FIRE ENGINEERING REPORT

17 June 2022

North Sydney Public School

Taylor Construction Group Pty Ltd

Revision A

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Revision Information

Project	North Sydney Public School
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Client	Taylor Construction Group Pty Ltd
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Prepared By	LCI Consultants Sydney Office L5 73 Miller Street, North Sydney NSW 2060 T 02 9157 0570
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Revision Schedule

Revision	Date	Issue Name	Prepared By	Authorised By
Draft	18/05/2022	Draft Issue – Awaiting FRNSW Return FEBQ	Mark Thomas	Stephen Hall
Rev A	17/06/2022	Issued incorporating stakeholder comments	Mark Thomas	Stephen Hall

Note: For and on behalf of Lehr Consultants International (Australia) Pty Ltd (LCI Consultants), this Fire Engineering Report (Rev A) has been authorised by Stephen Hall (BDC3416).

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Executive Summary

This document comprises a Fire Engineering Report (FER) for the proposed development at North Sydney Public School, NSW 2060. The project works involve:

- Minor refurbishment to existing Buildings F, D & A.
- Demolition of existing Buildings B and C,
- Construction of new Buildings J & Building I (3 Storeys), which are connected via walkways, comprising the following areas/ works:
    - Staff administration rooms,
    - 16 homebases,
    - a new library,
    - hall,
    - out of school hours care facilitates,
    - covered outdoor learning area,
    - bicycle parking and end of trip facilities for staff; and,
    - services, amenities and access.
    - New entry gate and forecourt from bay road,
    - internal refurbishment of building G ground floor from the existing library to 3 homebases,
    - Capacity for an increase in student numbers from 869 to 1,012; and

  Due to the walkway connection, the two buildings have been considered and assessed as one building for the purposes of BCA Compliance.

This FER follows, and shall be read in conjunction with, the Fire Engineering Brief Questionnaire (FEBQ) for the project (210557-FEBQ-V1, dated 04/04/2022). The FEBQ identified the fire safety engineering matters to be addressed (departures from the BCA DtS Provisions), defined a trial fire safety strategy and proposed analysis methods and acceptance criteria. The FEBQ, forming the Performance-based Design Brief (PBDB) for the project in accordance with the Building Code of Australia (BCA), was submitted to FRNSW as part of the fire engineering brief consultation process. FRNSW provided return comments on the FEBQ (FEBQ Ver02, FRNSW Reference Number: FRN22/1035, dated 08/06/2022 - see Appendix A) which have been incorporated into this FER as relevant/ applicable.

The objectives of the fire safety strategy are identified as compliance with the Regulatory Framework identified in Section 1.2, which specifies compliance with the BCA, with BCA 2019 Amendment One being the relevant edition for this project.

This FER includes detailed fire engineering analyses to verify the proposed Performance Solution (summarised in the table below) for compliance with the BCA to facilitate the issue of a Construction Certificate for this project by the Principal Certifying Authority.

The fire safety strategy for the project which has been verified by the fire engineering analyses is outlined in Section 3.

Table 1: Summary of Performance Solutions

Item	BCA DtS Provisions *(Performance Requirements)*	Proposed Performance Solution
1	E1.3, AS 2419.1-2005 (EP1.3)	It is proposed to permit the fire hydrant booster to be located within 10.5 m of the hardstand, in lieu of 8 m as prescribed within AS 2419.1-2005.

1. Introduction

1.1. Scope and Limitations

This document comprises a Fire Engineering Report (FER) for the proposed development at North Sydney Public School, NSW 2060. The project works involve:

- Minor refurbishment to existing Buildings F, D & A.
- Demolition of existing Buildings B and C,
- Construction of new Buildings J & Building I (3 Storeys), which are connected via walkways, comprising the following areas/ works:

  The building area comprises of:
  - Staff administration rooms,
  - 16 homebases,
  - a new library,
  - hall,
  - out of school hours care facilitates,
  - covered outdoor learning area,
  - bicycle parking and end of trip facilities for staff; and,
  - services, amenities and access.
  - New entry gate and forecourt from bay road,
  - internal refurbishment of building G ground floor from the existing library to 3 homebases,
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  Due to the walkway connection, the two buildings have been considered and assessed as one building for the purposes of BCA Compliance.

This FER follows, and shall be read in conjunction with, the Fire Engineering Brief Questionnaire (FEBQ) for the project (210557-FEBQ-V1, dated 04/04/2022). The FEBQ identified the fire safety engineering matters to be addressed (departures from the BCA DtS Provisions), defined a trial fire safety strategy and proposed analysis methods and acceptance criteria. The FEBQ, forming the Performance-based Design Brief (PBDB) for the project in accordance with the Building Code of Australia (BCA), was provided for stakeholder comment and acceptance so that in-principle agreement could be obtained prior to undertaking the fire engineering analyses, which forms the basis of this FER. The FEBQ was submitted to FRNSW as part of the fire engineering brief consultation process. FRNSW provided return comments on the FEBQ (FEBQ Ver02, FRNSW Reference Number: FRN22/1035, dated 08/06/2022 - see Appendix A) which have been incorporated into this FER as relevant /applicable.

This FER includes detailed fire engineering analyses to verify the proposed Performance Solution for compliance with the BCA to facilitate building approval. This FER has been developed based on the information referenced in Section 1.5.

The fire engineering methodology (comprising the FEB and FER) will be generally in accordance with the process in the *Australian Fire Engineering Guidelines 2021* (AFEG) [1], and follow the Engineers Australia Society of Fire Safety (SFS) *Code of Practice*[2] and the *Position on the Role of Registered Practitioners in Fire Safety Engineering*[3]. As the AFEG is a process document the previous edition, the International Fire Engineering Guidelines (IFEG) 2005 [4] will still be referred to in matters of fire engineering methodologies and data which are contained in that document.

The fire safety strategy and Performance Solutions prepared are specific to the project and apply to the subject building only and may not be suitable for other premises. Alterations to the design of the building, fire safety measures or use of the building as described in this document may impact on the

analyses and the risk assessment outcomes. Therefore should such changes occur, a review by the fire safety engineer should be undertaken to confirm the ongoing validity of the analysis.

This document is part of a design process to support a Construction Certificate for the project. Upon issue of the CC, the building certifier has determined the fire safety strategy defined in this report to be compliant with the Regulatory Framework including the BCA as appropriate.

Refer also to Section 1.3 of this document which details the fire safety objectives defined for this project, including limitations on objectives in relation to arson. Objectives that are not specifically identified are excluded from the scope of this document.

1.2. Regulatory Framework

The regulatory framework is identified in the following documents:

- NSW Environmental Planning and Assessment Act 1979.
- NSW Environmental Planning and Assessment Regulation 2000.
- Environmental Planning and Assessment (Development Certification and Fire Safety) Regulation 2021.

1.3. Fire Safety Design Objectives

1.3.1. General

The relevant building regulations prescribe compliance with the BCA, and the fire safety related objectives are generally specified in Sections C, D, E, G and H of the BCA. As outlined in the referenced BCA Report, BCA 2019 Amendment One is the relevant edition for this project.

Compliance with the BCA fire safety provisions are achieved by satisfying the Performance Requirements specified within each relevant section of the BCA.

For the project, a Performance Solution has been developed via the fire engineering process to address identified variation to the Deemed-to-Satisfy (DtS) Provisions of the BCA and demonstrate compliance with the Performance Requirements. Any other fire safety provisions / measures not specifically identified or included in the fire engineering process shall meet the Performance Requirements by fully complying with the BCA DtS provisions.

1.3.2. Other Objectives

Other Regulatory Objectives

Other regulatory objectives are treated as follows:

- Objectives of dangerous goods regulations and acts are excluded from the fire engineering design objectives as assessment against the dangerous goods regulations is outside the scope of the report.
- Work Health & Safety requirements outlined in the Act (2011) and Regulation (2017) are outside the scope of this report. Egress and fire safety provisions for persons with disabilities including compliance with the Disability Discrimination Act (DDA) were considered to the same degree as the BCA only.
- Fire brigade objectives that are relevant to fire engineering design of buildings are considered to be satisfied through complying with the relevant Performance Requirements which require consideration of fire brigade intervention. The Fire Brigade's own objectives and charter for the protection of life, property and the environment are outside the scope of the project.

  Under Section 25-29 of NSW EP&A (Development Certification and Fire Safety) Regulation 2021 (previously Clause 144 of the NSW EP&A Regulation 2000), the proposed plans and Performance Solutions for the proposed building must be referred to Fire & Rescue NSW (FRNSW) before a CC can be issued by the Certifying Authority.

  The requirement for FRNSW referral is based on the size of the building and the proposed Performance Solutions proposed relating to BCA Performance Requirements that are defined as Category 2 fire safety provisions in the EP&A Regulations (CP9, EP1.3, EP1.4, EP1.6, EP2.2 and EP3.2).

  LCI submitted a Fire Engineering Brief Questionnaire (FEBQ) Version 01 to FRNSW on 04/04/2022; FRNSW provided return comments on the FEBQ (Revision V02, dated 08/06/2022) which have been incorporated into this FER as relevant /applicable (refer to Appendix A).

Non-Regulatory Objectives

The client has not advised of any specific non-regulatory fire safety design objectives. Therefore, issues such as business continuity, property and asset protection (other than BCA requirements to protect adjoining properties), impact on the community, insurance risks, etc, have not been specifically considered in the fire engineering design.

Arson & Terrorist Activities

As noted in the AFEG, "the BCA is silent on the matter of fires set with malicious intent (arson and terrorist activities)." The fire engineering analyses undertaken for this project will be consistent with the Engineers Australia Code of Practice in that single ignition arson scenarios will be considered, however for the vast majority of buildings potential terrorist incidents need not be considered.

Hence, unless otherwise specifically identified as design fire scenarios, extreme events such as significant arson (involving multiple ignition sites, use of accelerants, introduced fuels and/or sabotage of fire protection measures), acts of terrorism, malicious acts, and aircraft collision leading to fire will not be considered in the fire engineering analysis. If such scenarios are requested by the relevant stakeholders, e.g. due the likelihood of the building being subject to incidents of civil disturbance, acts of terrorism or the like, this must be identified at the early stages of the project. Considerations of such scenarios has not been requested by stakeholders.

Recognition should also be given to the fact that such scenarios may be beyond the scope or capacity of the fire safety strategy and that conventional building design can only provide limited protection, and that other strategies such as security, housekeeping and management procedures may be more effective.

1.4. Relevant Stakeholders

The relevant stakeholders for the approval of the fire safety design are identified in Table 2 below.

Table 2: Relevant stakeholders of the project

Name	Organisation	Role
Cassandra Zughbi	Taylor Construction Group Pty Ltd	Client Representative
Emrys Jones Coles	Philip Chun	Principal Certifying Authority
Mark Thomas Stephen Hall	LCI Consultants	Fire Safety Engineer
Andy Huynh	Fire and Rescue NSW (FRNSW)	Fire Brigade Representative

1.5. Project Information

The following project information has been reviewed in preparation of this report:

- Fire Engineering Brief Questionnaire (FEBQ), Ref 210557-FEBQ-Ver01, prepared by LCI, submitted to FRNSW 04/04/2022.
- BCA Report, prepared by Philip Chun Building Compliance, dated 13/08/2021.
- Architectural Drawings set prepared by Fulton Trotter Architects *'North Sydney Public School, For Schools Infrastructure NSW, 7107WA01'* dated 25/03/2022.
- Returned Fire Engineering Brief Questionnaire Version 2 (FEBQ), FRSNW Reference Number: FRN22/1035, dated 08/06/2022.

2. Building and Occupant Characteristics

2.1. Existing Site Plan

The existing North Sydney Public School site is a primary school located at 182 Pacific Highway, North Sydney.

Figure 1: Existing Site Plan

2.2. Proposed Building Layout

The proposed North Sydney Public School works include:

- Minor refurbishment to existing Buildings F, D & A.
- Demolition of existing Buildings B and C,
- Construction of new Buildings J & Building I (3 Storeys), which are connected via walkways, comprising the following areas/ works:
    - Staff administration rooms,
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    - hall,
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    - New entry gate and forecourt from bay road,
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    - Capacity for an increase in student numbers from 869 to 1,012; and

Due to the walkway connection, the two buildings have been considered and assessed as one building for the purposes of BCA Compliance.

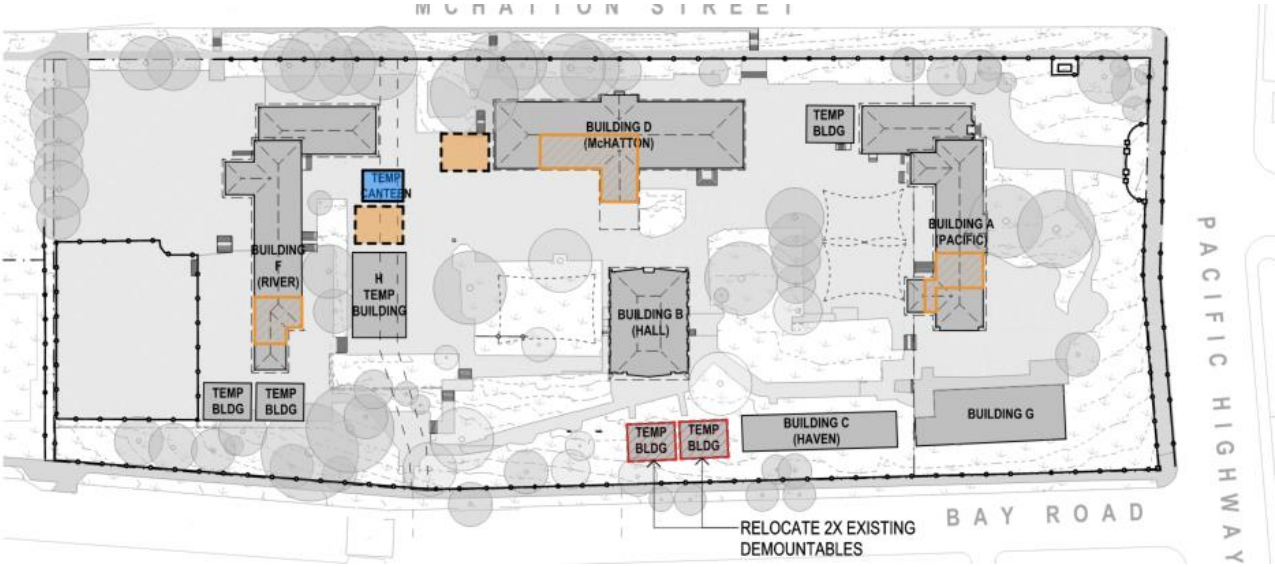


Figure 2: Proposed Minor Refurbishment to existing Buildings F, D & A

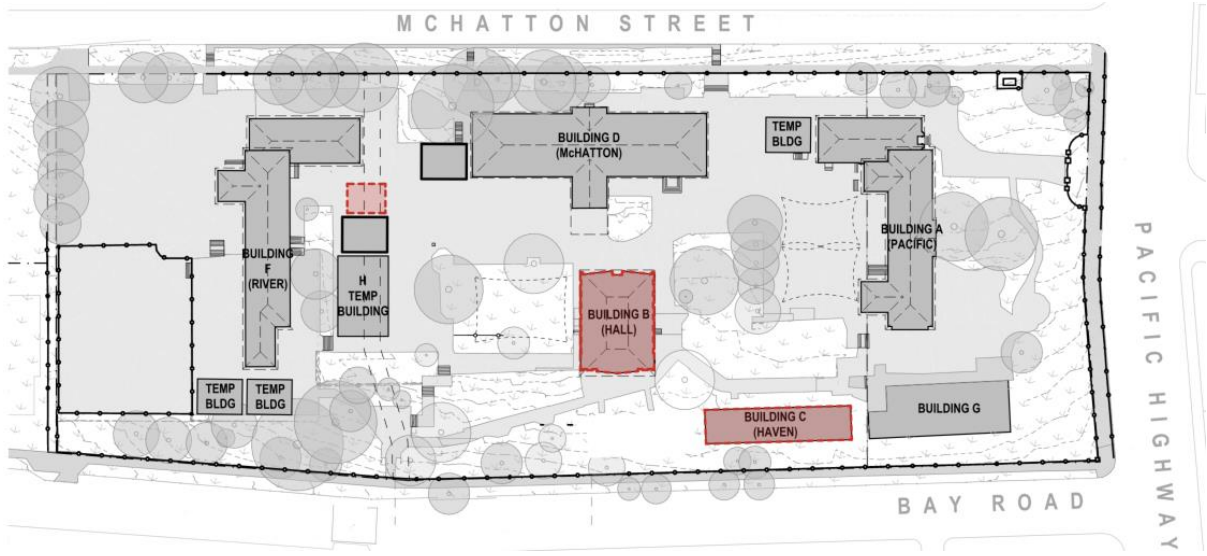
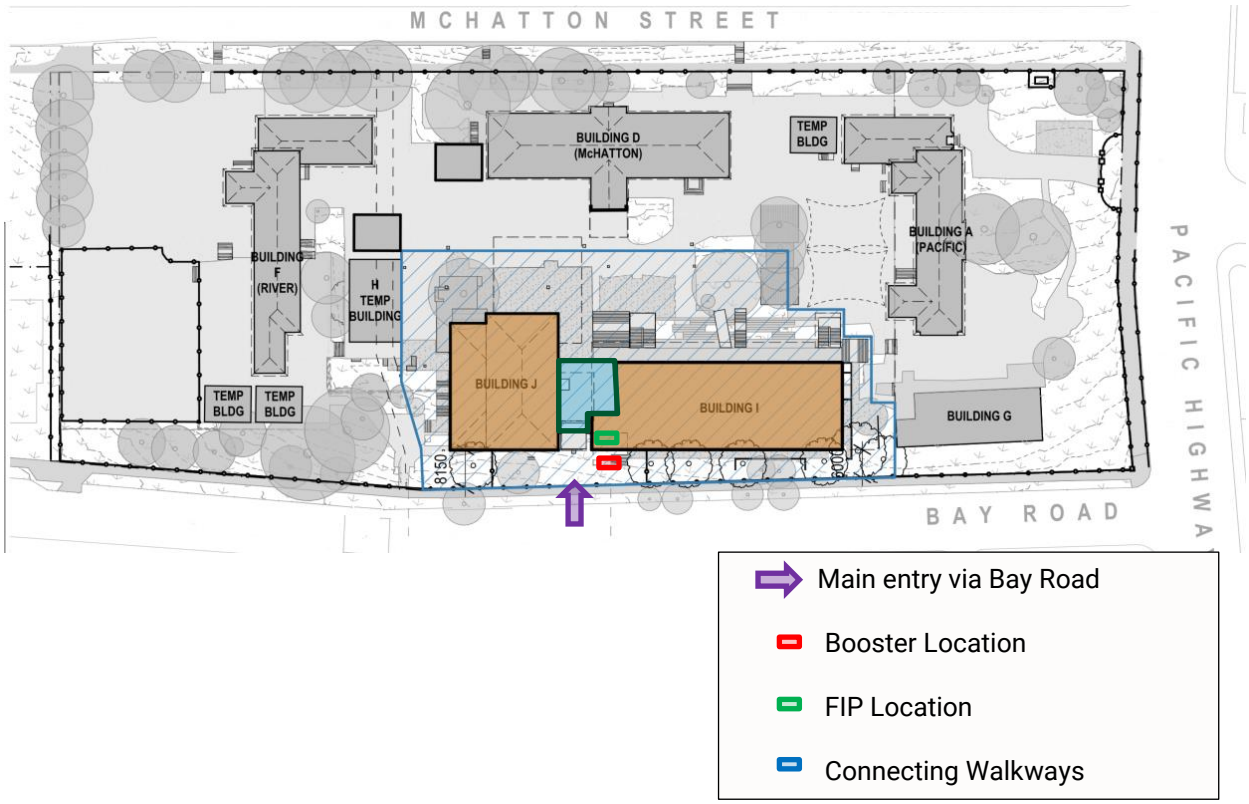


Figure 3: Proposed Demolition of Existing Buildings B & C



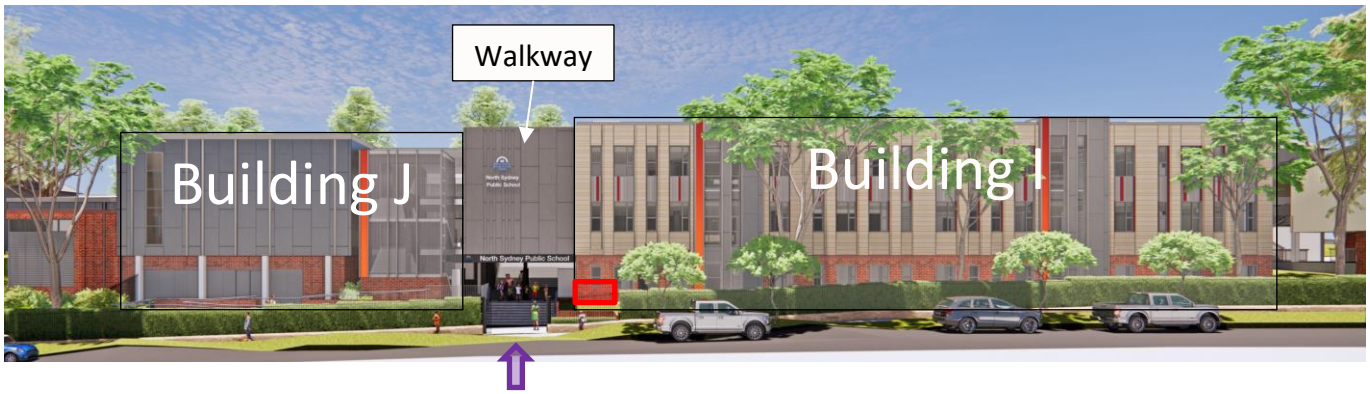


Figure 4: Proposed New Buildings J & I

Building J: Proposed Level 1

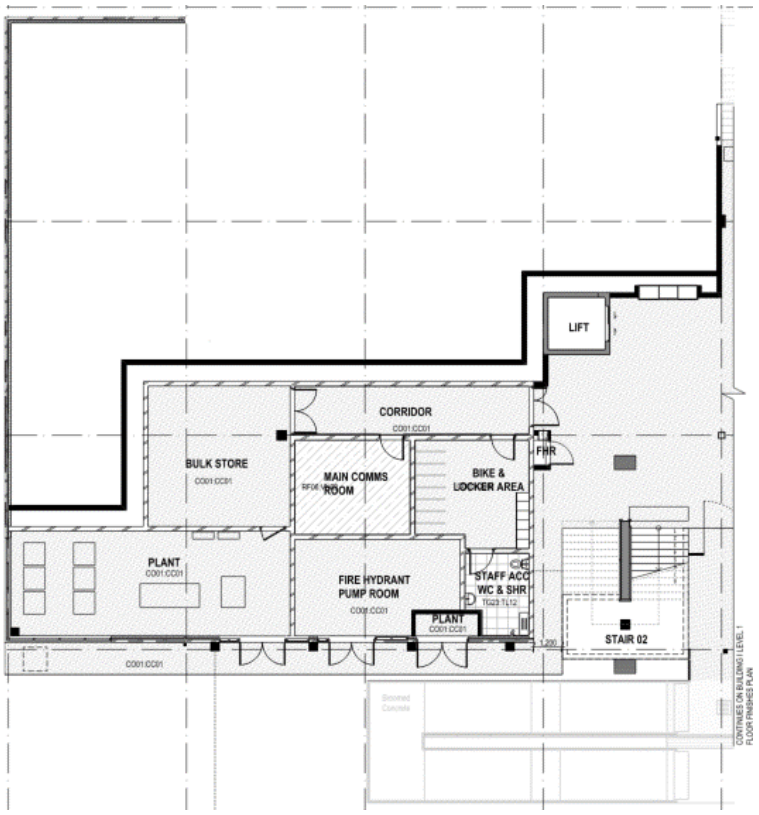


Figure 5: Proposed New Buildings J: Level 1

Building J: Proposed Level 2

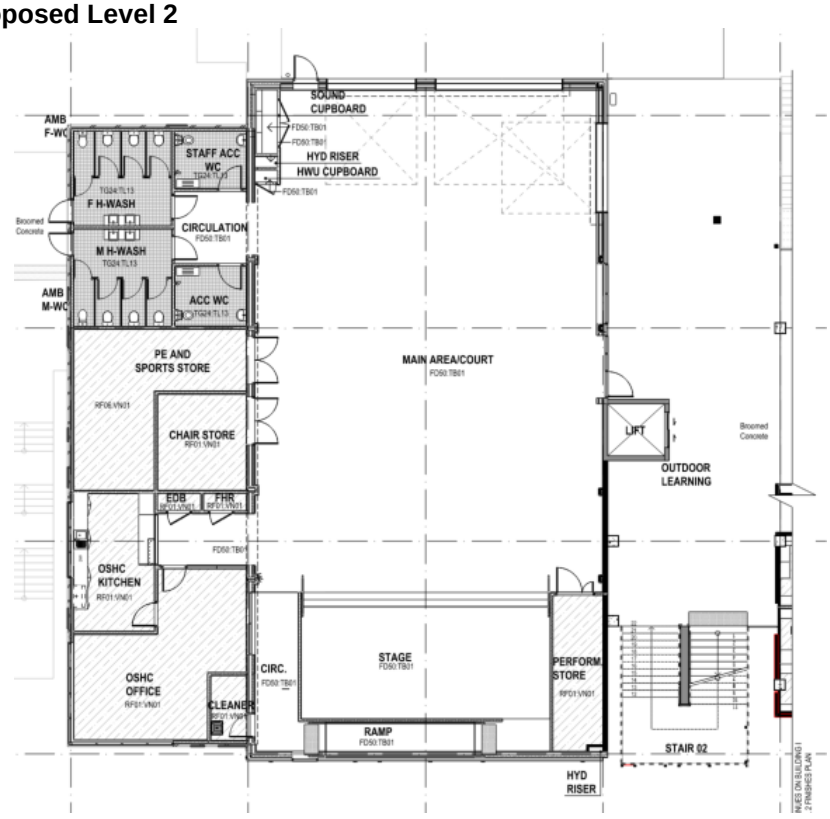


Figure 6: Proposed New Buildings J: Level 2

Building J: Proposed Elevations

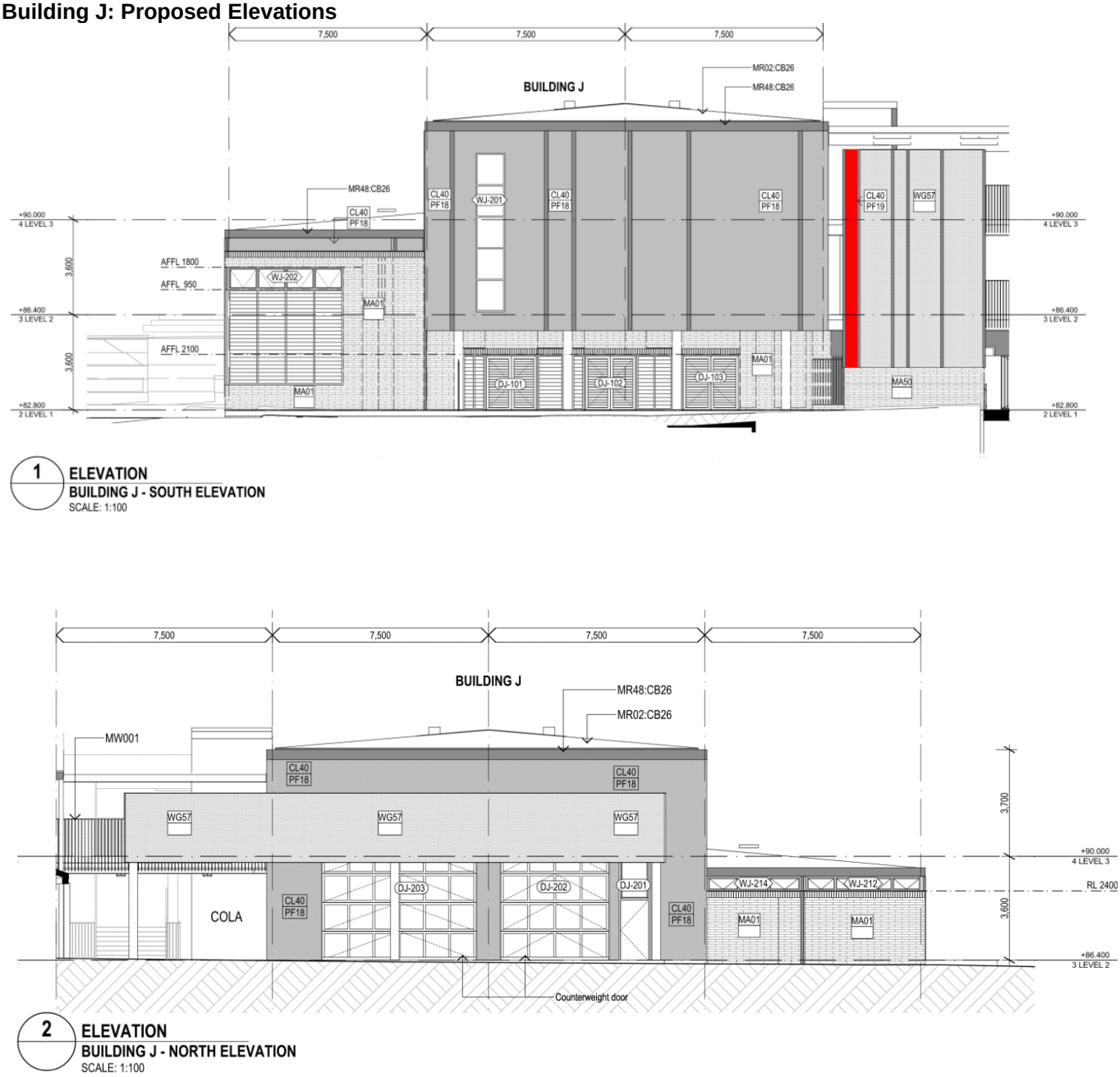


Figure 7: Proposed New Buildings J: Elevations

Building I: Proposed Level 1

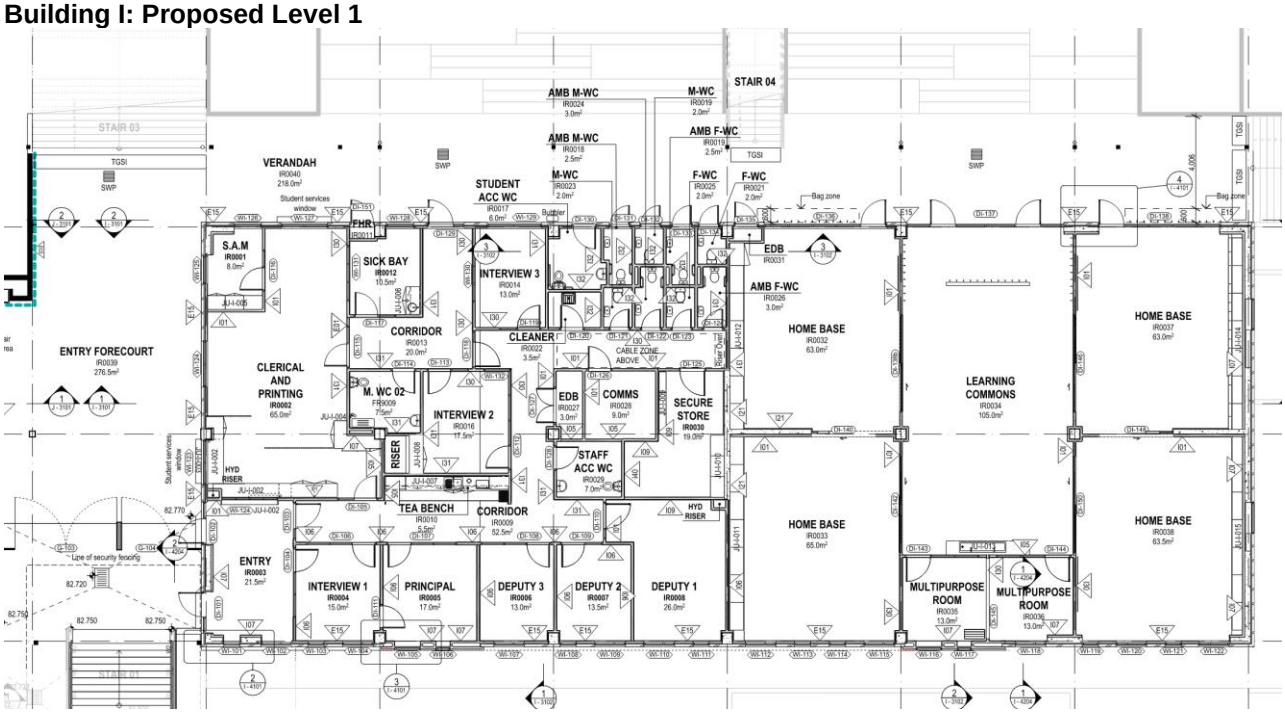


Figure 8: Proposed New Buildings I: Level 1

Building I: Proposed Level 2

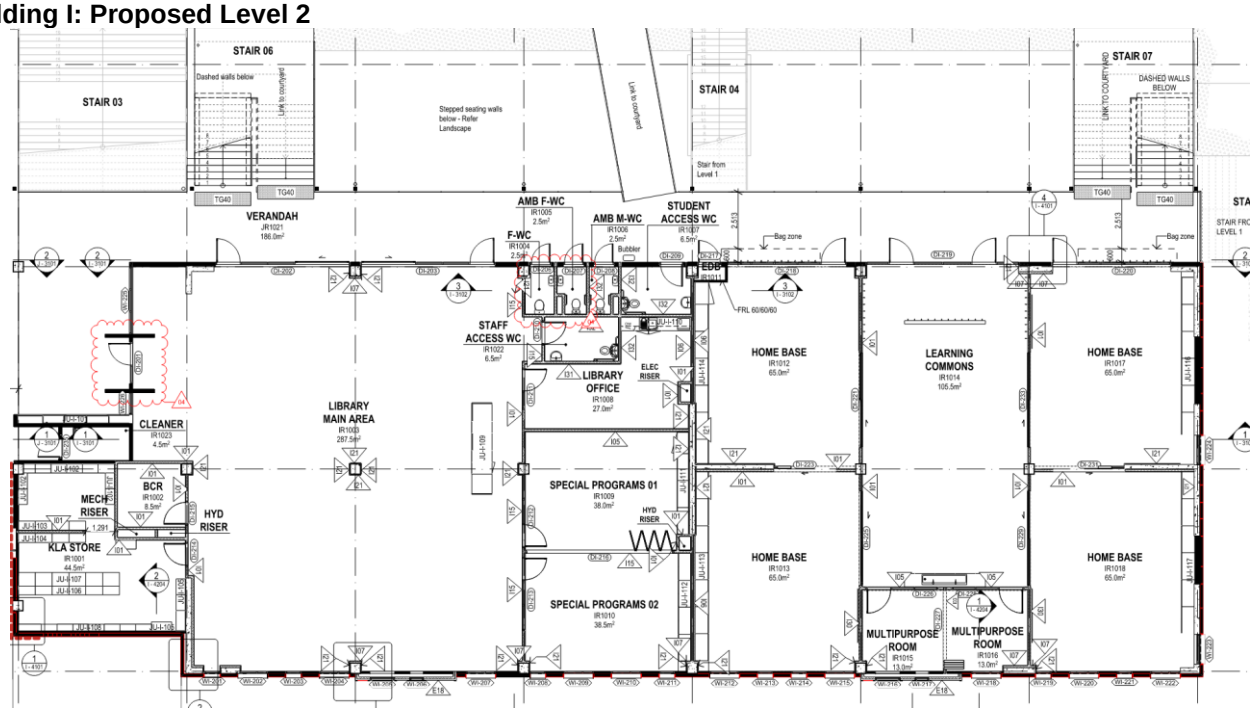


Figure 9: Proposed New Buildings I: Level 2

Building I: Proposed Level 3

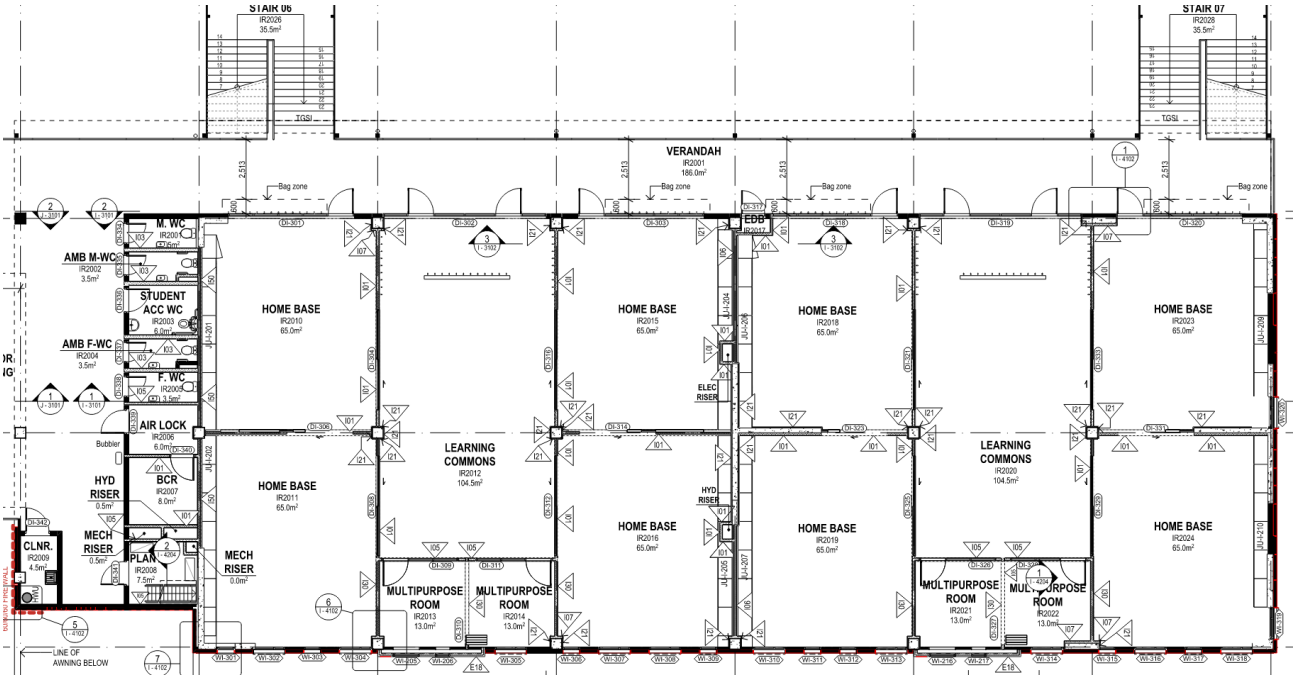


Figure 10: Proposed New Buildings I: Level 3

Building I: Proposed Elevations

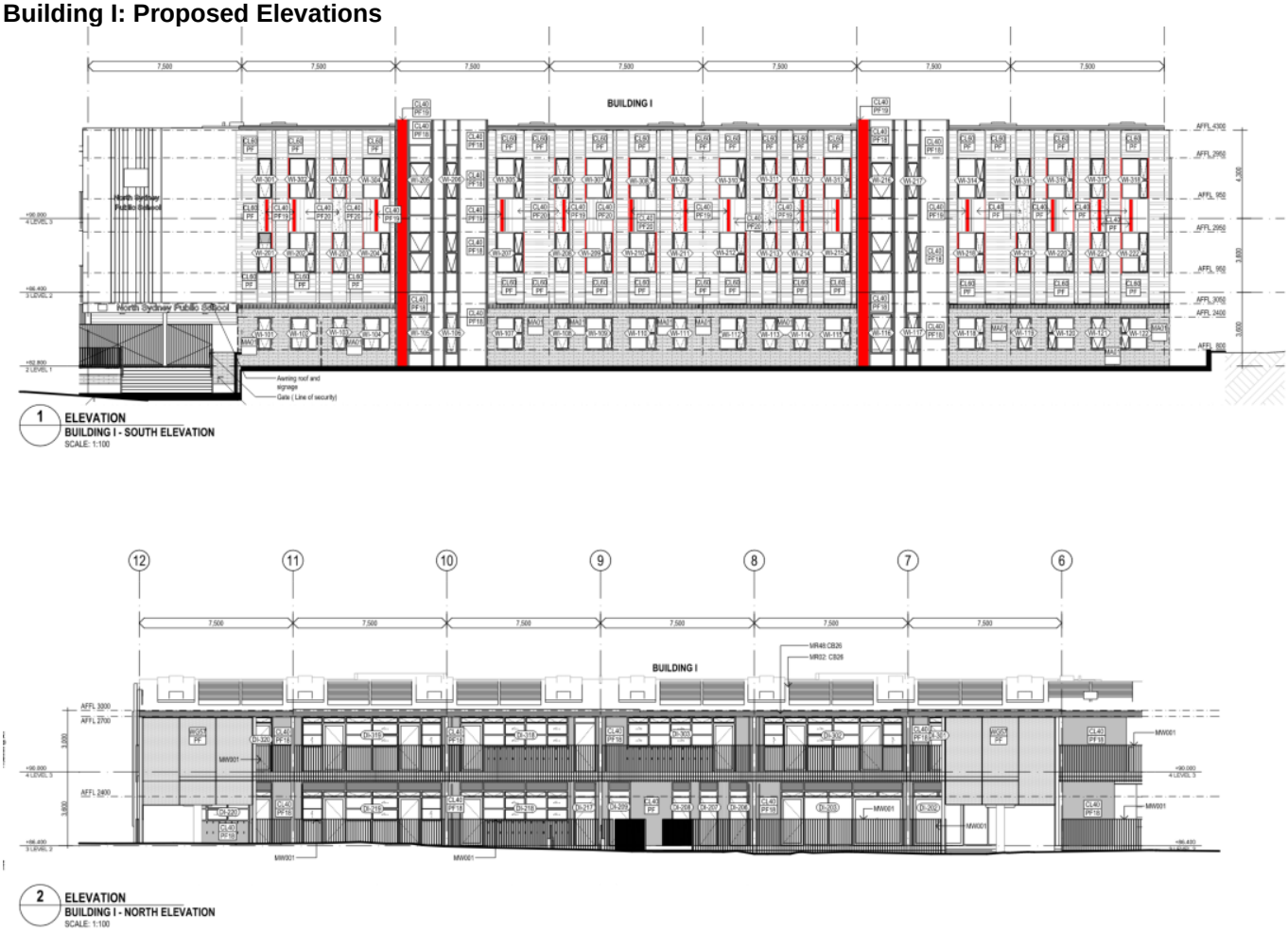


Figure 11: Proposed New Buildings I: Elevations

2.3. BCA DtS Reference Criteria

Table 3: BCA Building characteristics

BCA Criterion	Building Characteristics (United Buildings I & J)
Building Classifications (BCA Part A)	Class 9b (School)
Rise in Storeys (BCA C1.2)	3
Type of Construction (BCA C1.1)	Type A
Effective Height (BCA Schedule 3)	7.2 m

2.4. Occupant Characteristics

2.4.1. General

North Sydney Public School occupants are expected to generally comprise students, staff, contractors, and visitors. The characteristics of these occupant groups will vary and are identified below.

2.4.2. Student & Visitors

Students and Visitors are considered to be representative of the general population and may be of varying ages and abilities. They may be unfamiliar with the building layout and emergency procedures. They may require staff directions or instructions in an emergency but are expected to be able to self-evacuate without physical assistance from staff.

2.4.3. Staff

Staff in the building will typically be related to teaching requirements, with characteristics generally representative of the adult workforce. This may include people with varying ranges of abilities / disabilities, however as the building is their workplace, they are expected to be awake, alert and familiar with the building layout and features.

Staff are expected to have a level of understanding of the fire safety systems and emergency procedures of the building. Some staff are also expected to assist during an emergency, e.g. fire wardens.

2.5. Fire Hazard Review

The U.S. Fire Administration's National Fire Incident Reporting System (NFIRS) provides an overview of statistical fire incidents for Schools between 2014 – 2018 from Elementary, Middle and High school[5] and summarised below.

High School and Middle School fires

- One third of the property damage (34%) was caused by the small number of fires that occurred between midnight and 4 am, when buildings were unlikely to be occupied.
- More than two in five fires (44%) in high schools and middle schools were intestinally set and one in five was caused by playing with a heat source.
- Fires in high schools and middle schools were much more likely to originated in a lavatory or locker room (32%) than any other area.

Elementary School Fires

- Elementary school fires most often began with the ignition of trash or cooking materials.
- Several leading factors contributing to the ignition of elementary school fires had behavioural implications, including playing with a heat source (22%), unclassified misuse of a material or product (8%), abandoned or discarded material or product (7%), and unattended equipment (6%).

- Electrical failures or malfunctions (17%) and mechanical failures or malfunctions (14%) also contributed to a substantial share of fires and they suggest that there might be gaps in maintenance and repair of school equipment or infrastructure.
- Lighters and matches together provided the heat source in one-quarter of elementary school fires.

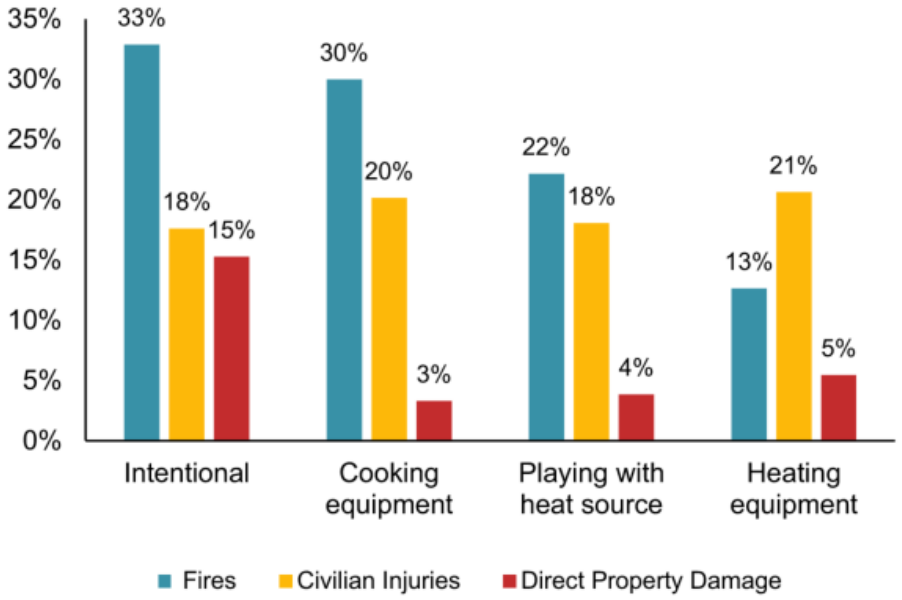


Figure 12: Structure Fires in Elementary Schools by Leading Cause, 2014-2018 Annual Averages

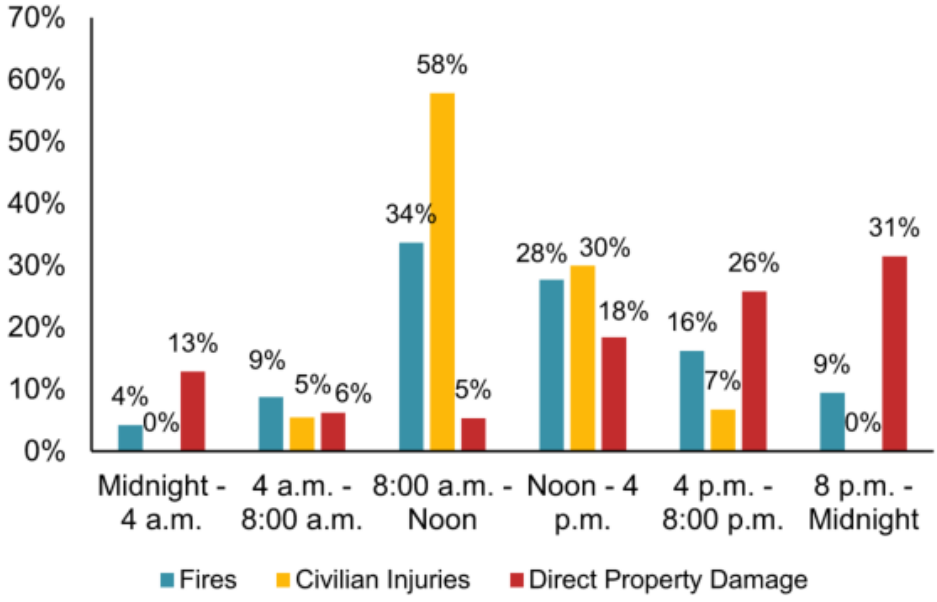


Figure 13: Structure Fires in Elementary Schools by Time of Day, 2014-2018 Annual Averages

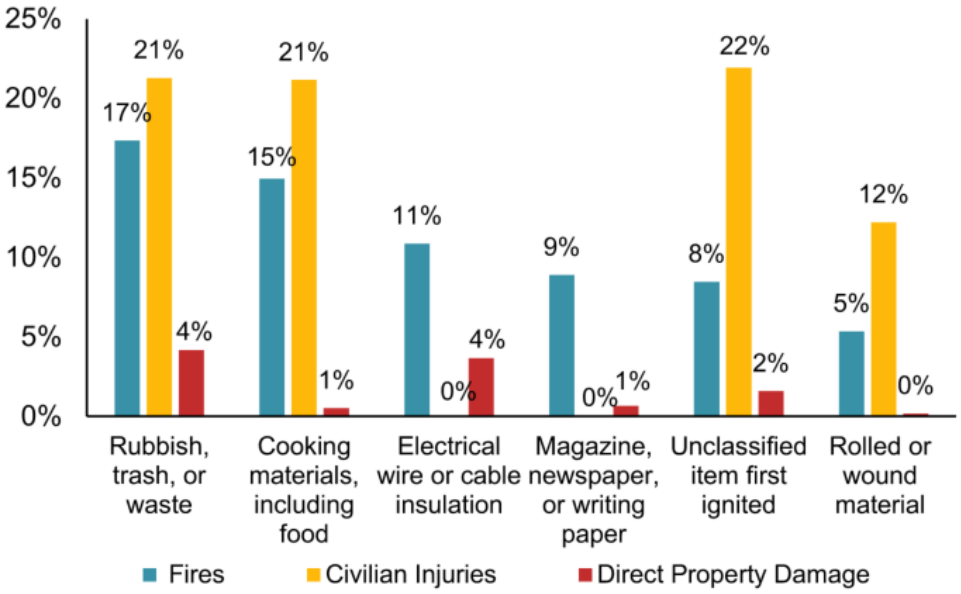


Figure 14: Structure Fires in Elementary Schools by Item First Ignited, 2014-2018 Annual Averages

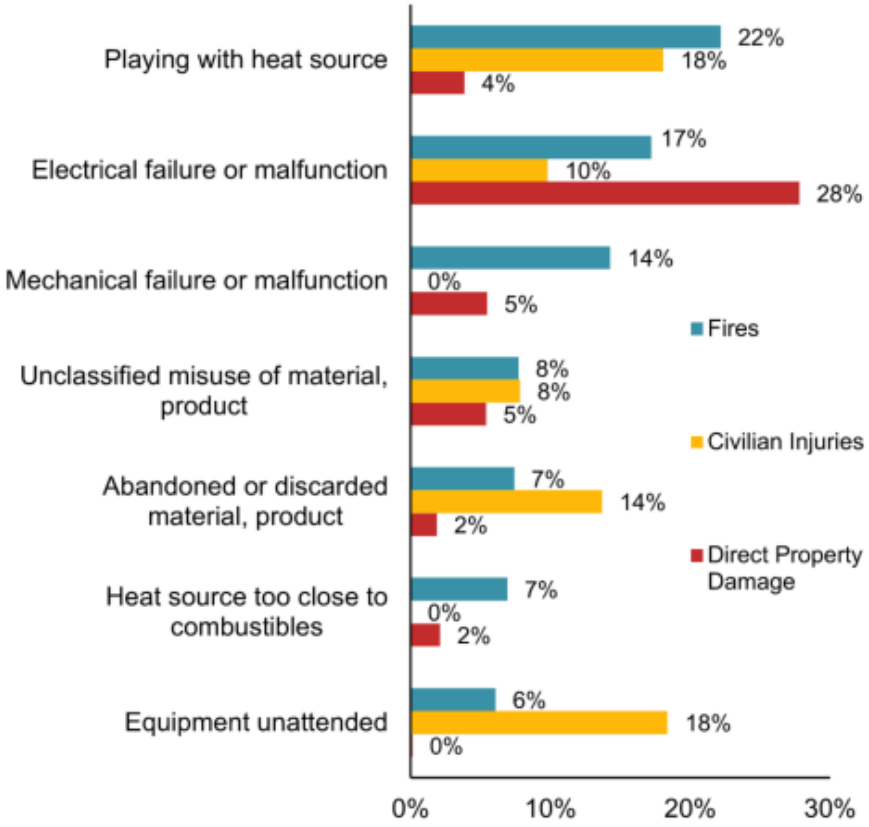


Figure 15: Structure Fires in Elementary Schools by Factor Contributing to Ignition, 2014-2018 Annual Averages

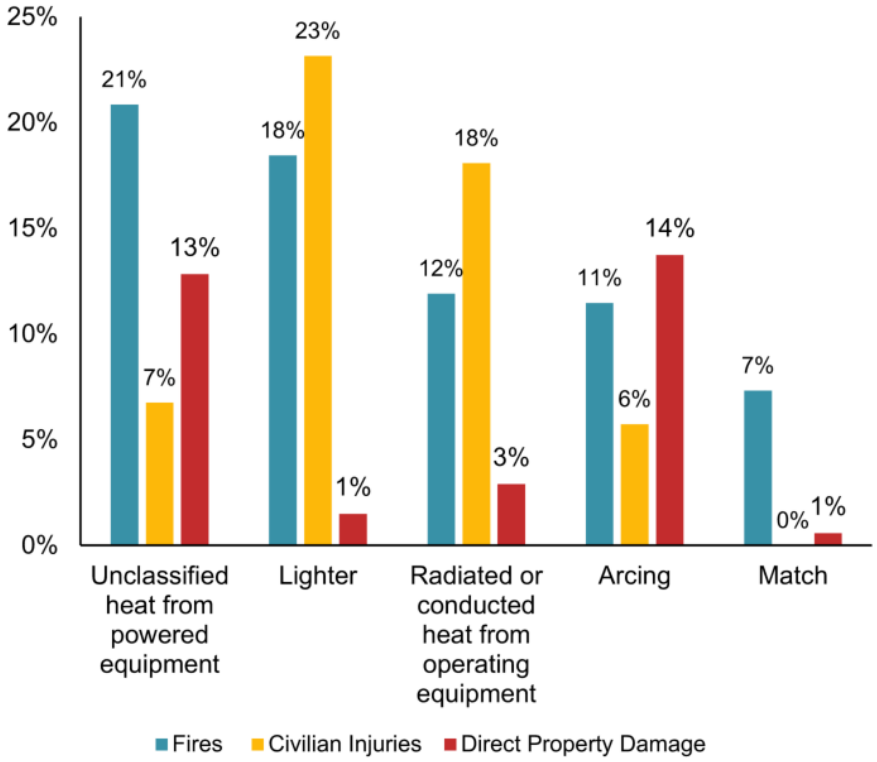


Figure 16: Structure Fires in Elementary Schools by Heat Source, 2014-2018 Annual Averages

2.6. Fire Brigade Locations

FRNSW provides a response to this site and the proximity of the nearby fire stations are identified in Table 4 below.

Table 4: Responding FRNSW fire stations.

Fire Brigade Stations	Approximate Road Distance
Crows Nest Fire Station 99 Shirley Rd, Crows Nest NSW 2065	1.1 km
Neutral Bay Fire Station 28 Yeo Street, Neutral Bay NSW 2089	2.6 km

3. Fire Safety Strategy

3.1. Overview

The fire safety strategy for united buildings I & J comprises a combination of BCA DtS solutions and fire engineered Performance Solutions.

The following sections outline the requirements of each fire safety system / measure forming the fire safety strategy of the project. These sections identify the key design criteria / parameters to enable the detailed system design to be fully developed and documented.

These requirements are not intended to be exhaustive or exclusive. Any fire safety items and details not specifically identified are required to comply fully with the DtS Provisions of the BCA unless otherwise approved.

3.2. Fire Resistance and Compartmentation

The building is prescribed to be of Type A construction. Fire resistance and compartmentation shall be in accordance with the DtS provisions of the BCA Part C.

3.3. Egress

Egress provisions shall be in accordance with the DtS provisions of the BCA Section D.

3.4. Emergency Warning and Intercom System

The building is to be provided with an Emergency Warning and Intercom System (EWIS) in accordance with BCA Clause E4.9 and AS 1670.4.

3.5. Smoke Hazard Management Smoke Detection System

The building is to be served by an automatic smoke detection and alarm system complying with Specification E2.2a and AS 1670.1.

3.6. Fire Hydrant System

A fire hydrant system is to be provided in accordance with BCA Clause E1.3 and AS 2419.1, except that a Performance Solution in this FER addresses the fire hydrant booster to be located within 10.5 m of the hardstand, in lieu of 8 m as prescribed AS 2419.1.

3.7. Manual Occupant Firefighting

The building is to be provided with fire extinguishers in locations outlined in BCA Clause E1.6 and installed in accordance with AS 2444.

The building is to be provided with fire hose reels in locations outlined in BCA Clause E1.4 and installed in accordance with AS 2441.

3.8. Exit Signage and Emergency Lighting

Emergency lighting and illuminated exit signage is to be provided to the building in accordance with AS 2293.1-2018 and BCA Clauses E4.2, E4.5 and E4.6.

3.9. Alternative Electrical Generation System(s) - FRNSW Requirements

To facilitate fire brigade intervention, the following measures are to be implemented relating to alternative electrical generation systems (i.e. solar panels system):

- Signage must be clearly displayed at the FIP identifying the presence and location of the alternative electrical generation system.
- A block plan showing the location of all associated isolation switches, AC and DC isolators for the shut-off of generated electricity should be displayed at the FIP

- If the alternative electrical generation system automatically isolates on fire trip, signage should be provided at the FIP detailing this provision that can clearly be identified by firefighters.

FRNSW recommend the following be provided with regards to signage:

- Be constructed of all-weather fade resistant material with red lettering not less than 25mm high with a contrasting coloured background.
- Provide notice of the type of alternative electrical generation system and the location of any isolation/shut-off switches and shut down procedures.
- Be provided on or adjacent to the fire indicator panel (FIP).
- Be provided on or adjacent to all sprinkler and hydrant block plans.

3.10. Management, Use & Maintenance Measures

3.10.1. Management

The following management procedures are required to complement the physical fire safety measures as a part of the fire safety strategy for the building:

- Emergency procedures based on AS 3745-2010 as relevant / applicable.
- Fire safety management, such as the following:
    - Smoking prohibited in the building and implementation of designated external smoking areas including these being located a minimum 5 m from any building;
    - Hot work permits (e.g. for cutting, welding, heating, angle grinding or any other related practices) which present a potential ignition source;
    - Procedures for system isolations;
    - Regular maintenance and testing of electrical equipment and appliances;
    - House-keeping measures, including avoidance of the accumulation of rubbish or storage within common areas, including the exits and the paths of travel to the exits; and
    - Record keeping, in particular as built documentation of fire safety systems, the occupancy permit and the Fire Engineering Brief upon which building approval was based.
    - Fire Orders and evacuation diagrams.

3.10.2. Use of the building

So that the fire safety strategy remains valid, the use of the project areas must be in accordance with the original design intent as identified herein and the building classes & number of occupants indicated on the occupancy permit. Alterations to these may invalidate the fire safety strategy and should be referred for further advice.

3.10.3. Maintenance

Following completion of the project works, a maintenance regime is required to be implemented such that the level of life safety in the building does not unduly deteriorate over time. This may include the following:

- Maintenance of fire safety provisions utilising AS 1851-2012 to facilitate this process;
- Emergency lighting and exit signage to be maintained in accordance the relevant design and installation standards, utilising AS 2293.2-2018; and
- Electrical and process equipment is to be the subject of any statutory requirements for inspection and maintenance, which is to be undertaken by a qualified person.

3.11. Construction & Commissioning

3.11.1. Construction

Successful implementation of the fire safety strategy in a building requires works to be undertaken by competent and appropriately qualified persons, with appropriate coordination between trades and systems.

3.11.2. Commissioning

Commissioning of fire safety measures shall include testing specified in the relevant Australian standards for design and/or installation, and any other requirements arising out of the Fire Engineering Report. It is recommended that testing of interfaces between systems be undertaken in accordance with the relevant standards during the commissioning of individual systems. Inspections by the following parties as necessary are recommended at the completion of the building works:

- A site review by the fire safety engineer to confirm the installed fire safety systems, and other features of the building which have an impact on fire safety are consistent with the approved fire safety strategy. Independent certification for fire safety systems should be provided (however this review does not replace the statutory role performed by the Building Surveyor);
- Inspections by the other project stakeholders as applicable; and
- An inspection by the relevant fire authority as necessary.

The details of the Fire Engineering Report are recommended to be included within the occupancy permit to assist future essential safety measures auditing of the building.

4. BCA Compliance

4.1. BCA DtS Reference Criteria

Table 5: BCA building characteristics

BCA Criterion	Building Characteristics (United Buildings I & J)
Building Classifications (BCA Part A)	Class 9b (School)
Rise in Storeys (BCA C1.2)	3
Type of Construction (BCA C1.1)	Type A
Effective Height (BCA Schedule 3)	7.2 m

4.2. Departures from the BCA DtS Provisions and Proposed Performance Solutions

Table 6 below summarises the variations from the BCA DtS provisions in have been identified by the Certifier for consideration by fire engineering analysis.

These fire safety issues have been addressed as Performance Solutions in the Fire Engineering Report.

Table 6: Summary of Performance Solutions

Item	BCA DtS Provisions *(Performance Requirements)*	Proposed Performance Solution
1	E1.3, AS 2419.1-2005 (EP1.3)	It is proposed to permit the fire hydrant booster to be located within 10.5 m of the hardstand, in lieu of 8 m as prescribed within AS 2419.1-2005.

5. Performance Solution 1 – Fire Hydrant Booster Location

5.1. Overview

Item	BCA DtS Provisions *(Performance Requirements)*	Proposed Performance Solution
1	E1.3, AS 2419.1-2005 (EP1.3)	It is proposed to permit the fire hydrant booster to be located within 10.5 m of the hardstand, in lieu of 8 m as prescribed within AS 2419.1-2005.

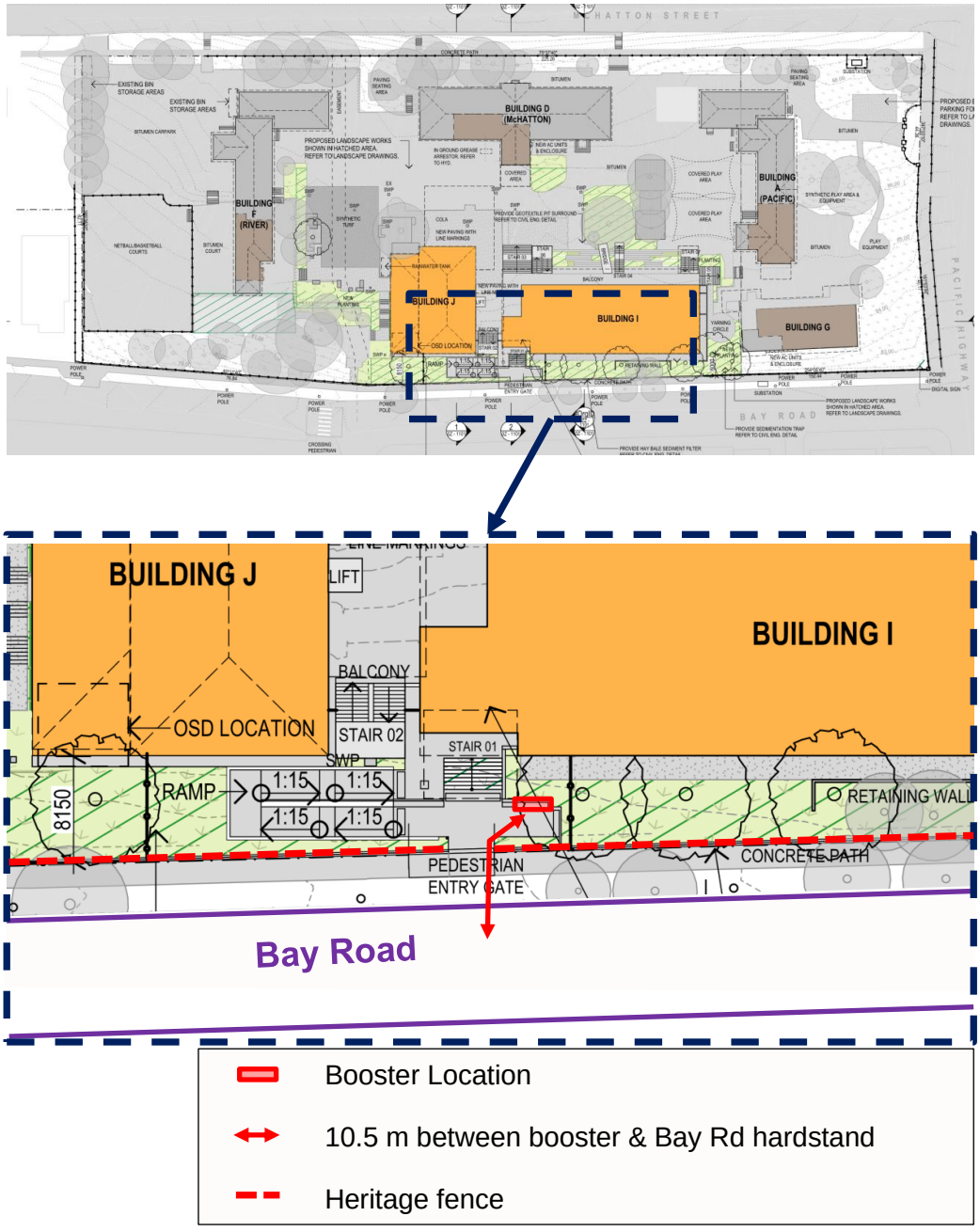


Figure 17: Overview of Performance Solution

Figure 18: Heritage Fence

5.2. Approach and Methods of Analysis

Table 7: Fire engineering approaches and methods of analysis.

Performance Solution 1 – Fire Source Feature Exposures	
Proposed Method(s) of Analysis	Deterministic assessment approach which includes qualitative analysis considering the appropriateness of the proposed booster location, in consultation with FRNSW.
BCA Assessment Method(s)	A2.2(1)(a); A2.2(2)(b)(ii)
AFEG Sub-systems	SS-F – Fire Services Intervention

5.3. Acceptance Criteria

Demonstration of compliance with the BCA Performance Requirement (EP1.3) relevant to the nominated Performance Solution forms the acceptance criteria for the fire engineering analysis. The fire engineering analysis will detail and demonstrate that the proposed hydrant booster location facilitates fire brigade intervention to the degree necessary, and meets the relevant BCA Performance Requirements.

5.4. Fire Engineering Analysis

5.4.1. Booster Location

The new fire brigade booster assembly serving the proposed united buildings I & J will be located within 10.5 m of the hardstand at Bay Street. The location of the booster is understood to be driven by the limitations posed by the existing heritage fence and the location of proposed new opening within the fence (new entry gate).

The Guide to the BCA states that the intent of Clause E1.3 is *"to require the installation of suitable fire hydrant systems to facilitate the fire brigade's firefighting operations"*. The fire hydrant system will be in accordance with BCA Clause E1.3 except that the only fire hydrant system DtS variation relates the booster location to be located within 10.5 m, in lieu of 8 m. Therefore, FRNSW acceptance of the booster location as satisfactory for their operational requirements in undertaking fire brigade intervention forms the acceptance criteria for this variation.

The booster will be located within sight of the main entry from Bay Road which also serves as the hardstand. The site's water supply will be from reticulated town main where the use of 65 mm hose connection on fire brigade booster inlets will be considered. Unlike large bore connections required for water storage which requires a rigid pipe, the 65 mm hose connection may be connected to flexible hose lengths up to 20 m.

This proposal was presented to FRNSW via the FEBQ submission process to which in-principal support was provided (see Appendix A).

5.5. Conclusion

Based on the above and consultation with FRNSW, it is considered that the Performance Solution relating to the fire hydrant booster location does not adversely impact fire brigade intervention to meet the operational requirements of FRNSW, and is acceptable; and satisfies the relevant BCA Performance Requirement (EP1.3); subject to the implementation of the fire safety strategy for the building outlined in Section 3.

6. BCA Criteria

6.1. Compliance with BCA Performance Requirements

The Performance Solutions have been analysed and are considered to achieve a satisfactory level of fire safety commensurate with the relevant BCA Performance Requirements EP1.3

Table 8: BCA Performance Requirement EP1.3 – Performance Solution 1

Performance Requirement Parameter	Discussion / Analysis	Parameter Addressed?
EP1.3 A fire hydrant system must be provided to the degree necessary to facilitate the needs of the fire brigade appropriate to -		
(a) fire-fighting operations, and	Qualitative analysis demonstrated that the proposed booster location is expected to facilitate fire brigade intervention, in conjunction with FRNSW support.	Yes
(b) the floor area of the building: and		Yes
(c) the fire hazard.		Yes

7. Conclusions & Recommendations

This Fire Engineering Report has assessed the variation to the DtS provisions related to the proposed development at North Sydney Public School located at 182 Pacific Highway, North Sydney NSW 2060

Based on the fire engineering analyses presented in this report, it is considered that the proposed BCA Performance Solution, as described and assessed in Sections 4 to 5 achieves compliance with the relevant BCA Performance Requirements, subject to the implementation of the Fire Safety Strategy outlined in Section 3 and the recommendations below.

1. Only the matter identified in Table 1 has been analysed as Performance Solution in this FER. All other fire safety related issues shall comply with the BCA DtS provisions.
2. To ensure the validity of the outcomes of this report, any design changes which impact fire safety provisions as assessed or documented in this report should be referred to LCI Australia for consideration.
3. The nominated departure from the BCA DtS provisions must be noted in the Fire Safety Schedule within the Occupation Certificate (or any other relevant permits) to assist with future auditing.

Appendix A. FRNSW Comments on FEBQ

Applicant reference number Enter ref. no. **FRNSW reference number** FRN22/1035

Ver.	Author	Organisation	Status	Date
01	Mark Thomas	Lehr Consultants (Australia) Pty Ltd	Initial submission	4/04/2022
02	Andy Huynh	FRNSW (BFS22/1456 #20510)	Response to V01	08/06/2022

#	Performance Solution / FEBQ Section	FRNSW V02 Comments on FEBQ (01/08/2019)	LCI Response	Location in FER Where Addressed
1	Section 5 - Hazards	FRNSW Comment: FRNSW note that P.V panels are located on the roof plan of Building I in the provided architectural drawings (undertaken by fulton trotter architects, dated: 07/02/2022) and recommend Section 5 be completed for consistency and clarity. Regarding the installation of alternative electrical generation system(s), FRNSW recommend the following: • Signage must be clearly displayed at the FIP identifying the presence and location of the alternative electrical generation system. • A block plan showing the location of all associated isolation switches, AC and DC isolators for the shut-off of generated electricity should be displayed at the FIP • If the alternative electrical generation system automatically isolates on fire trip, signage should be provided at the FIP detailing this provision that can clearly be identified by firefighters. FRNSW recommend the following be provided with regards to signage: • Be constructed of all-weather fade resistant material with red lettering not less than 25mm high with a contrasting coloured background. • Provide notice of the type of alternative electrical generation system and the location of any isolation/shut-off switches and shut down procedures. • Be provided on or adjacent to the fire indicator panel (FIP). • Be provided on or adjacent to all sprinkler and hydrant block plans.	These requirements form part of the fire safety strategy in this FER.	Section 3.9

#	Performance Solution / FEBQ Section	FRNSW V02 Comments on FEBQ (01/08/2019)	LCI Response	Location in FER Where Addressed
2	Issue Number 12	FRNSW Comment: In principle support is provided subject to the analysis in the FER demonstrating compliance with the performance requirements of the NCC.	Performance Solution 1 demonstrates compliance with the relevant Performance Requirements of the NCC.	Section 5.

References

1 Australian Fire Engineering Guidelines 2021, Australian Building Codes Board, Print Version 1.0, July 2021.

2 Code of Practice for Fire Safety Design, Certification & Peer Review to determine compliance with the Building Code of Australia, Engineers Australia Society of Fire Safety, June 2003.

3 Position on the Role of Registered Practitioners in Fire Safety Engineering, Version 2, Engineers Australia Society of Fire Safety, 15 February 2011.

4 International Fire Engineering Guidelines 2005, Australian Building Codes Board, 2005.

5 Campbell R, Structure Fires in Schools, NFPA Fire Analysis and Research, Quincy, MA, September 2020.