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Concept fire safety strategy

Leger Lawn – Royal Randwick Racecourse

Client: Australian Turf Club

Job number: SY190094

Date: 30 October 2019 Revision: CFSS1.0

Quality management

Version	Date	Information relating to report			
CFSS1.0	30/10/2019	Reason for issue	Report issued to COX Architecture, Mostyn Copper Group, GHD, and ADP Consulting for review and comment.		
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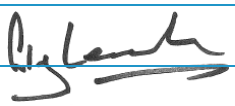
		Signature			
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Contents

1. Introduction

The Australian Turf Club has requested Warringtonfire to undertake a fire safety engineering assessment for the Leger Lawn development at Royal Randwick Racecourse – SSD 10285. The purpose of this report is to identify and document the fire safety measures that are likely to be required for the building to achieve compliance with the performance requirements of the National Construction Code Volume One - Building Code of Australia (NCC) 2019[1].

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

2. Description of the building and performance solutions

2.1 Building description

The project is a new multi-purpose assembly building located to the south-west of the existing QEII Grandstand within the Royal Randwick Racecourse precinct. The building is bound by a vehicular carriageway known as Eat Street to the north-west which separates it from the existing multi-deck carpark building by approximately 15m. The existing SWAB building is located to the south-east and is within 3m at the closest point.

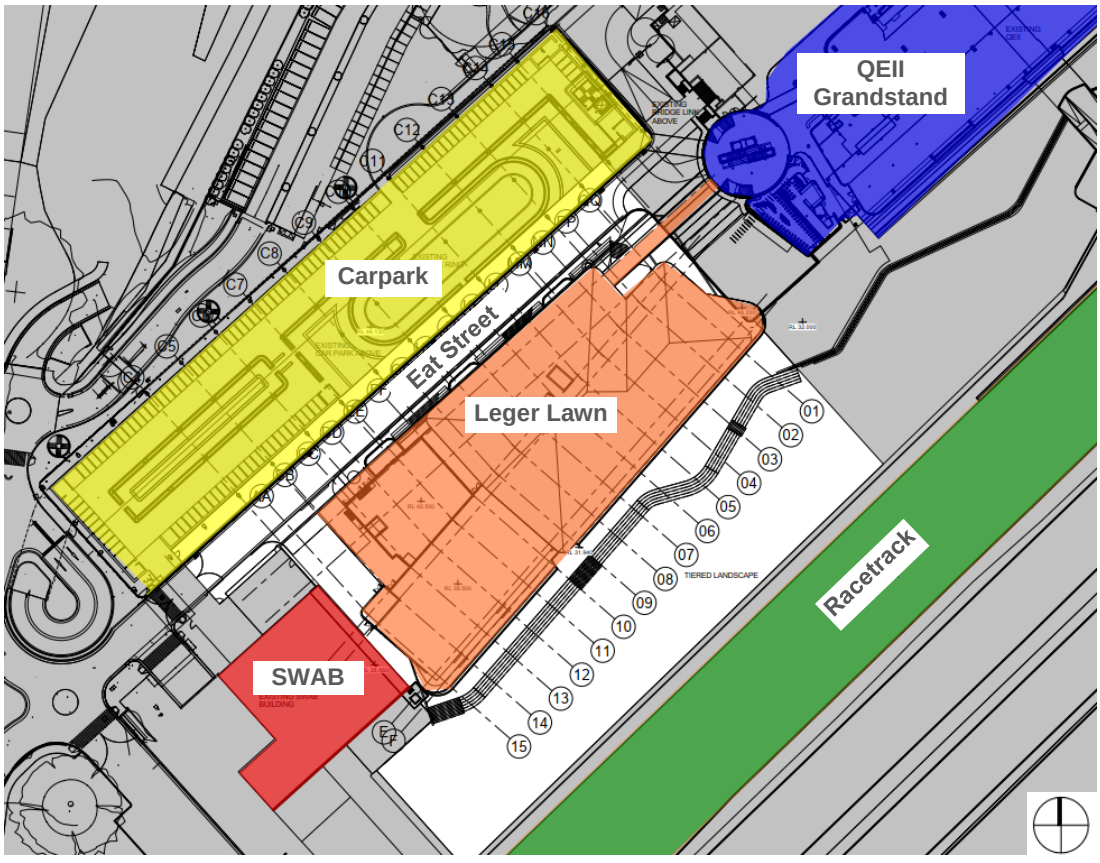

Figure 1 Site plan

[1] National Construction Code Volume One - Building Code of Australia 2019, Australian Building Codes Board, Australia.

The ground floor of the building will contain a multi-use hall (2305m^2), food and beverage facilities, amenities, entries and circulation space and back of house facilities. Level 1 will contain a multi-use hall (1305m^2), food and beverage facilities, amenities, entries and circulation space, back of house facilities and an external landscaped terrace. A bridge link connecting to the eastern drum of the QEII Grandstand will be provided at level 1. A mezzanine plant level will be located between the ground floor and level 1, and additional rooftop plant area will be provided to the west.

The multi-use halls will provide for banquet (seated) and race day (standing) modes and may also be used for other public assembly uses such as functions and examinations. The maximum population of the building is currently proposed to be 7500 between the ground floor (4750) and level 1 (2750) on race days. It is understood that the building is not intended to be used as an '*entertainment venue'* as defined by the NCC.

Table 1 shows the main characteristics of the building for determining compliance with the NCC. Table 2 shows the proposed use and classification of the building or part in accordance with part A6 of the NCC.

Characteristic	NCC provision	Description
Effective height	Schedule 3	Approximately 7.5m
Type of construction required	C1.1	Type A
Rise in storeys	C1.2	Three
Levels contained	-	Three
Notes: • The rise in storeys calculation does not include the roof plantroom. • The rise in storeys calculation includes the mezzanine plant room.		

Table 1 Main building characteristics

Part of building	Use	Classification (A6)
Ground floor	Multi use public assembly	Class 9b
Mezzanine	Plant	Class 9b
Level 1	Multi use public assembly	Class 9b
Roof	Plant	Class 9b

Table 2 Use and classification

2.2 Preventative and protective measures

The building will be provided with the major fire safety measures required by the DTS provisions of the NCC listed as follows. A comprehensive list of fire safety measures is to be provided by the certifier as part of the building approval process. Additional fire safety measures required as part of the performance solution are listed within section 4.

- Automatic fail-safe devices
- Automatic sprinkler system
- Emergency evacuation plan
- Emergency lighting
- Emergency warning and intercom system
- Exit signs
- Fire dampers
- Fire doors
- Fire hose reel system
- Fire hydrant system
- Fire resisting shafts with protected openings
- Fire seals (protecting openings in fire resisting components of the building)
- Fire-rated lightweight construction
- Portable fire extinguishers
- Smoke detection system for activation of smoke control
- Smoke exhaust system in multi-use hall areas
- Warning and operational signs

2.3 Occupant characteristics

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

Characteristic	Description
Familiarity	Occupants are expected to be primarily patrons who may not be familiar with the layout of the building and location of fire exits. Staff are also expected to be present who are familiar with the layout of the building and trained in emergency situations.
Awareness	Occupants are expected to be awake and alert to a potential emergency event such as a fire in the building. Some occupants may be focused on a performance and / or under the influence of alcohol.
Mobility	Occupants are assumed to have the same level of mobility as the general population. This may include a limited proportion of mobility impaired occupants. These occupants may require crutches, a wheelchair or similar to evacuate on their own or need assistance from other occupants.
Age	Occupants of all ages may be present within the building. Most of the occupants are between 15-65 years of age.
Language	Although occupants may have English as their second language, they are expected to understand signs and verbal instructions in English enough to not adversely impact evacuation.
Occupant load	The population of the building is proposed as follow: • Ground floor – 4750 • Level 1 – 2750

Table 3 Occupant characteristics

2.4 Performance solutions

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

The full extent of the non-compliances with the DTS provisions of the NCC will be identified within an NCC assessment. The requirements of this concept fire safety strategy will be further reviewed and developed once this assessment has been undertaken to determine whether additional fire safety measures may be required.

No	Description of performance solutions	DTS provision	Performance requirements
1.	The bridge link connecting the Leger Lawn building with the QEII grandstand will not be fire-separated from either building.	Clause C2.7	CP2
2.	The non-fire-isolated stair system serving the western rooftop plant area at grid C6-A passes by four storeys and is discontinuous at level 1.	Clause D1.3 and D1.9	DP4 and DP5
3.	The stair located at grid C11-B connects four storeys and is not currently designed as a fire-isolated exit.	Clause D1.3 and D1.9	DP4 and DP5
4.	The maximum travel distance to an exit from the external terrace on the southern side of level 1 is approximately 50m instead of 40m. The maximum travel distance between alternative exits measures via the external terrace on level1 is up to 70m instead of 60m.	Clause D1.4 and D1.5	DP4 and EP2.2
5.	The maximum travel distance to an exit from the external rooftop plant area is approximately 30m instead of 20m.	Clause D1.4	DP4 and EP2.2

No	Description of performance solutions	DTS provision	Performance requirements
6.	The aggregate exit width of level 1 is 20m which is less than the 23.5m required for the maximum population of 2750 occupants.	Clause D1.6	DP4, DP5 and EP2.2
7.	The smoke exhaust capacity and the size of smoke reservoirs is to be designed on a performance basis.	Specification E2.2b	EP2.2
8.	The location of the booster assembly is not within sight of the main building entry. Note: Final booster location to be confirmed.	Clause E1.3	EP1.3

Table 4 NCC requirements associated with the performance solutions

3. Scope and assumptions

3.1 Scope

- The scope of this report is limited to the performance solutions described in section 2.4. We have not confirmed that every aspect of the building complies with the building code and / or relevant Australian standards. It is the responsibility of other parties to ensure full compliance with the code and standards is achieved.
- The scope of works excludes assessing the level of performance and / or compliance of external walls and associated materials, unless specifically agreed in writing with Warringtonfire.
- The scope of this report is limited to the fire safety aspects of the performance requirements of the NCC. Matters such as property protection (other than protection of adjoining property), business interruption, public perception, environmental impacts and broader community issues – such as loss of a major employer and impact on tourism – have not been considered as they are outside the scope of the NCC.
- This report considers fires involving a single ignition point. Arson or destructive acts involving:
  - large amounts of accelerants which significantly change the expected burning behaviour of materials
  - multiple ignition sources
  - terrorism

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

3.2 Assumptions

- The design complies with the current DTS provisions of the NCC relating to fire safety except for the specific performance solutions described within section 2.4.
- All of the fire safety systems are assumed to be designed, installed and operate in accordance with the appropriate Australian standards, other design codes, legislation and regulations relevant to the project unless specifically stated otherwise.
- For a satisfactory level of fire safety to be achieved, regular testing and maintenance of all fire safety systems and measures, including management-in-use systems, is essential and is assumed in this report.

4. 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 NCC.

4.1 General

1. The design must comply with the current DTS provisions of the NCC relating to fire safety except specifically mentioned. This section does not provide a comprehensive list of fire safety measures required by the DTS provisions of the NCC. The fire safety measures listed within this section relate only to the performance solutions. The fire safety measures must be read in conjunction with the DTS provisions of the NCC.
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.

4.2 Fire resistance

3. The fire resistance levels (FRLs) of the building elements must be designed in accordance with the requirements of specification C1.1 of the NCC for type A construction.
4. The bridge link connecting level 1 of the Leger Lawn building to the drum of the QEII grandstand is not required to be fire separated from either building subject to the following requirements:
    a. The link must be a naturally ventilated structure.
    b. The link must be open along at least one side above a height of 1m. The open side must not be enclosed except by an open grille or the like having a free air space of not less than 75% of its area.
    c. The link must be constructed from and lined with non-combustible materials.
    d. The link must be sprinkler protected throughout.
5. The multi-use hall on level 1 must be separated from the circulation areas to the west by continuous construction which will prevent the free passage of smoke. Any doors in this separation must be self-closing but are not required to be provided with smoke seals.
6. Kitchen areas must be separated from the circulation areas to the west by smoke proof construction. The kitchen areas may open into the multi-use hall if servery counters and the like are required.
7. Storerooms and plant rooms must be separated from the remainder of the building by construction achieving an FRL of not less than 60/60/60. Door rooms are to be protected with self-closing fire doors with an FRL of -/60/30.
8. The two enclosed scissor stairs accessed directly from the multi-use hall and terrace areas must be fire separated in accordance with the requirements for a fire-isolated stair:
    a. Stair shaft FRL 120/120/120
    b. Doors into stair FRL -/60/30
    c. The roof of the stair shafts is not required to achieve an FRL provided the shaft extends to the underside of a non-combustible roof covering.

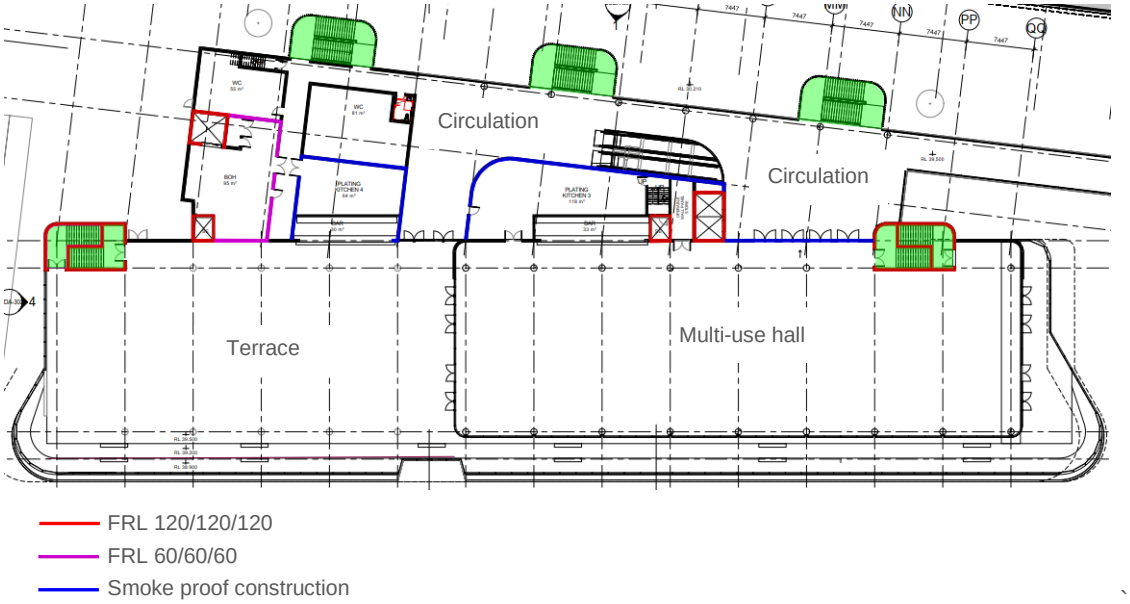

Figure 2 Level 1 plan showing fire and smoke separations

4.3 Evacuation

9. Travel distances throughout the building must comply with clauses D1.4 and D1.5 of the NCC unless otherwise noted within this report.

10. Travel distances will exceed the requirements of clause D1.4 of the NCC in the following locations:

    a. 50m to an exit from the south-east side of the hall and terrace on level 1

    b. 30m to an exit from the rooftop plant area

    c. 70m between alterative exits measured between alternative exits from the external terrace on level 1.

11. The maximum population for each level of the building is proposed to be:

    a. Ground floor: 4750

    b. Level 1: 2750

    A population management plan must be developed by the Australian Turf Club to ensure that the maximum populations identified for each level are not exceeded.

12. The aggregate unobstructed exit width from each level must be not less than:

    a. Ground floor = 40m

    b. Level 1 = 20m

13. The location of exits serving level 1 are identified in Figure 3.

    Note: The location of exits serving the ground floor are to be confirmed.

14. The width of a doorway forming part of an exit or in the path of travel to an exit must be not less than the unobstructed width of the exit minus 250mm – for example, a doorway serving a 2m wide stair can be 1750mm wide.

15. The unobstructed width of the circulation areas leading from the multi-use halls to exits must be at least as wide as the exits.

16. The discharge location of exits and the paths of travel from all exits to open space must comply with clause D1.10 of the NCC.

17. Exit doors and doorways in the path of travel to exits serving the multi-use hall areas on the ground floor and level 1 must be provided with panic bar hardware.

18. All doors which form part of a required exit and doors leading from the halls into the circulation spaces must swing in the direction of travel to the exit in accordance with clause D2.20 of the NCC.

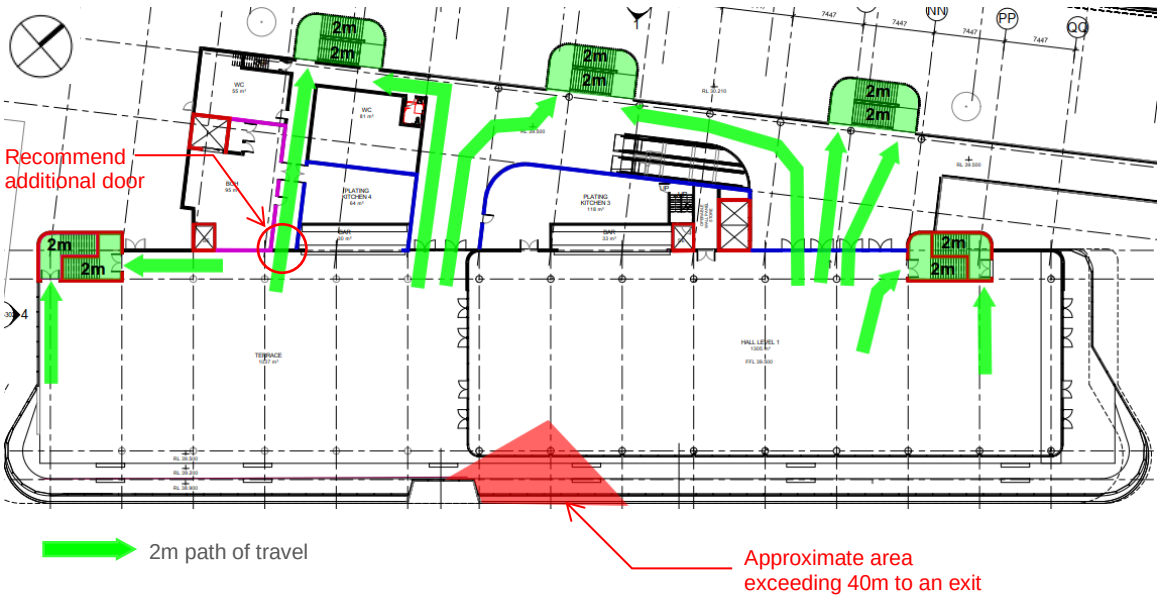

Figure 3 Location of exits and paths of travel to exits

19. The stair serving the rooftop plant area at grid C6-A is not required to be fire isolated. The stair is to discharge directly adjacent to the external scissor stairs at level 1 as shown in

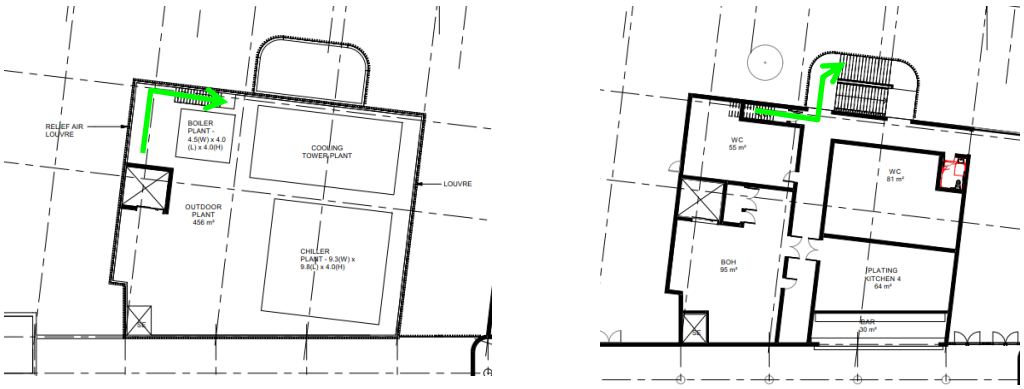

Figure 4 Exit from west rooftop plant area

20. It is recommended that the stair connecting the ground floor to the rooftop plant level at grid C10-B is designed as a fire-isolated stair in accordance with clauses D1.3 and D1.7 of the NCC. The discharge location of the stair and path of travel to open space may need to be assessed as a performance solution subject to detailed review.

4.4 Fire services

4.4.1 Firefighting equipment

21. The building must be provided with a hydrant system in accordance with clause E1.3 of the NCC and AS 2419.1-2005.

    Note: The location of the hydrant booster assembly is to be confirmed.

22. The building must be provided with a sprinkler system in accordance with specification E1.5 of the NCC and AS 2118.1-2017.

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

24. Portable fire extinguishers must be provided as listed in table E1.6 of the NCC and must be selected, located and distributed in accordance with sections 1, 2, 3 and 4 of AS 2444-2001.

4.4.2 Smoke hazard management

25. The building must be provided with a smoke detection system for activation of the smoke exhaust system in accordance with clause 6 of specification E2.2a of the NCC and AS 1670.1-2018.

26. The building must be provided with an automatic smoke exhaust system as follows:

    a. Each multi-purpose hall – ground floor and level 1 – must be provided with not less than 30m^3/s of smoke exhaust. The smoke exhaust may be designed so that only one level is operating at any time.

    b. The smoke exhaust inlets are to be located centrally at high level within the multi-purpose halls. Not less than three exhaust inlets are to be provided from the ground floor – refer to Figure 5. Not less than two exhaust points are to be provided from level 1 – refer to Figure 6.

    c. The location of exhaust inlets must account for any full height operable wall systems which could be used to divide the multi-use halls. At least one exhaust inlet is to be provided from each space separated by an operable wall.

       Note: Exhaust capacity and the number and location of exhaust inlets will be further reviewed and confirmed based on detailed smoke and evacuation modelling.

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

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

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

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

28. The smoke exhaust must be activated by smoke detectors within the multi-use halls.

29. Makeup air is to be provided for the smoke exhaust system as follows:

    a. Makeup air openings having a free area of not less than 12m^2 must be provided in the south-east external wall of the ground floor and level 1.

    b. The makeup air must be located at low level between 0m and 2m above finished floor level.

    c. The makeup air must be provided by doors or louvres in the façade which drive open automatically upon activation of the smoke detection system within the multi-use halls.

d. Operable doors or louvres for smoke control makeup air must either fail-safe open or be provided with dedicated uninterrupted power supply (UPS) backup that can fully open the doors / louvres in the event of a power failure.

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

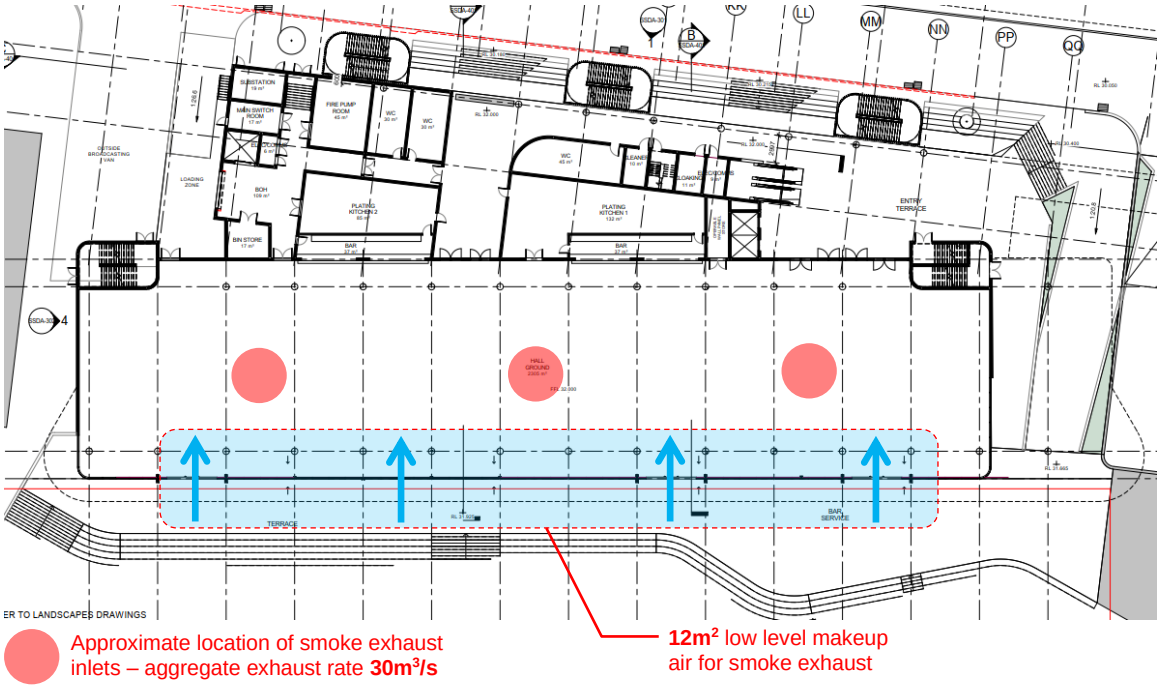

Figure 5 Ground floor – Smoke exhaust and makeup

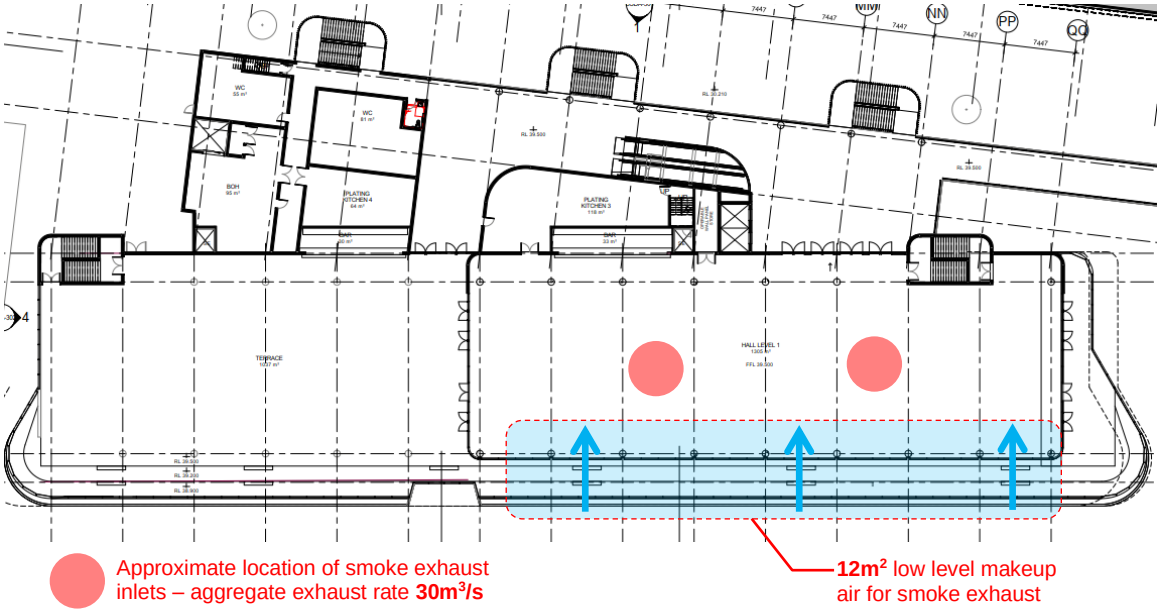

Figure 6 Level 1 – smoke exhaust and makeup air

31. The north-west external wall of the ground floor and level 1 along the circulation spaces is to be provided with openings for smoke ventilation. The size and extent of these openings will be further reviewed once the façade treatments are identified.

4.4.3 Visibility in an emergency, exit signs and warning systems

32. An emergency lighting system must be installed throughout the building in accordance with clauses E4.2 and E4.4 of the NCC and AS 2293.1-2018.

33. Exit signs and directional signs must be installed throughout the building in accordance with clauses E4.5, E4.6 and E4.8 of the NCC and AS 2293.1-2018.

34. An emergency warning and intercom system must be provided in accordance with clause E4.9 of the NCC and AS 1670.4:2018 with a pre-recorded verbal evacuation message. The system must be audible throughout the building.

4.5 Fire safety management and training

35. An emergency management plan complying with AS 3745-2010 must be developed and implemented for the building within three weeks of occupation.

36. Once the emergency management plan is developed, it is to be implemented with exercises, periodic audits, and suitable procedures to maintain safety. This should include training under simulated fire emergency conditions for all relevant personnel.

37. A population management plan is to be developed for the premises. The plan is to detail maximum populations for specific areas, how populations will be controlled, any additional requirements for 'special events', and the frequency and duration for utilisation of each specific area. The population management plan is to take into consideration the evacuation requirements included in this document and any associated procedures for evacuation must be included in the emergency management plan.

5. Safety in design

Our scope of works is to assess the level of fire safety and demonstrate the design achieves compliance with the relevant performance requirements of the NCC. A preliminary safety in design review considered whether the recommended fire safety measures in section 4 could reasonably be expected to introduce unique or unusual hazards that would not otherwise be present in the construction, installation and/or maintenance of building. The fire safety measures in section 4 are performance specifications for other consultants to incorporate into their designs. The detailed designers retain discretion over where and how systems and structures are installed and are therefore responsible for the safety in design for the detailed design. It is important to note that the outcomes of our review are limited to issues that could reasonably be foreseen by a fire safety engineer within our limited scope and involvement in the project. It is likely that other parties involved in detailed design, installation and/or maintenance will identify additional issues.

No unique or unusual hazards that would not otherwise be present in the construction, installation and/or maintenance of the building have been identified in relation to the performance solution as a result of our preliminary safety in design review.

Note: Residual risks are to be considered and addressed by appropriate persons within the design, construction and maintenance teams who have duties under the health and safety legislation.

Appendix A Drawings and information

Drawing title	Dwg no	Date	Drawn
Site plan	SSDA-101	08/10/2019	Cox Architecture Project: ATC RNSW Public Infrastructure
Ground floor plan	SSDA-201	08/10/2019	
Mezzanine floor plan	SSDA-202	08/10/2019	
Level 1 floor plan	SSDA-203	08/10/2019	
Plant level floor plan	SSDA-204	08/10/2019	
Roof plan	SSDA-205	08/10/2019	
Elevations	SSDA-301	08/10/2019	
Elevations	SSDA-302	08/10/2019	
Sections	SSDA-401	08/10/2019	