BLACKETT MAGUIRE+ GOLDSMITH

THE NATIONAL CONSTRUCTION CODE VOLUME ONE

SCHEMATIC DESIGN STAGE

WESTMEAD HOSPITAL
ADDITIONAL REFURBISHMENT WORKS
OPERATING THEATRES 9 - 16

NSW GOVERNMENT Health Infrastructure

Revision 0
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REVISION STATUS				
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A. INTRODUCTION

A.1 BACKGROUND / PROPOSAL

+ Blackett Maguire + Goldsmith Pty Ltd (BM+G) have been commissioned by Health Infrastructure to undertake a Building Code of Australia (BCA) 2019 Amendment No. 1 (including Access) assessment of the Design Development Issue Architectural Design Documentation for the proposed alterations and additions to the existing Operating Theatres 9 – 16 on Level 3 of Block F at Westmead Hospital.

A.2 AIM

The aim of this report is to:

+ Undertake an assessment of the proposed alterations and additions to the existing Westmead Hospital Building against the Deemed-to-Satisfy (DtS) provisions of Part C, D, E, F & J of the BCA 2022.
+ Identify any BCA compliance issues that require resolution/attention for the proposed redevelopment.
+ Identify non compliances that will be required to be assessed as part of the proposed Fire Engineering Assessment to be prepared by the appointed Fire Safety Engineer.
+ Identify the relevant Performance Requirements that will be required to be assessed as part of the Fire Engineering Assessment.
+ Review the design documentation against the Access to Premises Standards 2010.
+ Identify a list of essential fire safety measures that are required to be installed within the building.

A.3 PROJECT TEAM

The following BM+G Team Members have contributed to this Report:

+ Adam Durnford (Associate Director)
+ David Blackett (Director)

A.4 DOCUMENTATION

The following documentation has been reviewed, referenced and/or relied upon in the preparation of this report:

+ Building Code of Australia 2022
+ Access to Premises Standards 2010
+ Architectural Drawings issued Preliminary DD prepared by HDR dated 28 April 2023.

A.5 REGULATORY FRAMEWORK

Pursuant to Section 19 of the Environmental Planning and Assessment (Building Certification & Fire Safety) Regulation 2021 all new building work must comply with the applicable BCA. In relation to Crown Development, the applicable BCA is the BCA in force at time of calling for tenders or in the absence of calling for tenders, at the time of application for a Crown Certificate.

The BCA Assessment has been prepared in accordance with the Building Code of Australia 2022.

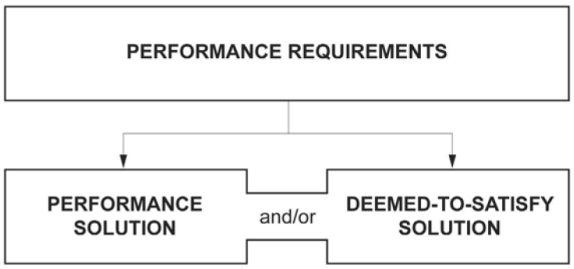
A.6 COMPLIANCE WITH THE BCA

Compliance with the NCC is achieved by complying with—

- The Governing Requirements of the NCC; and
- the Performance Requirements.

Performance Requirements are satisfied by one of the following, as shown in the Figure below:

- A Performance Solution.
- A Deemed-to-Satisfy Solution.
- A combination of the above two options.



A.7 LIMITATIONS & EXCLUSIONS

The limitations and exclusions of this report are as follows:

- The following assessment is based upon a review of the architectural documentation.
- The Report does not address matters in relation to the following:
- Local Government Act and Regulations.
- Occupational Health and Safety (OH&S) Act and Regulations.
- WorkCover Authority requirements.
- Water, drainage, gas, telecommunications and electricity supply authority requirements.
- BM+G Pty Ltd do not guarantee acceptance of this report by Local Council, NSW Fire Brigades or other approval authorities.
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A.8 TERMINOLOGY

Accessible

Means having features to enable use by people with a disability.

Accessway

Means a continuous accessible path of travel (as defined by AS 1428.1) to, into or within a building.

Carpark

Means a building that is used for the parking of motor vehicles but is neither a private garage nor used for the servicing of vehicles, other than washing, cleaning or polishing.

Alternative Solution

Means a Performance Solution

Building Code of Australia (BCA)

Document published on behalf of the Australian Building Codes Board. The BCA is a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia and is adopted in New South Wales (NSW) under the provisions of the EPA Act and Regulation. Building regulatory legislation

stipulates that compliance with the BCA Performance Requirements must be attained and hence this reveals BCA's performance based format.

Construction Certificate

Building Approval issued by the Certifying Authority pursuant to Part 4A of the EPA Act 1979.

Construction Type

The construction type is a measure of a buildings ability to resist a fire. The minimum type of fire-resisting construction of a building must be that specified in Table C1.1 and Specification C1.1, except as allowed for—

(i) certain Class 2, 3 or 9c buildings in C1.5; and
(ii) a Class 4 part of a building located on the top storey in C1.3 (b); and
(iii) open spectator stands and indoor sports stadiums in C1.7.

Note: Type A construction is the most fire-resistant and Type C the least fire-resistant of the types of construction.

Climatic Zone

Is an area defined in BCA Figure A1.1 and in Table A1.1 for specific locations, having energy efficiency provisions based on a range of similar climatic characteristics.

Deemed to Satisfy Provisions (DtS)

Provisions which are deemed to satisfy the Performance Requirements.

Effective Height

The vertical distance between the floor of the lowest storey included in the calculation of the rise in storeys and the floor of the topmost storey (excluding the topmost storey if it contains only heating, ventilating, lift or equipment, water tanks or similar service units).

Fire Isolated Stairway

Means a stairway within a fire resisting shaft and includes the floor and roof or top enclosing structure.

Fire Resistance Level (FRL)

The grading periods in minutes for the following criteria-

(a) structural adequacy; and
(b) integrity; and
(c) insulation,
and expressed in that order.

Fire Source Feature (FSF)

The far boundary of a road which adjoins the allotment; or a side or rear boundary of the allotment; or an external wall of another building on the allotment which is not a Class 10 building.

Flight

Means that part of a stair that has a continuous series of risers, including risers of winders, not interrupted by a landing or floor.

Health-care building

A building whose occupants or patients undergoing medical treatment generally need physical assistance to evacuate the building during an emergency and includes—

(a) a public or private hospital; or
(b) a nursing home or similar facility for sick or disabled persons needing full-time care; or
(c) a clinic, day surgery or procedure unit where the effects of the predominant treatment administered involve patients becoming non-ambulatory and requiring supervised medical care on the premises for some time after the treatment.

Landing

Means an area at the top or bottom of a flight or between two flights.

Loadbearing

Means intended to resist vertical forces additional to those due to its weight.

National Construction Code Series (NCC)

The NCC was introduced 01 May 2011 by the Council of Australian Governments. The BCA Volume One (Class 2 to 9 Buildings) is now referenced as the National Construction Code Series Volume One — BCA.

Occupation Certificate

Building Occupation Approval issued by the Principal Certifying Authority pursuant to Part 4A of the EPA Act 1979.

Open Space

A space on the allotment, or a roof or other part of the building suitably protected from fire, open to the sky and connected directly with a public road.

Performance Solution (Alternative Solution)

Means a method of complying with the Performance Requirements other than by a Deemed-to-Satisfy Solution.

Patient care area

A part of a healthcare building normally used for the treatment, care, accommodation, recreation, dining and holding of patients including a ward area and treatment area.

Performance Requirements of the BCA

A Building Solution will comply with the BCA if it satisfies the Performance Requirements. A Performance requirement states the level of performance that a Building Solution must meet.

Compliance with the Performance Requirements can only be achieved by-

(a) complying with the DtS Provisions; or
(b) formulating an Alternative Solution which-
    i. complies with the Performance Requirements; or
    ii. is shown to be at least equivalent to the DtS Provisions; or
(c) a combination of (a) and (b).

Primary Building Element

For the purposes of Volume One, means a member of a building designed specifically to take part of the loads specified in B1D3 and includes roof, ceiling, floor, stairway or ramp and wall framing members including bracing members designed for the specific purpose of action as a brace to those members.

Self-closing

For the purpose of Volume One, applied to a door, means equipped with a device which returns the door to the fully closed position immediately after each opening.

Sole occupancy Unit (SOU)

A room or other part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier and includes a dwelling.

Treatment area

An area within a patient care area such as an operating theatre and rooms used for recovery, minor procedures, resuscitation, intensive care and coronary care from which a patient may not be readily moved.

Ward area

That part of a patient care area for resident patients and may contain areas for accommodation, sleeping, associated living and nursing facilities.

B. BUILDING CHARACTERISTICS

B.1 BUILDING CLASSIFICATION

The following table presents a summary of relevant building classification items of the existing Westmead Hospital Level 3 Block F.

+ **BCA Classification:**	Class 5 (Professional Consultation Offices / Staff Administration Areas) Class 9a (Health-care Building)
+ **Rise in Storeys:**	The existing Building (Blocks F) has a rise in storeys of four (4)
+ **Effective Height:**	The building has an effective of: + < 25 m *Note: This is based on documentation available to us at the time of the preparation of the is report. At present no detailed elevations or sections have been made available to BM+G for review to determine the exact effective height of the building.*
+ **Type of Construction:**	Type A Construction
+ **Sprinklers**	The existing building is provided with an Automatic Fire Suppression System.
+ **Climate Zone:**	Energy Efficiency Zone 6
+ **Maximum Floor Area:**	Max. 8,000 m² compartments for Class 5 buildings. Max. 5,000 m² compartments for Class 9a Health Care buildings. *Note: -* *2,000 m² compartments applies to all Patient Care Areas within the building.*
+ **Maximum Volume:**	Max 48,000 m^3 compartments for Class 5 buildings. Max 30,000 m^3 compartments for Class 9a Health Care buildings.
+ **Largest Fire Compartment of Refurbishment:**	1,807 m^2

Table No. 1 – Summary of building classification items

C. SUMMARY OF KEY COMPLIANCE ISSUES

Based on the Design Development Issue Architectural Drawings prepared by HDR, the following is a summary of the key compliance issues identified within the proposed refurbishment of the Operating Theatres 9 – 16 on Level 3 of Block F.

C.1 SUMMARY OF KEY COMPLIANCES ISSUES:

No.	BCA CLAUSE	DESCRIPTION
1.	B1D3 (B1.2)	*Importance Level* The alterations and additions to the existing Hospital Building will be required to be designed and constructed in accordance with the requirements of Importance Level 4 (post disaster operations) including structure and services as detailed in Clause B1D3 of the BCA. Verification will be required from the Structural Engineer and respective Services Engineers that the new building structure and services have been designed in accordance with the requirements for Importance Level 4.
2.	C2D10 (C1.9)	*Timber Noggins in Fire Walls* Fire walls are required to be constructed of non -combustible construction including all elements that make up the smoke wall. In this instance timber noggins or plywood are not permitted to be installed within the fire walls. All services, handrails etc will be required to be supported within the fire wall cavity will be required to be constructed of a non-combustible material.
3.	C3D6 (C2.5)	*Existing Fire & Smoke Walls* In order to ensure that all of the areas of the proposed refurbishment are provided with compliant fire and smoke compartmentation, all fire and smoke that are within or bound the proposed the refurbishment areas that are identified as being deficient in terms of construction (including deficient FRL's, unprotected or inadequate fire and smoke sealing of penetrations etc) will be required to be upgraded.
4.	C4D15 (C3.15)	*Water Filled Pipes Systems Comprised of Metal* In accordance with Clause C4D15, a tested system is not required to comply with the insultation criteria relating to the service subject to the pipe system being constructed of entirely of metal and not having any combustible building elements being located within 100mm for a distance of 2000mm from the penetration and combustible materials not being able to be located within 100mm of service for a distance of 2000mm from the penetration. Having regard to the requirements of Clause C4D15 which are difficult to achieve in a health care environment due to the number of services especially in corridors, if the omission of an insulation rating is proposed to the metal pipes, then this will be required to be assessed by Arup and confirmed to determine if a Fire Engineering Assessment can be undertaken be in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
5.	Spec. 11 (Spec. C2.5)	*Timber Noggins in Smoke Walls*

No.	BCA Clause	Description
		Smoke walls are required to be constructed of non -combustible construction including all elements that make up the smoke wall. In this instance timber noggings or plywood are not permitted to be installed within the smoke walls install throughout Mental Health. All services, handrails etc will be required to be supported within the smoke wall cavity will be required to be constructed of a non-combustible material. If any timber noggins are proposed to be installed within smoke walls to be constructed, then the provision of the timber noggins will be required to be assessed by Arup and confirmed to determine if a Fire Engineering Assessment can be undertaken be in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
6.	(Spec. 12) Spec. C3.4	There are number of fire safety doors located in fire and smoke walls located within the refurbished areas that occupants are required to travel in two directions in order for egress to comply from within the subject parts of the building. The doorways that swing in one direction will be required to be assessed as part of a Fire Engineering Performance Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
7.	D2D5 (D1.4)	*Egress Travel Distance to a Point of Choice and Alternative Exit* Based on the Schematic Design Issue Architectural Drawings assessed to date, we have undertaken an egress assessment in terms of egress travel distance to a point of choice and to an exit and based on our review, we provide the following comments: + Travel distance to a point of choice from the individual Operating Theatres exceeds 12m with the most excessive travel distance being up to 13.5 m (1.5 m over the maximum distance permitted by DtS). + Travel distance from a number of the Operating Theatres to the nearest alternative exit exceeds 30 m, with the most excessive travel distance being up to 35 m (5 m over the maximum distance permitted by DTS). The extended travel distance to a point of choice and to an alternative exit from the subject Operating Theatres will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
8.	D3D24 (D2.19)	*Sliding Doors in Patient Care Areas* Sliding doors are not permitted to be installed within patient care areas. It is noted that there are a number of sliding doors which are located at the entry to the Anaesthetic Preparation Rooms associated with the Operating Theatres. The provision of the sliding doors will be required to be assessed as part of a Fire Engineering Performance Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
9.	D3D25 (D2.20)	*Swing of Fire Safety Doors* All exit doors are required to swing in the direction of egress. As detailed under Specification 12, there are a number of fire safety doors / horizontal exits that do not swing in the direction of egress.

No.	BCA Clause	Description
		The swing of the horizontal exit doors against the direction of egress will be required to be assessed as part of a Fire Engineering Performance Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
10.	Part D4 (Part D3)	*Access for a Person with a Disability* Having regard to the nature of the Operating Theatres and the clinical staff required to work within these areas, written verification is required to be submitted by the LHD that all staff working within the Operating Theatres, Recovery area etc are required to be able bodied in order to be able to fulfill their clinical work requirements. If written verification is obtained by the LHD confirming that all staff working within Operating Theatres and Recovery area are required to be able bodied, the access for a person with a disability will not be required to be provided throughout the proposed refurbishment area.
11.	E1D2 (E1.3)	*Fire Hydrants* Fire Hydrant coverage will be required to each part of the refurbished areas in in accordance with the requirements of AS 2419.1 - 2005. *Reliance on Ordinance 70 Infrastructure* As part of the FEBQ process to be undertaken with FRNSW, there will need to be discussions on a staged upgrade of the fire hydrant system which is designed and constructed in accordance with the requirements of Ordinance 70 which will be required to be committed to by the LHD to ensure that the fire hydrant system serving the existing Westmead Hospital is upgraded over time to the meet the operational requirements of FRNSW.
12.	E1D3 (E1.4)	*Fire Hose Reels* Fire hose reels are required to be installed throughout each part of refurbished areas in accordance with AS 2441 – 2005. In achieving compliant fire hose reel coverage, fire hose reels cannot pass through fire safety doors. Plans detailing the location of fire hose reels and how coverage is achieved will be required to be submitted for our review. *Omission of Fire Hose Reel Coverage to the Fire Separated Rooms* Verification is required as to whether there are any rooms proposed to be fire separated from the remainder of the floor which will impact on compliant fire hose reel coverage being achieved. If fire separated rooms are proposed to be constructed, then the omission of fire hose reel coverage to the rooms will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
13.	E1D4 (E1.5)	*Automatic Fire Suppression System* It is noted that the existing building is provided with an Automatic Fire Suppression System. The Automatic Fire Suppression System that is installed within the building will be required to be modified as a result of the proposed refurbishment works in accordance with Clause E1D4 and AS 2118.1 – 2017.

No.	BCA Clause	Description
		All proposed new works in terms of pipework, spacing of sprinkler heads, sprinkler heads etc will be required to comply with the requirements of AS 2118.1 – 2017. *Omission of Sprinklers from Electrical Rooms* Verification is required as to whether there are any rooms proposed to have sprinklers omitted due the provision of communication / electrical equipment within the room. If any fire separated rooms are proposed to have sprinklers omitted, then the omission of sprinklers to the rooms will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA. *Use of Concealed Sprinkler Heads in the Operating Theatres* As detailed above, the Automatic Fire Suppression System is to be installed / modified within the Level 3 refurbishment area. For the proposed occupancy use as defined by AS 2118.1 – 2017, a light hazard sprinkler system with fast response heads is required to be installed. Due to the infection control requirements associated with the Operating Theatres and do to avoid accidental activation of the sprinkler heads, concealed sprinklers heads are proposed to be installed. Due to the fact that the RTI for the sprinkler head cannot be confirmed as being 50 for a fast response head, a technical non-compliance occurs with AS 2118.1 – 2017. The proposed use of concealed sprinkler heads within the Operating Theatres will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
14.	E2D3 (E2.2)	*Zone Smoke Control System* A hospital building with an effective height less than 25m is required to be provided with an Automatic Fire Suppression or Zone Smoke Control System. As detailed above under Clause E1D4, the existing Hospital is provided with an Automatic Fire Suppression System installed throughout which meets the DtS Requirements of Table E2.2a. Notwithstanding the above, it is understood as confirmed by Northrop that the existing building is provided with a form of smoke hazard management system and as part of the proposed works, it is understood that the existing system will be maintained in accordance with its standard of performance and that the level of fire safety achieved by the existing system will not be lessened
15.	E2D3 (E2.2)	*Automatic Fire Detection & Alarm System* An Automatic Fire Detection & Alarm System is required to be installed / upgraded throughout each of part of the refurbished Level 3 in accordance with AS 1670.1 –2018. Having regard to Clause 1.7.3 of AS 1670.1 – 2018, all alterations to existing installations are required to be designed and installed to the requirements of AS 1670.1 – 2018.
16.	E4D9 (E4.9)	*EWIS* The existing EWIS System will be required to be altered / modified to suit the proposed refurbished areas. *Rationalisation of EWIS Speakers*

No.	BCA Clause	Description
		It is understood that is likely to omit EWIS speakers from the Operating Theatres due to the sensitive nature of the environment where the activation of the speaker within the room may cause trauma to the patient or disrupt medical staff performing surgeries. Any rationalisation of EWIS system from within the Operating Theatres will be required to be to be assessed as part of the Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.
17.	F4D4 (F2.3)	*Sanitary Facilities* As identified within the Stage 1 refurbishment, based on the fact that patients will be taken to and from the Operating Theatres by hospital staff to the respective ward area, there is no requirement for the provision of additional sanitary facilities within the Recovery Area where patients will be monitored. Furthermore, suitable sanitary facilities for staff have been provided as part of the Stage 1refurbishment works. There is no requirement for the provision of additional sanitary facilities as part of the refurbishment associated with Operating Theatres 9 – 16.
18.	Section J	*Energy Efficiency* The energy efficiency provisions of Section J are applicable to the new building works only. Verification will be required in the form of Design Statement certifying that the new works have been installed in accordance with the relevant provisions of Section J. In this regard Parts J2 – Energy Efficiency, J5 - Building Sealing, J6 - Air Conditioning and Ventilation, Part J7 - Artificial Lighting and Power, and Part J7 – Heated Water Supply are to be complied with for all new works associated with the proposed refurbishment with Operating Theatres 9 – 16. *Note: If the Crown Certificate Application is made prior to 1 October 2023, the energy efficiency provisions of BCA 2019 can be applied to the refurbishment works.*

Table No. 2 – Summary of key compliance items

C.2 Summary of Current Items Requiring a Fire Engineering Performance Solution:

No.	BCA Performance Requirement	DTS Departure
1.	C1P3, D1P4	Swing of fire safety doors located in fire and smoke walls throughout the building.
2.	D1P4, E2P2	Extended travel distances to a point of choice and to an alternative exit.
3.	D1P2	Swing of horizontal exit doors
4.	D1P2	Provision of a sliding doors in patient care areas
5.	E1P4	Use of concealed sprinkler heads within the Operating Theatres

6.	E4P3	Omission / Rationalisation of EWIS speakers from Operating Theatres

Table No. 3– Summary of required non compliances to be addressed via a Fire Engineering Assessment

The FER process must include input from the LHD and HI, being key stakeholders in the delivery and operation of the hospital project.

D. BCA ASSESSMENT

D.1 BCA DEEMED-TO-SATISFY COMPLIANCE ISSUES:

The following comments have been made in relation to the relevant BCA compliance issues associated with the proposed refurbishment of the Operating Theatres 9 – 16 on Level 3 of Block F.

SECTION A – GENERAL PROVISIONS

1. Part A6 – Building Classification

The existing hospital is building is classified as Class 9a (health care) and Class 5 (professional consultation).

SECTION B – STRUCTURE

PART B1 – STRUCTURAL PROVISIONS

2. Clause B1D3 (B1.2) – Determination of Individual Actions

Structural engineering details prepared by an appropriately qualified structural engineer to be provided to demonstrate compliance with Part B1 as applicable to all new structural works. This will include the following Australian Standards (where relevant):

(1) AS 1170.0 – 2002 Structural Design Actions - General Principles
(2) AS 1170.1 – 2002, Structural Design Actions – Permanent Imposed and Other Actions
(3) AS 1170.2 – 2021, Structural Design Actions – Wind Actions
(4) AS 1170.4 – 2007, Structural Design Actions – Earthquake Actions
(5) AS 1288 – 2021, Glass in Buildings – Selection and Installation
(6) AS 3600 – 2018, Concrete code
(7) AS 3700 – 2018, Masonry code
(8) AS 4100 – 2020, Steel Structures and/or
(9) AS/NZS 4600 – 2018, Cold formed steel.
(10) AS 2047 – 2014, Windows in buildings.

Importance Level

The BCA outlines minimum Importance Levels which reflect the values and expectations the community place on specific types of buildings in the event of an earthquake.

It is generally accepted that the structure is expected not to collapse but substantially damaged when this condition is reached. The interpretation of the performance expectations for buildings of different Importance Level in the event of an earthquake are generally as follows:

- Buildings of Importance Level 1: not expect to survive
- Buildings of Importance Level 2: expect not to collapse but substantially damaged
- Buildings of Importance Level 3: expect to survive with some damage
- Buildings of Importance Level 4: expect to survive intact and continue to function

AS1170.0-2002 *Structural design Actions – General Principals* categorises the Importance Levels for different building types as outlined below. *Note that the BCA only identifies Importance Levels 1-4, and hence Importance Level 5 is not a mandatory requirement under the National Code.*

The building works are required to be designed in accordance with ***Importance Level 4***.

The alterations and additions to the existing Hospital Building will be required to be designed and constructed in accordance with the requirements of Importance Level 4 (post disaster operations) including structure and services as detailed in Clause B1D3 of the BCA.

Verification will be required from the Structural Engineer and respective Services Engineers that the new building structure and services have been designed in accordance with the requirements for Importance Level 4.

SECTION C – FIRE RESISTANCE

PART C2 – FIRE RESISTANCE AND STABILITY

3. Clause C2D2 (C1.1) – Type of Construction Required

All new building elements are required to be constructed in Type A Construction.

The new building elements will be required to be constructed in accordance with the FRL's detailed in Table S5C11a of Specification 5 for Type A Construction (refer to table below).

TYPE A CONSTRUCTION	
BUILDING ELEMENT	**CLASS 5 & 9a**
EXTERNAL WALL (including any column and other building element incorporated within in) or other external building element, where the distance from any fire-source feature to which it is exposed is –	
For load bearing parts-	
less than 1.5m	120/120/120
1.5m to less than 3m	120/90/90
3m or more	120/60/30
For non-load bearing parts-	
less than 1.5m	-/120/120
1.5m to less than 3m	-/90/90
3m or more	-/-/-
EXTERNAL COLUMN not incorporated in an external wall, where the distance from any fire source feature to which it is exposed is –	
Less than 3m	120/-/-
3m or more	-/-/-
COMMON WALLS & FIRE WALLS	120/120/120
INTERNAL WALLS	
Fire Resisting lift and stair shafts –	
Loadbearing	120/120/120
Non-loadbearing	-/120/120
Ventilating, pipe, garbage, and the like shafts not used for the discharge of hot products of combustion –	
Loadbearing	120/90/90
Non-loadbearing	-/90/90
OTHER LOADBEARING INTERNAL WALLS & COLUMNS	120/-/-
FLOORS	120/120/120

ROOF	120/60/30

Table No. 4– Required FRL's for building elements

4. Clause C2D10 (C1.9) – Non Combustible Construction

In a building required to be constructed of Type A Construction, external walls including all components incorporated in them including all façade covering, framing and insulation are required to be constructed of non-combustible construction.

Aluminium Cladding

In this instance any proposed panels to be used on the external walls of the building will be required to comply with the requirements of Clause C2D10 i.e., single piece of pre-finished metal sheeting having a combustible surface finish not exceeding 1mm thickness and where the Spread of Flame Index of the product is not greater than 0.

Appropriate Test Reports / Certificates will be required to be submitted for any Aluminium Cladding demonstrating compliance with Clause C2D10 of the BCA.

Sarking within the External Wall Assembly

Sarking type materials installed within existing or new external walls will be required to have a thickness not exceeding 1mm and have a Flammability Index not greater than 5.

Insulation within the External Wall Assembly

Insulation installed within the external wall assembly will be required to be non-combustible.

Ancillary Components within the External Wall Assembly

All elements within the external wall assembly are required to non-combustible unless the element consists of the one of the following:

+ Gaskets
+ Caulking
+ Sealants
+ Termite Management Systems
+ Glass, including laminated glass
+ Thermal breaks associated with glazing systems
+ Damp-proof courses

Timber Noggins in Fire Walls

Fire walls are required to be constructed of non -combustible construction including all elements that make up the smoke wall.

In this instance timber noggins or plywood are not permitted to be installed within the fire walls. All services, handrails etc will be required to be supported within the fire wall cavity will be required to be constructed of a non-combustible material.

If any timber noggins are proposed to be installed within smoke walls to be constructed, then the provision of the timber noggins will be required to be assessed by Arup and confirmed to determine if a Fire Engineering Assessment can be undertaken be in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

5. Clause C2D11 (C1.10) – Fire Hazard Properties

The fire hazard properties of all new building materials and assemblies as well as all new floor materials, floor coverings, wall and ceiling lining materials used in the development must comply with the requirements of Specification 7 of the BCA.

In accordance with Specification 7, we note the following requirements:

Critical Radiant Flux of Floor Materials and Floor Coverings

- Patient Care Areas – 2.2 kW/m²
- Non Patient Care Areas – 1.2 kW/m²
- Fire Isolated Exits – 4.5 kW/m²

Wall and Ceiling Lining Materials – Group Number

- Fire Isolated Exit – Group 1
- Public Corridor – Group 1 or 2
- Patient Care Areas – Group 1, 2 or 3
- Other Areas – Group 1, 2 or 3

Material test data sheets will need to be submitted for further assessment to ensure compliance with the above.

PART C3 – COMPARTMENTATION AND SEPARATION

6. Clause C3D3 (C2.2) – General Floor Area and Volume Limitations

The maximum size of any fire compartment with a Class 9a (non patient areas) cannot exceed 5,000 m² & 30,000 m³.

The Schematic Design Drawings indicate that no proposed non-patient care areas exceed a floor area of 5,000 m².

7. Clause C3D6 (C2.5) – Class 9a Buildings

Fire & Smoke separation is required to be provided throughout the Patient Care Areas in accordance with Clause C3D6.

All Patient Care Areas must be divided into fire compartments not exceeding 2,000 m². It is noted that the Architectural Drawings indicated compliance in this instance with no fire compartment exceeding 2,000 m².

Ward and Treatment Areas are required to be designed in accordance with the following table.

<table>
<tr><th colspan="2">Area Use</th><th colspan="3">Max. Compartment Size</th></tr>
<tr><td rowspan="4">Patient Care Area (Max 2,000m2)</td><td rowspan="2">Ward Area</td><td>Where total floor area is less than 500m²:</td><td>Where total floor area is greater than 500m², but less than 1000m²:</td><td>Where total floor area is greater than 1000m²:</td></tr>
<tr><td>Separate from other areas with Smoke Walls</td><td>Separate with smoke walls into areas less than 500m²</td><td>Separate with smoke walls with an FRL of not less 60/60/60 into areas less than 1000m²</td></tr>
<tr><td rowspan="2">Treatment Area</td><td colspan="2">Where total floor area is less than 1000m²:</td><td>Where total floor area is greater than 1000m²:</td></tr>
<tr><td colspan="2">Separate from other areas with Smoke Walls</td><td>Separate with smoke walls into areas less than 1000m²</td></tr>
<tr><td colspan="5">Note: Walls identified above which are required to achieve an FRL or be smoke separated must be of non-combustible construction i.e., no timber framed stud walls.</td></tr>
</table>

Table No. 5– Required fire and smoke compartmentation for patient care areas

Having regard to a review of the proposed Compartmentation Drawings, it is noted that the total Fire Compartment size of G3.3 is less than 2,000 m² (1,807 m²) and Smoke Compartments G3.3a and G3.3b do not exceed 1,000 m² (975 m² and 832 m²). In this instance compliance with Clause C3D6 is achieved.

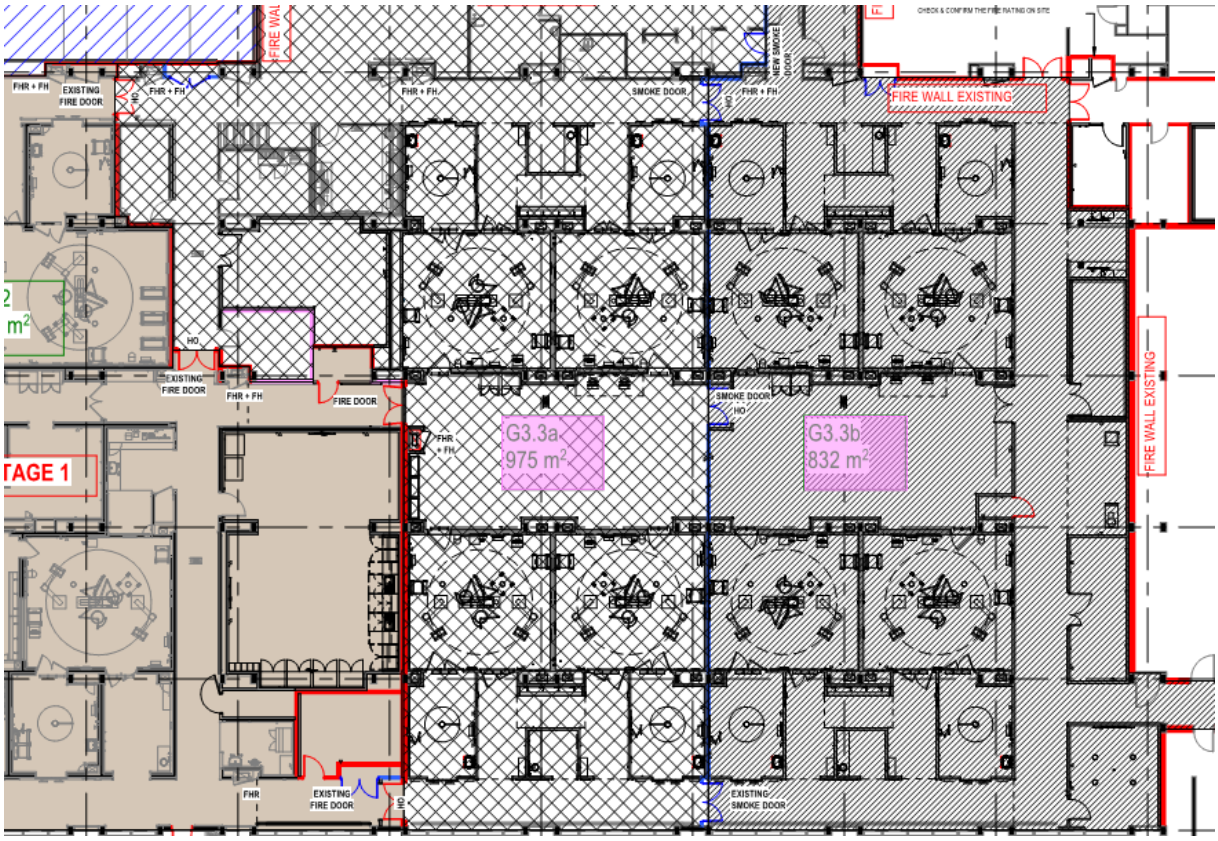


Figure No. 1 – Proposed fire and smoke compartment (G3.3) housing Operating Theatres 11 – 16 and part of the Stage 1 refurbishment

Ancillary Areas

The construction of any ancillary use areas located within the patient care areas and containing equipment or materials that are a high potential fire hazard (such as kitchens > 30 m^2, hyperbaric facility, storage of medical records > 10 m^2 or laundry with gas fire dryers), must be separated from the patient care area by construction achieving an FRL of not less than 60/60/60 and doors having an FRL of not less than -/60/30.

Required Works to Existing Fire & Smoke Walls

The following is specifically noted in relation to existing fire and smoke walls that are within or bound the refurbished areas:

+ All existing fire and smoke walls that are located within proposed refurbishment areas that are identified as being deficient in terms of construction (including deficient FRL's, unprotected or inadequate fire and smoke sealing of penetrations etc) will be required to upgraded.
+ All existing fire and smoke walls that bound the proposed refurbishment areas that are identified as being deficient in terms of construction (including deficient FRL's, unprotected or inadequate fire and smoke sealing of penetrations etc) will be required to upgraded.

8. Clause C3D8 (C2.7) – Separation by Fire Walls

Fire walls (*including fire rated walls*) required by Clause C3D6 above, must extend from the floor slab to the underside of the floor slab above or where no floor is provided above the roof sheeting, with no penetrations by building elements through the fire wall other than roof battens with a dimension of 75mm x 50mm or sarking.

All fire walls are required to achieve the required FRL of 120/120/120 in both directions. Details of the proposed fire wall construction is to be submitted for review.

Verification will be required from the Architect / Structural Engineer / Head Contractor that no proposed building elements have been designed to pass through the fire walls.

Note:-

No building elements penetrating fire walls includes steel brackets supporting electrical cable trays or any other structural elements supporting another building element.

Glazed Fire Walls

Glazing is not permitted to be located within a fire wall separating fire compartments.

It is understood that the proposed fire walls to be constructed as part of the Operating Theatres 9 – 16 do not contain any glazed elements.

If glazed elements are proposed to be installed, then consistent with the Stage 1 Operating Theatre refurbishment, the provision of glazed elements will be required to be assessed as part of a Fire Engineering Assessment.

9. Clause C3D13 (C2.12) – Separation of Equipment

Any of the following equipment must be fire rated with a fire resistance level of 120/120/120 and any doorway to have an FRL of not less than --/120/30:

- Emergency generators used to sustain emergency equipment operating in the emergency mode.
- Boilers where the water is boiled to greater than 100 degrees Celsius.
- A battery system installed in the building that has a total voltage of 12 volts or more and a storey capacity of 200 kWh or more.

PART C4 – PROTECTION OF OPENINGS

10. Clause C4D4 (C3.3) –Separation of External Walls and Other Openings in Different Fire Compartments

Where an internal fire wall intersects at the junction of an external wall, the external walls of the different fire compartments and any associated openings that are exposed to one another are required to be protected in accordance with Clause C4D4.

It is noted that there are no new works proposed to the external walls of the building resulting in exposure between fire compartments.

11. Clause C4D6 (C3.5) – Doorways in Fire Walls

All new fire doors located within fire walls must be fire rated to achieve the same rating as the fire wall itself i.e., 120 mins. Any existing doors located within fire walls that are being relied upon in order to achieve compliant fire compartmentation as part of the refurbishment works must also achieve a minimum FRL of 120 mins.

The doorways are required to be self-closing or automatic closing. All automatic closing doors are required to close upon activation of the fire alarm system within the building i.e., Automatic Fire Detection & Alarm System.

Smoke detectors must be installed within 1500mm of the automatic closing doors (on both sides of the door).

The fire doors are required to have a minimum FRL of -/120/30.

12. Clause C4D8 (C3.7) – Protection of Doorways in Horizontal Exits

All horizontal exits are required to have a FRL of -/120/30.

All horizontal exit doors are required to be self-closing or automatic closing. All automatic closing doors are required to close upon activation of the fire alarm system within the building i.e., Automatic Fire Detection & Alarm System.

Smoke detectors must be installed within 1500mm of the automatic closing doors (on both sides of the door).

13. Clause C4D9 (C3.8) – Openings in Fire Isolated Exits

The doors providing access to the fire isolated exits are required to be protected by self-closing or automatic closing –/60/30 fire doors.

14. Clause C4D10 (C3.9) – Service Penetrations in Fire Isolated Exits

No service penetrations can penetrate the fire isolated stairways other than electrical wiring for lighting, security or essential services, ducting for stair pressurisation (if adequately separated from the remainder of the building) and water supply pipes for fire services.

15. Clause C4D15 (C3.15) – Openings for Service Installations

Where service installations penetrate the walls or floors required to have an FRL with respect to integrity and insulation they are to be protected by fire seals having an FRL of the building element concerned. Fire seals are required to comply with Specification C4D15. Where the mechanical ventilation system penetrates floors or walls that require an FRL the installation is to comply with AS/NZS 1668.1.

Any new or existing penetrations within the existing and new smoke and fire walls that immediately bound or are within the areas of the proposed refurbishment works will be required to be appropriate sealed to ensure the effectiveness of the compartmentation within the building.

The proposed installation of pipework containing combustible liquids or gas (i.e., natural gas) is prohibited in accordance with Clause C4D15 unless it is a tested system.

Service Penetrations through the concrete slab above the Operating Theatres

Any new service penetrations through the concrete slab above the Operating Theatres will be required to be protected in accordance with Clause C4D15 as this is the fire rated element separating the Level below from the roof top plant which is a storey by definition.

Water Filled Pipes Systems Comprised of Metal

In accordance with Clause C4D15, a tested system is not required to comply with the insultation criteria relating to the service subject to the pipe system being constructed of entirely of metal and not having any combustible building elements being located within 100mm for a distance of 2000mm from the penetration and combustible materials not being able to be located within 100mm of service for a distance of 2000mm from the penetration.

Having regard to the requirements of Clause C4D15 which are difficult to achieve in a health care environment due to the number of services especially in corridors, if the omission of an insulation rating is proposed to the metal pipes, then this will be required to be assessed by Arup and confirmed to determine if a Fire Engineering Assessment can be undertaken be in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

Note 1:-

Where a wall is required to achieve both smoke and fire compartmentation, the penetrations must be protected to accommodate both i.e., combined fire and smoke dampers through all fire walls that bound or separate patient care areas throughout the building.

All fire walls double up as smoke walls when they are within or bound patient care areas and thus must be combined fire and smoke dampers.

The motorised component of the Damper is to be located no more than 600mm from the fire/smoke wall.

Note 2:-

A pipe system comprised entirely of metal that is not normally filled with liquid must not be located within 100mm, for a distance of 2000mm from the penetration of any combustible building element or a position where a combustible material may be located and must be constructed of:

+ *Copper alloy or stainless steel with a wall thickness of at least 1mm; or*

- *Cast iron or steel (other than stainless steel) with a wall thickness of at least 2 mm*

Note 3:-

All pipes normally filled with water cannot be less than 200mm from another service penetration unless protected with a fire wrap installed in accordance with a Tested System approved by a registered Testing Authority.

Note 4:-

A Tested System approved by a registered Testing Authority may be used as an alternative to complying Specification C4D15.

16. Clause C4D16 (C3.16) – Construction Joints

Construction joints, spaces and the like in and between building elements required to be fire-resisting with respect to integrity and insulation must be protected in a manner identical with a prototype tested in accordance with AS 1530.4 to achieve the required FRL.

17. Clause 4D17 (C3.17) – Columns Protected with Lightweight Construction to Achieve an FRL

A column protected by lightweight construction to achieve an FRL which passes through a building element that is required to have an FRL or a resistance to the incipient spread of fire, is required to be installed using a method and materials identical with a protype assembly of the construction which has achieved the required FRL or resistance to the incipient spread of fire.

18. Specification 5 (C1.1) – Fire Resisting Construction

The building design is required to comply with the requirements of Specification 5 for a building of Type A Construction. The following key items of Specification 5 are identified:

General Requirements – Type A Construction

The following requirements of Specification C1.1 are applicable to the proposed design:

- Where part of a building required to have an FRL depends on direct vertical or lateral support from another part to maintain its FRL, that supporting part must:
  - Have an FRL not less than the required by other provisions of Specification C1.1; and
  - If located within the same fire compartment as the part its supports have an FRL in respect of structural adequacy the greater of that required –
    - For the supporting part itself; and
    - For the part is supports
  - Be non-combustible –
    - If required by other provisions of Specification C1.1; or
    - If the part is supports is required to be non-combustible
- Shafts required to have an FRL must be enclosed at the top and bottom by construction having an FRL not less that the required for the walls of a non-loadbearing shaft in the same building except the provisions do not apply to the top of a shaft extending beyond the roof covering (other than one enclosing a fire stair or ramp) or the bottom of a shaft if it is non-combustible and laid directly on the ground.
- All internal walls that are required to have a fire rating must extend to the underside of the slab above.
- All loadbearing internal walls must be constructed of concrete or masonry.
- Due to the fact that the building is required to be constructed of Type A Construction, the FRL to the load bearing elements of the external applies in both directions.
- Any load bearing structural steel columns located within the external wall assembly of the building will require an FRL in accordance with the Table 3. This applies to Structural Steel columns located in the external wall that may be supporting the roof, link bridges above etc.

- All internal non-loadbearing walls that are required to be fire resisting and lift, ventilating, pipe, garbage, or similar shaft that is not for the discharge of hot products of combustion is required to be constructed of non-combustible construction.

19. Specification 11 (C2.5) – Smoke-Proof Walls in Health Care Buildings

Smoke proof walls within all patient care areas (or bounding patient care area) are required to comply with the following:

- Be non-combustible and extend to the underside of –
  - The floor above; or
  - A non-combustible roof covering; or
  - A ceiling having a resistance to the incipient spread of fire to the space above itself of not less than 60 minutes.
- Not incorporate any glazed areas unless the glass is safety glass as defined in AS 1288.
- Only have doorways which are fitted with smoke doors.
- Have all openings around penetrations and the junctions of the smoke-proof wall and the remainder of the building stopped with non-combustible material to prevent the free passage of smoke.
- Incorporate smoke dampers where air-handling ducts penetrate the wall unless the duct forms part of a smoke hazard management system required to continue air movement through the duct during a fire.

Timber Noggins in Smoke Walls

Smoke walls are required to be constructed of non -combustible construction including all elements that make up the smoke wall.

In this instance timber noggings or plywood are not permitted to be installed within the smoke walls install throughout Mental Health. All services, handrails etc will be required to be supported within the smoke wall cavity will be required to be constructed of a non-combustible material.

If any timber noggins are proposed to be installed within smoke walls to be constructed, then the provision of the timber noggins will be required to be assessed by Arup and confirmed to determine if a Fire Engineering Assessment can be undertaken be in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

20. Specification 12 (C3.4) – Fire Doors, Smoke Doors, Fire Windows and Shutters

There are number of fire safety doors located in fire and smoke walls located within the refurbished areas that occupants are required to travel in two directions in order for egress to comply from within the subject parts of the building. The subject doorways are nominated below.

The doorways that swing in one direction only will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order demonstrate compliance with the nominated Performance Requirements of the BCA.

Figure No. 2 – Doorways that are required to swing in both directions

SECTION D - ACCESS & EGRESS

PART D2 – PROVISION FOR ESCAPE

21. Clause D2D3 (D1.2) – Number of Exits Required

A minimum of two (2) exits (in addition to any horizontal exit) must be provided from each part of the storeys within the building which contains patient care areas.

The Architectural Drawings indicate that the minimum number of exits has been provided from Level 5 of the building.

22. Clause D2D5 (D1.4) – Exit Travel Distances

Egress travel distances from all areas used by patients is required in accordance with the DTS provisions of the BCA to be within a maximum distance of 12m to an exit or to a point of choice of two alternative exits in which case a maximum travel distance of 30m is permitted to the nearest exit.

Egress from the non-patient care areas is permitted to extend to 20m to a point of choice and a maximum distance of 40m to an alternative exit.

Based on the Schematic Design Issue Architectural Drawings assessed to date, we have undertaken an egress assessment in terms of egress travel distance to an exit and based on our review, we provide the following comments:

+ Travel distance to a point of choice from the individual Operating Theatres exceeds 12m with the most excessive travel distance being up to 13.5 m (1.5 m over the maximum distance permitted by DtS).

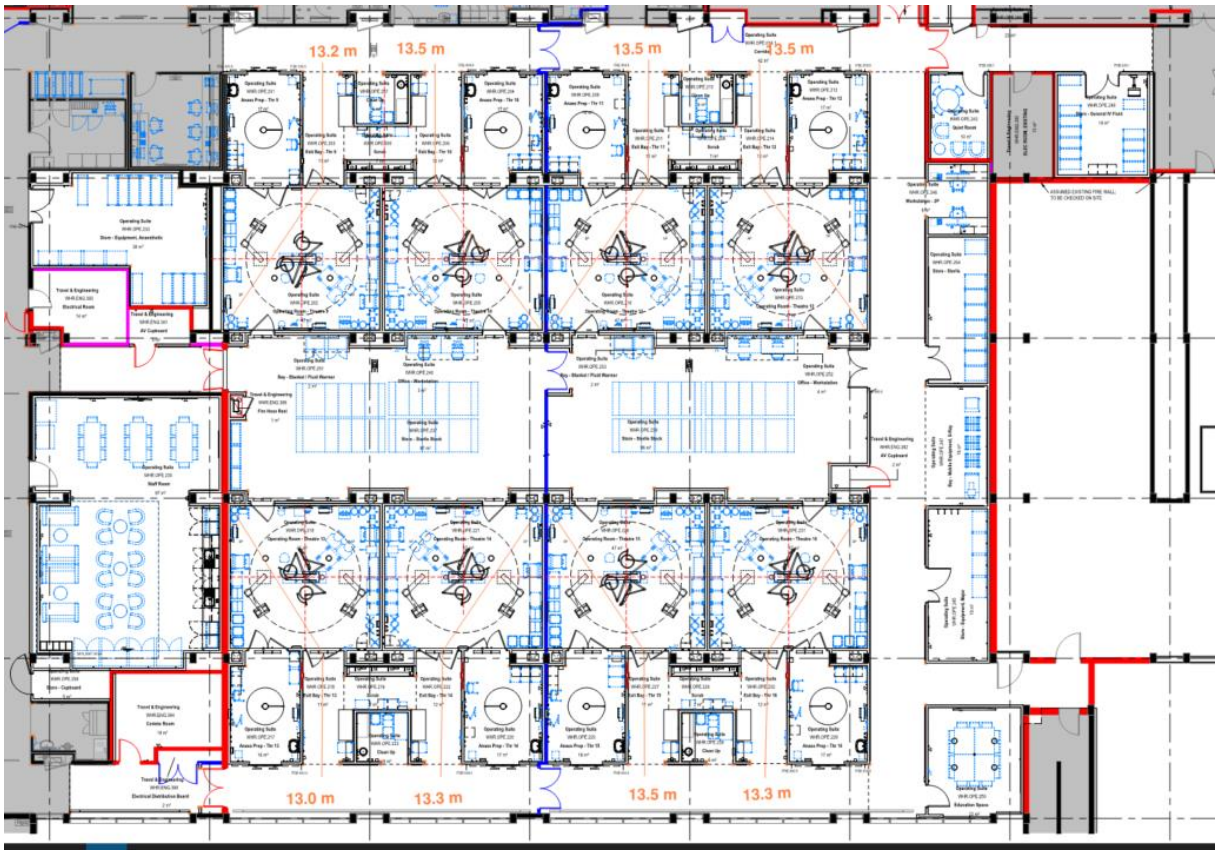


Figure No. 3 – Locations of extended travel distance to a point of choice within the Level 3 OTs and Roof Top Plant Room

+ Travel distance from a number of the Operating Theatres to the nearest alternative exit exceeds 30 m, with the most excessive travel distance being up to 35 m (5 m over the maximum distance permitted by DTS).

The extended travel distance to a point of choice and to an alternative exit from the subject Operating Theatres will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

Figure No. 4 – Locations of extended travel distance within the Level 3 OTs and Roof Top Plant Room

The following figures detail the required exit doors from the subject Operating Theatres.

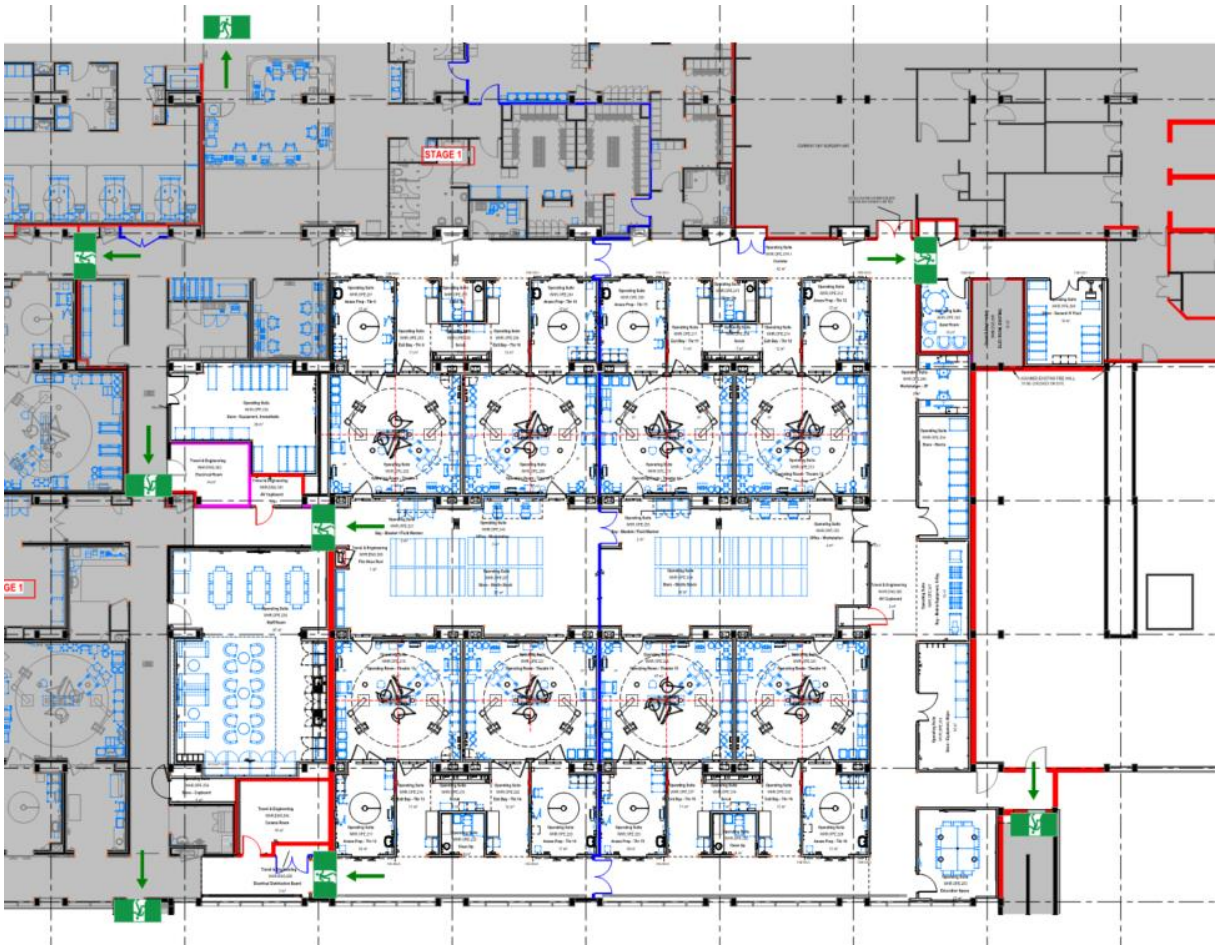


Figure No. 5 – Required exit doors from the refurbished areas within Level 5

23. Clause D2D6 (D1.5) – Distances Between Alternative Exits

The maximum travel distance between alternative exits from within patient areas cannot exceed 45m.

The maximum travel distance between alternative exits from non-patient care areas cannot exceed 60m.

Based on the Design Development Issue Architectural Drawings assessed to date, we have undertaken an egress assessment in terms of egress travel distance between alternative exit and based on our review, egress travel distance between alternative exits does not exceed 45 m.

24. Clause D2D7 (D1.6) – Dimensions of Exits

The unobstructed height throughout an exit or a path of travel to an exit must not be less than 2 metres, except for doorways which may be reduced to not less than 1980 mm.

In addition, the unobstructed width of any new exit or a path of travel to an exit must not be less than 1 metre except where patients are normally transported in beds within treatment and ward areas in which case a minimum of 1.8m corridor and passageway widths are required.

The unobstructed width of new doors throughout the patient care areas where patients are normally transported in beds are as follows:

a) Doorways leading to or from a corridor with a corridor width of less than 2.2m must not be less than 1200mm, or

b) Doorways leading to or from a corridor with a corridor width greater than 2.2m must not be less than 1070mm.

Width of Single Horizontal Exit Doors

Horizontal exit fire doors are to achieve a clear unobstructed width of 1250 mm. Where a single door is provided as a horizontal exit, it will need to achieve the clear unobstructed width of 1250 mm.

All other doorways other than the above are to achieve an unobstructed width of not less than 850 mm. Where double door leafs are provided, at least one door leaf is required to have a clear unobstructed width of 850 mm.

25. Clause D2D16 (D1.11) – Horizontal Exits

In accordance with the BCA, a horizontal exit may be counted as a required exit if the path of travel from a fire compartment leads by one or more horizontal exits directly into another fire compartment which has at least one required exit which is not a horizontal exit.

Having regard to the proposed design, egress travel distance via the horizontal exits serving the proposed refurbishment area is compliant.

The proposed travel via fire horizontal exits will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

PART D3 – CONSTRUCTION OF EXITS

26. Clause D3D8 (D2.7) – Installations in Exits & Paths of Travel

No access is permitted to service shafts within the fire isolated stairs.

Any electrical meters, distribution boards or ducts, central communications distribution boards or equipment or electrical motors located within the corridors are to be smoke sealed and enclosed within non-combustible construction with any penetrations smoke sealed.

Gas and other fuel services must not be located within a required exit.

Note that an opening to any chute that or duct that is to convey hot products or combustion from a boiler incinerator, fireplace or the like must not be located in any part of a required exit or any corridor, hallway, lobby or the like leading to a required exit.

27. Clause D3D8 (D2.13) – Goings & Risers

In relation to the construction of any new stairways we note the following:

+ Stairway must have not more than 18 and not less than 2 risers in each flight.
+ Goings and risers within the stair flights must be constant throughout.
+ Goings and risers are to be in accordance with the following dimensions.

+ Riser and Going Dimensions (mm)			
	Riser (R)	**Going (G)**	**Quantity (2R + G)**
Maximum	190	355	700
Minimum	115	250	550

Table No. 6 – Riser and going dimensions for stairways

+ The stair treads are required to be provided with the following:

- Have a surface with a slip resistance classification not less than that listed in Table D2.14 when tested in accordance with AS 4586; or
- Be provided with a nosing strip with a slip resistance classification not less than that detailed in Table D2.14 when tested in accordance with AS 4586.

- Each stairway is to be provided with a contrast strip to the nosing in accordance with AS1428.1-2009.

Table D3D15 Slip Resistance Classification

Application	Surface Conditions	
	Dry	Wet
Ramp steeper than 1:14	P4 or R11	P5 or R12
Ramp steeper than 1:20 but not steeper than 1:14	P3 or R10	P4 or R11
Tread or landing surface	P3 or R10	P4 or R11
Nosing or landing edge strip	P3	P4

Table No. 7 – Minimum slip resistance ratings required to stairs and ramps

In addition to the slip resistance ratings detailed within the table, the following slip resistance ratings are required throughout the building:

Location	Minimum Slip Resistance
Operating Theatres	P3 or R10
Bathrooms and ensuites	P3 or R10
Recovery Area *Note: Where handwash basins are contained within a corridor, a minimum Slip Rating of P3 or R10 should be maintained for a radius of 2m from the basin*	P2 or R9
Staff Areas & Consultation Areas	P2 or R9

Table No. 8 – Minimum slip resistance ratings required to specific areas throughout the hospital

28. Clause D3D16 (D2.15) – Thresholds

No steps can be located within the internal door thresholds. Where there are any steps within door thresholds, a threshold or step ramp is required to be installed in accordance with Clause 10 of AS 1428.1. In this instance the threshold ramps are required to be constructed in accordance with the following:

- Maximum rise of 35 mm
- Maximum length of 280 mm
- Maximum gradient of 1:8
- Be located within 20 mm of the door leaf it serves

Where the threshold ramp does not abut a wall, the edges of the threshold ramp are required to be tapered or splayed at a minimum of 45º.

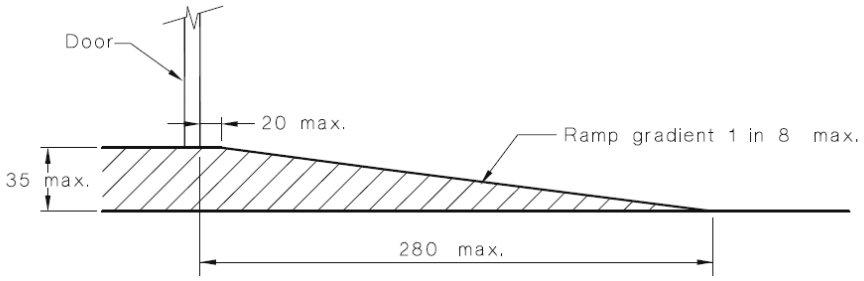


Figure No. 6 – Threshold ramp dimensions

29. Clause D3D17 (D2.16) – Barriers to Prevent Falls

All new balustrades will need to be compliant in terms of a minimum of 1000 mm in height above any fall more than 1m with no gaps greater than 125-mm.

In addition, where the fall exceeds 4 m the balustrades must not have any climbable elements between 150-mm and 760-mm above the floor. This extends to the external stairways provided in lieu of fire isolated stairways.

For openable windows where the window sill height is less than 865 mm and the fall exceeds 1 m the window must be fixed so as to open no more than 125 mm or a rail/s will need to be installed to restrict the gap to 125 mm where less than 865 mm above the floor.

All glass balustrades are required to comply with the requirements of AS 1288.

30. Clause D3D22 (D2.17) – Handrails

Handrails are required to be provided along at least one side of all corridors that are used by patients.

Having regard to the nature of the Operating Theatre space where patients will be bought into and out of the Operating Theatres on beds by hospital staff, there is no requirement for handrails to be provided within the corridors and passageways of the Operating Theatre space.

31. Clause D3D24 (D2.19) – Doorways & Doors

Sliding Doors in Patient Care Areas

Sliding doors are not permitted to be installed within patient care areas.

It is noted that there are a number of sliding doors which are located at the entry to the Anaesthetic Preparation Rooms associated with the Operating Theatres.

The provision of the sliding doors will be required to be assessed as part of a Fire Engineering Performance Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

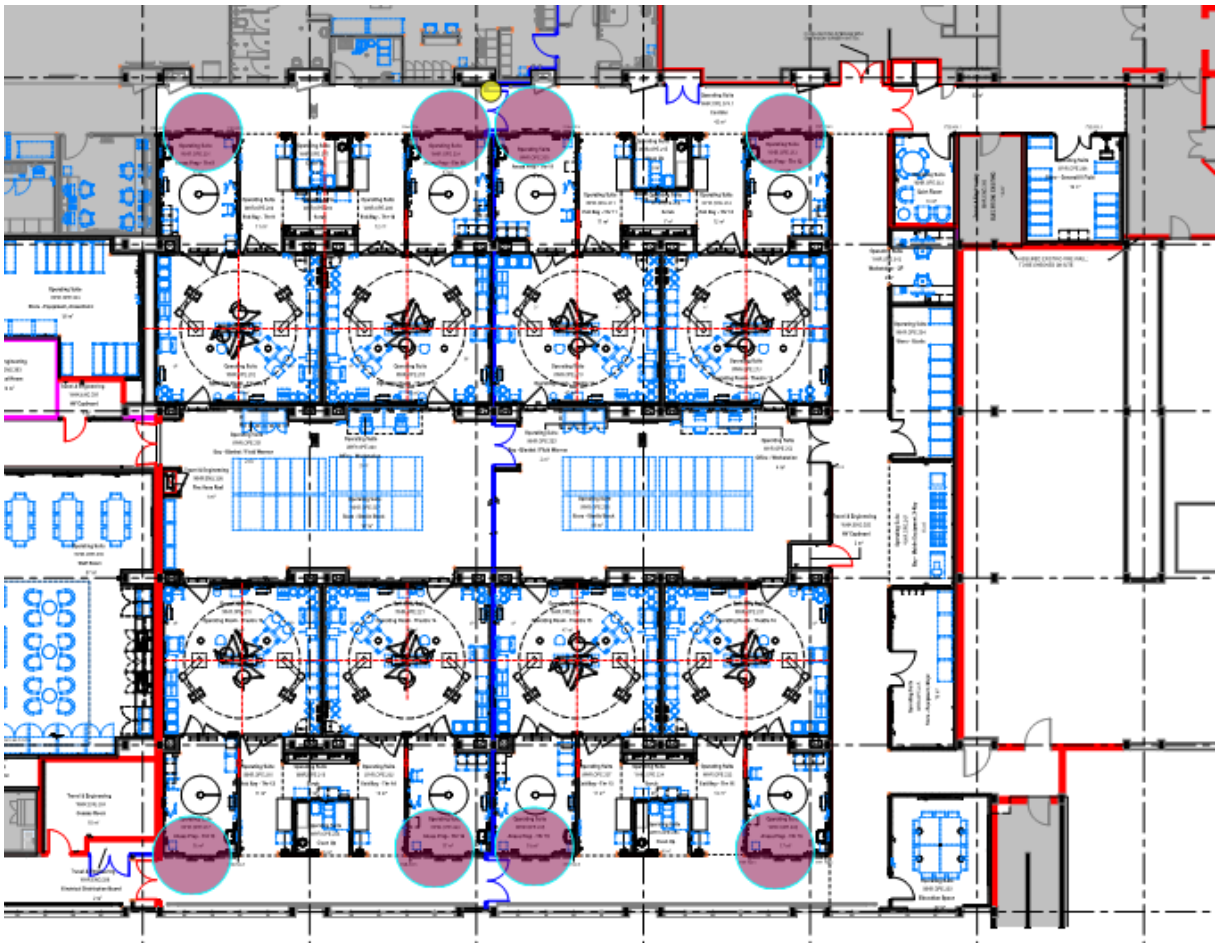


Figure No. 7 – Location of sliding doors within the proposed Operating Theatres 9 - 16

32. Clause D3D25 (D2.20) – Swinging Doors

All exit doors are required to swing in the direction of egress.

As detailed under Specification 12, there are a number of fire safety doors / horizontal exits that do not swing in the direction of egress (as detailed in the Figure below).

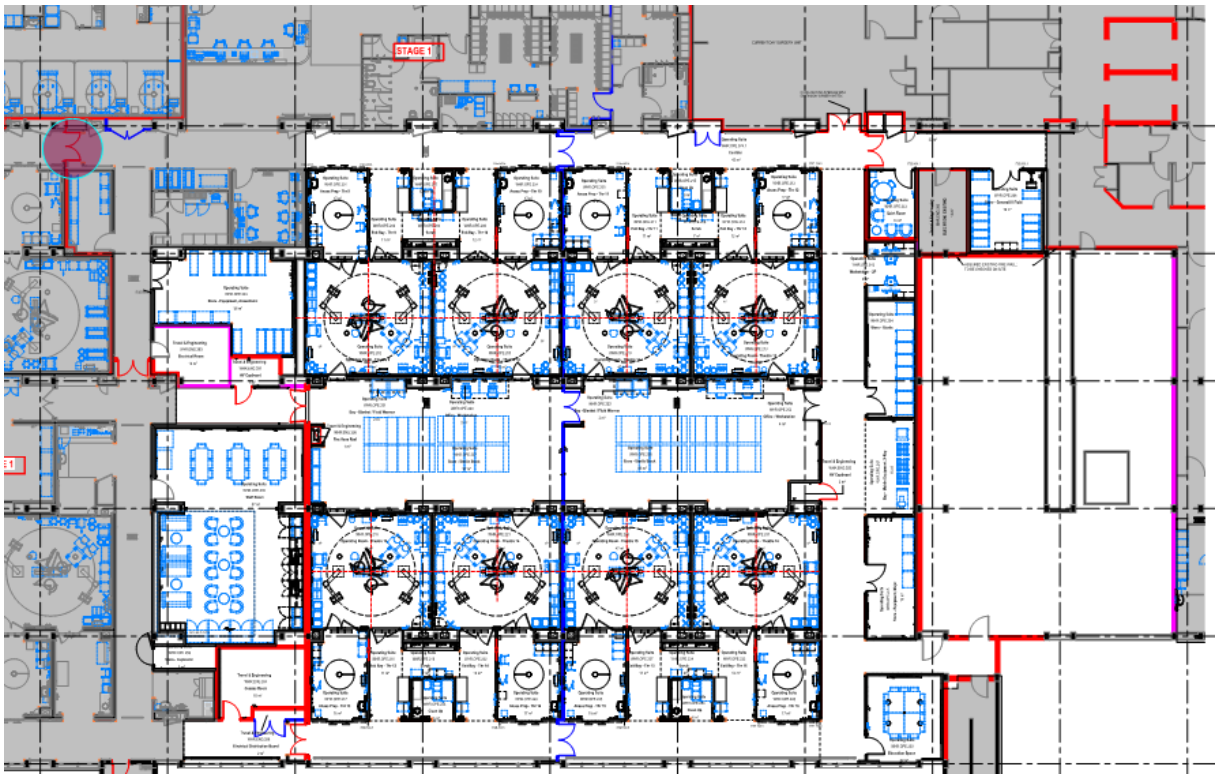


Figure No. 8 – Horizontal exit doors that are required to swing in both directions

The swing of the horizontal exit doors against the direction of egress will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

33. Clause D3D26 (D2.21) – Operation of Latch

All exit doors and doors in a path of travel are required to be provided with door hardware that is openable by a single-handed downward action without recourse to a key or locking device and meet the following criteria:

+ The door hardware is to be of a design that the hand of a person who cannot grip will not slip from the handle during the operation of the latch: and
+ Have a clearance between the handle and the back plate or door face at the centre grip section of the handle of not less than 35mm and not more than 45mm more.

The door hardware is to be positioned between 900 – 1100mm from the ground.

All doors that are secured are to be fitted with a fail-safe device that automatically unlocks the door upon fire trip.

34. Clause D3D28 (D2.23) – Signs on Doors

Signage is required to specific doorways throughout the building as follows:

All **self-closing** fire and/or smoke doors forming part of a Horizontal Exit or smoke compartment or doors providing access to the fire isolated stairs are to be provided with signage as follows:

FIRE SAFETY DOOR
DO NOT OBSTRUCT
DO NOT KEEP OPEN

All **automatic closing** fire and/or smoke doors which are held open on hold open devices forming part of a Horizontal Exit or smoke compartment or doors providing access to the fire isolated stairs are to be provided with signage as follows:

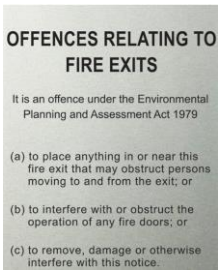
FIRE SAFETY DOOR

DO NOT OBSTRUCT

The doors discharging from the fire isolated stairways are to be provided with signage as follows (on both sides of the doorways):

FIRE SAFETY DOOR
DO NOT OBSTRUCT

The doors discharging into the fire isolated stairways are to be provided with the following additional signage installed on the wall on the latch side of the door.



In addition to above, BCA DTS clause D4D7 requires Braille signage for egress systems from the building. In this instance the following is required to be provided:-

+ Identify each door required by E4D5 (door to be provided with exit signs) to be provided with an exit sign and state –

  (a) ***"***Exit"; and

  (b) "Level" followed by the *floor number*

Signs identifying a door required by E4D5 to be provided with an exit sign must be located:

i. On the side that faces a person seeking egress; and

ii. On the wall on the latch side of the door with the leading edge of the sign located between 50mm and 300mm from the architrave; and

iii. Where (ii) is not possible, the sign may be placed on the door itself.

The provision of Braille and tactile exit signage with the message, *for example*. *"**Exit - Level 1**"* assists people with vision impairment to orientate themselves in case of an emergency situation and to find an exit and evacuate the area in a safe and equitable manner.

Signage Specification:-

The signage is to be:-

+ Located between 1200 – 1600 mm above FFL
+ Signs with single lines of characters are to have the line of the tactile characters between 1250mm-1350 mm above FFL
+ Signage tactile characters must be raised or embossed to a height between 1mm-1.5mm
+ Upper case letter to be between 20 mm – 55 mm

Signage Locations: -

The Braille & tactile egress signage is to be located adjacent or on (see above) each door that: -

+ Provides direct egress into a fire isolated stairway
+ Provides direct discharge from the storey into a passageway or lobby (airlock) associated with the fire isolated stairway
+ Provide direct discharge from a fire isolated stairway to open space (discharge door)

+ Forms part of a horizontal exit (-/120/30 fire doors in the fire compartment walls)

The below signage is an example of what will be required:-

PART D4 – ACCESS FOR PEOPLE WITH A DISABILITY

35. D4D2 (D3.1) – General Building Access Requirements

The BCA permits access for a person with a disability not be provided to:

+ An area where access would be inappropriate because of the particular purpose for which the area is used.
+ An area that would pose a health or safety risk for people with a disability.
+ Any path of travel providing access only to an area exempted by (a) or (b).

Having regard to the nature of the Operating Theatres and the clinical staff required to work within these areas, written verification is required to be submitted by the LHD that all staff working within the Operating Theatres, Recovery area etc are required to be able bodied in order to be able to fulfill their clinical work requirements.

If written verification is obtained by the LHD confirming that all staff working within Operating Theatres and Recovery area are required to be able bodied, the access for a person with a disability will not be required to be provided throughout the proposed refurbishment area.

36. Clause D4D3 (D3.2) – Access to Buildings

+ All new doorways shall have a minimum luminance contrast of 30% provided between—

  (a) door leaf and door jamb;

  (b) door leaf and adjacent wall;

  (c) architrave and wall;

  (d) door leaf and architrave; or

  (e) door jamb and adjacent wall.

  The minimum width of the area of luminance contrast shall be 50 mm.

  Doorways providing access to rooms that are not required to be accessible, are not required to be provided with a luminance contrast i.e., clean utility rooms, dirty utility rooms, equipment stores etc.

37. Clause D4D4 (D3.3) – Parts of Buildings to Be Accessible

In a building required to be accessible –

Accessible Fixtures & Fittings:

+ All fixtures, fittings and door hardware are to comply with Section 13.5 & Section 14 of AS1428.1-2009.

  In this instance, toggle style light switches and GPO outlets etc. should be provided within all patient care areas and to all accessible sanitary facilities (unless automatic lighting is provided within the sanitary facility)

+ Braille tactile signage will be required to be installed throughout the building identifying accessible sanitary facilities, exits and lifts in accordance with the DTS Provisions of the BCA and AS 1428.1.

  Signage to identify any ambulant or accessible sanitary facility is required to be located on the wall on the latch side of door or on the door itself leading to the sanitary facility.

38. Clause D4D13 (D3.12) – Glazing on An Accessway

On an accessway where there is no rail, handrail or transom provided to glazed walls and doors which may be mistaken as an opening must be clearly line marked in accordance with the following:

- Must be clearly marked for the full width of the glazed element,
- Must be a solid and non-transparent contrasting line,
- The contrasting line must have a minimum of 30% luminance contrast when viewed against the floor surface or surfaces within 2m of the glazing of the opposite side.
- Must be not less than 75mm in width,
- The lower edge of the contrasting line must be located between 900mm and 1000mm above the finished floor level.

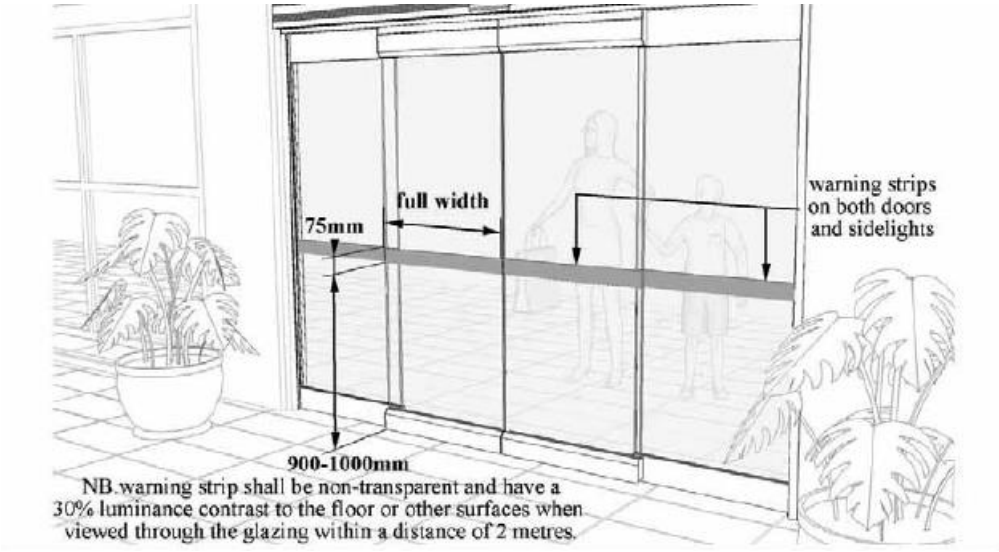


Figure No. 9 – Warning Strips to Full Height Glazing

SECTION E – SERVICES AND EQUIPMENT

PART E1 – FIRE FIGHTING EQUIPMENT

39. Clause E1D2 (E1.3) – Fire Hydrants

Fire Hydrant coverage will be required to each part of the Operating Theatres 9 – 16 refurbishment on Level 3 in in accordance with the requirements of AS 2419.1 - 2021.

Design verification will be required from the Design Consultant confirming the following:

- Hydrant coverage complies to all refurbished areas in accordance with AS 2419.1 -2005; and
- The existing fire hydrant system is operating in accordance with its original standard of performance for the existing building in terms of pressure and flow requirements

All hydrants within the refurbished area will be required to comply with the current requirements of AS 2419.1 – 2005 in terms of location, landing valves, storz couplings etc.

Reliance on Ordinance 70 Infrastructure

As part of the FEBQ process to be undertaken with FRNSW, there will need to be discussions on a staged upgrade of the fire hydrant system which is designed and constructed in accordance with the requirements of Ordinance 70 which will be required to be committed to by the LHD to ensure that the fire hydrant system serving the existing Westmead Hospital is upgraded over time to the meet the operational requirements of FRNSW.

Fire Hydrants in Fire Isolated Stairways

Fire hydrants serving the refurbished areas are required to be positioned within the fire isolated stairways.

It is understood that new hydrant landing valves are proposed to be installed within the fire isolated stairways serving the refurbished areas of Blocks A and D.

Location of Fire Hydrants

All fire hydrants being relied upon for coverage are required to be initially installed within 4m of an exit (including a horizontal exit). Additional hydrants required for coverage, can then be positioned further than 4m from an exit.

Final Hydraulic Design Development Drawings indicating the location of all fire hydrants and hose coverage will be required to be reviewed in order to confirm compliance.

40. Clause E1D3 (E1.4) – Hose Reels

Fire hose reels are required to be installed throughout the refurbished area in accordance with AS 2441 – 2005.

Location

Fire hose reels are required to be located within 4 m of an exit (including a horizontal exit) or adjacent to an internal fire hydrant (other than hydrants within a fire isolated stairway).

In achieving compliant fire hose reel coverage, fire hose reels cannot pass through fire safety doors separating fire and smoke compartments.

Plans detailing the location of fire hose reels and coverage achieved will be required to be submitted for our review.

Omission of Fire Hose Reel Coverage to the Fire Separated Rooms

Verification is required as to whether there are any rooms proposed to be fire separated from the remainder of the floor which will impact on compliant fire hose reel coverage being achieved.

If fire separated rooms are proposed to be constructed, then the omission of fire hose reel coverage to the rooms will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

Doors to Cupboards Housing FHRs

Doors to cupboards housing fire hose reels and fire hydrants are to be designed in such a manner that when they are open they do not impede on the path of travel leading to an exit. In this instance, doors to cupboards will be required to swing 180^{o} open against the wall face or in some instances, two smaller doors may need to be provided to cupboards so as not to impede the width of exits. Special attention is required to cupboards located directly adjacent to fire safety doors throughout the building.

Services within cupboards Housing FHRs

In accordance with AS 2441 – 2005, the cupboards housing fire hose reels are not permitted to contain non-fire equipment services. In this instance, any existing cupboards that contain non-fire services along with a fire hose reels are to have the non-fire services removed from the cupboards.

41. Clause E1D4 (E1.5) – Sprinklers

It is noted that the existing building is provided with an Automatic Fire Suppression System. The Automatic Fire Suppression System that is installed within the building will be required to be modified as a result of the proposed refurbishment works in accordance with Clause E1D4 and AS 2118.1 – 2017.

All proposed new works in terms of pipework, spacing of sprinkler heads, sprinkler heads etc will be required to comply with the requirements of AS 2118.1 – 2017.

Location of Sprinklers

The sprinkler system will be required to be installed to all EDB cupboards, Fire Services cupboards, Services cupboards etc throughout the building in accordance with AS 2118.1 – 2017.

The sprinkler system will be required to be installed to all Comms Rooms, DAS Rooms etc in accordance with AS 21118.1 – 2017.

Omission of Sprinklers from Electrical Rooms

Verification is required as to whether there are any rooms proposed to have sprinklers omitted due the provision of communication / electrical equipment within the room.

If any fire separated rooms are proposed to have sprinklers omitted, then the omission of sprinklers to the rooms will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

Use of Concealed Sprinkler Heads in the Operating Theatres

As detailed above, the Automatic Fire Suppression System is to be installed / modified within the Level 3 refurbishment area.

For the proposed occupancy use as defined by AS 2118.1 – 2017, a light hazard sprinkler system with fast response heads is required to be installed. Due to the infection control requirements associated with the Operating Theatres and do to avoid accidental activation of the sprinkler heads, concealed sprinklers heads are proposed to be installed.

Due to the fact that the RTI for the sprinkler head cannot be confirmed as being 50 for a fast response head, a technical non-compliance occurs with AS 2118.1 – 2017.

The proposed use of concealed sprinkler heads within the Operating Theatres will be required to be assessed as part of a Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

Sprinkler Coverage to Cupboards

Sprinklers are not required to be installed within built in service cupboards, cupboards and wardrobes, or shower and toilet cubicles in protected bathrooms for Light Hazard and Ordinary Hazard occupancies, provided: -

- The floor area of the cupboard does not exceed 2.5 m^2;
- The walls and ceilings are lined or backed with non-combustible materials;
- The cupboard is not used for the storage of flammable liquids; and
- Sprinklers in the adjoining room are positioned so they shall cover the unprotected area (obstructions caused by lintels or bulkheads are not considered in this case)

42. Clause E1D14 (E1.6) – Portable Fire Extinguishers

Portable fire extinguishers are to be installed in accordance with clause E1D14 and AS 2444. This includes the provision of type E fire extinguishers to nurse and staff stations.

Powder Extinguishers are not permitted to be installed within patient care areas.

PART E2 – SMOKE HAZARD MANAGEMENT

43. Clause E2D3, E2D11 (E2.2) – Smoke Hazard Management

Smoke Hazard Management System

A hospital building with an effective height less than 25m is required to be provided with an Automatic Fire Suppression or Zone Smoke Control System.

As detailed above under Clause E1D4, the existing Hospital is provided with an Automatic Fire Suppression System installed throughout which meets the DtS Requirements of E2D11.

Notwithstanding the above, it is understood as confirmed by Northrop that the existing building is provided with a form of smoke hazard management system and as part of the proposed works, it is understood that

the existing system will be maintained in accordance with its standard of performance and that the level of fire safety achieved by the existing system will not be lessened.

Mechanical Air Handling Systems

The Mechanical Air-Handling System (other than non-ducted systems with a capacity not more than 1000 litres/second, systems serving critical treatment areas and miscellaneous exhaust air system installed in accordance with Sections 5 and 6 of AS/NZS 1668.1) throughout each of the refurbished areas is to be upgraded /installed so that is shuts down automatically on the activation of the Automatic Fire Detection & Alarm System / Automatic Fire Suppression System.

Automatic Fire Detection & Alarm System

An Automatic Fire Detection & Alarm System is required to be installed / upgraded throughout each of part of the refurbished Level 3 together with throughout the roof top plant room floor in accordance with AS 1670.1 – 2018.

Having regard to Clause 1.7.3 of AS 1670.1 – 2018, all alterations to existing installations are required to be designed and installed to the requirements of AS 1670.1 – 2018.

1.7.3 Alterations to existing system

Alterations to existing installations shall be designed and installed to the requirements of this Standard. This applies only to equipment and transmission paths which are added, removed, relocated or replaced.

Power supply requirements shall be recalculated and upgraded as necessary to ensure the system can accommodate any additional loads.

The alteration, including detectors, shall be compatible, only used within the limitations detailed in the component conformance documentation, and shall perform the required functions in accordance with this Standard.

NOTE See Appendix A.

Where existing wiring is required to be joined at the FDCIE, fixed terminal strips utilizing clamp-type connectors shall be used. Where these joints are made outside the FDCIE, they shall be housed in a cabinet and labelled "FIRE" in a contrasting colour to the background with lettering size of not less than 5 mm.

In addition to updating the documentation detailed in Appendix A, the zone block plan (see Clause 3.10) shall be revised to include the alterations.

Photoelectric type smoke detectors are required to be installed in patient care areas and in paths of travel to exits from patient care areas.

Key elements of AS 1670.1 which require close attention are as follows:

- Where a sole occupancy unit i.e., bedroom consists of one main room and water closet/shower/bathroom (which is not used for other purposes i.e., laundry), it may be protected by one smoke detector located in the main room provided that the total area of the whole unit is less than 50m² i.e., when less than 50m², the water closet/shower/bathroom is not required to be protected.
- Where an area is divided into sections by walls, partitions, or storage racks reaching within 300mm of the ceiling (or the soffits of the joists where there is no ceiling) each section is to be treated as a room and is required to be protected.
- Where full height curtains are proposed to be installed within treatment areas, ward areas etc, they must be of open mesh material for at least 300 mm to permit smoke to pass through, otherwise the curtains will be considered a wall and smoke detectors will have to be installed either side of the curtains.
- A clear space of at least 300 mm radius, to a depth of 600mm is required to be maintained from the smoke detector.
- Detectors are required to be located a minimum distance of 900 mm from supply air fans or ceiling fans.

- Detectors are required in all sanitary facilities with a floor area greater than 3.5m^2.
- Any cupboard with a floor area >3m^3 is required to be protected.
- All electrical cupboards, comms cupboards etc. irrespective of the size are required to be protected.

Manual call points are required to be installed in evacuation routes so that no point on a floor is more than 30 m from a manual call point.

PART E4 – VISIBILITY IN AN EMERGENCY, EXIT SIGNS AND WARNING SYSTEMS

44. Clause E4D2 (E4.2) – Emergency Lighting

Emergency Lighting is required throughout in accordance with AS 2293.1 -2018 in the following locations:

- All fire isolated stairways and passageways;
- In every passageway, corridor, hallway or the like that is part of the path of travel to an exit;
- In every passageway, corridor, hallway or the like serving a treatment area or a ward area;
- In every room having a floor area of more than 120 m^2 in a patient care area;
- All covered balconies, walkways etc. that a person is required to egress under; and

45. Clause E4D5 (E4.5) – Exit Signs

Exit signs are to be installed throughout the building in accordance with AS 2293.1 -2018 in the following locations:

- Doors providing direct egress from a storey to a fire isolated stairway or passageway;
- Horizontal exit doors;
- Fire Safety Doors (i.e., fire/smoke doors) separating compartments;
- Doors leading from balcony areas, courtyards etc. back into the building; and
- Above doorways in a path of travel where the location of the exit is not clear.

The following figures detail indicative exit sign locations throughout the refurbishment area.

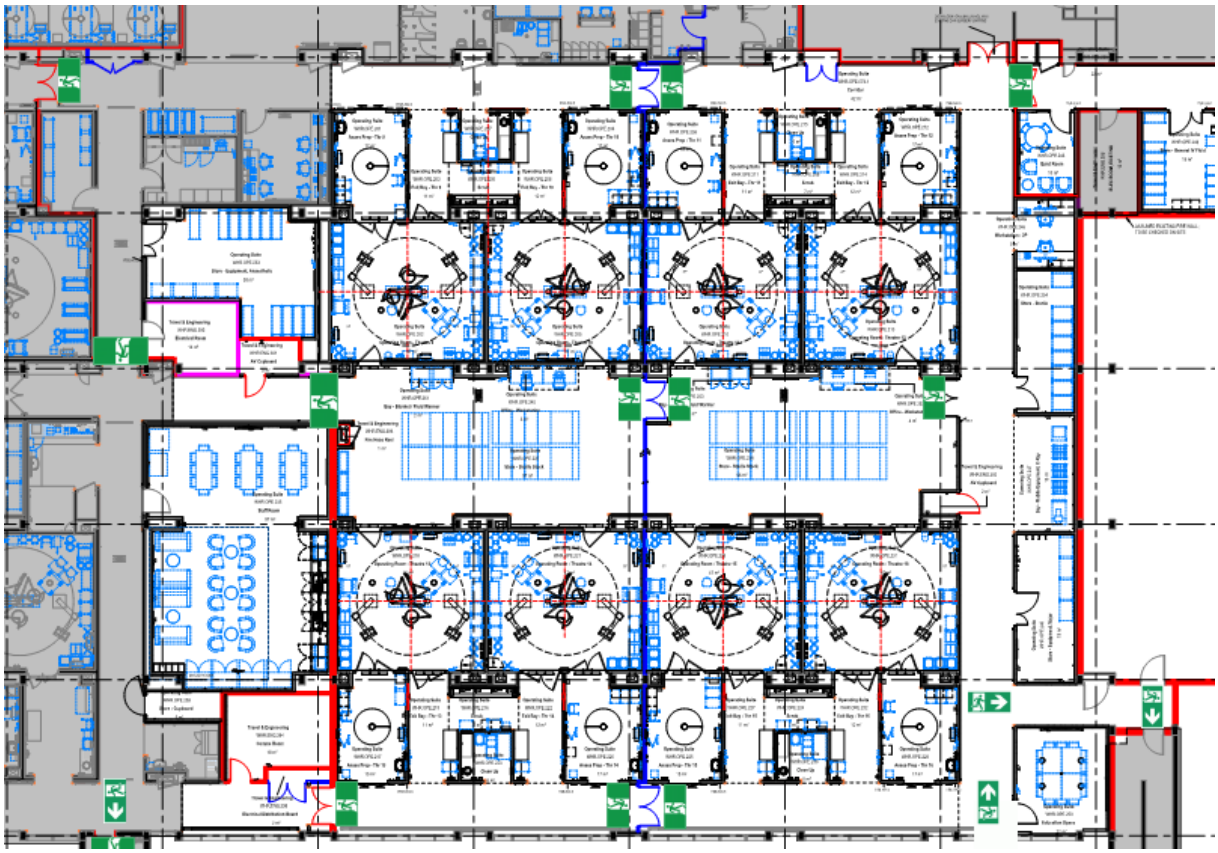


Figure No. 10– Indicative exit sign locations throughout the refurbished Level 3 area

46. Clause E4D6 (E4.6) – Directional Exit Signs

Directional exit signs are to be installed throughout the building where the exits are not readily apparent to occupants in accordance with AS 2293.1 -2018.

47. Clause E4D9 (E4.9) – Sound System and Intercom System for Emergency Purposes

The existing EWIS System will be required to be altered / modified to suit the proposed refurbished areas in accordance with AS 1670.4 –2018.

Rationalisation of EWIS Speakers

It is understood that is likely to omit EWIS speakers from the Operating Theatres due to the sensitive nature of the environment where the activation of the speaker within the room may cause trauma to the patient or disrupt medical staff performing surgeries.

Any rationalisation of EWIS system from within the Operating Theatres will be required to be to be assessed as part of the Fire Engineering Assessment to be undertaken by Arup in order to demonstrate compliance with the nominated Performance Requirements of the BCA.

SECTION F – HEALTH & AMENITY

PART F2 – SANITARY AND OTHER FACILITIES

48. Clause F4D4 (F2.3) – Facilities in Class 3 to 9 Buildings

The Class 9a facility is required to have:

- A shower for each 8 patients or part thereof
- One island-type plunge bath in each storey containing Ward Areas

Required Sanitary Facilities

+ BCA2019 Part F requires sanitary facilities with the Class 9a facilities as follows:-

(a) Facilities for Staff: -

Toilet facilities for staff are to be provided in accordance with the following: -

User Group	Closet Pans		Urinals		Washbasins	
	Design Occupancy	Number	Design Occupancy	Number	Design Occupancy	Number
Male Employees	1-20	1	1	0	1-30	1
			11-25	1		
	>20	Add 1 per 20	26-50	2	>30	Add 1 per 30
			>50	Add 1 per 50		
Female Employees	1-15	1	N/A		1-30	1
	> 15	Add 1 per 15			> 30	Add 1 per 30

Table No. 9 – Sanitary facilities required for staff members

(a) Facilities for Patients (when proposed future change of use to patient care occurs):

User Group	Closet Pans		Urinals		Washbasins	
	Design Occupancy	Number	Design Occupancy	Number	Design Occupancy	Number
Male Patients	1-16	1			1-8	1
	> 16	Add 1 per 16			>8	Add 1 per 8
Female Patients	1-16	1			1-8	1
	> 16	Add 1 per 16			> 8	Add 1 per 8

Table No. 10 – Sanitary facilities required for staff members

As identified within the Stage 1 refurbishment, based on the fact that patients will be taken to and from the Operating Theatres by hospital staff to the respective ward area, there is no requirement for the provision of additional sanitary facilities within the Recovery Area where patients will be monitored.

Furthermore, suitable sanitary facilities for staff have been provided as part of the Stage 1refurbishment works.

There is no requirement for the provision of additional sanitary facilities as part of the refurbishment associated with Operating Theatres 9 – 16.

PART F3 – ROOM HEIGHTS

49. Clause F5D2 (F3.1) – Height of Rooms

The floor to ceiling heights throughout shall comply with the following:

+ in a patient care area, treatment room, clinic, waiting room, passageway, corridor or the like – 2400mm; and
+ in an operating theatres or delivery rooms – 300 0mm; and

- Bathroom, shower room, sanitary compartment, airlock, tea preparation room, pantry, storeroom or the like must achieve a minimum height of 2100 mm.
- Fire isolated exits – 2000 mm.
- Staff Office & Meeting Rooms – 2400 mm;
- Consultation Rooms – 2400 mm;

PART F4 – LIGHT AND VENTILATION

50. Clause F6D2 (F4.1) – Provision of Natural Light

Natural light is required to all rooms within ward areas that are used for sleeping purposes.

Based on the fact that the Operating Theatre is a Treatment Area, there is no requirement for the provision of natural light.

51. Clause F6D5 (F4.4) – Artificial Lighting

Artificial lighting to the new works is required in accordance with AS 1680.0 - 2009.

If natural light of a standard equivalent to that required by Clause F6D3 is not available, and the periods of occupant or use of the room or space will create undue hazard to occupants seeking egress in an emergency then artificial lighting is required to be provided to all rooms that are frequently occupied, all spaces required to be accessible, all corridors, lobbies, internal stairways, other circulation spaces and paths of egress.

52. Clause F6D6 (F4.5) – Ventilation of Rooms

Mechanical Ventilation and Air Conditioning will be required to all areas of new works in accordance with the DTS Provisions of the BCA and AS 1668.2 - 2012.

SECTION J – ENERGY EFFICIENCY

53. Parts J1 – J9

The energy efficiency provisions of Section J are applicable to the new building works only. Verification will be required in the form of Design Statement certifying that the new works have been installed in accordance with the relevant provisions of Section J.

In this regard Parts J2 – Energy Efficiency, J5 - Building Sealing, J6 - Air Conditioning and Ventilation, Part J7 - Artificial Lighting and Power, and Part J7 – Heated Water Supply are to be complied with for all new works associated with the proposed refurbishment with Operating Theatres 9 – 16.

Note: If the Crown Certificate Application is made prior to 1 October 2023, the energy efficiency provisions of BCA 2019 can be applied to the refurbishment works.

E. CONCLUSION

This report contains a BCA 2022 and Access to Premises Standards 2010 assessment of the referenced Design Development Issue Architectural Drawings prepared by HDR for the proposed alterations and additions to the Level 3 Operating Theatres 9 - 16 of the existing Westmead Hospital, Block F against the requirements of the BCA..

Arising from our assessment we are satisfied that the new works can satisfy the requirements of the BCA 2022 and the Access to Premises Standards 2010 if the works are designed and constructed in accordance with the requirements of this BCA Report and the subsequent Fire Engineering Assessment undertaken by Arup.