AEDGROUP
Innovation & expertise in building regulations

NSW GOVERNMENT | Planning, Industry & Environment

Issued under the Environmental Planning and Assessment Act 1979

Approved Application No DA 10659

Granted on the 18 October 2021

Signed M Brown

Sheet No 20 of 21

Performance Based Design Brief

Attunga Ski Lodge, Thredbo

DATE ▶ 21 July 2021

FIRE ENGINEERING REPORT No ▶ F2807 PBDB Rev 01

PREPARED FOR ▶ Attunga Ski Lodge

PREPARED BY ▶ AED Fire

FRNSW REFERENCE ▶ NFB

Fire

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009
Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au
W: www.aedconsulting.com.au ABN: 15 149 587 495

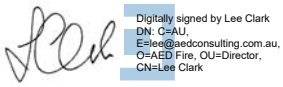
Document Control

This document has been prepared and reviewed by the following personnel at AED Fire and includes at least one C10 accredited fire safety engineer.

Report prepared by:

Leigh Hajek (LH)
Junior Fire Engineer for AED Fire

Report prepared/reviewed by:



Lee Clark (LC)
Director for AED Fire
Master Fire Engineering (UWS)
Certifier – Fire Safety BDC2770
RPEQ Registration Number 20229 (Fire Safety)
Building Services Provider Engineer (Fire Safety) 681499836
Accredited FSP F015633A (Fire Safety Assessment)

REVISION STATUS				
REVISION	DATE	STATUS	WRITTEN	CHECKED
F2807 PBDB Rev 01	21/07/2021	Issued to client	LH	LC

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

TABLE OF CONTENTS

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

TABLE OF FIGURES

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

1 Executive Summary

AED Fire has been commissioned by Attunga Ski Lodge to carry out a fire safety engineering analysis and assessment on the building at 4 Jack Adams Path, Thredbo.

This report details the fire engineering briefing process and reporting phase to report on the findings of the fire engineering assessment undertaken to verify compliance with a number of Performance Requirements of the Building Code of Australia (BCA)[1]. The Performance Solutions have been formulated in accordance with the International Fire Engineering Guidelines[2].

This version of the document represents the Performance-based design brief, which will be issued to the stakeholders for their review and approval.

This Performance-based design brief provides the proposed methods of assessment, acceptance criteria and design requirements of the Performance Solutions for the stakeholders review and comment.

Performance Solutions , as defined by the Building Code of Australia, permit departures to the Deemed-to-Satisfy (DTS) provisions of the BCA.

The Performance Solutions proposed are outlined in the table below. The proposed design requirements listed in the table, support the Performance Solutions, and are in addition to fire safety measures required by the Deemed to Satisfy provisions of the Building Code of Australia.

It is assumed in this assessment that, unless specifically stated otherwise, the building will be provided with all fire safety measures required by the Building Code of Australia Deemed to Satisfy provisions and the defects not addressed within this assessment will be rectified to meet the Deemed to Satisfy provisions.

The Performance Solutions have been identified in the Building Code of Australia Audit Report (Ref. #1399, Rev A) prepared by J Squared Engineering Pty Ltd, dated 19 November 2019 and are as follows:

PS#	Proposed Performance Solution	BCA DTS clause Determined in accordance with BCA Clause A2.4(3)(a)	BCA Performance Requirement Determined in accordance with BCA Clause		Assessment Method in accordance with Building Code of Australia Clause A2.2(2)	*IFEG Sub-system (s) (SS)**
			A2.4(3)(b)	A2.4(3)(c)		
1	**Separation of Equipment** A Performance Solution is to be developed permitting the doorway to the plant room to not achieve the required Fire Resistance Level (FRL). Clause C2.12 requires that a doorway separating equipment is to achieve an FRL of at least -/120/30. The solution is based on a discussion of the resistance of fire spread of the doorway where the building is protected by an automatic sprinkler system in accordance with AS2118.4.	C2.12	CP2	n/a	Absolute, Qualitative, and Deterministic in accordance with Building Code of Australia clause A2.2(2) (b)(ii) [Other Verification Methods]	SS-C
	Proposed Design Requirements for Performance Solution 1 (PS1) 1. The building is to be provided with an Automatic Sprinkler System in accordance with AS2118.4-2012. 2. The doors are to be self closing. 3. The door will be assessed and a reduced Fire Resistance Level or no Fire Resistance Level may be acceptable.					
2	**Bounding construction: Class 2 and 3 buildings** A performance solution is to be developed assessing the window with a view to	C3.11	CP2 DP4	EP2.2	Absolute, Quantitative, and Deterministic in accordance with Building Code of Australia clause A2.2(2)	SS-C

[1] Australian Building Codes Board (ABCB), 2019 Amendment 1, Building Code of Australia (BCA) Volume One.
[2] Australian Building Codes Board (ABCB), Edition 2005, International Fire Engineering Guidelines (IFEG).

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

PS#	Proposed Performance Solution	BCA DTS clause Determined in accordance with BCA Clause A2.4(3)(a)	BCA Performance Requirement Determined in accordance with BCA Clause		Assessment Method in accordance with Building Code of Australia Clause A2.2(2)	*IFEG Sub-system (s) (SS)**
			A2.4(3)(b)	A2.4(3)(c)		
	permitting the window to the gamers room within the bounding construction to remain unprotected.				(b)(ii) [Other Verification Methods]	

Proposed Design Requirements for PS2

4. The building is to be provided with an Automatic Sprinkler System in accordance with AS2118.4-2012. Additional sprinklers will be located, as and if necessary, to protect the opening.

3	Roof lights A performance solution is to be developed permitting the roof lights that are located within 3m of the adjacent sole-occupancy unit. Clause 3.6 of Specification C1.1 stipulates that if a roof is to achieve an FRL, or its covering is to be non-combustible, roof lights or the like are not to be less than 3m from any other roof light or the like in an adjoining sole-occupancy unit if the walls bounding the unit are required to have an FRL as well.	Clause C3.6 of Spec C1.1	CP2	n/a	Absolute, Quantitative, and Deterministic in accordance with Building Code of Australia clause A2.2(2) (b)(ii) [Other Verification Methods]	SS-C

Proposed Design Requirements for PS3

5. The provision of protection to the roof lights will be based on the full Fire Engineering assessment which may require protective measures such as –
    - Sprinklers installed in the roof light, or
    - Protection in accordance with Clause C3.4, or
    - Radiant heat shields installed between the roof light and fire-source feature if the radiant heat assessment fails.

4	Fire-resistance of building elements A performance solution is to be developed permitting the existing masonry wall to be retained without achieving the required FRL of 90/90/90. Table 3 requires that load bearing walls bounding Sole Occupancy Units in a Class 3 building achieve an FRL of 90/90/90.	Table 3 of Specification C1.1	CP1 CP2	n/a	Absolute, Qualitative and Quantitative, and Deterministic in accordance with Building Code of Australia clause A2.2(2) (b)(ii) [Other Verification Methods]	SS-C

Proposed Design Requirements for PS4

6. The building is to be provided with an Automatic Sprinkler System in accordance with AS2118.4-2012.
7. A thermal detector shall be located in each Sole Occupancy Unit within 1.5m of the entry door.
8. The thermal detector shall –
    - Be provided with a sounder base, and
    - On activation, operate the Building Occupant Warning System for the building.
9. Services penetrations in the bounding walls shall be fire stopped in accordance with C3.15
10. Installations in the path of travel shall be in accordance with D2.7

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

PS#	Proposed Performance Solution	BCA DTS clause Determined in accordance with BCA Clause A2.4(3)(a)	BCA Performance Requirement Determined in accordance with BCA Clause		Assessment Method in accordance with Building Code of Australia Clause A2.2(2)	*IFEG Sub-system (s) (SS)**
			A2.4(3)(b)	A2.4(3)(c)		
5	**Number of exits required** A performance solution is to be developed permitting the basement to have 1 exit in lieu of 2. Clause D1.2 requires that any basement that has a floor area greater than 50m^2 is required to have 2 exits.	D1.2	DP4	EP2.2	Absolute, Qualitative and Quantitative, and Deterministic in accordance with Building Code of Australia clause A2.2(2) (d) [Comparison to Deemed to Satisfy Provisions]	SS-E

Proposed Design Requirements for PS5

11. The building is to be provided with an Automatic Sprinkler System in accordance with AS2118.4.
12. The basement shall have smoke or multi-criteria detectors on reduced spacing configured to activate the BOWS solely for the basement in the event of activation.
13. Any additional systems such as Emergency Exit and Directional Exit Signage, designed for 24m spacing but installed at 16m spacing may be required based on the outcome of the full Fire Engineering Assessment.

6	**When fire-isolated stairways and ramps are required** A performance solution is to be prepared permitting the main internal stairs to be used in lieu of a fire-isolated stairway. Clause D1.3 requires that stairways serving as a required exit must be fire isolated in a Class 3 building that passes through more than 2 consecutive storeys in a Class 3 building. One additional storey may be included if the building is sprinklered. The stairs connect 4 storeys.	D1.3	DP5	EP2.2	Absolute, Qualitative and Quantitative, and Deterministic in accordance with Building Code of Australia clause A2.2(2) (b)(ii) [Other Verification Methods]	SS-E

Proposed Design Requirements for PS6

14. The building is to be provided with an Automatic Sprinkler System in accordance with AS2118.4.
15. Smoke detection shall be provided to all common areas and public corridors in accordance with AS1670.1 configured to activate the BOWS in the event of activation.
16. The building occupant warning system shall provide a minimum sound pressure level of 75dB(A) measured at the bedheads with all doors closed.
17. The non-fire-isolated stairs will be enclosed in a smoke lobby with construction impervious to smoke and with self-closing doors fitted with smoke seals. The doors may be held open on magnetic door holders.
18. The non-fire-isolated stairs shall be provided with general lighting in accordance with AS1680.0 and emergency lighting in accordance with AS2293.

Proposed Management in Use Plans

19. A management in use plan shall be implemented to keep paths of travel to an exit clear and to prevent storage of combustible materials in the paths of travel.

Proposed Common Design Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

PS#	Proposed Performance Solution	BCA DTS clause Determined in accordance with BCA Clause A2.4(3)(a)	BCA Performance Requirement Determined in accordance with BCA Clause		Assessment Method in accordance with Building Code of Australia Clause A2.2(2)	*IFEG Sub-system (s) (SS)**
			A2.4(3)(b)	A2.4(3)(c)		
	20. An emergency evacuation plan and procedure shall be developed and implemented in accordance with AS 3745 – 2010.					

**International Fire Engineering Guidelines 2005 (IFEG)*
Trial Design - A fire safety system that is to be assessed using fire engineering techniques.
Performance Solution is identical to the term Alternative Solution.
Sub-system A – Fire Initiation and Development and Control
Sub-system B – Smoke Development and Spread and Control
Sub-system C – Fire Spread and Impact and Control
Sub-system D – Fire Detection, Warning and Suppression
Sub-system E – Occupant Evacuation and Control
Sub-system F – Fire Services Intervention

Important Note Regarding the Design Requirements

The Design Requirements detailed in the above table shall be strictly complied with and any inability to comply with this design during the installation of the measures ***MUST*** be discussed with the fire engineer prior to installation. AED Fire will not provide fire engineering compliance statements on designs where the design has been modified without consultation with AED Fire. This consultation will allow the proposed design alterations to be assessed against the Performance Solution(s) and the report to be revised accordingly.

The Design Requirements do not replace the Building Code of Australia Deemed to Satisfy Provisions. The Design Requirements are measures required to support the Performance Solutions assessed in this report. The Design Requirements are in addition to any Deemed to Satisfy Provisions required to be provided to the building unless it is noted in the Performance Solution and Design Requirements that a Deemed to Satisfy Provision is being deleted or modified by the Design Requirements. AED Fire are not responsible for determining compliance with the Building Code of Australia Deemed to Satisfy Provisions - see relevant Building Code of Australia compliance report for the required Deemed to Satisfy provisions.

Where optional Design Requirements are provided, the full implementation of any of the options will achieve compliance with this report. The partial implementation or selective implementation of several options will not achieve compliance and should be discussed with the author.

1.1 Commissioning, Testing and Certification

The fire safety measures shall be designed, installed, and commissioned in accordance with the relevant Australian Standards referenced in the relevant version of the Building Code of Australia and the design requirements of this report.

The fire safety measures required by this report are to be inspected by a suitably qualified fire engineer to verify that they meet the intent of this report.

Prior to this, the contractors shall undertake commissioning tests to confirm that the systems operate to the required standards. This will include integrated systems testing where necessary.

On completion, the contractors shall issue installation certification and, where necessary, commissioning test reports, signed by an appropriate competent fire safety practitioner and referencing this Fire Engineering Report and including the revision and date of issue.

The following table gives the minimum inspection, certification, and testing requirements of this report –

Fire Safety Measure	Commissioning test results	Certification	Letter or other confirmation	Visual inspection by Fire Engineer	Witness of testing by Fire Engineer	Integrated systems testing
Automatic Fire Sprinklers	✓	✓		✓	✓	✓
Automatic detection and alarm system						
Exit Signage		✓		✓		
Fire Rated Doors		✓		✓		
Installations in the path of travel		✓		✓		
Management in use plans			✓			
Emergency evacuation plans and procedures			✓			

1.2 Maintenance Requirements

The fire safety measures required by this report shall –

- be listed on the schedule of essential services for the building, and
- subject to periodic maintenance and testing and annual certification in accordance with the relevant part of AS1851.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

1.3 Conclusion

It is concluded that, subject to the application of the design requirements and management in use procedures and based on the limitations and assumptions listed below, the Performance Solutions will meet and comply with the relevant Performance Requirements.

1.4 Limitations of the Report

This report is based on the following limitations –

- This report does not determine full compliance with the Building Code of Australia, other than the matters identified in the executive summary of this report;
- This report does not address any matters that are outside the scope or limitations of the Building Code of Australia;
- This report is based on interpretations and assumptions in common practice at the time of the report and future changes in interpretations and assumptions cannot be retrospectively applied to this analysis and recommendations without re-assessment.
- The design measures required by this report do not replace the fire safety measures require by the Deemed to Satisfy provisions of the Building Code of Australia unless specifically stated.
- Amendments to the Performance Solution due to design changes or incapacity to comply with the Design Requirements shall be assessed by a Fire Engineer;
- This report is not a Part 4A compliance certificate under the Environmental Planning & Assessment Act 1979 or Regulation 2000;
- This report does not provide any consideration of any fire services operations (including hydraulic, electrical or other systems);
- This report does not provide any consideration of any structural elements or geotechnical matters relating to the building, including any structural or other assessment of the existing fire resistance levels of the building;
- This report does not provide concessions for any Performance Solution or exemptions from the requirements of the BCA, other than that identified in the Executive Summary of this report;
- This report does not determine compliance with the Disability Discrimination Act 1992 or Part D3 of the BCA;
- This report does not include reporting on hazardous materials, OH&S matters or site contamination;
- This report does not consider heritage issues or any energy efficiency assessment.
- This report does not consider reimbursement of losses caused by business interruption.
- This report does not consider protection of property (other than directly adjoining property).
- This report does not consider fires caused by arson (other than as a potential source of fire initiation) or terrorist attacks.
- This report does not consider Bushfire
- This report does not consider multiple ignition sources for fire initiation.
- This report does not include operational checks of the fire safety equipment unless specified in this report.

1.5 Assumptions of the Report

This report provides a Performance Solution for departures from the Deemed-to-Satisfy provisions as identified in the table in the Executive Summary. The remainder of the building is assumed to comply with the Deemed-to-Satisfy Provisions of the BCA for the purpose of this report.

The report is provided on the basis that:

- The Performance Solution only applies to property detailed in the executive summary.
- The Performance Solution is applicable to the design documentation provided for assessment and as listed in section 2.2. Any future alteration, enlargement or addition will require re-assessment to determine the application of this solution to those changes.
- The Buildings will generally comply with the Deemed-to-Satisfy Provisions of the BCA, except where modified specifically by this report.
- It is assumed that the buildings will be subject to ongoing annual maintenance and the fire safety measures required by this report and the BCA will be maintained to a standard not less than their installation standard.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

2 Introduction

AED Fire has been commissioned by Attunga Ski Lodge to carry out a fire safety engineering analysis and assessment on the building at 4 Jack Adams Path, Thredbo.

This report details the fire engineering briefing process and reporting phase to report on the findings of the fire engineering assessment undertaken to verify compliance with a number of Performance Requirements of the Building Code of Australia (BCA)[3]. The Performance Solutions have been formulated in accordance with the International Fire Engineering Guidelines[4].

This version of the document represents the Performance-based design brief, which will be issued to the stakeholders for their review and approval.

This version of the document represents the Performance-based design brief, which will be issued to the stakeholders for their review and approval.

2.1 Scope and Basis of the Project

This Performance-based design brief contains an assessment of the Performance Solutions required to address the Deemed-to-Satisfy non-compliance issues identified by J Squared Engineering Pty Ltd in a BCA safety audit report reference 1399 revision A dated 19/11/2019.

This Performance-based design brief provides the proposed methods of assessment, acceptance criteria and design requirements of the Performance Solutions for the stakeholders review and comment.

Performance Solutions, as defined by the Building Code of Australia, permit departures to the Deemed-to-Satisfy (DTS) provisions of the BCA.

The proposed design requirements listed in the table, support the Performance Solutions, and are in addition to fire safety measures required by the Deemed to Satisfy provisions of the Building Code of Australia.

It is assumed in this assessment that, unless specifically stated otherwise, the building will be provided with all fire safety measures required by the Building Code of Australia Deemed to Satisfy provisions.

The Performance Solutions proposed as listed in the table in the executive summary of this report.

2.2 Reference Information and Documentation

This Fire Engineering Report is based on the following documentation:

- Australian Building Codes Board (ABCB) 2019 Amendment 1, Building Code of Australia (BCA) Volume One.
- Australian Building Codes Board (ABCB) 2019 Amendment 1, Guide to the BCA Volume One.
- Australian Building Codes Board (ABCB) Edition 2005, International Fire Engineering Guidelines (IFEG).

The project documents depicted in the following have been reviewed in preparing this report.

Document reference	Author	Description	Revision
1399	J Squared Engineering Pty Ltd	BCA Compliance Assessment Report	A
n/a	Myer & Berkery Architects Limited	Architectural Drawings	n/a

[3] Australian Building Codes Board (ABCB), 2019 Amendment 1, Building Code of Australia (BCA) Volume One.
[4] Australian Building Codes Board (ABCB), Edition 2005, International Fire Engineering Guidelines (IFEG).

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

3 Performance-based design brief

The development of this report follows a consultative process with the design team and relevant stakeholders. This process included meetings and discussions and resulted in an agreed Performance-based design. The following contains the Performance-based design brief.

3.1 Relevant Stakeholders

Organisation	Role
Attunga Ski Lodge	Client
Myer & Berkery Architects Pty Ltd	Architect
NSW Department of Planning	Regulatory Authority
AED Fire	Fire Engineering
J Squared Engineering Pty Ltd	Building Code of Australia Compliance

3.2 Principal Building Characteristics

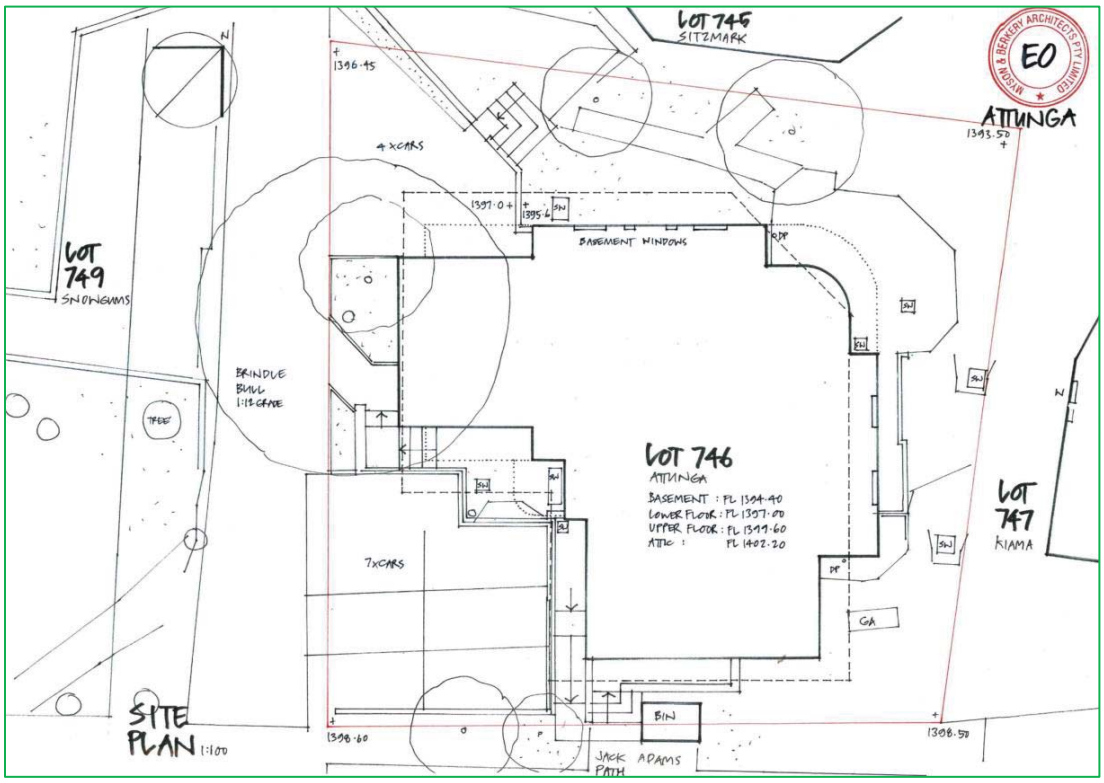


Figure 3-1 - Site Plan

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

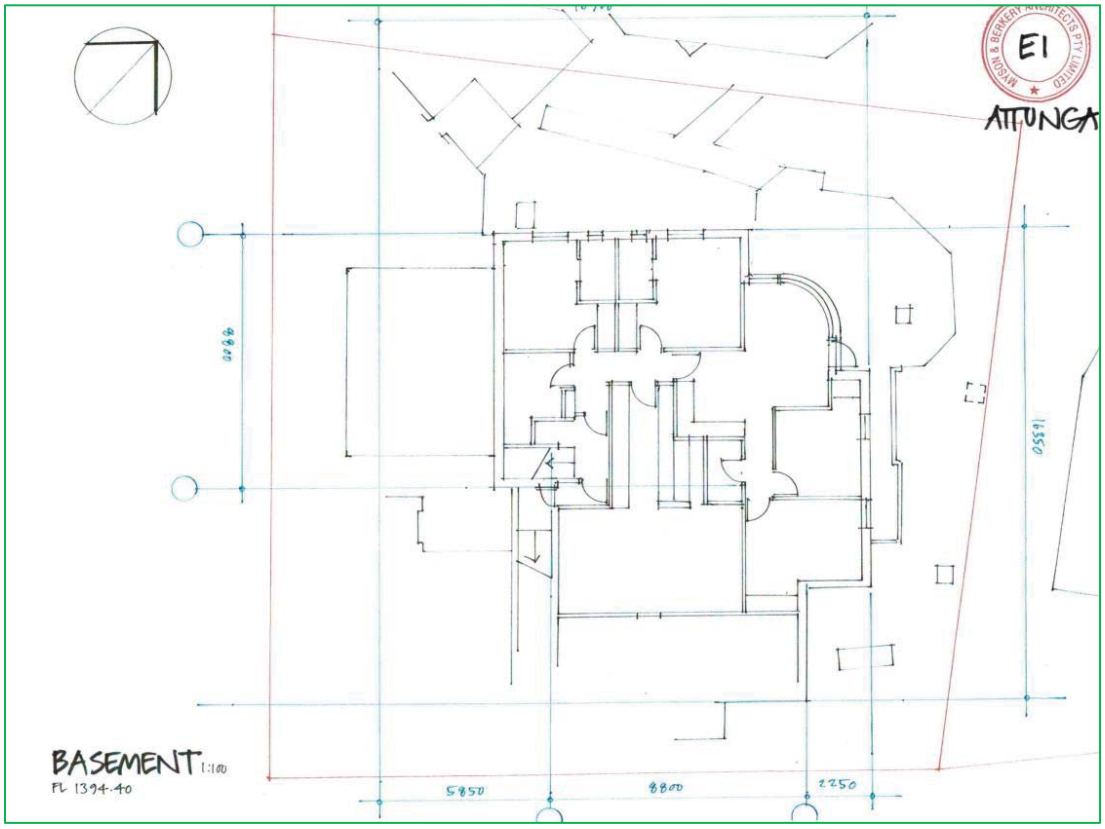


Figure 3-2 – Basement Floor Plan

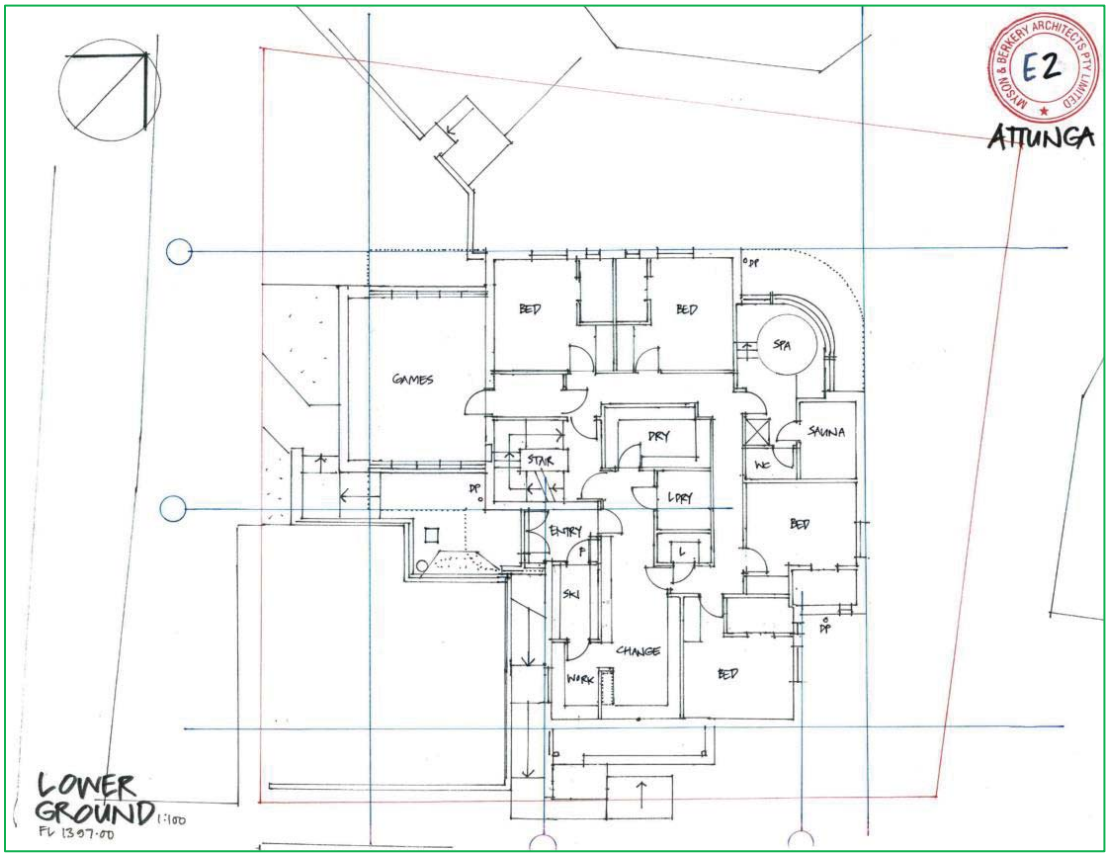


Figure 3-3 - Lower Ground Floor Plan

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

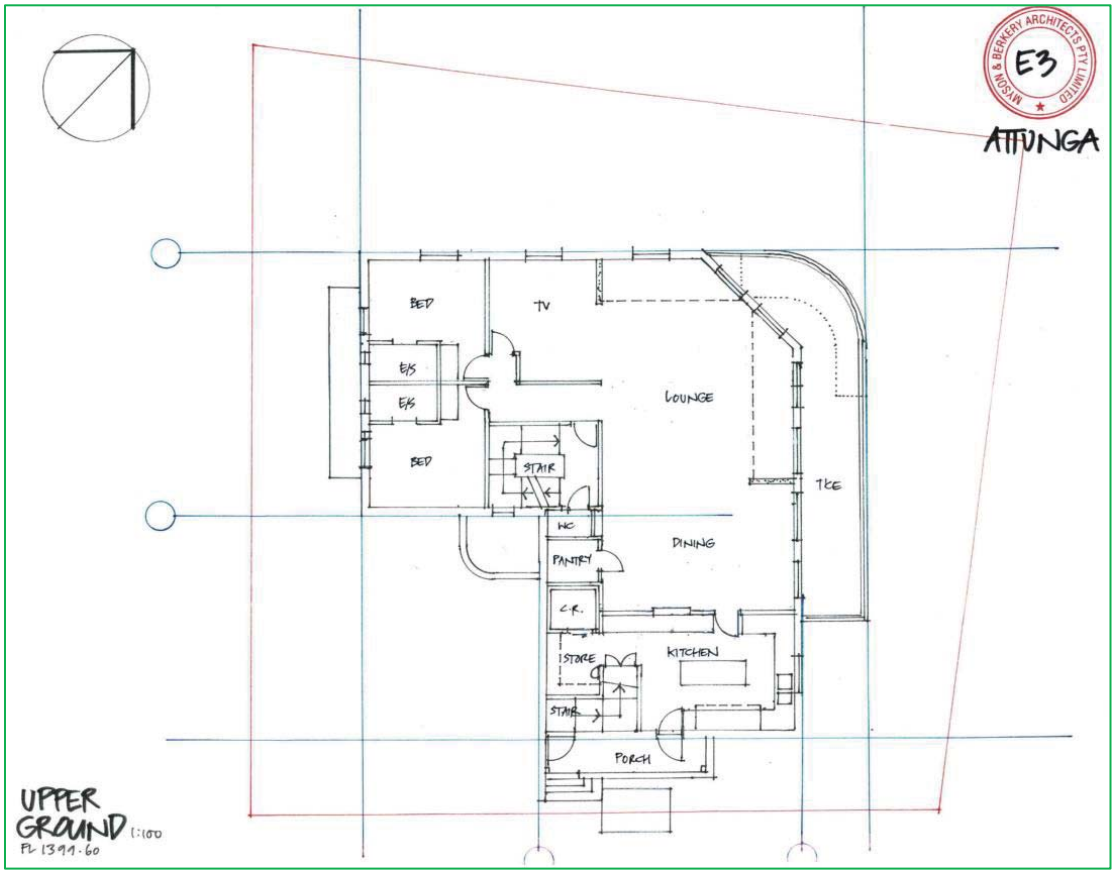


Figure 3-4 - Upper Ground Floor Plan

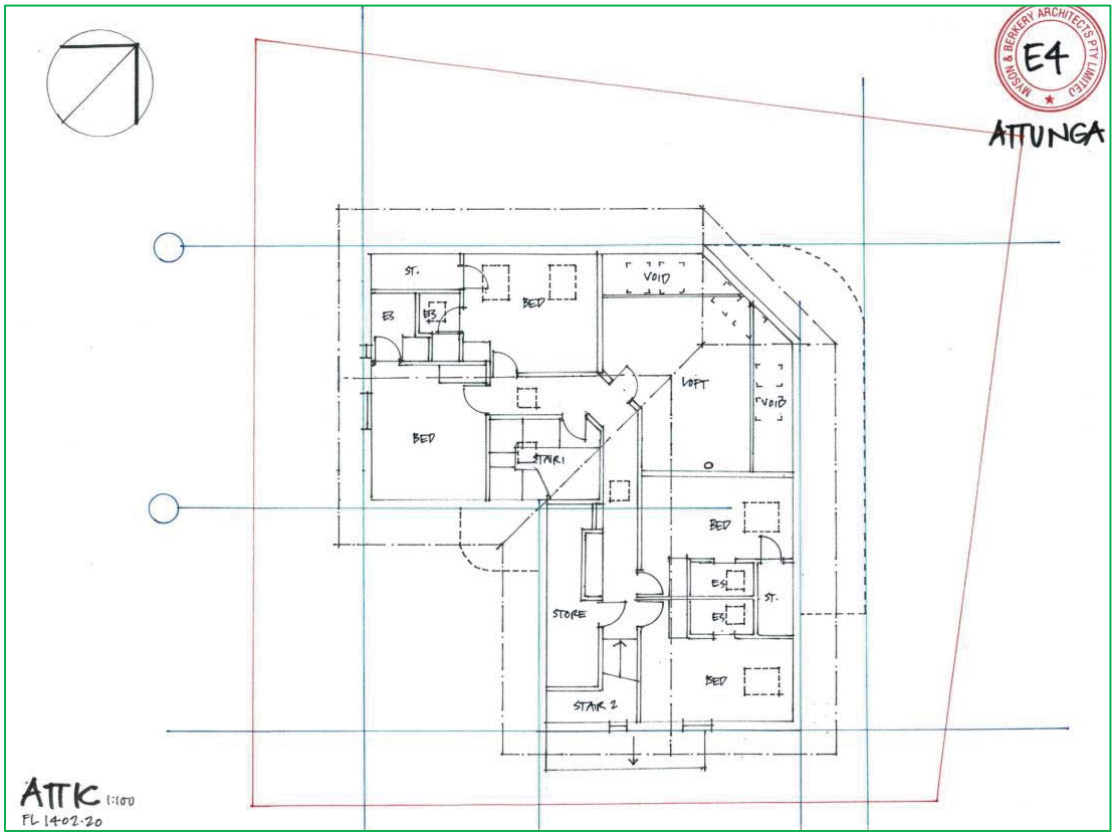


Figure 3-5 – Attic Floor Plan

The following information outlined in the table below was derived from the Building Code of Australia Assessment Report (Ref. #1399, Rev A) prepared by J Squared Engineering Pty Ltd and dated 19 November 2019.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

Building Characteristic	Description
Occupancy/Use	
Building Class:	Class 3 – Residential units
If more than one class:	Class 7a – Carpark
Type / use of premises:	Short-term transient residential use
Type of construction:	Type A required
Effective Height:	12.1m
Location	
General:	The subject building is located on the corner of Brindle Bull and Jack Adams Path, Thredbo NSW 2625
Proximity to other buildings:	The South-east and South-west boundaries are not within close proximity of other buildings, whereas the North-east and North-west are adjacent to other residential buildings.
Distance to two nearest fire stations:	FRNSW Thredbo: 0.95km FRNSW Jindabyne: 36.2km
Emergency services access:	Main entrance via Brindle Bull
Location of Fire Indicator Panel:	Required to be in accordance with the Building Code of Australia
Location hydrant & sprinkler boosters:	Hydrant Booster – Required to be in accordance with the Building Code of Australia Sprinkler Booster: Required to be in accordance with the Building Code of Australia
Building Layout and Structure	
General layout:	Separate residential SOUs with common corridors.
Rise in Storeys:	4
Levels Contained:	4
Total Floor Area:	730 sqm
Largest Fire Compartment Area:	Approx. 190 sqm (as per drawings)
Ground Floor Area:	Approx. 190 sqm (as per drawings)
Access and Egress	
Access paths:	Main entry via Brindle Bull or side entry via Jack Adams Pathway
Egress paths:	Main exit to Brindle Bull

3.3 Dominant Occupant Characteristics

Occupant Characteristic	Description
Type and number	Transient, short-term residential occupants.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

Occupant Characteristic	Description
	If necessary, the total number of occupants is calculated in accordance with Clause D1.13 of the Building Code of Australia.
Occupant state	Occupant's state is unpredictable in this scenario and may include being awake, sleeping, inebriated, and focussing on typical domestic values.
Physical and mental attributes	Represents that of the general public.
Assistance required/available	No assistance required.
Training and Roles	Staff are trained to direct occupants in accordance with the evacuation procedure.
Activity at the onset of fire	Sleeping, inebriation, interacting with other guests/staff, smoking, use of sanitary facilities, and other typical domestic activities.
Building familiarity	Lodge guests are not assumed to be familiar with the building. Long-term staff are familiar.
Design Occupant Group	Residential - Male/Female aged 0-99.

3.4 Hazards and Preventative and Protective Measures Available

The following hazards have been identified after design review and stakeholder input.

Hazard	Details
General Layout and Design	Some internal elements do not achieve the degree of fire-resistance required. The number of exits from the Basement is not adequate. Main entry serving as a fire-isolated exit does not achieve the protection required. Roof lights are subject to potential fire spread to the adjacent SOU. Plant room is not adequately separated from surrounding construction.
Activities	Using electrical equipment, candles, smoking, cooking, heaters and driving vehicles.
Ignition Sources	Heaters, electrical equipment, candles, cigarettes, cooking equipment, and vehicle failure.
Fuel Sources/Fire Load	Internal furnishings, cooking fuels, boilers, vehicles.

The building is provided with the following preventative and protective measures. Note that the following does not constitute a verification or Building Code of Australia determination of the measures and do not form part of the design requirements of this report. The measures listed are as required by the Building Code of Australia compliance report or as noted in the fire safety statement. Where the measures are not provided or are not compliant with the Building Code of Australia Deemed to Satisfy provisions, the fire engineer shall be consulted.

Sub-System	Present in Building/Requirements
A Fire initiation, development and control	Automatic Sprinkler System Portable Fire Extinguishers Fire Blanket Fire Hose Reel
B Smoke development, spread and control	Bounding construction and self-closing fire doors
C Fire spread, impact and control	Automatic Sprinkler System Portable Fire Extinguishers Fire Doors Fire Blanket Fire Hose Reel
D Fire detection, warning and suppression	Automatic Sprinkler System Smoke Detection System

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

Sub-System	Present in Building/Requirements
	Occupational Warning System Manual Call Point
E Occupant evacuation and control	Exit Signage Directional Exit Signage Emergency Lighting Occupant Warning System Manual Call Point
F Fire services intervention	Fire Hydrant System

*International Fire Engineering Guidelines 2005 (IFEG)
Sub-system A – Fire Initiation and Development and Control
Sub-system B – Smoke Development and Spread and Control
Sub-system C – Fire Spread and Impact and Control
Sub-system D – Fire Detection, Warning and Suppression
Sub-system E – Occupant Evacuation and Control
Sub-system F – Fire Services Intervention

3.5 Annual Fire Safety Schedule

The design requirements detailed in the Executive Summary shall be added to the Fire Safety Certificate for the subject building.

Section 4: Fire safety measures

Fire safety measure	Minimum standard of performance	Date(s) assessed	APFS *
Automatic fire detection and alarm system	BCA Specification E2.2a, BCA Clause G4.8, AS 1670.1-2004, AS1670.4- 2004	19/05/2021	AM
Emergency lighting including external emergency lighting	BCA Clause E4.4 & Part G4, AS2293.1-2005	19/05/2021	AM
Exit Signs	BCA Clause E4.5, E4.6 & E4.8, AS 2293.1-2005	19/05/2021	AM
Fire blanket	AS 2444-1995	19/05/2021	AM
Fire hose reel	BCA Clause E1.4, G4.8, AS 2441-1998	19/05/2021	AM
Fire orders and Evacuation plans	BCA Clause G 4.9	19/05/2021	AM
Manual Call Point	BCA Clause G4.8 & AS 1670.1-2004	19/05/2021	AM
Portable Fire Extinguishers	BCA Clause E1.6, AS 2444-1995	19/05/2021	AM
Solid core doors & door closers	BCA Clause C3.11, D2.19, D2.20, D2.21, G4.3	19/05/2021	AM
Warning and operational signs	BCA Clause G4.3	19/05/2021	AM

* See notes on page 4 about how to correctly identify an accredited practitioner (fire safety) (APFS).

3.6 Assessment of Performance Solutions

The areas of non-compliance, the directly and indirectly relevant performance requirements, assessment methods and Performance Solutions for each non-compliance issue in this project are summarised in the table presented in the Executive Summary of this report, along with the design requirements for each Performance Solution. The assessment of the Performance Solutions are provided in the following chapters, which includes the full assessment of the Performance Solution for suitability for the building design and discussion of the compliance of the solution with the relevant Performance Requirements of the Building Code of Australia.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

4 PS1 – Separation of Equipment

BCA Non-Compliance – Clause C2.12

A Performance Solution has been developed to address departures from the Building Code of Australia Deemed to Satisfy Clause C2.12.

The boiler room access door is not self-closing and does not achieve and FRL of -/120/30.

4.1 Assessment Methodology

The issue will be addressed as per the methodology in the table below –

Type of assessment	Building Code of Australia Deemed to Satisfy Clause in accordance with A2.4(3)(a)	Assessment Method in accordance with A2.2(2)	Performance Requirements in accordance with A2.4(3)(b)&(c)	IFEG Sub-systems
Absolute Qualitative Deterministic	Clause C2.12	(b)(ii) [Other Verification Methods]	CP2	SS-C Fire Spread and Impact and Control

4.2 Acceptance Criteria

The fire engineering analysis is considered acceptable if it can demonstrate that the design limits the spread of fire from service equipment having a high fire hazard or potential for explosion.

4.3 Fire Scenarios

The following design fire scenarios are considered –

Design Scenario[5]	Performance Requirement	Outcome required	Method or solution
Fire Scenario 1 A fire in the normally unoccupied room threatens the occupants of other rooms (UT) A fire within the boiler plant room ignites and smoulders within. There are high fuel loads and results in flashover, spreading to other parts of the building via the doorway.	CP2	Demonstrate that the level of safety is at least equivalent to the deemed to satisfy provisions	Solutions might include the use of separating elements or fire suppression to confine the fire to the room of origin.

4.4 Discussion of the Building Code of Australia

The Building Code of Australia deemed to satisfy provisions requires a minimum FRL be achieved by the doorways of a plant room separating equipment from other parts of the building. The relevant deemed to satisfy clause is C2.12 and the relevant parts are shown below in bold and italics –

Excerpt of Clause C2.12 - Separation of equipment

"

(a) *Equipment other than that described in (b) and (c) must be separated from the remainder of the building with construction complying with (d), if that equipment compromises –*
- *(i) Lift motors and lift control panels; or*
- *(ii) Emergency generators used to sustain emergency equipment operation in the emergency mode; or*
- *(iii) Central smoke control plant; or*
- ***(iv) Boilers; or***
- *(v) A battery system installed in the building that has a total voltage of 12 volts or more and a storage capacity of 200kWh or more.*

[5] Building Code of Australia Schedule 7 1.4 Design Scenarios: NCC Performance Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

(b) Equipment need not be separated in accordance with (a) if the equipment comprises –
(i) Smoke control exhaust fans located in the ait stream which are constructed for high temperature operation in accordance with Specification E2.2b; or
(ii) Stair pressurising equipment installed in compliance with the relevant provisions of AS1668.1; or
(iii) A lift installation without a machine-room; or
(iv) Equipment otherwise adequately separated from the remainder of the building.
(c) Separation of on-site fire pumps must comply with the requirements of AS2419.1.
(d) Separating construction must have –
(i) Except as provided by (ii) –
(A) An FRL as required by Specification C1.1, but not less than 120/120/120; and
(B) Any doorway protected with a self-closing for door having an FRL of not less than -/120/30; or
(ii) When separating a lift shat and motor room, and FRL not less than 120/-/-."

Guide to the Building Code of Australia[6]

The guide to the Building Code of Australia details that the intent of C2.12 is -

'to limit the spread of fire from services equipment having a high fire hazard or potential for explosion and to ensure emergency equipment continues to operate during a fire'.

The subject doorway is therefore required to achieve a level of fire-resistance that is deemed acceptable in ensuring the equipment is not subject to any fire that originates from another part of the building.

4.5 Assessment

The assessment is based on a discussion of the most likely fire scenario and the degree of fire resistance required to be achieved by the door is appropriate to the fire characteristics.

The discussion will include the fire suppression provided by an AS2118.4 sprinkler system and a self-closing door that achieves a Fire Resistance Level of -/60/30.

Additionally, analysis of occupant evacuation will be included to support the proposed design by determining if the overall risk of fire spread is deemed appropriate.

4.6 Compliance with Performance Requirements CP2.2

The fire engineering analysis has demonstrated compliance of the proposed Performance Solution with the relevant Performance Requirements.

CP2 Spread of fire
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—
(i) to exits; and
(ii) to sole occupancy units and public corridors; and
(iii) between buildings; and
(iv) in a building.
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -
(i) the function and use of the building; and
(ii) the fire load; and
(iii) the potential fire intensity; and
(iv) the fire hazard; and
(v) the number of storeys in the building; and
(vi) its proximity to other property; and
(vii) any active fire safety systems installed in the building; and
(viii) the size of the fire compartment; and
(ix) fire brigade intervention; and

[6] Australian Building Codes Board (ABCB), 2019, Guide to the BCA Volume One.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

CP2 Spread of fire
(x) other elements they support; and
(xi) the evacuation time.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

6 PS2 – Bounding Construction: Class 2 and 3 Buildings

BCA Non-Compliance – Clause C3.11

A Performance Solution has been developed to address departures from the Building Code of Australia Deemed to Satisfy Clause C3.11.

The window to the gamers room within the bounding construction is not protected in accordance with Clause 3.4 of the Building Code of Australia. It is required to be protected as it is within the path of travel to an exit.

6.1 Assessment Methodology

The issue will be addressed as per the methodology in the table below –

Type of assessment	Building Code of Australia Deemed to Satisfy Clause in accordance with A2.4(3)(a)	Assessment Method in accordance with A2.2(2)	Performance Requirements in accordance with A2.4(3)(b)&(c)	IFEG Sub-systems
Absolute Quantitative Deterministic	Clause C3.11	(b)(ii) [Other Verification Methods]	CP2, DP4, EP2.2	SS-C Fire Spread and Impact and Control

6.2 Acceptance Criteria

The fire engineering analysis is considered acceptable if it can demonstrate that the design maintains the performance of the bounding walls with regard to the fire safety measures provided.

6.3 Fire Scenarios

The following design fire scenarios are considered –

Design Scenario[7]	Performance Requirement	Outcome required	Method or solution
Fire Scenario 1 A fire blocks evacuation route (BE) A fire ignites within the gaming room with relatively high fuel loads resulting in flashover if there is no suppression. The opening within the bounding construction compromises the wall and allows for the fire to spread to the public corridor acting as a path of travel to an exit.	CP2, DP4, EP2.2	Demonstrate that the level of safety is at least equivalent to the deemed to satisfy provisions	Demonstration that a viable evacuation route has been provided for building occupants.

6.4 Discussion of the Building Code of Australia

The Building Code of Australia deemed to satisfy provisions requires that a bounding construction to a public corridor within a Class 2 or 3 building must have all windows protected internally in accordance with C3.4 of the Building Code of Australia. The relevant deemed to satisfy clause is C3.11 and the relevant parts are shown below in bold and italics –

Excerpt of Clause C3.11 – Bounding construction: Class 2 and 3 buildings and Class 4 parts

"

(a) A doorway in a Class 2 or 3 building must be protected if it provides access from a sole-occupancy unit to –
(i) A public corridor, public lobby, or the like; or
(ii) A room not within a sole-occupancy unit; or
(iii) The landing of an internal non fire-isolated stairway that serves as a required exit; or
(iv) Another sole-occupancy unit.

[7] Building Code of Australia Schedule 7 1.4 Design Scenarios: NCC Performance Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

(b) A doorway in a Class 2 or 3 building must be protected if it provides access from a room not within a sole-occupancy unit to –
(i) A public corridor, public lobby, or the like; or
(ii) The landing of an internal non fire-isolated stairway that serves as a required exit.
(c) A doorway in a Class 4 part of a building must be protected if it provides access to any other internal part of the building.
(d) Protection for a doorway must be at least –
(i) In a building of Type A construction – a self-closing -/60/30 fire door; and
(ii) In a building of Type B or C construction – a self-closing, tight fitting, solid core door, not less than 35mm thick, except –
(iii) In a Class 3 building used as a residential care building protected with a sprinkler system complying with Specification E1.5 –
(A) A tight fitting, solid core door not less than 35mm thick if the building is divided into floor areas not exceeding 500m^2 with smoke proof walls complying with Clause 2 of Specification C2.5; or
(B) A tight fitting, solid core door not less than 35mm thick fitted with a self-closing device, a delayed closing device or an automatic closing device.
(e) Openings in internal walls which are required to have an FRL with respect to integrity and insulation must not reduce the fire-resisting performance of the wall.
(f) A door required by (d) may be automatic-closing in accordance with the following:
(i) The automatic-closing operation must be initiated by the activation of a smoke detector, or any other detector deemed suitable in accordance with AS1670.1 if smoke detectors are unsuitable in the atmosphere, installed in accordance with the relevant provision of AS1670.1 and located not more than 1.5m horizontal distance from the approach side of the doorway.
(ii) Where any other required suitable fire alarm system, including a sprinkler system (other than a FPAA101D system) complying with Specification E1.5, is installed in the building, activation of the system must also initiate the automatic-closing operation.
(g) In a Class 2 or 3 building where a path of travel to an exit does not provide a person seeking egress with a choice of travel in different directions to alternative exits and is along an open balcony, landing or the like and passes an external wall of—
(i) Another sole-occupancy unit; or
(ii) A room not within a sole-occupancy unit,

then that external wall must –

(iii) Be constructed of concrete or masonry, or be lined internally with a fire-protective covering; and
(iv) Have any doorway fitted with a self-closing, tight-fitting solid core door not less than 35mm thick; and
(v) Have any windows or other openings –
(A) Protected internally in accordance with C3.4; or
(B) Located at least 1.5m above the floor of the balcony, landing or the like."

The window within the subject bounding construction does not achieve either provision of C3.11(g)(v) and is therefore required to be subject to a performance solution.

Guide to the Building Code of Australia[8]

The guide to the Building Code of Australia details that the intent of C3.11 is -

'to maintain the performance of a wall bounding any sole-occupancy unit or public corridor in Class 2 or 3 buildings; and any sole-occupancy unit in a Class 4 part'.

Further commentary by the guide of the clause is as follows –

Openings other than doorways

Under C3.11(e), openings other than doorways in internal walls which are required to have a fire-resistance level (FRL) for integrity and insulation are permitted only if they do not lower the wall's fire-resisting performance.

Path of travel to an exit

C3.11(g) applies, in a Class 2 or Class 3 building only, where a path of travel is along an open balcony, landing of the like and it does not provide a person evacuation with a choice of travel in a different direction to alternative exits. If this path of travel passes an external wall of another sole-occupancy unit or a room which is not within a sole-occupancy unit, the external wall must be constructed in accordance with C3.11(g)(iii), have any doorways protected in accordance with C3.11(g)(v), and any window or other openings protected in accordance with C3.11(g)(v)(A) or (B).

[8] Australian Building Codes Board (ABCB), 2019, Guide to the BCA Volume One.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

The window compromises the overall fire-resistance of the bounding construction as it is not protected in accordance with C3.11. The assessment will include discussion of all relevant components of the clause's intent, which overall forms the basis of the solution.

6.5 Assessment

The assessment will determine the fire-resisting performance of the bounding. The discussion will demonstrate that the degree of fire-resistance provided is appropriate and all occupants who are passing by the window via the public corridor are not exposed to unnecessary fire risk within a fire-scenario.

The proposed design requires that the building is protected by an Automatic Sprinkler system in accordance with AS2118.4.

6.6 Compliance with Performance Requirements CP2, DP4, & EP2.2

The fire engineering analysis has demonstrated compliance of the proposed Performance Solution with the relevant Performance Requirements.

CP2 Spread of fire
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—
(i) to exits; and
(ii) to sole occupancy units and public corridors; and
(iii) between buildings; and
(iv) in a building.
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -
(i) the function and use of the building; and
(ii) the fire load; and
(iii) the potential fire intensity; and
(iv) the fire hazard; and
(v) the number of storeys in the building; and
(vi) its proximity to other property; and
(vii) any active fire safety systems installed in the building; and
(viii) the size of the fire compartment; and
(ix) fire brigade intervention; and
(x) other elements they support; and
(xi) the evacuation time.

DP4 Exits
Exits must be provided from a building to allow occupants to evacuate safely, with their number, location and dimensions being appropriate to—
(a) the travel distance; and
(b) the number, mobility and other characteristics of occupants; and
(c) the function or use of the building; and
(d) the height of the building; and
(e) whether the exit is from above or below ground level.

EP2.2 Safe evacuation routes
(a) In the event of a fire in a building the conditions in any evacuation route must be maintained for the period of time occupants take to evacuate the part of the building so that—
(i) the temperature will not endanger human life; and
(ii) the level of visibility will enable the evacuation route to be determined; and
(iii) the level of toxicity will not endanger human life

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

EP2.2 Safe evacuation routes
(b) The period of time occupants take to evacuate referred to in (a) must be appropriate to-
(i) the number, mobility and other characteristics of the occupants; and
(ii) the function or use of the building; and
(iii) the travel distance and other characteristics of the building; and
(iv) the fire load; and
(v) the potential fire intensity; and
(vi) the fire hazard; and
(vii) any active fire safety systems installed in the building; and
(viii) fire brigade intervention.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

7 PS3 – Roof Lights

BCA Non-Compliance – Clause 3.6 of Specification C1.1

A Performance Solution has been developed to address departures from the Building Code of Australia Deemed to Satisfy Specification C1.1.

Roof lights located on the subject building are within 3m of an adjacent sole-occupancy unit.

7.1 Assessment Methodology

The issue will be addressed as per the methodology in the table below –

Type of assessment	Building Code of Australia Deemed to Satisfy Clause in accordance with A2.4(3)(a)	Assessment Method in accordance with A2.2(2)	Performance Requirements in accordance with A2.4(3)(b)&(c)	IFEG Sub-systems
Absolute Quantitative Deterministic	Clause 3.6 of Specification C1.1	(b)(ii) [Other Verification Methods]	CP2	SS-C Fire Spread and Impact and Control

7.2 Acceptance Criteria

The fire engineering analysis is considered acceptable if it can demonstrate that fire spread via the roof lights is limited.

7.3 Fire Scenarios

The following design fire scenarios are considered –

Design Scenario[9]	Performance Requirement	Outcome required	Method or solution
Fire Scenario 1 Horizontal fire spread (HS) A fire within the subject building results in flashover and produces high temperatures. The roof light within the same fire compartment radiates the heat exposing the adjoining sole-occupancy unit and risking fire spread.	CP2	Demonstrate that the risk of fire spread between buildings is not greater than buildings complying with the Deemed to Satisfy provisions	Radiant heat assessment with the potential of protective measures if deemed necessary.

7.4 Discussion of the Building Code of Australia

The Building Code of Australia deemed to satisfy provisions require any roof lights within a building to be located more than 3m from any adjacent sole-occupancy unit. The relevant deemed to satisfy clause is Clause 3.6 of Specification C1.1, and the relevant parts are shown below in bold and italics –

Excerpt of Clause 3.6 of Specification C1.1 – Fire-resisting construction

"3.6 Roof Lights

If a roof is required to have an FRL or its covering is required to be non-combustible, roof lights or the like installed in that roof must –

- *(a) Have an aggregate area of not more than 20% of the roof surface; and*
- *(b) Be not less than 3m from –*
  - *(i) Any boundary of the allotment other than the boundary with a road or public place; and*
  - *(ii) Any part of the building which projects above the roof unless that part has the FRL required of a fire wall and any openings in that part of the wall for 6m vertically above the roof light or the like are protected in accordance with C3.4; and*

[9] Building Code of Australia Schedule 7 1.4 Design Scenarios: NCC Performance Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

(iii) Any roof light or the like in an adjoining sole-occupancy unit if the walls bounding the unit are required to have an FRL; and

(iv) Any roof light or the like in and adjoining fire-separated section of the building; and

(c) If a ceiling with a resistance to the incipient spread of fire is required, be installed in a wall that will maintain the level of protection provided by the ceiling to the roof space."

Guide to the Building Code of Australia[10]

The guide to the Building Code of Australia details that the intent of Clause 3.6 of Specification C1.1 is -

'to *permit roof lights or the like in a roof that is required to either have an FRL or have a non-combustible covering*'.

Further commentary by the guide of the clause is as follows –

The roofs of certain types of building can be required to have and FRL, or to be of non-combustible construction, to limit the spread of fire from the roof to another building. This is particularly the case with a high-rise building. Clause 3.6 specifies the requirements for such roof lights (relevant parts are in bold and italics below).

The requirements of Clause 3.6 aim to minimise the risk that fire will spread by way of roof lights:

- *From another building in an adjoining allotment;*
- ***To an adjoining sole-occupancy unit; or***
- *To an adjoining fire compartment or fire-separated part of the building.*

Clause 3.6 facilitates this aim by minimising the:

- *Roof area which can be compromised of roof lights;*
- *Distance a roof light is from an allotment boundary;*
- *Distance a roof light is from unprotected parts of the building which are higher than the roof;*
- ***Distance a roof light is from roof lights or the like in adjoining sole-occupancy units, if the bounding walls are required to have an FRL; and***
- *Distance a roof light s from any roof light or the like in adjoining fire-separated parts of the building.*

7.5 Assessment

The roof lights will be subject to a radiant heat assessment within the stipulated fire scenario to determine if the risk of fire-spread is deemed adequate.

If the risk of fire spread is deemed acceptable, no further protection is required. If the risk of fire spread is deemed inadequate, additional protective measures will be required. The additional measures may include those stipulated in Clause C3.4 of the Building Code of Australia, radiant heat shields, etc.

7.6 Compliance with Performance Requirements CP2

The fire engineering analysis has demonstrated compliance of the proposed Performance Solution with the relevant Performance Requirements.

CP2 Spread of fire
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—
(i) to exits; and
(ii) to sole occupancy units and public corridors; and
(iii) between buildings; and
(iv) in a building.
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -
(i) the function and use of the building; and
(ii) the fire load; and
(iii) the potential fire intensity; and
(iv) the fire hazard; and
(v) the number of storeys in the building; and

[10] Australian Building Codes Board (ABCB), 2019, Guide to the BCA Volume One.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

CP2 Spread of fire
(vi) its proximity to other property; and
(vii) any active fire safety systems installed in the building; and
(viii) the size of the fire compartment; and
(ix) fire brigade intervention; and
(x) other elements they support; and
(xi) the evacuation time.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

8 PS4 – Fire-resistance of Building Elements

BCA Non-Compliance – Specification C1.1

A Performance Solution has been developed to address departures from the Building Code of Australia Deemed to Satisfy Specification C1.1.

Table 3 of the specification requires that internal, loadbearing walls of a Class 3 building are required to achieve a Fire Resistance Level of at least 90/90/90. The existing masonry wall does not achieve this Fire Resistance Level but is proposed to be retained.

8.1 Assessment Methodology

The issue will be addressed as per the methodology in the table below –

Type of assessment	Building Code of Australia Deemed to Satisfy Clause in accordance with A2.4(3)(a)	Assessment Method in accordance with A2.2(2)	Performance Requirements in accordance with A2.4(3)(b)&(c)	IFEG Sub-systems
Absolute Qualitative & Quantitative Deterministic	Table 3 of Specification C1.1	(b)(ii) [other verification method];	CP1 CP2	SS-C Fire Spread and Impact and Control

8.2 Acceptance Criteria

The fire engineering analysis is considered acceptable if it can demonstrate that the degree of fire-resistance achieved by the subject wall is adequate with consideration for the fire safety measures proposed.

8.3 Fire Scenarios

The following design fire scenarios are considered –

Design Scenario[11]	Performance Requirement	Outcome required	Method or solution
Fire Scenario 1 A fire blocks evacuation route (BE) A fire ignites within the building and is exposed to high fuel loads typical of a residential property. The fire growth rate is high and results in flashover if there is no suppression early in the fire growth timeline. The masonry wall within the fire compartment is exposed to high temperatures and is required to resist the spread of fire to ensure a viable evacuation route is maintained.	CP1, CP2	Demonstrate that the level of safety is at least equivalent to the deemed to satisfy provisions	Demonstration that a viable evacuation route (or multiple evacuation routes where necessary) has been provided for building occupants.
Fire Scenario 2 A fire in the normally unoccupied room threatens the occupants of other rooms (UT) A fire ignites within the building and is exposed to high fuel loads typical of a residential property. The fire growth rate is high and results in flashover if there is no suppression early in the fire growth timeline. The masonry wall within the same fire compartment is exposed to high temperatures and is required to resist the spread of fire which may put occupants in other rooms/fire compartments at fire risk.	CP1, CP2	Demonstrate that the level of safety is at least equivalent to the deemed to satisfy provisions	Demonstrate that the masonry wall is able to provide separating construction that can adequately resist the spread of fire.

[11] Building Code of Australia Schedule 7 1.4 Design Scenarios: NCC Performance Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

8.4 Discussion of the Building Code of Australia

The Building Code of Australia deemed to satisfy provisions require that internal walls of a Type A construction achieve a certain degree of fire-resistance (FRL). The relevant deemed to satisfy clause is C1.1 and the relevant parts are shown below in bold and italics –

Excerpt of Clause 3 of Specification C1.1 – Type A Fire-resisting Construction

"Fire-resistance of building elements

In a building to be of Type A construction –

- *(a) Each building element listed in Table 3 and any beam or column incorporated in it, must have an FRL not less than that listed in the Table for the particular Class of building concerned; and*
- *(b) * * * * **
- *(c) Any internal wall required to have an FRL with respect to integrity and insulation must extend to –*
  - *(i) The underside of the floor next above; or*
  - *(ii) The underside of a roof complying with Table 3; or*
  - *(iii) If under Clause 3.5 the roof is not required to comply with Table 3, the underside of the non-combustible roof covering and, except for roof battens with dimensions of 75mm x 50mm or less or sarking-type material, must not be crossed by timber or other combustible building elements; or*
  - *(iv) A ceiling that is immediately below the roof and has a resistance to the incipient spread of fire to the roof space between the ceiling and the roof of not less than 60 minutes; and*
- *(d) A loadbearing internal wall and a loadbearing fire wall (including those that are part of a loadbearing shaft) must be constructed from –*
  - *(i) Concrete; or*
  - *(ii) Masonry; or*
  - *(iii) Fire-protected timber, provided that –*
    - *(A) The building is –*
      - *(aa) a separate building; or*
      - *(bb) a part of a building –*
        - *(AA) which only occupies part of a storey, and is separated from the remaining party by a fire wall; or*
        - *(BB) which is located above or bellow a part not containing fire-protected timber and the floor between the adjoining parts is provided with an FRL not less than that prescribed for a fire wall for the lower storey; and*
    - *(B) The building has an effective height of not more than 25m; and*
    - *(C) The building has a sprinkler system (other than a FPAA101D or FPAA101H system) throughout complying with Specification E1.5; and*
    - *(D) Any insulation installed in the cavity of the timber building element required to have an FRL is non-combustible; and*
    - *(E) Cavity barrier are provided in accordance with Specification C1.13; or*
  - *(iv) Any combination of (i) to (ii); and*
- *(e) * * * * **
- *(f) The FRLs specified in Table 3 for an external column apply also to those parts of an internal column that face and are within 1.5m of a window and are exposed through that window to a fire-source feature.*

Table 1 - Table 3 of Specification C1.1 – Type A construction: FRL of building elements

Building element	*Type A Construction* *Class of building – Fire Resistance Level: (minutes)* *Structural adequacy/integrity/insulation*			
	2, 3 or 4 part	*5, 7a or 9*	*6*	*7b or 8*
External Wall (including any column and other building element incorporated therein) or other external building element, where the distance from any fire-source feature to which it is exposed is—				
For loadbearing parts -				
Less than 1.5m	*90/90/90*	*120/120/120*	*180/180/180*	*240/240/240*
1.5m to less than 3m	*90/60/60*	*120/90/90*	*180/180/120*	*240/240/180*
3m or more	*90/60/30*	*120/60/30*	*180/120/90*	*240/180/90*
For non-loadbearing parts -				
Less than 1.5m	*-/90/90*	*-/120/120*	*-/180/180*	*-/240/240*
1.5m to less than 3m	*-/60/60*	*-/90/90*	*-/180/120*	*-/240/180*

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

3m or more	*-/-/-*	*-/-/-*	*-/-/-*	*-/-/-*
External Column (not incorporated in an external wall)				
Loadbearing columns	*90/-/-*	*120/-/-*	*180/-/-*	*240/-/-*
Non-loadbearing columns	*-/-/-*	*-/-/-*	*-/-/-*	*-/-/-*
Common walls and fire walls	*90/90/90*	*120/120/120*	*180/180/180*	*240/240/240*
Internal walls				
Fire resisting lift and stair shafts				
Load bearing	*90/90/90*	*120/120/120*	*180/120/120*	*240/120/120*
Non-load bearing	*-/90/90*	*-/120/120*	*-/120/120*	*-/120/120*
Bounding public corridors, public lobbies and the like				
Load bearing	*90/90/90*	*120/-/-*	*180/-/-*	*240/-/-*
Non-load bearing	*-/60/60*	*-/-/-*	*-/-/-*	*-/-/-*
Between or bounding sole-occupancy units				
Load bearing	*90/90/90*	*120/-/-*	*180/-/-*	*240/-/-*
Non-load bearing	*-/60/60*	*-/-/-*	*-/-/-*	*-/-/-*
Ventilating, pipe, garbage, and the like shafts not used for the discharge of hot products of combustion -				
Load bearing	*90/90/90*	*120/90/90*	*180/120/120*	*240/120/120*
Non-load bearing	*-/90/90*	*-/90/90*	*-/120/120*	*-/120/120*
Other loadbearing internal walls. Internal beams, trusses and columns	*90/-/-*	*120/-/-*	*180/-/-*	*240/-/-*
Floors	*90/90/90*	*120/120/120*	*180/180/180*	*240/240/240*
Roofs	*90/60/30*	*120/60/30*	*180/60/30*	*240/90/60*

…"

Guide to the Building Code of Australia[12]

The guide to the Building Code of Australia details that the intent of Table 3 of Specification C1.1 is -

'to *specify the fire-resistance level (FRL) and other requirements for building elements in Type A construction*'.

8.5 Assessment

The assessment will include a discussion of the fire-resisting properties of the Masonry wall, and the possible fire-resistance required. The proposed design requires that the building is protected by an Automatic Sprinkler system in accordance with AS2118.4 that will limit temperatures in a fire. This will extend the fire resistance of the wall.

The assessment will include a discussion of the fire detection and occupant warning system and possible enhancements to this.

8.6 Compliance with Performance Requirements CP1 and CP2

The fire engineering analysis has demonstrated compliance of the proposed Performance Solution with the relevant Performance Requirements.

CP1 Structural stability during a fire
A building must have elements which will, to the degree necessary, maintain structural stability during a fire appropriate to—
(a) the function or use of the building; and
(b) the fire load; and
(c) the potential fire intensity; and
(d) the fire hazard; and
(e) the height of the building; and
(f) its proximity to other property; and
(g) any active fire safety systems installed in the building; and

[12] Australian Building Codes Board (ABCB), 2019, Guide to the BCA Volume One.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

CP1 Structural stability during a fire
(h) the size of any fire compartment; and
(i) fire brigade intervention; and
(j) other elements they support; and
(k) the evacuation time.

CP2 Spread of fire
(a) A building must have elements which will, to the degree necessary, avoid the spread of fire—
(i) to exits; and
(ii) to sole occupancy units and public corridors; and
(iii) between buildings; and
(iv) in a building.
(b) Avoidance of the spread of fire referred to in (a) must be appropriate to -
(i) the function and use of the building; and
(ii) the fire load; and
(iii) the potential fire intensity; and
(iv) the fire hazard; and
(v) the number of storeys in the building; and
(vi) its proximity to other property; and
(vii) any active fire safety systems installed in the building; and
(viii) the size of the fire compartment; and
(ix) fire brigade intervention; and
(x) other elements they support; and
(xi) the evacuation time.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

9 PS5 – Number of Exits Required

BCA Non-Compliance – Clause D1.2

A Performance Solution has been developed to address departures from the Building Code of Australia Deemed to Satisfy Clause D1.2

The basement carpark only contain one exit and has a floor area greater than 50m^2. The Deemed-to-Satisfy provisions of the Building Code of Australia require at least 2 exits.

9.1 Assessment Methodology

The issue will be addressed as per the methodology in the table below –

Type of assessment	Building Code of Australia Deemed to Satisfy Clause in accordance with A2.4(3)(a)	Assessment Method in accordance with A2.2(2)	Performance Requirements in accordance with A2.4(3)(b)&(c)	IFEG Sub-systems
Equivalent Qualitative & Quantitative Deterministic	Clause D1.2	(d) [Comparison to Deemed to Satisfied Provisions]	DP4, EP2.2	SS-E Occupant Evacuation and Control

9.2 Acceptance Criteria

The fire engineering analysis is considered acceptable if it can demonstrate that the design provides sufficient exits to enable safe egress in the case of emergency with consideration of the fire safety measures proposed and the number of occupants evacuating.

9.3 Fire Scenarios

The following design fire scenarios are considered –

Design Scenario[13]	Performance Requirement	Outcome required	Method or solution
Fire Scenario 1 A fire blocks evacuation route (BE) A fire ignites within the basement and is subject to low fire growth rates with relatively low fuel loads. The fire smoulders and due to a single exit may impede the path of travel to the single exit.	DP4, EP2.2	Demonstrate that the level of safety is at least equivalent to the deemed to satisfy provisions	An RSET-RSET comparison study between the proposed design and Deemed-to-Satisfy design will be deployed to demonstrate that a viable evacuation route has been provided for building occupants.

9.4 Discussion of the Building Code of Australia

The Building Code of Australia deemed to satisfy provisions require that basements greater than the minimum floor area require 2 or more exits. The relevant deemed to satisfy clause is D1.2 and the relevant parts are shown below in bold and italics –

Excerpt of Clause D1.2 – Number of exits required

"

(a) All buildings – Every building must have at least one exit from each storey.
(b) Class 2 to 8 buildings – In addition to any horizontal exit, not less than 2 exits must be provided from the following:
(i) Each storey if the building has an effective height of more than 25m.
(ii) A Class 2 or 3 building subject to C1.5.
(c) Basements – In addition to any horizontal exit, not less than 2 exits must be provided from any storey if egress from that storey involves a vertical rise within the building of more than 1.5m, unless –
(i) The floor area of the storey is not more than 50 sqm; and
(ii) The distance of travel from any point on the floor to a single exit is not more than 20m.
(d) Class 9 buildings –
(i) Each storey if the building has a rise in storeys of more than 6 or an effective height of more than 25 m.
(ii) Any storey which includes a patient care area in a Class 9a health-care building.

[13] Building Code of Australia Schedule 7 1.4 Design Scenarios: NCC Performance Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

(iii) Any storey that contains sleeping areas in a Class 9c building.
(iv) Each storey in a Class 9b building used as an early childhood centre.
(v) Each storey in a primary or secondary school with a rise in storey of 2 or more.
(vi) Any storey or mezzanine that accommodated more than 50 persons, calculated under D1.13.

NSW D1.2(d)(vii)

(e) Exits from Class 9c building and patient care areas in Class 9a health-care buildings – In a class 9a health-care building and a Class 9c building, at least one exit must be provided from every part of a storey which has been divided into fire compartments in accordance with C2.2 or C2.5.
(f) Exits in open spectator stands – In an open spectator stand containing more than one tier of seating, every tier must have not less than 2 stairways or ramps, each forming part of the path of travel to not less than 2 exits.
(g) Access to exits – Without passing through another sole-occupancy unit every occupant of a storey or part of a storey must have access to –
(i) An exit; or
(ii) At least 2 exits if 2 or more exits are required."

Guide to the Building Code of Australia[14]

The guide to the Building Code of Australia details that the intent of D1.2 is -

'to *require the provisions of sufficient exits to enable safe egress in the case of an emergency*'.

Further commentary by the guide of the clause is as follows –

Basements

"Basement" is not defined in the BCA. A basement is regarded as a below-ground-level storey not counted on the rise in storeys.

Any basement in excess of the minimum floor area specified in D1.2(c)(i) which has travel distance to an exit in excess of that specified in D1.2(c)(ii), must have at least two exits. The reason for this is that the basements present difficulties in terms of egress and fire-fighting. These include:

- *The difficulty in naturally venting smoke from a fire because of the lack of windows; and*
- *The need for occupants to evacuate in the direction of smoke travel. This is the opposite to upper storeys, where people would be evacuating downwards and the smoke travelling upwards.*

9.5 Assessment

The assessment is based on a comparison study between the proposed design and equivalent Deemed-to-Satisfy design for the stipulated fire scenario.

The comparison study will include an RSET-RSET analysis demonstrating that the time for occupants to evacuate in the proposed design is at least equivalent to the equivalent Deemed-to-Satisfy design, and that the required exit is able to accommodate the expected occupant population. The table below identifies the key factors that will be included within the comparison study –

Detail	Proposed Design	Deemed-to-Satisfy Design
Number of Exits	1	2
Travel Distance to Exit (Worst-case scenario)	TBD	As per D1.4 of the Building Code of Australia
Occupant Movement Speed	1.2 m/s Equivalent	1.2 m/s
Total Time to Evacuate	TBD	TBD
Required Safe Evacuation Time (RSET)	TBD	TBD
RSET Difference	TBD	TBD
Occupant Population	As per D1.13 of the Building Code of Australia Equivalent	As per D1.13 of the Building Code of Australia
Total Aggregate Width of Exit(s)	TBD	TBD

[14] Australian Building Codes Board (ABCB), 2019, Guide to the BCA Volume One.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

Rate of Discharge per Exit	TBD	TBD
Fire Safety Measures		
Automatic Sprinkler System	Yes Equivalent	Yes
Sprinkler Design	AS2118.4 Equivalent	AS2118.4
Automatic Smoke Detection System	Yes Equivalent	Yes
Smoke Detection Design	AS16701 with reduced spacing between Smoke Detectors.	AS1670.1
Emergency Exit & Directional Exit Signage	Yes Equivalent	Yes
Design	AS2293.1 (reduced spacing of signage may be required based on outcome of this assessment).	AS2293.1

Based on the outcome of the comparison study, additional fire safety measures may be required to address the offset any additional fire-risk in the proposed design.

9.6 Compliance with Performance Requirements DP4 and EP2.2

The fire engineering analysis has demonstrated compliance of the proposed Performance Solution with the relevant Performance Requirements.

DP4 Exits
Exits must be provided from a building to allow occupants to evacuate safely, with their number, location and dimensions being appropriate to—
(a) the travel distance; and
(b) the number, mobility and other characteristics of occupants; and
(c) the function or use of the building; and
(d) the height of the building; and
(e) whether the exit is from above or below ground level.

EP2.2 Safe evacuation routes
(a) In the event of a fire in a building the conditions in any evacuation route must be maintained for the period of time occupants take to evacuate the part of the building so that—
(i) the temperature will not endanger human life; and
(ii) the level of visibility will enable the evacuation route to be determined; and
(iii) the level of toxicity will not endanger human life
(b) The period of time occupants take to evacuate referred to in (a) must be appropriate to-
(i) the number, mobility and other characteristics of the occupants; and
(ii) the function or use of the building; and
(iii) the travel distance and other characteristics of the building; and
(iv) the fire load; and
(v) the potential fire intensity; and
(vi) the fire hazard; and

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

EP2.2 Safe evacuation routes
(vii) any active fire safety systems installed in the building; and
(viii) fire brigade intervention.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

10 PS6 – When Fire-isolated Stairways and Ramps are Required

BCA Non-Compliance – Clause D1.3

A Performance Solution has been developed to address departures from the Building Code of Australia Deemed to Satisfy Clause D1.3

The main internal stairs are to be used as fire-isolated, however do not comply with the requirements of the Deemed-to-Satisfy provisions of the Building Code of Australia.

10.1 Assessment Methodology

The issue will be addressed as per the methodology in the table below –

Type of assessment	Building Code of Australia Deemed to Satisfy Clause in accordance with A2.4(3)(a)	Assessment Method in accordance with A2.2(2)	Performance Requirements in accordance with A2.4(3)(b)&(c)	IFEG Sub-systems
Absolute Qualitative & Quantitative Deterministic	Clause D1.3	(b)(ii) [Other Verification Methods]	DP5, EP2.2	SS-E Occupant Evacuation and Control

10.2 Acceptance Criteria

The fire engineering analysis is considered acceptable if it can demonstrate that the main stairs can enable safe egress of building occupants in the event of a fire.

10.3 Fire Scenarios

The following design fire scenarios are considered –

Design Scenario[15]	Performance Requirement	Outcome required	Method or solution
Fire Scenario 1 A fire blocks evacuation route (BE) A fire ignites within the building and is exposed to relatively high fuel loads resulting in flashover. Building occupants are required to use the main internal stairway to evacuate the building.	DP5, EP2.2	Demonstrate that the level of safety is at least equivalent to the deemed to satisfy provisions	An ASET-RSET assessment will be deployed to demonstration that a viable evacuation route has been provided for building occupants.

10.4 Discussion of the Building Code of Australia

The Building Code of Australia deemed to satisfy provisions require that fire-isolated stairways achieve a degree of fire safety for building occupant to evacuate during a fire scenario. The relevant deemed to satisfy clause is D1.3 and the relevant parts are shown below in bold and italics –

Excerpt of Clause D1.3 – When fire-isolated stairways and ramps are required

"

(a) *Class 2 and 3 buildings – Every stairway or ramp serving as a required exit must be fire-isolated unless it connects, passes through or passes by not more than –*
   (i) 3 consecutive storeys in a Class 2 building; or
   (ii) 2 consecutive storeys in a Class 3 building.

   And one extra storey of any classification may be included if –

   (iii) It is only for the accommodation of motor vehicles or for other ancillary purposes; or

[15] Building Code of Australia Schedule 7 1.4 Design Scenarios: NCC Performance Requirements

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

(iv) The building has a sprinkler system (other than a FPAA101D system) complying with Specification E1.5 installed throughout; or

(v) The required exit does not provide access to or egress for, and is separated from, the extra storey by construction having –

(A) An FRL of -/60/60, if non-loadbearing; and

(B) An FRL of 90/90/90, if loadbearing; and

(C) No opening that could permit the passage of fire or smoke.

(b) Class 5, 6, 7, 8 or 9 buildings – Every stairway or ramp serving as a required exit must be fire-isolated unless –

(i) In a Class 9a health-care building – it connects, or passes through or passes by not more than 2 consecutive storeys in areas other than patient care areas; or

(ii) It is part of an open spectator stand; or

(iii) In any other case except in a Class 9c building, it connects, passes through or passes by not more than 2 consecutive storeys and one extra storey of any classification may be included if –

(A) The building has sprinkler system (other than a FPAA101D system) complying with Specification E1.5 installed throughout; or

(B) The required exit does not provide access to or egress for, and is separated from, the extra storey by construction having –

(aa) An FRL of -/60/60, if non-loadbearing; and

(bb) An FRL of 90/90/90 for Type A construction or 60/60/60 for Type B or C construction, if loadbearing; and

(cc) No opening that could permit the passage of fire or smoke."

Guide to the Building Code of Australia[16]

The guide to the Building Code of Australia details that the intent of D1.3 is -

'to *indicate when a fire-isolated stairway and ramps are required to enable safe egress in case of a fire*'.

Further commentary by the guide of the clause is as follows –

D1.3 comprises the Deemed-to-Satisfy Provisions for DP5.

Purpose of fire-isolated exits

Fire-isolated exits are required in multi-storey buildings to enable people to evacuate past a storey on fire. They also help the fire brigade carry out search and rescue and firefighting.

Such exits minimise the distance people need to travel in a fire-affected area before accessing a "safe place", such as a fire-isolated stairway.

10.5 Assessment

The assessment will demonstrate that the degree of fire-safety provided by the main internal stairway to occupants is adequate. The fire safety is deemed adequate if the stairway can be considered a safe place. A qualitative discussion of the proposed design detailed in the table below will demonstrate this.

Key elements of the proposed design are the provisions for all doorways providing access to the stairway to be self-closing and fitted with intumescent smoke seals to provide smoke lobbies, and for the building and subsequent stairway to be protected by an Automatic Sprinkler system. This ensures that smoke migration from any storey to the stairway is limited, and the sprinkler system will control a fire and limit the temperatures expected to 200˚C.

Other fire safety measures are included within the proposed design to further mitigate risks.

10.6 Compliance with Performance Requirements DP5 and EP2.2

The fire engineering analysis has demonstrated compliance of the proposed Performance Solution with the relevant Performance Requirements.

DP5 Fire-isolated exits
To protect evacuating occupants from a fire in the building exits must be fire-isolated, to the degree necessary, appropriate to—
(a) the number of storeys connected by the exits; and
(b) the fire safety system installed in the building; and
(c) the function or use of the building; and

[16] Australian Building Codes Board (ABCB), 2019, Guide to the BCA Volume One.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

DP5 Fire-isolated exits
(d) the number of storeys passed through by the exits; and
(e) fire brigade intervention.

EP2.2 Safe evacuation routes
(a) In the event of a fire in a building the conditions in any evacuation route must be maintained for the period of time occupants take to evacuate the part of the building so that—
(i) the temperature will not endanger human life; and
(ii) the level of visibility will enable the evacuation route to be determined; and
(iii) the level of toxicity will not endanger human life
(b) The period of time occupants take to evacuate referred to in (a) must be appropriate to-
(i) the number, mobility and other characteristics of the occupants; and
(ii) the function or use of the building; and
(iii) the travel distance and other characteristics of the building; and
(iv) the fire load; and
(v) the potential fire intensity; and
(vi) the fire hazard; and
(vii) any active fire safety systems installed in the building; and
(viii) fire brigade intervention.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495

11 Conclusions

It is concluded that, subject to the detailed assessment and the application of the requirements of the design requirements based on the limitations and assumptions listed below, the Performance Solutions will meet and comply with the relevant performance requirements.

11.1 Final Design and Other Requirements

The final design requirements that support the Performance Solutions are presented in the table in the Executive Summary of this report. Along with the assumptions and limitations of the solutions and the construction and commissioning, management and use and maintenance issues that are a relevant to the Performance Solutions.

AE&D Pty Ltd A: Suite 3.04, 55 Miller Street, Pyrmont NSW 2009 - Southern Highlands A: Unit 10, 19 Lyell Street, Mittagong NSW 2575
Sutherland Shire A: Suite 20, Level 1 Regus, 29 Kiora Road, Miranda NSW 2228
P: (02) 9571 8433 E: admin@aedconsulting.com.au - W: www.aedconsulting.com.au ABN: 15 149 587 495