Fire Safety Engineering Design Review for SSDA Submission

WESTERN SYDNEY UNIVERSITY

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Western Sydney University – Indigenous Centre of Excellence NSW

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Issue No	Date	Document control - Purpose of issue	Prepared by	Checked by	Approved by
1-0	01/05/2024	Fire Safety Engineering Design Review for SSDA Submission	Kapilan Sarma	Mahmut Horasan	Russell Kilmartin
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1. General

Scientific Fire Services has undertaken a preliminary review and assessment of the architectural drawings/concepts for the development known as Western Sydney University – Indigenous Centre of Excellence located at 171 Victoria Road, Parramatta NSW. This report responds to the SSD-64916225 Secretary's Environmental Assessment Requirement (SEARs) Number 32 which was issued by the Department of Planning, Housing and Infrastructure on 21st November 2023.

2. Building Description

The subject site is located within WSU South Parramatta Campus, whereby it is proposed to construct a new tertiary education building to serve the growing WSU campus at 171 Victoria Road, Parramatta NSW. The site is bounded by Victoria Road to the north, Railway Street to the east, Fifth Street to the south, which serves as the principal site entry, and Bridge Street to the west (Refer to Figure 2.2). The development shall also be accessible via the newly constructed Yallamundi Light Rail station, which is currently awaiting operation. The site is noted to currently comprise a hardstand area for carparking and the existing Central Energy Plant, the latter of which is to remain unaffected by the proposed works. With respect to the car parking areas serving this building, it is proposed to maintain the 13 spaces on the existing P1 car park site, introduce 107 spaces to the new western car park on the western side of Bridge Street and introduce 181 spaces to the new eastern car park on the southern side of Fifth Street.

Figure 2.1: Site locality within the WSU South Parramatta Campus (Image courtesy of Near map/Ethos Urban)

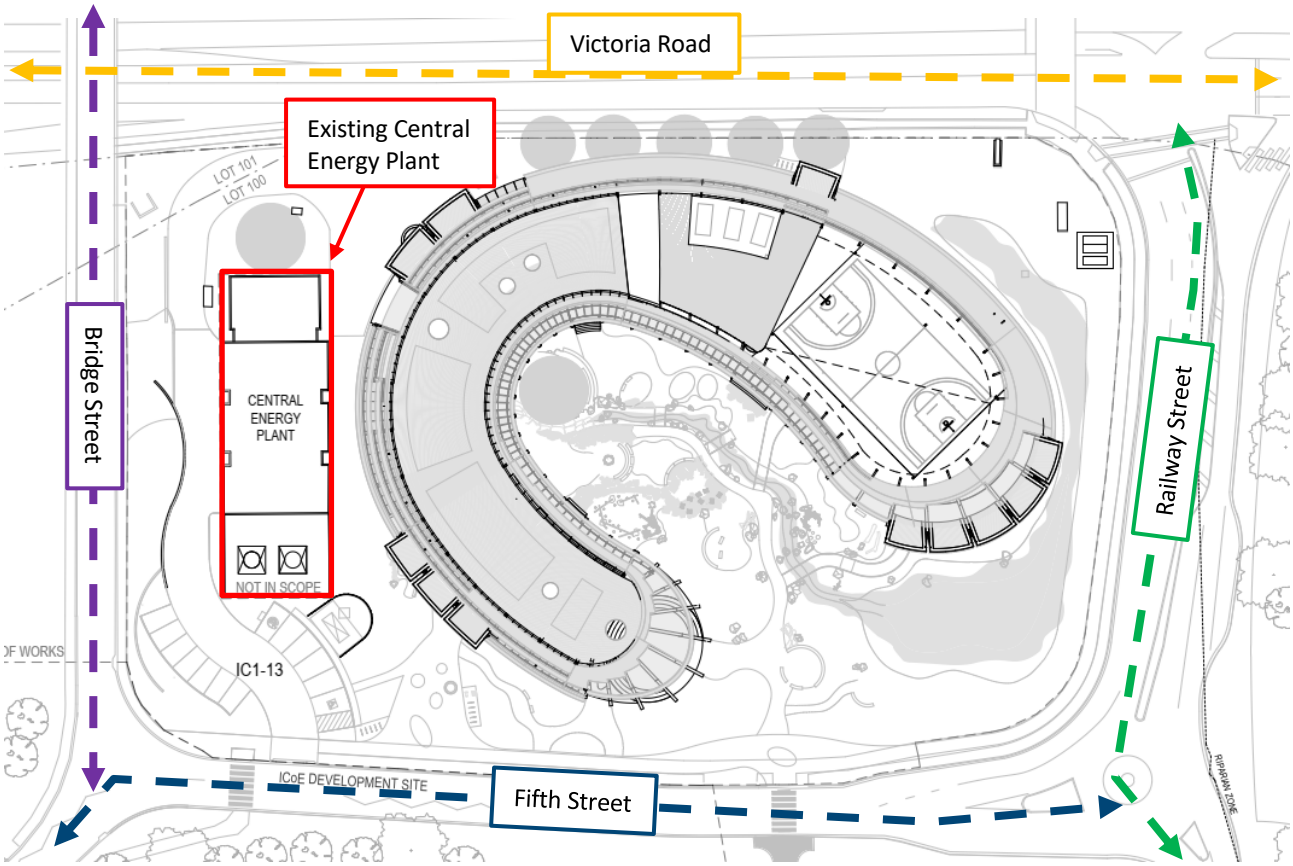


Figure 2.2: Site Plan

Figure 2.3: Artist impressions of the Indigenous Centre of Excellence

The proposed works entail the construction of a four (4) storey building, named the Indigenous Centre of Excellence, which is noted to incorporate extensive timber construction. The new development shall mainly consist of Class 9b facilities, most notably an outdoor amphitheatre, a gallery and a triple height theatre on Ground Floor. Further Class 9b facilities housed in the building include a cinema/lecture hall, various study/learning spaces and a rooftop recreational area comprising a garden and a sports court. Additionally, the building shall contain Class 5 office spaces, mainly concentrated on Ground Floor and Level 2. Figure 2.4 to Figure 2.8 illustrate the planned building layout.

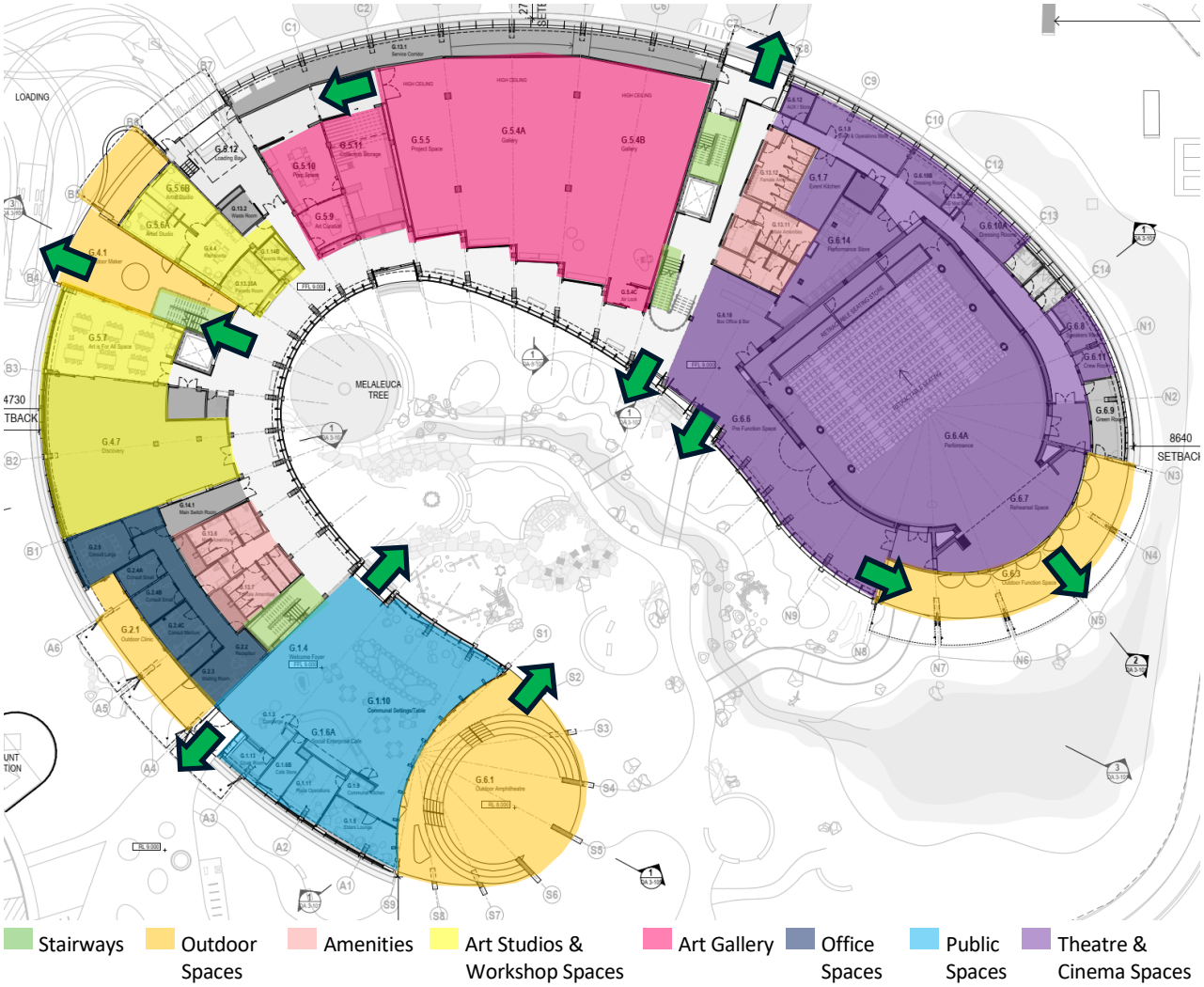


Figure 2.4: Floor Plan – Ground Floor

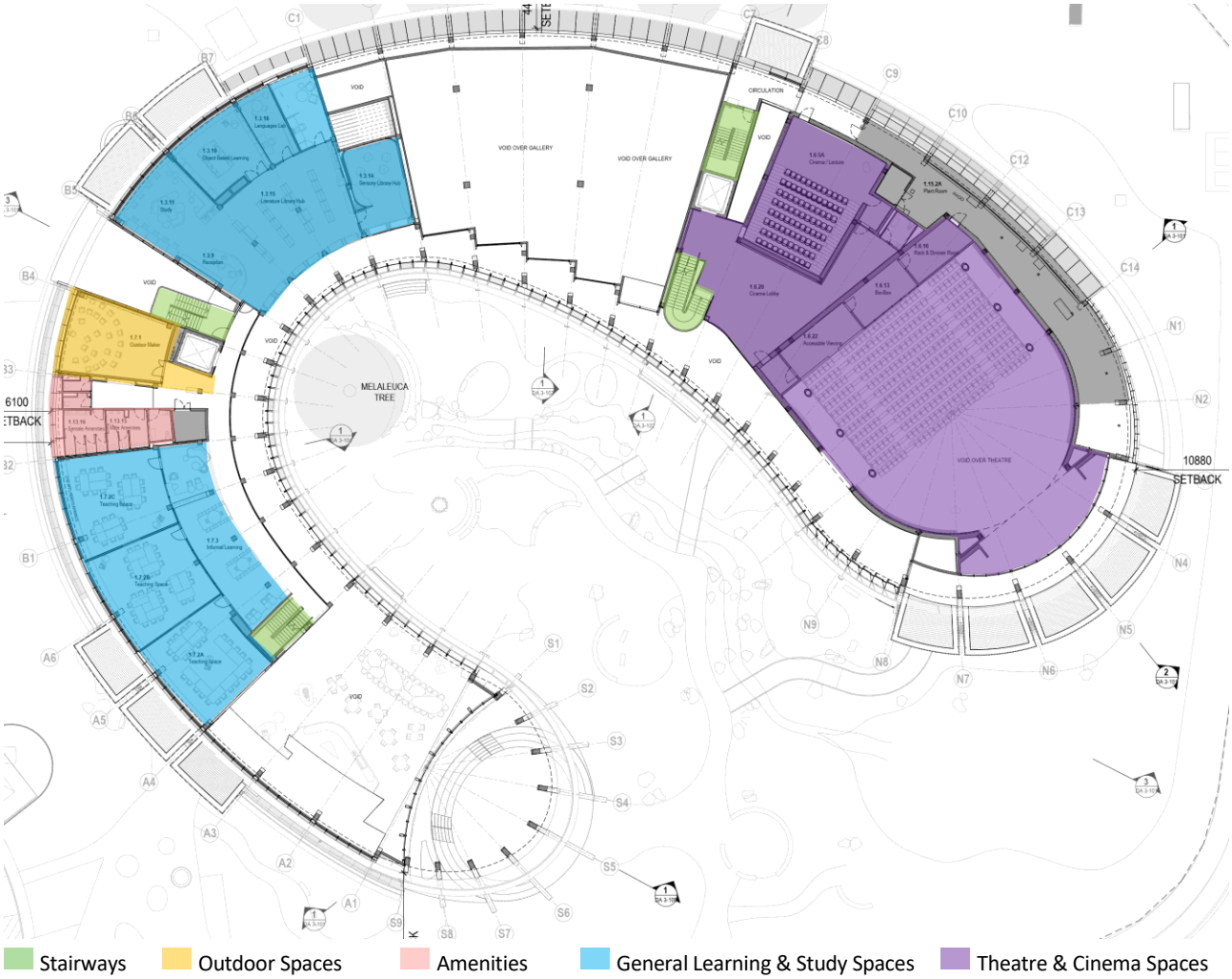


Figure 2.5: Floor Plan – Level 1

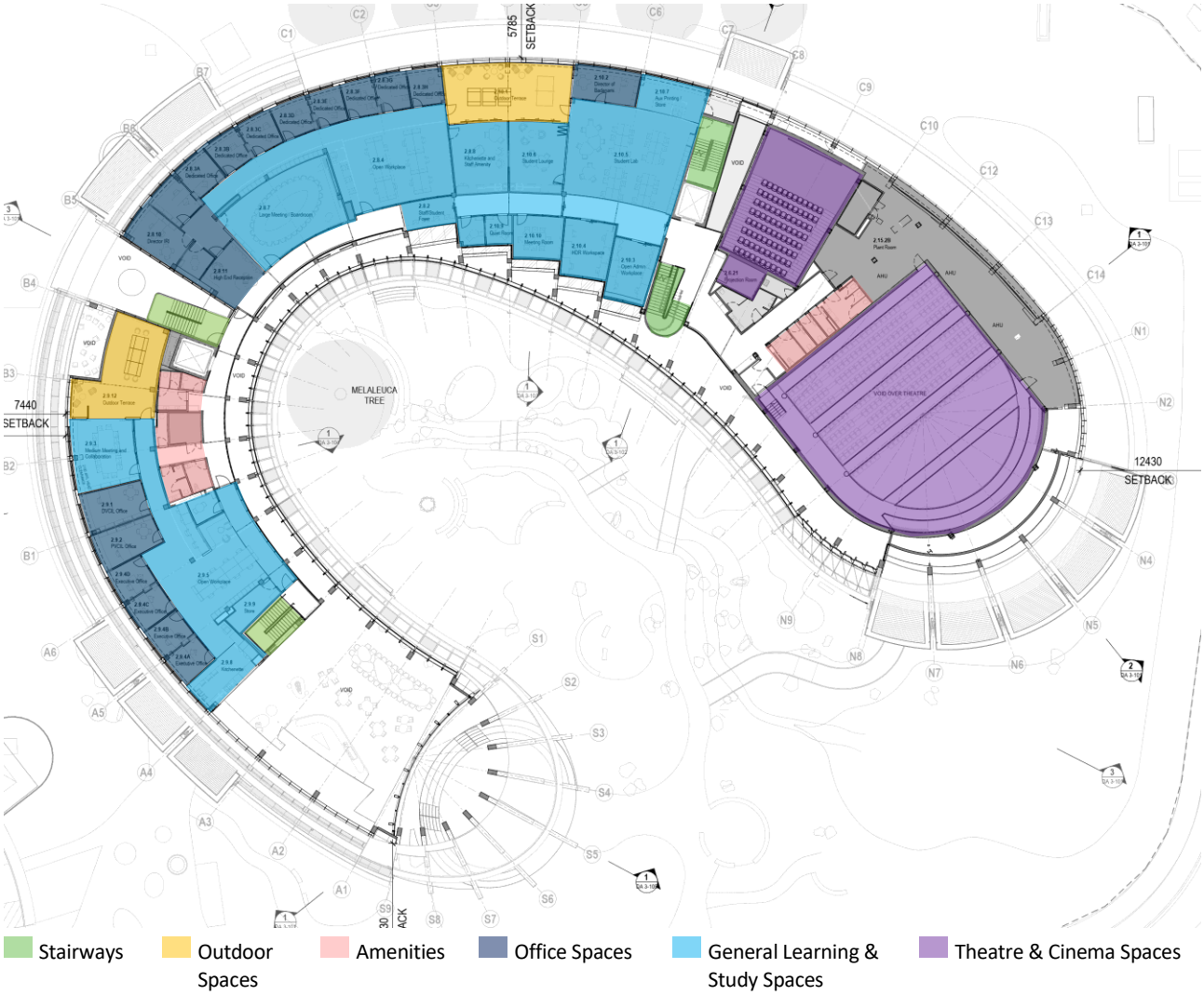


Figure 2.6: Floor Plan – Level 2

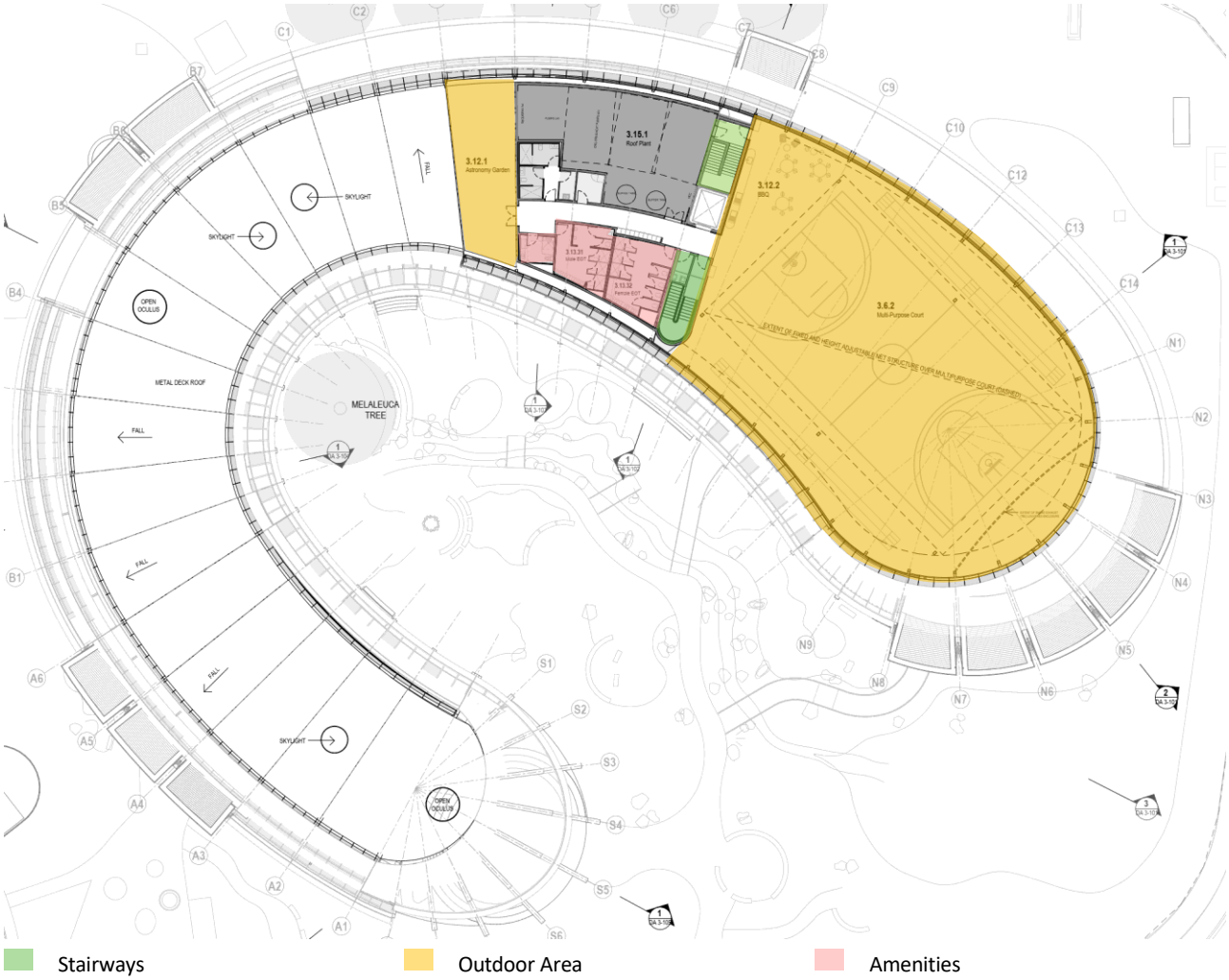


Figure 2.7: Floor Plan – Level 3

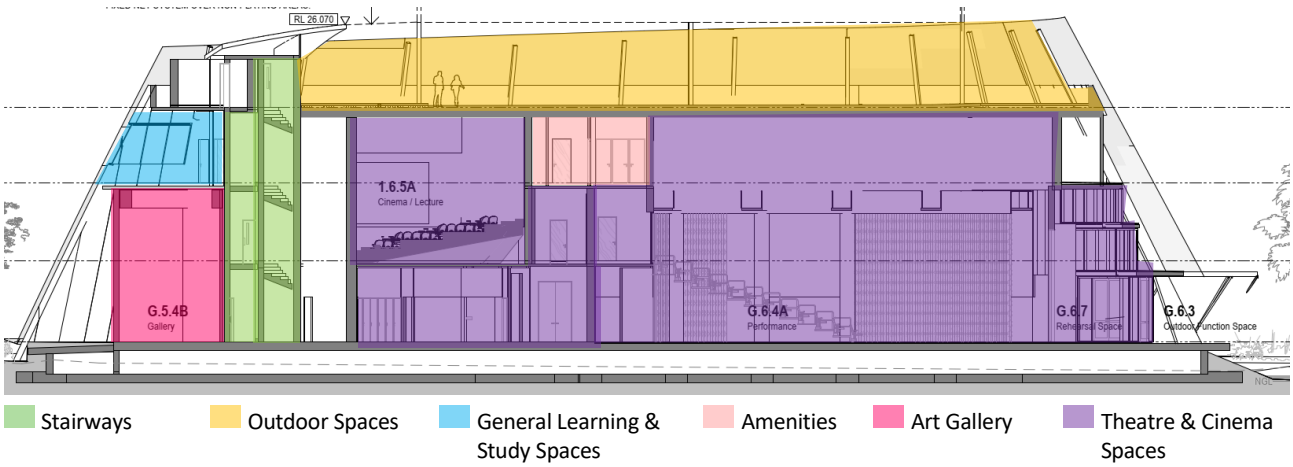


Figure 2.8: Section drawing

Table 2.1 provides a detailed summary of the key building characteristics.

Table 2.1: Overview of building characteristics

Occupancy Levels	Key Characteristics
Ground Floor	• Welcome Foyer • Theatre (triple height) • Cinema/Lecture Hall (double height) • Gallery (double height) • Outdoor Amphitheatre • Art Studios & Exhibition spaces • General Learning/Study spaces • Consulting offices • Loading bay & plant rooms
Level 1	• Library facilities • General Learning/Study spaces • Outdoor Terraces • Plant rooms
Level 2	• Offices & Workspaces • General Learning/Study spaces • Outdoor Terraces • Plant rooms
Level 3 (Rooftop)	• Outdoor astronomy garden • Outdoor multi-purpose sports court

3. Purpose

The preliminary fire safety engineering review was undertaken to determine 'in-principle' whether the design will achieve compliance with the Performance Requirements of the Building Code of Australia (BCA) (ABCB, 2022). The design review relates to the fire-resisting construction, egress provisions and fire protection services proposed for the entire development.

The design issues specific to the development will be formally assessed through the application of the fire safety risk engineering process in accordance with the Australian Fire Engineering Guidelines (AFEG) (ABCB, 2021). It is the expectation that a suitable Performance Solution will be developed and supported through robust fire engineering methodologies in accordance with the current design proposal.

4. Compliance Expectation

4.1 General

The relevant Performance Requirements against which the Performance Solution is assessed must be established in accordance with the BCA. From Clause A2G2, a number of 'Performance Solutions' may be used to show that a Building Solution complies with the Performance Requirements. The design issues that will be the subject of the project Performance Solution has been identified by the BCA consultant in conjunction with the Principal Certifying Authority (PCA). The following table provides a summary of the fire safety risk engineering aspects of the design that will be the subject of the project Performance Solution.

Table 4.1: BCA departures – Fire safety engineering scope of works

No.	Performance Solution Design Issues Addressed	BCA DtS Provision	Performance Requirement(s)
1.	The proposed building is within 6m of the existing Central Energy Plant building on the same allotment.	Clause C4D3 inter alia Specification 5	C1P2 and C1P8
2.	The building is proposed to be constructed from Mass Engineered Timber: • Selected elements to not be encapsulated with a fire protective covering.	Clause C2D15	C1P1 and C1P2

No.	Performance Solution Design Issues Addressed	BCA DtS Provision	Performance Requirement(s)
3.	Exit travel distances proposed to be extended as follows: Ground Level (L1) • 24m to a point of choice in lieu of 20m • 50m to an exit in lieu of 40m Theatre • 45m to an exit to auditorium in lieu of 40m Level 2 • 29m to a point of choice in lieu of 20m Level 3 • 28m to a point of choice in lieu of 20m	Clause D2D5	D1P4 and E2P2
4.	Distances between alternative exits are proposed to be extended as follows: Theatre • 80m between exits in the auditorium. • 90m between exits in the backstage area	Clause D2D6	D1P4 and E2P2
5.	It is proposed to assess the stair discharge of an open stair which serves all levels. It is also proposed to explore the option of providing glazed construction to the stair at the top most level.	Clause D2D12	D1P4 and D1P5
6.	Assessment of required smoke exhaust system to: • Building generally due to atrium (non-fire compartmented) • Building generally due to gallery / exhibition uses • Theatre stage and auditorium	Clause E2D3	E2P2
7.	It is proposed to review the open void/atria and evaluate its impact via human movement modelling and smoke spread analysis to demonstrate acceptable levels of life safety is achieved.	Clause G3D3, Clause G3D4, Clause G3D5, Clause G3D6 and Clause G3D8	C1P2, C1P4, D1P4, E2P2 and E4P2.

The abovementioned design issues shall be addressed through a combination of qualitative & quantitative assessment methodologies. The methodologies will rely upon a combination of enhanced passive and active fire safety measures specific to each design issue which is to be rationalised through a holistic approach.

4.2 Fire Resistance and Construction

The Class 9b community development shall be predominately constructed from mass timber in the form of Cross Laminated Timber (CLT) and Glue Laminated Lumber (Glulam). The timber structure shall include loadbearing CLT panels forming the separating floor structures and loadbearing Glulam mass timber columns and beams forming the main structure. Based on the structural design the lift, services and fire stair shafts may be constructed of traditional reinforced concrete construction methods.

The proposed mass timber and concrete structure shall be designed to resist the impact of fire for a minimum duration of 120 minutes and as such the inherent fire resistance performance shall achieve no less than 120-minute resistance to fire. It is proposed to expose substantial portions of the structural timber columns, beams and CLT soffit. Based on further design development and fire engineering analysis there may be areas within the building where the soffits are required to be encapsulated with fire rated plasterboard to the underside of the mass timber floor/ceiling soffits.

From a design perspective either *Eurocode 5: Design of Timber Structures – Part 1-2: General – Structural Fire Design (EN 1995-1-2:2004)* or *AS1720.4:2006. Timber Structures- Fire Resistance for Structural Adequacy of Timber Members* shall be adopted for the structural design of the Glulam beams and columns and CLT floor slabs with supporting fire testing and fire engineering justification. The methodology used to calculate the fire resistance period of the exposed Glulam elements shall be reduced cross section method to 120-minute duration for charring.

The review of the site plan indicates that distance between the existing CEP building, and proposed building is less than 6.0m. As the detailed design progresses evaluation of fire spread between buildings will be undertaken by evaluating the fire spread risks between the buildings based on credible fire scenarios.

In the context of fire resistance, the building shall achieve the required Fire-Resistance Period's (FRP's) appropriate to the individual building classification and consistent with Type A fire-resisting construction.

4.3 Occupant Egress

Due to the unique shape of the building, function and use of the building and occupant characteristics on each level being different the occupant egress provisions serving the building is a key aspect to review during the DA stage. The building shall be served by a minimum of three (3) stairways which shall be provided for occupant egress on all levels. The design shall incorporate internal open communication stairs that will be used as part of daily use and for emergency evacuation.

One of the key aspects to review is the occupant loading on each level due to the presence of an outdoor basketball area on level 3 and the theatre at ground and level 1. The occupants on the outdoor basketball area shall be provided with a dedicated fire stair which discharges into a sterile lobby on ground level prior to exiting the building. The egress provisions from the theatre space have been reviewed and it was identified that occupants are provided with multiple egress pathways to a road or open space. A level of smoke proof construction has been introduced to assist occupants in accessing the most suitable egress path.

The BCA consultant shall provide further advice with respect to aggregate egress width requirements for each level. The distribution of available egress paths/exits is considered to be adequately uniform across the building levels. Aggregate egress widths will form part of the detailed assessment adopting human movement simulation software and potential improvements to egress widths of stairs and exits on the discharge level shall be further explored in the detailed design development phase.

In the context of occupant evacuation, exit travel distances to point of choice, to an exit and between alternative exits and internal discharge of fire stairs in limited circumstances have been reviewed and all potential issues of compliance can be readily supported under a Performance Solution.

4.4 Fire Services and Equipment

In the context of fire services & equipment, the design shall incorporate a standard suite of fire safety measures which are appropriate to the size & nature of the building. This shall include automatic sprinkler systems installed throughout the building, occupant warning system, smoke detection and alarm, portable fire extinguishers, fire hose reel system, fire hydrant system, emergency lighting & exit signage.

The primary fire safety measure in fire control and suppression will be automatic sprinkler systems installed throughout to ensure adequate control of timber fuel loads in the event of an emergency fire situation.

Due to the presence of multiple voids, auditorium/theatre and exhibition hall a level of automatic smoke hazard management is required within the building. The smoke hazard management shall be rationalised in co-ordination with the mechanical consultant.

It should be noted that the fire services consultant is in the process of reviewing the fire hydrant locations to ensure that fire hydrant coverage is achieved throughout the building without any shortfalls.

4.5 FRNSW Consultation

Scientific Fire Services can confirm that the approvals process through Fire & Rescue NSW (FRNSW) will be followed in regard to the Performance Solution submission of the WSU Indigenous Centre of Excellence which have been categorised as *"State Significance"*. FRNSW has confirmed that they look forward to reviewing the design once the design has been further development and will likely support a meeting during the FRNSW consultative stage and Fire Engineering Brief Questionnaire (FEBQ) stage.

The role of the Authority Having Jurisdiction (FRNSW) is clearly understood and Scientific Fire Services confirm that the fire engineering consultation and design shall comply with Fire & Rescue NSW Fire Safety Guidelines and Position Statements and all other relevant requirements.as provided within https://www.fire.nsw.gov.au/page.php?id=9145.

5. Statement of Endorsement

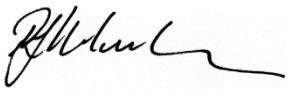
The fire and life safety related design issues will be addressed through the performance-based path of compliance. Scientific Fire Services can confirm that the proposed design will achieve fire safety design compliance to the Performance Requirements of Volume 1 of the Building Code of Australia (BCA)(ABCB, 2022).

The formulation of the Performance Based Design Brief (PBDB) represents the next step in the approvals process. Scientific Fire Services shall commence the process of developing this document and will provide a formal comprehensive PBDB submission. As part of the process, a Fire Engineering Brief Questionnaire (FEBQ) document shall be prepared in accordance with the Fire and Rescue NSW pro forma and formally submitted as part of the referrals process.

Finally, and in order to ensure that the client can obtain a Construction Certificate for the proposed building works, Scientific Fire Services will prepare a Fire Safety Engineering Report (FSER) incorporating stakeholder conditions, comments and advice to the satisfaction of the Principle Certifying Authority (PCA).

On the basis of the review of the proposed design issues identified herein, Scientific Fire Services can confirm that the design of the WSU Indigenous Centre of Excellence building will achieve fire safety design compliance to the relevant Performance Requirements of the National Construction Code Series – Volume 1, Building Code of Australia (BCA), 2022.

I trust the above is satisfactory for your current purposes. Should you have any queries, please do not hesitate to contact me on (03) 9686 4730 or russell.kilmartin@scifire.com.au



Russell Kilmartin
Director

Scientific Fire Services

BDC 0210 – Certifier – Fire Safety

Appendix A. Architectural Drawings

Drawing Number	Drawing Name	Revision	Date
DA 0-102	SITE PLAN - PROPOSED	July 2025	4
DA 1-102	PROPOSED FLOOR PLAN_LEVEL G	June 2025	3
DA 1-103	PROPOSED FLOOR PLAN_LEVEL 01	June 2025	3
DA 1-104	PROPOSED FLOOR PLAN_LEVEL 02	June 2025	3
DA 1-105	PROPOSED FLOOR PLAN_LEVEL 03	June 2025	3
DA 3-101	SECTIONS	April 2025	3