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Fire Safety Engineering
Building Services Engineering
ABN 14 162 610 568

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PIC 10 Warriewood Pty Ltd
3 Nicholson Avenue
St Ives, NSW 2075

Attn: Mr Mojtaba Tajziehchi

PROPOSED RESIDENTIAL DEVELOPMENT – 10 FERN CREEK ROAD, WARRIEWOOD PROVISION FOR FIRE ENGINEERING (FOR SECTION 96 SUBMISSION)

We refer to the proposed residential development to be located at 10 Fern Creek Road, Warriewood. This letter outlines the potential Performance Solution being proposed to address the single exit being proposed to the basement levels. As such, there is a variation to the Deemed to Satisfy (DtS) provisions of the Building Code of Australia 2016 (BCA), in particular BCA Clause D1.2.

The purpose of this document is to assist in the design development process, and to assist the Consent Authority in the determination of the Development Application.

PROJECT DESCRIPTION

The proposed works include the construction of a new 5 storey residential development consisting of 3 levels of residential (with storage area on Ground Floor) and 2 levels of common basement car park.

The site is bounded by Fern Creek Road to the south-west, a private road to the north, and exiting adjoining dwellings to the south-east and the east.

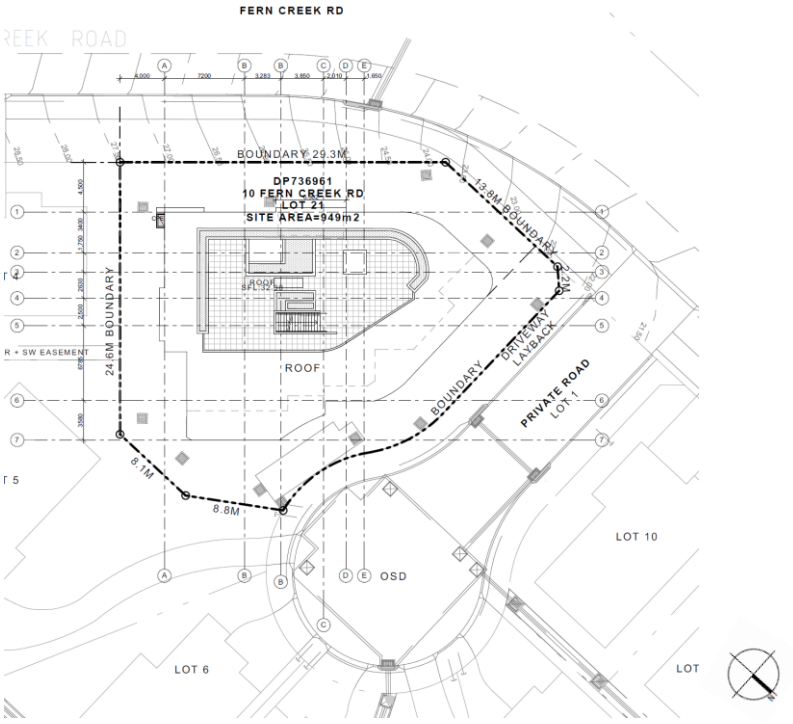

Figure 1: Site Plan of Proposed Development

BCA ASSESSMENT DATA

The relevant BCA Assessment Data for the proposed development is summarised in Table 1 below.

Table 1: Relevant BCA Assessment Data

BCA Reference	BCA Assessment
Building Classification and Use	Class 2 (residential) Class 7a (car parking) Class 7b (storage)
Rise in Storeys	3
Number of Levels Contained	5
Minimum Type of Construction Required	Type A
Effective Height	Less than 12 m
Maximum Size of Fire Compartments	To comply for Type A construction

REFERENCED DRAWINGS

Architectural plans of the subject development is prepared by Ghazi Al Ali Architect as summarized in Table 2 below.

Table 2: List of Referenced Architectural Drawings

Drawing No.	Issue	Title	Dated
A 02.001	E	Basement 02 Plan	30-01-2018
A 02.002	E	Basement 01 Plan	30-01-2018
A 02.003	E	Ground Floor Plan	30-01-2018
A 02.004	E	Level 01 Plan	30-01-2018
A 02.005	E	Level 02 Plan	30-01-2018
A 02.006	E	Roof Plan	30-01-2018

ACHIEVING COMPLIANCE WITH THE BCA

Clause A0.2 of the BCA states that the Performance Requirements can be satisfied by:

(a) Performance Solution (formerly known as Alternative Solution); or

(b) Deemed to Satisfy provisions; or

(c) a combination of (a) and (b).

Clause A0.3(a) of the BCA states that a Performance Solution must:

(i) comply with the Performance Requirements; or

(ii) be at least equivalent to the Deemed-to-Satisfy Provisions,

and be assessed according to one or more of the Assessment Methods.

Clause A0.5 of the BCA states that the following Assessment Methods, or any combination of them, can be used to determine that a Performance Solution or Deemed to Satisfy provisions complies with the Performance Requirements:

(a) Evidence to support that the use of a material, form of construction or design meets a Performance Requirement or a Deemed to Satisfy Provision as described in A2.2.

(b) Verification methods such as -

(i) the Verification Methods in the NCC; or

(ii) such other Verification Methods as the appropriate authority accepts for determining compliance with the Performance Requirements.

(c) Expert judgment

(d) Comparison with the Deemed to Satisfy provisions.

SUMMARY OF PROPOSED PERFORMANCE SOLUTION (SINGLE EXIT FROM THE BASEMENT LEVELS)

Table 3 below provides a summary of the relevant regulatory criteria associated with the proposed Performance Solution.

Table 3: Summary of Regulatory Criteria

Regulatory Criteria	Comments / Description
BCA DtS Provisions	Clauses D1.2 & D1.4
Variation to BCA DtS Provisions	To have a single exit from the basement levels, in lieu of 2 exits as required for basements with a floor area of greater than 50 m^2. To have an exit travel distance within Basement Level 2 to a single exit of up to 24 m, in lieu of 20 m.
BCA Performance Requirements	DP4 and EP2.2
IFEG Subsystems	A, B, C, D, E & F

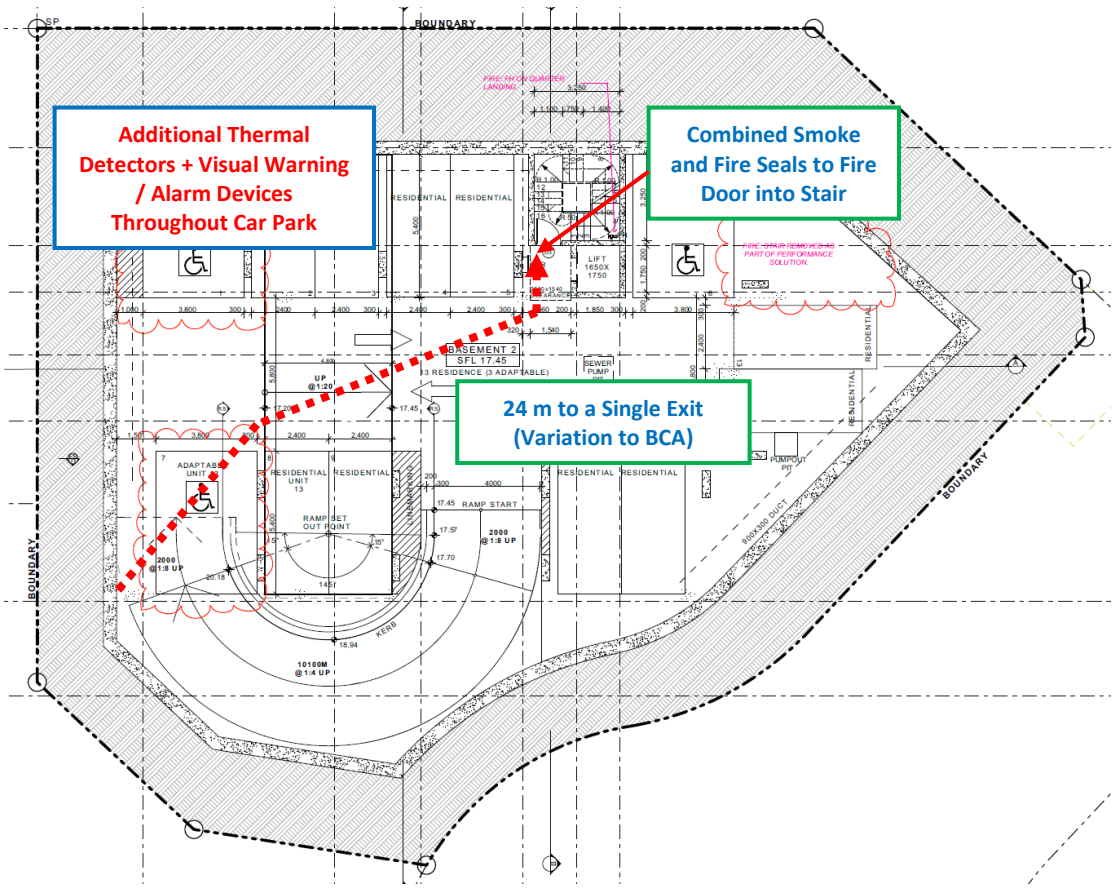

Figure 1: Basement 2 Floor Plan

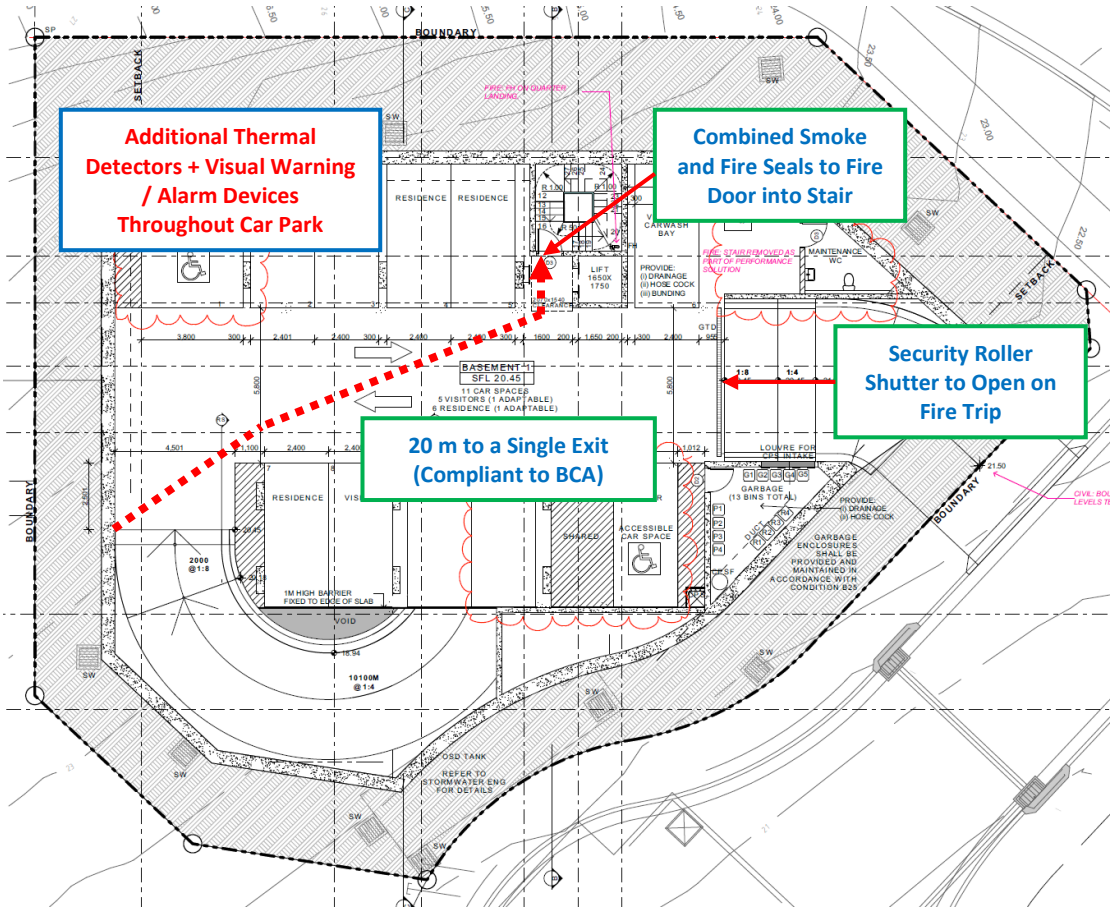

Figure 2: Basement 1 Floor Plan

Relevant BCA DtS Provisions

Number of Exits Required

In relation to basements Clause D1.2 of the BCA states, in part, that 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 1.5 m. With the exception of basements if the floor area of the storey is not more than 50 m^2 and travel distance to the single exit is not more than 20 m.

Exit Travel Distances

Clause D1.4 of the BCA states, in part, that no point on a floor must be more than 20 m from an exit, or a point from which travel in different directions to 2 exits is available, in which case the maximum distance to one of those exits must not exceed 40 m.

Basis of BCA DtS Provisions

Number of Exits Required

The Guide to the BCA states that the intent of Clause D1.2 is *"to require the provision of sufficient exits to enable safe egress in case of an emergency".*

In relation to basements, the Guide to the BCA recognises difficulties for egress and fire-fighting, including:

- *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.*

Exit Travel Distances

The Guide to the BCA states that the intent of Clause D1.4 of the BCA is *"to maximise the safety of occupants by enabling them to be close enough to an exit to safely evacuate"*.

The maximum exit travel distances given within the BCA are notional figures, and do not consider the layout of the building or the active fire safety systems installed.

Approach and Method of Analysis

Table 4 below provides a summary of the assessment methodology to be adopted for the assessment of the proposed Performance Solution.

Table 4: Summary of Assessment Methodology

BCA Meeting the Performance Requirements	**A0.3(a)(ii);** shown to be at least equivalent to the DtS provisions
BCA Assessment Approach	**A0.5(d);** Comparative
Method of Analysis	Qualitative

Acceptance Criteria

The Performance Solution is to demonstrate compliance with BCA Performance Requirements DP4 and EP2.2 in terms of:

- Ensuring occupants can evacuate from the basement areas safely and in conditions at least equivalent to the DtS provisions of the BCA.

Design Fire Scenarios

The following fire scenarios will be considered within the subject development to assess the Performance Solution:

- A non-sprinkler controlled fire within car park areas
- A flashover fire within a residential unit

Quantitative Design Fires will not be considered as the Fire Engineering Analysis is proposed to focus on a qualitative discussion and assessment.

Preliminary Fire Safety Strategy

The assessment is based on comparing the Performance Solution against a BCA DtS Compliant Design in terms of occupant evacuation and fire brigade intervention. Figure 1 and Figure 2 illustrates the single exit and variation to travel distances within basement car park area.

Typically, the occupants within the subject building are considered to be long-term residents who are expected to be familiar with the building layout and the location of the available exits. Visitors may not be familiar with the building layout and may rely on residents in the event of a fire. Further, the design and layout of the basement levels is relatively simplistic layout where occupants will have good visual of the single exit.

It is considered that the DtS requirements for travel distances within the building relates to the potential for an occupant to be exposed to a fire whilst evacuating. Therefore increasing the travel distance may increase the risk that the path of travel to a single exit becomes blocked or obstructed as a result of fire.

The following is an assessment / discussion of the fire safety systems and measures that will be implemented within the subject development that will ensure occupants are allowed to evacuate from the building in conditions at least equivalent to a design that complies with the minimum DtS provisions of the BCA.

BCA DtS Compliant Design

A BCA DtS Compliant Design for the basement levels with a floor area of more than 50 m^2 can be described as follows:

- The provision of 2 exits, constructed as non-fire-isolated exits (as they do not connect more than 2 consecutive storeys as per BCA Clause D1.3).
- The travel distance to the nearest exit within the basement levels is up to 40 m.
- No windows or openings to aid fire fighters in the natural venting of smoke.
- No smoke or heat detection system to provide occupants with an early warning of fire (given no sprinklers are required for a fire compartment of less than 40 vehicles).
- Minimum ceiling height of 2.1 m, as per BCA Clause F3.1.

Performance Solution

The Performance Solution for the basement levels comprises of the following:

- The provision of a single exit, constructed as a fire-isolated exit (which exceeds the minimum DtS provisions of the BCA).

  The single exit to be fire separated from the basement levels in construction having an FRL of at least 120/120/120, with the doorways into the exit protected with self-closing fire doors with an FRL of at least -/60/30 and fitted with combined intumescent fire and smoke seals.
- The travel distance to the single exit within Basement Level 2 is up to 24 m, in lieu of 20 m.
- The vehicle entry into the basement levels to be provided with a roller door / shutter comprising of permanent ventilation openings that achieve at least a 50% free open area.
- Additional heat detection system installed throughout the basement levels (which exceeds the minimum BCA DtS provisions), with additional visual warning and visual alarm devices.
- Ceiling heights between 2.4 m to 2.8 m within the basement levels.

In consideration of the assessment above and of the additional fire safety measures, it has been demonstrated that occupants can evacuate from the basement levels safely and under conditions that is at least equivalent to the DtS provisions of the BCA.

Therefore the proposed Performance Solution is demonstrated to achieve compliance with BCA Performance Requirements DP4 and EP2.2.

REQUIRED FIRE SAFETY SYSTEMS

The following fire safety systems will be required to be installed throughout the subject building:

- Fire and smoke seals to the doors opening into the single exit from the basement levels
- Fire hydrants
- Fire hose reels (excluding residential areas)
- Portable fire extinguishers
- Automatic smoke detection and alarm system, with additional thermal detection throughout the car park areas
- Smoke alarms
- Building occupant warning system, with additional verbal messaging and visual warning / alarm devices
- Car park ventilation system
- Emergency lighting and exit signs

NOTE: *The above list may change or vary during the detail design process, and / or as a result of the future Fire Engineering Report.*

CONCLUSION

In consideration of the above, it is concluded that a Performance Solution can be developed to address the provision of a single exit from the basement levels, and to ensure the proposed development can achieve compliance with the relevant Performance Requirements of the BCA.

Yours Faithfully

Jaimee Choi
Senior Fire Engineer
C10 Accredited Fire Engineer (BPB2221)