of the new shopping centre building to the existing shopping centre.
- An amended road alignment and modification to the vehicular route on Smidmore Street to implement a new one-way access off Murray Street.
- Introduction of a right-hand entry into the new building from Edinburgh Road.
- Redistribution of car space provisions across the development without increasing the overall permitted car parking numbers.
- Introduction of paid parking across the site.
- Redistribution of the GFA across the site without increasing the overall permitted GFA.
- Introduction of signage / signage zones on the development along with a potential zone for mural(s) on the frontage.

4. Staging of development

The MOD2 application which was approved in April 2015 contained an updated construction staging programme. As a result of this, the following stages of development are consented:

Stage 1A

The proposed early stage of works or Stage 1A of the development would focus on the Victoria Road entrance and comprise:

- an upgrade to the portion of the existing building façade facing Victoria Road, which will include a minor increase in floor area which occurs with the new alignment of the external walls of the building;
- an upgrade to the main entry in the shopping centre;
- new paving and landscape treatment to ‘Civic Place’;
- archival recording of the Mill House [as required by Condition C7 of the original approval];
- preservation of the existing brick footpath [required by Condition E7 of the original approval]; and
- traffic management works and with some associated stormwater management works [required by Conditions B15(f), B15(g) and B17].

The above works which formed Stage 1A were completed in March 2017.

Stage 1B

Stage 1B would comprise the new building on the Edinburgh Road site, which will become an extension of the existing Marrickville Metro Shopping Centre, and alterations to the portion of the existing building on or near Smidmore Street, as this area has a physical relationship with and provides the pedestrian connection to the new shopping centre extension.

Stage 2

Stage 2 would continue to be the balance of the work proposed for the redevelopment of the existing shopping centre building, including an additional retail floor at first floor level and additional rooftop car parking.

This Modification application principally concerns Stage 1B of the proposed development.

5. Main characteristics of the building and performance solutions

5.1 Main characteristics of the building

A description of the main characteristics of the building for the purpose of determining compliance with the BCA is given in Table 12. The proposed use and classification of the building or part in accordance with clause A3.2 of the BCA is described in Table 2.

Characteristic	BCA provision	Description
Effective height	A1.1	Less than 25m
Type of construction required	C1.1	Type A (large isolated)
Rise in storeys	C1.2	Five
Levels contained	-	Five

Table 1 Main building characteristics

Part of building	Use	Classification (A3.2)
Ground floor, Level 1	Retail	Class 6
Level 2	Retail Carpark	Class 6 Class 7a
Level 2a, Level 2b	Carpark	Class 7a

Table 2 Use and classification

5.2 Preventative and protective measures

The building will be provided with the major fire safety measures required by the DTS provisions of the BCA listed as follows. A comprehensive list of fire safety measures is to be provided by the certifier as part of the building approval process. Additional fire safety measures required as part of the performance solution are listed within section 7.

- Automatic fail safe devices
- Automatic sprinkler system
- Building occupant warning system
- Emergency lighting
- Exit signs
- Fire control centre
- Fire dampers
- Fire doors
- Fire hose reel system
- Fire hydrant system
- Fire seals (protecting openings in fire resisting components of the building)
- Fire rated lightweight construction
- Perimeter access for emergency vehicles
- Portable fire extinguishers
- Smoke detection system
- Smoke exhaust system
- Warning and operational signs

[2] Steve Watson & Partners, August 2017, BCA assessment report for design development, Marrickville Metro Development (stage 1b), report 2015/1094 R1.0 Draft.

5.3 Occupant characteristics

The characteristics of the occupants expected to be in the building are listed in Table 3.

Characteristic	Description
Familiarity	Occupants within the retail portions of the building are expected to be primarily shoppers who may not be familiar with the layout of the building and location of fire exits. A limited number of staff are also expected to be present who are familiar with the layout of the building and trained in emergency situations. Occupants within the carpark are mainly expected to be associated with the retail portions of the building and are expected to be within the carpark for short periods.
Awareness	Occupants are expected to be awake and alert to a potential emergency event such as a fire in the building. Some occupants within the casual dining tenancies may be under the influence of alcohol.
Mobility	Occupants are assumed to have the same level of mobility as the general population. This may include a limited proportion of mobility impaired occupants. These occupants may require crutches, a wheelchair or similar to evacuate on their own or need assistance from other occupants.
Age	Occupants of all ages may be present within the building.
Language	Although occupants may have English as their second language, they are expected to understand signs and verbal instructions in English enough to not adversely impact evacuation.
Occupant load	Population densities used in this assessment are to be based upon the figures recommended in the Fire Code Reform Centre document Fire Safety in Shopping Centres – Project 63.

Table 3 Occupant characteristics

5.4 Performance solutions

The design of the building includes areas that do not comply with the DTS provisions of the BCA. We intend to use performance solutions to meet relevant performance requirements of the BCA. Table 4 describes the BCA requirements associated with the performance solutions.

No	Description of performance solutions	DTS provision	Performance requirements	Method of meeting performance requirements	Assessment method
1.	The fire resistance level (FRL) of the building elements is proposed to be reduced from 180/180/180 to 120/120/120.	Clause C1.1	CP1 and CP2	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
2.	The building is a large isolated building and is not provided with perimeter vehicular access complying with clause C2.4 due to the level 1 bridge connection linking the existing and proposed retail buildings.	Clause C2.3 and C2.4	CP9	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
3.	The level 2 and 2A carparks are to be separated by fire walls. The fire walls separating the retail and carpark portions will incorporate glazed mall entry doors and shopfront.	Clause C2.7, C2.8, C3.5 and specification C1.1	CP2	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)

[3] Fire Safety in Shopping Centres – Project 6, 1998, Fire Code Reform Centre (FCRC), Sydney.

No	Description of performance solutions	DTS provision	Performance requirements	Method of meeting performance requirements	Assessment method
4.	The maximum travel distance to a point of choice is proposed to be extended to: • 26m from the ground floor amenities • 30m from retail speciality tenancies	Clause D1.4	DP4 and EP2.2	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
	The maximum travel distance to the nearest exit is proposed to be extended to: • 62m within the retail portion • 80m within the open deck carpark		DP4 and EP2.2	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
	The maximum travel distance between alternative exits is proposed to be extended to: • 100m within the retail portion • 120m in the open deck carpark	Clause D1.5	DP4 and EP2.2	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
5.	The supermarket tenancy on level 1 opens directly into fire-isolated stairways that do not occupy the entire storey.	Clause D1.7	DP5 and EP2.2	Equivalent to DTS A0.3(a)(ii) and A0.3(b)	Comparison to DTS A0.5(d)
6.	The hydrant booster assembly is not located within sight of the main entrance to the building.	Clause E1.3	EP1.3	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
7.	Access to the fire control centre involves a change in level of 780mm from the street instead of 300mm.	Clause E1.8	EP1.6	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)
8.	Rationalisation of smoke hazard management including: • Performance based smoke exhaust rates • Performance based smoke reservoirs • Smoke exhaust is not to be provided in the loading dock, store rooms and plant rooms	Clause E2.2	EP2.2	Complies with performance requirements A0.3(a)(i) and A0.3(b)	Verification method A0.5(b)(ii)

Table 4 BCA requirements associated with the performance solutions

6. Scope and assumptions

6.1 Scope

- The scope of this report is limited to the performance solutions described in section 5.4.
- The scope of this report is limited to the fire safety aspects of the performance requirements of the BCA. Matters such as property protection (other than protection of adjoining property), business interruption, public perception, environmental impacts and broader community issues – such as loss of a major employer and impact on tourism – have not been considered as they are outside the scope of the BCA.
- This report considers fires involving a single ignition point. Arson or destructive acts involving:
  - large amounts of accelerants which significantly change the expected burning behaviour of materials
  - multiple ignition sources
  - terrorism

  are not considered in the scope of this assessment.
- The scope of our works is limited to considering evacuation and fire safety issues for people with disabilities to the same degree as the DTS provisions of the BCA. Specifically, consideration of evacuation from the building by people with disabilities under the provisions of the Disability Discrimination Act 1992 is excluded.
- If there are building alterations or additions, a change in use or changes to the fire safety systems in the future, a reassessment will be needed to verify consistency with the assessment in this report.
- The documentation that forms the basis for this report is listed within Appendix A.
- This report has been prepared based upon information provided by others. Defire has not verified the accuracy and/or completeness of this information and shall not be responsible for any errors or omissions which may be incorporated into this report as a result.

6.2 Assumptions

- The design complies with the current DTS provisions of the BCA relating to fire safety except for the specific performance solutions described within section 5.4.
- All of the fire safety systems are assumed to be designed, installed and operate in accordance with the appropriate Australian standards, other design codes, legislation and regulations relevant to the project unless specifically stated otherwise.
- For a satisfactory level of fire safety to be achieved, regular testing and maintenance of all fire safety systems and measures, including management-in-use systems, is essential and is assumed in this report.

7. Fire safety measures

The following fire safety measures are proposed for the building as a starting point for the fire safety engineering assessment to achieve compliance with the relevant performance requirements of the BCA.

7.1 General

1. The design must comply with the current DTS provisions of the BCA relating to fire safety except specifically mentioned. This section does not provide a comprehensive list of fire safety measures required by the DTS provisions of the BCA. The fire safety measures listed within this section relate only to the performance solutions. The fire safety measures must be read in conjunction with the DTS provisions of the BCA.
2. This report and the requirements listed in this section must be implemented into the design and identified on the fire safety schedule for the building. They must be maintained and certified in accordance with the Environmental Planning and Assessment Regulations 2000 and relevant Australian standards.

7.2 Structural fire resistance

7.2.1 Fire resistance and stability

3. The fire resistance levels (FRLs) of the building elements must be designed in accordance with the requirements of specification C1.1 of the BCA for a large isolated building of type A construction with the exception that the maximum FRL criteria for any element is 120 minutes – eg if an element is required to achieve an FRL of 180/180/180 it can be reduced to 120/120/120.

7.2.2 Compartmentation and separation

4. The level 2 and 2a carpark and retail portions must be fire separated by construction in accordance with item 5 and as illustrated in Figure 3 and Figure 4.
5. The separation between the level 2 and 2a carpark and retail portions must be fire rated construction achieving an FRL of not less than 120/120/120 and may include glazed construction instead of the fire rated construction as illustrated in Figure 3 and Figure 4, provided the following criteria is achieved:
    a. All parts of the separation above a false ceiling or below a raised floor must be fire rated and is not permitted to be glazed and protected by sprinklers.
    b. The glass must be toughened and laminated – ie two layers of toughened glass – with a minimum thickness of 2x6mm with a plastic polyvinylbutral (pvb) interlayer not less than 0.38mm thick.
    c. The glass must have polished edges to mitigate the risk of failure of the glass at low temperatures due to imperfections at the glass edge.
    d. The maximum height of the glass must not exceed 3.96m.
    e. Frames must be non-combustible with no horizontal transoms or mullions. Butt-joints sealed with an appropriate silicone based sealant capable of withstanding at least 200°C may be used between the individual frameless panes.
    f. The glazing must be protected by wall-wetting sprinklers on both sides in accordance with item 7.
    g. Any doors within the glazed separation must comply with item 6.
6. Any doors located within the glazed carpark and retail separation on levels 2 and 2a must comply with the following:
    a. Be self-closing or automatic closing in the event of the activation of either a smoke detector or sprinkler head within the subject level.

b. Automatically close in the event of the activation of smoke detectors located within 1.5m of the automatic closing doors on both sides in accordance with clause C3.5(b)(ii) of the BCA.

c. Any automatic closing device fitted to the doors within the glazed separation must also be deactivated to fail safe in the closed position.

7. The sprinklers used to protect the glazing on levels 2 and 2a between the carpark and retail portions must comply with the following requirements which are based on the findings of the IRC studies4 on the use of sprinklers for protection of tempered or heat-strengthened glazing.

a. The duration of water supply must be not less than 120 minutes. This is in addition to the water supply for any other system such as a building sprinkler system.

b. The water pressure at the sprinkler/s must be maintained at a minimum of 145kPa.

c. The sprinklers must be fast response sprinklers with a temperature rating of 74°C or less and a RTI of not more than 50(ms)1/2.

d. The sprinkler head must be mounted adjacent to the glazing at the top centre of the window assembly. The centreline of the sprinkler's deflector should be located 50mm below the top window frame, and the deflector positioned 13mm from the glass as shown in item (a) of Figure 2.

e. The maximum width of glazing that can be protected using a single sprinkler is 3m wide, with a mullion having a depth of 25mm or less as shown in (b) of Figure 2. For windows with mullions more than 25mm deep multi-sprinkler protection systems must be provided.

f. A wider window without mullions can be protected by multiple sprinkler heads located at least 2m apart to reduce the risk of delayed sprinkler activation. If there is a centre mullion with a depth of 50mm or more located between the sprinkler heads, spacing between multiple sprinkler heads is not limited. Refer to item (c) of Figure 2.

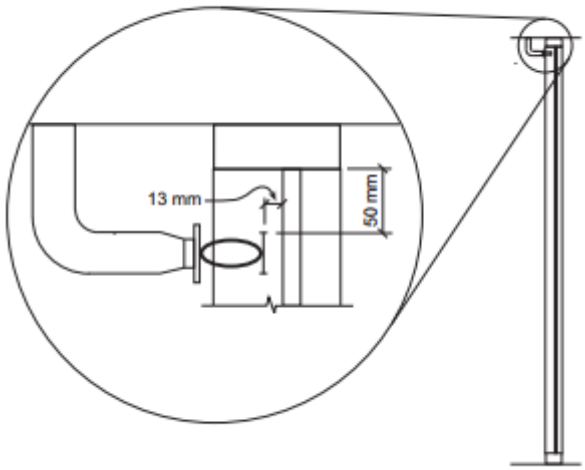
g. Protection of glazed doors with ceiling-mounted pendent sprinklers as shown in item (d) of Figure 2 is permitted provided they comply with the following requirements.

i. The following parameters must not be exceeded for a ceiling-mounted pendent sprinkler:

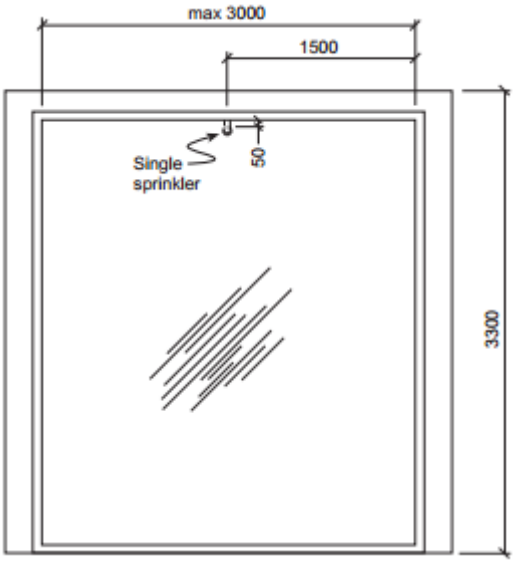
- a maximum sill depth of 150mm
- a maximum sprinkler height above the window of 450mm
- a maximum sprinkler distance from the window assembly of 600mm.

ii. The sprinkler heads must be spaced at least 1.8m apart for multi-sprinkler head arrangements mounted on the ceiling.

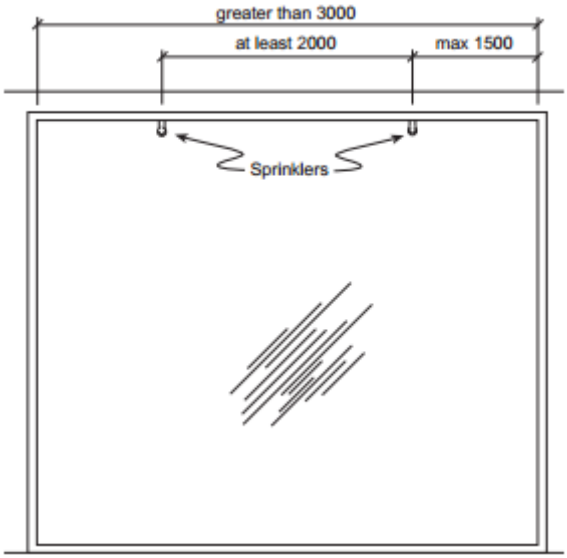
[4] Kim AK, Lougheed GD, 1997, Fire protection of windows using sprinklers, Construction Technology Update no 12.



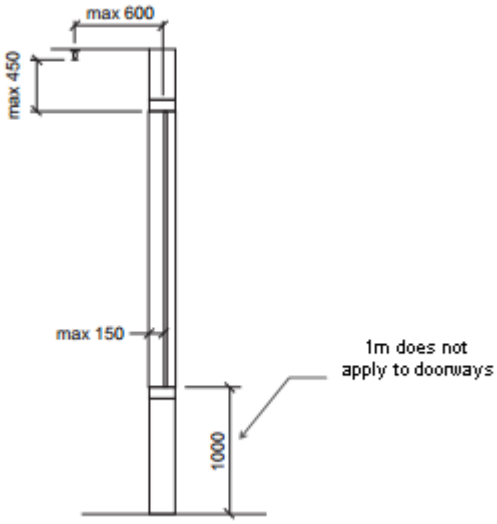
(a) Sprinkler location relative to full-height window assembly (section)



(b) Location of single sprinkler for protection of full-height window assembly (elevation)

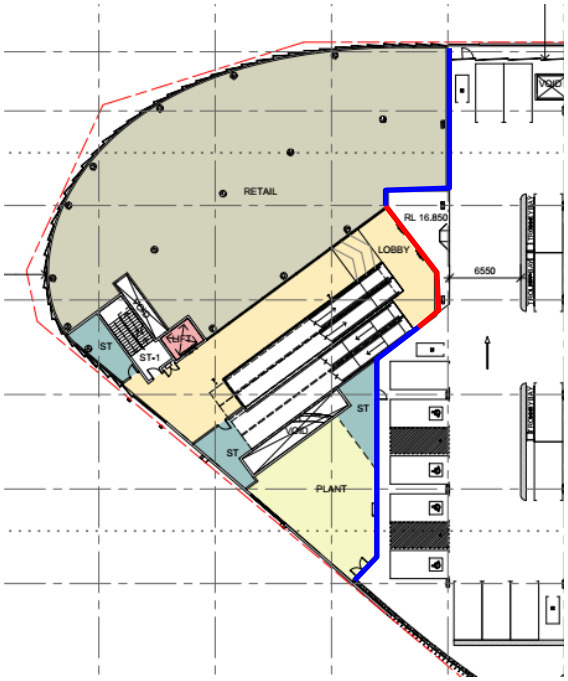


(c) Location of sprinklers in multi-sprinkler system for protection of wide windows (elevation)



(d) Limiting distances for ceiling-mounted pendent sprinklers (section)

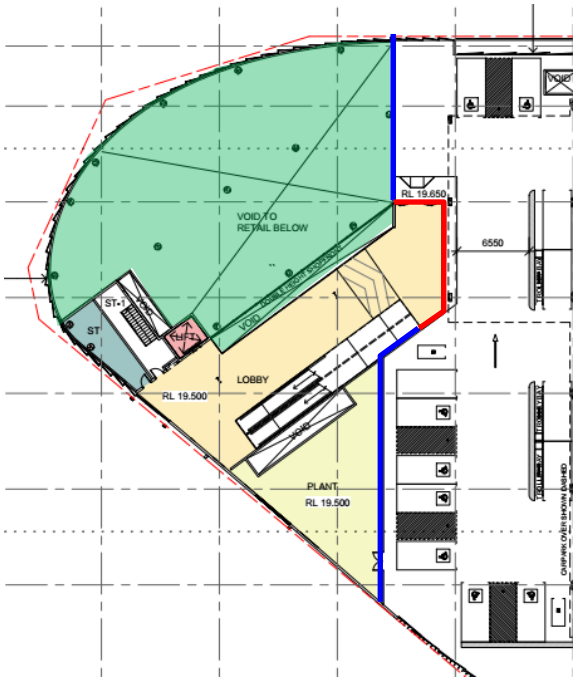
Figure 2 Illustration of sprinkler requirements for protection of glazing



Glazed construction protected with wall-wetting sprinklers

120/120/120 fire rated construction

Figure 3 Level 2 glazed construction between retail and carpark portions



Glazed construction protected with wall-wetting sprinklers

120/120/120 fire rated construction

Void above level 2 retail

Figure 4 Level 2a glazed construction between retail and carpark portions

7.3 Perimeter vehicular access

8. Vehicular access complying with clause C2.4(b) of the BCA must be provided around the building with the exception of the level 1 bridge connection linking the existing and proposed retail buildings. Refer to Figure 5. The level 1 bridge link must have an unobstructed height from the road of not less than 4.5m.

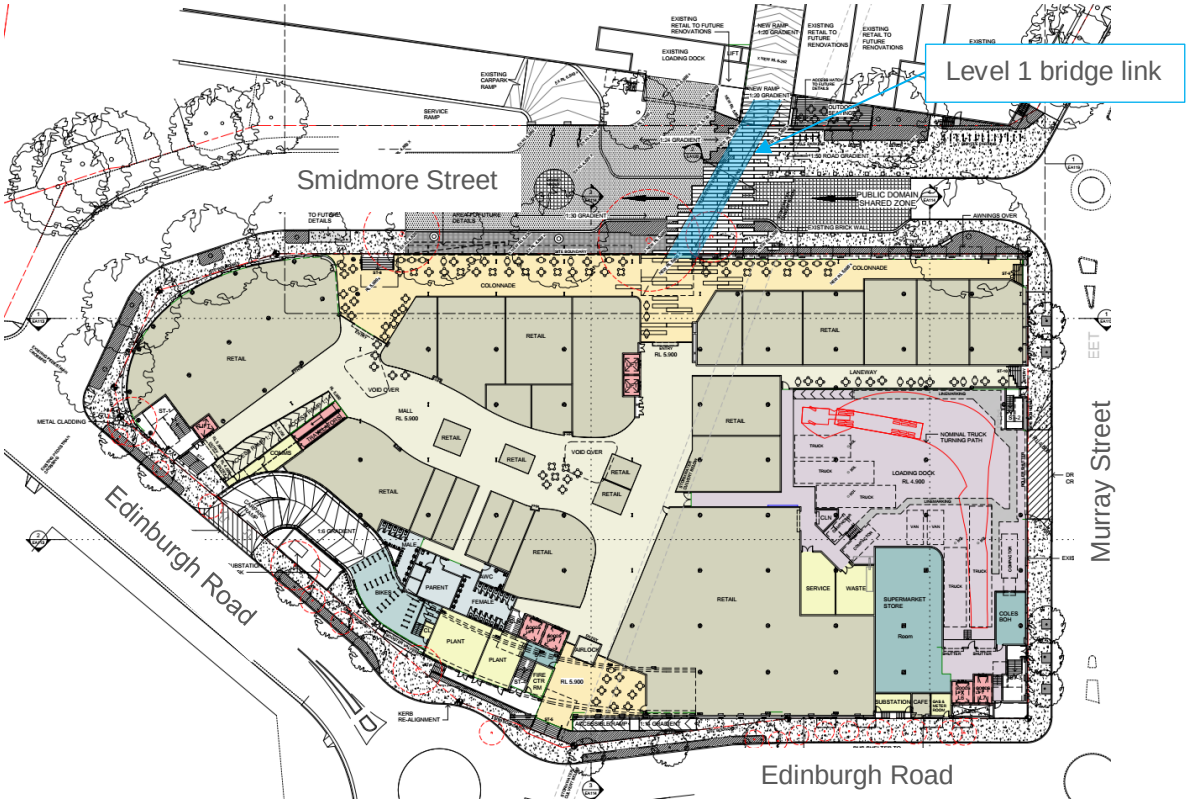


Figure 5 Perimeter vehicular access

7.4 Access and egress

7.4.1 Provisions of escape

9. The following maximum travel distances apply within the retail portions of the building:
   a. 20m to a single exit or point of choice
   b. 30m to a single exit or point of choice from a specialty tenancy to the mall subject to the special tenancy being provided with smoke detection installed in accordance with item 21. Refer to Figure 6.
   c. 26m to a point of choice in the mall from the ground floor amenities subject to smoke detection installed in accordance with item 21 being provided within the ground floor amenities and associated corridor. Refer to Figure 7.
   d. 62m to the closest of two or more alternative exits
   e. 100m between alternative exits when measured through the point of choice.

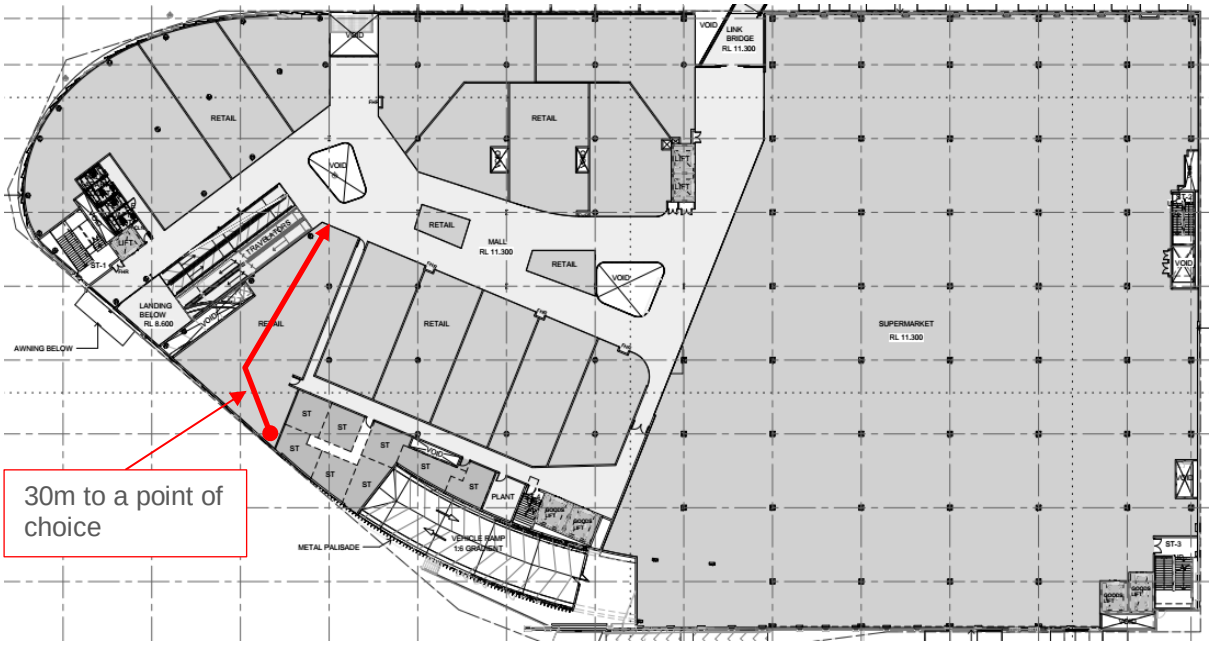
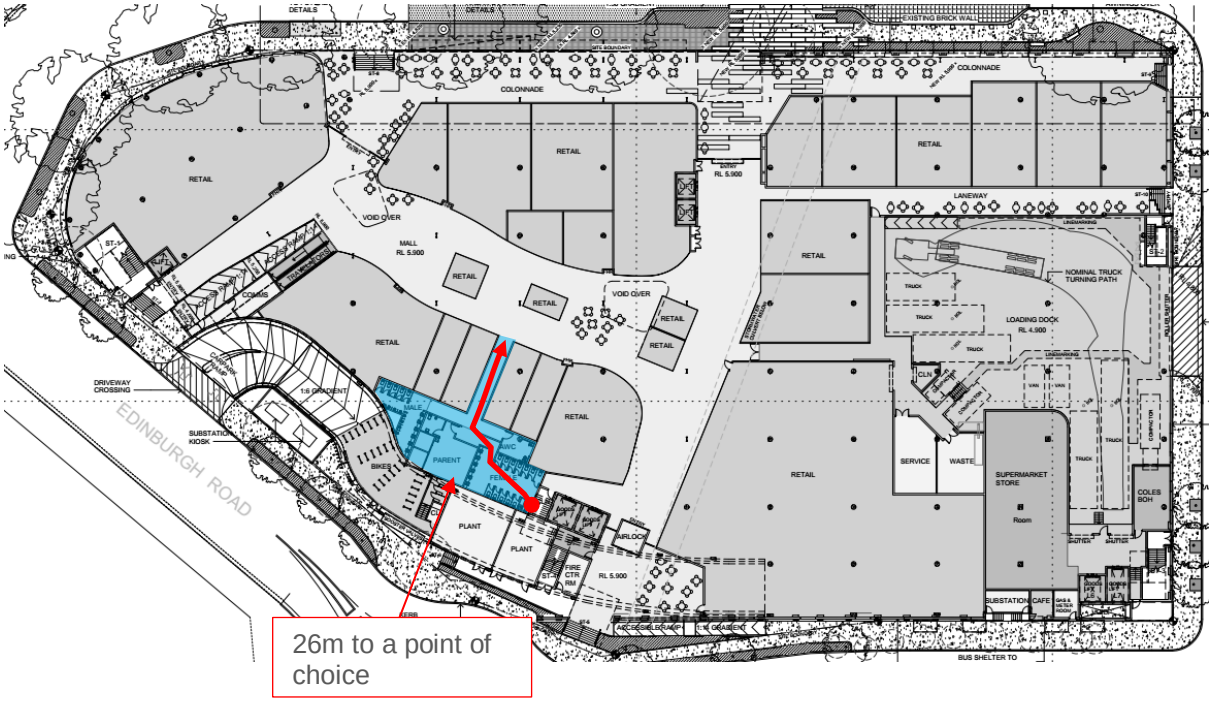


Figure 6 Maximum extended travel distance from level 1 retail speciality tenancies (indicative only)



Smoke detection installed in accordance with AS 1670.1-2015

Figure 7 Maximum extended travel distance from ground floor amenities

10. The following maximum travel distances apply within the open deck carpark portions of the building:

    a. 20m to a single exit or point of choice

    b. 80m to the closest of two or more alternative exits

    c. 120m between alternative exits when measures through the point of choice.

11. All exits and paths of travel to exits must be not less than 1m in unobstructed width in accordance with clause D1.6 of the BCA.

12. Exits must be provided from the retail mall building as identified in Figure 8 – Figure 11. The required widths of exits are subject to further design resolution and may be rationalised where appropriate.

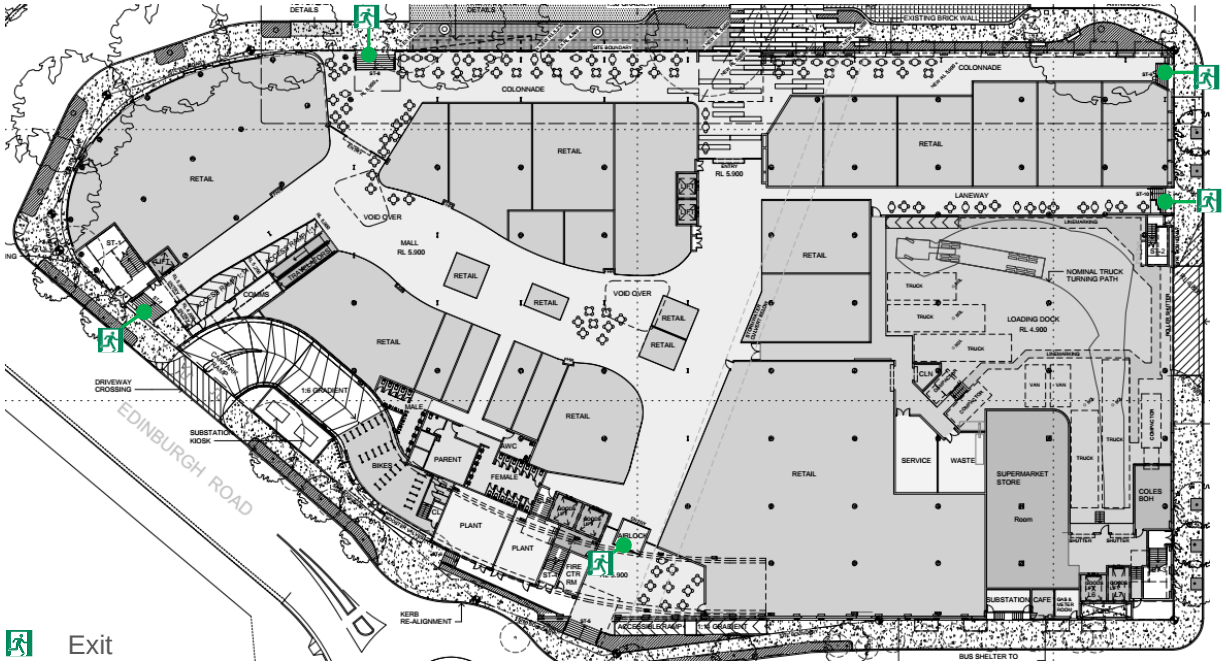


Figure 8 Ground floor exit locations

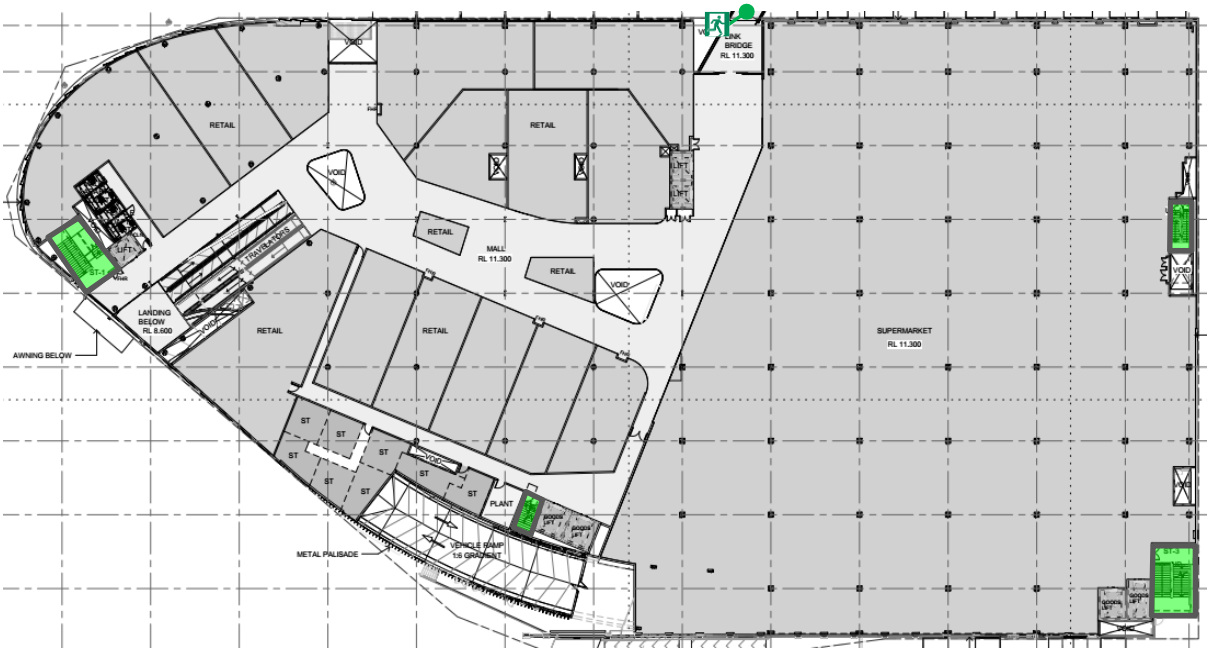
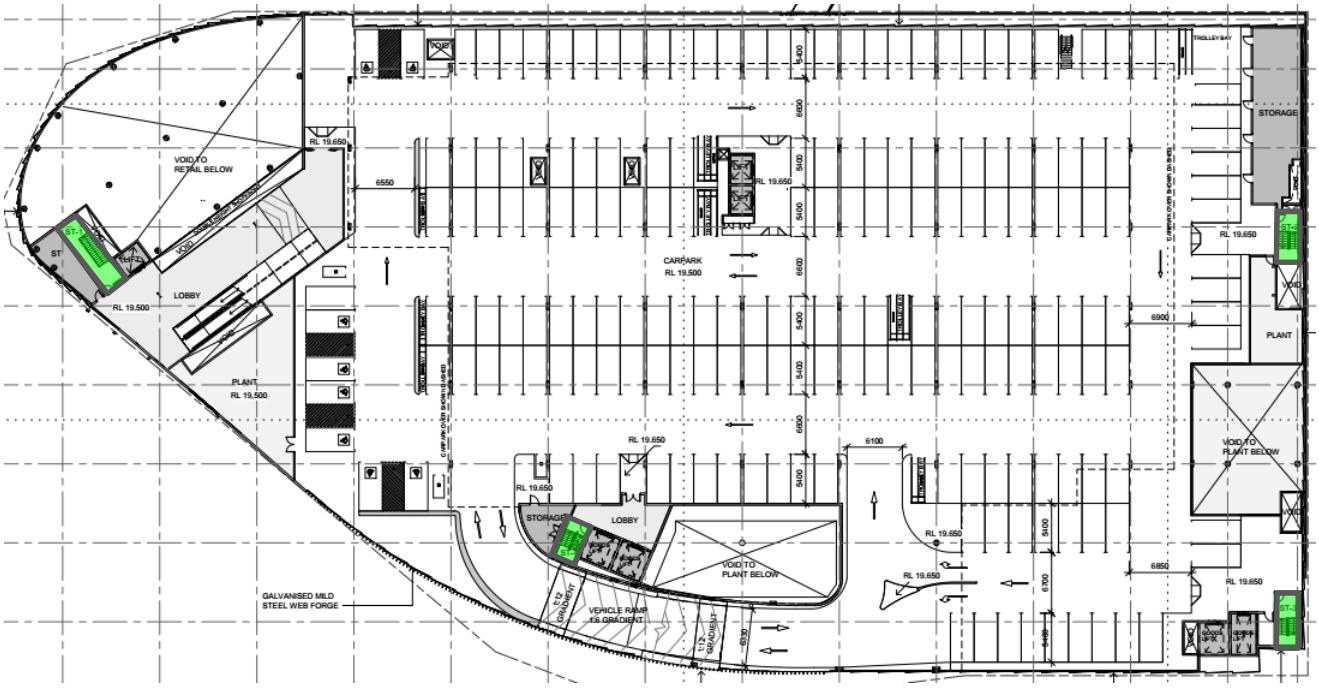


Figure 9 Exits serving level 1



Exit

Fire-isolated stair

Figure 10 Exits serving level 2 – indicative of level 2a

Exit

Fire-isolated stair

Figure 11 Exits serving level 2b

13. The supermarket tenancy on level 1 opens directly into fire-isolated stairways that do not occupy the entire storey as illustrated in Figure 12.

Figure 12 Level 1 supermarket tenancy opening directly into fire-isolated stairways

7.4.2 Construction of exits

14. Doorways that open directly from the supermarket tenancy on level 1 into fire-isolated stairways must be protected with self-closing fire doors achieving an FRL of not less than -/60/30 that swing in the direction of egress. Refer to Figure 12. The doors must be fitted with smoke seals complying with the following requirements:

    a. be medium temperature rated – ie capable of resisting exposure to 200°C for 30 minutes

    b. be fitted to all sides of the door including under the door blade

    We recommend the smoke seals be rebated into the bottom of the doors to improve the reliability of the smoke seals.

7.5 Services and equipment

7.5.1 Fire fighting equipment

15. A fire hydrant system must be installed throughout the building in accordance with the requirements of clause E1.3 of the BCA and AS 2419.1-2005 with the following exceptions:

    a. The fire hydrant booster assembly is located along Edinburgh Road and is not within sight of the main entrance to the building – refer to Figure 13.

    Please note that the fire hydrant booster assembly connections and all fire hydrant valves must be fitted with 65mm Storz hermaphrodite delivery couplings manufactured and installed in accordance Fire & Rescue NSW technical information sheet ‘FRNSW compatible hose connections’ D15/45534 version 5 dated 17 November 2016 for more information. This document is available at www.fire.nsw.gov.au.

16. Hydrant block plans and site plans indicating the location of the hydrant booster assembly must be provided at the entrances to the building as indicated in Figure 13, in the fire control centre and at the hydrant booster assembly.

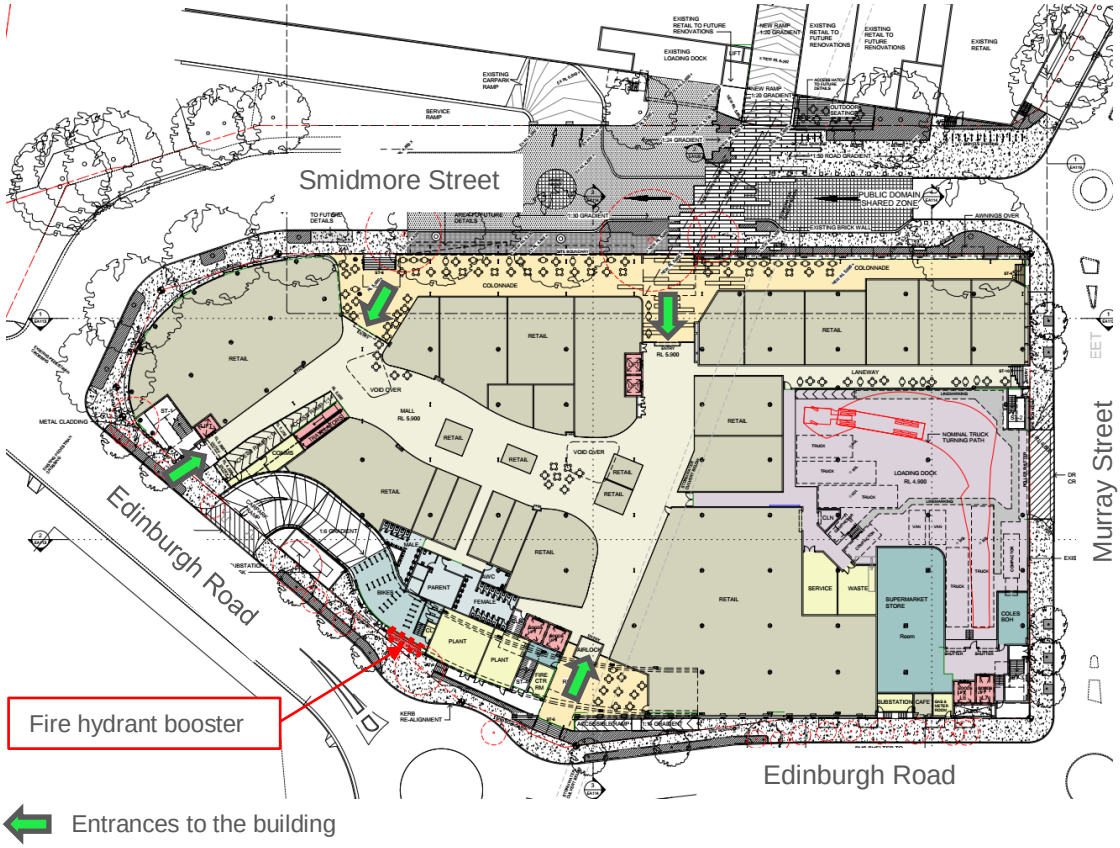


Figure 13 Location of hydrant booster assembly

17. A fire hose reel system must be installed throughout the building in accordance with the requirements of clause E1.4 of the BCA and AS 2441-2005.

18. A sprinkler system in accordance with the requirements of specification E1.5 of the BCA and AS 2118.1-1999 must be provided throughout the building. The sprinkler system must have the following additional characteristics:

    b. All sprinkler heads must be fast response with an RTI of 50 (ms)1/2 or less in accordance with the requirements of AS 2118.1-1999.

    c. Concealed, recessed or flush-mounted sprinkler heads must not be used as it may delay sprinkler activation and not achieve fast response activation. Semi-recessed sprinkler heads are considered acceptable provided they achieve a fast response rating.

    d. Activation temperature of 68°C except where otherwise required by AS 2118.1-1999 such as under glazed skylights and roof areas.

    e. Activation of the sprinkler system must operate the smoke hazard management systems of that area and activate the building occupant warning system.

    f. The sprinkler system must be zoned to match the zoning of the smoke exhaust system.

    g. The sprinkler system must be permanently connected with a direct data link or other approved monitoring system to a fire station or fire station dispatch centre in accordance with AS 2118.1-1999.

    h. System component fault monitoring must be provided in accordance with clause 3.4 of AS 2118.1-1999.

    i. Sprinkler valves must be provided to permit the identified smoke zones – ie major tenancies, mall area and specialty tenancies on each level, carparks – to be isolated separately. The intent of this requirement is to prevent large areas of a single floor being unprotected at any one time.

j. Records must be maintained such that there will be no confusion as to which sprinkler head belongs to which sprinkler valve.

19. The building must be provided with a fire control centre in accordance with clause E1.8 and specification E1.8 of the BCA, with the exception that the control centre may be located 780mm above the public road instead of 300mm. Refer to Figure 14.

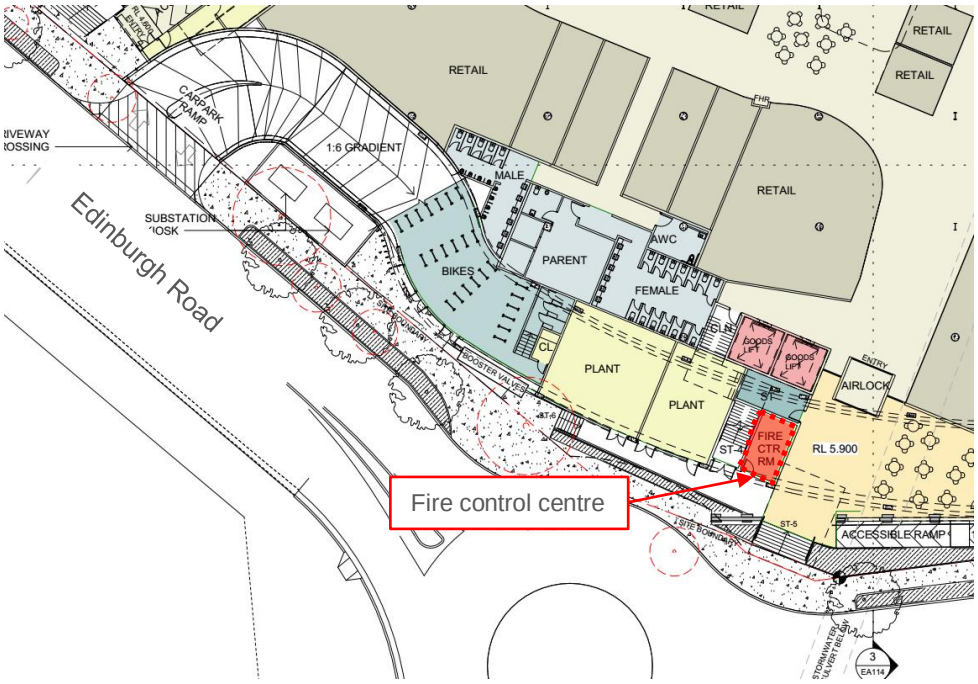


Figure 14 Fire control centre – ground floor

7.5.2 Smoke hazard management

Smoke detection system

20. An analogue addressable smoke detection system must be provided throughout the retail mall building in accordance with clause 5 of specification E2.2a of the BCA to activate the smoke exhaust and occupant warning systems.

21. Additional smoke detection must be provided throughout:

- Specialty tenancies which incorporate extended travel distance to a point of choice of up to 30m in lieu of 20m.
- Ground floor amenities and the associated corridor – refer to Figure 7.
- Level 1 store room – refer to Figure 6.

The smoke detectors must have the following characteristics:

a. The smoke detectors must be spaced in accordance with section 5 of AS 1670.1-2015 below the ceiling – ie 10m grid with detectors not more than 5m from any wall or bulkhead.

a. The smoke detectors must be connected with and fully integrated with the building's smoke detection system and connected to the building's fire detection control and indicating equipment (FDCIE).

b. The smoke detectors must be connected to the base building FDCIE.

c. Activation of the smoke detection system must operate the smoke hazard management systems of the relevant area and activate the building occupant warning system as appropriate.

Smoke zones and smoke exhaust system

22. The open deck carparks on level 2, level 2A and level 2B are to be naturally ventilated. The open deck carparks must comply with the requirements for an open deck carpark in part A1.1 of the BCA.

23. The building is to be separated into different smoke zones and provided with smoke exhaust in accordance with specification E2.2b of the BCA with the following exceptions:

    a. Smoke reservoirs may be greater than 2000m2 in floor area. Refer to item 24. It is noted that the smoke reservoirs are subject to further design resolution.

    b. Smoke exhaust rates may be rationalised. Refer to item 25. It is noted that the smoke exhaust rates are subject to further design resolution.

    c. Smoke exhaust is not required to be provided to the loading dock, store rooms and plant rooms.

24. The building must be separated into a number of smoke zones. The speciality tenancies and mall area on each floor will comprise a smoke zone, and the major tenancy on level 1 will comprise a smoke zone. Smoke separation must comply with the following requirements:

    a. The separation must be non-combustible, smoke proof construction extending to the underside of the slab above or to the underside of an impervious ceiling.

    b. Smoke baffles must be provided to separate adjacent smoke zones and meet the following criteria:

        i. extend to the underside of the slab above.

        ii. have minimum depth of 1m below ceiling height with a maximum height of 3m above the finished floor level.

        iii. be of non-shatterable and non-combustible construction.

        Note: If glass baffles are provided they must be constructed of toughened glass with a minimum thickness of 6mm.

    c. Smoke baffles must be provided to separate any major and mini-major tenancies from the retail mall and meet the following criteria:

        i. extend to the underside of the slab above.

        ii. have a minimum depth of 1.0m below the lowest ceiling height (between the mall or major and mini-major tenancy) unless addressed via a separate fire safety engineering assessment for a specific tenancy fitout.

        iii. be of non-shatterable and non-combustible construction. The baffles can be formed by the bulkheads at the shop entry of the tenancy.

    d. Smoke proof construction includes openings, penetrations and junctions with other building elements to prevent the free passage of smoke.

    e. Any gaps around penetrations must be sealed with non-combustible material.

    f. Any doors in the smoke separation must be self-closing or automatic closing in the event of a fire alarm.

    It is noted that the mini-major tenancy on the ground floor is less than 1000m2 and is not currently proposed to form its own smoke zone with dedicated smoke exhaust. In the event that the mini-major incorporates extended travel distances, the mini-major may be required to form a separate smoke zone and be provided with a dedicated smoke exhaust system.

25. The indicative locations of exhaust inlets and plenums are illustrated in Figure 15 and Figure 16. Note that the smoke exhaust system within the level 1 major tenancy is likely to require additional inlets distributed throughout the tenancy. The smoke exhaust system is subject to further design resolution and detailed analysis by Defire. The smoke exhaust system must have the following characteristics:

Control and operation

a. Smoke detector activation within a smoke zone must automatically activate the corresponding smoke zone smoke exhaust system.

b. Manual override control and indication for each smoke zone, together with operating instructions for use by emergency personnel, must be provided adjacent to the FDCIE in accordance with the requirements of clauses 4.11 and 4.13 of AS/NZS 1668.1-2015.

Componentry

c. Each smoke exhaust fan, complete with its drive, flexible connections, control gear and wiring must:

   i. be constructed and installed so that it is capable of continuous operation – exhausting the required volumetric flow rate at the installed system resistance – at a temperature of 200°C for a period of not less than 1 hour;

   ii. be rated to handle the required volumetric flow rate at ambient temperature to be capable of exhausting cool smoke during the early stages of a fire and to allow routine testing; and

   iii. have any high temperature overload devices installed, automatically overridden during the smoke exhaust operation.

d. Power supply wiring to exhaust fans together with detection, control and indication circuits – and where necessary to automatic make-up air supply arrangements – must comply with AS/NZS 1668.1-2015.

Discharge

e. The smoke exhaust fans and vents must be located to discharge directly to outdoor at a suitable point not less than 6m from any air intake point or exit.

Make-up air provisions

f. Evenly distributed low level make-up air must be provided in accordance with clause 6 of specification E2.2b of the BCA which states:

   i. Low level make-up air must be provided either automatically or via permanent ventilation openings to replace the air exhausted so as to minimise-

      - any disturbance of the smoke layer due to turbulence created by the incoming air, and
      - the risk of smoke migration to areas remote from the fire due to the effect of make-up air on the air balance of the total system.

   ii. The velocity of make-up air through doorways must not exceed 2.5m/s.

   iii. Within a multi-storey fire compartment, make-up air must be provided across each vertical opening from a building void to the fire-affected storey at an average velocity of 1m/s so as to minimise the spread of smoke from the fire-affected storey to other storeys.

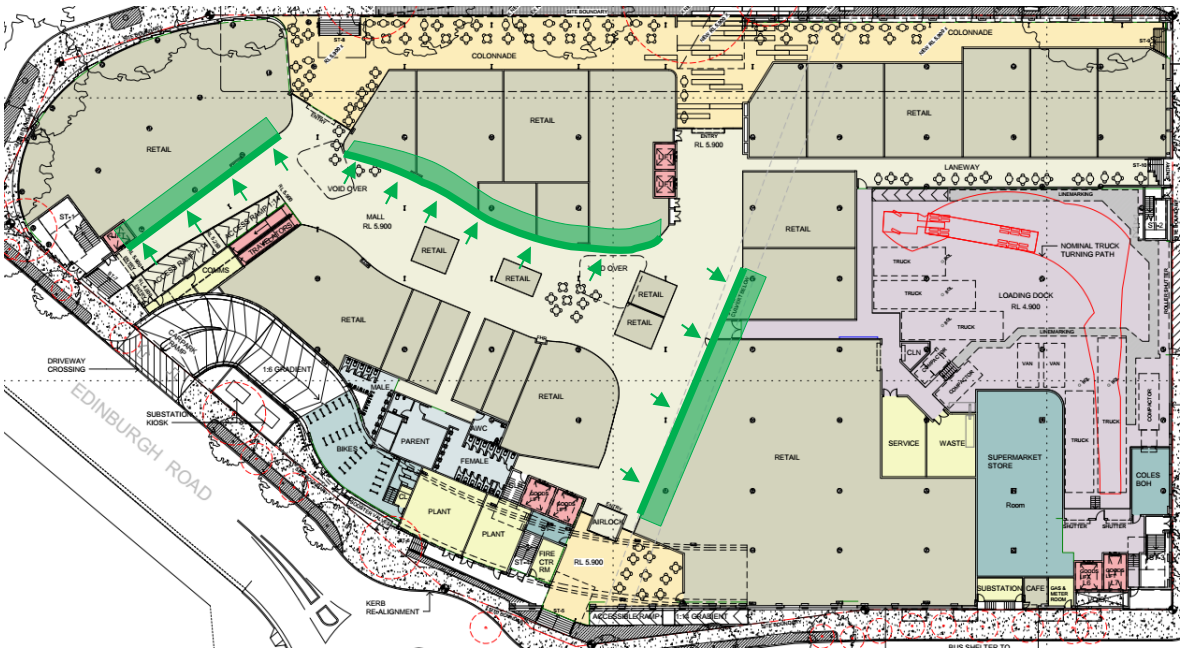


Figure 15 Ground floor smoke hazard management – indicative only

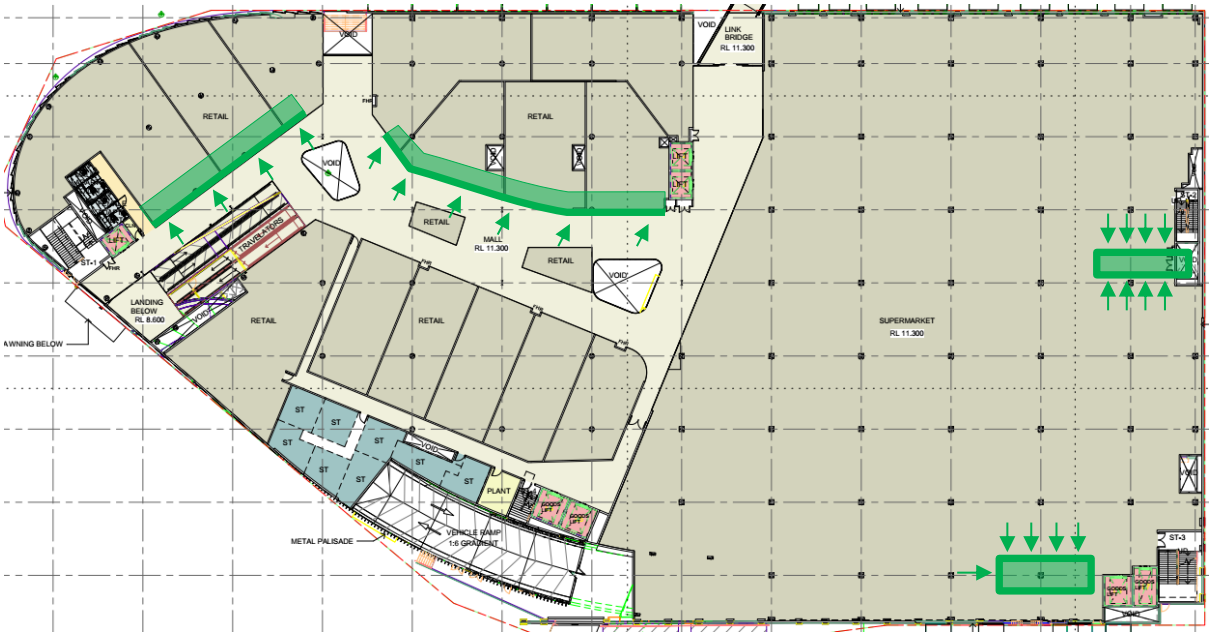


Figure 16 Level 1 smoke hazard management – indicative only

7.5.3 Emergency lighting, exit signs and warning systems

26. An emergency lighting system must be installed throughout the building in accordance with clauses E4.2 and E4.4 of the BCA and AS 2293.1-2005.

27. Exit signs and directional signs must be installed throughout the building in accordance with clauses E4.5, E4.6 and E4.8 of the BCA and AS 2293.1-2005.

28. A building occupant warning system in accordance with clause 6 of specification E2.2a and complying with clause 3.22 of AS 1670.1:2015 with a pre-recorded verbal evacuation message must be provided. The building occupant warning system must be audible throughout the building.

Appendix A Drawings and information

Drawing title	Dwg no	Date	Drawn
General arrangements proposed ground floor plan	EA106 rev A	11/10/2017	Hames Sharley
General arrangements proposed level 1 floor plan	EA107 rev A	11/10/2017	
General arrangements proposed level 2 floor plan	EA108 rev A	11/10/2017	
General arrangements proposed level 2A floor plan	EA109 rev A	11/10/2017	
General arrangements roof plan	EA110 rev A	11/10/2017	
Ground floor plan	A02 rev P4	20/10/2016	Cundall Johnston & Partners
Level 1 floor plan	A03 rev P4	20/10/2016	

Other information	Ref no	Date	Prepared by
BCA assessment report for design development, Marrickville Metro Development (Stage 1b)	2015/1094 R1.0 Draft	08/2017	Steve Watson & Partners