Consultant advice

Defire (NSW) Pty Limited
ABN. 30 099 090 089
Telephone 02 9211 4333
Facsimile 02 9211 4366
Suite 3, Level 4, 83-97 Kippax Street, Surry Hills, NSW 2010
PO BOX 2046, Strawberry Hills, NSW 2012

Defire

To	Vanessa Walker	AMP Capital Investors	vanessa.walker@ampcapital.com.au
	Derrick Burrows	Bovis Lend Lease	derrick.burrows@lendlease.com.au
	Steve Moulsdale	Bovis Lend Lease	Steve.Moulsdale@lendlease.com.au
	Guiseppe Graziano	Steve Watson & Partners	ggraziano@swpartners.com.au
	Luke Denny	Steve Watson & Partners	ldenny@swpartners.com.au
From	Johan Axelsson	Job number	SY100052
Date	6 May 2010	Pages	21
Subject	Marrickville Metro shopping centre redevelopment – preliminary fire safety measures		

Dear All

1. Introduction

The design of the proposed redevelopment of the Marrickville Metro shopping centre is likely to incorporate alternative solutions in order to achieve compliance with the performance requirements of the Building Code of Australia 2010 (BCA). The intent of this review is to provide preliminary advice on a feasible fire safety strategy for the proposed redevelopment to achieve compliance with the performance requirements of the BCA. The main focus of this document is in regards to evacuation provisions.

Defire has been engaged by AMP Capital Investors (AMPCI) to undertaken this preliminary review of the proposed design to accompany a Concept Plan Application under part 3A of the Environmental Planning and Assessment Act 1979 (Act) for the proposed redevelopment of the Marrickville Metro Shopping Centre. The development is being considered under part 3A of the Act as it satisfies the criteria described in schedule 1 of the Major Projects State Environmental Planning Policy (Major Projects SEPP).

The review was based on the drawings and information listed in attachment 1. It is noted that this is preliminary advice only and should not be considered a final design. Should the detailed fire safety engineering assessment reveal that the proposed strategy does not satisfy the identified performance requirements of the BCA, modifications to the fire safety strategy may be required.

2. Project description

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. Car parking is located at roof top 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 site is currently used as a warehouse with associated ground level car parking.

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.

Figure 1 Location plan

AMPCI owns Marrickville Metro Shopping Centre and the land to the immediate south at 13-55 Edinburgh Road, Marrickville.

2.2. Proposed works

AMPCI proposes 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:

- An extension of retail floor area at first floor level above the existing shopping centre building with further additional roof top parking above;
- Redevelopment of the existing industrial land south of Smidmore Street (13-55 Edinburgh Road) to create a two level retail addition to the shopping centre with car parking above.
- The closure of Smidmore Street between Edinburgh Road and Murray Street in order to create a new pedestrian plaza including a two storey retail link and car parking access.

The additional retail floor area will primarily accommodate a discount department store, supermarket, mini major and specialty retail space. The development will incorporate additional car parking as well as improved vehicle access and loading facilities.

The proposal will create a new urban plaza in Smidmore Street and will be complimentary to an enhanced public space fronting Victoria Road. The proposal will include works 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 car parking above. This work will also incorporate the creation of the pedestrian plaza and retail extension across Smidmore Street linking the two retail buildings and the refurbishment of the existing shopping centre building fronting the northern side of Smidmore Street.

Stage 2 will involve the first floor level retail extension over the existing shopping centre building with the proposed additional car parking at roof top level.

Further details on the proposed staging strategy are provided in the staging strategy issued 3 May 2010 prepared by Defire.

3. Main building characteristics and alternative solutions

3.1. Building description

The existing 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 link 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. As such adequate fire and smoke separation must be developed and incorporated into the design. It is likely that a fire safety upgrade of the existing centre will be required as part of stage 2 works.

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 are given in Table 1 and Table 2 respectively [1].

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 B
Rise in storeys	C1.2	Three (large isolated building)

Table 2 Stage 2 building characteristics

3.2. Occupant characteristics

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

Characteristic	Description
Familiarity	Retail tenancies – Occupants 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 which are familiar with the layout of the building Carpark – Occupants are mainly expected to be associated with the retail tenancies and 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.
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.

[1] Draft BCA Assessment Report, 2010/0116 R1.0, issued 3 May 2010 and prepared by Steve Watson & Partners.

Characteristic	Description
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	It is proposed that occupant densities in carparks are based on occupant numbers as per table D1.13 of the BCA which specifies 30m^2/person. It is proposed that occupant densities in the retail parts are based on occupant numbers as per Project 6.[2] Refer to the calculations in Table 4 and Table 5.

Table 3 Occupant characteristics

3.3. Alternative solutions

The design of the building includes areas that will not comply with the DTS provisions of the BCA. We intend to use a performance-based fire safety engineering approach to develop alternative solutions to the DTS provisions of the BCA. The key areas of departures from the DTS provisions are likely to be:

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

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

4. Fire safety measures

The following fire safety measures are proposed for the building as a starting point for the fire safety strategy.

4.1. Compartmentation and separation

1. Stage 1 and stage 2 works must be adequately fire separated during construction of both stages. During construction temporary alternative egress provisions must be made in the occupied portion. Once both stages are completed a combination of fire separation, smoke separation and smoke exhaust is likely to be required to facilitate horizontal evacuation between the two buildings.

4.2. Population and exit width

2. The estimated populations and aggregate exit widths required in the retail portion of the building are proposed to be based upon the figures recommended in the Project 6 report 'Fire Safety in Shopping Centres' and are as follows:

    a. 6m²/person in retail areas (including front and back of house)

    Note: Population numbers and aggregate exit widths for back of house areas are currently based upon the same numbers as front of house areas. These are considered to be conservative in nature and may be reduced once detailed floor areas are provided.

    b. 10m²/person in mall areas

    c. Food court areas or the like are to be treated as retail or counted based upon the number of seats. The most conservative of the two numbers to be used.

3. The estimated populations and aggregate exit widths required in the carpark portions of the building are proposed to be based upon table D1.13 of the BCA which is 30m²/person.

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. 50% of all major tenancy occupants evacuate via the mall.

6. The estimated populations and aggregate exit widths required from the major tenancies, mall and carparks are summarised in Table 4 and Table 5.

Tenancy	Floor area (m^2)	Population density (m^2/person)	Population (persons)	Total exit width required
Stage 1				
Mini Major – GF	1,000	6	167	1.75m • 1m through dedicated exits within the major 1m through entrance to mall
Specialty tenancies – GF	2,700	6	450	4m in aggregate • 1m per specialty tenancy either into the mall or direct to outside
Main Mall – GF	2,000	10	200	4m + 2m + 1m = 7m • Determined based upon 100% of speciality tenancies + 100% mall + 50-55% mini-major Note: less width is likely as majority of specialty tenancies have their own dedicated exits onto the street
Specialty tenancies north of plaza – GF	930	6	155	1.75m in aggregate • 1m per specialty tenancy either into the mall or direct to outside
Mall north of plaza – GF	200	10	20	1.75m + 1m + existing centre = >2.75m • Determined based upon 100% of speciality tenancies + 100% mall + existing centre Note: less width is likely as majority of specialty tenancies have their own dedicated exits onto the street
Supermarket – L1	4,000	6	667	6m • 3m through dedicated exits within supermarket • 3m through entrance to mall
Specialty tenancies – L1	1,900	6	317	3m in aggregate 1m per specialty tenancy into the mall
Mall – L1	1,500	10	150	3m + 3m + 1.5m = 7.5m Note: It is likely that up to 6m can be achieved via the bridge link. During construction of stage 2 consideration must be taken to provide temporary exits achieving this width. To be further reviewed and discussed with all stakeholders
Carpark – L2	7,800	30	260	• 2.5m

Stage 2				
Carpark – L1	12,400	30	413	4m + 5.5m + 9 = 18.5m (see item 14) Determined based upon carpark + 5.5m from DDS + 60% from the L1 mall. This can be reduced depending on the capacity of the exits via the bridge link
Carpark – L2A	19,800	30	660	6m
DDS – L1	7,400	6	1,233	11m • 5.5m through dedicated exits within the DDS • 5.5m through entrance to mall
Specialty tenancies – L1	4,100	6	683	6.5m in aggregate 1m per specialty tenancy into the mall or direct to L1 carpark
Mall – L1	2,400	10	240	5.5m + 6.5m + 2.5m = 14.5m • Determined based upon 100% of speciality tenancies + 100% mall + 45-50% of DDS • 3m (45% of 6.5m) less width is likely as majority of specialty tenancies have their own dedicated exits onto the L1 carpark Note: It is likely that up to 6m can be achieved via the bridge link

Table 4 Exits required during project stages

Tenancy	Floor area (m^2)	Population density (m^2/person)	Population (persons)	Total exit width required
Existing Centre				
Kmart – GF	6,330	6	1,055	8m • 6m through dedicated exits within Kmart • 2m 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 75% uitilsation of the rear exits and 25% via the mall. It is likely that a better distribution could be adopted.
Woolworths – GF	4,600	6	767	6m • 3.5m through dedicated exits within Woolworths • 2m 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 75% uitilsation of the rear exits and 25% via the mall. It is likely that a better distribution could be adopted.

Table 5 Exits required in existing building

4.3. 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 in the basement carpark:
    a. 20m to a point of choice
    b. 60m to the closest of two or more alternative exits
    c. 100m between alternative exits
8. It is proposed to apply the following maximum travel distances on the open deck 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

    Note – exits to be provided based on travel distances in lieu of populations as roof is treated as open space.
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 compliant travel distances in back-of-house areas with no dedicated smoke exhaust:
    d. 20m to a point of choice
    e. 40m to the closest of two or more alternative exits
    f. 60m between alternative exits
11. 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. 75m between alternative exits
12. 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
13. 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.

14. The rooftop carparks are proposed to be treated as open space when determining aggregate exit width required from these areas. This is allowed for under clause D2.12 of the BCA and the intent is to allow a roof of a building to be used as a point of discharge from an exit. The carpark slab must achieve a 2 hour fire separation to protect people on the roof from fire below during evacuation from the building and is not to have any openings within three metres of the path of travel to the portion of the roof being used as open space, and from that portion to a road.

    Note: FRL's to be confirmed by a structural engineer.

4.4. Smoke hazard management

4.4.1. Smoke exhaust system

15. Smoke exhaust must be provided within the smoke zones as described in Table 6 and outlined in Figure 2 - 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
DDS – Stage 2	45	Three exhaust points of 15m^3/s each to be provided. Refer to Figure 2.
Mall, L1 – Stage 2	60-80 (40 + 20-40)	Two exhaust points of 20-40m^3/s and 40 m^3/s respectively to be provided. Refer to Figure 2.
Supermarket, L1 – Stage 1	30	Three exhaust points of 10m^3/s each to be provided. Refer to Figure 4.
Mall, L1 – Stage 1	40	Two exhaust points of 20m^3/s each to be provided. Refer to Figure 4.
Mini major, GF – Stage 1	10	Two exhaust points of 5m^3/s each to be provided. Refer to Figure 3.
Mall, GF – Stage 2	-	Exhaust via Mall, L1. Refer to Figure 3.

Table 6 Smoke exhaust rates for smoke zones

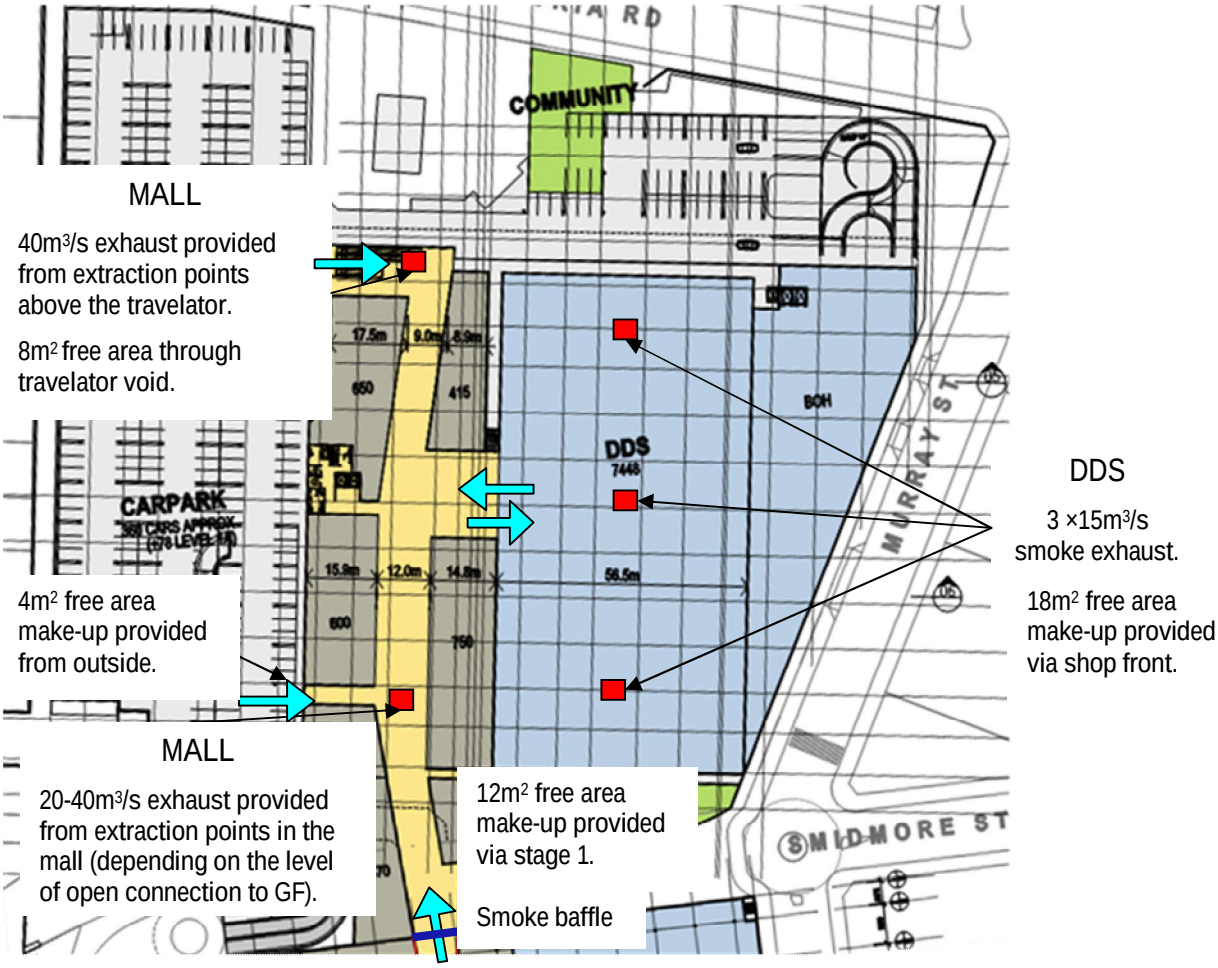


Figure 2 Stage 2 – Proposed smoke exhaust and make up air, L1

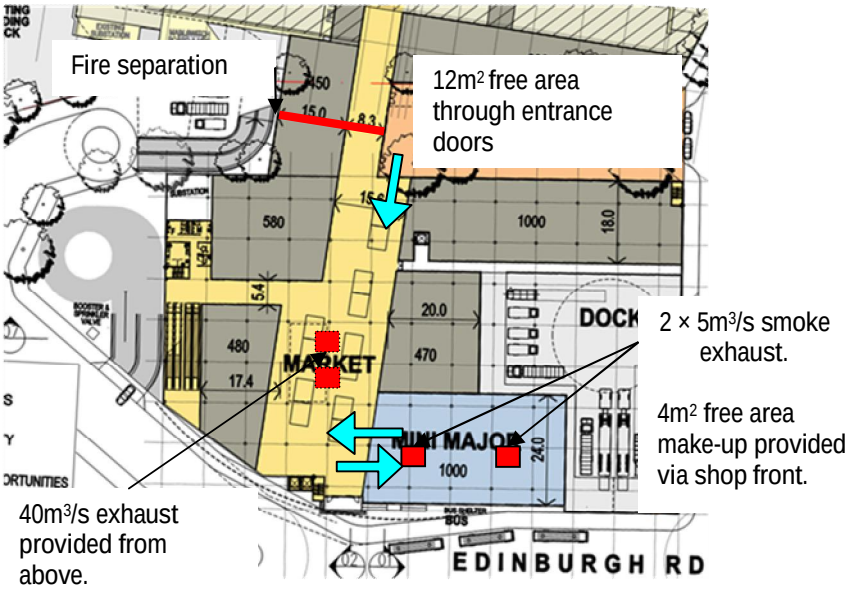


Figure 3 Stage 1 – Proposed smoke exhaust and make up air, GF

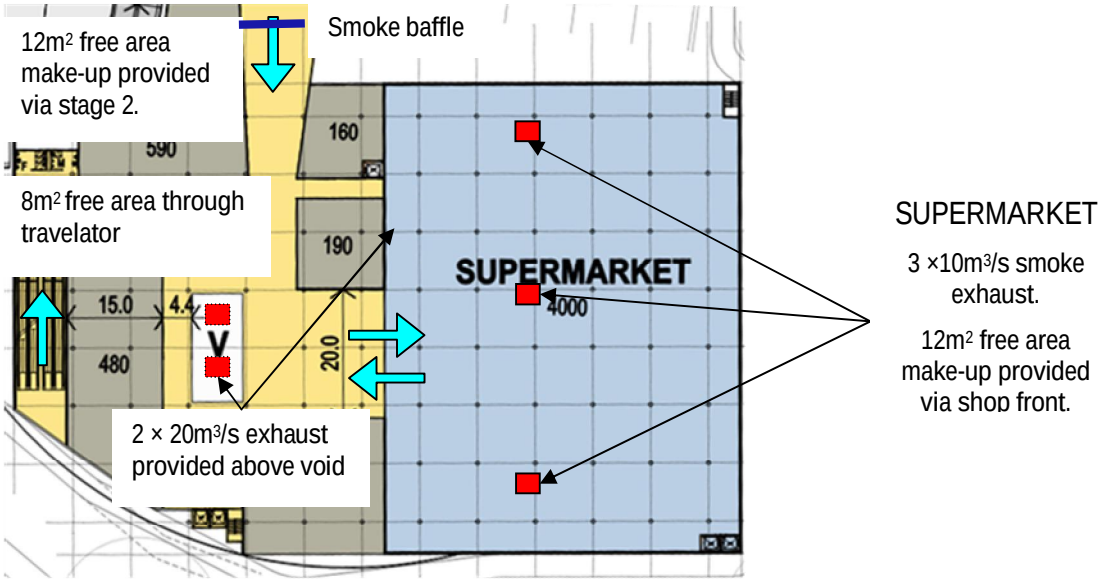


Figure 4 Stage 1 – Proposed smoke exhaust and make up air, Level 1

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

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

18. 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.

4.4.2. Make-up air

19. The proposed location and distribution of make-up air is outlined in Figure 2 - Figure 4.

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

21. 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.

4.4.3. Smoke baffles

22. 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.

4.5. Optional items that can be adopted

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

24. 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.

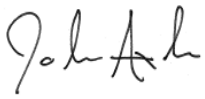
4.6. Other areas

25. 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.

26. The construction of the bridge link, the level of separation required at the bridge link and the evacuation strategy via the bridge is discussed further in the staging strategy issued 6 May 2010 prepared by Defire.

Please contact Johan Axelsson of Defire on 02 9211 4333 if you have any questions regarding this information.

Regards,



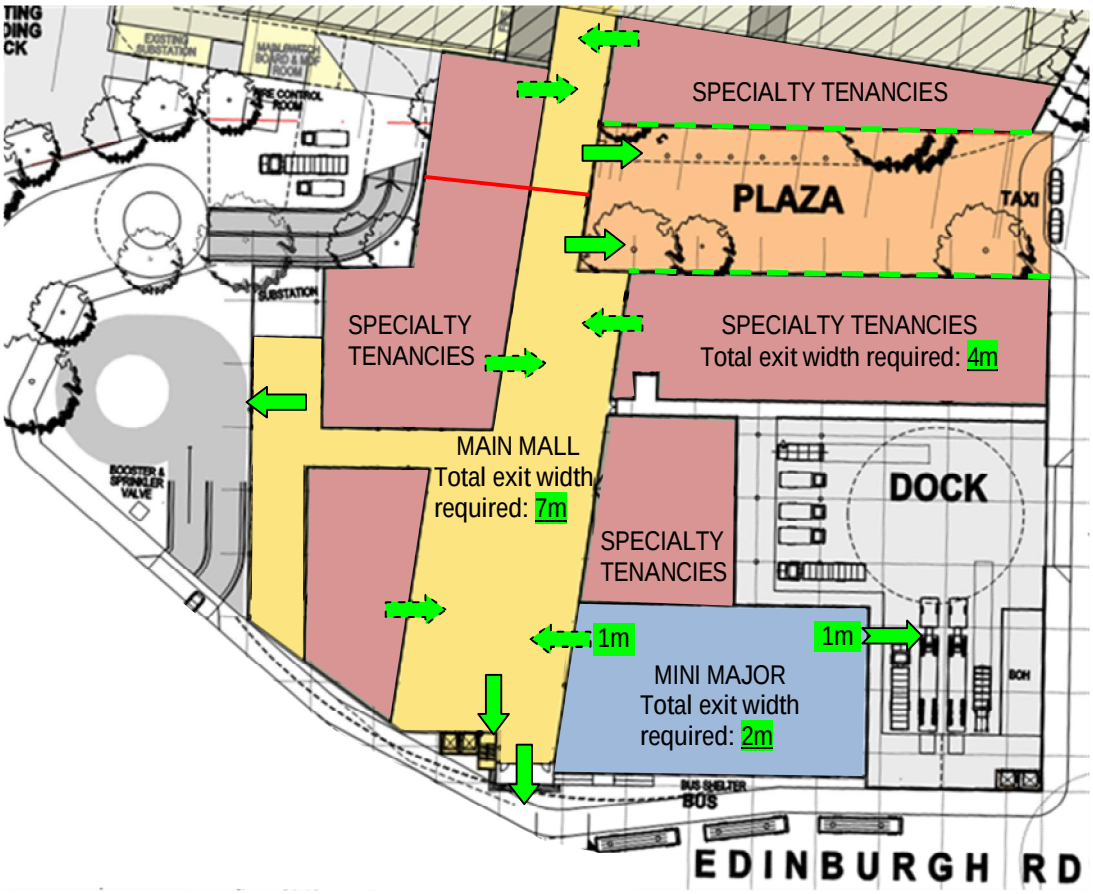
Johan Axelsson
Fire safety engineer
Defire

Attachment 1 Drawings and information

Drawing title	Dwg no	Date	Drawn
Retail outlet survey	CH4331.003 B	11 Jan 2006	William L. Backhouse
Ground level plan	SK 028	9 April 2010	Bovis Lend Lease
Level 1 plan	SK 029	9 April 2010	Bovis Lend Lease
Level 2 & 2a similar	SK 031	9 April 2010	Bovis Lend Lease

Other information	Ref no	Date	Prepared by
Draft BCA assessment report for development application – concept design	2010/0116 R1.0	03/05/10	Steve Watson & Partners

Attachment 2 Ground level of new centre – south of plaza



Legend

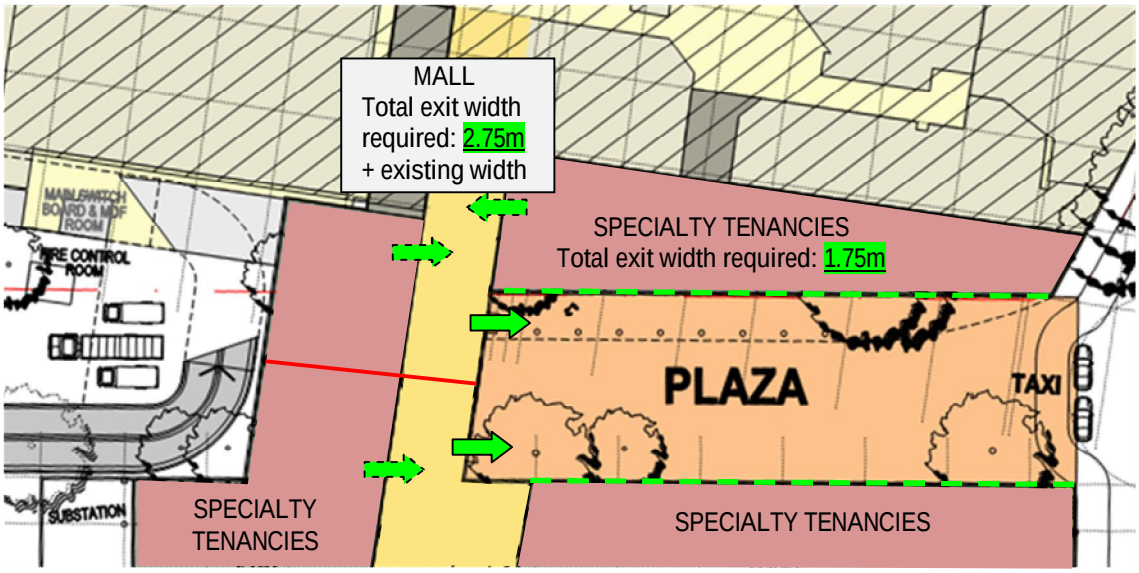
- Required exit – in direction of arrow
- Dedicated exit from tenancy to open space
- Exit from tenancy into mall area
- 1m — Width of exit required
- Alternative exits direct to outside
- Fire separation – eg via sliding fire door

SPECIALTY TENANCIES
Floor area: 2,700m³
Population density: 6m³ / person
Population: 450
Total exit width required: 4m

MAIN MALL
Floor area: 2,000m³
Population density: 10m³ / person
Population: 200
Total exit width required: 2m + 4m + 1m = 7m

MINI MAJOR
Floor area: 1,000m³
Population density: 6m³ / person
Population: 167
Total exit width required: 2m

Attachment 3 Ground level of new centre – north of plaza



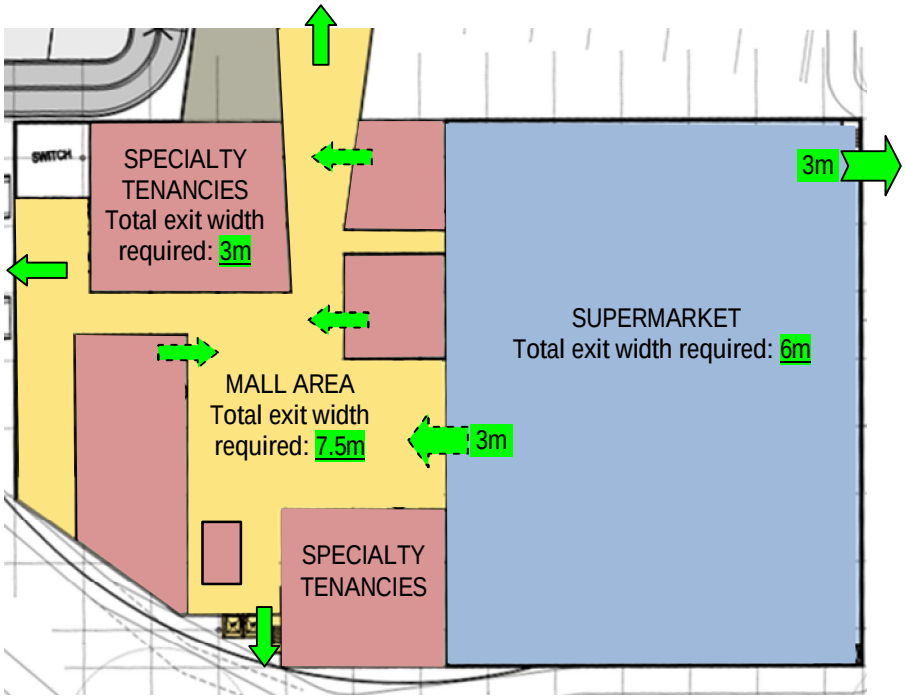
Legend

- Required exit – in direction of arrow
- Dedicated exit from tenancy to open space
- Exit from tenancy into mall area
- 1m — Width of exit required
- Alternative exits direct to outside
- Fire separation – eg via sliding fire door

MAIN MALL
Floor area: 200m³
Population density: 10m³ / person
Population: 20
Total exit width required: 1m + 1.75m = 2.75m + existing width

SPECIALTY TENANCIES
Floor area: 9,30m³
Population density: 6m³ / person
Population: 155
Total exit width required: 1.75m

Attachment 4 Level 1 of new centre



Legend

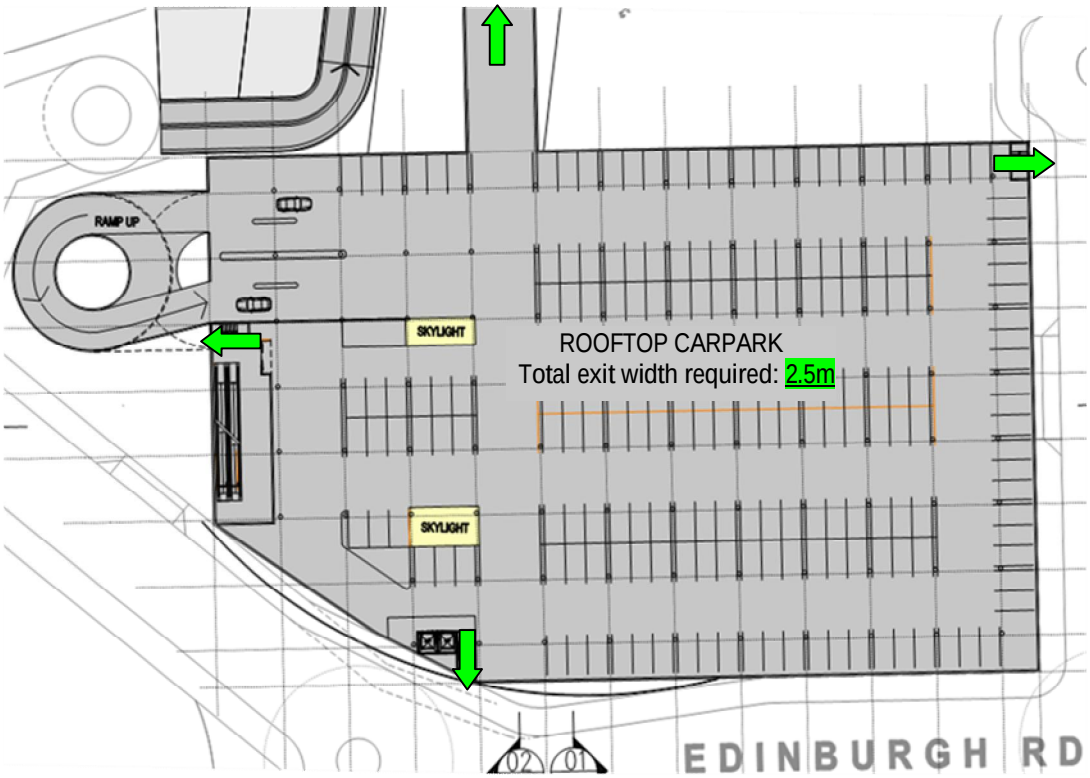
- Required exit – in direction of arrow
- Dedicated exit from tenancy to open space
- Exit from tenancy into mall area
- 1m Width of exit required

MALL AREA
Floor area: 1,500m³
Population density: 10m³ / person
Population: 150
Total exit width required: 1.5m + 3m + 3m = 7.5m

SPECIALTY TENANCIES
Floor area: 1,900m³
Population density: 6m³ / person
Population: 317
Total exit width required: 3m

SUPERMARKET
Floor area: 4,000m³
Population density: 6m³ / person
Population: 667
Total exit width required: 6m

Attachment 5 Level 2 and rooftop carpark of new centre



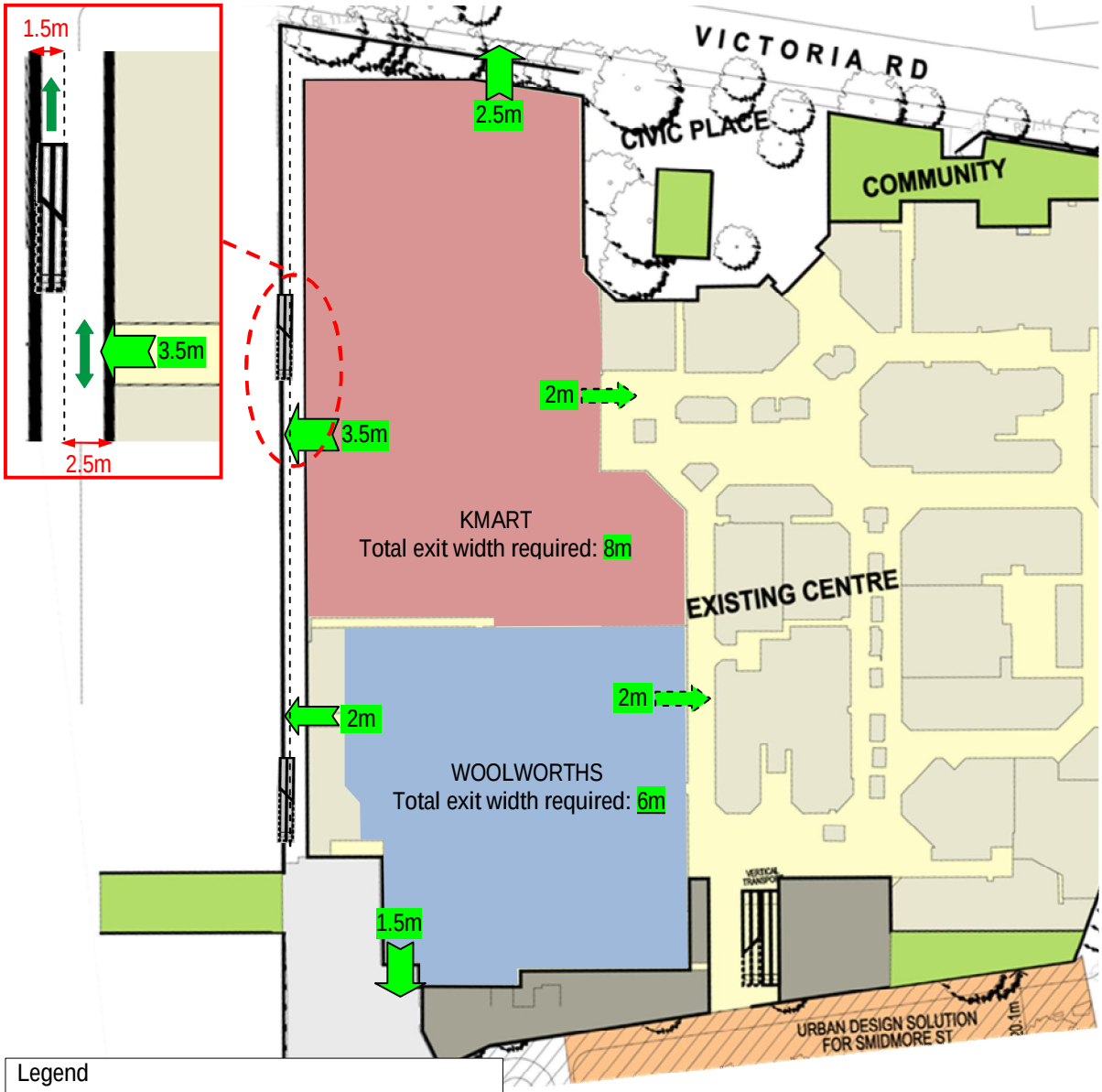
Legend

Required exit – in direction of arrow

1m Width of exit required

ROOFTOP CARPARK
Floor area: 7,800m³
Population density: 30m³ / person
Population: 260
Total exit width required: 2.5m

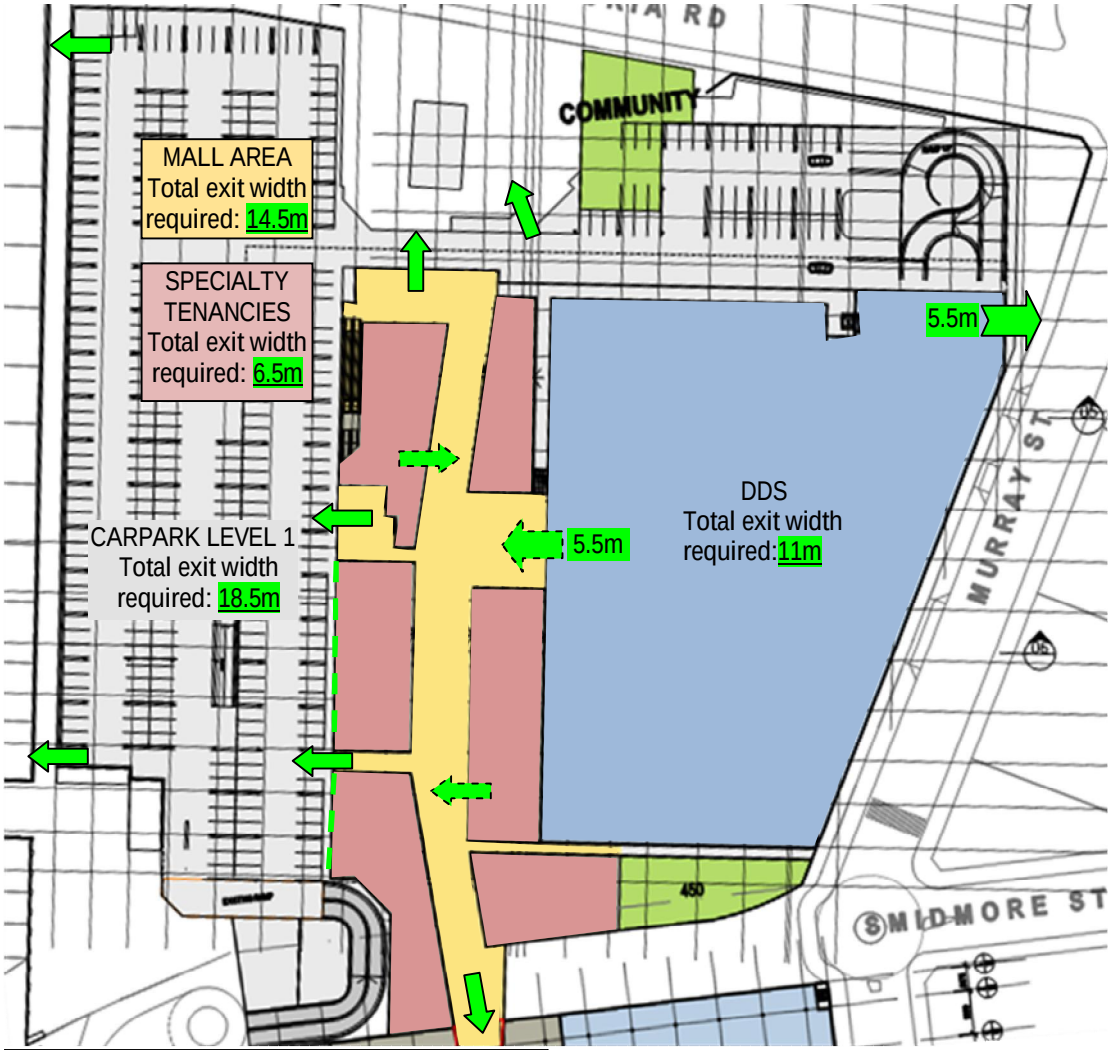
Attachment 6 North-western portion on ground level of existing centre



KMART
Floor area: 6,330m³
Population density: 6m³/person
Population: 1,055
Total exit width required: 8m

WOOLWORTHS
Floor area: 4,600m³
Population density: 6m³/person
Population: 767
Total exit width required: 6m

Attachment 7 Level 1 of existing centre



Legend

- Required exit – in direction of arrow
- Dedicated exit from tenancy to open space
- Exit from tenancy into mall area
- 1m — Width of exit required
- Alternative exits direct to outside

MALL AREA
Floor area: 2,200m³
Population density: 10m³/person
Population: 220
Total exit width required: 2.5m+6.5m+5.5m=14.5m

DDS
Floor area: 7,300m³
Population density: 6m³/ person
Population: 1,233
Total exit width required: 11m

SPECIALTY TENANCIES
Floor area: 4,300m³
Population density: 6m³/ person
Population: 683
Total exit width required: 6.5m

CARPARK LEVEL 1
Floor area: 12,400m³
Population density: 30m³/person
Population: 413
Total exit width required: 18.5m

Attachment 8 Carpark level 2 of existing centre

Legend

Required exit – in direction of arrow

1m Width of exit required

CARPARK LEVEL 2
Floor area: 19,800m^3
Population density: 30m^3/person
Population: 660
Total exit width required: 6m