IMG HOTEL

FIRE ENGINEERING REPORT

Federal Hotel 34 Inglis Street Mudgee, 2850

Project Number: 119722
Revision: FER_1.0
Date: 10 January 2025

Design and Building Practitioners Act Regulated Design Record				
Project Address:	Federal Hotel 34 Inglis Street Mudgee, 2850			
Project Title:	Federal Hotel 34 Inglis Street Mudgee, 2850			
Consent No:		**Body Corporate Reg No:**	DEP0003067	
Drawing Title:	Fire Engineering Report	**Drawing No:**		
Rev	**Date**	**Description**	**DP Full Name**	**Reg No**
FER_1.0	10 January 2025	Fire Engineering Report	Michael Mason	DEP0000005

Jensen Hughes Pty Limited
ABN 29 077 183 192

Quality management

Rev	Issue Date	Issue Description	Prepared	Reviewed	Authorised
119722-FER_0.0	5 December 2024	Draft issued to stakeholders.	Diksha Rawat	Michael Mason	Michael Mason
119722-FER_1.0	10 January 2025	FER	Michael Mason	James Murch	Michael Mason Certifier fire safety BDC 3308 DEP0000005

Executive summary

The report documents the finding of a fire engineering assessment undertaken to determine whether the modification to the existing premise located at 34 Inglis Street Mudgee NSW 2850 complies with the relevant performance requirements of the National Construction Coe Volume One – Building Code of Australia (NCC) 2022. Jensen Hughes undertook the assessment at the request of IMG Hotels

This report is a fire engineering report (FER) prepared in accordance with the Australian Fire Engineering Guidelines (AFEG). The purpose of this FER is to document fire safety performance solutions relating to specific departures from the deemed-to-satisfy (DTS) provisions of the National Construction Code Volume One – Building Code of Australia (NCC) 2022. The report includes fire engineering analysis and identifies fire safety measures which must be implemented in the design to meet the performance requirements of the NCC.

The building will achieve compliance with the fire safety performance requirements of the NCC using a combination of performance solutions and DTS solutions. This report relates specifically to the performance solutions. Assessment and documentation of DTS solutions is outside the scope of this report.

The performance solutions and associated NCC requirements are identified in Table 1.

Table 1 NCC requirements associated with the performance solutions

No	Description of performance solution	DTS provision	Performance requirements
1.	Rationalised FRL of external walls within 18 m of the far side of the road to the north, and the hotel building on the same lot.	S5C12, Table S5C21a, Table S5C21b	C1P1 & C1P2
2.	The keg room basement is greater than 50 m² in area and served by one exit in lieu of two.	D2D3	D1P4 & E2P2
3.	The fire hydrant system in the building is to comply with AS2419.1-2021, except for the following: + It is proposed to only allow for one fire hydrant (FH) operating in lieu of two.	E1D2	E1P3
4.	It is proposed to provide portable fire extinguishers in lieu of hose reels in the class 6 parts.	E1D3	E1P2

The fire safety engineering assessment found that the performance solutions comply with the relevant performance requirements of the NCC, subject to the following:

+ The fire safety measures in section 6.0 must be incorporated into the design of the building, installed, commissioned and maintained in accordance with the Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021 and relevant Australian standards. These fire safety measures, and this report, must be listed on the fire safety schedule for the building.
+ If there are building alterations or additions, a change in use or changes to the fire safety system in the future, a reassessment will be needed to verify consistency with the assessment contained in this report.

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1.0 Introduction

1.1 THE PROJECT

The project comprises alterations and additions to an existing building at 34 Inglis Street Mudgee, 2850. Jensen Hughes has been engaged by IMG Hotel to prepare this report in relation to the project.

1.2 SCOPE AND OBJECTIVE

This report is a fire engineering report (FER) prepared in accordance with the Australian Fire Engineering Guidelines (AFEG)[1]. The purpose of this FER is to document fire safety performance solutions relating to specific departures from the deemed-to-satisfy (DTS) provisions of the National Construction Code Volume One – Building Code of Australia (NCC) 2022[2]. The report includes fire engineering analysis and identifies fire safety measures which must be implemented in the design to meet the performance requirements of the NCC.

The building will achieve compliance with the fire safety performance requirements of the NCC using a combination of performance solutions and DTS solutions. This report relates specifically to the performance solutions. Assessment and documentation of DTS solutions is outside the scope of this report.

1.3 REGULATORY SCOPE

We understand that the proposed building works will be approved through a Construction Certificate (CC) under the Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021.

[1] Australian Fire Engineering Guidelines, 2021, version 1.0, Australian Building Codes Board, Australia.
[2] National Construction Code Volume One – Building Code of Australia 2022, Australian Building Codes Board, Australia

2.0 Building characteristics

2.1 BUILDING DESCRIPTION

The building project, located at 34 Inglis Street, Mudgee NSW, involves the following proposed works:

+ Additions to the existing two-storey pub (Building A).
+ Construction of a new two-storey hotel accommodation building (Building B).
+ Construction of a new single-storey bottle shop (Building C).

Table 2[3] shows the main characteristics of the building for determining compliance with the NCC. Table 3 shows the proposed use and classification of the building in accordance with part A6 of the NCC.

This FER pertains only to Building A pub. Building B and C are understood to comply fully with all DTS provisions.

Figure 1 Site location (courtesy nearmap accessed on 03/12/2024)

[3] Steven Watson & Partners, 30 September 2024, BCA assessment report, R2.0

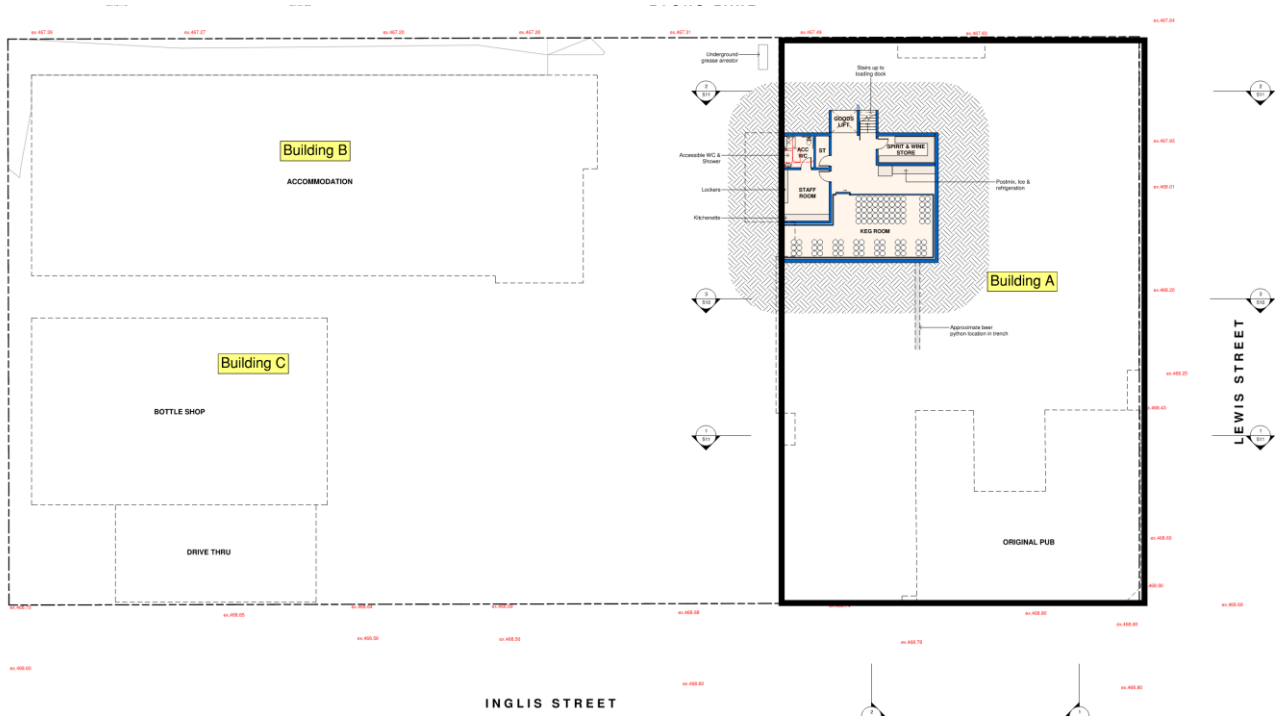


Figure 2: Site layout

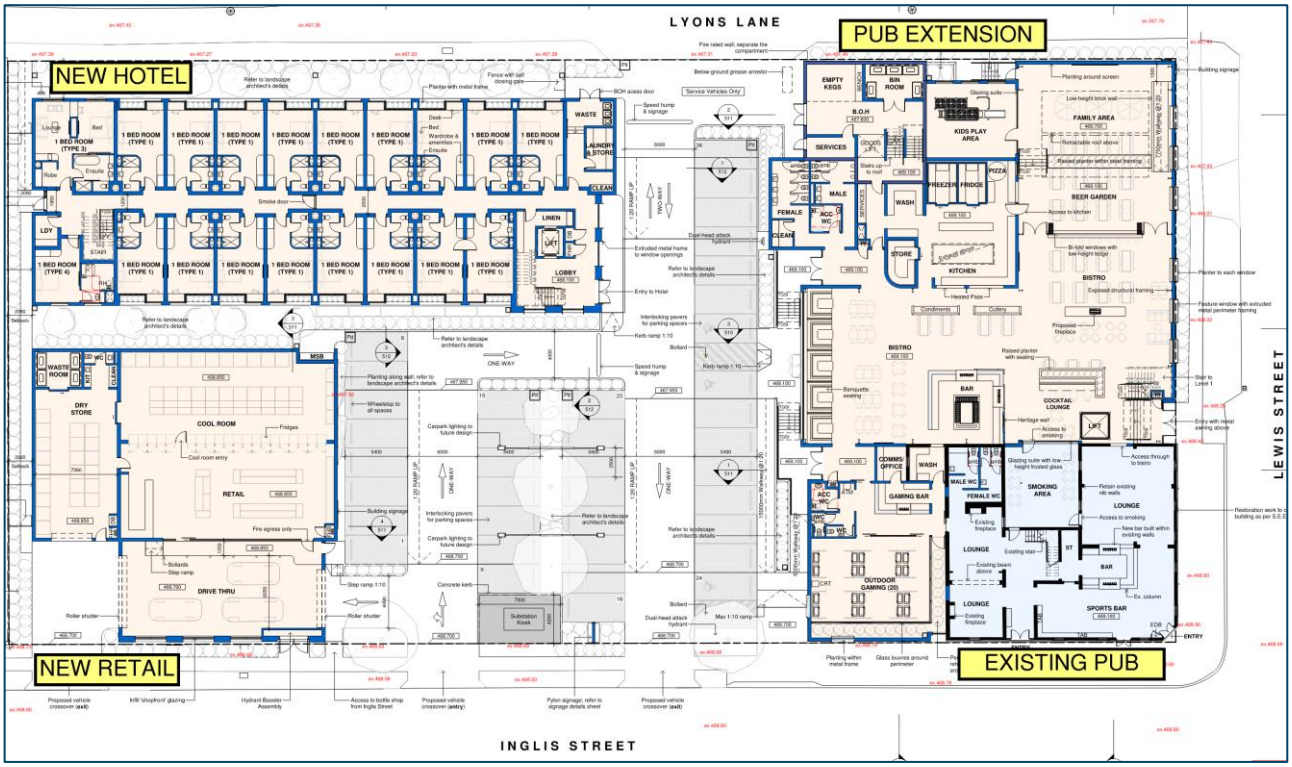


Figure 3: Site plan ground level

Table 2 Main building characteristics

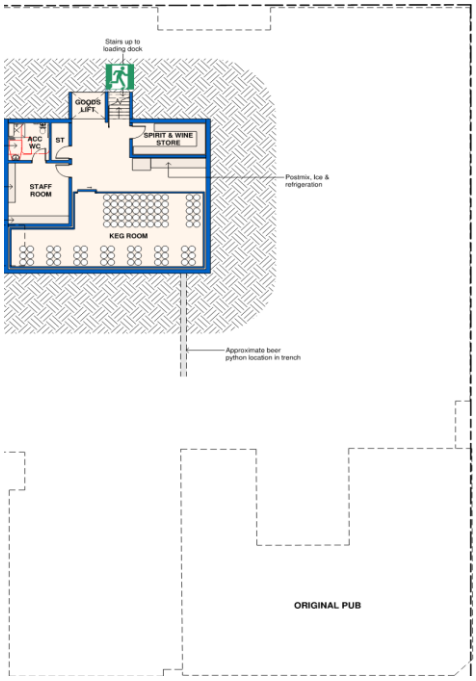
Characteristic	NCC provision	Description
Effective height	Schedule 1	Less than 12 m 3.6 m
Type of construction required	C2D2 and C3D3	Type B
Rise in storeys	C2D3	2
Storeys contained	-	3

Table 3 Use and classification

Part of building	Use	Classification (A6)
Basement	Pub storage	Class 6
Ground floor	Pub	Class 6
Level 1	Staff accommodation	Class 3

2.2 GENERAL ARRANGEMENT AND EXITS

The discharge location of exits at street level are show in refer



Exit locations

Figure 4 Typical floor layout and exit locations on the lower ground building A.

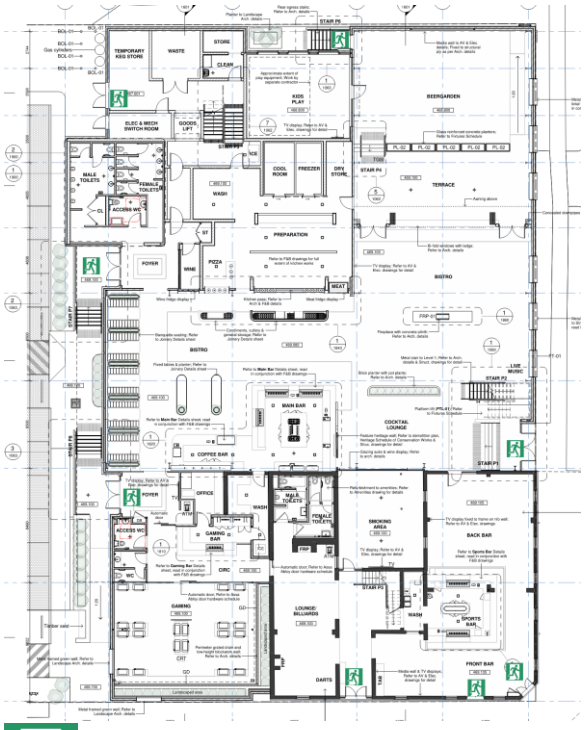


Figure 5: Floor layout and exit locations on the ground level building A

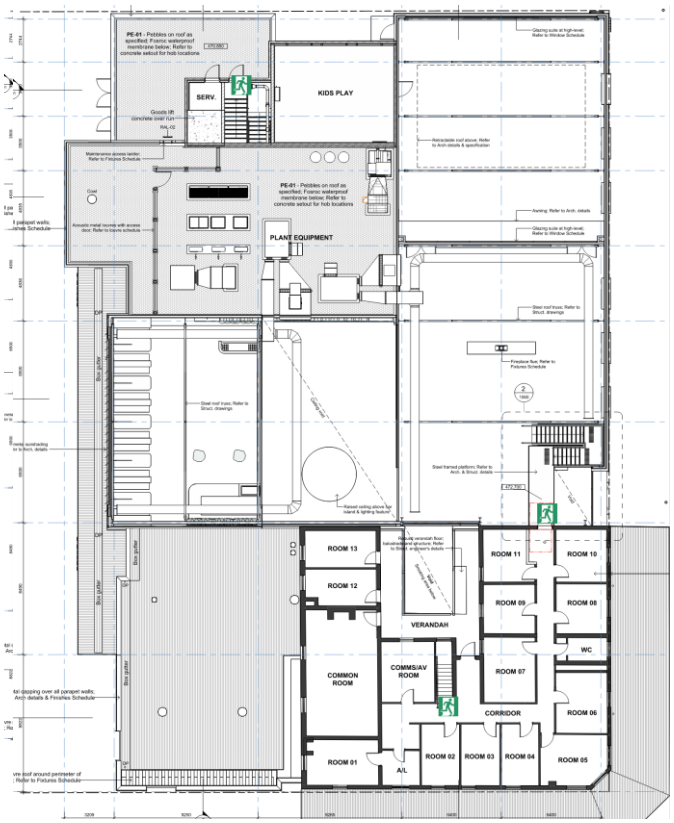


Figure 6: Floor layout and exit locations on the Level 1 building A

2.3 PREVENTIVE AND PROTECTIVE MEASURES

The fire safety measures provided in the building are listed in the fire safety statement. Additional fire safety measures required as part of the performance solution are listed in section 6.0.

- Automatic sprinkler system
- Building occupant warning system
- Emergency evacuation plan
- Emergency lighting
- Exit signs
- Fire doors
- Fire hydrant system
- Portable fire extinguishers
- Smoke detection system
- Smoke detectors
- Smoke baffles
- Warning and operational signs

2.4 EXISTING PERFORMANCE SOLUTION APPLICABLE TO THE BUILDING

No previous performance solutions have been identified for the existing building. However, a fire engineering upgrade strategy report was produced relating to existing elements proposed to remain as-is. Refer to Jensen Hughes report reference 119722_Pub_FEUSR_1.1 dated 10 January 2025.

The new performance solutions presented in this report have no adverse impact on the FEUSR and vice versa.

3.0 Occupant characteristics

3.1 PHYSICAL AND MENTAL CHARACTERISTICS

The characteristics of the occupants expected to be in the building are listed in Table 4.

Table 4 Occupant characteristics

Characteristic	Use	Description
Familiarity	Residential	Residents are likely to be familiar with the building and exits. Visitors may have limited familiarity but will likely be accompanied by residents.
	Hotel	Residents / guests may have varying levels of familiarity. It is assumed that occupants are not familiar with the building.
Awareness	Retail	The public may be unfamiliar with the building and exits, but likely remember the entry they used. Staff are likely to be familiar with the building and exits.
	Residential / Hotel	Occupants may have varying levels of awareness. Occupants may be sleeping or unresponsive at the time of a fire.
	Retail	Occupants are expected to be awake and alert to a potential emergency event such as a fire in the building.
Mobility	Bar	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 or drugs. Staff will be present who are awake and aware of their surroundings.
Number of occupants	Residential / Hotel/Retail/Bar	Occupants are expected to have general mobility and be capable of evacuating independently. A limited number may require mobility aids or assistance due to reduced mobility. Similarly, a portion of occupants may have hearing or sight impairments. The proportion of occupants with disabilities is comparable to a DTS design. Therefore, this factor does not differentiate between performance solutions and DTS approach.

4.0 Performance-Based Design Brief

Clause A2G2(4) of the NCC requires a performance-based design brief (PBDB) to be undertaken for all performance solutions. This section provides a summary of the PBDB process undertaken for the project.

4.1 STAKEHOLDERS

The relevant stakeholders identified for the project are included in Table 5.

Table 5 Project stakeholders

Name	Role	Organisation
Andrew Turnbull	Client	IMG Hotel
Matt Milledge	Project Manager	Qualis Consulting
Tom Bergstrom, Elliot Oxley	Architect	Bergstrom
Andrew Connor	Town planner	Canberra Airport
Greg Evans	Certifier	360 Certification
David Cartwright	BCA consultant	Steve Watson & Partners
Brett Petersen	Fire protection designer	MGP Building and Infrastructure Services
Michael Mason	Fire engineer	Jensen Hughes
TBC	Builder	TBC

4.2 PBDB PROCESS

A PBDB was prepared using the Fire and Rescue NSW (FRNSW). This FER incorporates feedback received from stakeholders on the PBDB. Where stakeholders other than FRNSW have not provided feedback, it is assumed that this constitutes no objection to the PBDB content.

FRNSW responded to the PBDB application by indicating they would not provide comments – see Appendix B .

5.0 Limitations and Assumptions

5.1 ASSUMPTIONS

1. The existing building complied with the applicable building standard at the time of construction or was deemed acceptable for occupation by the authority having jurisdiction. All new works comply with the DTS provisions of NCC 2022 relating to fire safety, except for the specific performance solutions described in this report.
2. The building complies with the relevant requirements of previous fire engineering report(s) identified in section 2.4 except where superseded by this report.
3. All the fire safety systems are to be designed, installed, operated and maintained in accordance with the appropriate Australian standards, other design codes, legislation and regulations relevant to the project unless specifically stated otherwise.
4. This report considers fires involving a single ignition point. Our assessment does not cover arson or destructive acts involving:
    a. large amounts of accelerants which significantly change the expected burning behaviour of materials
    b. multiple ignition sources
    c. terrorism.
5. Occupants will become aware of the fire through fire cues, respond to the cue, cope with the cue and attempt to avoid the fire, as intended by the NCC for safe evacuation.
6. Occupants do not engage in major firefighting activities. However, occupants may engage in first aid firefighting. Any positive outcome from this will not be included in the analysis.

5.2 LIMITATIONS

1. The scope of this report is limited to the fire safety performance solutions described in this report. We have not confirmed that every aspect of the building complies with the NCC and/or relevant Australian standards. It is the responsibility of other parties to ensure full compliance with the code and standards is achieved.
2. This report does not include assessment of the performance nor compliance for:
    a. The structural provisions of Part B of the NCC
    b. The design and/or operating capabilities of any proposed electrical, mechanical or hydraulic fire protection services (other than any specifically referred to within this FER)
    c. Business protection, business continuity, public perception, tourism
    d. Energy efficiency
    e. Damp and weatherproofing
    f. Insurer’s requirements
    g. Property protection, other than adjacent properties.
3. This report does not include assessment of special hazards or dangerous goods – including substances or materials that have explosive, flammable, toxic, infectious, or corrosive properties – unless specifically identified.

4. The scope of our work is limited to considering evacuation and fire safety issues for people with disabilities to the same degree as the DTS provisions of the NCC. The evacuation of people with disabilities under the provisions of the Disability Discrimination Act 1992 is specifically excluded.
5. The information in this report specifically relates to the building and must not be used for any other purpose.
6. The figures included in this report are provided for illustrative purposes only and may not reflect the latest design drawings. They should be read together with the latest drawings and other documentation prepared by the project team.
7. This report has been prepared based on information provided by others. Jensen Hughes has not verified the accuracy and/or completeness of this information and will not be responsible for any errors or omissions that may be incorporated into this report as a result.
8. This report identifies safety measures that are relied on for the specific performance solutions to comply with the performance requirements of the NCC. Design and specification of these fire safety measures, or any other building elements, remain the full responsibility of others and are beyond the scope of this report.
9. The documentation that forms the basis for this report is listed in Appendix A

6.0 Fire safety measures

6.1 GENERAL

This section describes the fire safety measures relating to the performance solutions assessed in this report. These measures must be designed, implemented, and maintained for the building to satisfy the performance requirements of the NCC.

The building is proposed to achieve compliance with the fire safety performance requirements of the NCC using a combination of performance solutions and DTS solutions. This section does not provide a comprehensive list of all fire safety measures required to meet the DTS provisions of the NCC or relevant Australian standards. The responsibility for confirming compliance with the prescriptive DTS provisions of the NCC remains with the Certifying Authority.

The fire safety measures in this section must be incorporated into the design of the building, installed, commissioned, certified, and maintained in accordance with the relevant Australian standards and the Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021. These fire safety measures, and this report, must be listed on the fire safety schedule for the building.

We recommend that all fire safety measures are periodically inspected, tested and maintained in accordance with AS 1851:2012.

6.2 FIRE RESISTANCE

1. Existing class 3 bounding construction walls and floor/ceiling system permitted to remain as-is, as described by the fire engineering strategy report applicable to existing building parts reference 119722_FEUSR_1.1 dated 10 January 2025
2. New class 3 bounding construction walls shall be constructed in accordance with deemed to satisfy provisions.
3. Interfaces between any new fire rated wall parts and existing walls, floors and ceilings shall be fire sealed using system(s) generally used for control joints and the like. Any mastic type products used shall be listed for use with the building element it may be applied to eg brick or plasterboard etc.
4. Any new ceiling installed in the pub or accommodation shall be DTS in accordance with the various options of BCA Spec 5 for Type B construction.
5. Provide smoke separation between the existing pub lounge part and new accessway to the north, by the following means, as shown in Figure 7:
    a. Smoke baffle at the lounge opening. Depth of baffle to be as deep as reasonable possible without causing head clearance issue – nominally 2 m AFFL i.e. similar to a door frame height.
6. Smoke separation described above shall constitute as a minimum:
    a. Gypsum wall linings.
    b. Toughened glass.
    c. Solid core doors with smoke seals and self-closers.
    d. Other non-combustible construction.

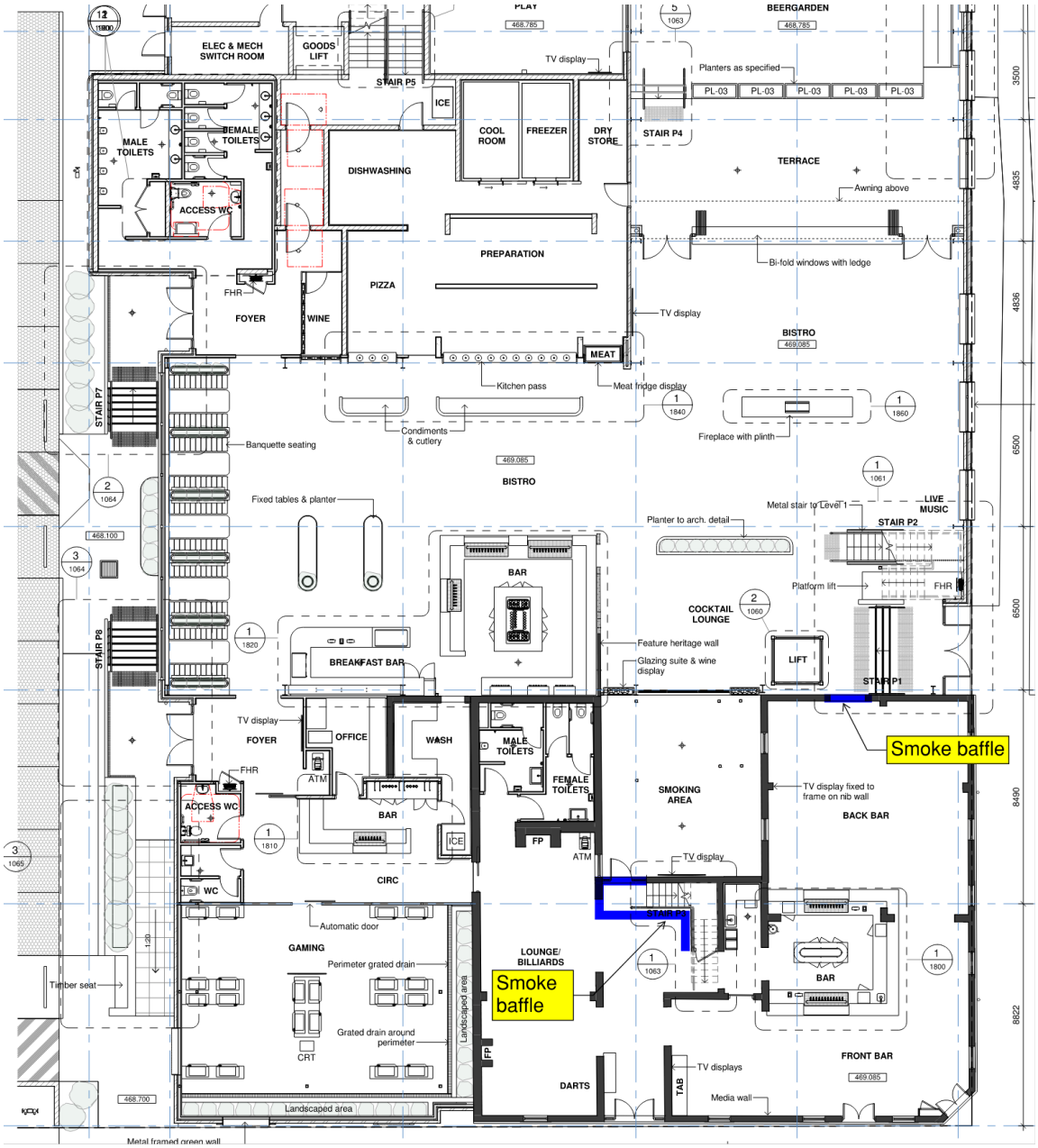


Figure 7: Smoke baffle location on ground level pub

6.3 ACCESS AND EGRESS

7. A single exit may be provided from the basement level keg room area.

8. All doorways which form part of a required exit within the building must swing in the direction of egress in accordance with clause D3D25 of the NCC with the exception of the existing exit door serving as a required exit for the heritage pub which is permitted to remain as-is.

6.4 SMOKE DETECTION AND OCCUPANT WARNING SYSTEM

9. Smoke detection and occupant warning system in accordance with AS1670.1-2018 shall be provided throughout the pub, including pub, accommodation and back of house areas.

10. Smoke detection in the accommodation areas shall be in accordance with BCA S20C4 – i.e. part of the building's AS1670.1 system and not separate AS3786 smoke alarms.
11. Alarm verification facilities may be provided in accordance with the DTS provisions of AS1670.1-2018.

6.5 FIRE HYDRANTS

12. The building is to be provided with coverage from the site-wide fire hydrant system, with booster assembly located in front of Building C (retail building) facing Inglis Street. Hydrant coverage to the pub is achieved from external hydrants on site.
13. The fire hydrant (FH) system shall comply with AS2419.1-2021, with the following modifications / amendments:
    a. Water supply designed for the operation of only one FH to operate simultaneously with the sprinkler system. The site wide hydrant system is designed to flow a single hydrant, i.e., achieve 5 L/s boosted by the onsite bump and 10 L/s when boosted by fire brigade appliance.
14. Hydrant and sprinkler block plans are to be provided at both entrances of the building, and must indicate the following:
    a. Booster inlet location, and path of travel to reach. (sign to be modified depending on location).
    b. Street feed hydrant location.
    c. General layout of the building showing key entry points.

6.6 AUTOMATIC FIRE SPRINKLER SYSTEM

15. An automatic sprinkler system is to be provided to serve the existing and new parts of the pub building.
16. The sprinkler system shall be generally in accordance with AS 2118.1-2017 and the following clarifications/modifications:
    a. Ordinary Hazard 1 in the pub and associated areas (per AS 2118.1-2017 A3.1(d)) and light hazard residential in the accommodation parts on level 1.
    b. All sprinkler heads, including ordinary hazard heads, must have an RTI no greater than 50 – i.e. fast response.
    c. The sprinkler system shall be provided with a full capacity storage tank. No direct connection of the sprinkler system to town main is required, other than facility to fill the full capacity tank in accordance with the provision of AS 2118.1-2017.
    d. The sprinkler system booster pump shall be a diesel pumpset.
    e. The sprinkler system tank and pump are located in Building C (retail building) on site.
    f. The sprinkler booster assembly is located at the front of Building C (retail building), co-located with the site-wide hydrant system booster assembly.
    g. Large bore suction is not required to be provided to the sprinkler tank and booster assembly.
17. The sprinkler system shall be independent of the site hydrant system.
18. The sprinkler system shall be listed as a 'critical' measure on the AFSS. This requires system to be maintained every 6 months.

6.7 PORTABLE FIRE EXTINGUISHER

19. Fire extinguishers are to be provided within the pub area to AS2444-2001 in lieu of fire hose reels. Extinguishers are to be of Type ABE and have a minimum capacity of 4.5 kg.

6.8 SUMMARY OF KEY FIRE SAFETY SYSTEMS

The key fire safety measures relating to the performance solutions are summarised in Table 6. This identifies the standard of performance for design, installation, certification of the identified measures.

Table 6 Fire safety measures and standard of performance associated with performance solutions

Fire safety measure	Standard of performance
Fire resisting construction	Jensen Hughes FER reference 119722-FER_1.0 dated 10 January 2025 Jensen Hughes FEUSR reference 119722_Pub_FEUSR_1.1 dated 10 January 2025
Automatic fire detection and alarm system	NCC E2D3, NSW specification 20 AS 1670.1:2018 Jensen Hughes FER reference 119722-FER_1.0 dated 10 January 2025 Jensen Hughes FEUSR reference 119722_Pub_FEUSR_1.1 dated 10 January 2025
Automatic sprinkler system	NCC E1D4, specification 17 AS 2118.1:2017 and AS 2118.6:2012 Jensen Hughes FER reference 119722-FER_1.0 dated 10 January 2025 Jensen Hughes FEUSR reference 119722_Pub_FEUSR_1.1 dated 10 January 2025
Building occupant warning system	NCC clause S20C7 of specification 20 AS 1670.1:2018
Emergency evacuation plan	AS 3745:2010
Emergency lighting	NCC E4D2, E4D4 AS/NZS 2293.1:2018
Exit signs	NCC E4D5, E4D6, E4D7 (class 2 and 3), E4D8 AS/NZS 2293.1:2018

Fire safety measure	Standard of performance
Fire hydrant system	NCC E1D2 AS 2419.1:2021 Jensen Hughes FER reference 119722-FER_1.0 dated 10 January 2025
Portable fire extinguishers	Jensen Hughes FER reference 119722-FER_1.0 dated 10 January 2025
Smoke Seals	Jensen Hughes FER reference 119722-FER_1.0 dated 10 January 2025 Jensen Hughes FEUSR reference 119722_Pub_FEUSR_1.1 dated 10 January 2025
Solid core doors	NCC C4D12 Jensen Hughes FEUSR reference 119722_Pub_FEUSR_1.1 dated 10 January 2025

7.0 Safety in design

Our scope of work is to assess the compliance of the specific performance solutions with the relevant performance requirements of the NCC. The fire safety measures in section 6.0 are partial performance specifications for other consultants to incorporate into their detailed designs. The other 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.

With regards to a safety in design specific to elements nominated by this FER, we have considered whether the recommended fire safety measures in section 6.0 could reasonably be expected to introduce unique or unusual hazards that would not otherwise be present in the construction, installation and/or maintenance of the building. This preliminary safety in design consideration has not identified any unique or unusual hazards for the performance solution that would not otherwise be present in the construction, installation.

System and building designers remain responsible for the identification and mitigation of any risks associated with the construction, installation, maintenance and decommissioning of systems described within this report. Designers are encouraged to contact Jensen Hughes if their safety in design review identifies issues for which modification to the FER may be beneficial.

8.0 Performance solution 1 – Rationalising FRL for external walls

8.1 INTRODUCTION

The building is considered a Type B construction building, however new load-bearing wall elements less than 18 m from a fire source feature are proposed to be non-fire rated. The affected wall parts are shown in the below figure.

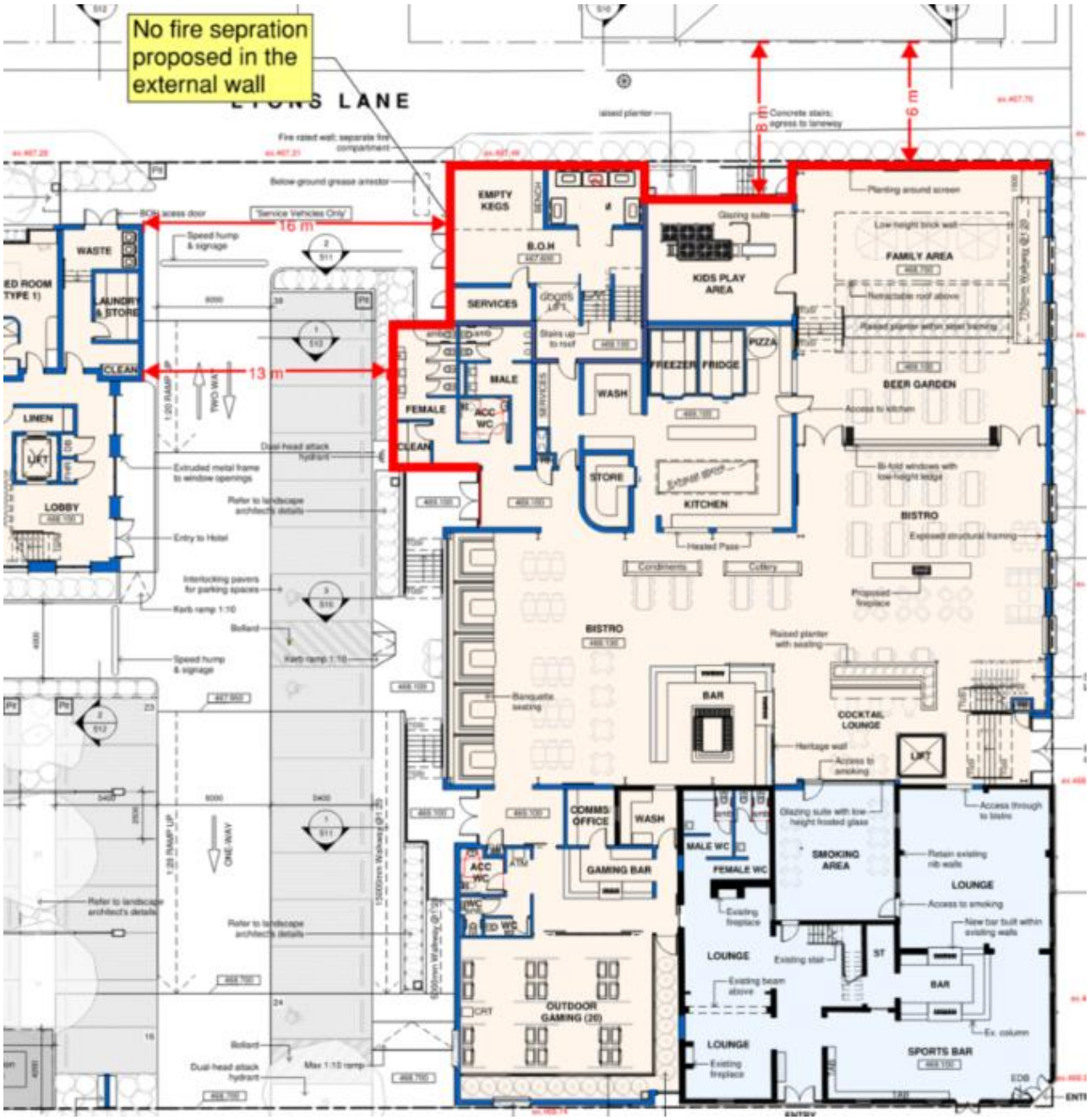


Figure 8: Subject external wall parts

Table 7: Performance solution overview

DTS departure and performance solution	
Description	Parts of the north and west external walls are more than 3 m but less than 18 m from a fire source feature: + North wall is 6 m from opposite boundary + West wall is 13 m from another building on the same allotment. DTS Table S5C21(a) requires FRL of 180/90/60 for these load-bearing wall parts however no FRL is proposed to be provided.
NCC DTS clause	Clause S5C12, Table S5C21a
Performance requirements	C1P1 and C1P2
Methodology	
NCC assessment methodology	A2G2(1)(b) and A2G2(2)(d) – Comparison with the Deemed-to-Satisfy Provisions.
Type of assessment	Qualitative and Quantitative
Fire safety sub-systems addressed	Sub-system C – Fire spread, impact and control

8.2 ACCEPTANCE CRITERIA

The solution will be considered acceptable if it is demonstrated:

+ Resistance to fire spread to and from the pub building is at least equivalent to DTS provisions.
+ Pub building structural performance in a fire is at least equivalent to DTS provisions.

8.3 FIRE SCENARIOS

The following scenarios will be assessed:

1. Fire spread inward from a fire source feature (ie the other building on the allotment or the adjacent lot).
2. Fire spread outward from the pub building:
    a. Credible scenario sprinkler controlled fire.
    b. Sensitivity scenario sprinkler failure fire.
3. Fire within the pub building causing potential structural failure:
    a. Credible scenario sprinkler controlled fire.
    b. Sensitivity scenario sprinkler failure fire.

8.4 FIRE ENGINEERING ASSESSMENT

8.4.1 Overview

The assessment will consider:

+ Resistance to fire spread to and from Building 3 comparing quantitative radiant heat calculations
+ Building 3 structural performance in a fire using qualitative comparison.

8.4.2 Establishment of DTS reference design

The assessment will consider a hypothetical DTS reference design building of identical size, position, use and contents. The differences between DTS reference design and performance solution design are shown in the below Table 8 and indicative schematic section Figure 9.

The key feature of the DTS reference design is that the load bearing columns have been moved inward from the external walls, see Figure 9, and the external walls are constructed as metal clad curtain walls. Through application of BCA DTS clause S5C6(1) and S5C21(1)(e) the internal steel columns do not require any FRL. Therefore, no loadbearing columns require any FRL for DTS compliance in this reference design building. Then through application of BCA Table S5C21b the external walls, being more than 3 m from a fire source feature, require no FRL. Further, openings within the external walls do not require protection due to being >6 m from a fire source feature and the external wall they are installed in does not require an FRL.

Table 8: DTS reference design vs performance solution design

Building element	DTS reference design	Performance solution design
Load bearing columns	Non fire rated steel frame All columns are internal.	Non fire rated steel frame Columns are internal and incorporated in the external walls.
External walls greater than 18 m from a fire source feature	Brick veneer with internal columns separate from the wall system. Ie a non-loadbearing external wall.	Brick veneer with columns incorporated in the wall.
External walls less than 18 m from a fire source feature	Brick veneer with no FRL provided.	Brick veneer with no FRL provided.
Openings in external walls	No protection provided.	No protection provided.
Automatic sprinkler system	None	AS2118.1

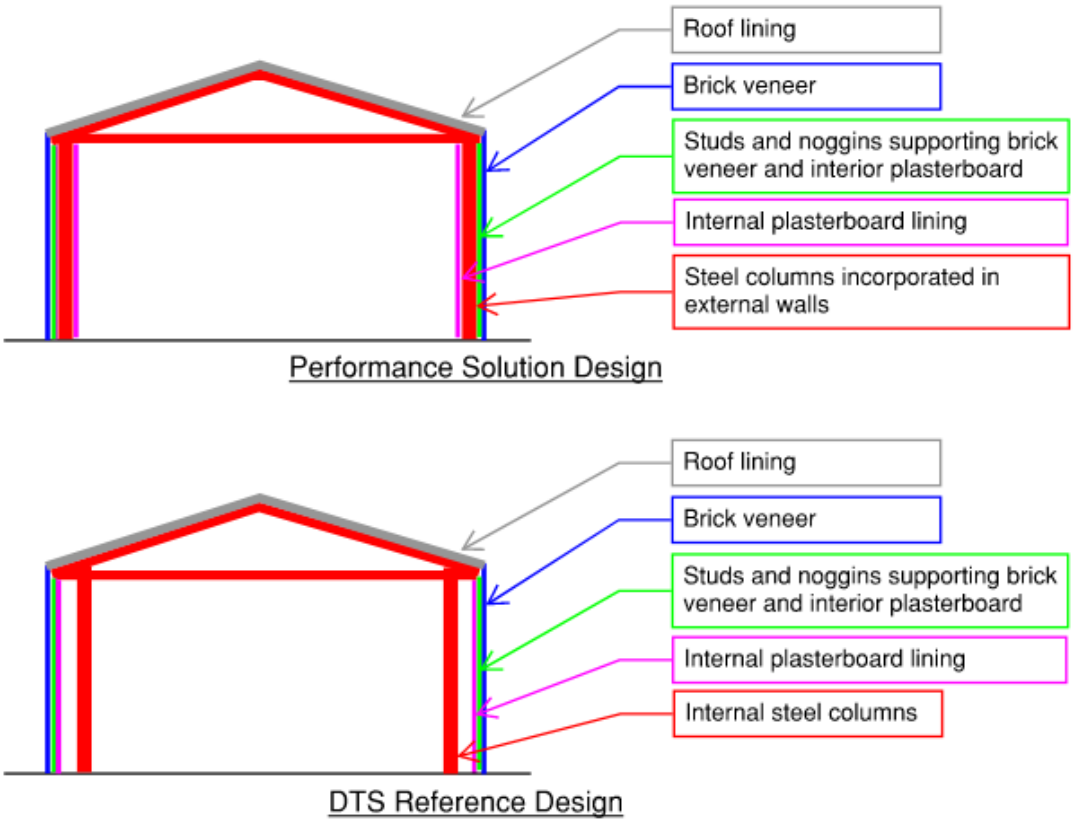


Figure 9: DTS reference vs performance solution figure showing internal vs columns incorporated in external walls

8.4.3 Inward fire spread

Inward fire spread from the boundary to the pub building could potentially occur via radiant heat from the fire source feature causing heat flux at the pub building external wall or openings therein.

For both DTS and performance solution designs the external wall is non-fire rated and openings are unprotected therefore resistance to inward fire spread is the same for both cases.

The performance solution therefore receives equivalent radiant heat as the DTS reference design from a fire source feature. Therefore, the acceptance criteria is fulfilled regarding resistance to inward spread of fire.

8.4.4 Outward fire spread

8.4.4.1 Credible scenario

In the event of a fire in the pub building fire may spread to the north boundary or building 1 to the west via radiant heat emitted through openings in external walls or collapsed portions of non-fire rated external walls. The performance solution is provided with a sprinkler system. The successful operation of the sprinkler system is expected to have the following impact on compartment temperatures during a fire[4]:

[4] England JP, Young SA, Hui MC and Kurban N, 2000, Guide for the design of fire resistant barriers and structures, Warrington Fire Research Australia and Building Control Commission, Melbourne VIC.

- The average temperatures outside the immediate area of operation of the sprinkler system will be below 100 °C.
- The temperature in the localised area above the fire will be somewhat higher than the mean compartment temperature but is still unlikely to exceed 200 °C.

The external walls would therefore be expected to remain intact during a fire, and heat emitted from openings in the external walls would be at a radiation temperature of 100 – 200 °C.

By contrast, the DTS design is not provided with sprinklers. In the event of a fire the outward radiating temperature of unprotected openings we be expected to be 830 °C as described by DFES guideline GL15[5]; or in the case of external walls collapsing the resultant well-ventilated fire would create outward radiant head temperature of 630 °C. In either case the temperature is significantly higher than the performance solution.

Therefore, the performance solution is likely to cause fire spread due to radiant heat than the DTS solution, ie the acceptance criteria is fulfilled.

8.4.4.2 Sensitivity scenario

With regards to reliability and redundancy, in the unlikely event of a sprinkler failure scenario the performance solution, having equivalent construction to the DTS solution, would be expected to behave similarly to the DTS solution, ie will provide equivalent resistance to spread of fire as a DST design. Therefore, the acceptance criteria is also fulfilled in the case of a sprinkler failure scenario.

8.4.5 Structural performance during fire

8.4.5.1 Credible scenario

As is evident in Table 8 the DTS reference design provides no fire resistance to any load bearing columns. Likewise, the performance solution building does not provide fire resistance to the load bearing elements. Also, neither the performance solution or DTS reference design have fire rated external walls.

The performance solution is provided with an automatic fire sprinkler system. As discussed in the preceding section the sprinkler system is anticipated to maintain temperatures less than 200 °C. The non fire rated but non-combustible external walls are constructed of brick and steel and would not be expected to fail when exposed to 100 – 200 °C temperature.

By contrast, the DTS design is not provided with sprinklers. As described in the preceding section the compartment temperature would be expected to reach 830 °C and even more if a standard fire time-temperature curve is followed the temperature may exceed 1,000 °C. The DTS reference design would be expected to suffer structural failure during a fire, whereas the Performance solution design is expected to remain intact.

The Pub building structural performance in a fire is therefore exceeds DTS provisions, ie the acceptance criteria is fulfilled.

[5] GL-15 Fire Safety Engineered Performance Solutions, WA Department Fire & Emergency Services, July 2021.

8.4.5.2 Sensitivity scenario

In the unlikely event of a sprinkler failure leading to uncontrolled fire - both DTS and performance solution designs would be subject to structural failure once the steel exceeds its limiting temperature. The performance solution therefore has the same structural resistance to fire as the DTS reference design, therefore for the sensitivity case the acceptance criteria is fulfilled.

8.5 CONCLUSIONS

Based on the fire engineering assessment above, it is considered by Jensen Hughes that the applicable Performance Requirements are satisfied: C1P1 and C1P2

9.0 Performance solution 2– Single stair serving the lower ground

9.1 INTRODUCTION

Clause D2D3(3) of the NCC states that 'in addition to any horizontal exit, not less than two exits must be provided from any storey if egress from that storey involves a vertical rise within the building of more than 1.5 m, unless –

i. the floor area of the storey is not greater than 50 m^2; and

ii. the distance of travel from any point on the floor to a single exit is not more than 20 m.'

The keg room located at the lower ground room has a floor area of approximately 150 m^2. The proposed design does not meet the requirements of clause D2D3 of the NCC as it is only served by a single exit.

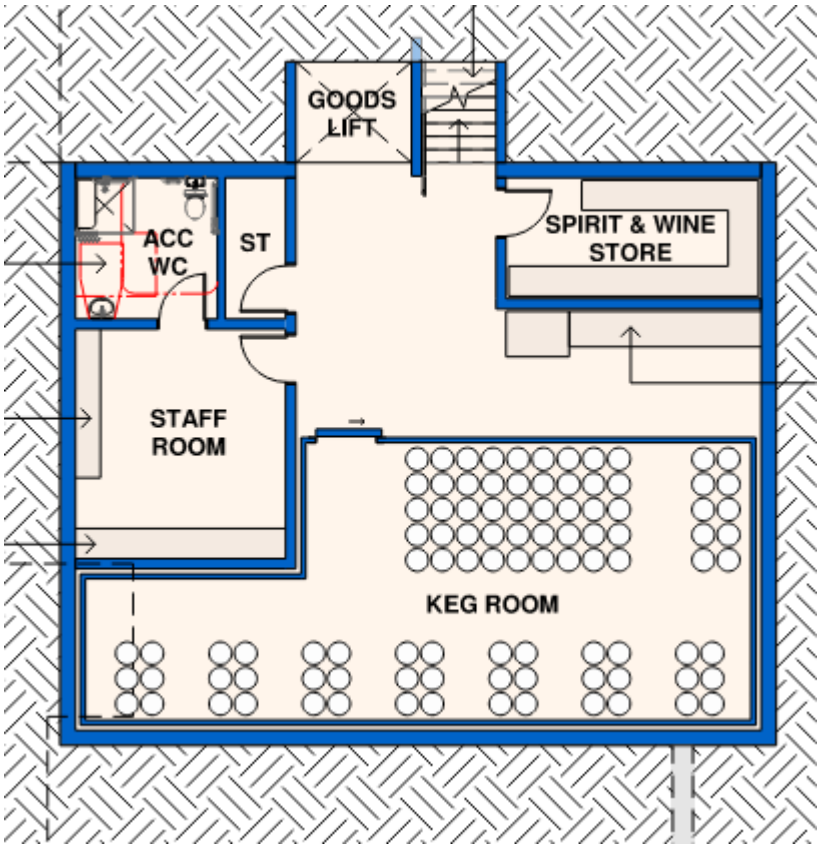


Figure 10: Keg room in the basement level.

Table 9 Performance solution overview

DTS departure and performance solution	
Description	The basement has a floor area of approximately 150 m^2 m and is only served by a single exit.
NCC DTS clause	Clause D2D3
Performance requirements	D1P4
Methodology	
NCC assessment methodology	Clause A2G2(1)(a): Complying with the performance requirements Clause A2G2(2)(b)(ii): Other verification methods
Type of assessment	Qualitative, comparative
Fire safety sub-systems addressed	Sub-system B – Smoke development, spread and control Sub-system C – Fire spread, impact and control Sub-system E – Occupant evacuation and control Sub-system F – Fire services intervention

9.2 ACCEPTANCE CRITERIA

The acceptance criteria for this assessment is that the design facilitates safe occupant evacuation and fire brigade intervention the following to an equivalent or greater extent than a DTS building considering:

+ size and use of the keg room,
+ the likely population,
+ the fire safety systems provided.

9.3 HAZARDS AND PREVENTIVE MEASURES

9.3.1 Hazard identification

Table 10 identifies potential fire hazards associated with the departures from the DTS provisions of the NCC.

Table 10 Hazards and preventive / protective measures related to the assessment

Hazards	Preventive and protective measures
Single exit from the basement adversely impacting occupant evacuation and fire brigade intervention.	+ Illuminated exit signs and wayfinding signage + Sprinkler protection + Smoke detection and building occupant warning system

9.4 FIRE SCENARIOS

9.4.1 Identification of fire scenarios

The following relevant fire scenarios have been identified for analysis:

+ A fire starts within the basement or elsewhere in the building.

9.5 ANALYSIS

9.5.1 Establishment of DTS comparison

The DTS reference design has been developed in accordance with AFEG and BCA verification method handbook. The proposed and DTS reference designs are comparable except for the differences identified in the below table.

Table 11: DTS vs Proposed design

Building element/safety feature	DTS design	Subject building	Comparison to DTS
Number of exits	2	1	Not DTS (subject of this assessment)
Automatic sprinkler	None	AS2118.1	Exceeds DTS
Automatic Smoke detection	None	AS 1670.1	Exceeds DTS
Occupant warning system (OWS)	None	AS 1670.1	Exceeds DTS

9.5.2 Occupant characteristics and wayfinding

In Class 6 buildings, public occupants may not be familiar with the layout or exits but are likely to remember the entry point they used. Staff are generally familiar with the building and its exits. In the keg room scenario, access is restricted to staff, who are expected to be familiar with its layout. Additionally, due to the small floor area of the storey and the simple layout, staff are anticipated to locate the exit quickly in an emergency.

9.5.3 Number of occupants in the keg room

The maximum populations for a range of uses can be calculated in accordance with table D2D18 of the NCC for a floor area of 50 m², which is the maximum floor area granted for a single exit exemption under clause D2D3 of the NCC. It should be noted that the clause D2D3 exemption based on floor area applies to all building classes. The calculated populations are shown in Table 12

The calculations show that the maximum population expected in a 50 m² basement served by a single exit, which is permitted under clause D2D3 of the NCC, can vary and may be up to 17 people for a basement retail tenancy. Other uses can be higher again. The proposed basement level will be used as a keg room with a staff room and staff toilets and some storage space and has a floor area of approximately 150 m². This corresponds to a maximum population of 7 people for the total basement area when calculated in accordance with table D2D18 of the NCC, as shown in Table 13.

Table 12: DTS maximum population as per D2D18.

Occupancy type	Population density specified by table D2D18 of the NCC (m^2/person)	Population in accordance with table D2D18 of the NCC for a 50 m^2 basement
Storage	30	2
Office	10	5
Shop in basement level	3	17

Table 13: Performance solution population as per D2D18.

Occupancy type	Floor area	Population density specified by table D2D18 of the NCC (m^2/person)	Population in accordance with table D2D18 of the NCC for a 50 m^2 basement
Storage	130	30	5
Office / staff room	20	10	2
Total			7

9.5.4 Occupant evacuation

The relatively small size of the basement level and its open layout will enable occupants to identify the approximate location of a fire prior to beginning evacuation.

The DTS reference design provides no form of detection or occupant warning. In the event of a fire occurring elsewhere in the building occupants may remain in the abasement for an extended duration until smoke descends down the stairs to alert them. The Performance Solution provides automatic smoke detection and occupant warning systems to alert occupants in the basement much earlier than the DTS design. The

Further, the building is provided with a sprinkler system whereas the DTS design is not. Full scale tests have shown that standard sprinklers can be expected to maintain tenable conditions in relation to temperature and toxicity outside the room where the fire started. Data collected in the US demonstrates that in properties with sprinklers compared with those with no automatic suppression system, fatalities were reduced by 90%, civilian injuries were reduced by 32% and firefighter fireground injuries were reduced by 35%[6].It is therefore expected that the provision of sprinkler system will maintain tenability of the egress routes during egress, even In the event of a fire in the basement, to a greater extent than the DTS design which would have no sprinklers. The performance solutions therefore facilitates safe occupant evacuation to a greater extent than a DTS building considering the likely population and the fire safety systems provided.

9.5.5 Fire brigade intervention

The building is to be provided with a sprinkler system in accordance with specification 17 of the NCC and AS 2118.1:2017. The successful activation of the sprinklers is expected to provide the following benefits:

[6] McGree T, 2024, U.S. Experience with sprinklers, National Fire Protection Association.

- A reduction in the rate of burning and quantity of smoke produced, subsequently increasing the available safe egress time.
- A reduced fire intensity and duration, which in turn reduces the severity of fire exposure to structural and fire separating elements.
- A reduction in the chances of a fire spreading beyond the area of origin or flashover occurring.

Provision of the sprinkler system over and above DTS is anticipated to control or extinguish the fire prior to fire brigade arrival, whereas for the DTS case having no sprinklers the fire would be permitted to grow uncontrolled and establish a fully involved compartment fire prior to brigade arrival. The performance solution therefore compares favourably to DTS with respect to fire brigade intervention.

9.6 CONCLUSIONS

The assessment shows that the single exit provided to the basement level facilitates safe occupant evacuation and fire brigade intervention considering the size and use of the basement area, the likely population and fire safety systems provided. The proposed design of the building is therefore considered to comply with performance requirement D1P4.

10.0 Performance solution 3– Number of hydrants operating

10.1 INTRODUCTION

Due to insufficient flow available in the town main and impracticality of providing a large on-site tank, a fully compliant hydrant system to AS 2419.1-2021 cannot achieved. Therefore, it is proposed to only allow for one fire hydrant operating on the site in lieu of two.

Table 14 Performance solution overview

DTS departure and performance solution	
Description	It is proposed to only allow for one fire hydrant operating on the site in lieu of two.
NCC DTS clause	Clause E1D2
Performance requirements	E1P3
Methodology	
NCC assessment methodology	Clause A2G2(1)(b): Demonstrating equivalence to the DTS provisions Clause A2G2(2)(d): Comparison to the DTS provisions
Type of assessment	Qualitative
Fire safety sub-systems addressed	Sub-system C – Fire spread, impact and control Sub-system D – Fire detection, warning and suppression Sub-system F – Fire services intervention

10.2 ACCEPTANCE CRITERIA

The proposed design will be considered acceptable if it can be demonstrated that the potential risk to occupant life safety and fire brigade intervention is better than or equivalent to a DTS comparative design.

10.3 FIRE SCENARIOS

10.3.1 Identification of fire scenarios

+ **Fire Scenario 1:** A fire originating anywhere in the building.

The assessment will be qualitative in nature and as such no specific quantitative fire characteristics will be established.

10.4 ANALYSIS

NCC Clause E1D2 requires that a fire hydrant system be installed in a building having a total floor area greater than 500 m^2 and in accordance with AS 2419.1-2021. According to the NCC 2022 Guide to Volume One, the intent of the subject clause is *"To require the installation of suitable fire hydrant systems to facilitate the fire brigade's firefighting operations"*.

Table 2.2.5(A) and Table 2.2.5(B) of the subject standard requires a minimum of two hydrants required to flow simultaneously (refer to Figure 11), which is based on the fact that the Class 6 parts of the subject building are considered a single fire compartment with a floor area exceeding 500 m^2 Tables 2.2.6(A) and

Table 2.2.6(B) of the subject standard further detail the required pressure and flow requirements for each hydrant to be able to achieve (refer to Figure 12)

Table 2.2.5(B) — Number of fire hydrant outlets required to flow simultaneously — Class 2 to Class 9 buildings (excluding Class 7a open deck car parks)

NCC building classification	Fire compartment floor area, m^2	Number of fire hydrant outlets
NON-SPRINKLER-PROTECTED BUILDINGS		
2, 3, 5 and 9 (having a rise in storeys less than 2)	≤ 1 000	1
2, 3, 5 and 9 (having a rise in storeys less than 2)	> 1 000 ≤ 5 000	2
2, 3, 5 and 9 (having a rise in storeys of more than 2)	≤ 500	1
2, 3, 5 and 9 (having a rise in storeys of more than 2)	> 500 < 5 000	2
6, 7 and 8	≤ 500	1
6, 7 and 8	> 500 ≤ 5 000	2
All classes	> 5 000 ≤ 10 000	3

Table 2.2.5(B) *(continued)*

NCC building classification	Fire compartment floor area, m^2	Number of fire hydrant outlets
All classes	> 10 000	3, plus 1 additional fire hydrant for each additional 5 000 m^2 or part thereof
SPRINKLER-PROTECTED BUILDINGS — Not more than 25 m in effective height		
All classes	≤ 1 000	1
All classes	> 1 000 ≤ 10 000	2
All classes	> 10 000	3
SPRINKLER-PROTECTED BUILDINGS — More than 25 m in effective height		
All classes	≤ 5 000	2
All classes	> 5 000	3
NOTE See Table 2.2.5(C) for the requirements for open deck car parks where the size of the largest storey, not the largest fire compartment, is used to determine the number of fire hydrants required to flow.		

Figure 11: Extract from AS2419.1-2021 detailing the number of fire hydrant outlets required to operate simultaneously

Table 2.2.6(A) — Feed fire hydrant — Minimum unassisted outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate	Minimum required residual pressure, kPa	
	L/s	NSW	Other States and Territories
External feed or attack/feed fire hydrant located not more than 20 m from a hardstand	10	150	200
NOTE 1 Minimum required flow = 10 L/s × number of hydrant outlets required to flow simultaneously. NOTE 2 The different minimum required residual pressures in this table are partially attributable to the different size fire hoses used by fire brigades across Australia; in NSW, 70 mm fire hose is used while in other States and Territories 65 mm fire hose is used.			

Table 2.2.6(B) — Attack fire hydrant — Minimum unassisted outlet pressure and flow rate

Fire hydrant type	Minimum required flow rate, L/s	Minimum required residual pressure, kPa	
		NSW	Other States and Territories
External or internal attack fire hydrant	10	250	350
NOTE Minimum required flow = 10 L/s × number of hydrant outlets required to flow simultaneously.			

Figure 12: Extract from AS2419.1-2021 detailing the minimum pressure and flow requirements for feed and attack hydrants.

10.4.1 Proposed hydrant system

The pub will be provided with a fire hydrant system complying with AS 2419.1-2021, with the following exceptions due to the limited flow available in the town main-

+ The system will be designed for the operation of one fire hydrant in lieu of two. That is, the onsite pump system has been designed to achieve the required pressure and flow requirements for the operation of a single fire hydrant anywhere in the building.

10.4.2 Proposed Design Vs Reference design

The solution ultimately relies on the provision of an automatic fire suppression system, which is not required to be provided by the DTS Provisions of the NCC. The solution involves a qualitative and comparative analysis to demonstrate that by providing automatic fire suppression, the overall risk to occupant life safety and fire brigade intervention is better than or equivalent to a DTS complying reference design.

For comparative purposes, the Proposed Design and Reference Design are identical with the only exception being that the Proposed Design has automatic fire suppression (AS 2118.1) and 10 L/s hydrant supply whereas the Reference Design has no automatic fire suppression but has 20 L/s hydrant water supply from the town main.

Table 15: Summary of Proposed Design v Reference Design

	Reference Design	Proposed Design
Building layout / configuration / use / means of escape	Identical	Identical
Fire hydrant system	Fully compliant to AS2419.1-2021, with the following key elements: + town main provides 20 L/s. + 1 x diesel pump set in accordance with Clause 6.4.2 of AS 2419.1-2021.	Partially compliant to AS2419.1-2021, noting the following: + town main provides 10 L/s + 1 x diesel pump set
Automatic fire suppression	None	AS2118.1-2017 sprinkler system with the following enhancements: + Full capacity tank water supply on site to allow for the full hydraulic demand for 1 hour. + 1 x diesel fire sprinkler pump set. + Sprinkler system will be listed as a 'critical' measure on the AFSS. This requires system to be maintained every 6 months.

10.4.3 Qualitative Analysis

10.4.3.1 General

The following analysis discusses key aspects of the proposed design and how they are effective in mitigating risk to occupant life safety, attending fire brigade personnel and fire spread, from a fire occurring within the building.

10.4.3.2 Voluntary inclusion of an automatic fire suppression (sprinklers)

To compensate for the lack of a second hydrant operating simultaneously to the building will be provided with an enhanced automatic fire suppression system which will be in accordance with AS 2118.1-2017.

The sprinklers are therefore designed to spray water at high level to prevent fire from getting above the sprinklers. This water delivered close to ceiling level protects the wall and cools the gases at ceiling level[7]. Ordinary hazard sprinklers in the class 6 parts are also expected to control fire development appropriate to the fire hazards present. Ordinary hazard heads shall be fast response type in order to minimise potential fire size to an even better extend than typical AS2118.1 heads which are permitted to be standard response.

The successful activation of the sprinklers is expected to provide the following benefits, all of which are not provided by the Reference Design, where no sprinklers are proposed:

[7] Madrzykowski D and Fleming RP, 2008, section 16, chapter 6: Residential sprinkler systems, Fire protection handbook, 20th edition, NFPA, Quincy MA, pp 16-91–16-107.

- A reduction in the rate of burning and quantity of smoke produced, subsequently increasing the available safe egress time.
- A reduced fire intensity and duration, which in turn reduces the severity of fire exposure to structural and fire separating elements.
- A reduction in the chances of a fire spreading beyond the area of origin or flashover occurring.

The successful operation of the sprinkler system is expected to have the following impact on compartment temperatures during a fire[8]

- The average temperatures outside the immediate area of operation of the sprinkler system will be below 100 °C.
- The temperature in the localised area above the fire will be somewhat higher than the mean compartment temperature but is still unlikely to exceed 200 °C.

Full scale tests have shown that standard sprinklers can be expected to maintain tenable conditions in relation to temperature and toxicity outside the room where the fire started. Data collected in the US demonstrates that in properties with sprinklers compared with those with no automatic suppression system, fatalities were reduced by 90%, civilian injuries were reduced by 32% and firefighter fireground injuries were reduced by 35%[9]. When fatalities do occur in sprinkler protected buildings, the victims tend to be in close proximity to the fire, involved in its ignition or incapable of self-preservation[10].

The CIBSE Guide E[11] notes the following potential concessions for buildings protected by sprinklers:

- Building compartment areas / volumes may be increased over that for a similar building without sprinklers.
- A structural element is liable to maintain its load-bearing capacity and a separating element will maintain both its integrity and its ability to resist the transfer of heat. The fire resistance levels may therefore be reduced if sprinklers are fitted.
- The distance required to travel to an exit can potentially be increased without reducing the level of safety to people.

Statistics on US experience show that sprinklers operated in 92% of the fires in which sprinklers were present and the fire was considered large enough to activate them. They were effective at controlling the fire in 97% of fires in which they operated[12]. Data provided by Marryatt concludes that 92% of fires are controlled by 1-5 heads[13].

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[8] England JP, Young SA, Hui MC and Kurban N, 2000, Guide for the design of fire resistant barriers and structures, Warrington Fire Research Australia and Building Control Commission, Melbourne VIC.

[9] McGree T, 2024, U.S. Experience with sprinklers, National Fire Protection Association.

[10] Fire protection handbook, 2008, 20th edition, NFPA, Quincy MA.

[11] Fire safety engineering – CIBSE guide E, 2019, 4th edition, CIBSE Publications Department.

[12] McGree T, 2024, U.S. Experience with sprinklers, National Fire Protection Association.

[13] Marryatt HW, 1988, Fire: A century of automatic sprinkler protection in Australia and New Zealand 1886-1986, Australian Fire Protection Association, Melbourne VIC.

Sprinkler systems have been demonstrated to achieve high operational reliability through numerous statistical studies. Budnick estimated that the mean reliability of sprinkler systems was 93-96%, based on the analysis of 16 separate studies[14]. Reliability is likely to be even higher where sprinkler systems are correctly designed, commissioned, and maintained.

In addition, the system will also be monitored in accordance with AS 1670.4-2018. A full capacity water storage tank will also be provided to supply the sprinkler system along with a diesel sprinkler pump. By providing 100% capacity onsite water supply, the town main line can continue to supply the single fire-hydrant, so that fire brigade personnel can use one hydrant in conjunction with the sprinkler-system. The sprinkler water supply therefore has high level of added reliability and redundancy.

With these additional provisions, the proposed sprinkler system is considered to be better than or equivalent to a standard AS 2118.1-2017 system, and subsequently provides a higher level of safety to building occupants and attending fire brigade personnel in the event of a fire. In the DTS Design, where there are no sprinklers, there is a risk that a flashover fire could occur within the building. Once this occurs, the only way the fire can be controlled and prevented from spreading within the building and to adjacent allotments is via the fire-resisting construction combined with fire brigade intervention. Therefore, in such a scenario, the risk to occupant egress and fire brigade personnel is much higher than the proposed design.

10.4.3.3 Proposed fire hydrant system

As previously discussed, the hydrant system will be designed to operate a single fire hydrant to achieve the required flow rate of 10 L/s, which can be supplied by the town main system. According to AS 2419.1-2021, only one fire hydrant is required to operate within a fire compartment smaller than 1,000 m² in a sprinkler-protected building (refer to Figure 12).

While the combined area of the Class 6 in the proposed building technically exceeds 1,000 m², approximately 20% of the ground floor comprises spaces (toilets, cool room, kids play area, garden area) that are not anticipated to contain high fuel loads or significant ignition sources.

Water pressure and flow information has been provided by the local authority, included in Appendix D , with flow rates presented below in Table 16 and

[14] Budnick EK, 2001, Automatic sprinkler system reliability, Fire Protection Engineering, Winter 2001, issue 9, pp 7-12.

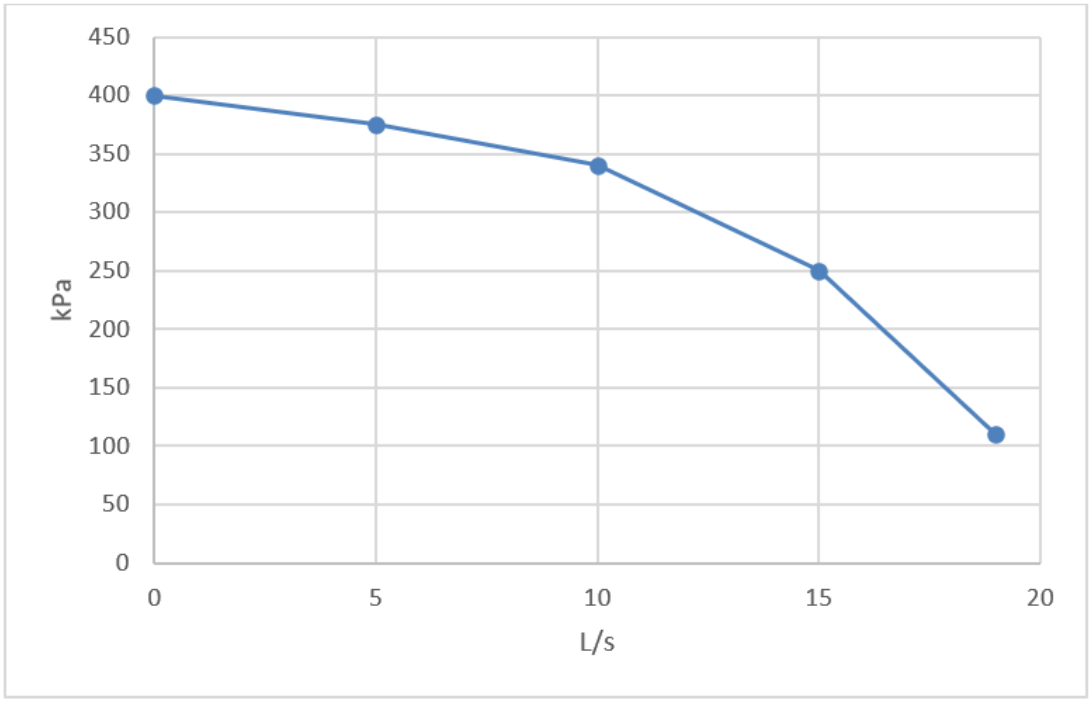

Figure 13. It is evident that the flow rate is significantly higher than 10 L/s, only just short of 20 L/s. It is also noted that the flow and pressure provided are measured via actual onsite street hydrants. The pressure therefore already accounts for losses upstream of the hydrant valve (eg check valves and meter bypasses that might otherwise be installed in a typical on-site system) – therefore although pressure drops below 150 kPa at 19L/s it is likely the residual pressure is still sufficient for fire brigade appliances to draw from.

It is therefore likely that during an actual fire event the town main would still be sufficient for the fire brigade to supply two hydrants operating at sufficient flow rate for effective fire intervention even though the quoted figures are slightly less than the AS2419.1 specified parameters.

Table 16 Town main fire water flow rate

Flow rate [L/s]	Pressure [kPa]
0	400
5	375
10	340
15	250
19	110

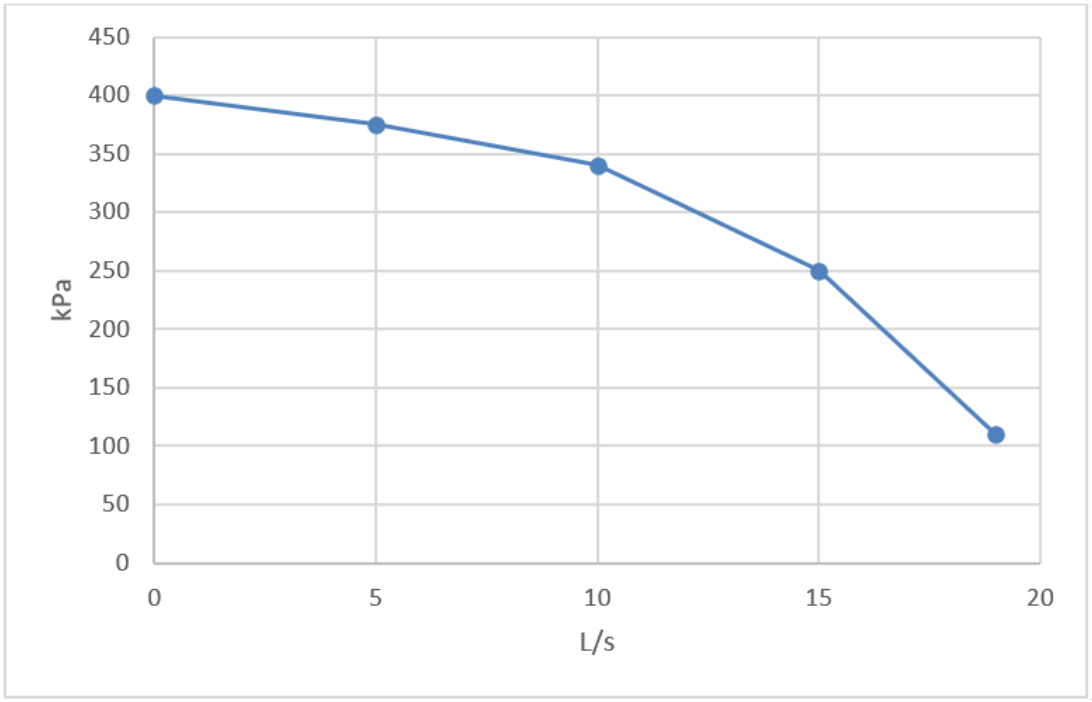

Figure 13: Town main water supply (authority tested 2 July 2024)

10.4.3.4 Summary

The analysis has demonstrated that the provision of sprinklers, relatively small compartment areas and dedicated fire-isolated stairs, are sufficient in compensating for the rationalised fire hydrant system. Therefore, the potential risk to occupant life safety and fire brigade intervention is better than or equivalent to a DTS complying Reference Design

10.5 CONCLUSIONS

Based on the fire engineering assessment above, it is considered by Jensen Hughes that the applicable Performance Requirement E1P3 is satisfied.

11.0 Performance solution 4– Portable fire extinguishers in lieu of fire hose reel

11.1 INTRODUCTION

It is proposed to omit fire hose reels from the Class 6 pub areas in Building A.

Table 17 Performance solution overview

DTS departure and performance solution	
Description	Portable fire extinguisher are provided in lieu of fire hose Class 6 pub areas
NCC DTS clause	Clause E1D3
Performance requirements	E1P1 and E1P2
Methodology	
NCC assessment methodology	Clause A2G2(1)(a): Complying with the performance requirements Clause A2G2(2)(b)(ii): Other verification methods
Type of assessment	Qualitative
Fire safety sub-systems addressed	Sub-system A – Fire initiation, development and control Sub-system D – Fire detection, warning and suppression

11.2 ACCEPTANCE CRITERIA

The proposed design is considered acceptable if it can be demonstrated that initial fire-fighting activities undertaken by occupants are not adversely affected by the omission of fire hose reels within the Class 6 area

11.3 FIRE SCENARIOS

11.3.1 Identification of fire scenarios

The following fire scenarios will be considered in the analysis:

+ **Fire Scenario 1:** A Fire originating on the Class 6 pub area.

The assessment will be qualitative in nature and as such no specific quantitative fire characteristics will be established.

11.4 ANALYSIS

11.4.1 Timing for Occupant Intervention

With consideration of the fire scenario above, depending on the nature of the fire, occupants may only have a short time to pick up a fire hose (or extinguisher) and attack the growing fire. Of special concern is the hazard posed to occupants using a fire hose if they remain in the building for extended periods while the surrounding conditions deteriorate.

11.4.2 Extinguishers in lieu of fire hose reels

It is considered that fire extinguishers would be an appropriate alternative in lieu of fire hose reels with the appropriately installed in accordance with AS 2444-2001 for the following reasons:

- Extinguishers or fire hose reels are generally intended for the use by occupants. It is understood that the BCA DTS Provisions allow occupants to fight a fire at its early stage with some expectation of extinguishment or some suppression may reduce the fire hazard.
- Portable fire extinguishers have the ability to be safely used to attack multiple types of fire hazard where water (hose reel) may be less efficient at extinguishing the fire. This is particularly important given the room in which the FHR is proposed to be omitted is an electrical / communications room, where water suppression is not considered to be safe for an occupant.
- Fire extinguishers, as a compact portable unit are more manoeuvrable than a hose reel connected to the wall, which means that occupants using an extinguisher can be expected to reach the fire, attack and evacuate more rapidly than occupants relying on a fire hose reel. Similarly, the finite supply of fire-fighting chemicals supplied by a fire extinguisher limits the temptation to carry on fighting a growing fire, instead of the unlimited supply from a hose reel which may enable occupants to attempt to fight a fire which is growing out of control and is unsafe.
- One disadvantage of fire extinguishers is that they have a limited capacity when compared to a fire hose reel. Therefore, it is considered that if a fire grows large enough, it may overcome the suppressing capabilities of the fire extinguisher. However, as fire extinguishers are intended for use in the initial stages of a fire, occupants would be expected to be engaging small fires, regardless of the size and fuel loads of the fire compartment. By the time the fire grows too large to be controlled by an extinguisher, occupants would be expected to have egressed from the fire affected compartment.

11.4.3 Summary

Therefore, the proposed omission of fire hose reels is considered not to increase the risk to occupants being exposed to fire and smoke within the pub area. Reason being that under such scenario assessed above, the portable extinguishers are considered to be more effective than fire hose reels when engaging a fire at its early stage

11.5 CONCLUSIONS

Based on the fire engineering assessment above, it is considered by Jensen Hughes that the applicable Performance Requirements E1P1 and E1P2 are satisfied.

Appendix A - Drawings and information

Drawing title	Drawing no	Date	Drawn
Wall types	WD-700	06/2024	Bergstrom
GA Plan- LGF	WD-1030	06/2024	Bergstrom
GA Plan- GF	WD-1031	06/2024	Bergstrom
GA Plan- L1	WD-1032	06/2024	Bergstrom

Other information	Reference	Date	Prepared by
BCA Report	2024/1221	30/11/2024	SWP

Appendix B FRNSW response to PBDB

Mason, Michael

From: Fire Safety <FireSafety@fire.nsw.gov.au>
Sent: Wednesday, 8 January 2025 9:18 AM
To: Mason, Michael
Cc: Matt Milledge; David Cartwright
Subject: PBDB WILL NOT BE PROVIDED - 34 Inglis Road Mudgee - Federal Hotel - The Trustee for Investment Management Group Hotels Unit Trust - Jensen Hughes - SRID 8000040152 [Filed 08 Jan 2025 09:32]

Categories: Filed by Mail Manager

[CAUTION - EXTERNAL SENDER] Warning this email comes from an external source.

Good Morning Michael,

Fire & Rescue NSW (FRNSW) acknowledge receipt of your application and supporting documents for a Performance Based Design Brief.

In this instance, FRNSW advises that an Performance Based Design Brief **will not be provided.**

The decision not to assess the version submitted is not to be interpreted as FRNSW support for the proposal nor an objection to the proposal, only that FRNSW does not have the resources to review and provide stakeholder comment on this proposal.

For any future correspondence regarding this matter, we request that you quote your below reference numbers:

Project Reference:	**FRN25/80**
Job Number:	**BFS25/48**
SRID Number:	**8000040152**

Should you have any further queries, please contact the Fire Safety Branch by replying to this email.

Regards,

AUBREY BARTOLO
Administrative Support Officer
CSD Admin & Project Services | Fire and Rescue NSW
T: (02) 9742 7434 **E:** firesafety@fire.nsw.gov.au
1 Amarina Avenue, Greenacre NSW 2190 | Locked Mail Bag 12, Greenacre, NSW 2190

Appendix C Effectiveness of smoke seals

In order to provide a higher level of fire and life safety to occupants it is proposed to provide ambient and medium temperature smoke seals to all doors. The smoke seals are to be applied to all four edges of the doors and are able to withstand smoke temperature of 200°C for 30 minutes with their smoke leakage rates is no higher than 3 m^3 per hour per metre of the door perimeter.

The smoke seals provided to all SOUs are expected to reduce the amount of smoke that leaks into the corridor. This is supported by the experiments conducted by Rakic[15] which is summarised in The improvement of the enclosed public corridors with respect to tenability by fitting the aforementioned smoke seals to doorsets can be found in the full-scale fire test investigation by Young and England () in which a detailed assessment was undertaken to compare the level of smoke leakage between doors provided with and without elevated temperature smoke seals to a corridor of 6.0 m long, 1.8 m wide and 2.4 m high. The investigation results summarised in Table 19 show that the provision of smoke seals could delay the onset of untenable conditions with respect to smoke layer height, smoke layer temperature and visibility by approximately 14 mins for an ISO fire curve.

Table 18. The experiments show that the amount of smoke that leaks via the door that is provided with smoke seals is significantly less than the amount of smoke that leaks through the door that is not provided with smoke seals.

The improvement of the enclosed public corridors with respect to tenability by fitting the aforementioned smoke seals to doorsets can be found in the full-scale fire test investigation by Young and England [16] in which a detailed assessment was undertaken to compare the level of smoke leakage between doors provided with and without elevated temperature smoke seals to a corridor of 6.0 m long, 1.8 m wide and 2.4 m high. The investigation results summarised in Table 19 show that the provision of smoke seals could delay the onset of untenable conditions with respect to smoke layer height, smoke layer temperature and visibility by approximately 14 mins for an ISO fire curve.

Table 18 Summary of medium temperature smoke seal test results

Cross-door Pressure Difference (Pa)	Total Leakage of AS2688 Solid Core Door with No Seals (m3/h)	Total Leakage of AS2688 Solid Core Door + Perimeter Smoke Seals (m3/h)
12.5	172.2	5.1
25	214.84	8.31
50	254.28	12.43
75	307.69	16.52

Table 19 - Summary of smoke test seal results

Smoke seals fitted to door?	Smoke Layer Commenced Forming (min:sec)	Smoke Layer at approximately 2.0 m (min:sec)	Low Visibility in Corridor (min:sec)	No Visibility in Corridor (min:sec)
Yes	6:00	Not reported	19:10	21:30
No	3:30	5:35	5:45	6:15

[15] Maintaining Tenability of Exitways in Buildings in the Event of Fire – Literature Review, by BRANZ, study report No. 148 (2006). Unit Entry Doors when Exposed to Simulated Sprinkler Controlled Fires – published in Fire Australia February 2000 P 24-28.
[16] Young, S.A. and England, J.P., "The performance of doorsets to restrict the passage of smoke when exposed to simulated fully developed fires," Proceedings of the 8th Interflam Conference, Interscience Communications Limited, 1999.

Appendix D Town main fire water supply

Good Morning Alexander

Please find a copy of the requested pressure flow test results for 34-36 Inglis Street, Mudgee.

Pressure and Flow Test Details

Property address: 34-36 Inglis Street, Mudgee (Location 1 – Inglis Street Hydrant)
Date of testing: 02.07.24
Time of testing: 8.04am
Operators: Darren Thorpe & Lance Fuller
Main Size: 100mm PVC

Distance hydrant is from test address: 20m

Time	Hydrant Flow	Line Pressure
8.07am	No flow	400KPA
	5L/s	375KPA
	10L/s	340KPA
	15L/s	250KPA
8.10am	19L/s	110KPA

Test Procedure:

1. Install the flow metering hydrant standpipe on the water main to be tested as close as possible to the test address.
2. Install a calibrated water pressure gauge within the correct pressure range on the property service line or as close to the test location as possible. A Hydrant Tap Assembly may be required if there are no services close by.
   NOTE: the pressure gauge must not be attached directly to the hydrant flow meter due to excessive pressure loss.
3. Note the distances of both the hydrant meter and the pressure gauge is from the location and make a record.
4. Take a reading of the current time and pressure at the relevant flow and fill in the appropriate line pressure reading.
5. Run the hydrant at each hydrant flow rate and record the line pressure.

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