Concept fire safety strategy

Defire
Innovative fire safety
Sydney Canberra Brisbane Adelaide

Marrickville Metro Shopping Centre
34 Victoria Road, Marrickville

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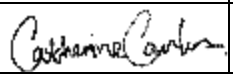
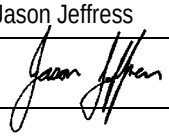
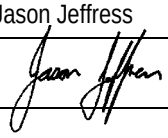
		Signature			

Contents

1. Introduction

This report documents the fire safety strategy for the proposed redevelopment of Marrickville Metro Shopping Centre at 34 Victoria Road, Marrickville. Defire has developed this report at the request of Bovis Lend Lease.

The purpose of the report is to identify the fire safety measures that are likely to be required for the building to achieve compliance with the performance requirements of the Building Code of Australia 2010 (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 require further assessment.

This report forms part of a Preferred Project Report (PPR) prepared on behalf of AMP Capital Investors in respect to the Concept Plan Application under Part 3A of the NSW Environmental Planning and Assessment Act 1979 for the proposed redevelopment of the Marrickville Metro Shopping Centre.

This report has been prepared in response to the letter from the Department of Planning (DOP) dated 14 October 2010 requesting that a PPR be prepared. The letter requests that the proponent respond to the issues raised by the submissions and for the PPR to identify how the issues raised by the submissions including those of the DOP have been addressed and how the PPR minimises the environmental impacts of the proposal. The Preferred Project includes the following key amendments to the original proposal:

- The adoption of the 'alternative proposal' for Smidmore Street as outlined in section 5.6 of the Environmental Assessment Report, meaning that all proposed development within the Smidmore Street road reserve has been deleted from the proposal and the road will remain open to vehicle traffic.
- Removal of the draft voluntary planning agreement from the PPR following Marrickville Council's decision not to grant owner's consent for the inclusion of Smidmore Street in the application.
- Accompanying refinements to the design of the buildings fronting Smidmore Street to address the existing street interface, optimise pedestrian access between the two buildings and maximise street front retail activation and pedestrian amenity.
- A reduction in the gross leasable floor space of the new development from 21,470m^2 to 16,767m^2 – a reduction of 22% in floor area.
- A reduction in the number of new car parking spaces from 715 to 528.
- A significant reduction in the new building footprint above the existing shopping centre within the north-east section of the site, including the removal of the spiral ramp near the corner of Victoria Road and Murray Street.
- Retention of the existing vehicle ramp location within Murray Street and the relocation of the access from Murray Street to the new loading dock 3 further to the south.
- A public domain 'concept vision' for Smidmore Street which will be subject to the further agreement of Marrickville Council.
- Retention of all existing mature Lemon Scented Gums in Smidmore Street.
- Revised Statement of Commitments.

[1] Building Code of Australia 2010, Australian Building Codes Board, Australia, 2010.

2. Description of the building and alternative solutions

2.1 Site context

Marrickville Metro Shopping Centre is located at 34 Victoria Road, Marrickville. The existing shopping centre fronts Victoria Road to the north, Murray Street to the east and Smidmore Street to the south and is adjoined by single storey residential dwellings to the west. The shopping centre is predominantly a single level retail building and comprises major tenants being Kmart, Woolworths and Aldi as well as a range of speciality stores. Carparking is located at rooftop level with existing vehicle ramp access via Smidmore Street and Murray Street.

The land at 13-55 Edinburgh Road is located to the south of Smidmore Street and is bounded by Edinburgh Road and Murray Street. This is an industrial site and is currently used as a warehouse with associated ground level carparking.

The shopping centre is located within an established residential and industrial precinct surrounded by small lot residential housing to the north and west, and predominantly industrial land comprising larger allotments and larger building scales to the south and east.

AMP Capital Investors owns Marrickville Metro Shopping Centre and the industrial site to the immediate south at 13-55 Edinburgh Road, Marrickville. Refer to Figure 1 for the overall site plan.

Figure 1 Site plan

2.2 Proposed works

AMP Capital Investors propose to upgrade and expand Marrickville Metro Shopping Centre to accommodate additional retail floor space, improved facilities and services, as well as enhance convenience and accessibility for the community.

The proposal has three key elements:

- Redevelopment of the industrial site south of Smidmore Street located at 13-55 Edinburgh Road to create a new building that will contain two levels of retail with two carparking levels above.
- An extension of the retail floor area on the first floor of the existing building with further additional rooftop carparking above. The additional retail floor area will primarily accommodate a discount department store, supermarket, mini major, and specialty retail space.
- The retaining of Smidmore Street's vehicular operations with active retail frontage improving the public domain.

The overall development will incorporate additional carparking areas as well as improved vehicle access and loading facilities.

The proposal includes work to the public domain in order to improve the pedestrian, cycling and public transport connections to and from the site and enhance pedestrian and patron safety.

2.3 Staging details

Owing to the scale of the project and the need to undertake the development whilst maintaining a safe and functional retail centre, it is proposed that construction will occur over at least two discrete stages.

Stage 1 will involve the redevelopment of the industrial site at 13-55 Edinburgh Road to accommodate the new two level retail centre including carparking above. This work will also incorporate the refurbishment of the existing shopping centre building fronting the northern side of Smidmore Street.

Stage 2 will involve the first floor retail extension over the existing shopping centre building with the proposed additional carparking at rooftop level.

2.4 Building description

The existing shopping centre was built circa 1987 under ordinance 70 building code requirements and is provided with sprinkler protection throughout. The existing centre has been the subject of previous fire safety engineering assessments undertaken by Holmes Fire and Safety.

It is our understanding that stage 1 will not be linked to the existing centre and is proposed to be treated as a separate building in terms of BCA compliance – ie construction of stage 1 will not require an upgrade of the existing centre. A fire safety upgrade of the existing centre will be required as part of stage 2 works.

A description of the main characteristics of the proposed new building – stage 1 – and the alterations and additions to the existing building – stage 2 – for the purpose of determining compliance with the BCA is given in Table 1 and Table 2 respectively [2].

[2] BCA Assessment Report for Development Application – Concept Stage, 2010/0116 R3.0, issued 29 October 2010, prepared by Steve Watson & Partners.

Characteristic	BCA clause	Description
Effective height	A1.1	Less than 25m
Type of construction required	C1.1	Type B
Rise in storeys	C1.2	Three (large isolated building)

Table 1 Stage 1 building characteristics

Characteristic	BCA clause	Description
Effective height	A1.1	Less than 25m
Type of construction required	C1.1	Type A
Rise in storeys	C1.2	Four (large isolated building)

Table 2 Stage 2 building characteristics

2.5 Occupant characteristics

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

Characteristic	Description
Familiarity	Occupants within the retail tenancies 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. Occupants in the carparking areas are mainly expected to be associated with the retail tenancies and be within the carpark for short periods.
Awareness	Occupants in retail tenancies and carpark areas are expected to be awake and alert to a potential emergency event such as a fire in the building.
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 to the degree necessary to not adversely impact upon evacuation.
Occupant load	Population densities in the carparks are based upon occupant numbers as per table D1.13 of the BCA which specifies 30m^2/person. Population densities in the retail areas are based upon occupant numbers as per Project 6 [3]. Refer to population calculations in Table 8.

Table 3 Occupant characteristics

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

2.6 Alternative solutions

The design of the proposed redevelopment includes areas which do not comply with the DTS provisions of the BCA. We intend to use a performance-based fire safety engineering approach to achieve compliance with the performance requirements of the BCA.

The key areas of departures from the DTS provisions include the following:

- Extended travel distances
- Aggregate exit widths and paths of travel
- Smoke hazard management with performance based smoke exhaust rates and smoke reservoirs.

Table 4 and Table 5 for stages 1 and 2 respectively describe the BCA requirements associated with the departures from the DTS provisions identified to date.

Item	Description of departure from DTS provision	DTS provision	Performance requirements
1.	The maximum travel distance to a nearest exit are proposed to be extended to: • 60m within mall areas and major tenancies (>1000m^2) • 80m within the carpark portions. Note: Travel distances to a point of choice are proposed to be DTS compliant – ie not more than 20m.	Clause D1.4	DP4 and EP2.2
2.	The maximum travel distance between alternative exits are proposed to be extended to: • 75m within mall areas • 100m within the retail portions • 120m within the carpark portions.	Clause D1.5	DP4 and EP2.2
3.	Travel via required non-fire-isolated stairs will exceed 80m.	Clause D1.9	DP4 and EP2.2
4.	Smoke hazard management including: • Performance based smoke exhaust rates • Performance based smoke reservoirs • Smoke exhaust is not to be provided in the back of house area.	Table E2.2a	EP2.2

Table 4 BCA requirements associated with the departures from the DTS provisions – stage 1

Item	Description of departure from DTS provision	DTS provision	Performance requirements
1.	Fire rating of building elements of the existing building may be reduced because they may not achieve compliance with table 3 of specification C1.1.	Clause C1.1 and specification C1.1	CP1 and CP2
2.	Perimeter vehicular access to all sides of the existing building will not be provided.	Clause C2.3 and C2.4	CP9
3.	The maximum travel distance to a nearest exit are proposed to be extended to: • 60m within mall areas and major tenancies (>1000m^2) • 80m within the carpark portions. Note: Travel distances to a point of choice are proposed to be DTS compliant – ie not more than 20m.	Clause D1.4	DP4 and EP2.2
4.	The maximum travel distance between alternative exits are proposed to be extended to: • 75m within mall areas • 100m within the retail portions • 120m within the carpark portions.	Clause D1.5	DP4 and EP2.2
5.	Travel via required non-fire-isolated stairs will exceed 80m.	Clause D1.9	DP4 and EP2.2
6.	Smoke hazard management including: • Performance based smoke exhaust rates • Performance based smoke reservoirs • Smoke exhaust is not to be provided in the back of house area.	Table E2.2a	EP2.2

Table 5 BCA requirements associated with the departures from the DTS provisions – stage 2

3. Proposed fire safety measures – stage 1

The following fire safety measures are proposed for the buildings during stage 1 as a starting point for the fire safety engineering assessment to achieve compliance with the relevant performance requirements of the BCA.

3.1 General

1. It is proposed to treat the new shopping centre development as a standalone building. The design of the new shopping centre must comply with the current DTS provisions unless specifically addressed in an alternative solution. A separate fire safety schedule must be prepared for the new building as part of stage 1.

2. The existing shopping centre is understood to comply with the applicable building standards at the time of construction. As the proposed alterations and additions – ie the refurbishment of the southern front side facing Smidmore Street – are only of a minor nature it is not likely to require full compliance with the current DTS provisions of the BCA. This is on the basis that:

   - All new works will generally comply with the current DTS provisions of the BCA or be addressed on a performance basis in an alternative solution report.
   - Any new works must not decrease the level of fire safety in the existing building, in particular the evacuation provisions and risk of fire spread.

3.2 Access and egress

3.2.1 Provision of escape

3. The provision for escape within the new building is to be in accordance with part D of the BCA unless otherwise noted within the alternative solution report to be prepared.

4. The provision for escape within the existing building is not to be decreased and specifically exit widths must not be reduced. It is the intent to provide independent compliant egress for the refurbished portions facing Smidmore Street. The aggregate width of these exits must not be less than the current exit width provided for the centre.

3.2.2 Construction of exits – population and exit width

5. The mall can be treated as a safe place and is to be included in the exit width calculations for the major tenancies on the following basis:

   a. At least 1/3 of the total aggregate exit width from the major tenancies must be provided via the mall. This accounts for the fact that occupants are generally familiar with the main entry and are more likely to evacuate via the mall than the dedicated exit doors.

   b. Not more than 1/2 of the total aggregate exit width from the major tenancies is to be provided via the mall. This is to ensure that a fire affecting the mall and the mall entrance does not eliminate all available exits from the tenancy.

   c. The exits from the major tenancies to the mall must be via dedicated paths with a minimum width of 1.0m each via breakout gates or aisles.

6. The total aggregate exit width provided from the mall must be calculated on the following basis:
   a. 100% of all mall occupants evacuate via the mall.
   b. 100% of all specialty shop occupants evacuate via the mall unless provided with a dedicated second exit.
   c. Addition of the population from all major tenancies that rely upon evacuation via the mall to achieve the required aggregate exit width from the tenancies.

7. The estimated populations and aggregate exit widths required from the major tenancies, mall and carparks are summarised in Table 6.

Tenancy	Floor area (m^2)	Population density (m^2/person)	Population (persons)	Total exit width required
Industrial site – Ground floor				
Mini Major: Fruit and veg store	1,000 (SWP [4])	6	167	2.0m • 1.0m through dedicated exit within the tenancy • 1.0m through entrance to mall
Loading dock 1	1,629 (BLL [5])	30	55	1.0m • Floor area does not include Coles receiving store
Specialty tenancies	2,700 (SWP [4])	6	450	4.0m in aggregate • 1.0m per specialty tenancy into the mall
Mall areas	1,184 (SWP [4])	10	119	1. 5m Total exit width required from ground floor exits = 1.5m + 4.0m + 1.0m = 6.5m • Determined based upon 100% mall + 100% of speciality tenancies + up to 50% mini major • It is noted that some specialty tenancies have their own dedicated exits directly out to the street. The populations from these tenancies have not been included in these calculations.
Industrial site – Level 1				
Supermarket: Coles	4,000 (SWP [4])	6	667	6.0m • 5.0m through dedicated exits within supermarket • 1.0m through entrance to mall
Specialty tenancies	2,243 (SWP [4])	6	374	3.5m in aggregate • 1m per specialty tenancy into the mall
Mall areas	930 (SWP [4])	10	93	1.0m Total exit width required from level 1 exits = 1.0m + 3.5 m + 1.0m = 5.5m • Determined based upon 100% mall + 100% of speciality tenancies + up to 50% supermarket

[4] BCA Assessment Report for Development Application – Concept Stage, 2010/0116 R3.0, issued 29 October 2010, prepared by Steve Watson & Partners.
[5] Area schedule issue 12, received 20 October 2010, Excel Spreadsheet from Bovis Lend Lease.

Tenancy	Floor area (m^2)	Population density (m^2/person)	Population (persons)	Total exit width required
Industrial site – Level 2 undercover carpark				
Carpark	7,458 (SWP 4)	30	249	2.5m
Industrial site – Level 2A rooftop carpark				
Carpark	7,458 (SWP 4)	30	249	2.5m

Table 6 Exits required during project stage 1

Note – Any food court areas have not been taken into consideration at this point in time and may impact upon the final populations.

3.2.3 Travel distances

The travel distance limitations nominated in the following should be used by the architect when considering different design options.

8. It is proposed to apply the following maximum travel distances on the carpark levels:
   a. 20m to a point of choice
   b. 80m to the closest of two or more alternative exits
   c. 120m between alternative exits
9. It is proposed to apply the following maximum travel distances in the major tenancies (>1,000m^2) with dedicated smoke exhaust:
   a. 20m to a point of choice
   b. 60m to the closest of two or more alternative exits (mall to be considered an exit)
   c. 100m between alternative exits when measured through point of choice
10. It is proposed to apply the following maximum travel distances in the individual smaller tenancies (<1,000m^2):
   a. 25m to a single dedicated exit or into the mall, where travel in different directions to two exits is available or alternatively 30m if dedicated smoke detection is provided within the tenancy
   b. 60m to the closest of two or more alternative exits (measured out in the mall)
   c. 100m between alternative exits
11. It is proposed to apply the following maximum travel distances in the mall areas with dedicated smoke exhaust:
   a. 20m to a point of choice
   b. 60m to the closest of two or more alternative exits
   c. 75m between alternative exits measured via a direct path and not back through the point of choice.

12. All mall exits and paths of travel to exits must be not less than 1.5m in clear width. All other exits and paths of travel to exits must be not less than 1m in clear width in accordance with clause D1.6 of the BCA.

13. The carpark floor structures must achieve a 2 hour fire rating to protect people during evacuation from the building.

3.3 Smoke hazard management

3.3.1 General requirements

14. A smoke detection system in accordance with clause 5 of specification E2.2a of the BCA must be provided throughout the building to activate the smoke exhaust system, including any additional smoke detectors required to comply with AS/NZS 1668.1-1998.

15. A building occupant warning system in accordance with clause 6 of specification E2.2a and complying with clause 3.22 of AS 1670.1-2004 with a pre-recorded verbal evacuation message must be provided. The building occupant warning system must be audible throughout the building, including potential external areas where evacuation back into the building is required.

3.3.2 Smoke exhaust system

16. Smoke exhaust must be provided within the smoke zones in the new building as described in Table 7 and outlined in Figure 2 and Figure 3.

    Note: These are indicative numbers only and may vary when a more detailed assessment is undertaken.

Smoke zone	Total exhaust rate required (m^3/sec)	Comment
Ground floor mini major: Fruit and veg store	15	Two exhaust points of 7.5m^3/s each to be provided. Refer to Figure 2.
Ground floor mall area	10	One exhaust point of 10m^3/s to be provided. The remainder of the level is to be exhausted via the voids to the first floor. Refer to Figure 2.
Level 1 supermarket	30	Three exhaust points of 10m^3/s each to be provided. Refer to Figure 3.
Level 1 mall area	50-60	One exhaust point of 10m^3/s and two exhaust points of 20-25m^3/s each to be provided. Refer to Figure 3.

Table 7 Smoke exhaust rates for smoke zones during stage 1

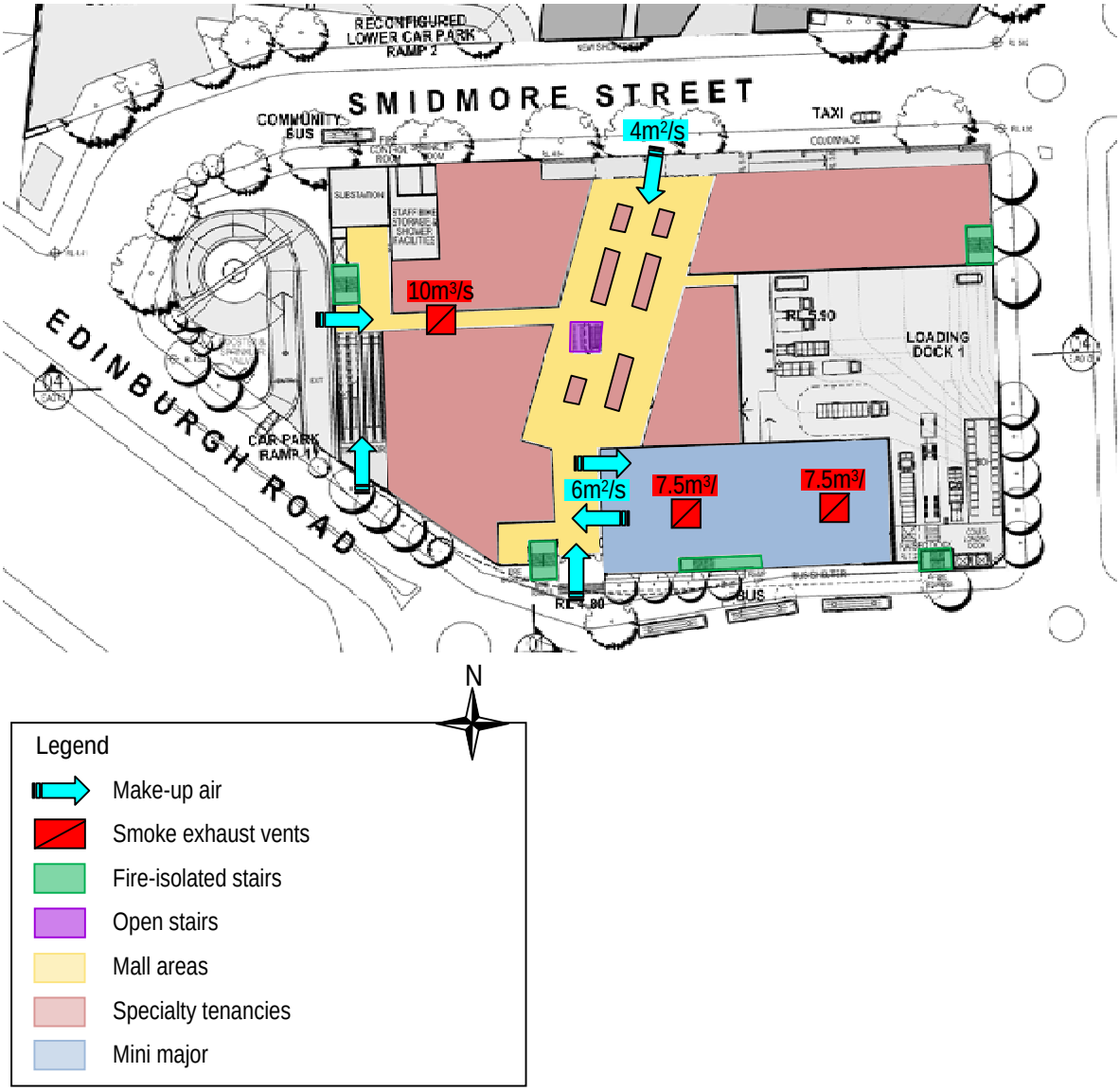


Figure 2 Proposed smoke exhaust and make-up air on ground floor

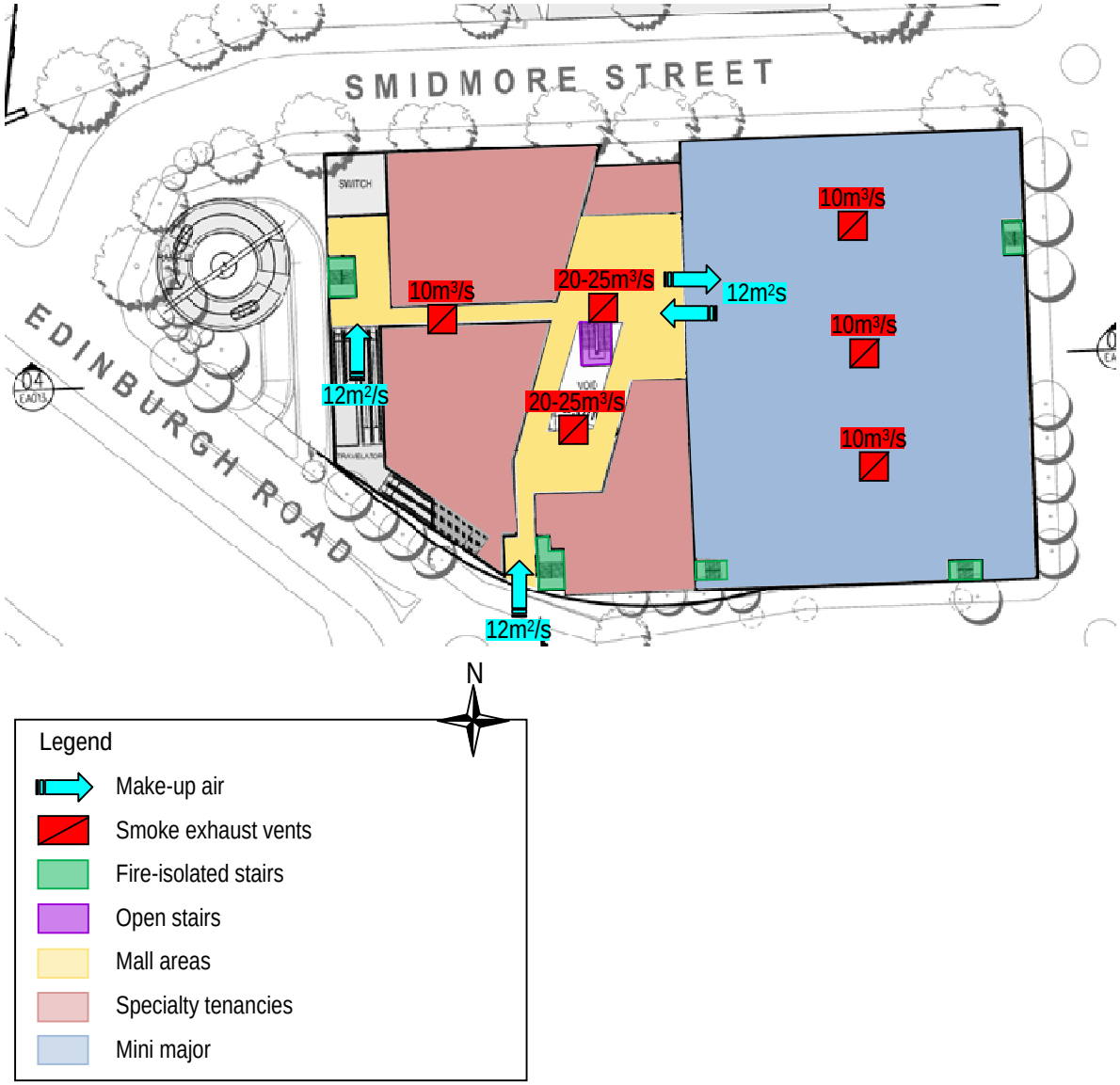


Figure 3 Proposed smoke exhaust and make-up air on level 1

17. Smoke exhaust is not required to be provided from the back of house areas associated with the majors.

18. Smoke exhaust fans must be located to discharge directly to outdoor with a velocity of not less than 5m/s, at a suitable point not less than 6m from any air intake point or exit.

19. To reduce 'plugholing' – ie fresh air being drawn through the smoke layer – smoke exhaust inlets must be sized so that the air velocity into the vents does not exceed 5m/s.

3.4 Make-up air

20. The proposed location and distribution of make-up air is outlined in Figure 2 and Figure 3.

21. The proposed make-up air is intended during business hours. These may be reduced after business hours dependent upon further analysis.

22. The smoke exhaust system must be activated by the smoke detection system and the sprinkler system without any delay. Both the detection system and the sprinkler system must be zoned accordingly. Only the smoke exhaust system in the smoke zone initially activated shall be activated. Should smoke detectors in more zones eventually be activated both smoke exhaust systems are not to be activated.

3.5 Smoke baffles

23. Smoke baffles must be provided to separate the majors from the mall areas and specialty tenancies with the following characteristics:

    a. The baffles must have a minimum depth of 1m below the general ceiling height with a maximum height of 3m above finished floor level.

    b. All baffles must be of non-shatterable and non-combustible construction. If glass baffles are provided they must be constructed of toughened laminated glass with a minimum thickness of 2x6mm.

    c. The baffles can be formed by the bulkheads at the front of the tenancy.

3.6 Optional items that can be adopted

24. Alarm verification for staff investigation may be incorporated into the design.

25. The evacuation alarm may be phased in stages to reduce the risk of false alarms that could decrease occupant's alertness to the evacuation message.

3.7 Fire hydrants and hose reels

26. A new separate fire hydrant system must be installed throughout the new building in accordance with the requirements of clause E1.3 of the BCA and AS 2419.1-2005. The hydrant system must be provided with a ring main in accordance with AS 2419.1-2005.

27. A fire hose reel system must be installed throughout the new building in accordance with the requirements of clause E1.4 of the BCA and AS 2441-2005. A combined slim line fire hose reel and fire hydrant design is not to be installed.

3.8 Fire suppression

28. A new separate sprinkler system in accordance with the requirements of specification E1.5 of the BCA and AS 2118.1-1999 must be provided throughout the new building.

29. A new sprinkler valve room must be constructed on Smidmore St adjacent to the fire control centre.

3.9 Fire control centre

30. A new fire control centre in accordance with specification E1.8 of the BCA is to be provided on Smidmore St. This fire control centre will be provided for the new building.

4. Proposed fire safety measures – stage 2

The following fire safety measures are proposed for the buildings during stage 2 as a starting point for the fire safety engineering assessment to achieve compliance with the relevant performance requirements of the BCA.

4.1 General

1. The proposed works during stage 2 will result in significant additions and alterations to the existing building. As such the new portions must comply with the current DTS provisions of the BCA unless specifically addressed in an alternative solution and the existing portions must undergo a fire safety upgrade.
2. The full extent of the proposed fire safety upgrade is to be developed during the design development stage for the project.

4.2 Access and egress

4.2.1 Provision of escape

3. The provision for escape within the existing building is not to be decreased and specifically exit widths must not be reduced. It is noted that additional exits may be required in some areas.

4.2.2 Construction of exits – population and exit width

4. The mall can be treated as a safe place and is to be included in the exit width calculations for the major tenancies on the following basis:
    a. At least 1/3 of the total aggregate exit width from the major tenancies must be provided via the mall. This accounts for the fact that occupants are generally familiar with the main entry and are more likely to evacuate via the mall than the dedicated exit doors.
    b. Not more than 1/2 of the total aggregate exit width from the major tenancies is to be provided via the mall. This is to ensure that a fire affecting the mall and the mall entrance does not eliminate all available exits from the tenancy.
    c. The exits from the major tenancies to the mall must be via dedicated paths with a minimum width of 1.0m each via breakout gates or aisles.
5. The total aggregate exit width provided from the mall must be calculated on the following basis:
    a. 100% of all mall occupants evacuate via the mall.
    b. 100% of all specialty shop occupants evacuate via the mall unless provided with a dedicated second exit.
    c. Addition of the population from all major tenancies that rely upon evacuation via the mall to achieve the required aggregate exit width from the tenancies.
6. The estimated populations and aggregate exit widths required from the major tenancies, mall and carparks are summarised in Table 8.

    It is noted that in relation to exits from the major tenancies, we may need to confirm these at a later stage.

Tenancy	Floor area (m^2)	Population density (m^2/person)	Population (persons)	Total exit width required
Existing shopping centre – Ground floor				
Kmart	6,330 (SWP [6])	6	1,055	8.0m • 6.0m through dedicated exits within Kmart • 2.0m through entrance to mall Note: Existing evacuation provisions and populations have not been verified. As the rear exits will form part of upgrades during stage 2 a conservative approach has been taken assuming 66% uitilsation of the rear exits and 33% via the mall. It is likely that a better distribution could be adopted.
Woolworths	4,600 (SWP [6])	6	767	6.0m • 4.0m through dedicated exits within Woolworths • 2.0m through entrance to mall Note: Existing evacuation provisions and populations have not been verified. As the rear exits will form part of upgrades during stage 2 a conservative approach has been taken assuming 66% uitilsation of the rear exits and 33% via the mall. It is likely that a better distribution could be adopted.
Aldi	1,200 (SWP [6])	6	200	2.0m
Specialty tenancies	8,524 (SWP [6])	6	1,421	10.5m in aggregate • 1.0m per specialty tenancy into the mall
Loading dock 3	2,255 (SWP [6])	30	76	1.0m
Mall areas	3,154 (SWP [6])	10	316	3.0m Total exit width required from ground floor exits = 3.0m + 10.5m + 8.0m = 21.5m • Determined based upon 100% mall + 100% of speciality tenancies + up to 50% mini majors • It is noted that some specialty tenancies have their own dedicated exits directly out to the street

[6] BCA Assessment Report for Development Application – Concept Stage, 2010/0116 R3.0, issued 29 October 2010, prepared by Steve Watson & Partners.

Tenancy	Floor area (m^2)	Population density (m^2/person)	Population (persons)	Total exit width required
Existing shopping centre – Level 1				
Discount Department Store	4,855 (SWP [6])	6	810	7.5m • 2.0m through entrance to mall • 5.5m through dedicated exits within the DDS • Floor area includes receiving store in loading dock
Specialty tenancies	3,227 (SWP [6])	6	538	5.0m in aggregate 1m per specialty tenancy into the mall or direct to L1 carpark
Mall areas	1,365 (SWP [6])	10	137	1.5m Total exit width required from ground floor exits = 1.5m + 5.0m + 3.75m = 10.25m • Determined based upon 100% mall + 100% of speciality tenancies + up to 50% DDS • 3m (45% of 6.5m) less width is likely as majority of specialty tenancies have their own dedicated exits onto the L1 carpark
Carpark	16,567 (SWP [6])	30	553	5.0m 4m + 7.5m = 11.5m • Determined based upon 100% carpark + up to 70% from the L1 mall.
Existing shopping centre – Level 2 undercover carpark				
Carpark	12,848 (SWP [6])	30	429	4.0m
Existing shopping centre – Level 2A rooftop carpark				
Carpark	12,848 (SWP [6])	30	429	4.0m

Table 8 Exits required during project stage 2

4.2.3 Travel distances

The travel distance limitations nominated in the following should be used by the architect when considering different design options.

7. It is proposed to apply the following maximum travel distances on the carpark levels:
   d. 20m to a point of choice
   e. 80m to the closest of two or more alternative exits
   f. 120m between alternative exits

8. It is proposed to apply the following maximum travel distances in the major tenancies (>1,000m^2) with dedicated smoke exhaust:

   d. 20m to a point of choice

   e. 60m to the closest of two or more alternative exits (mall to be considered an exit)

   f. 100m between alternative exits when measured through point of choice

9. It is proposed to apply the following maximum travel distances in the individual smaller tenancies (<1,000m^2):

   d. 25m to a single dedicated exit or into the mall, where travel in different directions to two exits is available or alternatively 30m if dedicated smoke detection is provided within the tenancy

   e. 60m to the closest of two or more alternative exits (measured out in the mall)

   f. 100m between alternative exits

10. It is proposed to apply the following maximum travel distances in the mall areas with dedicated smoke exhaust:

    d. 20m to a point of choice

    e. 60m to the closest of two or more alternative exits

    f. 75m between alternative exits measured via a direct path and not back through the point of choice.

11. All mall exits and paths of travel to exits must be not less than 1.5m in clear width. All other exits and paths of travel to exits must be not less than 1m in clear width in accordance with clause D1.6 of the BCA.

12. The carpark floor structures must achieve a 2 hour fire rating to protect people during evacuation from the building.

4.3 Smoke hazard management

4.3.1 Smoke exhaust system

13. Smoke exhaust must be provided within the smoke zones as described in Table 9 and outlined in Figure 4.

    Note: These are indicative numbers only and may vary when a more detailed assessment is undertaken.

Smoke zone	Total exhaust rate required (m^3/sec)	Comment
Ground floor mall area	-	Smoke exhaust will be reduced throughout existing building.
Level 1 mall area	80-100	Four exhaust points of 20-25m^3/s to be provided. Refer to Figure 4.
Discount Department Store	45	Three exhaust points of 15m^3/s each to be provided. Refer to Figure 4.

Table 9 Smoke exhaust rates for smoke zones during stage 2

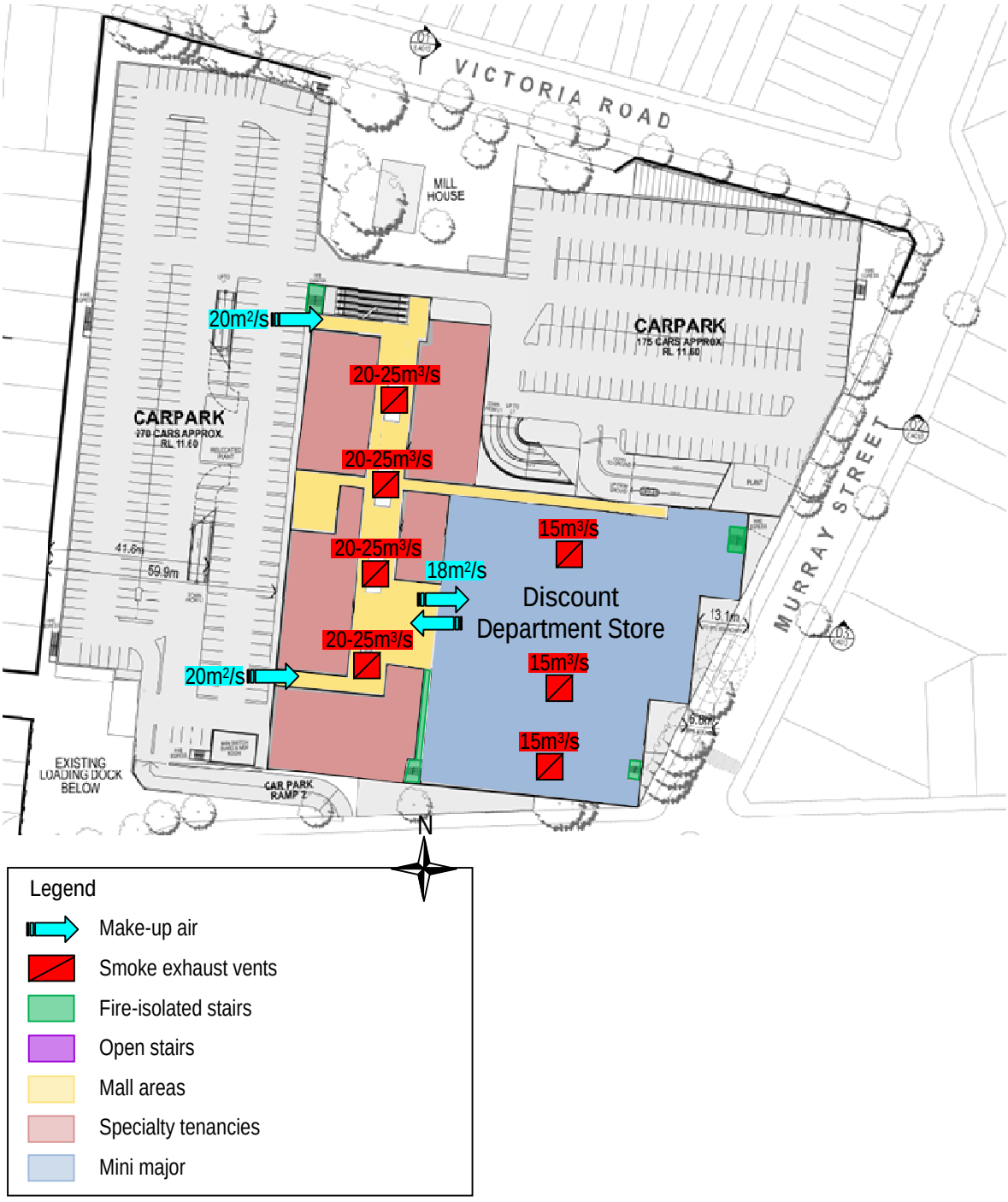


Figure 4 Proposed smoke exhaust and make up air on level 1

14. Smoke exhaust is not required to be provided from the back of house areas associated with the majors.

15. Smoke exhaust fans must be located to discharge directly to outdoor with a velocity of not less than 5m/s, at a suitable point not less than 6m from any air intake point or exit.

16. To reduce 'plugholing' – ie fresh air being drawn through the smoke layer – smoke exhaust inlets must be sized so that the air velocity into the vents does not exceed 5m/s.

4.3.2 Make-up air

17. The proposed location and distribution of make-up air on level 1 of the existing shopping centre building is outlined in Figure 4.

18. The proposed make-up air is intended during business hours. These may be further reduced after business hours.

19. The smoke exhaust system must be activated by the smoke detection system and the sprinkler system without any delay. Both the detection system and the sprinkler system must be zoned accordingly. Only the smoke exhaust system in the smoke zone initially activated shall be activated. Should smoke detectors in more zones eventually be activated both smoke exhaust systems are not to be activated.

4.3.3 Smoke baffles

20. Smoke baffles must be provided to separate the majors from the mall and specialty tenancies with the following characteristics:

    a. The baffles must have a minimum depth of 1m below the general ceiling height with a maximum height of 3m above finished floor level.

    b. All baffles must be of non-shatterable and non-combustible construction. If glass baffles are provided they must be constructed of toughened laminated glass with a minimum thickness of 2x6mm.

    c. The baffles can be formed by the bulkheads at the front of the tenancy.

4.4 Optional items that can be adopted

21. Alarm verification for staff investigation may be incorporated into the design.

22. The evacuation alarm may be phased in stages to reduce the risk of false alarms that could decrease occupant's alertness to the evacuation message.

4.5 Fire hydrants and hose reels

23. The existing hydrant system and any new portions of the building must be upgraded to comply with the requirements of clause E1.3 of the BCA and AS 2419.1-2005.

24. The existing fire hose reel system and any new portions of the building must be upgraded to comply with the requirements of clause E1.4 of the BCA and AS 2441-2005. A combined slim line fire hose reel and fire hydrant design is not to be installed.

4.6 Fire suppression

25. 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 new portions of the existing building.

26. The existing sprinkler valve room off Murray Street of the existing building must be upgraded in accordance with specification E1.8 of the BCA and AS 2118.1-2006.

4.7 Fire control centre

27. The existing fire control centre on Murray St must be retained to serve the existing shopping centre building. The equipment in the existing fire control centre is likely to require an upgrade to the current Australian standards.

4.8 Other areas

28. There is currently only 1m of aggregate width provided on the ground level of the north-western portion of the existing building and additional exit width is required. The exit width must accommodate occupants evacuating from Woolworths and Kmart as well as occupants travelling downwards from the open deck carparks above. Providing egress both to the south and north is preferred.

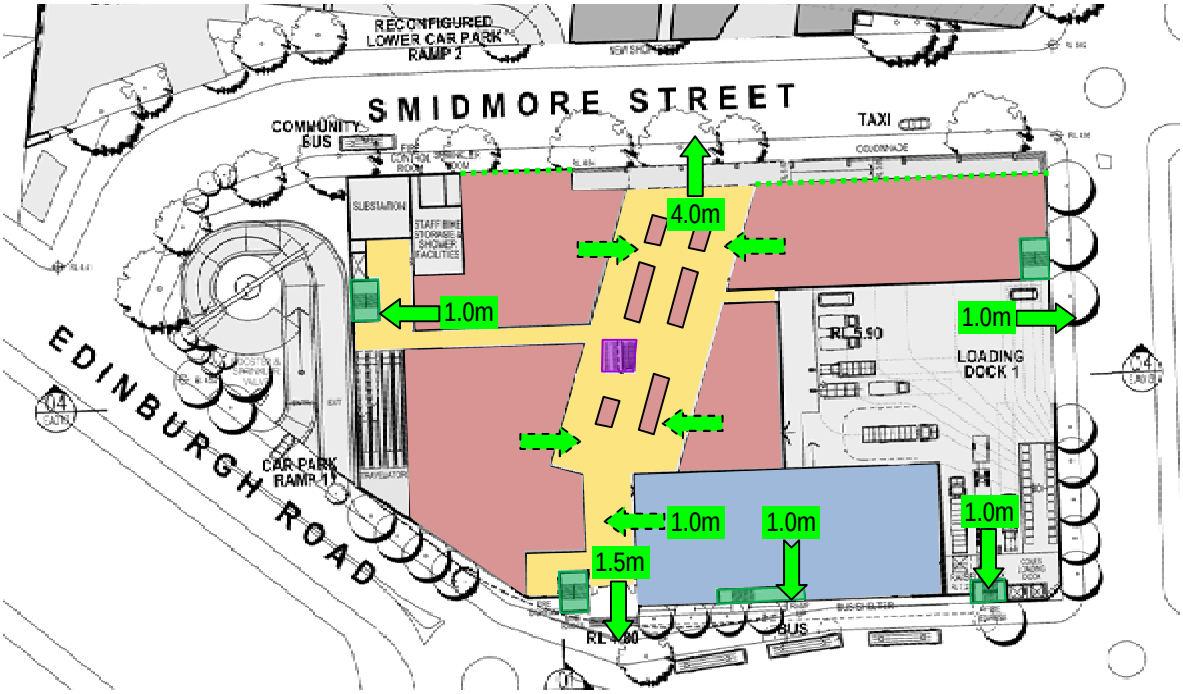
Appendix A Drawings and information

Drawing title	Dwg no	Date	Drawn
Proposed ground floor plan	EA006 rev 03	29/10/2010	Lend Lease Design
Proposed level 1 plan	EA007 rev 03	29/10/2010	Lend Lease Design
Proposed level 2	EA008 rev 03	29/10/2010	Lend Lease Design
Proposed rooftop car park level 2A	EA009 rev 03	29/10/2010	Lend Lease Design

Other information	Ref no	Date	Prepared by
BCA Assessment Report for Development Application – Concept Stage	2010/0116 R3.0	29/10/2010	Steve Watson & Partners
Aerial plan	-	Received 01/11/2010	Bovis Lend Lease

Appendix B Egress within building on industrial site – stage 1

B.1 Ground floor



N

Legend

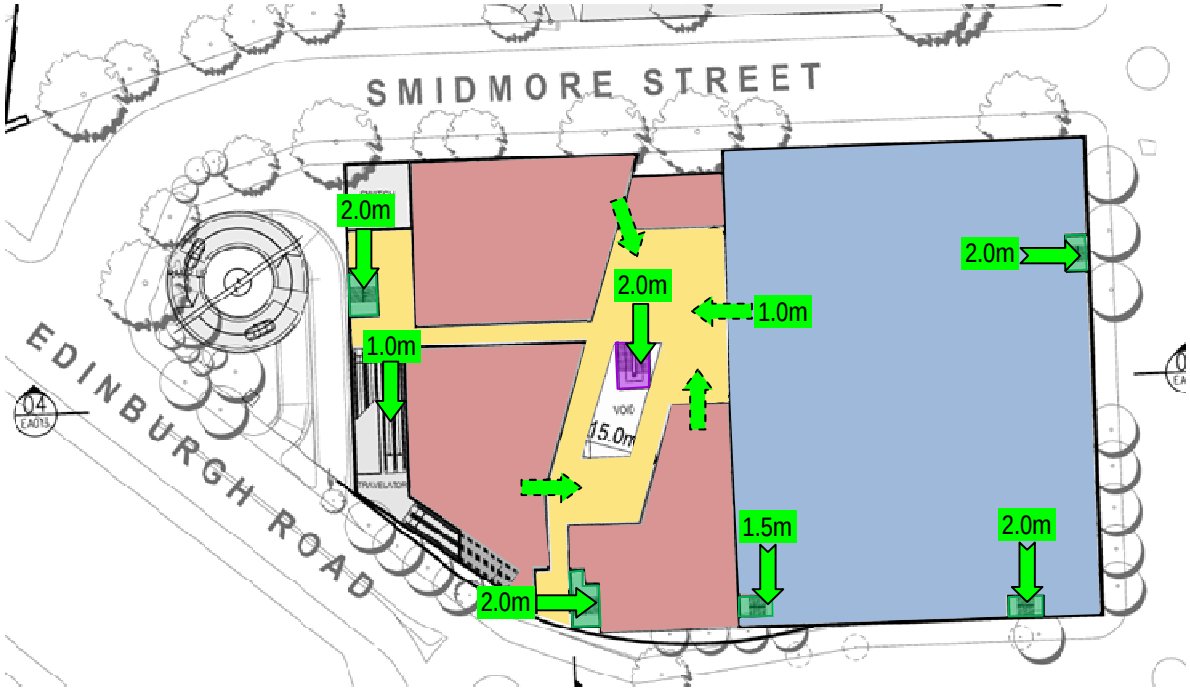
- Required exit – in direction of arrow
- Dedicated exit from tenancy
- Exit from tenancy into mall area
- 1m – Width of exit required
- Alternative exits direct to outside
- Fire-isolated stairs
- Open stairs
- Mall areas
- Specialty tenancies
- Mini major

MALL AREA
Floor area: 1,184m²
Population density: 10m² / person
Population: 119
Total exit width required: 1.5m+4.0m+1.0m =6.5m

SPECIALTY TENANCIES
Floor area: 2,700m²
Population density: 6m² / person
Population: 450
Total exit width required: 4.0m

MINI MAJOR
Floor area: 1,000m²
Population density: 6m² / person
Population: 167
Total exit width required: 2.0m

B.2 Level 1



N

Legend

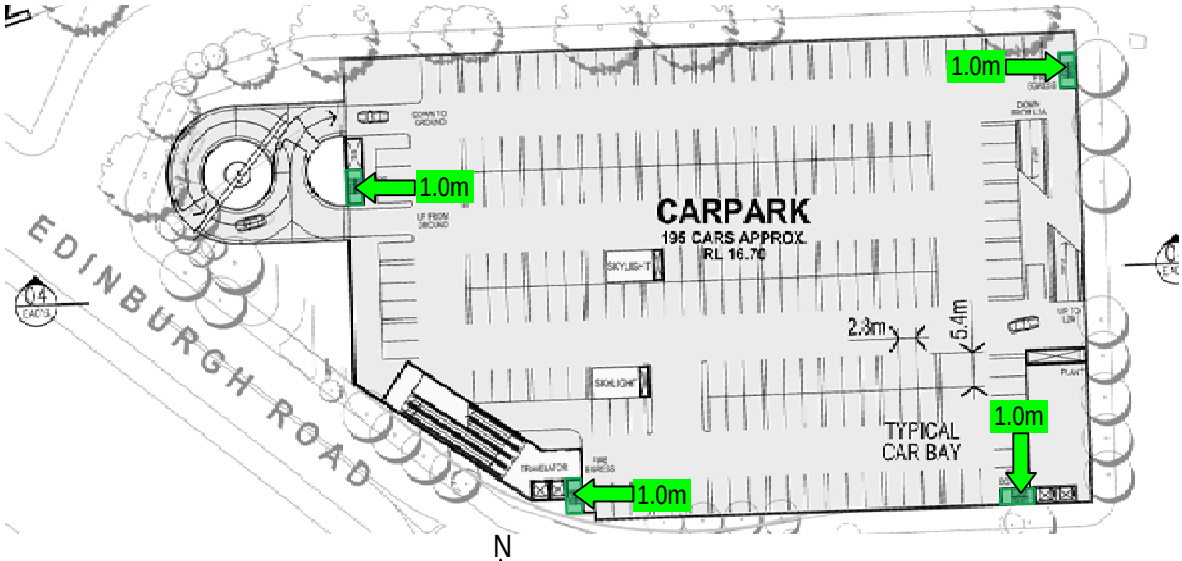
- Required exit – in direction of arrow
- Dedicated exit from tenancy
- Exit from tenancy into mall area
- 1m — Width of exit required
- Alternative exits direct to outside
- Fire-isolated stairs
- Open stairs
- Mall areas
- Specialty tenancies
- Mini major

MALL AREA
Floor area: 930m²
Population density: 10m² / person
Population: 93
Total exit width required: 1.0m+3.5m+1.0m =5.5m

SPECIALTY TENANCIES
Floor area: 2,243m²
Population density: 6m² / person
Population: 374
Total exit width required: 3.5m

SUPERMARKET
Floor area: 4,000m²
Population density: 6m² / person
Population: 667
Total exit width required: 6.0m

B.3 Level 2 undercover carpark

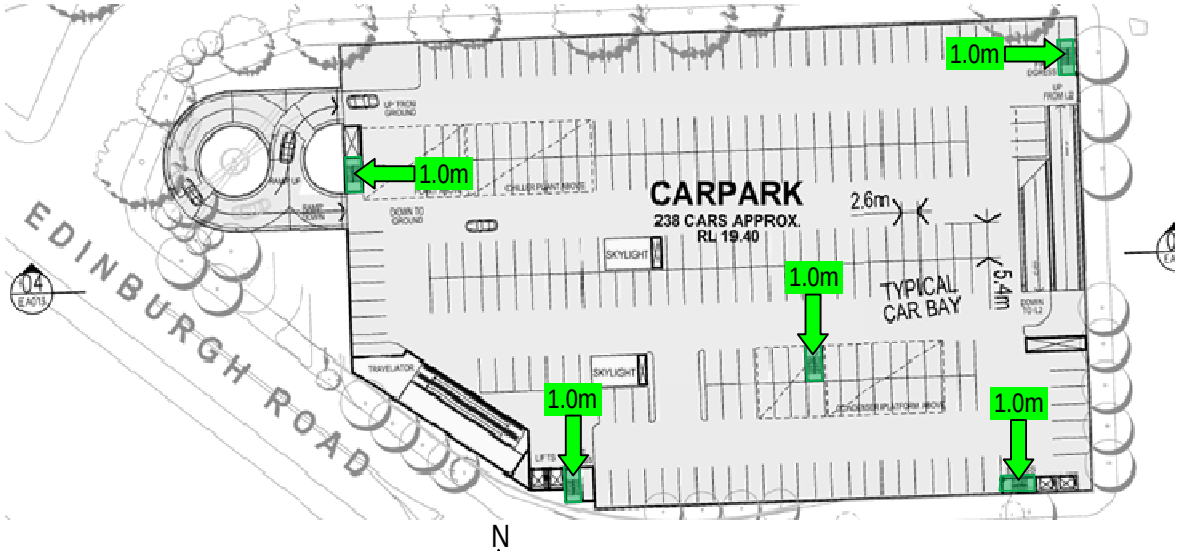


Legend

- Required exit – in direction of arrow
- 1m — Width of exit required
- Fire-isolated stairs

CARPARK
Floor area: 7,458m²
Population density: 30m² / person
Population: 249
Total exit width required: 2.5m

B.4 Level 2A rooftop carpark



Legend

- Required exit – in direction of arrow
- 1m — Width of exit required
- Fire-isolated stairs

CARPARK
Floor area: 7,458m²
Population density: 30m² / person
Population: 249
Total exit width required: 2.5m

Appendix C Egress within existing building – stage 2

C.1 Ground floor

Legend

- Required exit – in direction of arrow
- Dedicated exit from tenancy
- Exit from tenancy into mall area
- 1m — Width of exit required
- Alternative exits direct to outside
- Fire-isolated stairs
- Mall areas
- New specialty tenancies
- Existing specialty tenancies
- Majors

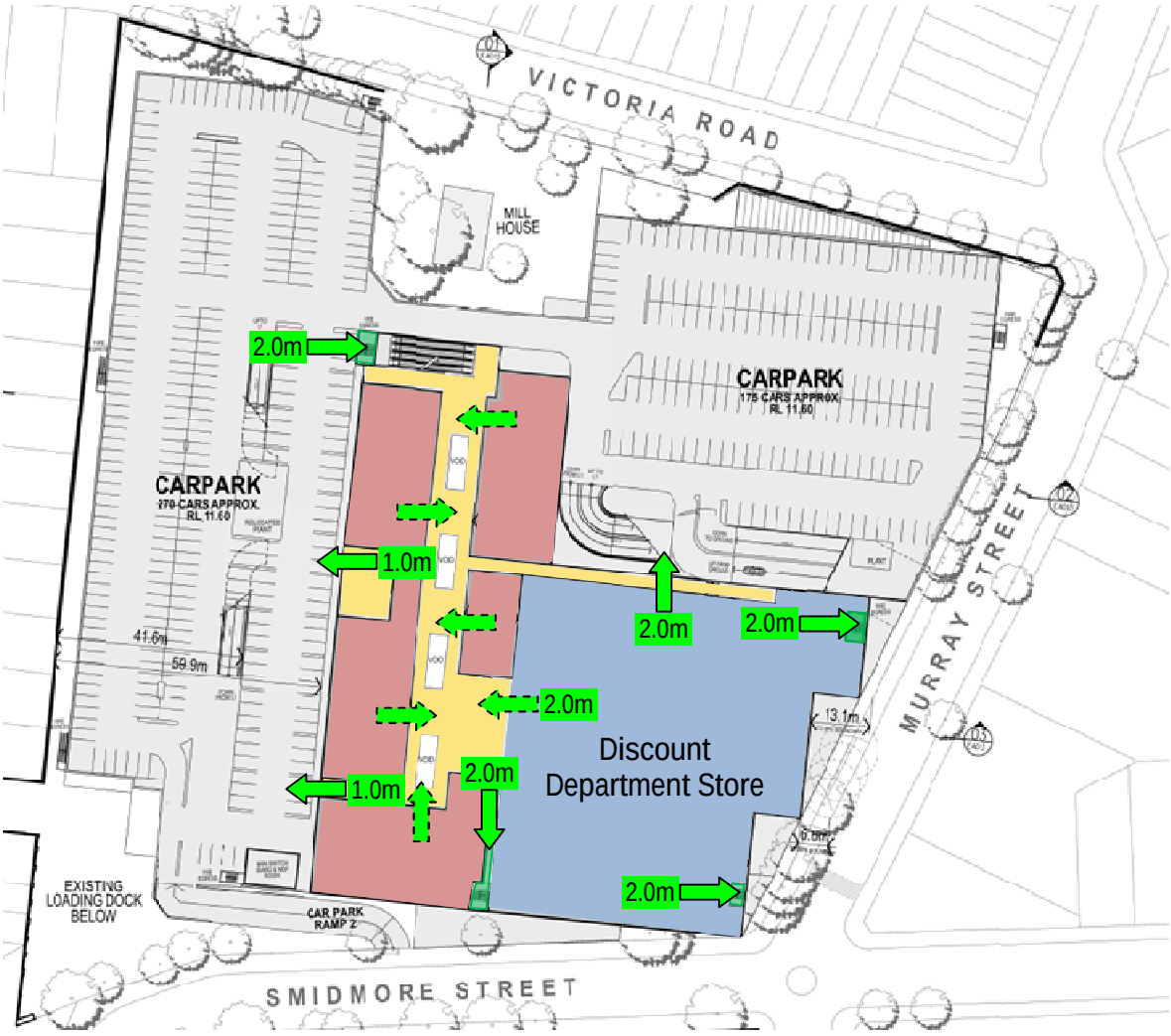
MALL AREA
Floor area: 3,154m²
Population density: 10m² / person
Population: 316
Total exit width required: 3.0m+10.5m+8.0m=21.5m

SPECIALTY TENANCIES
Floor area: 8,524m²
Population density: 6m² / person
Population: 1,421
Total exit width required: 10.5m

MAJORS
Floor area: 12,130m²
Population density: 6m² / person
Population: 2022
Total exit width required: 16.0m

Note – Egress for the existing centre will need to be reviewed in detail in the future.

C.2 Level 1 retail



Legend

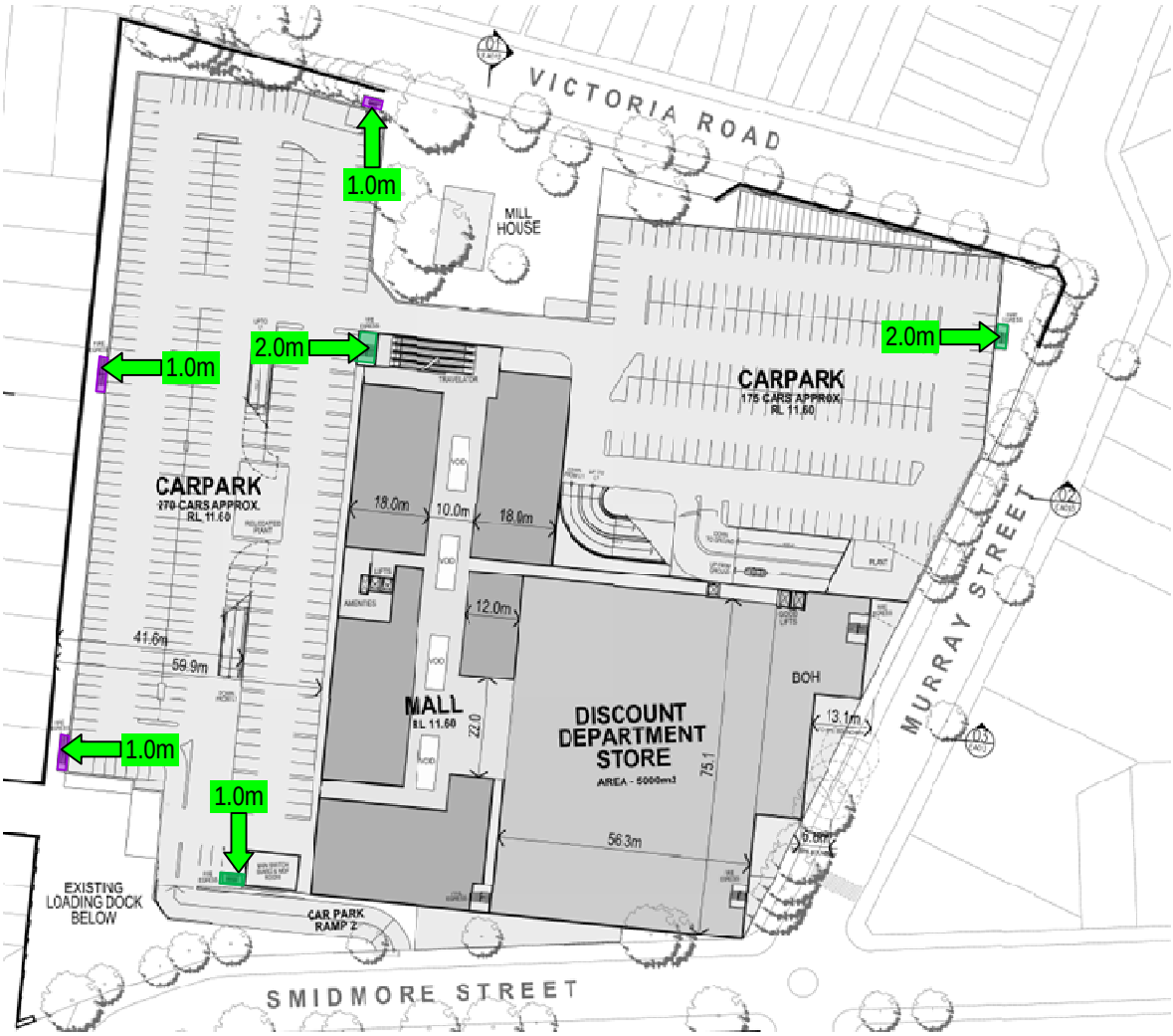
- Required exit – in direction of arrow
- Dedicated exit from tenancy
- Exit from tenancy into mall area
- 1m — Width of exit required
- Alternative exits direct to outside
- Fire-isolated stairs
- Open stairs
- Mall areas
- Specialty tenancies
- Mini majors

MALL AREA
Floor area: 1,365m²
Population density: 10m² / person
Population: 137
Total exit width required: 1.5m+5.0m+4.0m= 10.5m

SPECIALTY TENANCIES
Floor area: 3,227m²
Population density: 6m² / person
Population: 538
Total exit width required: 5.0m

DISCOUNT DEPARTMENT STORE
Floor area: 4,855m²
Population density: 6m² / person
Population: 810
Total exit width required: 7.5m

C.3 Level 1 open deck carpark



Legend

- Required exit – in direction of arrow
- 1m — Width of exit required
- Fire-isolated stairs
- External stairs

CARPARK
Floor area: 16,567m^2
Population density: 30m^2 / person
Population: 553
Total exit width required: 5.0m

C.4 Level 2 undercover carpark

Legend

- Required exit – in direction of arrow
- 1m — Width of exit required
- Fire-isolated stairs

CARPARK
Floor area: 12,848m^2
Population density: 30m^2 / person
Population: 429
Total exit width required: 4.0m

C.5 Level 2A rooftop carpark