Preliminary fire safety measures

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Project	**Site 9 – Sydney Olympic Park**		

Dear All

1. Introduction

We have prepared this advice to identify and document the fire safety measures that are likely to be required for the proposed residential tower development at Site 9, Sydney Olympic Park to achieve compliance with the performance requirements of the National Construction Code Series 2015 Volume One – Building Code of Australia (BCA)[1]. This review is based on the documentation listed in Appendix A.

2. Alternative solutions

The design of the building includes areas that do not comply with the deemed-to-satisfy (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. Table 1 describes the BCA requirements associated with the alternative solutions.

Item	Description of alternative solution	DTS provision	Performance requirement
1.	The maximum travel distance to the nearest exit within the podium carpark levels is proposed to be extended up to 55m instead of 40m.	Clause D1.4	DP4 and EP2.2
2.	The fire rating of the building elements associated with the retail areas on the ground floor is reduced from 3 hours to 2 hours.	Clauses C1.1, C2.8, C2.9 and specification C1.1	CP1 an CP2
	The fire rating of the building elements bounding the bike storage room on level 9 is to be reduced from 4 hours to 2 hours.		
3.	The maximum travel distance to the nearest exit from the open residential courtyard is up to 52m in lieu of 20m.	Clause D1.4	DP4 and EP2.2
4.	The maximum travel distance to the nearest exit within the commercial office levels is proposed to be extended up to 50m instead of 40m.	Clause D1.4	DP4 and EP2.2
5.	The maximum travel distance to a point of choice within the residential levels is proposed to be extended up to 15m instead of 6m.	Clause D1.4	DP4 and EP2.2

[1] National Construction Code Series 2015, Volume One – Building Code of Australia, Australian Building Codes Board, Australia.

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Item	Description of alternative solution	DTS provision	Performance requirement
6.	The maximum travel distance to a point of choice/nearest exit from the plant areas on levels 7 and 8 is to be extended to 27m in lieu of 20m.	Clause D1.4	DP4 and EP2.2
7.	The maximum travel distance to a point of choice/nearest exit from the common area/room on level 9 is to be extended to 30m in lieu of 20m.	Clause D1.4	DP4 and EP2.2
8.	The two entries to the fire-isolated scissor stair serving level 39 of the building are proposed to be located 4m apart in lieu of 9m.	Clause D1.5	DP4 and EP2.2
9.	The fire-isolated stairs serving the commercial portion discharge into the covered through site link which is not open for 1/3 of its perimeter and the travel distance to open space exceeds 6m. The path of travel from the discharge location of the two fire stairs serving the residential tower is within 6m of unprotected openings.	Clause D1.7	DP4 and DP5
10.	The proposed location of the fire hydrant booster is not within sight of the main entry to the building.	Clause E1.3	EP1.3
11.	The hydrant booster is not proposed to be provided with a fire rated shielding wall extending 2m either side and 3m above the booster assembly.	Clause E1.3	EP1.3
12.	Internal fire hydrants are proposed to be located in fire-isolated stairs with two steps higher than the level they are serving.	Clause E1.3 and AS 2419.1-2005	EP1.3
13.	The combined fire hydrant / system ring main does not meet the requirements of clause 2.6.2 of AS 2118.6-2012 which recommends that the vertical portions of the combined fire sprinkler / hydrant ring main shall be located within separate fire rated exits or fire rated riser shafts.	Clause E1.3 and AS 2118.6-2012	EP1.3
14.	The current location of the fire control room has the potential to be obstructed by escaping occupants from adjacent North Wing fire-isolated stairs. Additionally, the fire control room and associated fire indicator panel is unable to be located at the front entrance as multiple entrances exist.	Clause E1.8	EP1.6

Table 1 BCA requirements associated with the alternative solutions

3. 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.

3.1 General

1. The design must comply with the current DTS provisions of the BCA relating to fire safety unless 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 alternative 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.

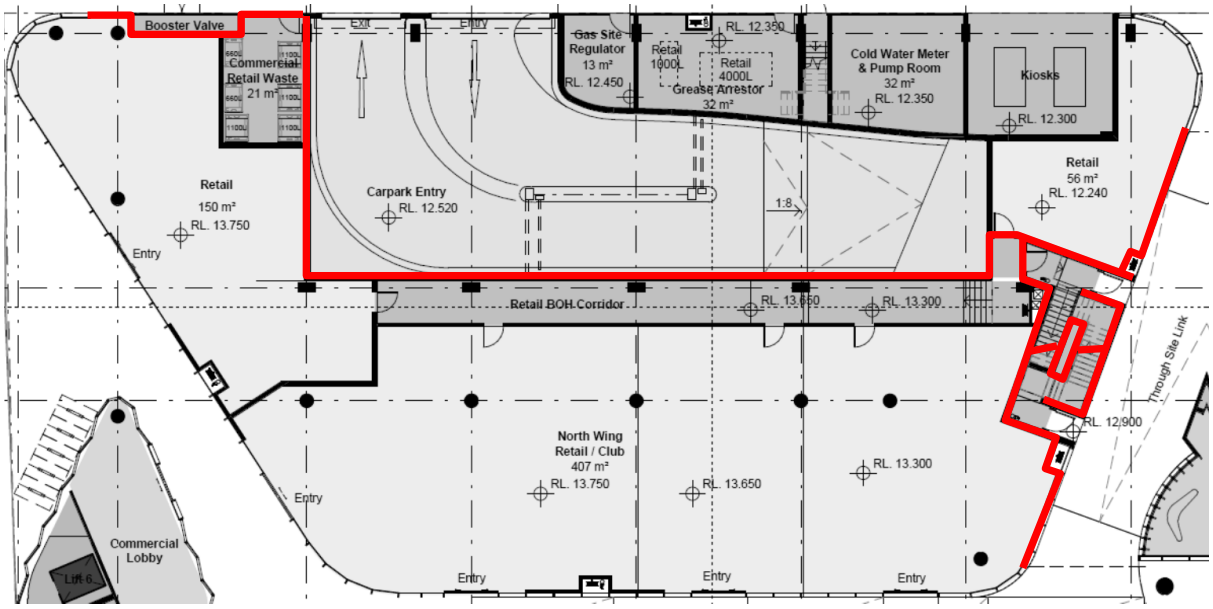
3.2 Structural fire resistance

3.2.1 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 building of type A construction with the exception that the maximum FRL criteria for any element associated with the retail tenancies on the ground floor and the bicycle store room on level 9 is 120 minutes – eg if an element is required to achieve an FRL of 180/120/90 it can be reduced to 120/120/90.

3.2.2 Compartmentation and separation

4. The retail areas on the ground floor must be separated from the other classifications on the storey by a fire wall and floor above that achieve an FRL of not less than 120/120/120 instead of 180/180/180 as required by clauses C2.7, C2.8 and C2.9 of the BCA. Refer to Figure 1.



FRL 120/120/120 for loadbearing element or -/120/120 for non-loadbearing element

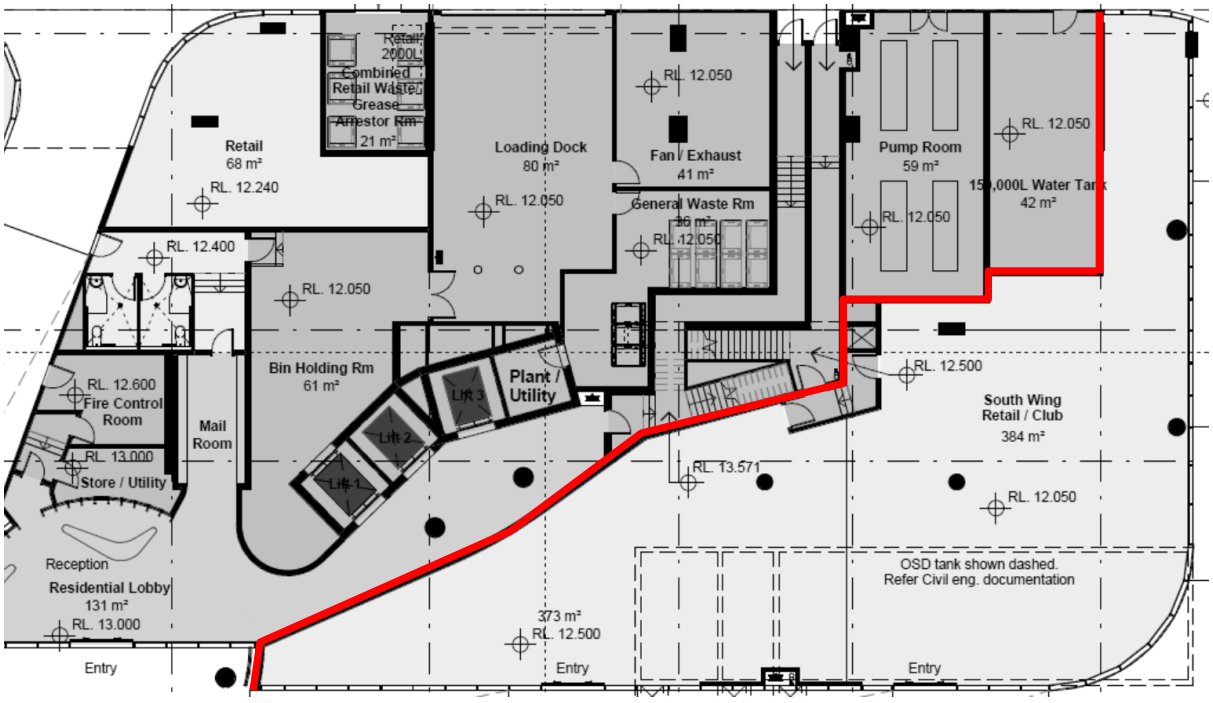


Figure 1 Ground floor retail fire separation

5. All doorways opening onto the common residential corridors with extended travel distance to a point of choice or nearest exit must be fitted with smoke seals complying with clause 3 of specification C3.4 of the BCA and 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.

3.3 Access and egress

3.3.1 Provision of escape

6. Each storey including the commercial portions on levels 7 and 8 must be served by a minimum of two fire-isolated exits in accordance with clause D1.2 of the BCA.

7. The maximum travel distance to a point of choice within the residential corridors may be extended to:

   a. 14m instead of 6m from the furthest apartment on levels 7-9 and 36-38 provided occupants need not travel past another apartment before reaching a point of choice as shown in Figure 2.

   b. 15m instead of 6m from the furthest apartment on levels 10-35 provided occupants need not travel past more than one apartment before reaching a point of choice as shown in Figure 3.

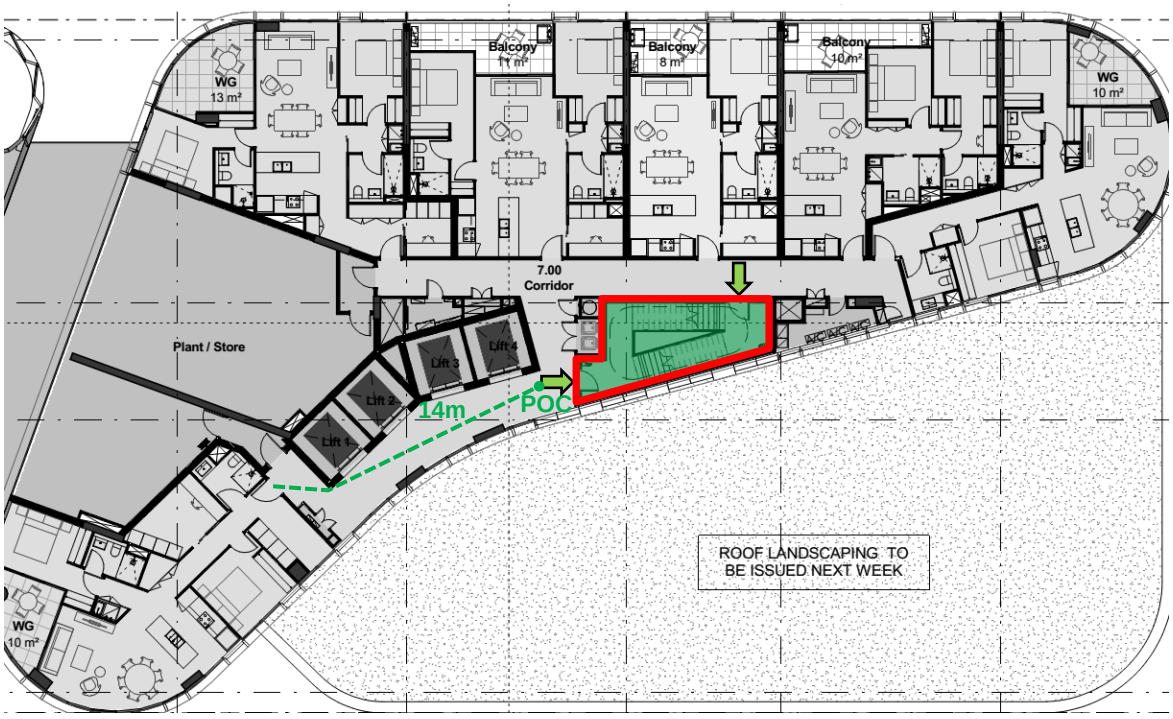


Figure 2 Levels 7-9 and 36-38 maximum travel distance to a point of choice

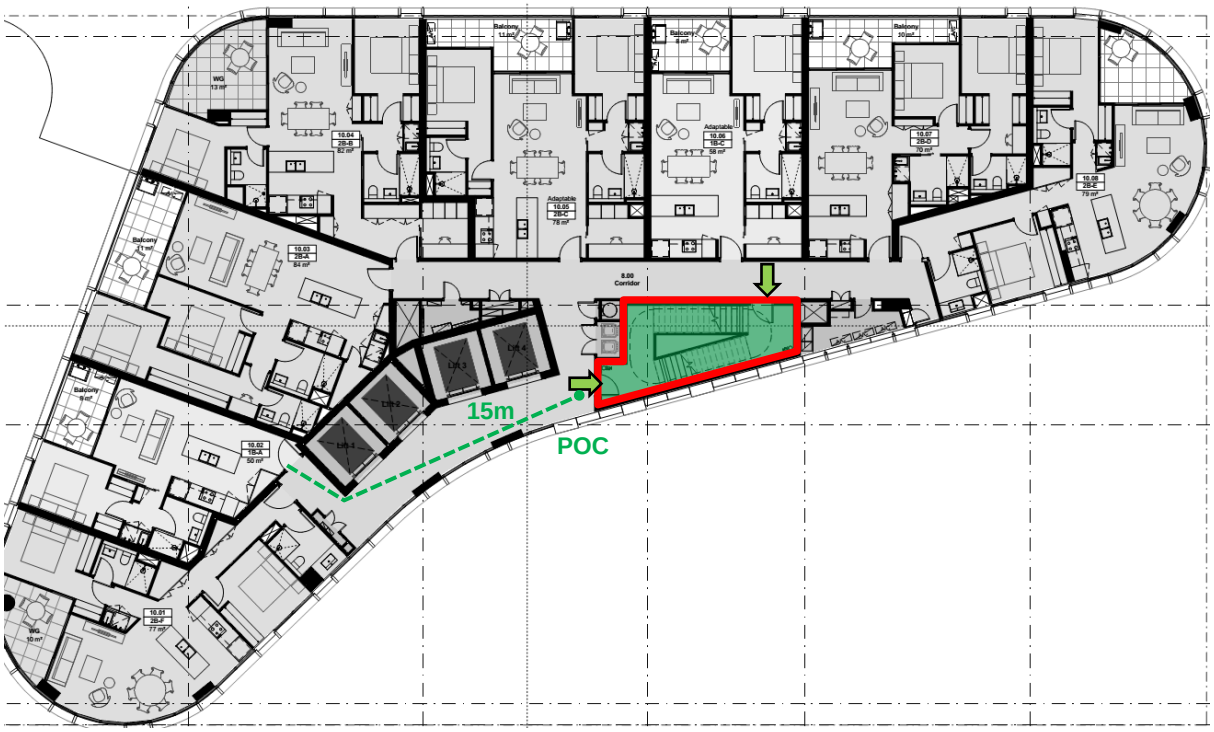


Figure 3 Levels 10-35 maximum travel distance to a point of choice

8. The following maximum travel distances apply within the podium carpark levels of the building:

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

   b. 55m to the closest of two or more alternative exits

   c. 60m between alternative exits.

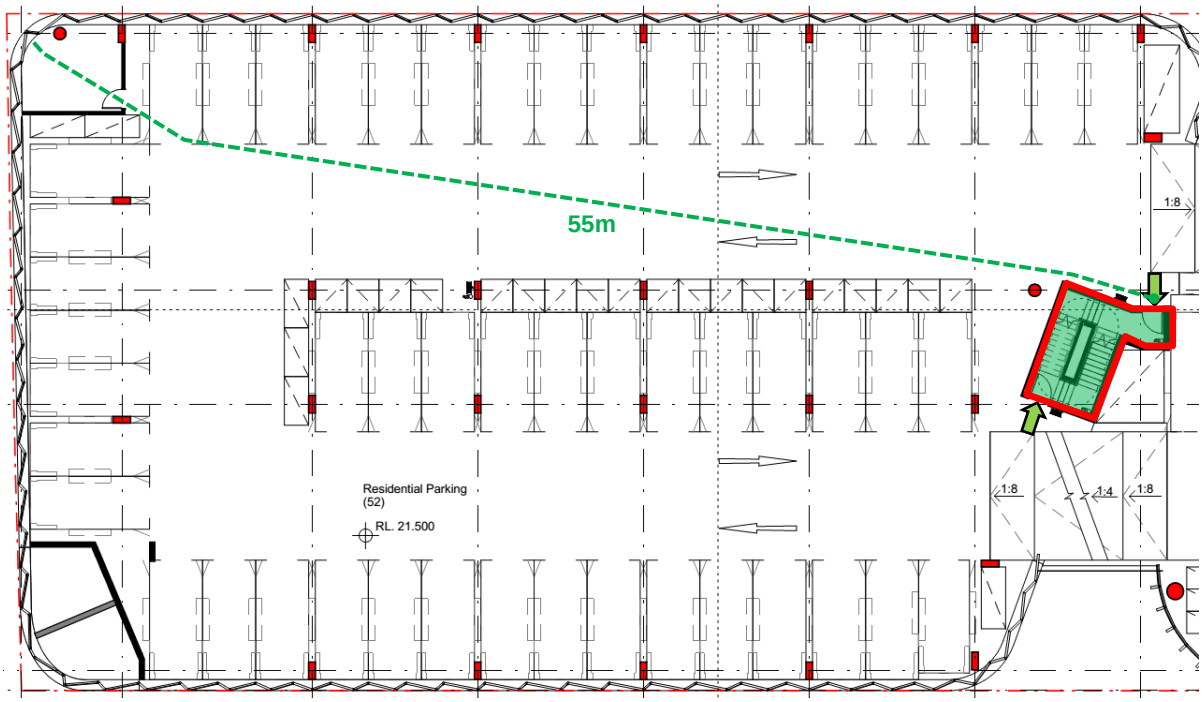


Figure 4 Maximum travel distance to nearest exit on the podium carpark levels 3 to 6

9. The following maximum travel distances apply within the commercial office levels of the building:

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

   b. 50m to the closest of two or more alternative exits including fitout

   c. 60m between alternative exits.

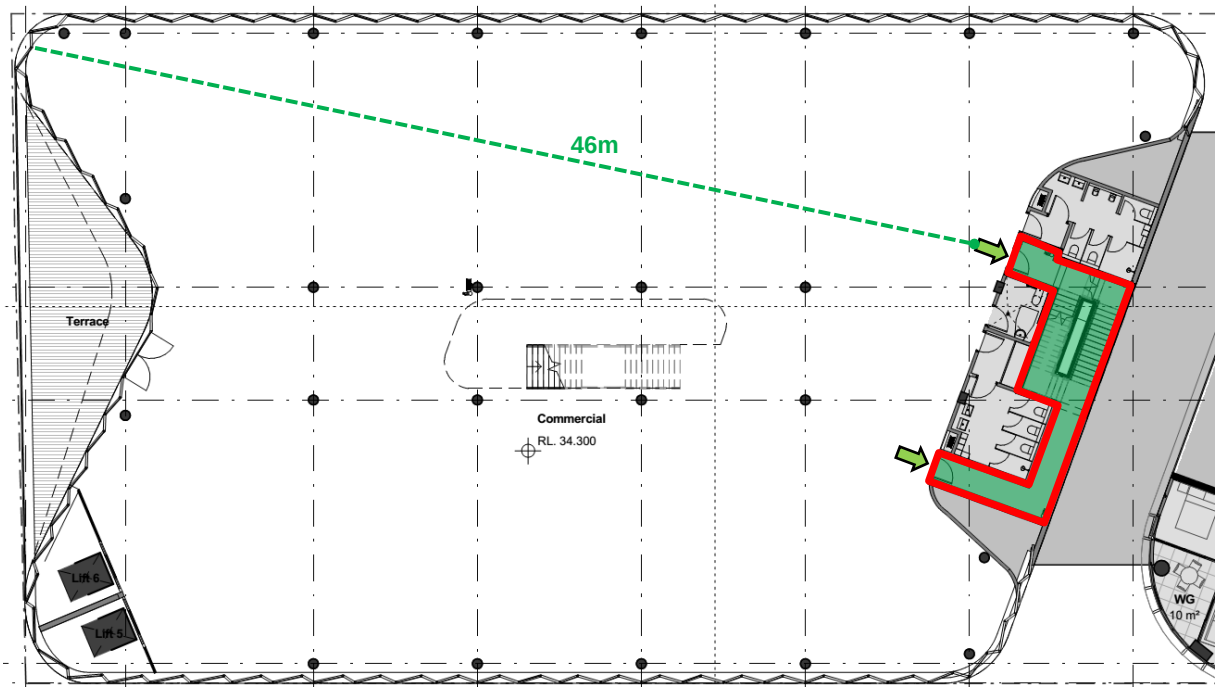


Figure 5 Maximum travel distance to nearest exit on commercial levels 7 and 8

10. The maximum travel distance to the nearest exit from the residential courtyard on level 9 may be extended to 52m in lieu of 20m as shown in Figure 6 provided the following requirements are met:

    a. The floor of the roof must achieve an FRL of 120/120/120 in accordance with clause D2.12 of the BCA.

    b. The courtyard is fully opened to the sky.

    c. The sound system and intercom system for emergency purposes must be audible throughout the courtyard.

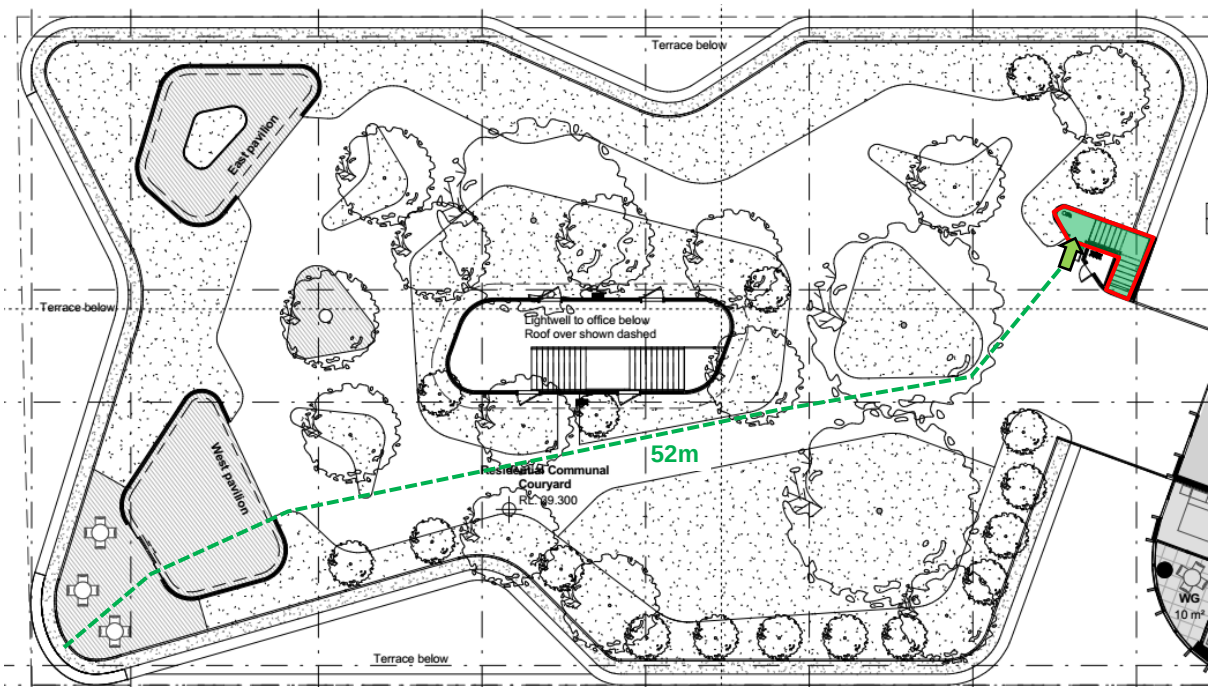


Figure 6 Residential courtyard on level 9

11. The maximum travel distance to a point of choice/nearest exit from the plant areas on levels 7 and 8 may be extended to 27m in lieu of 20m.

12. The two entries to the fire-isolated scissor stair serving level 39 of the building may be located 4m apart in lieu of 9m provided a doorway is provided between the plant room and the lift lobby as shown in Figure 7. This doorway is to be protected by a self-closing FRL -/60/30 fire door which may swing inwards into the plant room.

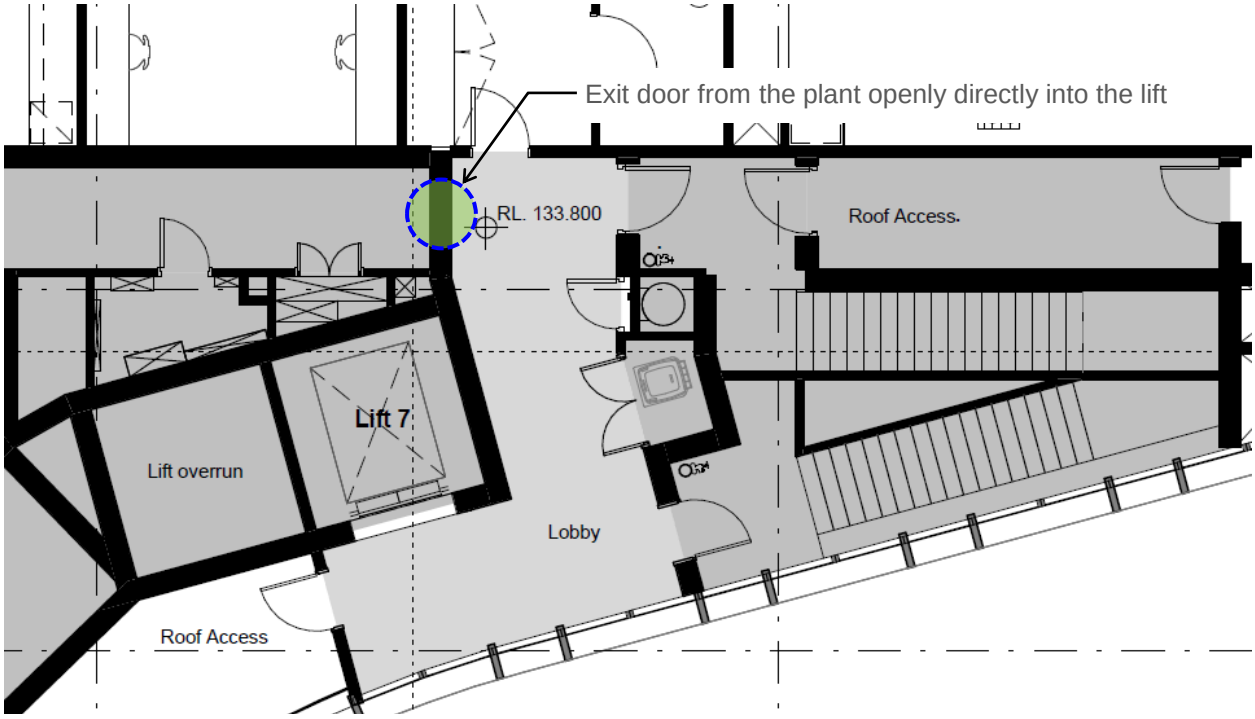


Figure 7 Level 39 lobby

13. The two fire-isolated stairs serving the low rise portion of the building may discharge into the covered through site link which is not open for at least 1/3 of its perimeter provided the following requirements are met:

    a. Openings must have a total clear width of 9m comprising of the two openings at either end of the through link

    b. Has an unobstructed clear height throughout, including the perimeter openings, of not less than 3m

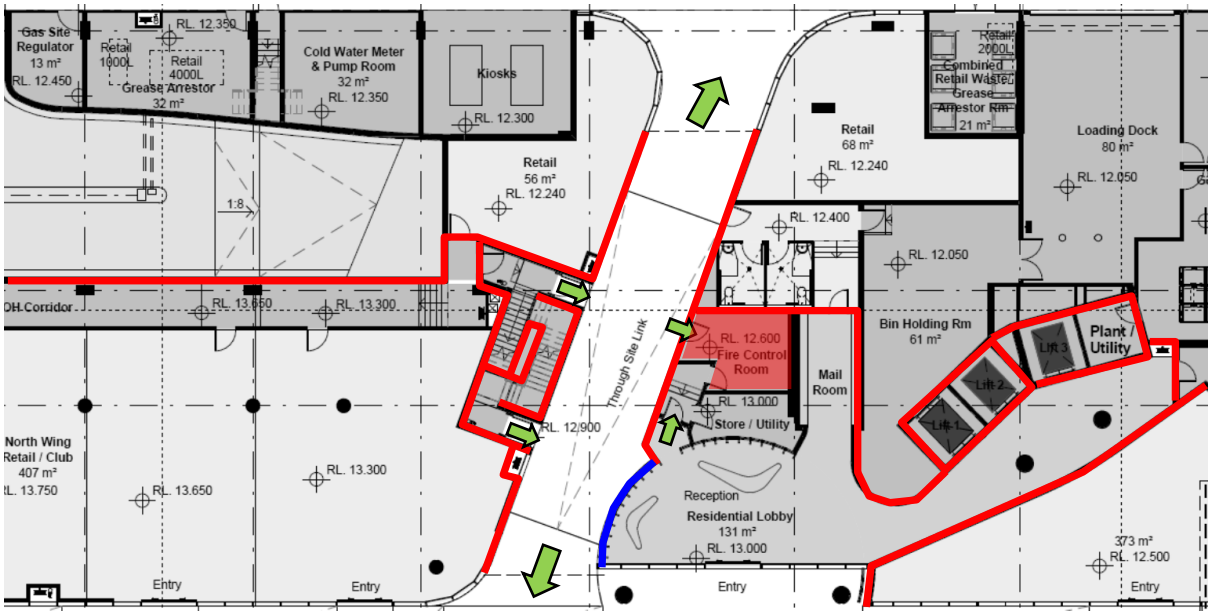
    c. The internal walls bounding the through site link must achieve an FRL of 120/120/120 or -/120/120 if the walls are non-loadbearing

    d. Glazing in the internal walls between the entry lobby and the through site link is permitted provided it is FRL -/60/- fire rated glass or 10mm toughened glazing protected on the inside by quick response Tyco Model WS™ 5.6 K-factor pendent vertical or horizontal sidewall sprinkler heads

    e. Doorways opening into the through site link must be protected by self or automatic closing FRL -/120/30 fire doors

    f. The residential entry lobby must be fire separated from the bike store as shown in Figure 8

14. The maximum travel distance to a point of choice/nearest exit from the common area/room on level 9 may be extended up to 30m in lieu of 20m.



FRL 120/120/120 for loadbearing element or -/120/120 for non-loadbearing element

FRL -/60/- fire rated glass or toughened glazing protected by internal wall-wetting sprinklers

Figure 8 Discharge of fire isolated stairs into covered through site link

3.4 Services and equipment

3.4.1 Firefighting equipment

15. A fire hydrant system with a ring main 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 hydrant booster is not proposed to be provided with a fire-rated shielding wall extending 2m either side and 3m above the booster assembly.

    b. The rear wall of the booster cabinet must be fire-rated to achieve an FRL of not less than 90/90/90.

    c. Internal fire hydrants are proposed to be located in fire-isolated stairs with two steps higher than the level they are serving.

    Note: The proposed location of the internal hydrants will need to be referred to FRNSW for approval.

    Please note that the fire hydrant booster assembly connections and all fire hydrant valves must be fitted with Storz aluminium alloy delivery couplings manufactured and installed in accordance with clauses 7.1 and 8.5.11.1 of AS 2419.1-2005. Blank caps must be fitted to the couplings via a screw thread. Refer to guide sheet no. 4 'Fire brigade hose couplings' prepared by Fire and Rescue NSW for more information. This document is available at www.fire.nsw.gov.au.

16. The combined fire hydrant / system ring main does not meet the requirements of clause 2.6.2 of AS 2118.6-2012 which recommends that the vertical portions of the combined fire sprinkler / hydrant ring main shall be located within separate fire rated exits or fire rated riser shafts.

    Note: This issue will need to be referred to FRNSW for approval.

17. The fire hydrant booster must be separated from the building by construction achieving an FRL of not less than 90/90/90 for a distance of not less than 2m each side of and 3m above the upper hose connections in the booster assembly in accordance with the requirements of clause 7.3 of AS 2419.1-2005.

18. The proposed location of the fire hydrant booster assembly adjacent to the carpark entry as shown in Figure 1 is not considered comply with AS 2419.1-2005 as it is not within sight of the main entry to the building being the main residential entry lobby.

    Note: The proposed location of the fire hydrant booster will need to be referred to FRNSW for approval.

19. The building is required to be provided with a fire control room in accordance with clause E1.8 of the BCA. The fire control room is proposed to be accessed via the through site link and the residential entry lobby as shown in Figure 8.

    Note: The proposed location and access to the fire control room will need to be referred to FRNSW for approval.

20. 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.

    Note – Fire hose reels are not required to be provided on the residential levels.

21. A sprinkler system with a grade 1 water supply 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:

    a. 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.

    b. Activation of the sprinkler system must operate the smoke hazard management systems of that area and activate the sound system and intercom system as appropriate.

    c. 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.

    d. Sprinkler booster connections must be provided and located to allow ready access for the fire brigade.

    e. The sprinkler system is to be provided with a grade 1 water supply as set-out in AS 2118.1-1999.

22. Portable fire extinguishers must be provided as listed in table E1.6 of the BCA and must be selected, located and distributed in accordance with sections 1, 2, 3 and 4 of AS 2444-2001. In particular, the portable fire extinguishers provided in the residential parts must be:

    a. an ABE type fire extinguisher

    b. a minimum size of 2.5kg

    c. distributed outside a sole-occupancy unit so that the travel distance from the entrance doorway of any sole-occupancy unit to the nearest fire extinguisher is not more than 10m.

3.4.2 Smoke hazard management

23. The public corridors and other internal public spaces within the residential portions of the building including plant rooms on levels 7 and 8 and the common room on level 9 must be provided with a smoke detection system in accordance with clause 4 of specification E2.2a of the BCA and AS 1670.1-2004. Note that the exemption for smoke detection in sprinkler protected buildings are not applicable.

24. Smoke detectors required to activate air pressurisation systems for the fire isolated exits must:

    a. be installed in accordance with AS/NZS 1668.1:1998, and

    b. have additional smoke detectors installed adjacent to each bank of lift landing doors set back horizontally from the door openings by a distance of not more than 3m.

25. All fire-isolated stairs including associated passages and lobbies serving any storey above an effective height of 25m must be provided with a stair pressurisation system in accordance with table E2.2a and AS/NZS 1668.1:1998.

3.4.3 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. Clause E4.7(a) which allows the omission of illuminated exit signage in class 2 buildings is not applicable as part of the alternative solution. All exit signage must be illuminated.

29. A sound system and intercom system for emergency purposes in accordance with clause E4.9 of the BCA and AS 1670.4-2004 with pre-recorded verbal evacuation message must be provided throughout the building. The system must be audible throughout the building including the residential courtyard on level 9.

4. Conclusion

The proposed fire safety measures outlined in section 3 are required to achieve compliance with the relevant performance requirements of the BCA subject to completion of the detailed fire safety engineering assessment and documentation within an alternative solution report.

Should any of the stakeholders have any comments or inclusions for the proposed fire safety strategy please respond in writing to Defire as soon as possible. If no comments are received within 7 days it is assumed that all stakeholders accept and agree with the preliminary fire safety measures.

Please contact me on 02 9211 4333 if you have any questions regarding this information.

Kind regards

Aaron Li
Accredited fire safety engineer
Defire – **Innovative fire safety**

Appendix A Drawings and information

Drawing title	Dwg no	Date	Drawn
General arrangement plan – Ground	DA02.001 B	08/07/2016	Bates Smart Architects
General arrangement plan – Level 02	DA02.002 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 03	DA02.003 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 04	DA02.004 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 05	DA02.005 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 06	DA02.006 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 07	DA02.007 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 08	DA02.008 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 09	DA02.009 B	08/07/2016	Bates Smart Architects
General arrangement plan – Level 10,12,14	DA02.010 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 11,13	DA02.011 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 15,17,19	DA02.015 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 16,18	DA02.016 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 20, 22, 24, 26	DA02.020 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 21, 23, 25	DA02.021 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 27, 29, 31, 33, 35	DA02.027 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 28, 30, 32, 34	DA02.028 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 36-37	DA02.036 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 38	DA02.038 A	01/03/2016	Bates Smart Architects
General arrangement plan – Level 39/Roof plan	DA02.039 B	08/07/2016	Bates Smart Architects