Fire Safety Performance-Based Design Report (FER)

352 King Georges Road Beverly Hills

Report Number: 240298-FER

Date: 18/03/2025

Version B

Client: Sitaco Developments

1 DOCUMENT CONTROL

Document Details	
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Approved For Issue	
Approver Signature	Signed  William Mark Anderson FRICS, FiFireE BSc (Hons) Director of Fire Engineering C10 BPB 2511, RPEQ 16514 | QBCC License A1234148

2 EXECUTIVE SUMMARY

PROACT has been engaged by Sitaco Developments for the professional fire engineering services to formulate fire safety design solutions for the BCA DTS provision departures associated with the proposed development at 352 King Georges Road Beverly Hills

This document (Fire Safety Performance-Based Design Report (FER)) describes in detail the design considerations regarding Fire and life Safety compliances to the Building Code of Australia (BCA), also known as National Construction Code 2022 (NCC)[1], and applicable Australian Standards, including any other project-specific requirements as listed in the Project Scope, based on a reasonably practicable approach.

This Fire Safety Performance-Based Design Report (FER) was prepared generally in accordance with the methodology set out within the Australian Fire Engineering Guidelines[2] (AFEG) and undertaken in accordance with the Engineers Australia Society of Fire Safety – Code of Practice.

The Fire Engineering process involves the collaborative development and agreement of an appropriate methodology, structure and trial concept(s) by relevant stakeholders. In conjunction with meetings and correspondence with relevant stakeholders and authorities having jurisdiction, the PBDB forms the basis for further detailed fire safety analysis and design presented in the Fire Engineering Report.

As confirmed by the Building Certifier, the BCA-DTS provision departures and proposed performance solutions for this project are detailed in Section 3.2 of this report.

The fire engineering strategy/requirements are detailed in Section 7 and the requirements for standards of construction, commissioning, management and maintenance in Section 8 shall be provided to the building. It is the responsibility of individual stakeholder or discipline consultant to ensure that the relevant fire engineering requirements in this report are correctly incorporated into their design.

[1] ABCB, 2022. Building Code of Australia - Volume 1
[2] ABCB, 2021. Australian Fire Engineering Guidelines

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3 INTRODUCTION

3.1 Project

The project relates to the proposed new building at 352 King Georges Road Beverly Hills. The report is for:

- The proposed construction of a three (3) storey, shop top housing development.
- The development comprises a shop on ground floor, with a two-storey residential unit above and associated carparking.

A 3D architectural rendering is shown in Figure 3-1, and a site map based on Nearmap is shown in Figure 3-2.

Figure 3-1: 3D architectural rendering

Figure 3-2: Site map based on nearmap[3]

3.2 Description of Work

PROACT has been engaged to provide performance solutions to address the BCA-DTS provision departures.

[3] https://apps.nearmap.com/maps/#/P14Y0xl3QnS7K0_lOJd7ew/@-33.9413689,151.0764831,21.00z,0d/V/20241117

3.3 Summary of Fire Safety Performance Solutions

The building design incorporates a combination of Performance Solutions and Deemed-to-Satisfy (DtS) Solutions that must together comply with the Performance Requirements of the BCA. The Performance Solutions relating to fire safety for this project is in Table 3-1.

Analysis No.	BCA DTS Provision	Description of the Performance Solution	Performance Requirement(s)
A	C4D3	Permission of the following • Door and window openings on First floor and Second floor less than 3m from the allotment boundary allowed to be non-FRL openings	C1P2

Table 3-1: Performance Solutions relating to fire safety

3.4 Scope and Limits of Report

For any fire safety elements that are not specifically addressed by Performance Solution, they must be designed and installed as per NCC DtS provisions.

Any additional Performance Solutions proposed by the Project Team during the design process must be raised by the respective team member, for further instruction from the Client and Project Certifier/BCA consultant, to facilitate any changes to this report and any additional stakeholder consultation (if required)

The Building Certifier for the purposes of considering applications for building permits relating to the proposed building and construction works at the above address. In considering the applications, the issues described in Section 3.3 were identified as varying from the deemed-to-satisfy (DTS) provisions of the BCA.

The Client has requested that these issues be considered as Performance Solutions and addressed in accordance with appropriate methodologies and procedures so as to satisfy regulatory requirements for the project. The analysis of the concept fire safety strategy against stakeholder agreed objectives will be reported in the Fire Engineering Report, and will provide a technical opinion to the Authorities Having Jurisdiction in their considerations of approving the proposed design for compliance with the applicable regulations.

The analysis will be consistent with the objectives and limitations of the Society of Fire Safety Code of Practice, and therefore does not specifically consider arson (other than as a source of initial ignition), multiple simultaneous ignition sources, acts of terrorism, protection of property (other than adjoining property), business interruption or losses, or personal or moral obligations of the owner / occupier.

PROACT will develop the fire safety strategy for this project taking note of our duty as designers of workplaces under the relevant workplace safety legislation. Other practitioners documenting

these designs may also have a duty under such legislation which they must consider in preparing their designs.

3.5 Regulatory Framework

For NSW, the development is required to obtain approval under the Environmental Planning and Assessment Act 1979 (as amended) and the Environmental Planning and Assessment Regulations 2021. Through these Acts and Regulations, the National Construction Code (NCC) is given legal effect.

3.6 Information Considered for Fire Engineering Brief

The following documents or information have been considered in the formulation of this Fire Engineering Brief:

(i) Regular design team meetings and communications
(ii) BCA information by the BCA consultant, refer to Section 10.1.
(iii) Architectural drawings associated with this report are in Section 10.5.

3.7 Fire Safety Design Objectives

3.7.1 Overall Objectives

The overall Fire safety engineering objectives are:

- Limit spread of smoke and/or fire within the facility.
- Prevent spread of fire and any physical damage to other neighbouring properties.
- Safely evacuate occupants potentially at risk to open space or location of relative safety.
- Facilitate a prompt and efficient response by emergency responders and fire brigade.

3.7.2 Loss Control Objectives

Consideration of specific issues such as property and asset protection, business interruption, insurance related risks or community impact as a result of fire losses are specifically excluded and are therefore beyond the scope of this report.

While arson as a single point of ignition may be considered in the analysis, multiple simultaneous ignition sources, use of accelerants, sabotage of fire protection systems or terrorism are not included as part of the report scope.

It should however be noted, as is advised, that due to the client's request to develop performance solutions for the project, fire and smoke damage may vary when compared to a building design that complies with the BCA-DTS provisions.

It is recommended that the building owner liaises with its relevant insurers on this matter.

3.7.3 Regulatory Objectives

To meet the regulatory requirements, the design is to be in accordance with the Building Code of Australia. Compliance with the fire safety objectives in the BCA is achieved by satisfying the relevant BCA performance requirements, as determined by the authorities having jurisdiction.

3.7.4 Fire Brigade Objectives

General fire brigade objectives are addressed in the relevant performance clauses under fire brigade intervention. The fire brigade objective throughout Australia is to protect human life and property. Other brigade responsibilities that may be contained within their statutory act or other objectives are beyond the scope of this report.

3.7.5 Client Objectives

The client has not indicated any additional fire safety objectives to those required by the relevant statutory requirements, as described in the BCA. Therefore, asset protection and community impact of fire are excluded from the analysis outcomes.

3.7.6 Variations to Other Objectives to be Addressed

No other fire safety objectives requiring assessment have been identified by stakeholders during the Fire Engineering Brief process.

3.8 Design Documentation & Reporting

The results of the fire engineering study will set out clearly the basis of the concept fire safety strategy design, the calculation procedures used and any assumptions made during the report.

The fire safety engineering process, including preparation of this Report, has been undertaken in accordance with the Australian Fire Engineering Guidelines. The typical process is summarised in Figure 3-3.

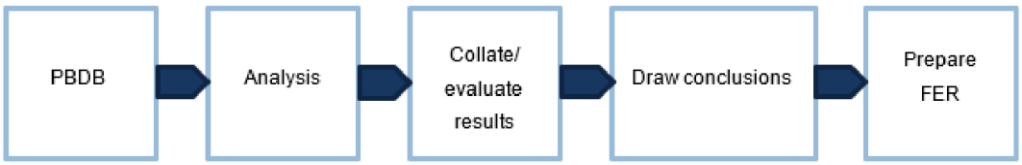


Figure 3-3: Typical fire safety engineering process.

The format of the report will typically contain the following information in two parts:

PART A – Fire Safety Performance-Based Design Brief (PBDB)

1. Objectives of the study
2. Description of the building and its type of occupancy
3. Development of the trial concept designs
4. Results of the Fire Engineering Brief process.

PART B – Fire Engineering Report

1. Fire engineering analysis of results
2. Identification of fire safety strategy; i.e. The fire safety solution to include fire protection systems, fire prevention measures system performance levels, etc.
3. References e.g. Drawings, design documentation and technical literature
4. Conclusions to show that a reasonable level of fire safety has been achieved
5. Analysis of fire safety strategy against relevant objectives

The relevant issues identified in the fire safety strategy will require full review and implementation during the design, construction and operation phases of the project. This will then require the approval/regulatory authority and owner/operator to confirm the installation prior to occupation.

3.9 Fire Engineering Stakeholders

The relevant stakeholders of this project are nominated in Table 3-2 and Table 3-3 below.

Name	Organisation	Role
Millard Joseph Meray Abou-Mehrez	Sitaco Developments	Client representative
Millard Joseph Meray Abou-Mehrez	Sitaco Developments	Project manager
Tim O'Reilly Chloe Kitching	Building Certifier	Building Certificate Australia
Deniz Sertlioglu	BCA Consultant	Western Sydney Building Certifiers
Antoine Farah	Fire alarm and Service Engineer	Viscona Pty Ltd
Luke Nguyen	EPW DESIGNS	Architect or Building Designer
Mark Anderson Alex Zhu	ProAct Fire Engineering	Fire engineer
Relevant Engineer	FRNSW	Fire brigade

Table 3-2: Project stakeholders

Role	Name and BPB number	Organisation and phone	Email address
BCA consultant	Deniz Sertlioglu BDC0985	Western Sydney Building Certifiers 0423 211 830	*Deniz@wsbcertifiers.com.au*
Certifier	Tim O'Reilly BDC3184	Building Certificate Australia 0438 407 495	*tim@bcaustralia.net.au*
FRNSW reviewers	FRNSW use only FRNSW use only	Fire and Rescue NSW 02 9742 7434	*firesafety@fire.nsw.gov.au*

Table 3-3: Project stakeholders in FRNSW Consultation form

4 PRINCIPAL BUILDING AND OCCUPANTS CHARACTERISTICS

4.1 Building Characteristics

4.1.1 General Description

The project relates to the development of a building at 352 King Georges Road Beverly Hills, as per the BCA report (refer to Section 10.1)., the building information is as follows:

Part of Project	Construction Determination
Building Code of Australia Volume 2022	
Classification	**4, 6 & 10a**
Rise in Storeys	**3**
Type of Construction	**B**
Effective Height (m)	**<25m**

Table 4-1: Building information.

4.1.2 Location Plan

Refer to Section 3.1 for the location plans.

4.1.3 Unusual or High Hazard Factors

Any dangerous goods to be stored in the property (if applicable) are to be addressed by way of adherence with the relevant codes and standards.

- For this building, we have not been advised by the client or the design team for any special hazards.

4.2 Dominant Occupant Characteristics

4.2.1 Occupant Profile (current fitout)

We understand that the characteristics of the building population are as described below in Table 4-2.

Item for Occupant characteristics	Staff	Visitors	Residents
State	Awake Alert	Awake Alert	Awake Asleep
Physical Attributes	In line with general public	In line with general public	In line with general public
Mental Attributes	Able to understand and interpret cues, take instruction and implement decisions independently	Able to understand and interpret cues, take instruction and implement decisions independently	Able to understand and interpret cues, take instruction and implement decisions independently
Level of Assistance Required	Limited	Limited	Limited
Level of assistance available	Other Staff	Other Staff	N/A
Emergency training	Fire drills for staff	N/A	N/A
Building Familiarity	Familiar for staff	Familiar for regular visitors Unfamiliar for new visitors	Familiar

Table 4-2: Occupant Profile

4.2.2 Occupant Number

The occupant load for the building shall be as per NCC Table D2D18.

5 Hazards

A review of fire hazards has been undertaken to identify the potential fire risk associated with the performance solutions.

5.1 General Layout

The layout of the proposed development is considered to be legible and does not result in any apparent way finding difficulties, and there does not appear to have any unusual egress provisions. No exposures to fire source features are evident, and none have been advised by the design team.

5.2 Hazards and Preventative and Protective Measures Available

A summary of Hazards and Preventative and Protective Measures is shown in Table 5-1.

Area	Hazards Identified	Preventative and Protective Measures
Retail shop	Ignition Sources ▪ Typical items, including: ▪ Electrical faults ▪ Equipment fault/overheating ▪ Short circuit ▪ Bundled cabling ▪ Rubbish/ debris ▪ Mechanical ventilation equipment ▪ Vandalism Typical fuel loads, including: ▪ Retail products ▪ Office items ▪ Rubbish bins ▪ Furniture ▪ Storage general items • Plastic components	Preventative Measures: • No smoking policy in the Class 6 part and common area • Presence of other occupants and staff • Cleaning staff Protective Measures • Smoke alarm system • Smoke detection system • Building occupant warning system • Portable fire extinguishers • Exit signage and emergency lighting • Fire rated construction/separation
Garage	Ignition Sources: ▪ Electrical faults ▪ Smoker's material ▪ Motor vehicle fault ▪ Heating equipment ▪ Arson Fuel Load: ▪ Vehicles ▪ Rubbish bin	

Apartment unit	Ignition Sources: ▪ Short circuit ▪ Electrical faults ▪ Incendiary / suspicious ▪ Smokers material Fuel Load: ▪ Sofa/couches/beds ▪ Chairs and tables ▪ Rubbish bins ▪ Linings and coverings including curtains and blinds	

Table 5-1: Hazards and Preventative and Protective Measures

6 Emergency Egress Strategy

The egress strategy for the building in the case of a fire emergency shall be in accordance with NCC requirements.

7 FIRE SAFETY MEASURES

The fire safety measures required for this project are described below. Specific details of design for the building and services are the responsibility of each discipline consultant in respect of incorporation of fire engineering specific requirements into their design.

It should be noted that the fire engineering requirements and strategy in this section are only provided to address the BCA-DTS provision departures specified in Section 3.3. Other issues/areas in the building which are not part of this project, will not be included in this report.

All other items relating to fire and life safety not specifically described within this section is to be provided in accordance with the BCA DtS Provisions, or separately accepted by the Appropriate Authority as defined by the BCA.

All systems and management-in-use procedures (Section 8) shall be considered as Essential Safety Provisions for the building.

Any changes to the layout, active fire safety systems or locations of exits must be reviewed by a Professional Engineer as defined by the BCA. It shall be the Professional Engineers responsibility to ascertain if the alterations may negatively affect the fire safety strategy documented herein.

No changes or alterations to the fire safety strategy documented herein is permitted without written consent from PROACT.

7.1 Compartmentation

7.1.1 Fire and Smoke Compartmentation Strategy

The building shall be constructed as Type B Construction, including complying with the requirements of:

- Separation of classification in the same storey and
- Separation of classification in different storey

7.1.2 Passive Fire Protection

All services penetration through fire and/or smoke rated construction shall be suitably labelled in accordance with AS4072. The head contractors shall prepare services penetration register/schedule and associated drawings.

7.1.3 Opening protection

The building opening protection is in accordance with NCC Part C4.

- For the Ground floor (both sides, Figure 7-1), opening protection shall meet the DtS requirements, with the minimum fire wall required as:
    - Full height fire rated walls extend to the front and rear boundary

- For the First floor (King Georges Road side only, Figure 7-2), opening protection shall meet the DtS requirements, with the minimum fire wall required as:
    - Full height fire rated wall extends to the boundary King Georges Road side

The following is permitted by a performance solution

- For the First floor (Moondani Lane side only, Figure 7-2),
    - Full height fire rated wall is allowed to extend to only 1.5m in lieu of 3m for Moondani Lane side.
        - Except for the non-FRL openings shown in Figure 7-4, the wall facing Moondani Lane side shall be fire rated.
- For Second floor (both sides, Figure 7-3)
    - Full height fire rated wall is allowed to extend to only 1.5m in lieu of 3m for Moondani Lane side.
        - Except for the non-FRL openings shown in Figure 7-4, the wall facing Moondani Lane side shall be fire rated.
    - Full height fire rated wall is allowed to extend to only 1.5m in lieu of 3m for King Georges Road side.
        - Except for the non-FRL openings shown in Figure 7-4, the wall facing for King Georges Road side shall be fire rated.
- The subjected allowed non-FRL openings for First floor and Second floor is shown in Figure 7-4.
- Refer to Section 9 for the assessment of the performance solution
- Refer to Section 7.3 for the additional fire/smoke detection requirement to support the performance solution.

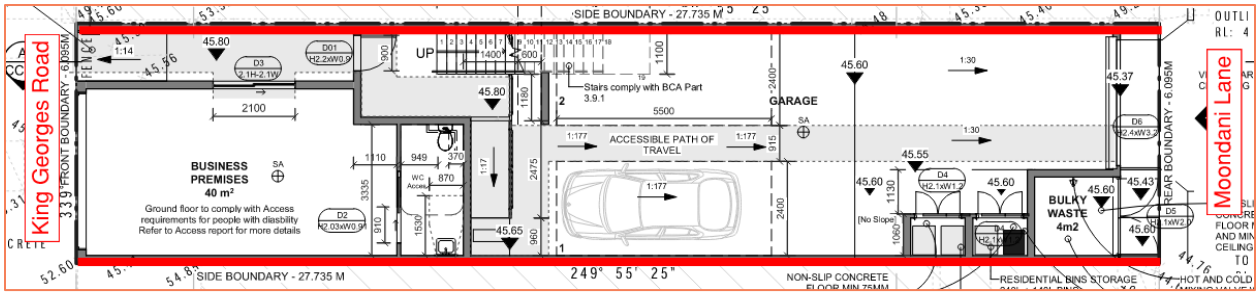


Figure 7-1: Indicative fire wall markup – Ground floor. Note: fire wall and fire rating markup may be indicative, and the building shall meet NCC DtS and certifier's requirements for fire rating in the DtS areas

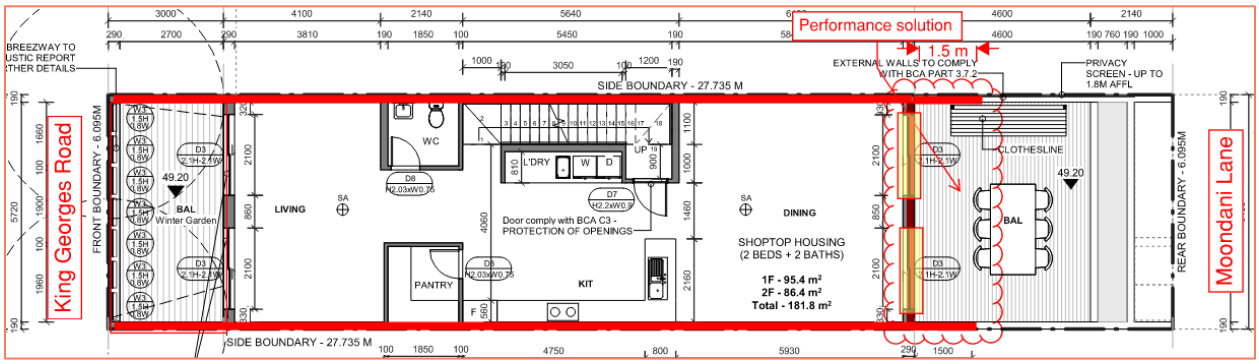


Figure 7-2: Indicative fire wall markup – First floor. Note: fire wall and fire rating markup may be indicative, and the building shall meet NCC DtS and certifier's requirements for fire rating in the DtS areas

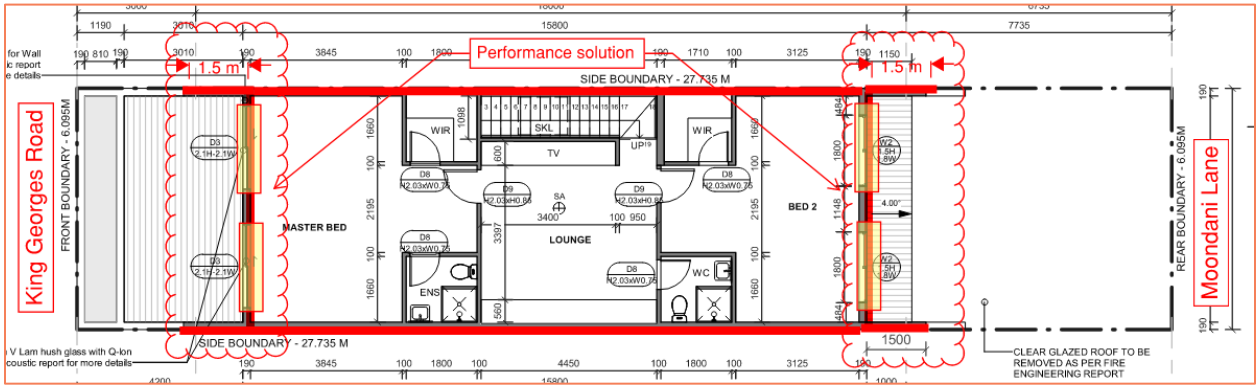


Figure 7-3: Indicative fire wall markup – Second floor (red solid line: fire wall; yellow shade: non-FRL openings). Note: fire wall and fire rating markup may be indicative, and the building shall meet NCC DtS and certifier's requirements for fire rating in the DtS areas

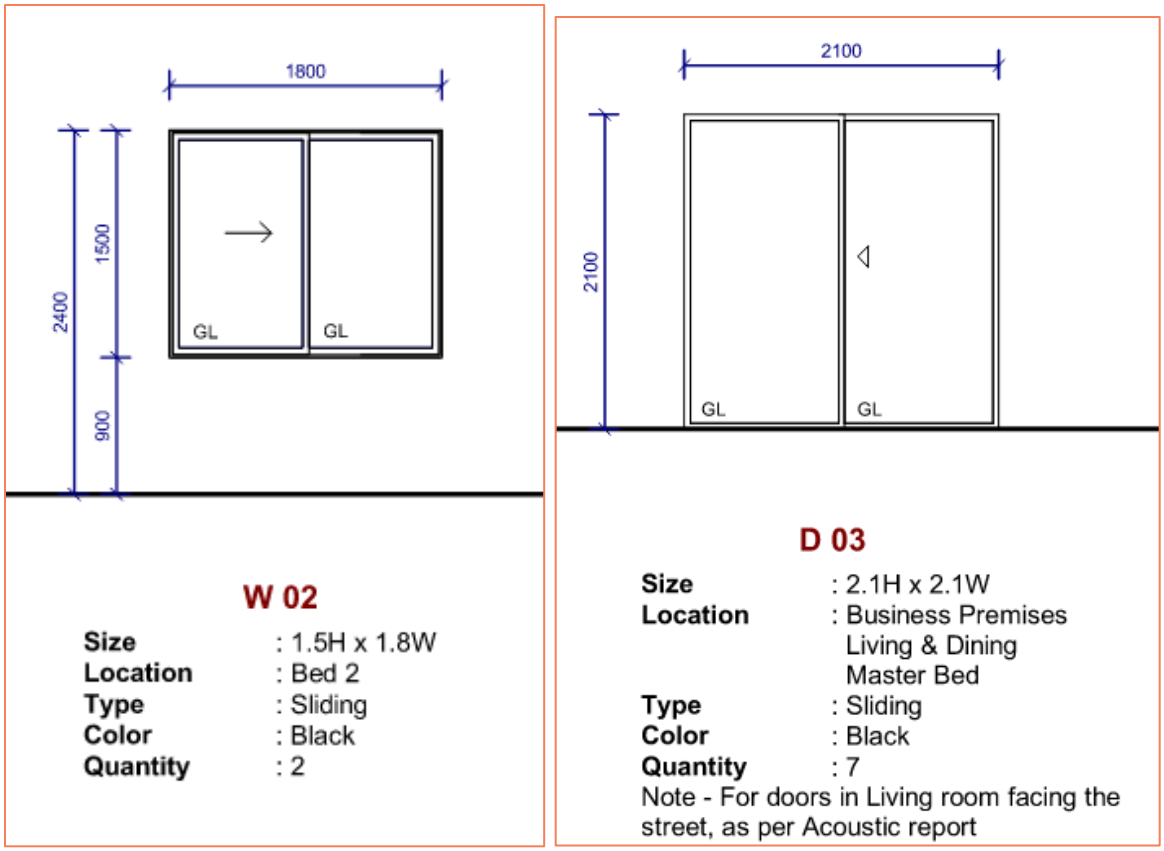


Figure 7-4: Subjected allowed non-FRL openings for First floor and Second floor

7.2 Egress Provisions

The building egress provisions are to comply with BCA Section D.

7.3 Active Fire Safety Systems

Fire safety requirements pertaining to base building active fire safety systems shall comply with requirements of the BCA report, refer to Section 10.1 for more details.

7.3.1 Fire Detection & Alarm

The following fire/smoke detection is required:

- The Class 4 residential unit shall be provided with a smoke alarm system complying with NCC Clause E2D8 and AS 3786. Note: Suitable alarms shall be provided to avoid the occurrence of false alarms.
- In addition to this, additional ceiling mounted heat detector complying with AS 1670.1-2018 shall be provided within 1.5 metre of the unit entry door.
- The Class 6 portion and remaining common areas shall be provided with a smoke detection system complying with NCC Clause E2D9, Spec 20 and AS 1670.1-2018.

Note: Note: Suitable detectors shall be provided to avoid the occurrence of false alarms, and alarm mitigation methods as noted in Section 3.2 of AS 1670.1-2018 should be considered to mitigate false alarms.

- Upon the activation of any detector in the Class 6 portion, common areas and the one heat detector inside the unit the building wide occupant warning system shall be activated.
- The building wide occupant warning system shall be capable of delivering a minimum sound pressure level (SPL) of 75dB(A) at the bedheads (with the bedroom door closed) within the residential unit, noting that all other areas within the residential units need not achieve any specific SPL. A building occupant warning speaker would be required in each bedroom.

7.3.2 Other fire safety systems

As per the BCA report, the other fire safety systems shall be provided for the building as per NCC requirements, including (but may not be limited):

- Portable fire extinguishers
- Wayfinding (Exit and Directional Signage and Emergency Lighting)
- Note: Fire hydrant is not required as the building is not more than 500 sqm as per the BCA report (Figure 7-5)

3.4 Section E – Services and Equipment

PART E1 – FIRE FIGHTING EQUIPMENT			
Clause	**Description**	**Status**	**Action**
E1D2	Fire hydrants	N/A	Building is not greater than 500sqm.

Figure 7-5: Reference of nil Fire hydrant requirements from the BCA report

7.4 Electric Vehicle Charging Advice (Not the Scope of This Work)

It is our understanding that there is currently NO electric vehicle charging equipment provided in the garage or indoor areas.

- The proposed Performance Solutions and fire engineering advice in this document also have not considered any potential hazards associated with indoor charging of cars operated by lithium battery.
- Regardless, if electric vehicle charging equipment are to be allowed for in the indoor areas, the building must be reviewed again by the Project design team, where additional passive and active fire safety systems are likely required to demonstrate fire and life safety, and to obtain acceptance from attending fire brigade. It is anticipated that strategic location of

charging points, additional fire separation walls, review of fire alarm system, etc, will be required.

Refer to Section 8 Standards of Construction, Commissioning, Management and Maintenance for more information.

8 STANDARDS OF CONSTRUCTION, COMMISSIONING, MANAGEMENT AND MAINTENANCE

8.1 Construction

Building works associated with the installation of the proposed fire safety measures and construction elements are to be undertaken by appropriately qualified persons. Co-ordination of such works is to be undertaken by a project manager and / or construction manager nominated for the project.

8.2 Commissioning

Fire safety measures are to be the subject of any testing and commissioning requirements specified within the relevant Australian design and installation standards.

The following inspections of the completed building works should form part of the commissioning phase of the building:

- An inspection by the project fire engineer for the purposes of reviewing the consistency of the fire safety installations and architectural features with the fire safety strategy presented as the basis of the fire engineering report, with supporting certification from the relevant designers and installers to be provided, where necessary.
- Inspections by the project stakeholders, where necessary, to determine that the fire safety installations and architectural features comply with the fire safety strategy presented as the basis of the fire engineering report.

The details of the fire engineering report are to be included within the building' fire safety schedule to assist future essential services auditing of the building.

8.3 Management-In-Use

A number of management procedures and policies shall be implemented on an on-going basis to enable the basis of the fire safety design analysis to be satisfied.

8.3.1 General

- A house-keeping policy is to be implemented based on avoiding the accumulation of rubbish or storage within the common areas, including the exits and the paths of travel to the exits – exit routes are to be free from obstructions.
- **Non-smoking policy** in the common areas is to be implemented, supported by signage placed in appropriate locations.
- Management procedures are to be identified and addressed the process of isolation for the active fire protection systems (such detection systems) for maintenance or re-configuration purposes, which take into account the following recommendations:

8.3.2 Management of active fire protection systems

Sound management of active fire protection systems includes:

- Using primarily one company for fire system isolations.
- Re-instatement of system at the completion of work each day.
- An approval system in place which requires written permission from management before isolation can take place and a statement as to the length of isolation (which must generally be less than one day)
- A requirement for the contractor to sign-off after completion of the work.

8.3.3 Evacuation and emergency response plan

An evacuation and emergency response plan is to be developed and implemented for the building in accordance with the principles of AS 3745–2010. The development of emergency procedures is to be consistent with the egress strategy for the building. The plan is to include / address the following matters as a minimum:

- Emergency plans
- Emergency evacuation equipment
- Emergency response procedures

8.3.4 Hot works permit policy

A hot works permit policy is to be adopted to address the undertaking of hot works within the building, which can present as a potential ignition source. A permit is to be submitted to building management for any hot works process involving cutting, welding, heating, angle grinding or any other related practices and returned to the authorizing person upon completion of the associated works, addressing:

- Risks associated with exposure of adjacent combustibles;
- Working within confined spaces;
- Fire watch procedures;
- Gas testing requirements.
- Each permit is required to be returned to the authorizing person upon completion of the associated works.

8.4 Maintenance

Under the necessary Acts all prescribed fire safety installations shall be adequately maintained. Fire safety installations include any installations provided as part of the performance solutions prescribed in this report.

The fire safety installations shall be maintained in accordance with AS1851 and annual fire statement (or other relevant required documentation by the local authorities and fire brigade) undertaken by an independent suitably qualified representative (e.g. from an Essential Services Maintenance Company). Failure to do so will render the outcomes of this report invalid, null and void. Up to date logbooks must be provided on site.

9 ANALYSIS A – RATIONALISATION OF UNPROTECTED OPENING

9.1 Summary Of BCA DTS

This section details the proposed assessment methodology and acceptance criteria for the Performance Solution associated DtS departures listed below.

Analysis No.	BCA DTS Provision	Description of the Performance Solution	Performance Requirement(s)
A	C4D3	Permission of the following • Door and window openings on First floor and Second floor less than 3m from the allotment boundary allowed to be non-FRL openings	C1P2

Table 9-1: Summary of performance solution

9.2 Assessment Methodology

Item	Description
Compliance Pathway BCA A2.2(1)	☒ BCA A2.2(1)(a) "compliance with all relevant Performance Requirements." OR ☐ BCA A2.2(1)(b) "the solution is at least equivalent to the Deemed to Satisfy Provisions." AND ☒ BCA A2.2(2)(b)(ii) "Other Verification Methods, accepted by the appropriate authority that show compliance with the relevant Performance Requirements." ☐ BCA A2.2(2)(c) "Expert Judgement" ☐ BCA A2.2(2)(d) "Comparison with the Deemed to Satisfy Provisions"
Method of Analysis	☒ Absolute ☐ Comparative ☒ Quantitative ☒ Qualitative

Table 9-2: BCA Compliance Pathway

9.3 Intent of BCA and Acceptance Criteria

The intention of the C1P2 is to deal with the spread of fire both within and between buildings (including risk of spread of fire via the external walls of the building).

The analysis is based on Other Verification Methods, The Performance Solution is acceptable where it is demonstrated that the incident radiant heat flux via the openings is less than 20 kW/m² for critical heat flux on the boundary.

The following factors are also considered for the performance requirements:

- The location of the subject openings
- The construction conditions around the openings
- The fire hazard around the subject openings, which means the danger in terms of potential harm and degree of exposure arising from the start and spread of fire
- The fire brigade access and intervention for potential fire.

9.4 Analysis

9.4.1 Background

To calculate the radiation, Thermal Radiation Analysis model (TRA) in FiRE package was used. As per the User Manul[4]

- TRA is provided to analyse complex or simple thermal radiation problems normally associated with fire engineering design including fire spread between buildings and egress via evacuation routes.
- It also be used to verify configuration factors used within heat transfer calculations.

Note:

- The critical heat flux is the minimum heat flux required to ignite the combustible. the critical heat flux values ranged from a low of 13.7 kW/m^2 to a high of 47 kW/m^2. [5] As suggested by the data[6] [7], It is also found that most the external wall construction materials are with the critical heat flux more than 20 kW/m^2.
- The radiant heat flux 20 kW/m² is considered to be conservative, as it is below the minimum incident heat flux required by Australian NCC verification method, and below the minimum incident heat flux required by other countries such as New Zealand.

The total energy emitted as radiation by a body can be represented by the following equation[8]:

$$E = \phi_{Total} . \varepsilon . \sigma . T^4$$

where: E is the emitted energy (W/m^2)

ϕ_{Total} is the configuration factor

[4] FiRE – Fire, Radiation & Egress Analysis 12 January 2024 (User Manuel), Rev 3.2
[5] Fire Indicators, Engineering Project Report, Directorate For Engineering Sciences Washington, by Dean L. LaRue DC 20207, U.S. Consumer Product Safety Commission August 2002
[6] Chapter 6, Estimating The Ignition Time of a Target Fuel Exposed to a Constant Radiative Heat Flux, United States Nuclear Regulatory Commission
[7] Leong Poon, (2002), "Literature Review of Bushfire Construction Materials and Proposed Test Protocols for Performance Assessment", Warrington Fire Research
[8] BRE External fire spread: building separation and boundary distances (BR 187), second edition, 2014

ε is the emissivity of the body

σ is the Stefan-Boltzmann constant (5.67×10^{-8} W/m^2.K^4)

T is the temperature (K)

The calculation of the energy emitted will assume that the following

- Emissivity of the body is 1.
- Temperature of the emitting radiator panel is 830°C. Drysdale[9] quoting the work of McCaffrety stated that the average temperature, which is approximately constant in the persistent flaming part, is 800°C. The upper parts of the flame would have a lower temperature and therefore reduces the effective temperature of the radiator panel.

9.4.2 Results

The setup and results of the TRA model are shown as follows:

- Figure 9-1 and Figure 9-2 show TRA model setup for both First and Second floors (red panels: unprotected openings as emitter; green panels: unprotected allotment boundary as receiver). Note: the black shadows behind are the emitters on the other side.
- The subjected allowed non-FRL openings for First floor and Second floor is shown in Figure 7-4.
- Figure 9-3 shows radiation results for both First and Second floors by TRA. It can be found that the highest radiation is the location close to the unprotected openings; however, the maximum radiant heat flux is less than (<) 20 kW/m², thus it is acceptable.

[9] D Drysdale, An Introduction to Fire Dynamics, 2nd ed, John Wiley & Sons, Chichister, 1999, p. 133

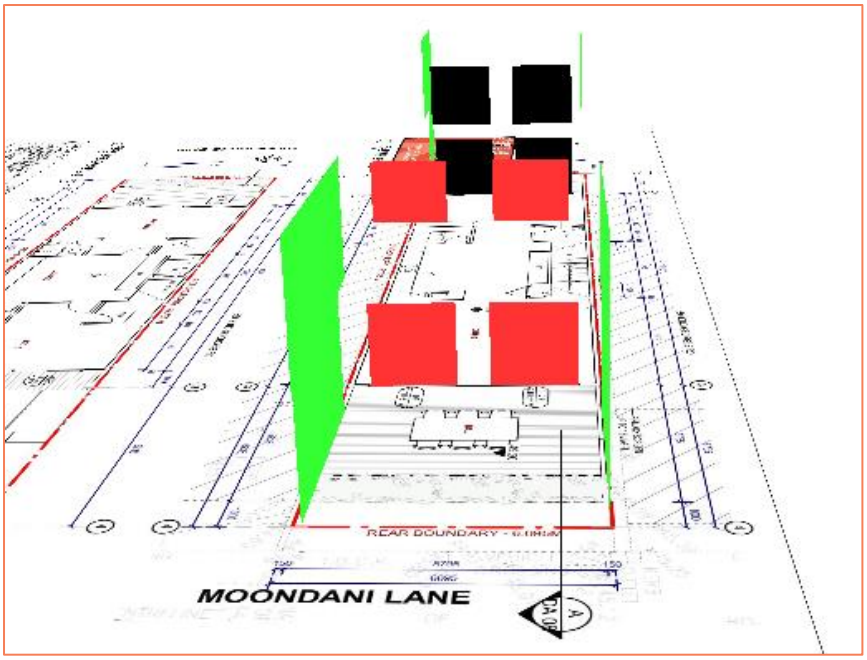


Figure 9-1: TRA model setup Moondani Lane side for both First and Second floors (red panels: unprotected openings as emitter; green panels: unprotected allotment boundary as receiver). Note: the black shadows behind are the emitters on the other side

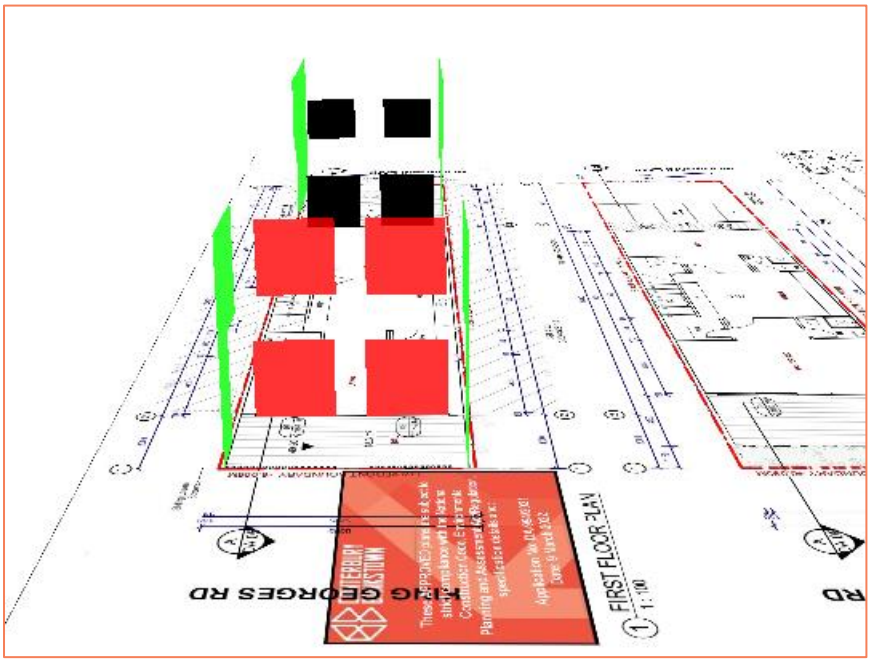


Figure 9-2: TRA model setup King Georges Road side for both First and Second floors (red panels: unprotected openings as emitter; green panels: unprotected allotment boundary as receiver). Note: the black shadows behind are the emitters on the other side

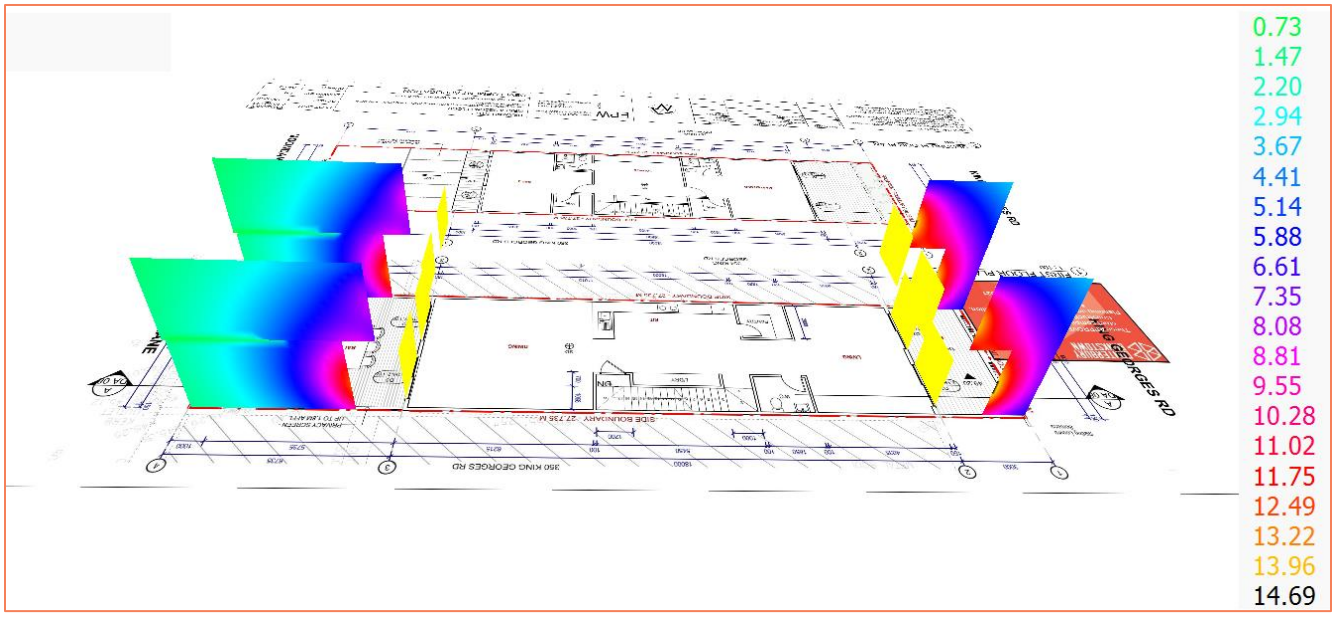


Figure 9-3: Radiation results for both First and Second floors by TRA

- The following paragraph is a summary of the maximum radiant heat flux on each allotment boundaries, and the results further shows that the maximum radiant heat flux is less than (<) 20 kW/m², thus it is acceptable. (note: L1 = First floor and L2 = Second floor)

Total Area of receiver L1 - North boundary - King Georges = 15.080m2
Average incident radiation on receiver L1 - North boundary - King Georges = 4.770kW/m2
Maximum radiation on receiver L1 - North boundary - King Georges = 12.767kW/m2

Total Area of receiver L2 - South boundary - King Georges = 33.665m2
Average incident radiation on receiver L2 - South boundary - King Georges = 4.249kW/m2
Maximum radiation on receiver L2 - South boundary - King Georges = 13.030kW/m2

Total Area of receiver L2 - North boundary - King Georges = 18.585m2
Average incident radiation on receiver L2 - North boundary - King Georges = 3.866kW/m2
Maximum radiation on receiver L2 - North boundary - King Georges = 8.575kW/m2

Total Area of receiver L1 - North boundary - Moondani = 4.350m2
Average incident radiation on receiver L1 - North boundary - Moondani = 9.703kW/m2
Maximum radiation on receiver L1 - North boundary - Moondani = 14.692kW/m2

Total Area of receiver L1 - South boundary - Moondani = 4.640m2
Average incident radiation on receiver L1 - South boundary - Moondani = 9.526kW/m2
Maximum radiation on receiver L1 - South boundary - Moondani = 14.686kW/m2

Total Area of receiver L2 - North boundary - Moondani = 8.410m2
Average incident radiation on receiver L2 - North boundary - Moondani = 7.930kW/m2
Maximum radiation on receiver L2 - North boundary - Moondani = 13.915kW/m2

Total Area of receiver L2 - South boundary - Moondani = 8.990m2
Average incident radiation on receiver L2 - South boundary - Moondani = 7.955kW/m2
Maximum radiation on receiver L2 - South boundary - Moondani = 14.525kW/m2

For fire brigade rescue,

- The building is to be provided with Smoke alarm system and Smoke detection system (refer to Section 7.3.1 for details). The detection systems are expected to active at a smouldering fire stage, initialising earlier warning. Thus, once fire is detected, the fire may be controlled by occupants initially if it is safe to do so, and the overall fire size for fire brigade to intervene with may not be reduced.
- Due to the alarm system, the overall evacuation time is expected to be reduced. It is unlikely that the fire brigade needs to conduct a complex search and rescue occupants at fire event.
- The Building occupant warning system are also expected to give effective warning for sleeping occupants.
- The building is a lower height building facing two public roads, and the fire brigade can access the building from both sides. When they are onsite, the fire fighters can fight the fire with hoses for different levels on an appropriate appliance.

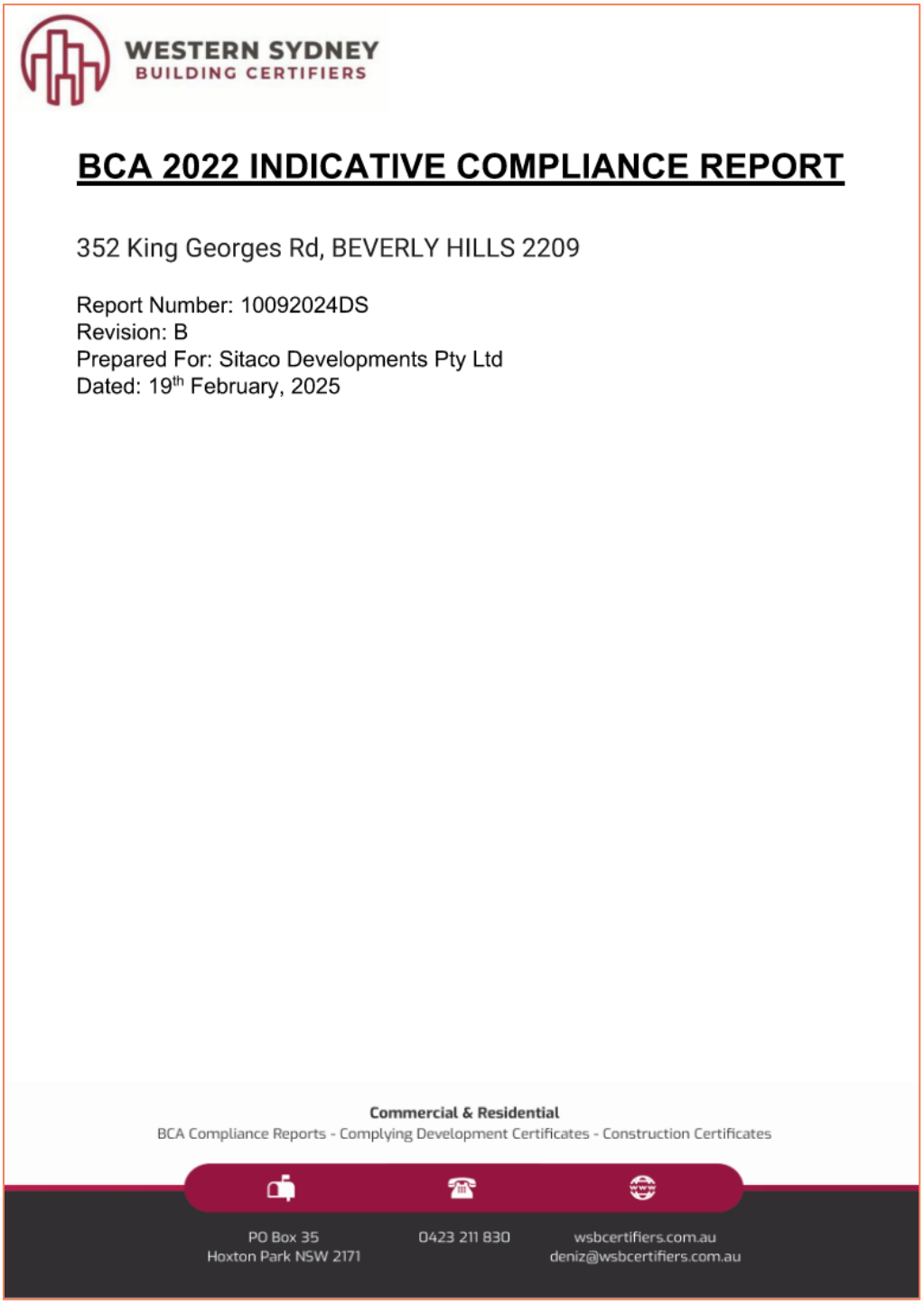
9.5 Conclusion

Based on the assessment above, the Performance Solution meets the Performance Requirements D1P2

10 Appendices

10.1 Appendix A – BCA/NCC information

10.1.1 BCA Report



WESTERN SYDNEY
BUILDING CERTIFIERS

BCA 2022 INDICATIVE COMPLIANCE REPORT

352 King Georges Rd, BEVERLY HILLS 2209

Report Number: 10092024DS
Revision: B
Prepared For: Sitaco Developments Pty Ltd
Dated: 19th February, 2025

Commercial & Residential
BCA Compliance Reports - Complying Development Certificates - Construction Certificates

PO Box 35
Hoxton Park NSW 2171

0423 211 830

wsbcertifiers.com.au
deniz@wsbcertifiers.com.au

10.2 Appendix B – Fire Brigade Consultation

From: Fire Safety <FireSafety@fire.nsw.gov.au>
Sent: Monday, 10 March 2025 9:17 AM
To: Alex Zhu
Cc: Millard Joseph; meray administration; EPW DESIGNS
Subject: PBDB WILL NOT BE PROVIDED – 352 King Georges Road Beverly Hills – Sitaco Developments Pty Ltd – ProAct Fire Engineering Pty Ltd - SRID 8000041098

Good Morning Alex,

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:	**FRN23/2543**
Job Number:	**BFS25/1324**
SRID Number:	**8000041098**

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

10.3 Appendix C – Correspondence with Stakeholders

10.3.1 Required performance solution as per the BCA Report

Also Refer to Section 10.1.1 for the BCA Report

C4D5	Acceptable methods of protection	PS	Refer to C4D3 - Where protection is required, openings must be protected as follows: Doorways: (i) External wall-wetting sprinklers used with doors that are self-closing; or (ii) –/60/30 fire doors that are self-closing. Windows: (i) **External wall-wetting sprinklers used with windows that are automatic closing or permanently fixed in the closed position;** or

BCA INDICATIVE COMPLIANCE REPORT- REVISION B 19/02/2025
352 KING GEORGES RD, BEVERLY HILLS
Page **11** of **30**

WESTERN SYDNEY BUILDING CERTIFIERS

PART C4 – PROTECTION OF OPENINGS			
Clause	**Description**	**Status**	**Action**
			(ii) –60/– fire windows that are automatically closing or permanently fixed in the closed position; or (iii) –/60/– automatic closing fire shutters. Other openings: (i) Excluding voids – internal or external wall-wetting sprinklers; or (ii) Construction having an *FRL* not less than –/60/– (iii) Fire doors, fire windows and fire shutters must comply with Specification 12. Sufficient detail to accompany the application for a Construction Certificate. A Performance Solution has been developed.

10.4 Appendix D – Scope, Limits and other assumptions

10.4.1 Scope and Limits

For any fire safety elements that are not specifically addressed by Performance Solution, they must be designed and installed as per NCC DtS provisions.

Any additional Performance Solutions proposed by the Project Team during the design process must be raised by the respective team member, for further instruction from the Client and Project Certifier/BCA consultant, to facilitate any changes to this report and any additional stakeholder consultation (if required)

The Client has requested that these issues be considered as Performance Solutions and addressed in accordance with appropriate methodologies and procedures so as to satisfy regulatory requirements for the project. The analysis of the concept fire safety strategy against stakeholder agreed objectives reported in this report, and will provide a technical opinion to the Authorities Having Jurisdiction in their considerations of approving the proposed design for compliance with the applicable regulations.

The analysis will be consistent with the objectives and limitations of the Society of Fire Safety Code of Practice, and therefore does NOT consider the following aspects:

- Fire-related risks and associated mitigation measures during the construction, renovation or demolition of the Project Works.
- Fire-related risks and associated mitigation measures during staged or partial occupation of the Project Works prior to completion of construction.
- Property/asset protection.
- Business continuation (including business interruption or losses).
- Personal or moral obligations of the owner/occupier
- Environmental considerations arising from a fire or the effect of firefighting operations on the surrounding neighbourhood.
- Storage and handling of hazardous substances subject to dangerous goods legislation; bulk storage of any materials, processing of flammable liquids and explosive materials.
- Emergency planning or management in relation to Work Health and Safety legislation.
- Bushfire prevention, protection, or planning.
- Arson, terrorist attacks, explosions, multiple fire ignitions, or acts of malicious intent (including deliberate interference/sabotage of fire-safety systems).
- Assessment or advice related to Battery Energy Storage System (BESS), Electrical Vehicle (EV) and associated EV charging equipment risks.
- Assessment or advice for non-compliant products or combustible claddings.
- Insurance related risks or community impact
- PROACT is not engaged to verify/validate any information provided by the client or design team, including information and documentation

- PROACT assume all the building and site works are authorised or previously consented/approved by local authorities. ProAct do not take responsibility for the unauthorised, unconsented, unapproved works.

PROACT will develop the fire safety strategy for this project taking note of our duty as designers of workplaces under the relevant workplace safety legislation. Other practitioners documenting these designs may also have a duty under such legislation which they must consider in preparing their designs.

It should however be noted, as is advised, that due to the client's request to develop performance solutions for the project, fire and smoke damage may vary when compared to a building design that complies with the BCA-DTS provisions. It is recommended that the building owner liaises with its relevant insurers on this matter.

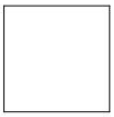
10.4.2 Other Assumptions

Fire and its effects on people and property are both complex and variable. Therefore, a fire safety system may not cope with all possible scenarios. The ideal concepts of 'absolute' or '100%' safety – as well as 'zero' or 'no' risk – are not attainable. This needs to be understood by designers, owners, occupiers, contractors, appropriate authorities and others in their assessment of fire-engineered solutions.[10]

In general, passive safety concepts such as fire resistance constructions in combination with suitable egress provisions, are considered more effective in providing constant fire safety than active fire safety systems which may be prone to potential deficiency or fault. Lastly, strategies such as security, on-going housekeeping and other management procedures may be more effective in preventing the start of a fire, than additional fire protection systems to address a fire emergency.

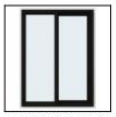
[10] ABCB, Australian Fire Engineering Guidelines, 2021

10.5 Appendix E - Architectural drawing set information



1 - ALUCOBOND
600x600 PURE WHITE

2 - CEMENT RENDER -
BLACK PAINT FINISH



3 - BLACK POWDER
COATED ALU. FRAME
GLAZED WINDOWS/ DOORS

4 - ALU. LOUVRES
TIMBER COLOR

GENERAL NOTES

- ALL DIMENSIONS ARE TO BE CHECKED ON SITE PRIOR TO ANY WORK COMMENCEMENT.
- ALL DIMENSIONS ARE IN MILLIMETRES.
- WRITTEN DIMENSIONS WILL TAKE PRECEDENCE OVER SCALE
- GROUND LEVELS ARE APPROXIMATE ONLY.
- ALL TIMBER FRAME WORKS SHALL BE IN ACCORDANCE WITH TIMBER FRAME CODE.

REVISION	AMENDMENTS	Date
3	Front facade	23/2/2022

EPW
109 WOOLCOTT ST.
EARLWOOD NSW 2206
P (02) 9591 5292
M 0402206326
E epwdesigns@gmail.com

DRAWING TITLE:
MATERIAL SCHEDULE OF FINISHES

DEMOLITION OF EXISTING STRUCTURES AND CONSTRUCTION OF A SHOPTOP HOUSING
AT: NO. 352 KING GEORGES RD, BEVERLY HILLS 2209

CONSTRUCTION CERTIFICATE

PLOT DATE: 31/01/2025 3:54:25 PM
SCALE: (A3)
DRAWN BY: PL
SHEET: CC 24