Appendix H:FRNSW FEBQ Response

Request for Consultation - Alternative Solutions Fire Engineering Brief Questionnaire

Process

Please complete and submit this FEBQ in Microsoft Word format, as part of your Fire Engineering Brief Process to FRNSW. You will be contacted in due course to discuss the type of meeting required. For any additional non-compliances you wish to submit after your initial consultation, you will need to submit the original FEBQ along with the additional items, identify them as new and the submission will be treated as a new consultation request.
Please limit the information in this questionnaire to essential elements.
No FEB meetings will be scheduled without a complete FEBQ and mandatory attachments as specified in Submitting Your Application section. All cells must be completed. Any FEBQ considered unnecessarily lengthy or lacking information may be rejected with a request to summarise or expand.
All departures from DtS Provisions Issues (Alternative Solutions) to be detailed and numbered individually in the sections following and should not exceed 2-3 pages per alt sol, not including diagrams and pictures.
The Certifying Authority should identify the non-compliances in this FEBQ.
FEBQ details from Applicant should be in blue text. Responses from FRNSW will be in red text. Applicants may respond to FRNSW once, and a final comment will be made in return, on the last page of this form. FRNSW then leaves the Applicant to determine their action thereafter.

Version Control

Version	Author	Organisation	Content	Date
V1	Ulf Johansson	RED Fire Engineers	For review and comment	19th of February 2016
V2	Matthew Rowley	FRNSW	Response to FEBQ V1	06/04/16
V3	Ulf Johansson	RED Fire Engineers	Response to FRNSW comments	27/05/16

Application Details

Meeting Type Requested

Please indicate the type of meeting required and your reasons for your selection. Please note that face-to-face meetings may benefit from the participation of the Certifying Authority, either face-to-face or via teleconference.

☐ No Meeting Required ☐ Telephone Meeting ☒ Face-to-face Meeting

FRNSW to add meeting detail ⇩

Date Held	16/05/2016	
Time (From – To)	1300	1500 hrs

Reason for Application

☐ Clause 144 (EP&A Reg) ☐ BPB Condition ☐ Voluntary

☐ Ministerial Condition ☒ Crown Building Works (EP&A Act Sect 109R)

Note:
FRNSW will not hold meetings with Fire Engineers when the building is under council orders. They must submit to council first. FRNSW is unable to provide comment on 'voluntary upgrades' and 'change of use' to existing buildings prior to the issue of DA conditions or any envisaged Section 96 amendments.
Local Government Authority can seek advice during DA review.

Applicant Agreement

I confirm that the PCA has identified the non-compliances in this FEBQ. I also confirm that block plans or schematics for all hydraulic fire systems are included where available, or at least an indication of likely hydrant locations.
I agree to pay FRNSW the charges set out in Part 6, Clause 54 of the Fire Brigades Regulation 2008 for the provision of services performed in connection with statutory fire safety (see Summary of Schedule of Charges at the end of this form). I understand that I am liable for the abovementioned payment, irrespective of whether I am acting on the behalf of another person or party.

Name of Applicant (Individual)	⇨	Robert Marinelli
Individual's Mobile Number	⇨	0411557702
Individual's email address	⇨	Robert.Marinelli@philipchun.com
Company Name (Vendor Name)	⇨	Philip Chun & Associates Pty Ltd
Trading As	⇨	Philip Chun & Associates Pty Ltd
ABN (Australian Business Number)	⇨	64 597 649 811
Remittance email address (generic email address)	⇨	accountsnsw@philipchun.com.au
Remittance contact name	⇨	Yue Yang
Remittance phone contact	⇨	(02) 9412 2322
Remittance fax contact	⇨	(02) 9412 2433
Remittance postal address (including suburb & postcode)	⇨	PO Box 156, Artarmon, NSW 2064
Remittance street address (including suburb & postcode)	⇨	44 Hampden Road, Artarmon, NSW 2064

Premises

Applicant File Number	⇨	JN14-00010	**DP Number**	⇨	Lots 1-11 DP 26087; Lots 12-15 DP 792918; and Lot 1 DP 1179362
Name	⇨	Northern Beaches Hospital	**Address**	⇨	Cnr Warringah Rd & Wakehurst Pwy
Suburb	⇨	Frenchs Forrest	**Postcode**	⇨	2086
FRNSW Reference No	⇨	FRN12/1242 (#9929)			

Description of Building

Is the building existing?	⇨	No	**Number of issues**	⇨	21
Building Class	⇨		**If more than one class**	⇨	Primarily 9a, also Class 6 and 7b

Type/use of premises ⇨	Hospital	**Type of Construction** ⇨	Type A
Effective height (m) ⇨	Over 25 m, less than 50 m	**Levels contained** ⇨	10
Rise in Storeys (RIS) ⇨	10	**Total Floor Area: (m^2)** ⇨	78 250
Ground Floor area: (m^2) ⇨	12 700	**Total Volume (m^3)** ⇨	
Largest fire compartment (m2) ⇨			7377
Is the building likely to be subject to a Fire Safety Study? ⇨			No
Estimated Cost of development ⇨			$460 million
If more than one building, please provide a description of site/building: ⇩			

Other Stakeholders

Fire Engineer

Name of Fire Engineer ⇨	Tobias Salomonsson	**Postal Address** ⇨	Suite 306, 22 St Kilda Road
Company Name ⇨	RED Fire Engineers	**A1 BPB Reference** ⇨	C10 - BPB1790
Telephone ⇨	03 9079 4143	**Suburb** ⇨	St Kilda
Email ⇨	tobias@redfireengineers.com.au	**Postcode** ⇨	3182

Certifying Authority

Name of Certifier ⇨	Rod Shepherd	**Postal Address** ⇨	Suite 404, 44 Hampden Road
Company Name ⇨	Philip Chun	**A1 BPB Reference** ⇨	BPB 0753
Telephone ⇨	(02) 9412 2322	**Suburb** ⇨	Artarmon
Email ⇨	rod.shepherd@philipchun.com	**Postcode** ⇨	2064

Local Government Authority (LGA)

Name of LGA ⇨	Warringah Council	**Postal Address** ⇨	725 Pittwater Road
Telephone ⇨	02 9942 2111	**Suburb** ⇨	Dee Why
Email ⇨	N/A	**Postcode** ⇨	2099

Hydraulics Consultant

Name ⇨	TBC	**Postal Address** ⇨	5 Nelson Avenue,
Company ⇨	Axis Plumbing		
Telephone ⇨	02 9708 5666	**Suburb** ⇨	Padstow
Email ⇨	info@axisplumbing.com.au	**Postcode** ⇨	2211

BCA Consultant

Name ⇨	Rob Marinelli	**Postal Address** ⇨	Suite 404, 44 Hampden Road
Company ⇨	Philip Chun		
Telephone ⇨	(02) 9412 2322	**Suburb** ⇨	Artarmon
Email ⇨	Robert.marinelli@philipchun.com	**Postcode** ⇨	2064

Others

Name ⇨	Chris Billinghurst (Project manager)	**Company** ⇨	CPB Contractors
Name ⇨	Julie Wong (Architect)	**Company** ⇨	BVN Architects
Name ⇨	Tom Astalosh (Mechanical Engineer)	**Company** ⇨	Fredon
Name ⇨	Frank Hull (Fire Services)	**Company** ⇨	Wormald
Name ⇨	Zoran Stjejla (Fire Services)	**Company** ⇨	Wormald
Name ⇨		**Company** ⇨	

Fire & Rescue NSW

Fire Safety Officer/s ⇨	D.Bofinger	**Engineer** ⇨	M. Rowley

Scope of Project (1.2.1)

Is the development:

☒ A New Development ☐ Rebuilding/Refurbishment/Extension ☐ Change of Use

If existing, list the approximate date built and code in force at that time. ⇩

Is the development subject to a DA/CC process or Section109R of the EP & A Act? (List any other legislative provisions that may be applicable, e.g. BPB conditions). ⇩

Section 109R of the EP&A act applies

Any DA conditions (or Section 96 amendments), if known? (e.g. Cl 93 Change of use, Cl 94 rebuilding etc.) ⇩

Yes as per attached Department Planning Authority Stage 2 Instrument of Approval.pdf

Any conditions that may impact on Category 2 fire safety provisions? ⇩

None know.

Is the development subject to any special regulatory approvals? (e.g. State Environmental Planning Policies', Integrated Development i.e. requires approval from more than one authority)

If a Fire Safety Study is required then this should be completed prior to undertaking the FEB and Alternative Solution Report.

All limitations and assumptions of the report should be clearly detailed and justified. ⇩

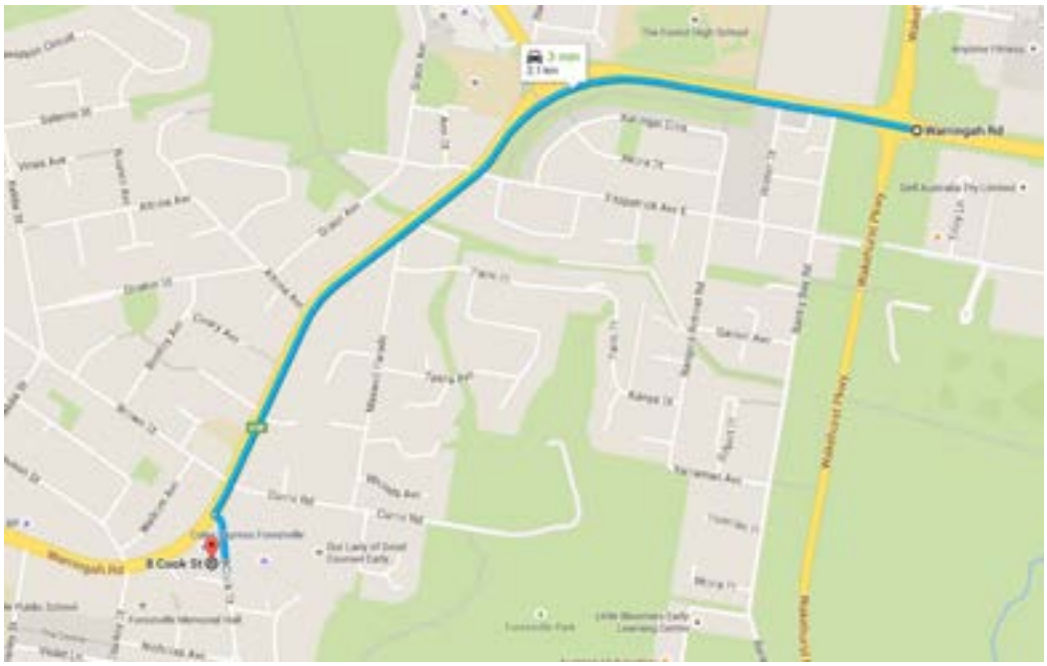
None that the PCA or Fire Engineer are aware of at this stage.

Principal Building Characteristics (1.2.3)

Please outline the building characteristics as they are referred to within the International Fire Engineering Guidelines ⇩

Table 1: Building characteristics

Building Characteristics	
Occupancy	Basement 1 Class 7b – Loading dock Class 9a – Non patient care areas, ancillary Ground Floor Class 6 – Retail stores Class 9a – Non-patient care areas (Offices/Administration) Class 9a – Patient care areas (treatment) Level 1 Class 9a – Patient care areas (treatment) Class 9a – Non-patient care areas (SSD) Level 2 Class 9a – Patient care areas (wards) Class 9a – Non-patient care areas (Support, Offices/Administration, ancillary) Level 3 - 4 Class 9a – Patient care areas (Wards) Class 9a – Non-patient care areas (Offices/Administration) Level 5 Class 9a – Patient care areas (wards) Level 6 Class 9a – Patient care areas (Wards) Class 9a – Non-patient care areas (Medical consulting suites, ancillary) Level 7 Class 9a – Non-patient care areas (Medical consulting suites, ancillary) Level 8 Class 9a – Non patient care areas
DtS Minimum Construction Type	Type A
Floor Plan (NTS)	Basement 1 – 11 000 m^2 Ground Floor – 12 700 m^2 Level 1 – 10 700 m^2 Level 2 – 9 200 m^2 Level 3 – 7 500 m^2 Level 4 – 7 400 m^2 Level 5 – 7 200 m^2 Level 6 – 7 000 m^2

	Level 7 – 4 400 m^2 Level 8 – 1 150 m^2
Height	For the parts of the building considered by this FEBQ, the following building characteristics relevant to the BCA provisions apply: Rise in Storeys – 10 Effective Height – more than 25 m
Location	 ©2015 Google – Map data ©2015 Google This map identifies the location of the development at Warringah Road, French Forrest, and its proximity to the Forrestville Fire Station (8 Cook St, Forrestville), approximately 2.1 km away.

Dominant Occupant Characteristics (1.2.4) and Parameters for Design Occupant Groups (1.2.12)

All "dominant occupant characteristics" should be identified and agreed to.
The "design occupant group" should be selected from the dominant occupant groups which are either: the most common, the most influential or the most vulnerable occupant groups. More than one group may used for the analysis. **N.B** the **number of occupants should not be the main criterion used to select the "design occupant groups".**

Please outline the dominant occupant characteristics and parameters for design occupant groups as they are referred to within the International Fire Engineering Guidelines ⇩

Refer to the tables below for the occupants characteristics.

Table 2: Occupant characteristics for Class 9a areas

Characteristic	Patient care areas (Class 9a)	Non patient care areas (Class 9a)
Occupancy load	Patient care areas – 10 m² per person (BCA Table D1.13)	Office or similar - 10 m² per person (BCA Table D1.13) Plant - 30 m² per person (BCA Table D1.13)
State	At any time (but especially at night), patients may be asleep. Patients are receiving treatment and therefore	Occupants are expected to be mainly hospital staff. Staff members are

	cannot be expected to respond to alarms or evacuate without assistance from staff members. Staff members are expected to be awake and not under the influence of drugs/alcohol.	expected to be awake and not under the influence of drugs/alcohol.
Level of Assistance Required	Patients may require assistance during evacuation. Staff in the building are not expected to require physical assistance to evacuate the building in an emergency. Staff are expected to assist patients to evacuate.	Staff in the building are not expected to require physical assistance to evacuate the building in an emergency.
Emergency Training	It is expected that staff will have a level of fire and evacuation training. An Emergency Management Organisation shall be setup in accordance with AS3745 and staff training shall be provided to assist patients evacuating.	It is expected that staff will have a level of fire and evacuation training. An Emergency Management Organisation shall be setup in accordance with AS3745 and staff training shall be provided to assist patients evacuating.
Familiarity	Staff are assumed to be familiar with the building and location of exits, and procedures during evacuation including assistance with evacuation. Patients may need assistance during evacuation due to mobility or other way-finding difficulties.	Staff are assumed to be familiar with the building and location of exits, and procedures during evacuation including assistance with evacuation.

Table 3: Occupant characteristics for Class 6 and Class 7b areas

Characteristic	Retail (Class 6)	Other (Class 7b or ancillary)
Occupancy load	Shops - 1 person per 3 m² (BCA Table D1.13)	Plant - 1 person per 30 m² (BCA Table D1.13)
State	Occupants in shops may be staff, patients or visitors. Occupants are expected to be awake.	People in Class 7b or ancillary areas are expected to be staff members. Staff members are expected to be awake and not under the influence of drugs/alcohol.
Level of Assistance Required	Patients or visitors in shop areas are generally expected to be mobile and able to self-evacuate.	Staff in the building are not expected to require physical assistance to evacuate the building in an emergency.
Emergency Training	None.	It is expected that staff will have a level of fire and evacuation training. An Emergency Management Organisation shall be setup in accordance with AS3745 and staff training shall be provided to assist patients evacuating.
Familiarity	Patients and visitors may need assistance during evacuation due to way-finding difficulties.	Staff are assumed to be familiar with the building and location of exits, and procedures during evacuation including assistance with evacuation.

Table 4: Number of occupants per floor and use

Level	Class 9a (PCA)	Class 9a (NPCA)	Class 6	Class 7b	Total
Basement	-	657	-	41	698
Ground	688	123	440	-	1251
Level 1	837	-	-	-	837
Level 2	437	134	-	-	571
Level 3	390	102	-	-	492
Level 4	431	92	-	-	523
Level 5	508		-	-	508
Level 6	223	287	-	-	510
Level 7	-	192	-	-	192
Level 8	-	39	-	-	39
				Total:	5621

General Objectives (1.2.5)

FRNSW must ensure that all general FRNSW objectives will be considered in the FER analysis (e.g. design will facilitate the activities of emergency services personnel, protection of adjacent exposures, protection of the subject property, limit the release of hazardous materials into the environment).

Expand on the following and **explain** how they have been considered or addressed?

BCA objectives (performance requirements, particularly those relating to FB intervention).

NOTE: Consider the definition of FB Intervention as per the IFEG, 'All fire services activities from the time of notification up to the completion of fire attack with consideration of management of re-ignition potential and the environmental impact of fire mitigation'. ⇩

The principle objectives in Parts C, D, E of the BCA are as follows:

- Safeguard occupants from illness or injury while evacuating during a fire;
- Provide facilities for occupants and the fire brigade to undertake fire-fighting operations;
- Prevent the spread of fire between buildings;
- Protect other property from physical damage caused by structure failure of a building as a result of fire.

One method in meeting the BCA objectives is providing a design that complies with the relevant Performance Requirements of the BCA.

The proposed Alternative Solution in this FEBQ is to meet the relevant Performance Requirements of the BCA.

The client has been advised that the BCA does not include any objectives regarding protection of property or contents, and has not requested additional fire prevention or protection measures.

Fire Brigades Act – Duty to protect and save lives, property and the environment ⇩

Fire & Rescue New South Wales (FRNSW) is the Fire Brigade having jurisdiction for this development. FRNSW has objectives regarding the protection of life, property and the environment. For this building, it is expected that their main activities during a fire will include assistance with evacuation and fire extinguishment using the fire hydrant system.

FRNSW are consulted as part of the FEB process in agreeing assessment methodology and acceptance criteria.

Workplace Health and safety, Dangerous Goods etc.

Consideration may need to be given to other objectives such as increased security measures that may clash with fire safety and/or the use of new materials. ⇩

WH&S risks will be considered as part of the legislated safety in design review/mitigation process. We have not been informed of any dangerous goods.

On-site security personnel will be present at all times in the building.

Other objectives ⇩

N/A

Hazards and Preventative and Protective Measures (1.2.6)

Please outline the Hazards and Preventative and Protective Measures as they are referred to within the International Fire Engineering Guidelines ⇩

Activities

The activities within the building are not considered to promote any additional hazards to the occupants when compared to the DtS provisions.

Ignition Sources

Electrical faults in fittings/equipment, light fitting failure, hot surfaces, vehicles in loading dock and ambulance bay, arson, flammable liquids, flammable gases, air handling units.

Fuel

Furniture, vehicles (in loading dock and ambulance bay), waste (plastic, paper, etc.), appliances (e.g. computers),

Proposed Preventative and Protective measures

Fire Resisting Construction and Compartmentation

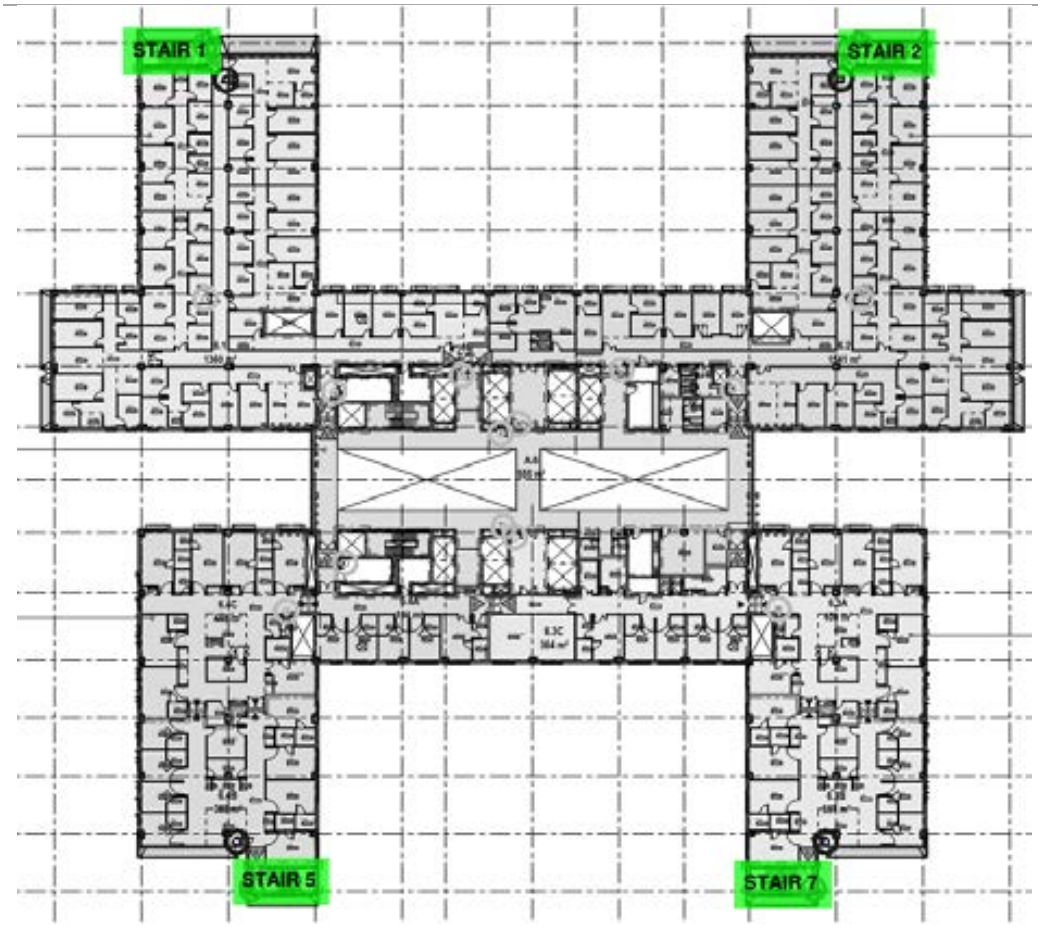
The Fire-Resistant Levels are proposed to be (120)/120/120 throughout the building. For Class 6 areas (e.g. atrium and retail areas) and Class 7b areas (basement loading dock), this is a departure from BCA DtS Specification C1.1. An assessment will use fire engineering methods to verify that the proposed FRLs provide an acceptable level of fire safety.

Class 6 areas on Ground Floor and the atrium will form a single fire compartment. The total floor area for this fire compartment is approximately 7377 m^2 which exceeds the prescribed maximum floor area of 5000 m^2 in Class 6 compartments by the BCA DtS Provisions (C2.2) in Type A constructions. The fire compartment is divided into two smoke compartments on Ground Floor as shown in the figure below. An assessment will use fire engineering methods to verify that the proposed compartment size provides an acceptable level of fire safety.

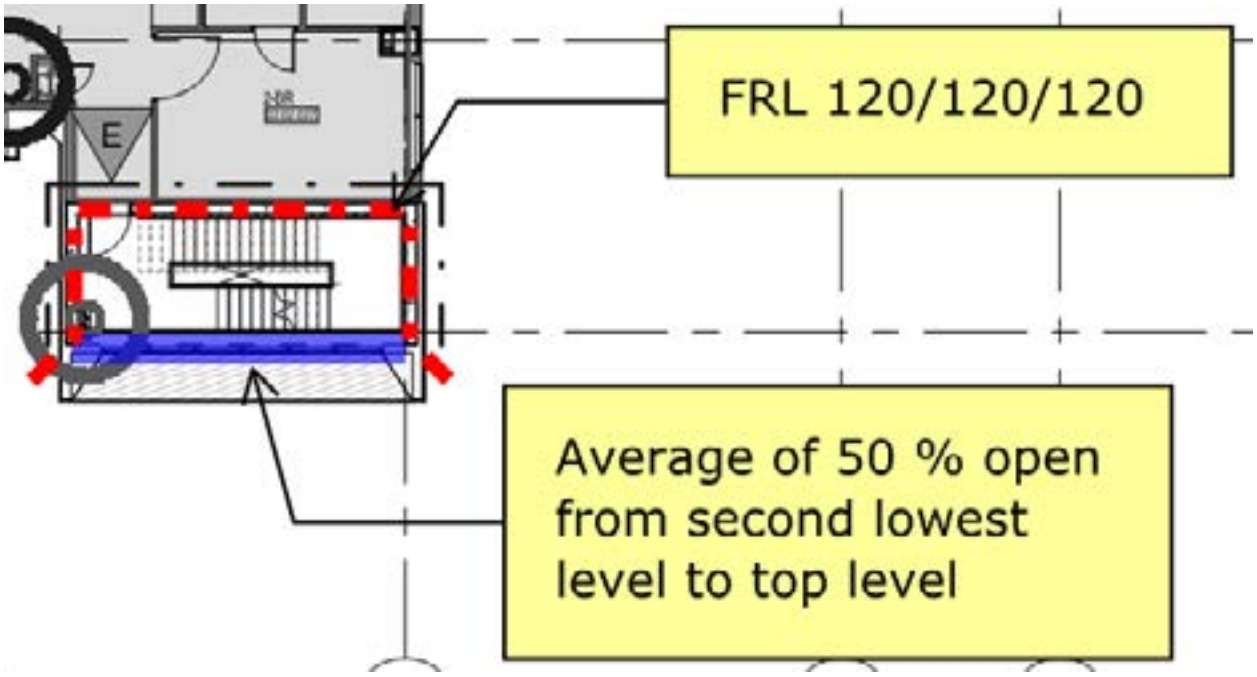
Smoke compartments on Ground Floor

In several junctions of external walls, there are walls and openings that are prescribed to be protected in accordance with BCA Clause C3.3. A fire engineered solution will be used to determine appropriate protection between fire compartments.

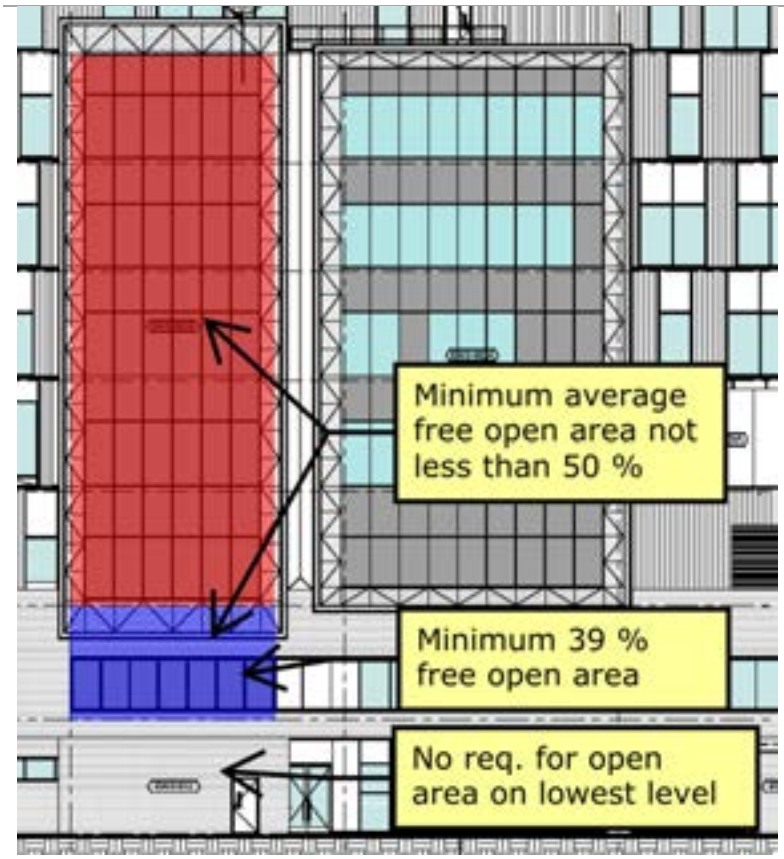
Fire stairs 1, 2, 5 and 7 providing egress from Level 6 to the level of discharge to the outside will be external fire stairs instead of fire-isolated stairs. Three sides of the stairs bounding the building will be of concrete and have an FRL of 120/120/120. The fourth side, facing the outside, will be naturally vented to using louvres. Each stair shall achieve a minimum average free open area of 50 % (based on the width and height of the longest side of the stair). The level of discharge to the outside does not have to be vented to the outside provided that it does not provide access to the building from this level. The free open area shall be achieved with louvres evenly distributed over the height (slab to slab) and with a width of no less than 6.9 m for each storey. The louver shall have a cutoff angle of no less than 31°. An exception to these requirements is made on the second lowest level for each stair where a free open area of not less than 39 % will be achieved by an open framing fitted with a bird protection mesh. The open framing shall be located at least 0.7 m above the slab to the storey below. From this level, the open framing must extend at least 2.0 m. The framing shall be provided for the full width of the stair on these levels (approximately 8 m wide). Façade areas that are obstructed by slabs between floors do not need to be included when calculating the free open area. This is a departure from BCA Clauses D1.3 and D1.8 and will be addressed by a fire engineered solution.



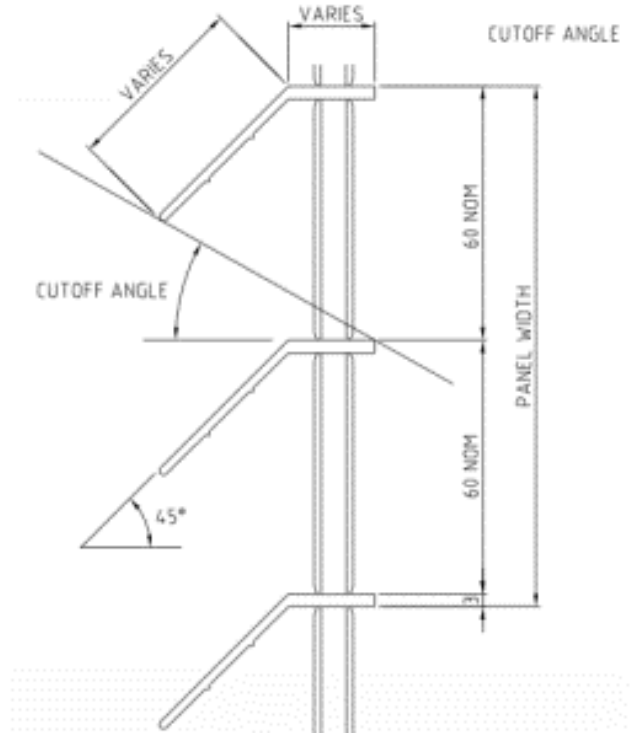
Location of Fire Stairs 1, 2, 5 and 7 (on Level 6)



FRL and openness requirements for fire stairs

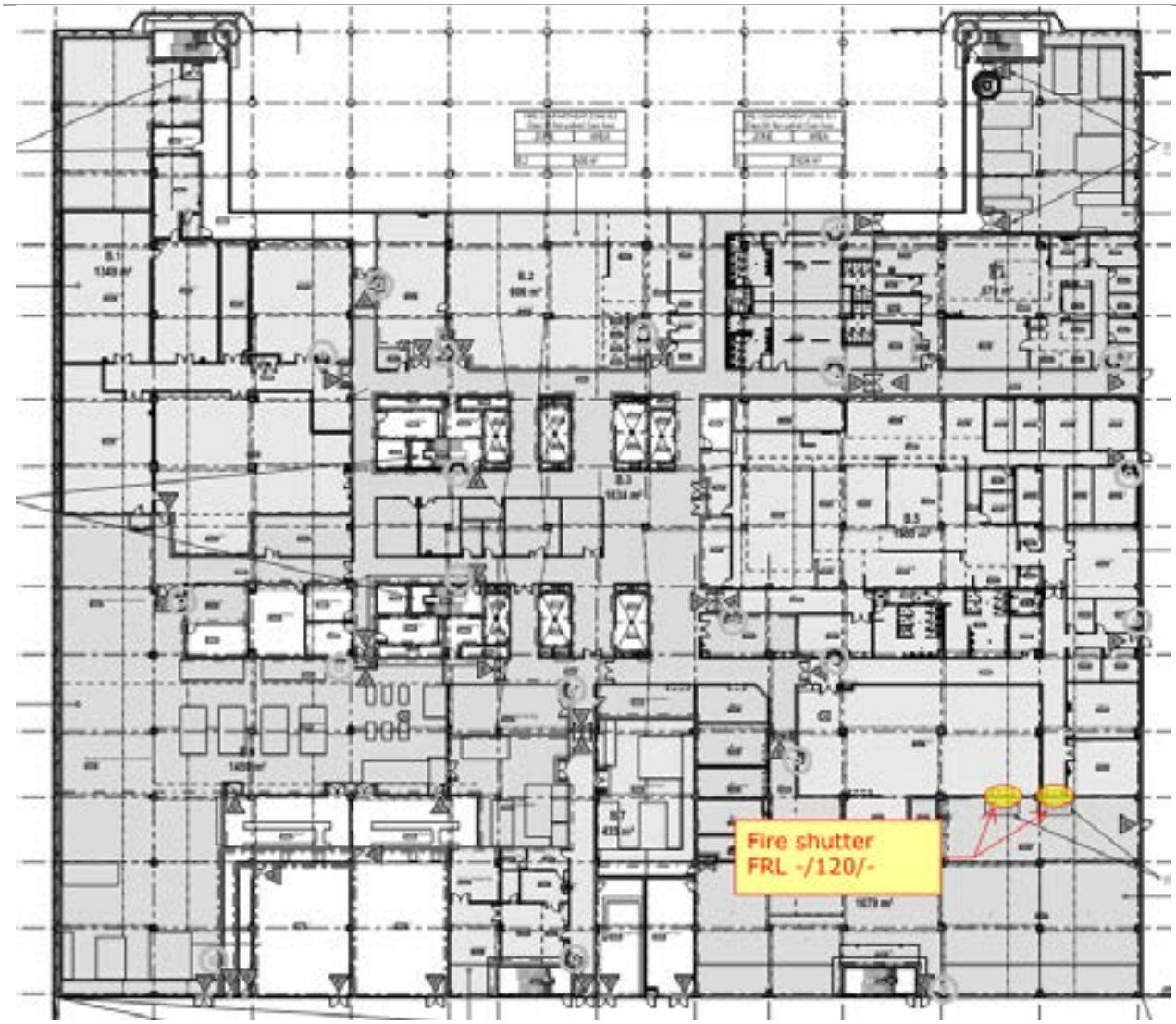


FTypical venting solution for fire stairs (illustrates fire stair 5)



Detail of louvre for external stair venting

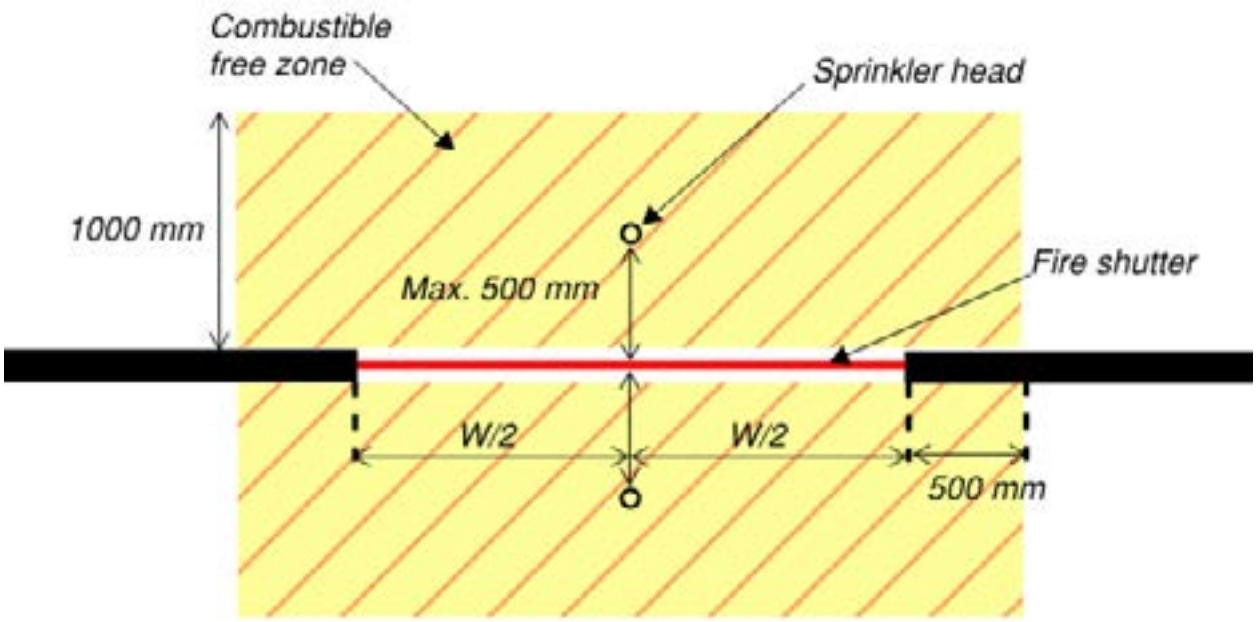
Basement Level and Ground Floor will have fire shutters located in fire compartment walls (i.e. having an FRL of 120/120/120). The shutters have an FRL of -/120/- instead of -/120/30 as prescribed by the BCA DtS Provisions. This is a departure from BCA Clause C3.5 and will be addressed by a fire engineered solution.



Fire shutter locations in Basement

Fire shutter location on Ground Floor

For each fire shutter, sprinkler heads are to be provided at a maximum of 500 mm from the centre line of shutter on both sides. . For the fire shutter on Ground Floor, two sprinkler heads will be required to provide coverage of the width of the shutter. For the basement fire shutters, a single sprinkler head will be able to provide coverage across the width of each fire shutter. For fire shutters in the basement, a combustible free zone shall be provided on each side of the. For these shutters, signs shall be clearly provided on each side of a shutter stating “COMBUSTIBLES NOT ALLOWED TO BE STORED NEAR SHUTTER” in capital letters at least 50 mm in height against a white or silver contrasting background. Delineation shall be provided on both sides of the basement fire shutters to illustrate where combustible materials are not permitted to be stored. For the fire shutter on Ground Floor, a combustible free zone shall be maintained on the atrium side of the shutter only. A sign shall be clearly provided on the atrium side of a shutter stating “COMBUSTIBLES NOT ALLOWED TO BE STORED NEAR SHUTTER” in capital letters at least 50 mm in height against a white or silver contrasting background. Fire shutters are to be geared and to close on GFA. The shutters are to be fail-safe closed. In the event of power loss a controlled descent of the shutter door is required so that a person under the shutter can safely move away before the shutter closes. The combustible free zone only applies to non-fixed combustible materials, e.g. a pallet with goods. Fixed combustible materials such as light switches, push buttons or the like are still permitted within the combustible free zone.



Combustible free zone

Fire and smoke compartments in the building do not meet the prescribed size limitations of the BCA DtS Provisions (Clause C2.5) as illustrated in the table below. A fire engineered solution will be developed to address these departures.

Floor	Comp.	Fire/Smoke Comp.	Size	DtS Prescribed limit (C2.5)
Ground	0.6	Smoke	1108 m^2	1000 m^2
	0.8	Smoke	1177 m^2	1000 m^2
Level 1	1.2	Smoke	1019 m^2	1000 m^2
	1.3	Fire (FRL 120/120/120)	2101 m^2	2000 m^2
	1.3	Smoke	1111 m^2	1000 m^2
Level 2	2.1A	Smoke	603 m^2	500 m^2
	2.6B	Smoke	523 m^2	500 m^2
	2.7A	Smoke	517 m^2	500 m^2
	2.7B	Smoke	505 m^2	500 m^2
Level 3	3.1	Fire (FRL 60/60/60)	1081 m^2	1000 m^2
	3.1	Smoke	601 m^2	500 m^2
	3.2	Fire (FRL 60/60/60)	1044 m^2	1000 m^2
	3.2B	Smoke	600 m^2	500 m^2
	3.5	Fire (FRL 60/60/60)	1042 m^2	1000 m^2
	3.5A	Smoke	565 m^2	500 m^2
Level 4	4.1B	Smoke	598 m^2	500 m^2
	4.2	Fire (FRL 60/60/60)	1160 m^2	1000 m^2
	4.3A	Smoke	518 m^2	500 m^2
	4.3B	Smoke	560 m^2	500 m^2
Level 5	5.1B	Smoke	602 m^2	500 m^2
	5.3B	Smoke	639 m^2	500 m^2

Non fire-isolated stairs 3 and 4 are to be fire separated from the basement level with a minimum FRL of 120/120/120.

Level 6 roofs used as paths of egress from stairs 8 and 9 and from plant rooms on Level 7 shall have a minimum FRL of 120/120/120 and not have any roof lights or other openings within three meters of the paths of travel to the fire stairs (stairs 1, 2, 5 and 7).

Any sliding fire doors in the building shall be protected in accordance with BCA DtS Clause C3.6.

Atrium roof lights/sky lights shall be of toughened glass as defined in AS 1288-2006.

The façade wall systems and external walkways/canopies on Ground Floor shall be fully non-combustible as defined by the BCA.

Access and Egress

Part D of the BCA prescribes the minimum requirement for access and egress to a building.

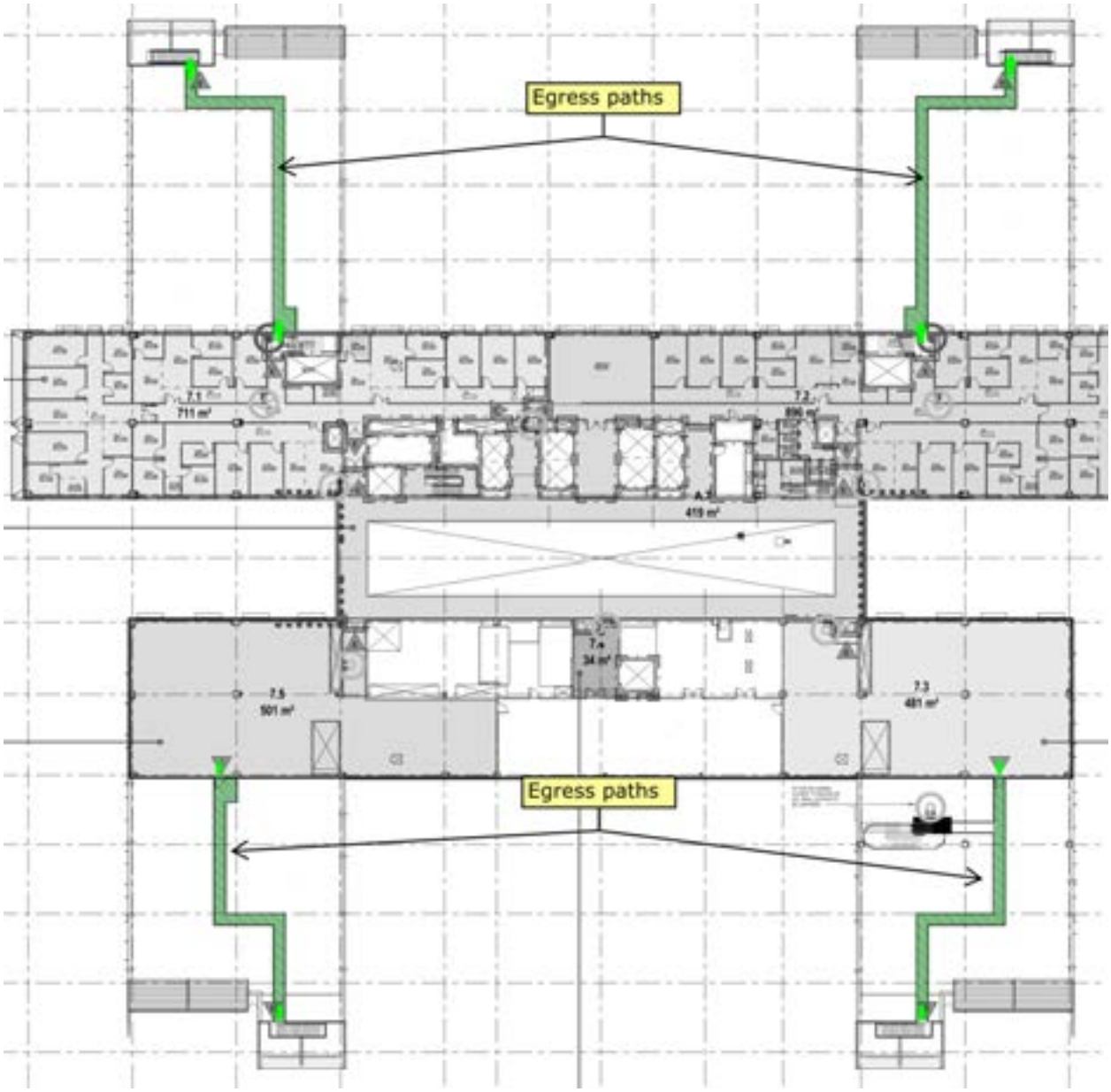
Travel distances to a point of choice, to an exit and between exits exceed the DtS prescribed distances in several locations in the building. A fire engineered solution will be developed to address these departures.

Floor	Patient Care Area	Maximum travel distances (compartment)	Travel distance	DtS travel distance
Basement	No	Distance to point of choice (B.3)	26 m	20 m
	No	Distance to an exit (B.5)	45 m	40 m
	No	Distance to point of choice (B.5)	28 m	20 m
Ground	Yes	Distance to point of choice (0.3)	25 m	12 m
	Yes	Distance to an exit (0.5)	48 m	30 m
	Yes	Distance between exits (0.5)	59 m	45 m
	No	Distance to point of choice (0.7)	38 m	20 m
	No	Distance to an exit (0.7)	45 m	40 m
Level 1	Yes	Distance to an exit (1.5)	36 m	30 m
	Yes	Distance between exits (1.7)	60 m	45 m
	Yes	Distance to point of choice (1.7)	17 m	12 m
Level 2	Yes	Distance to an exit (2.6)	33 m	30 m
	Yes	Distance between exits (2.6)	53 m	45 m
	Yes	Distance to point of choice (2.1)	22 m	12 m
Level 3	Yes	Distance to an exit (3.1)	43 m	30 m
	Yes	Distance between exits (3.5)	61 m	45 m
	Yes	Distance to point of choice (3.1, 3.2)	23 m	12 m
Level 4	Yes	Distance to an exit (4.1)	47 m	30 m
	Yes	Distance between exits (4.3)	62 m	45 m
	Yes	Distance to point of choice (4.1, 4.2)	25 m	12 m
	No	Distance to point of choice (4.4)	29 m	20 m
	No	Distance to an exit (4.4)	43 m	40 m
Level 5	Yes	Distance to an exit (5.2)	48 m	30 m
	Yes	Distance between exits (5.1, 5.2, 5.5)	59 m	45 m
	Yes	Distance to point of choice (5.2)	25 m	12 m
Level 6	Yes	Distance to an exit (6.3, 6.4)	34 m	30 m
	Yes	Distance between exits (6.4)	61 m	45 m
	No	Distance to point of choice (6.1, 6.2)	30 m	20 m
	No	Distance to an exit (6.2)	48 m	40 m
Level 7	No	Distance to point of choice (7.1, 7.2)	30 m	20 m
Level 8 (Helipad)	No	Distance to an exit	60 m[1]	40 m[1]
	No	Distance between exits	120 m[1]	45 m[1]

Fire-isolated passageways in the basement level are proposed to not be provided with smoke lobbies or a pressurisation system which is a departure from BCA DtS Clause D1.7. A fire engineered solution will be developed to address this departure.

Fire stairs 8 and 9 discharge to the Level 6 roof (Level 7) from which travel across the roof is required in order to reach fire stairs 1 and 2 which lead to open space/road. Egress from Level 7 plant rooms also discharge to the Level 6 roof and require travel across the roof to reach fire stairs 5 and 7. This is a departure from BCA Clause D1.10 which will be addressed by a fire engineered solution.

Paths on Level 6 rooftops connecting stairs 1 and 8, 2 and 9 as well as egress from plant rooms to stairs 5 and 7 are to be considered as paths of egress and must be kept clear at all times. The egress paths are shown in figure below. The paths of egress are to be on an even level throughout (i.e. no height changes). Handrails must be provided on both sides of paths of egress. Doors to stairs 1, 2, 5, 7, 8 and 9 on Level 7 and between plant rooms and roofs on Level 7 are not permitted to be locked. Adequate drainage to remove any water on the egress paths or slip protection for occupants must be provided.



Egress routes on Level 6 roofs

Certain doors will be sliding or swing against the direction of egress which are departures from the BCA DtS provisions D2.19 and D2.20. Departures from the BCA DtS provisions will be addressed by a fire engineered solution.

The external fire stairs are to be provided with:

- Adequate means of weather protection to restrict rain entering the stair
- Adequate drainage to remove any water entering the stair or slip protection for occupants
- Door re-entry on Levels 4 and 6 (doors not permitted to be locked from stair side)

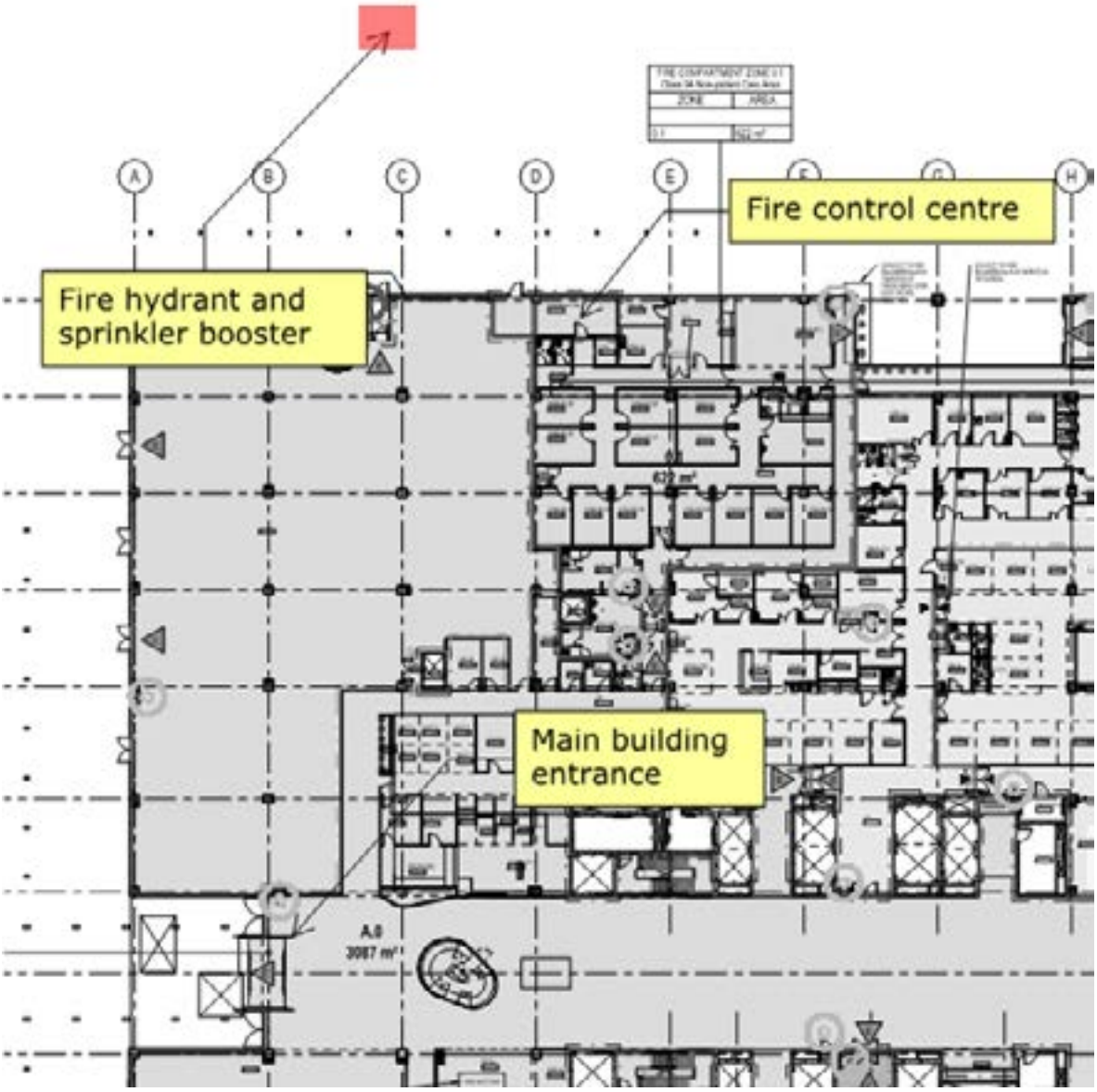
Fire Services & Equipment

Part E of the BCA prescribes the requirements for fire services and equipment to facilitate smoke detection, fire suppression and the attending fire service or brigade to conduct search, rescue and fire fighting operations.

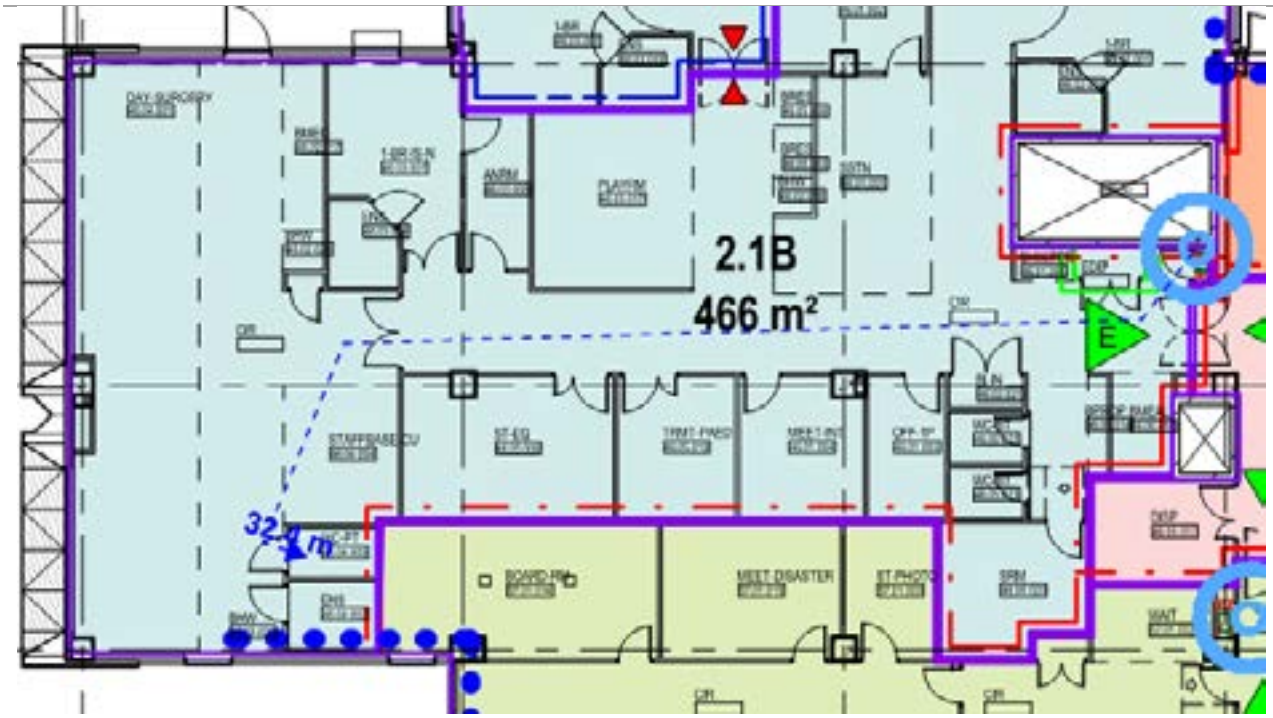
Fire hydrant coverage shall be provided in accordance with BCA Clause E1.3 and AS2419-2005. Departures from AS 2419-2005 are the following (see also section 3.4.4):

- Hydrant/sprinkler booster not being within sight of main entrance

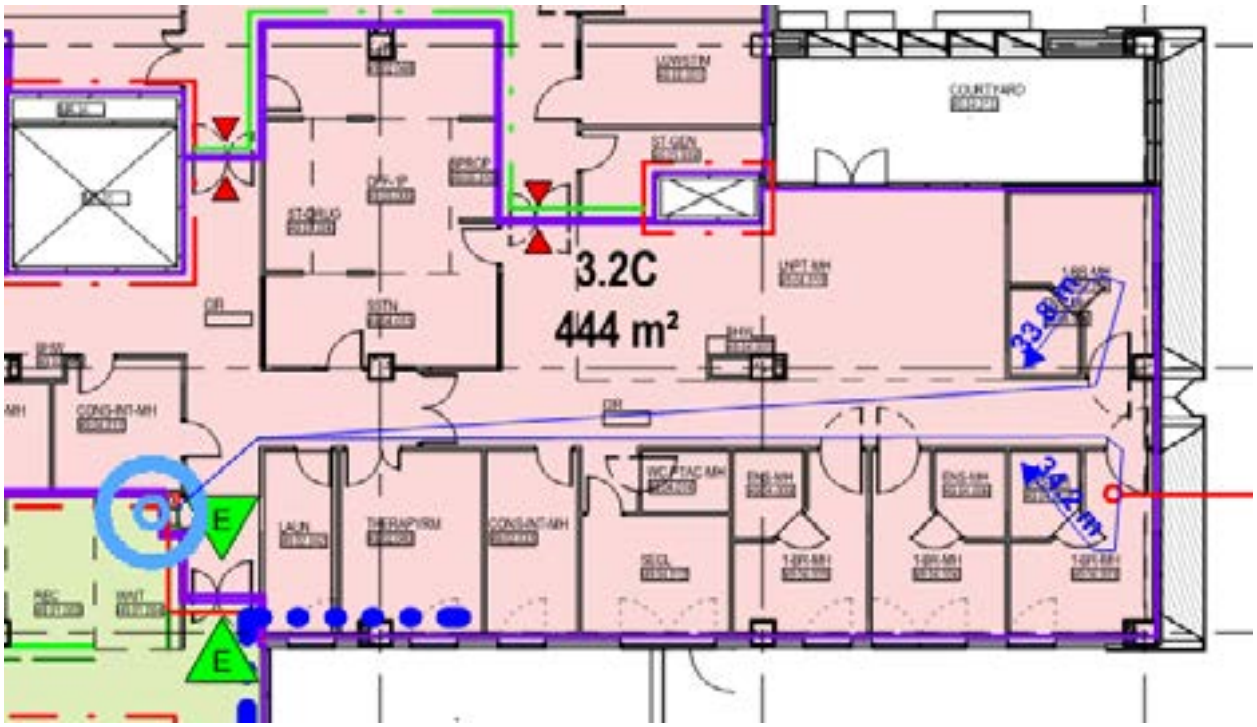
- Fire hydrant coverage shortfalls in compartments 2.1B (46.04.003 & 46.04.002) and 3.2C
- Level 8 helipad being served by fire hydrant located at stair landing on level below.



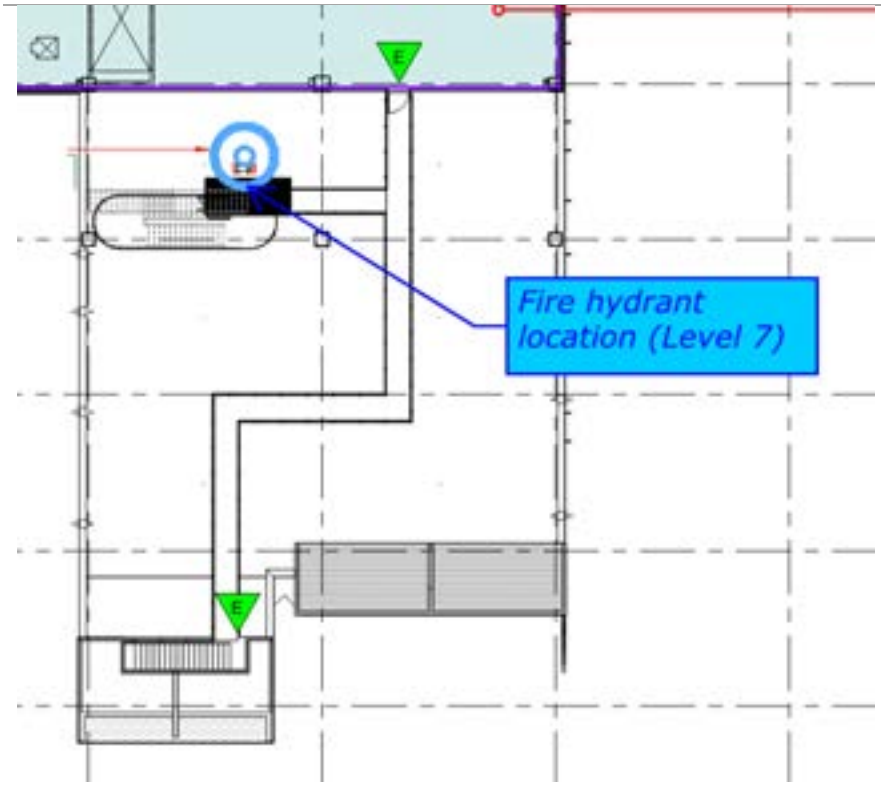
Approximate FH and sprinkler booster location in relation to main entrance



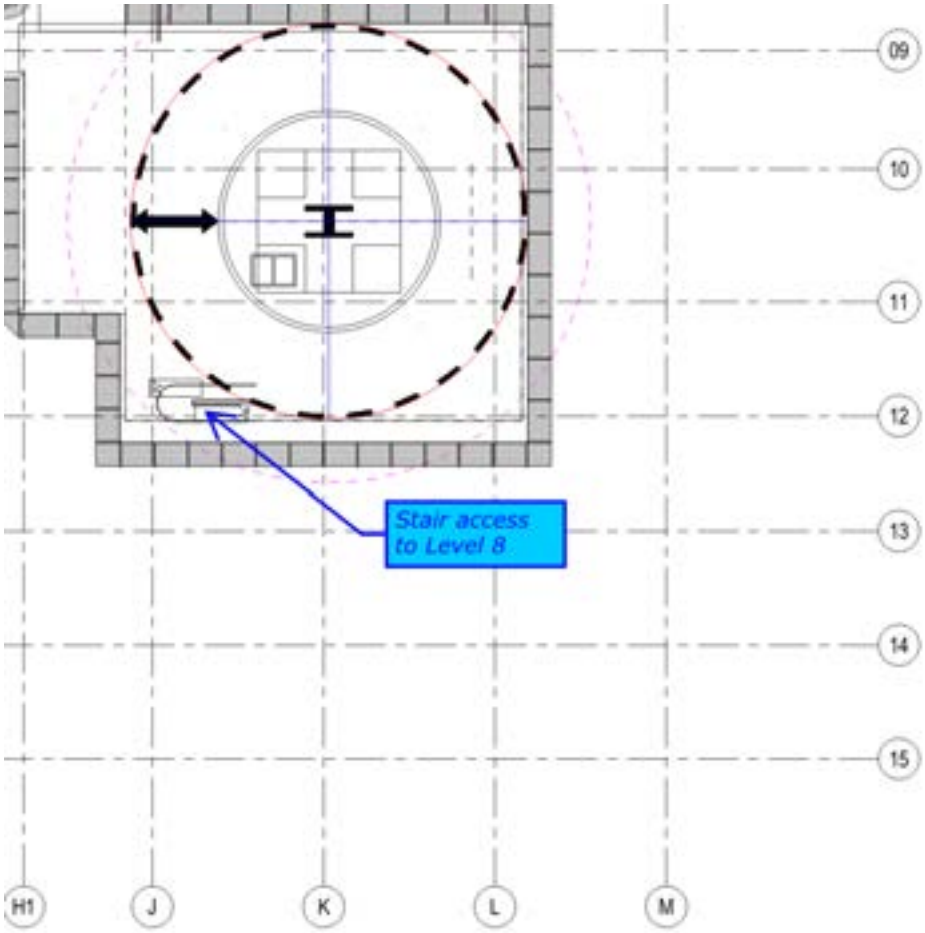
Fire hydrant coverage departure in compartment 2.1B



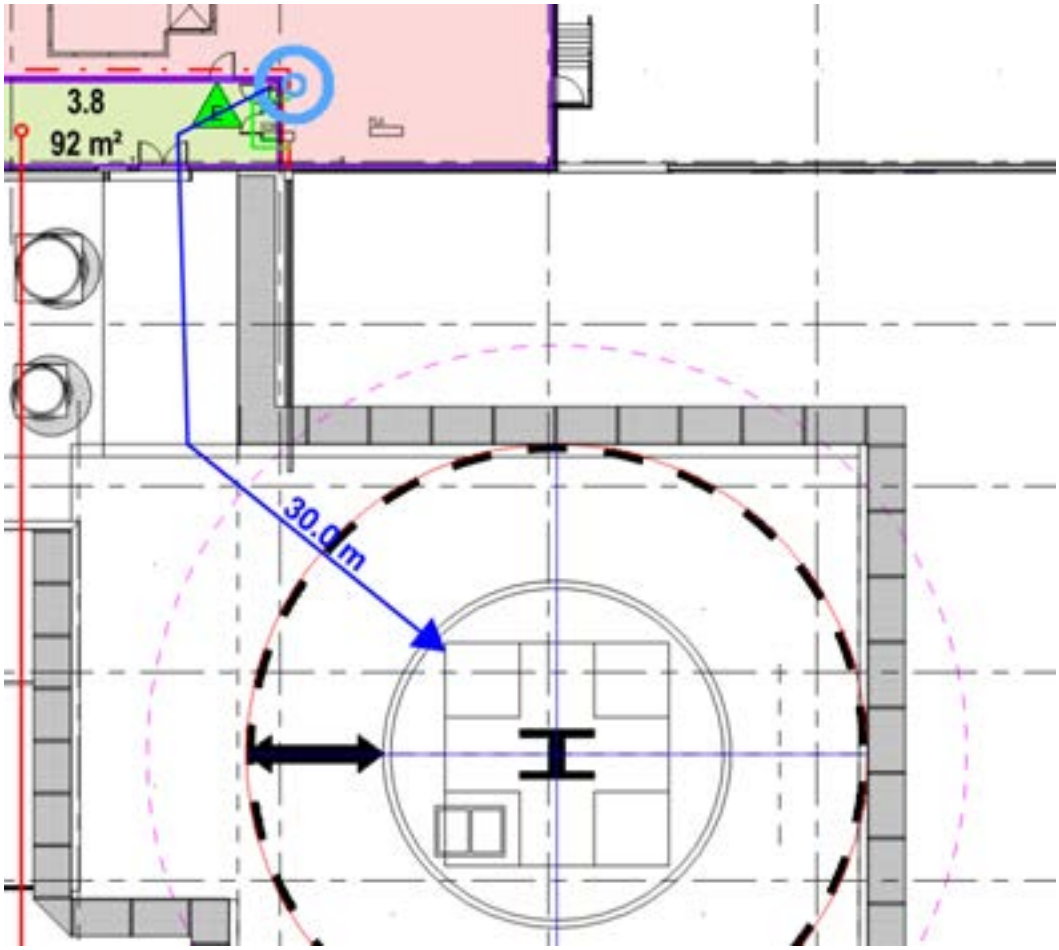
Fire hydrant coverage departure in compartment 3.2C



Fire hydrant on Level 7



Stair access to helipad from Level 7

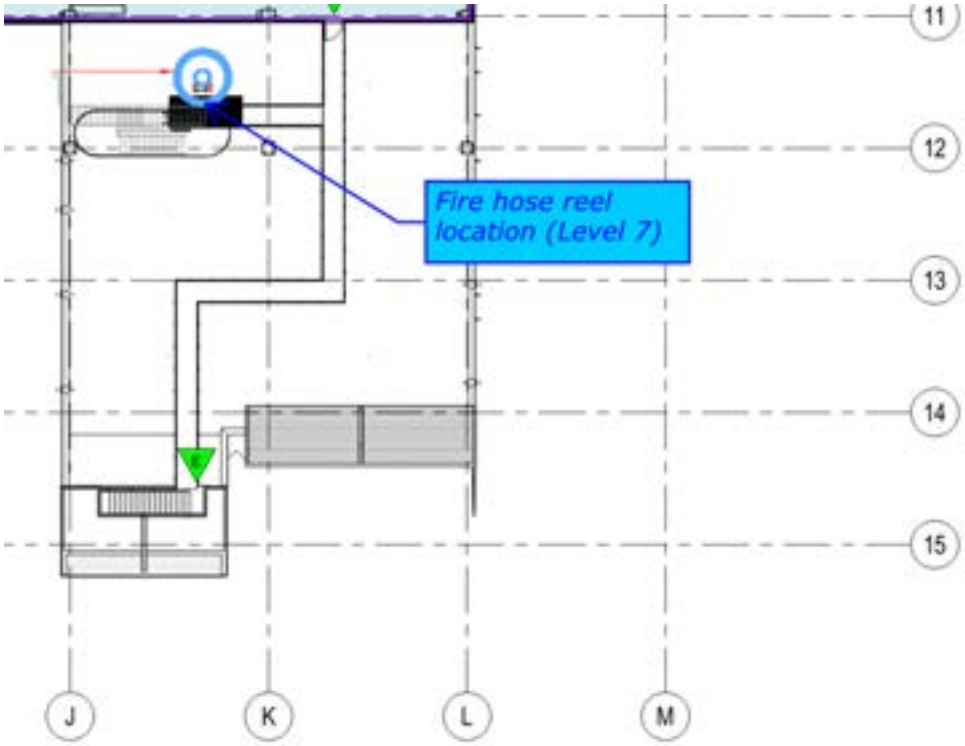


Fire hydrant coverage from lift lobby on Level 8

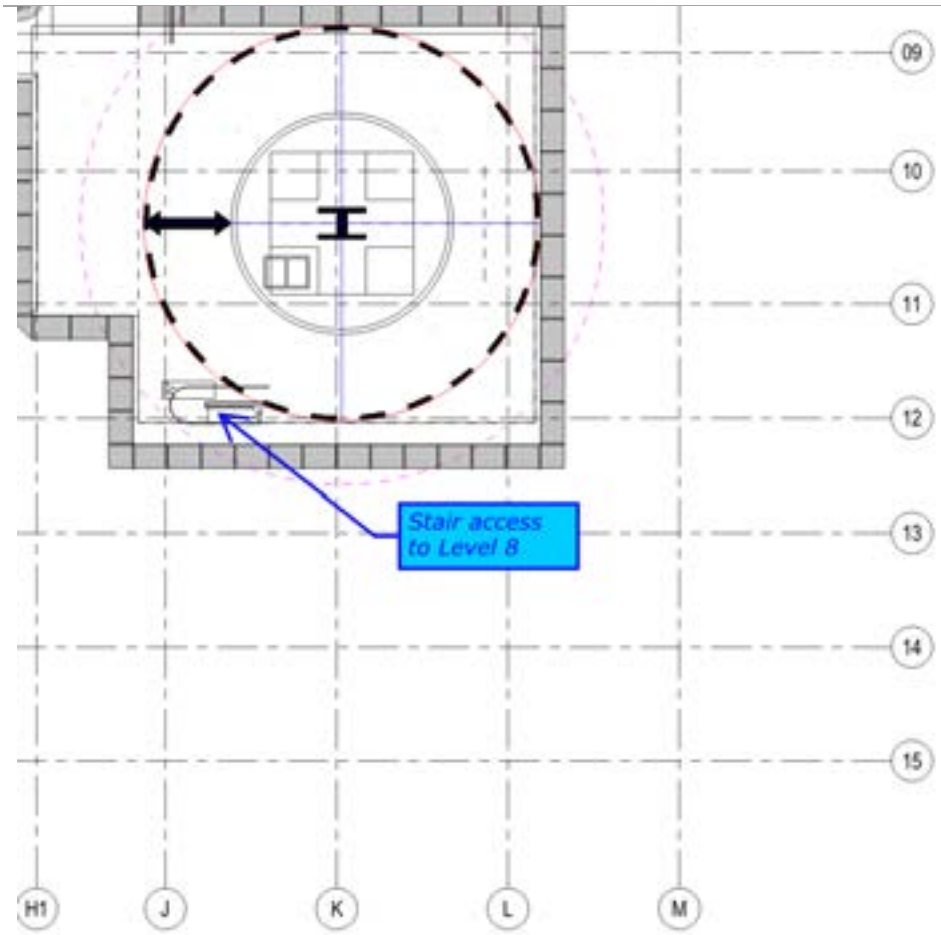
Fire hose reel coverage shall be provided in accordance with BCA Clause E1.4 and AS 2441-2005. Departures from AS 2441-2005 are the following (see also section 3.4.4):

- Fire hose reel shortfalls in compartment 3.4
- Fire hose reels will be required to pass through a fire rated wall for the medical gases plant room
- Fire tank and pump room and building distribution room being provided with fire extinguishers instead of fire hose reels
- Level 8 helipad being served by fire hose reel located at stair landing on level below.

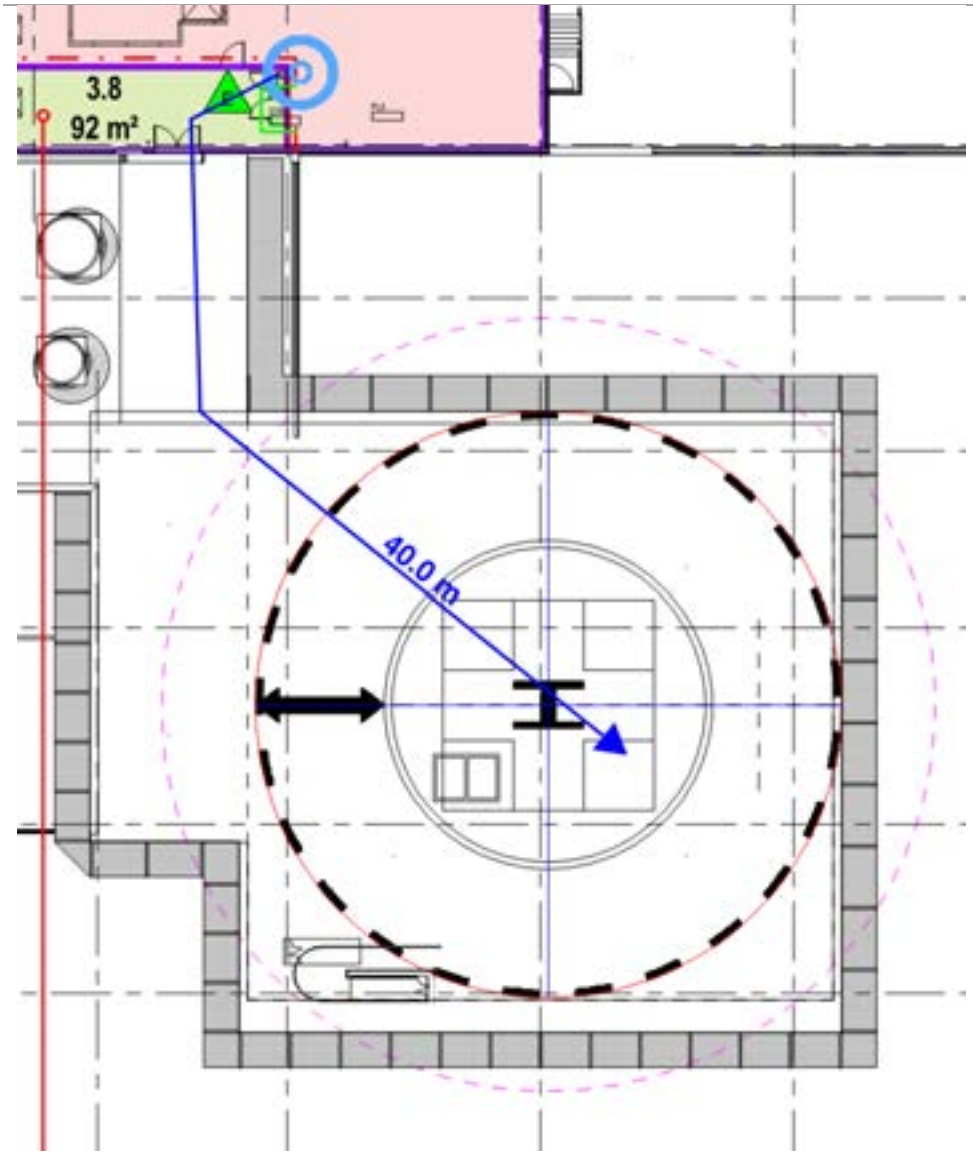
Fire hose reel coverage departure in compartment 3.4



Fire hose reel on Level 7



Stair access to helipad from Level 7



Fire hose reel coverage from lift lobby on Level 8

Fire hydrant and hose reel cabinets in mental health departments are permitted to be locked. A fire brigade 003 key shall open locks to such cabinets. Every member of staff in mental health departments shall have key access to the cabinets. This will be addressed by a fire engineered solution.

Fire extinguishers shall be provided in accordance with BCA Clause E1.6. Additionally, fire extinguishers shall be provided in the:

- Fire tank and pump room (basement)
- Building distribution room (basement)

The building must be sprinkler protected throughout in accordance with BCA E1.5/G3.8 and AS2118.1-1999 unless explicitly stated. Water supply will be Grade 1 supplied from one town main and one tank. The following departures from the BCA DtS provisions/AS 2118.1-1999 are proposed:

- Maximum pressure at Basement Level is 1200 kPa instead of 1000 kPa
- Stop valves not provided to atrium sprinklers
- Sprinkler heads are proposed to be deleted from
    - atrium roof above void
    - electrical cupboards, UPS rooms and communications equipment rooms
    - external walkways/canopies

- Only to provide wet system sprinkler head to bottom of lift shaft instead of dry system sprinklers to top and bottom of each lift shaft.

The following are proposed additional requirements for the sprinkler system:

- The atrium void at Ground Floor must be provided with extended coverage sidewall sprinklers.
- The sprinkler heads are to be of 'fast response' type throughout the hospital.
- The sprinkler heads must be approved for a maximum pressure of 1200 kPa.
- Sprinkler coverage shall be provided to ceiling voids greater than 800 mm in depth where smoke detectors are deleted. Sprinkler heads shall be 10 mm nominal size sprinklers and protect a maximum of 21 m^2 per sprinkler head. Sprinkler heads shall be spaced no more than 4.6 m apart and 2.3 from compartment boundaries.
- Sprinklers shall be provided adjacent fire shutters

The whole building shall be provided with an automatic smoke detection and alarm system complying with Specification E2.2 of the BCA. Installation of the smoke detection and alarm system is to be in accordance with AS1670.1-2004. The BCA and AS1670.1-2004 requirements shall be met unless explicitly stated in this report. The following deviations from AS 1670.1-2004 will be addressed by a fire engineered solution:

- Thermal detectors to be provided in external fire stairs instead of smoke detectors
- Smoke detectors will be deleted from ceiling voids greater than 800 mm in depth not used as return air paths

The following are proposed additional requirements for the smoke detection and alarm system:

- Smoke detection shall be provided in Class 7b areas (thermal detectors shall be provided instead of smoke detectors).
- Smoke detection shall be provided in Class 9a non-patient care areas
- Smoke detectors in patient care areas shall be provided as follows:
    - Detectors shall generally have a maximum coverage area of 52 m^2. The spacing between detectors in corridors shall be a maximum of 5.1 meters.
    - In compartments 0.2A, 0.2B, 0.3, 0.8, 1.1, 1.7A, 1.7B and 2.5 where enclosed rooms also contains a corridor, reduced spacing of detectors shall be provided in corridors. The maximum spacing in such corridors shall be 5.1 meters. The corridors subject to these requirements are illustrated in Appendix C. Other spaces than corridors in the same enclosed room as these corridors shall have normal detector spacing. Detectors in other rooms (i.e. not containing corridors) in these compartments shall have a maximum coverage area of 52 m^2.
    - Operating suites and Cath labs are permitted to only be protected by a single smoke detector in each respective room.
- Smoke detectors shall be provided in fire-isolated passageways to stairs 01 and 02 on Level B1.

Activation of thermal detectors in the loading dock fire compartment shall open the loading-dock roller doors into a fully open position and latch in the open position. When the doors are in the open position, power loss shall not cause the roller doors to close.

A single heat detector shall be provided in the ambulance bay adjacent the door to the emergency department (Grid K). Activation of this thermal detector shall force the door to the ambulance bay to remain closed. The heat detector shall have an activation temperature of 68 °C.

The building requires a sound system and intercommunication system for emergency purposes (SSISEP) in accordance with BCA Clause E4.9 and AS1670.4-2004 and AS4428.4-1998 unless explicitly stated in this report. Reduced sound intelligibility is accepted in plant rooms and loading docks which will be addressed by a fire engineered solution. The sound levels in the loading dock and plant rooms shall be sufficiently loud to make occupants aware of hazard. In ward areas the alarm signal shall be adjusted in volume and content to minimise trauma consistent with the type and condition of the patients whilst still providing warning for all occupants.

A zone smoke control system shall be provided and generally designed in accordance with AS 1668.1-1998 unless explicitly stated in this report. The following deviations from AS 1668.1-1998 will be addressed by a fire engineered solution:

- Motorised fire dampers (without fusible links) are provided instead of sub-ducts to return air/smoke exhaust shafts. From the shafts, return air/smoke exhaust ducts will extend to each fire compartment and will be provided with fire dampers
- Atrium smoke compartment not to be part of zone smoke control system

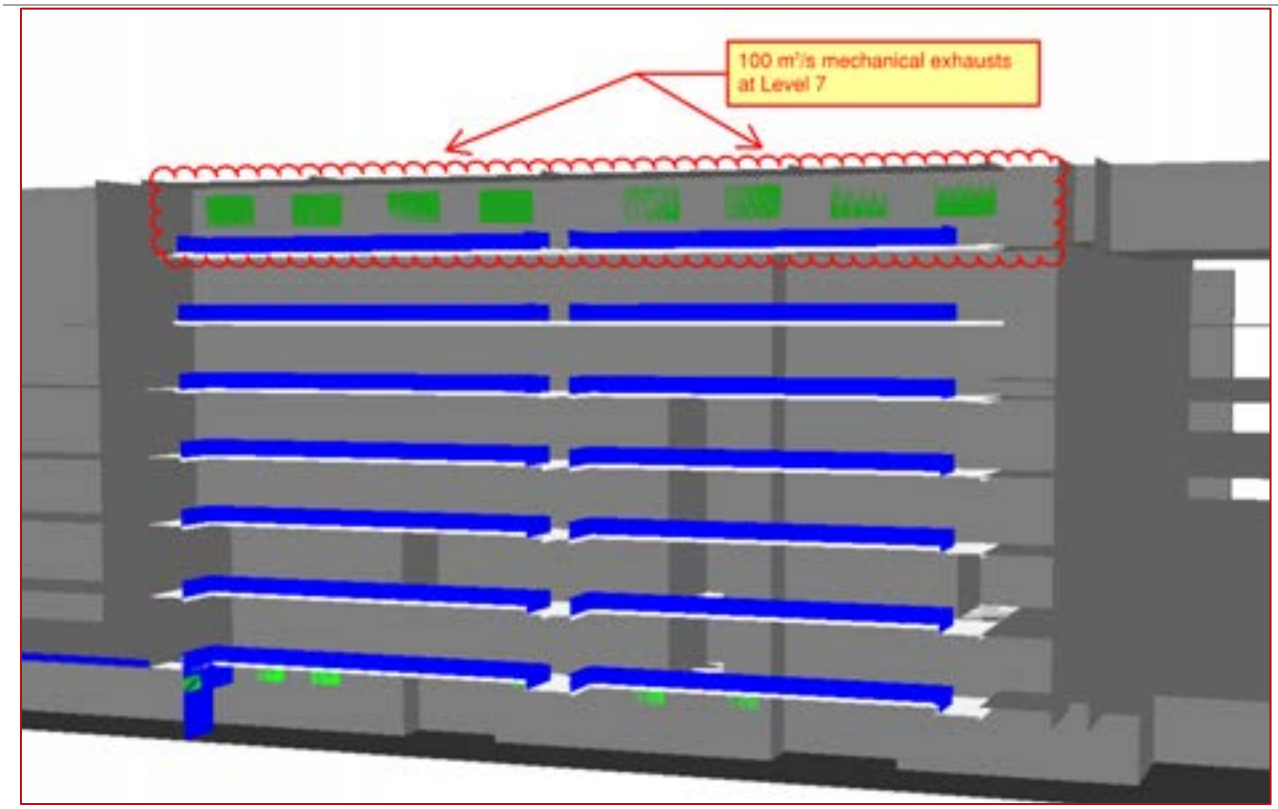
- Change of fire mode operation for specific compartments. The departures from AS 1668.1-1998 related to fire mode operation are summarised in the table below. For compartments on Ground to Level 6 proposed to be in shut down mode during certain fire locations, the pressure differential achieved by the zone smoke control system shall still be 20 Pa to 100 Pa between the subject compartment and the compartment where fire has been detected.

Floor	Comp. in fire mode	Departure from AS 1668.1-1998
Basement	B.1-B.4, B.7, B.8	Basement AHU's in shut down mode, i.e. no exhaust or pressurisation.
	B.5	Compartment B.5 in exhaust mode. All other compartments in the basement in shut down mode.
	B.6	Compartment B.6 in exhaust mode. All other compartments in shut down mode.
Ground – L7	All	All basement compartments in shut down mode.
Ground	All	0.4 in shut down mode.
	0.6	0.5A and 0.5B in shut down mode.
	0.8	0.7 in shut down mode.
Level 1	1.7B	1.7A in shut down mode.
Level 2	All	2.7A and 2.7B not served by central plant system and have separate FCUs. FCUs in 2.7A to supply outside air to this compartment when 2.7B is in fire mode. FCUs in 2.7B to supply outside air to this compartment when 2.7A is in fire mode.
	2.2	2.1A and 2.1B in shut down mode.
	2.1B	2.1A in shut down mode.
	2.3	All compartments on L1, L2 and L4 in shut down mode.
	2.6A	2.6B in shut down mode.
	2.6C	2.6D in shut down mode.
Level 3	3.1A	3.1B in shut down mode.
	3.1B	3.1A in shut down mode.
	3.1C	3.1A and 3.1B in shut down mode.
	3.5B	3.5A in shut down mode.
	3.4	3.5A, 3.5B and 3.6 in shut down mode.
Level 4	All	4.4 in shut down mode
	4.1B	4.1A and 4.1C in shut down mode.
	4.2C	4.2B and 4.2D in shut down mode.
	4.3A	4.3B in shut down mode.
Level 5	5.1B	5.1A, 5.1C and 5.2 in shut down mode.
	5.3B	5.3A, 5.3C and 5.2 in shut down mode.
	5.4A	5.4B and 5.4C in shut down mode.
	5.5C	5.5B and 5.5A in shut down mode.
Level 6	6.3A	6.3B in shut down mode. 6.3C to operate at 100 % outside air (but might not fully meet 20 Pa differential criteria).
	6.4C	6.4B in shut down mode. 6.4A to operate at 100 % outside air (but might not fully meet 20 Pa differential criteria).

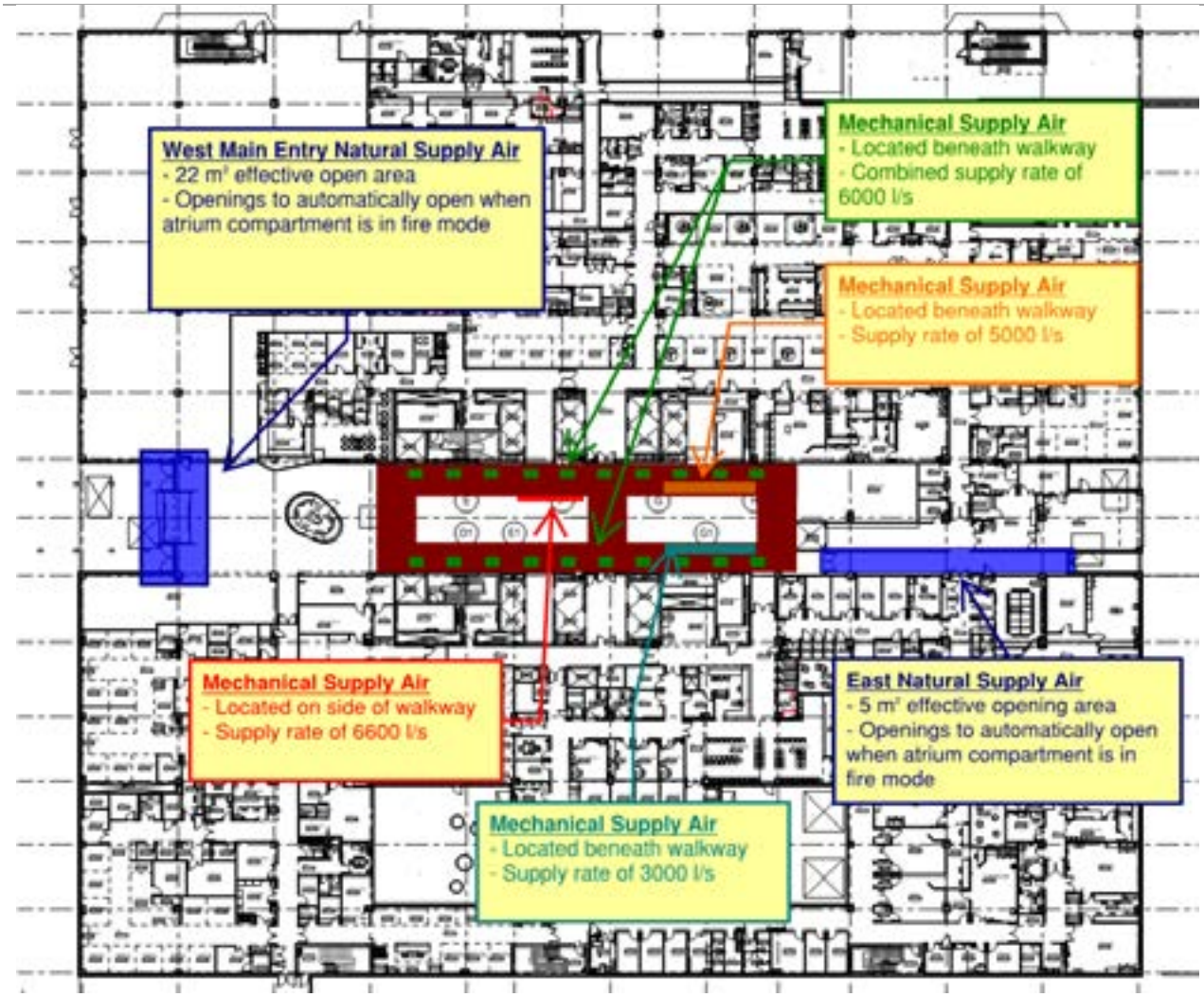
Safe and readily available access must be provided to the motorised fire dampers to facilitate annual maintenance, inspection and certification.

The atrium is to be provided with a bespoke mechanical smoke exhaust system. The design of the system will be determined by calculations instead of being provided in accordance with BCA DtS Specification E2.2b. This will be addressed by a fire engineered solution to meet the Performance Requirements of the BCA. The system is proposed to consist of:

- Exhaust: Evenly spaced vents at the top of the atrium (Level 7) providing a total of 100 m^3/s exhaust rate
- Supply/make-up air:
    - Natural supply-air (passive) through openings with a minimum of 27 m^2. The supply air is provided from the main hospital entry doors (22 m^2) and east corridor (5 m^2). The openings are to change into a fully open position automatically upon activation of the atrium smoke exhaust system.
    - Mechanical supply-air through fans delivering a minimum of 21 m^3/s to ducts evenly spaced at ceiling level on Ground Floor. This shall be 100 % outside air.
- Activation: The atrium smoke exhaust system activate upon activation of smoke detectors within the atrium smoke compartment zone (A.0). Sprinkler activation shall not start the atrium smoke exhaust system. In the event of failure of either the natural supply-air openings opening or the mechanical supply-air, the exhaust fans shall not start. The passive and active supply-air systems are to be provided with measures to enable such control measures (e.g. airflow gauges within ducts).
- Zone smoke control: If the smoke detection system is activated in any other zone than the atrium smoke compartment, the mechanical supply air shall operate at 100 % outside air. Passive make-up air openings shall not open automatically. Atrium smoke exhaust mode shall have a higher priority than other modes (i.e. in the event of activation of a smoke detector within the atrium smoke compartment, atrium smoke exhaust mode shall take precedence and activate).



Proposed location of mechanical smoke exhaust on Level 7



Means of make-up air on Ground Floor level

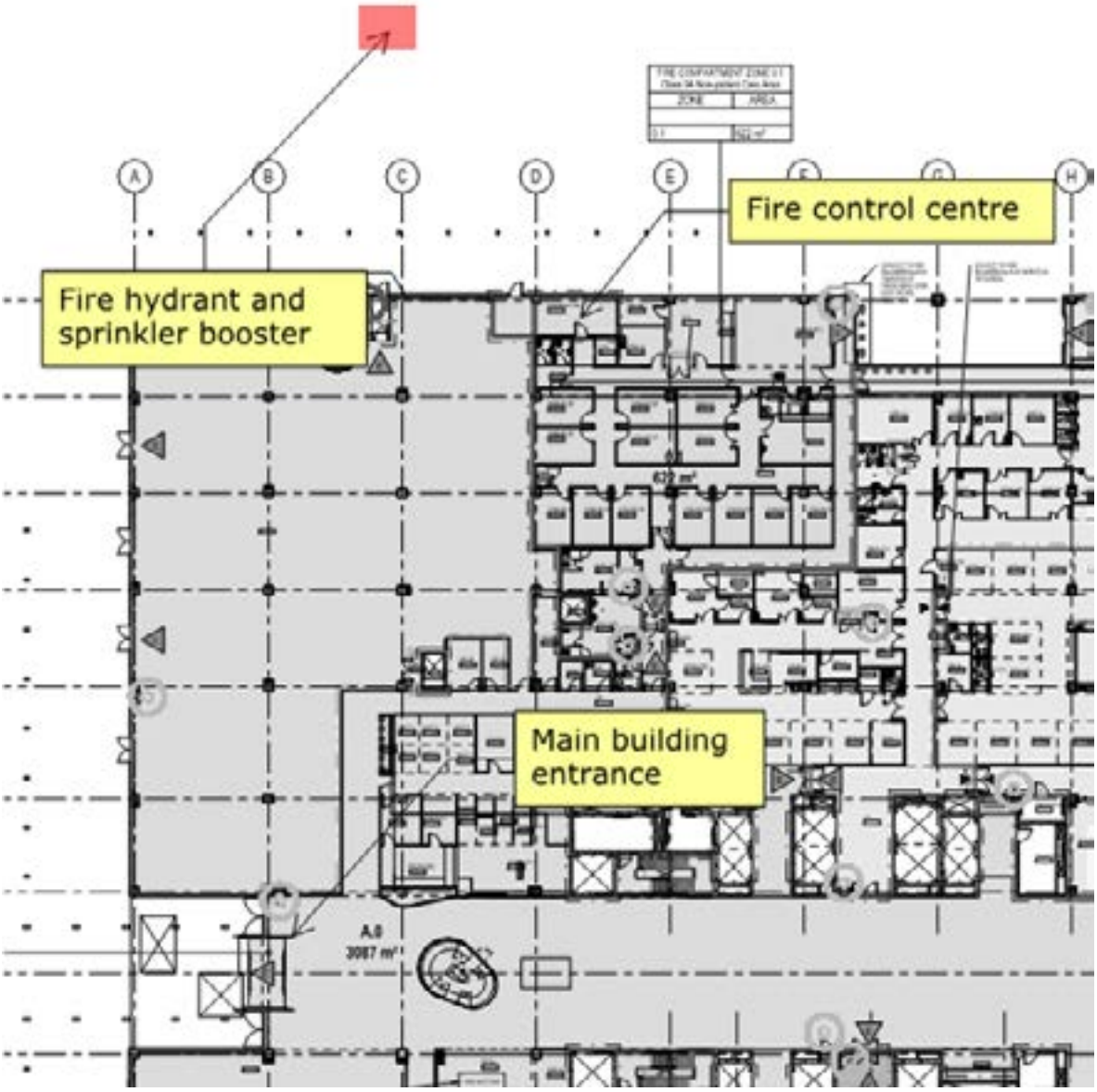
The hospital atrium shall comply with BCA section G3.8 unless explicitly stated in this report. In the atrium, visual warning devices that display "EVACUATE" upon GFA are removed from the design. This will be addressed by a fire engineered solution.

Emergency lighting shall be provided in accordance with BCA Clause E4.2 and AS 2293.1-2005. In addition to the requirements of the BCA DtS and the AS 2293.1-2005, emergency lighting shall be provided on Level 6 rooftops being used as egress paths (see section 3.3.5). The illuminance at floor level shall be not less than 1 lux in the centre line of the egress paths on the Level 6 rooftops. This emergency lighting on the Level 6 rooftops shall activate upon GFA. The emergency lighting shall be able to operate for 120 minutes in the event of loss of power.

Exit signage shall be provided in accordance with BCA Clause E4.5 and E4.6 and AS 2293.1-2005. In addition to the requirements of the BCA DtS and the standard, exit signage shall be provided on Level 6 rooftops being used as egress paths (see section 3.3.5).

The atrium walls and doors will be fitted with woven vinyl and timber facings to make the doors blend in with the walls. Such doors used as exits must be provided with a sign stating “EXIT DOOR” in capital letters with a height no less than 50 mm against a white or silver contrasting background. Above each door used as an exit there shall be emergency signage in the form of an illuminated exit sign. The woven vinyl and timber facings need to achieve a Group 1 or 2 rating as defined in BCA Specification C1.10.

The fire hydrant and sprinkler booster is proposed to be located not within sight of the main entrance. This is a departure from AS 2419.1 and will be addressed by a fire engineered solution.



Maintenance and Management in Use

Exits, fire hydrant, fire hose reel and fire extinguisher cabinets are to be kept free from any storage or obstructions. This shall be checked every month and records kept on site.

We have assumed in our assessments that staff will have a high level of fire and evacuation training. Therefore an Emergency Management Organisation must be established in accordance with AS3745-2010.

Management procedures shall be implemented to ensure that the exits are available and that the exit paths are free (i.e. no objects impeding/blocking egress). If locks are required at exits for patient safety, the locking mechanism will need to comply with clause D2.21 of the BCA. A mechanism is also to be provided that permits nursing staff to access bedrooms from outside when required.

Combustible materials are

- not permitted on Level 6 roofs used for egress
- to be limited in the Ground Floor atrium.
- within combustible free zones adjacent fire shutters (only applies to non-fixed materials)

Management procedures shall also be implemented to ensure that the essential services measures are maintained and regularly inspected in accordance with the EP&A Regulation and AS1851-2012 .

Staff shall practice fire evacuation procedures on a regular basis. Procedures to be undertaken (if safe to do so) include:

- Checking all rooms for occupants.
- Manual fire fighting, if properly trained.
- Assisting patients on the Ground Floor to evacuate directly to outside where possible, or through a smoke/fire wall away from the fire
- Where multiple patients require evacuation from the compartment where fire has been located, one or preferably two staff members should collect patients from their bedrooms and assist them through the fire door into the adjacent fire compartment before returning to collect the next patient. Other staff members should assist with taking patients downstairs and outside.

Good housekeeping and regular fire prevention practices are to be carried out to minimise the risk of unnecessary fuel loads and sources of ignition.

Hazards

All "hazards" should be identified and agreed to. What hazards have been identified?

- ☐ Insulated sandwich panels
- ☐ Dangerous/Hazardous goods storage
- ☐ Electrical hazards (substations/switchboards etc)
- ☐ Alternative electrical generation systems (eg solar, Tri-Gen)

Other hazards ⇩

N/A

Preventative and Protective Measures

Anything undecided should be included in reviews of FEB and in the FER. Additional text may be added to better describe any systems or indicate systems that may be subject to Alternative Solution.
Please identify the following, highlight dot points and add information as necessary:

Occupant Warning (EP2.2)

- ☐ Building Occupant Warning System (BOWS)
- ☐ EWIS
- ☒ SSISEP

Detection (EP2.2)

- ☐ Clause 3: Smoke Alarm System
- ☒ Clause 4: Smoke Detection System
- ☐ Monitored AS1670.3
- ☐ Clause 5: Smoke Detection for Smoke Control
- ☐ MASDS
- ☒ Heat Detectors (instead of smoke detectors in loading dock and external stairs)

Sprinklers (EP1.4)

- ☒ AS2118.1-1999
- ☐ AS2118.1-2006
- ☐ AS2118.2 – Wall Wetting
- ☐ AS2118.3 – Water Foam Deluge
- ☐ AS2118.4 – Residential
- ☐ AS2118.5 – Home
- ☒ AS2118.6 – Combined
- ☐ ESFR
- ☐ Storage Mode
- ☒ Fast response heads
- ☐ CA16
- ☐ Gaseous Suppression (relevant AS or ISO standard)
- ☐ ESFR

Certification from hydraulic consultant required. Refer to BCA Spec. E1.5 (5) ⇩

FRNSW: FRNSW were advised that a combined system will be provided. The sprinkler stop valves will be provided within 2 sets of stairs. The location of the stop valves and the corresponding floor plates to which they are relevant should be clearly identified on block plans.

RED: Combined system will be provided, update reflected in above table. Block plans to be provided for stop valve locations.

Grade of water supply (sprinklers): Grade 1 supplied from one town main and one tank

Schematic diagram or draft block plan required with FEBQ submission.
Requested in accordance with Clause 144 (2) (b). Certifying Authority may need to supply. ⇩

See attached "prelim sprk block plan,pdf"

Hydrants (EP1.3)

- ☐ AS 2419.1 – 1994 Hydrants
- ☒ AS 2419.1 – 2005 Hydrants
- ☐ Ordinance 70 Hydrants
- ☐ External Hydrants
- ☒ Internal Hydrants

Schematic diagram or draft block plan required with FEBQ submission. ⇩
Requested in accordance with Clause 144 (2) (b), Certifying Authority may need to supply. ⇩

See attached "Sprinkler Hydrant Block Prelim.pdf"

Smoke Hazard Management (EP2.2)

- ☒ Zone Smoke Control
- ☐ Smoke Heat Vents
- ☐ Ridge Vents
- ☐ Natural Ventilation
- ☒ Auto Exhaust Fan (Atrium)
- ☐ Manual Exhaust Fan
- ☒ AS 1668.1
- ☐ AS 1668.2
- ☐ Purge
- ☒ Smoke Baffles

Other

- ☒ Automatic fail-safe devices
- ☐ Fire seals protecting openings
- ☐ Solid core doors
- ☐ Storage tanks
- ☒ Fire shutters
- ☒ Smoke doors
- ☒ Emergency lighting
- ☐ Fire windows
- ☒ Smoke dampers
- ☒ Emergency lifts (EP3.2)
- ☒ Hose reel system
- ☒ Standby power systems
- ☒ Exit signs
- ☐ Lightweight construction
- ☐ Warning & operational signs
- ☒ Fire control centre
- ☒ Perimeter vehicular access (CP9)
- ☐ Stair pressurisation
- ☐ Fire control room (EP1.6)
- ☒ Portable fire extinguishers
- ☐ Medium smoke seals
- ☒ Fire dampers
- ☐ Smoke/heat alarms
- ☐ Hot smoke seals
- ☒ Fire doors
- ☐ Safety curtains for openings

Trial Design Requirements

You may include brief details of fire safety measures required as part of the Alternative Solution, alternatively you can provide details in the specific Non-compliance Issues Section. ⇩

Refer to specific DtS non-compliance issues section.

BCA Report and Departures from DtS Provisions and Performance Requirements (1.2.8)

A BCA report that identifies all departures from DtS provisions and relevant performance requirements must submitted with all FEBQs. Submitted BCA report must be signed by the relevant certifying authority.

FRNSW expects that the building complies with the DtS Provisions of the BCA except for those identified as subject to alternative solution, unless otherwise advised.

Note: In instances where the departure from DtS Provisions involves extended travel distance (DP4) it is highly likely that there will be a related departure from DtS Provisions with fire hydrant coverage, accordingly EP1.3 should also be identified. ⇩

Departure 1 - Floors, columns, shafts and fire walls to have an FRL of 120/120/120 instead of 180/180/180 in:

- Class 6 areas (Ground Floor retail and associated atrium)
- Loading-dock areas on Basement Level

Departure 2 - Class 6 compartment containing Ground Floor retail and associated atrium having a floor area exceeding 5,000 m^2.

Departure 3 - Bespoke smoke exhaust system from atrium instead of being provided in accordance with Specification E2.2b.

Departure 4 - Openings in external walls not to be protected in accordance with BCA Clause C3.4

Departure 5 - Openings in fire walls on Level B1 and Ground Floor protected with fire shutters with an FRL of -/120/- instead of -/120/30.

Departure 6 - Compartment sizes to exceed prescribed floor area limitations.

Departure 7 - Travel distances to a point of choice or an exit to exceed prescribed values (Basement Level to Level 7)

Departure 8 - Distance between alternative exits exceed prescribed values (Basement Level to Level 7)

Departure 9 - Four required exits being external, non fire-isolated stairs instead of fire-isolated stairs

Departure 10 - Allowing the use of external stairs instead of fire-isolated stairs in buildings over 25 m effective height

Departure 11 - Allow the use of sliding doors in patient care areas. Sliding doors to be installed to:

- Ground Floor: Triage rooms
- Level 1: ICU suites, Corridors in interventional suites areas

Departure 12 - Certain doors in patient care areas swing against the direction of egress. Doors swinging against the direction of egress in:

- Ground Floor: Ambulance entrance, Corridors in adult acute areas
- L1: Corridors in interventional suites areas
- L4: Corridors in medical/surgical inpatient unit areas
- L5: Corridors in medical/surgical inpatient unit areas

Departure 13 - Fire-isolated passageways in basement with more than two doorways opening into them not to be provided with pressurisation system or smoke lobbies.

Departure 14 - Fire-isolated stairs 8 and 9 and Level 7 plant rooms discharge to Level 6 rooftop instead of to open space on the same level as public road.

Departure 15 - Zone smoke control not being fully compliant with AS 1668.1 by:

- Motorised fire dampers used in instead of sub-ducts
- Basement level to be in shutdown mode except for kitchen and loading dock
- Atrium smoke compartment not to be part of zone smoke control system
- Change of fire mode operation for specific compartments (shut down mode instead of pressurisation).

Departure 16 - Automatic sprinkler system not to fully comply with AS 2118.1-1999 due to:

- Maximum pressure at Basement Level is 1200 kPa instead of 1000 kPa
- Stop valves not provided to atrium sprinklers
- Sprinkler heads not provided at atrium roof level above void
- Sprinkler heads not provided to electrical cupboards, UPS rooms and communications equipment rooms
- Only to provide wet system sprinkler head to bottom of lift shaft instead of dry system sprinklers to top and bottom of each lift shaft.
- Sprinklers not provided to external walkways/canopies.

Departure 17 - Fire hydrant system not to fully comply with AS 2419.1-2005 due to:

- Hydrant/sprinkler booster not being within sight of main entrance
- Fire hydrants to be in locked cupboards in mental health departments
- Hose shortfalls in compartments 2.1B and 3.2C
- Level 8 helipad being served by fire hydrant located at stair landing on level below.
- Fire hydrant and fire hose reel being located more than 4 meters from an exit at:
    - L02: 98.02.711

Departure 18 - Fire hose reel not to fully comply with AS 2441-2005 due to:

- Fire hose reels to be in locked cupboards in mental health departments
- Hose shortfalls in compartment 3.4
- Fire hose reels will be required to pass through a fire rated wall for the medical gases plant room
- Fire tank and pump room and building distribution room being provided with fire extinguishers instead of fire hose reels
- Level 8 helipad being served by fire hose reel located at stair landing on level below

Departure 19 - Emergency warning or intercommunication system (EWIS) not to fully comply with AS 1670.4-2005 due to reduced sound intelligibility in plant rooms and loading docks.

Departure 20 - Delete the requirement for visual warning devices that displaying “EVACUATE” upon GFA.

Departure 21 - Automatic smoke detection and alarm system not to fully comply with AS 1670.1-2004 due to:

- Thermal detectors to be provided in external fire stairs instead of smoke detectors
- Smoke detectors will be deleted from ceiling voids greater than 800 mm in depth not used as return air paths

NOTE: Under the EP&A Legislation this process is the responsibility of the certifying authority and not the fire engineer.

This should be included in the Certifying Authority referral letter. ⇩

Refer Attached preliminary BCA assessment report prepared by Philip Chun

Previous alternative solution/s

Identify if any, previous alternative solutions that apply to the building and whether there is any impact upon them. ⇩

N/A

Clause 188 exemptions

Identify if any dispensations are/have been applied for with / approved by the Fire & Rescue NSW under clause 188 of the Environmental Planning and Assessment Regulations 2000. ⇩

Departures from DtS Provisions (1.2.8, 1.2.9 & 1.2.10)

All departure from DtS Provisions Issues (Alt Sols) are to be detailed and numbered individually.

Use the following section and repeat as required to identify all the non-compliance issues associated with the project. **Please provide only broad details of the departure from DtS Provisions. The broad details of the departure from DtS Provisions should be provided in 2-3 pages maximum per departure from DtS Provisions (not including photographs, diagrams etc).**

Please Note:

Assessment Method

The method of analysis should:

- Be well documented (especially their limitations and assumptions) either in the literature or by the fire engineer
- Be well validated
- Be suitable for the task
- Generate outputs that can be compared with the acceptance criteria agreed for the analysis
- Have clearly defined limitations and assumptions that are well documented.

The use of qualitative assessment should be justified and the basis used to justify qualitative analysis must be documented (with appropriate references where applicable).

Acceptance Criteria

The acceptance criteria must be agreed to. Acceptance criteria should:

- Be appropriate to the general and specific objectives, performance requirements and analysis methods used (e.g. ASET/RSET x 1.5)
- Be numerical in nature, unless qualitative analysis used
- Be realistic (e.g. zero risk is not appropriate)

Justification for acceptance criteria where numeric values used must be provided, other than values that are commonly accepted or acknowledged, e.g. SFPE Handbook etc.

Modelling

All modelling input data should be referenced and validated. Consideration should be given:

- to changes in ventilation conditions (window breakage, air handling, doors burning through, openings created by fire service)
- commencement of suppression (automatic equipment, occupants, fire service)
- Details of proposed modelling should be provided on the “CFD Modelling Inputs” form or “Zone Modelling Inputs” form.

COPY / PASTE

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	1. Reduction in FRLs to Class 6 and 7b areas

Performance Requirement & DtS Clauses ⇩

DtS Clauses: Spec. C1.1

Performance Requirements: CP1, CP2

Details of Departures from DtS Provisions ⇩

Floors, columns, shafts and fire walls to have an FRL of 120/120/120 instead of 180/180/180 in:

- Class 6 areas (Ground Floor retail and associated atrium)
- Loading-dock areas on Basement Level

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Quantitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	C, E, F		

Acceptance Criteria

Acceptance criteria ⇨	Areas where flashover is not possible: Temperature increase in proposed separating or structural construction element from a local fire not causing structural failure or failure related to integrity or insulation. Failure in steel calculated using limiting steel temperature increase based on load-ratio of structural elements as per Eurocode. Insulation and integrity failure criteria defined as per AS 1530.4. Areas where flashover is possible: Construction elements will be given an FRL according to the following criteria: $t_{equivalency} < FRL$
Factors of safety? ⇨	Effects of sprinklers will be neglected for certain areas.

Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention will not be affected as collapse or fire spread should not occur.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

- Local fire used for assessment of required FRLs in areas where flashover is not predicted to occur. Assessment will consider sprinklered (fast t^2 fire) and non-sprinklered fires (fast t^2 fire, 2 MW).

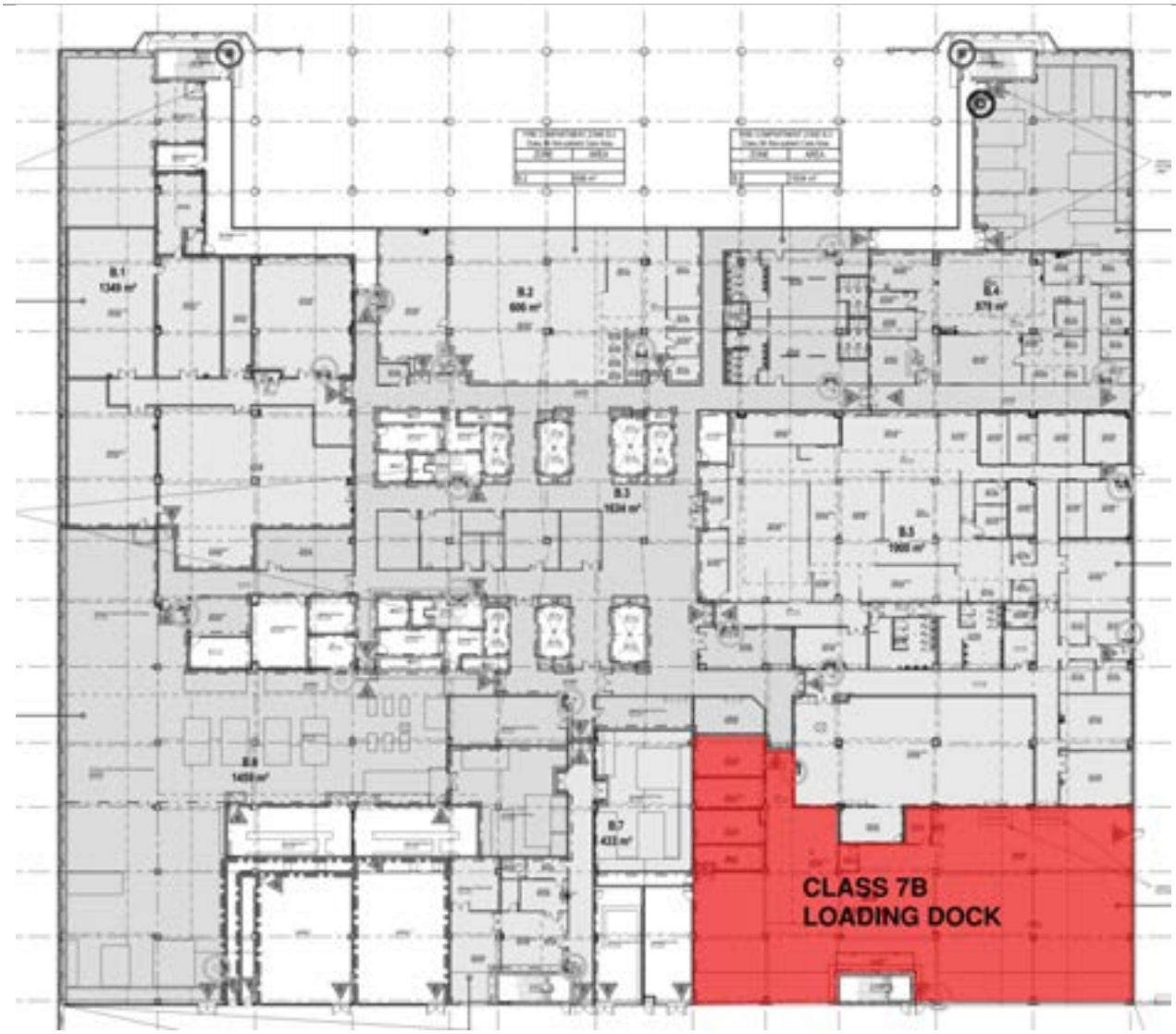
FRNSW recommend that the abovementioned design fire sizes and growth rates be justified and referenced.

RED: The FER will contain justification for the design fire sizes and growth rates.

- A fully developed fire will be assumed where flashover is predicted to occur and is calculated using Eurocode 'Time Equivalency' calculations. Fuel load assumed to be 600 MJ/m^2 (mean value), 990 MJ/m^2 (90th percentile value)

Proposed Alternative Solution and Trial Design Requirements ⇩

Floors, columns, shafts and fire walls to have an FRL of 120/120/120 instead of 180/180/180 in retail (incl. atrium) and loading dock areas. The atrium is to be fitted with a bespoke smoke exhaust system. The loading dock will be provided with heat detection. The heat detectors in the loading dock shall automatically open the roller shutter doors upon activation and vent smoke to the outside.



Location of Class 7b loading dock (Basement Level)

Location of Class 6 areas (Ground Level)

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
A sensitivity study will be employed, allowing for variation of parameters in the calculations, e.g. different floor areas, ventilation openings and fuel loads.

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	Yes for atrium, see attachment.
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A (occupant egress not considered)

Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (Equivalent to DtS)

FRNSW recommend the assessment should demonstrate the following:

1. The structure remains for the time which is commensurate to the hazard, risk and fuel load.
2. Fire spread to other buildings and external fire attack needs are to be within acceptable BCA verification methods. Any reduction in FRL should also demonstrate that it is adequate to prevent fire spread to and from neighbouring buildings/compartments. The assessment should also demonstrate that the FRL is adequate to maintain structural adequacy under exposure from a fire in neighbouring buildings/compartments.
3. Where fire severity / time equivalence calculations are undertaken the following should be considered:
    a. Fire severity calculations are not considered appropriate for unprotected steel.
    b. Where timber is used, the fire load of the timber needs to be added to the fire load of the compartment. An appropriate assessment of the amount of charring and the performance of the timber is to be undertaken.
    c. Pictorial identification of the input calculation areas relating to the fire severity calculation is to be included.
    d. Multiple methods of fire severity calculation is recommended to be evaluated which takes into consideration various defining parameters. Three potential methods include: CIB Formula, Law Formula, and Eurocode Formula.
    e. Where the floor area exceeds 500 m^2, a range of sensitivity scenarios should be considered with regards to the area assessed. A calculation involving the entire compartment should be undertaken, however calculations involving smaller areas, such as a half or a quarter of the compartment, and calculations involving smaller portions (e.g. a room or other delineated space) should also be undertaken.
    f. The limitations on ventilation parameters as specified in Equations 5.14 and 5.15 of Structural Design for Fire Safety (Buchanan, 2001) should be adhered to for all methods.
    g. At least a 95 % fractile fire load should be adopted (as per the recommendation on page 3.4-8 of IFEG). If using the figures from Table 3.4.1a of IFEG, at least a 90 % fractile value should be chosen calculated as per the methodology given on page 3.4-2 of IFEG.
    h. Where a reliable sprinkler system is installed appropriate to the hazard, a sprinkler reduction factor of 0.5 may be applied to the fire severity calculations. However, a larger value should be considered where local member failure could cause disproportionate structural collapse, for example isolated columns in a multi-storey building that could suffer sudden and complete failure (Fire Engineering Design Guide, Third Edition, p65). However, if the mean fuel load is higher than this value, the mean fuel load should be used.

        No additional reduction factors should be incorporated.

    i. The conversion factor k_b should be taken as 0.09 (Fire Engineering Design Guide, Third Edition, p58 & Structural Design for Fire Safety, p103), unless the lining materials of the compartment are identified and form part of the Trial Design requirements to ensure future compliance. A conversion factor appropriate to these lining materials may then be selected based on those recommended for “large compartments” in Table 5.4 of Structural Design for Fire Safety (Buchanan, 2001).
    j. Clear justification of ventilation to equivalent fire severity calculation area is to be included. A variety of potential ventilation areas are to be evaluated and justified. In this regard, consideration

should be given to height of openings, the size of the openings and their relationship to the height of the external wall [e.g. in a full height window only the upper portion may fail (See CIB Publication 269 – Rational Fire Safety Engineering approach to Fire Resistance of buildings)]. For this reason FRNSW recommend that a scenario with no more than 50% window breakage/failure be undertaken. Where it can be demonstrated that more than 50% breakage is likely to occur appropriate justification is to be included in the FER (e.g. modelling to demonstrate temperatures are sufficient to cause window breakage)

Where internal openings are relied upon it is to be demonstrated that an adequate external air supply is available to these internal openings.

k. The parameters used to determine fire severity should be either clearly referenced or agreed to by stakeholders.

l. A reduction in the required FRL by more than 50 % using fire severity calculations will not be supported, as the calculations are empirical and generally considered a crude approximation method (Structural Design for Fire Safety, p104).

4. Where fire severity calculations are not appropriate, or are not proposed to be undertaken, an alternative method of demonstrating that the proposed fire resistance level is adequate is to be used and is to be agreed upon by the stakeholders as a valid method.
5. The potential for catastrophic building collapse should also be discussed.
6. A structural engineer should verify any assumptions made in the analysis on the performance of the structure and confirm that the proposed Alternative Solution has no other impacts on the structural design. The Structural Engineer should also confirm that the structural design is consistent with and incorporates all requirements of the Alternative Solution.

It is reminded that comparing the actual times of occupant evacuation and fire brigade intervention against the nominated FRL of building elements is not appropriate. As stated in Section B2 of AS1530.4-2005 “It should be noted that the recorded FRL’s expressed as the time to failure under the relevant criteria **do not** bear a direct relationship to the failure times in real fires”. Therefore, the fire severity within the compartment should be considered in the assessment of these times (FRL’s are determined against the standard time temperature curve, the fire engineer needs to demonstrate that the foreseeable fire load will be less than that).

RED: General comments from FRNSW noted.

Fuel load densities assessed include 90th percentile values as calculated with the methodology on page 3.4-2 in the IFEG. Sprinkler reduction factors not applied to calculations on Ground Floor Class 6 areas (conservative). A sprinkler reduction factor (0.61 as per the Eurocode 1991-2-1) will be applied to basement loading dock time equivalence calculations however the assessed fuel load is greater than the mean fuel load for ‘Loading ramp, including goods’ and therefore in agreement with FRNSW comments.

In regards to window breakage, sensitivity scenarios where only a 50 % breakage of windows will be included. Please note that RED do not consider that a 90th percentile fuel load and only 50 % breakage of windows as a worst credible scenario because of the very small probability. In the ‘50 % breakage of windows’-scenario the mean fuel load is applied. However, we believe this is consistent with FRNSW policy on reduction of the design fuel load in sprinkler protected buildings and we therefore believe we assess the fire severity to the same degree as recommended by FRNSW.

A sensitivity analysis of calculated equivalent times of fire exposure is provided where the compartment sizes exceed 500 m^2.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	2. Increased compartment sizes and bespoke atrium smoke exhaust

Performance Requirement & DtS Clauses ⇩

DtS Clauses: C2.2, E2.2b

Performance Requirements: EP2.2, CP2

Details of Departures from DtS Provisions ⇩

Departure 2 - Class 6 compartment containing Ground Floor retail and associated atrium having a floor area exceeding 5,000 m^2.

Departure 3 - Bespoke smoke exhaust system from atrium instead of being provided in accordance with Specification E2.2b.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii) & (c)
Comparative or absolute? ⇨	Absolute & comparative		
Qualitative or Quantitative analysis? ⇨	Qualitative & quantitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	B, C, D, E, F		

Acceptance Criteria

Acceptance criteria ⇨	Spread of fire: The spread of fire (in terms of affected area) not to likely to be greater than a DtS compliant fire compartment (5 000 m^2). Smoke filling of atrium: Tenable conditions shall remain on Ground Floor with the exception of the area directly adjacent the fire. FRNSW comment: As discussed during the FEBQ meeting, it is understood that the assessment will demonstrate that the smoke layer will not descend to ground level. The acceptance criterion for the upper levels should also be detailed.

	RED: The acceptance criterion for levels above the Ground Floor is implied when the smoke layer is allowed to descend to Level 1 but no further.
Factors of safety? ⇨	Not applicable
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention will not be affected as the smoke filling of the atrium shall be managed to maintain tenable conditions on the Ground level and fire spread should not occur. FRNSW recommend that the Fire Brigade tenability criterion be in accordance with the 'Hazardous Conditions' exposure limits as detailed in the Society of Fire Safety 'Tenability Criteria Practice Note'. RED: FRNSW recommended acceptance criteria noted. Will be adopted in the FER.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Atrium retail fire – Balcony spill plume scenario (fast t^2 fire, max 20 MW, sprinklers assumed to operate and limit fire growth)
- Atrium retail fire – Balcony spill plume scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Atrium fire – Free burning fire scenario (fast t^2 fire, max 5 MW, no sprinklers able to limit fire growth)

FRNSW recommend the above design fire sizes, growth rates etc be justified and referenced

RED: The FER will contain justification for the design fire sizes and growth rates.

Proposed Alternative Solution and Trial Design Requirements ⇩

Fire compartment permitted to be 7377 m^2 instead of 5000 m^2. Fire compartment split into two smoke compartments.

Atrium provided with bespoke smoke exhaust system consisting of:

- Exhaust: Evenly spaced vents at the top of the atrium (Level 7) providing a total of 100 m^3/s exhaust rate
- Supply/make-up air:
  - Natural supply-air (passive) through openings with a minimum of 27 m^2. The supply air is provided from the main hospital entry doors (22 m^2) and east corridor (5 m^2). The openings are to change into a fully open position automatically upon activation of the atrium smoke exhaust system.
  - Mechanical supply-air through fans delivering a minimum of 21 m^3/s to ducts evenly spaced at ceiling level on Ground Floor. The system shall operate with 100 % outside air.
- Activation: The atrium smoke exhaust system activate upon activation of smoke detectors within the atrium smoke compartment zone (A.0). Sprinkler activation shall not start the atrium smoke exhaust system. In the event of failure of either the natural supply-air openings opening or the mechanical supply-air to operate, the exhaust fans shall not start. The passive and active supply-air systems are to be provided with measures to enable such control measures (e.g. airflow gauges within ducts).

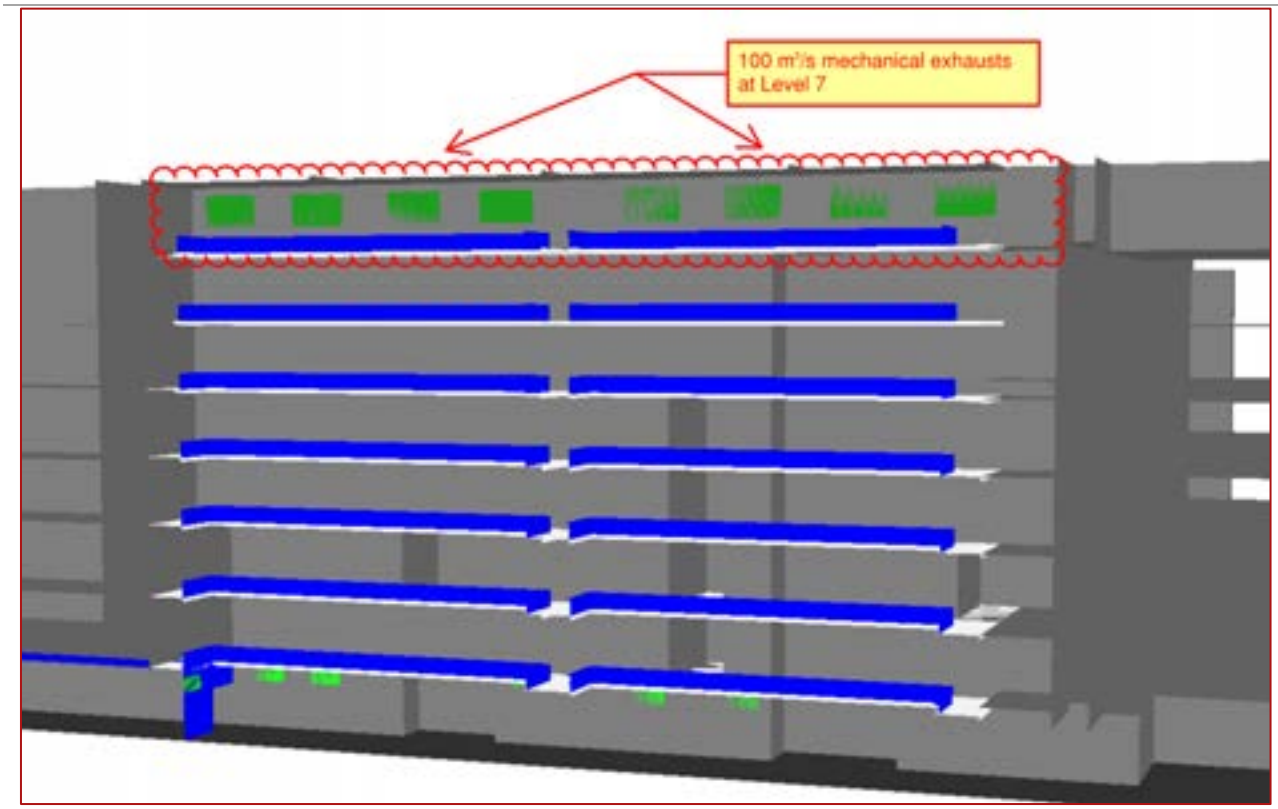
FRNSW comment: The submitted CFD form states that the sprinkler system will activate the exhaust, which goes against what is stated above. This should be clarified in the FER (of Version 3 of the FEBQ, if applicable).

RED: The statement that the sprinkler system will activate the bespoke smoke exhaust system is incorrect. Only smoke detection system will active this system. This will be clarified in the FER.

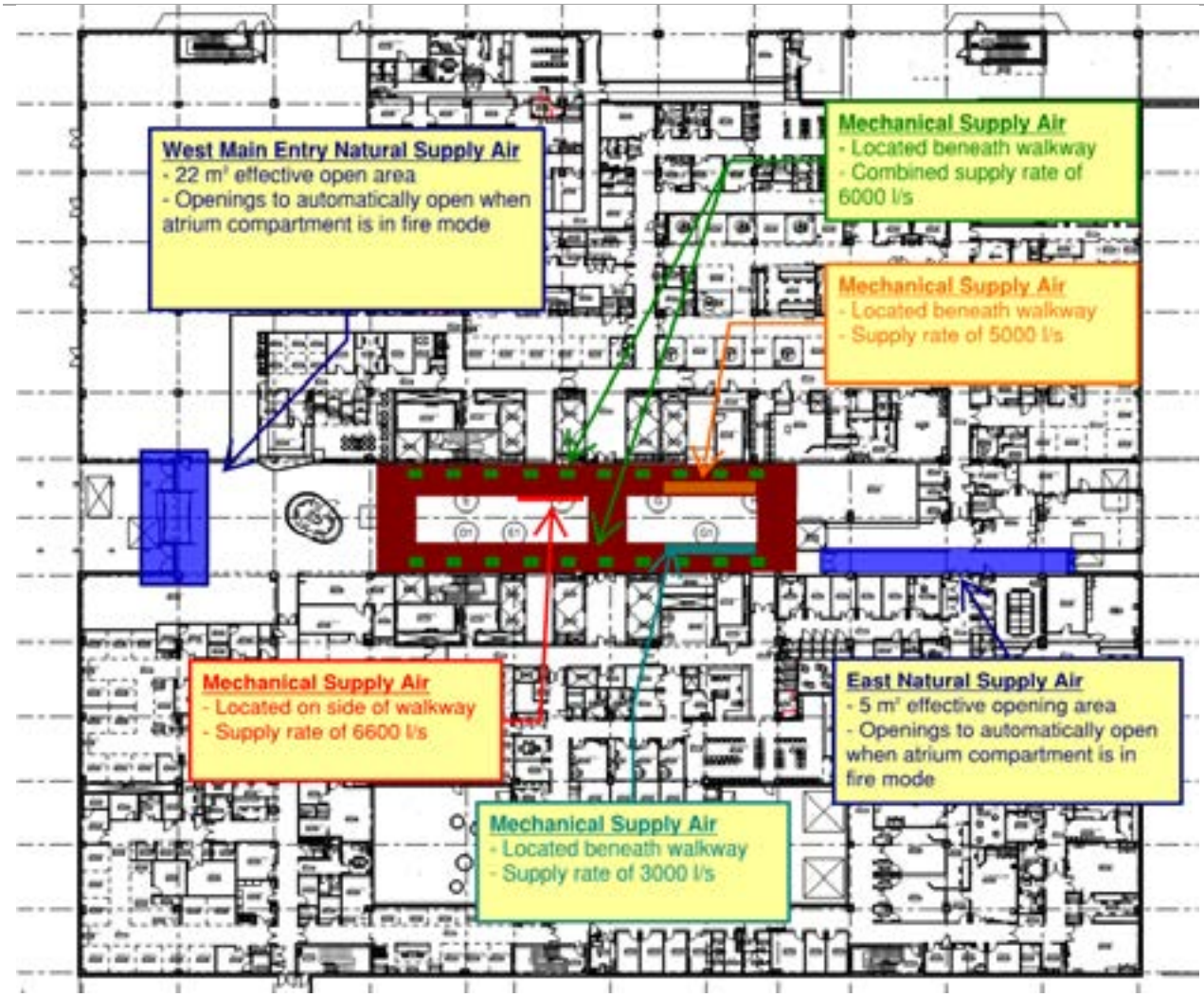
- Zone smoke control: If the smoke detection system is activated in any other zone than the atrium smoke compartment, the mechanical supply air shall operate at 100 % outside air. Passive make-up air openings shall not open automatically. Atrium smoke exhaust mode shall have a higher priority than other modes (i.e. in the event of activation of a smoke detector within the atrium smoke compartment, atrium smoke exhaust mode shall take precedence and activate).

FRNSW comment: As discussed in the FEBQ meeting, please provide further explanation on how the Zone Smoke Control system will operate in conjunction with the atrium smoke exhaust system. This should consider different fire scenarios, e.g.1) smoke detected in atrium, 2) smoke detected in a ward, 3) or smoke detected in atrium and in ward compartment simultaneously.

Smoke compartments on Ground Floor



Proposed location of mechanical smoke exhaust on Level 7



Means of make-up air on Ground Floor level

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
Sprinkler failure scenario will be considered. Worst possible location of fire will be used to determine the smoke filling of the atrium. FRNSW recommend that failure (or partial failure) of the atrium exhaust system, (or supply air) also be considered in the assessment, to assess the effect on conditions in the atrium as well as the effect on conditions in adjacent compartments. RED: The smoke exhaust will have an equal or better reliability compared to a DtS compliant (E2.2b) solution, as each bay of fans will have a stand by fan provided. No modelling of failure or partial failure of the atrium smoke exhaust system will therefore be included in the FER.

Modelling/Assessment Tools	
Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A

CFD? Provide details on "CFD Modelling Inputs" form ⇨	Yes, see attached form.
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A (occupant egress not considered) FRNSW comment: Occupant evacuation should be addressed as required by EP2.2. FRNSW recommend that the assessment should pay particular consideration to the mobility and characteristics of occupants. As discussed during the FEBQ meeting, it is FRNSW's understanding that occupants in the upper levels of the atrium will be required to horizontally evacuate into an adjacent compartment. This should be detailed in the assessment. RED: Correct. Will be clarified in the FER.
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (considered equivalent to DtS)

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	3. Openings between fire compartments (external and internal)

Performance Requirement & DtS Clauses ⇩

DtS Clauses: C3.3, C3.5

Performance Requirements: CP2, CP8

Details of Departures from DtS Provisions ⇩

Departure 4 - Openings in external walls not to be protected in accordance with BCA Clause C3.4

Departure 5 - Openings in fire walls on Level B1 and Ground Floor protected with fire shutters with an FRL of -/120/- instead of -/120/30.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (i) & (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Quantitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	C, D		

Acceptance Criteria

Acceptance criteria ⇨	Openings in external walls Reference will be made to BCA Verification Method CV1. In summary, CV1 prescribes that an external wall receiving a heat flux of up to 20 kW/m^2 meets the requirements of an acceptably low risk of fire spread. For openings where the received radiation is calculated to be over 20 kW/m^2, additional protection will be required. FRNSW recommend that for any external openings that can be opened, the acceptance criterion should be appropriate to piloted ignition. RED: No such openings exist. This will be clarified in the FER.

	Openings in fire walls on Level B1 and Ground Floor Provision of sprinkler heads and separation distance to combustible material shall be sufficient to not cause ignition and fire spread.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention will not be affected as fire spread should not occur.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- For external fire spread: External fully developed fire in Class 9a and 6 areas (simple plane emitter @ 1000 °C and 0.9 emissivity, reduction factor of 0.5 applied to sprinkler protected areas). Plane emitter determined by openings in external walls with an FRL or external walls.
- For internal fire spread: Fully developed fire in Class 9a and 6 areas (simple plane emitter @ 1000 °C and 0.9 emissivity, reduction factor of 0.5 applied to sprinkler protected areas). Plane emitter represented by size of fire shutter.

FRNSW recommend that all the above input variables be justified and referenced.

RED: Justification will be provided in the FER.

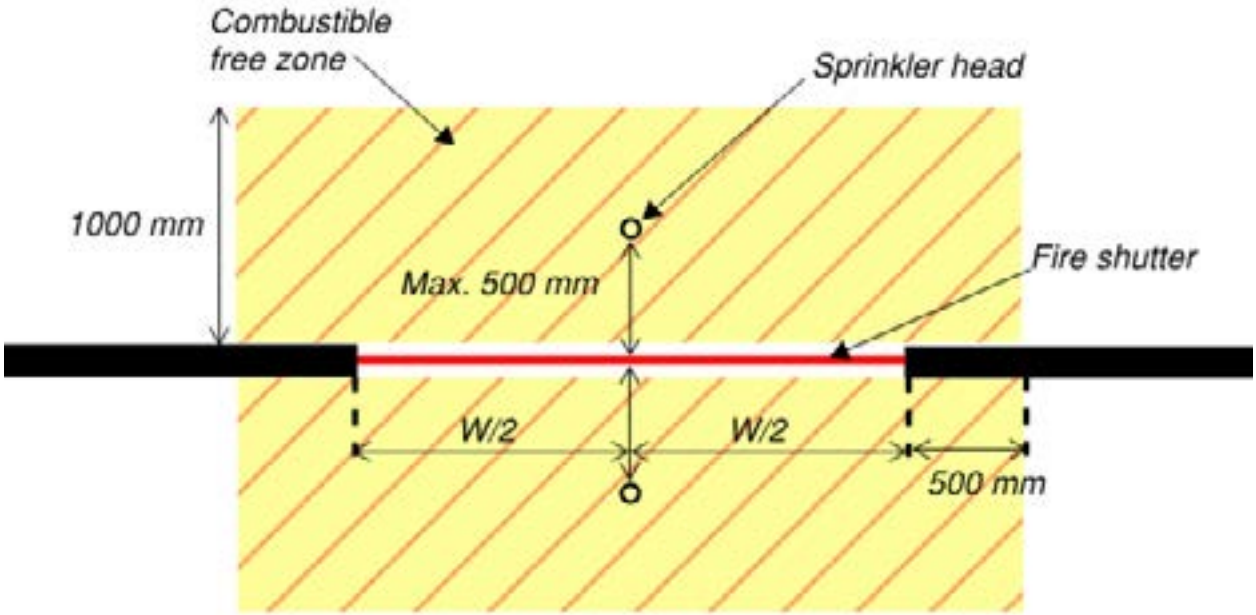
Proposed Alternative Solution and Trial Design Requirements ⇩

External walls without FRL or unprotected openings in walls with an FRL: Separation distance, toughened glass, walls with an FRL or a combination of these measures will be applied to each individual location being a departure to so that the received radiant heat flux meets the acceptance criteria.

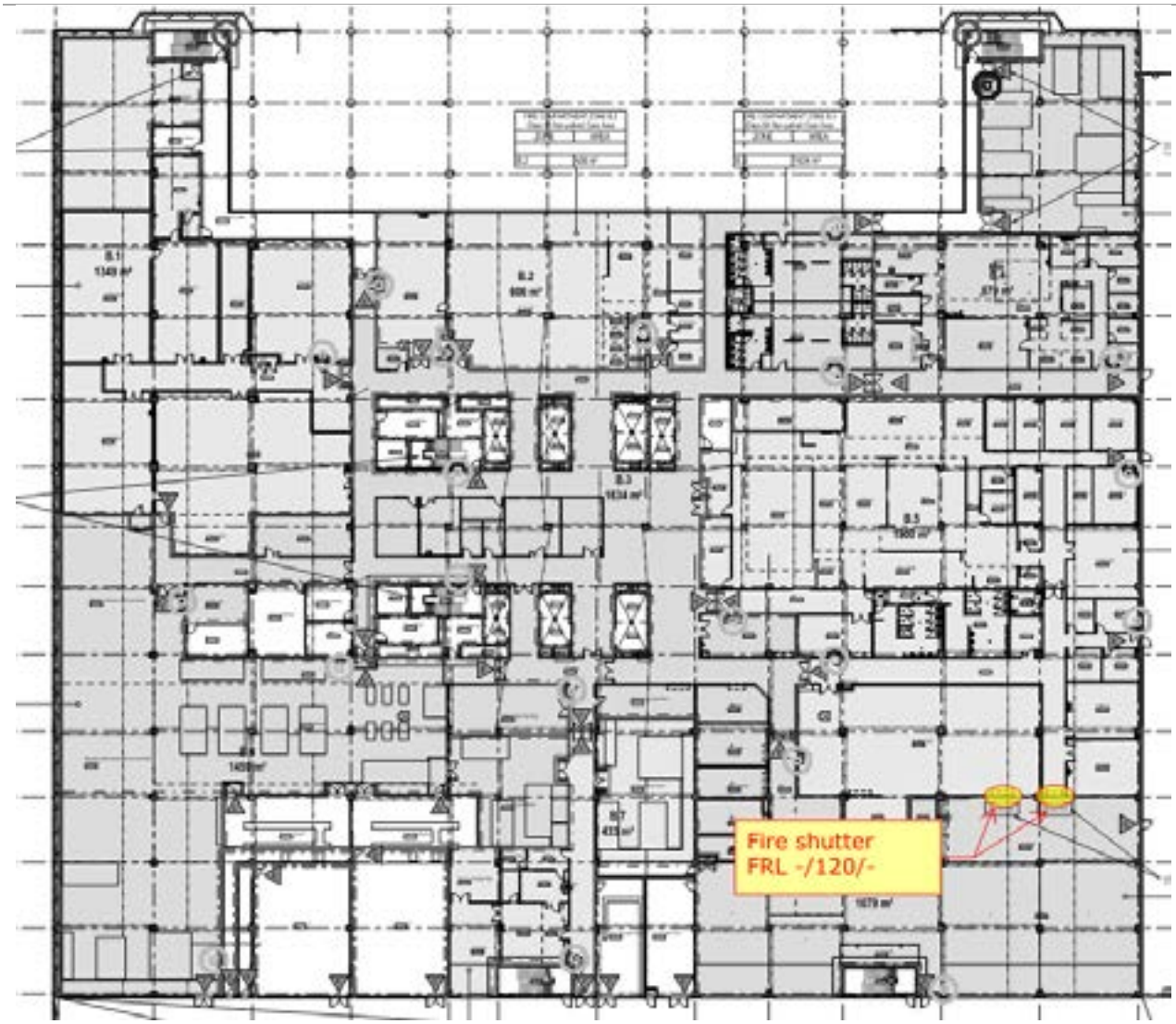
Fire shutters: Basement Level and Ground Floor will have fire shutters located in fire compartment walls (i.e. having an FRL of 120/120/120). The shutters have an FRL of -/120/- instead of -/120/30 as prescribed by the BCA DtS Provisions. This is a departure from BCA Clause C3.5 and will be addressed by a fire engineered solution. For each fire shutter, sprinkler heads are to be provided at a maximum of 500 mm from the centre line of shutter on both sides. . For the fire shutter on Ground Floor, two sprinkler heads will be required to provide coverage of the width of the shutter. For the basement fire shutters, a single sprinkler head will be able to provide coverage across the width of each fire shutter. For fire shutters in the basement, a combustible free zone shall be provided on each side of the. For these shutters, signs shall be clearly provided on each side of a shutter stating “COMBUSTIBLES NOT ALLOWED TO BE STORED NEAR SHUTTER” in capital letters at least 50 mm in height against a white or silver contrasting background. Delineation shall be provided on both sides of the basement fire shutters to illustrate where combustible materials are not permitted to be stored. For the fire shutter on Ground Floor, a combustible free zone shall be maintained on the atrium side of the shutter only. A sign shall be clearly provided on the atrium side of a shutter stating “COMBUSTIBLES NOT ALLOWED TO BE STORED NEAR SHUTTER” in capital letters at least 50 mm in height against a white or silver contrasting background. Fire shutters are to be geared and to close on GFA. The shutters are to be fail-safe closed. In the event of power loss a controlled descent of the shutter door is required so that a person under the shutter can safely move away before the shutter closes. The combustible free zone only applies to non-fixed combustible materials, e.g. a pallet with goods. Fixed combustible materials such as light switches, push buttons or the like are still permitted within the combustible free zone.

FRNSW recommend the restriction on combustible items adjacent to the shutters be listed as an Essential Fire Safety Measure on the Fire Safety Schedule and listed in the buildings Management in Use Policy.

RED: The combustible free zones will be added to ESM schedule. The combustible free zone on the Ground Floor, the requirement will form part of the Pharmacy tenancy agreement as well.



Required sprinklers adjacent fire shutters and combustible free zone



Fire shutter locations in Basement

Fire shutter location on Ground Floor

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
Conservative input data are to be assumed throughout the assessment. Fire brigade intervention will not be taken into account, however following General Fire Alarm (GFA) fire brigade intervention will occur and limit the risk for fire spread.

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc.	N/A

⇨	
Other? Provide details ⇨	Thermal Radiation Analysis (TRA) software for calculating radiant heat transfer.

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparative to DtS design)

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	4. Compartment sizes and travel distances

Performance Requirement & DtS Clauses ⇩

DtS Clauses: C2.5, D1.4, D1.5

Performance Requirements: CP2, DP4, EP2.2

Details of Departures from DtS Provisions ⇩

Departure 6 - Compartment sizes to exceed prescribed floor area limitations.

Departure 7 - Travel distances to a point of choice or an exit to exceed prescribed values (Basement Level to Level 7)

Departure 8 - Distance between alternative exits exceed prescribed values (Basement Level to Level 7)

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii) & (c)
Comparative or absolute? ⇨	Absolute & comparative		
Qualitative or Quantitative analysis? ⇨	Quantitative & qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	B, C, D, E, F		

Acceptance Criteria

Acceptance criteria ⇨	If the proposed compartment sizes and travel distances demonstrate that: - extent of fire spread is unlikely to increase compared to a DtS compliant design - number of people affected in the event of a fire is no greater than a DtS complaint design - fire brigade intervention will not be associated with worse conditions compared to a DtS compliant building then, the design shall be deemed acceptable.
Factors of safety? ⇨	Sprinkler failure will be considered.

Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention will not be affected as the amount of people requiring to be evacuated shall be no greater than a DtS compliant building.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 9a patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Class 9a non-patient care areas – Worst credible fire (medium t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a non-patient care areas – Robustness fire scenario (medium t^2 fire, max 2 MW, sprinklers assumed to fail)

FRNSW comment: The above design fire sizes and growth rates should be justified and referenced.

RED: The FER will contain justification for the design fire sizes and growth rates.

Proposed Alternative Solution and Trial Design Requirements ⇩

Travel distance to a point of choice allowed to be up to 25 m in patient care areas.

Travel distance to an exit allowed to be up to 48 m in patient care areas.

Travel distance between exits allowed to be up to 62 m in patient care areas.

Travel distance to a point of choice allowed to be up to 38 m in non-patient care areas.

Travel distance to an exit allowed to be up to 48 m in non-patient care areas.

Smoke compartments in patient care areas allowed to be up to 639 m^2 in size.

Fire compartments (FRL 60/60/60) in patient care areas allowed to be up to 1177 m^2 in size.

Fire compartments (FRL 120/120/120) in patient care areas allowed to be up to 2101 m^2 in size.

A non-prescribed smoke detection system will be provided for non-patient care areas.

Smoke detection will be provided in Class 7b areas.

Smoke detectors in patient care areas will have a reduced spacing and shall be provided as follows:

- Detectors shall generally have a maximum coverage area of 52 m^2. The spacing between detectors in corridors shall be a maximum of 5.1 meters.
- In compartments 0.2A, 0.2B, 0.3, 0.8, 1.1, 1.7A, 1.7B and 2.5 where enclosed rooms also contains a corridor, reduced spacing of detectors shall be provided in corridors. The maximum spacing in such corridors shall be 5.1 meters. The corridors subject to these requirements are illustrated in Appendix C. Other spaces than corridors in the same enclosed room as these corridors shall have normal detector spacing. Detectors in other rooms (i.e. not containing corridors) in these compartments shall have a maximum coverage area of 52 m^2.
- Operating suites and Cath labs are permitted to only be protected by a single smoke detector in each respective room.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

Sprinkler failure scenarios will be considered.

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A

CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A (Explicit occupant evacuation will not be calculated)
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS)

FRNSW comment: As discussed in the FEBQ meeting, FRNSW recommend that the assessment should quantitatively demonstrate that the earlier warning afforded by the proposed trial design measures will offset the additional travel time due to the extended travel distances.

The occupant movement speed should also be specified, justified and referenced.

RED: The current proposed assessment involves an assessment of travel distances which also accounts for the number of occupants and the staff-to-patient ratio. These factors together will determine the egress time in the hospital (where occupants are not mobile and need assistance). There is therefore an implicit correlation between time required for evacuation of a part of a hospital (e.g. a ward) and the number of patients, the number of staff and the travel distance to an exit. RED will explore further scientifically validated methods to translate these parameters into an egress time for a part of a hospital. If such method exist, a quantitative assessment of egress times will be provided to further support the assessment by comparing the egress times in the proposed design compared to a DtS compliant design. The DtS compliant design will assume compartment sizes, travel distances and staff-to-patient ratios for a DtS compliant design. The DtS compliant design will be assumed to have staff-to-patient ratios as was applicable when the DtS provisions first became a part of the BCA.

Movement speeds will be included if applicable.

The additional benefit of earlier detection will also be included in such quantitative assessment if possible.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	5. External stairs instead of fire-isolated stairs

Performance Requirement & DtS Clauses ⇩

DtS Clauses: D1.3, D1.8
Performance Requirements: DP5, EP2.2

Details of Departures from DtS Provisions ⇩

Departure 9 - Four required exits being external, non fire-isolated stairs instead of fire-isolated stairs
Departure 10 - Allowing the use of external stairs instead of fire-isolated stairs in buildings over 25 m effective height

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute & comparative		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	B, E, F		

Acceptance Criteria

Acceptance criteria ⇨	Risk of smoke exposure of occupants in a stair being equal or less compared to a fire-isolated stair with a pressurisation system. Stairs meeting smoke venting requirements of international regulations. It shall be deemed unlikely that occupants experience vertigo and that weather effects shall not affect egress.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	The stairs shall not affect fire brigade intervention negatively.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 9a patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Class 9a non-patient care areas – Worst credible fire (medium t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a non-patient care areas – Robustness fire scenario (medium t^2 fire, max 2 MW, sprinklers assumed to fail)

FRNSW comment: The above design fire sizes and growth rates should be justified and referenced.

RED: The FER will contain justification for the design fire sizes and growth rates.

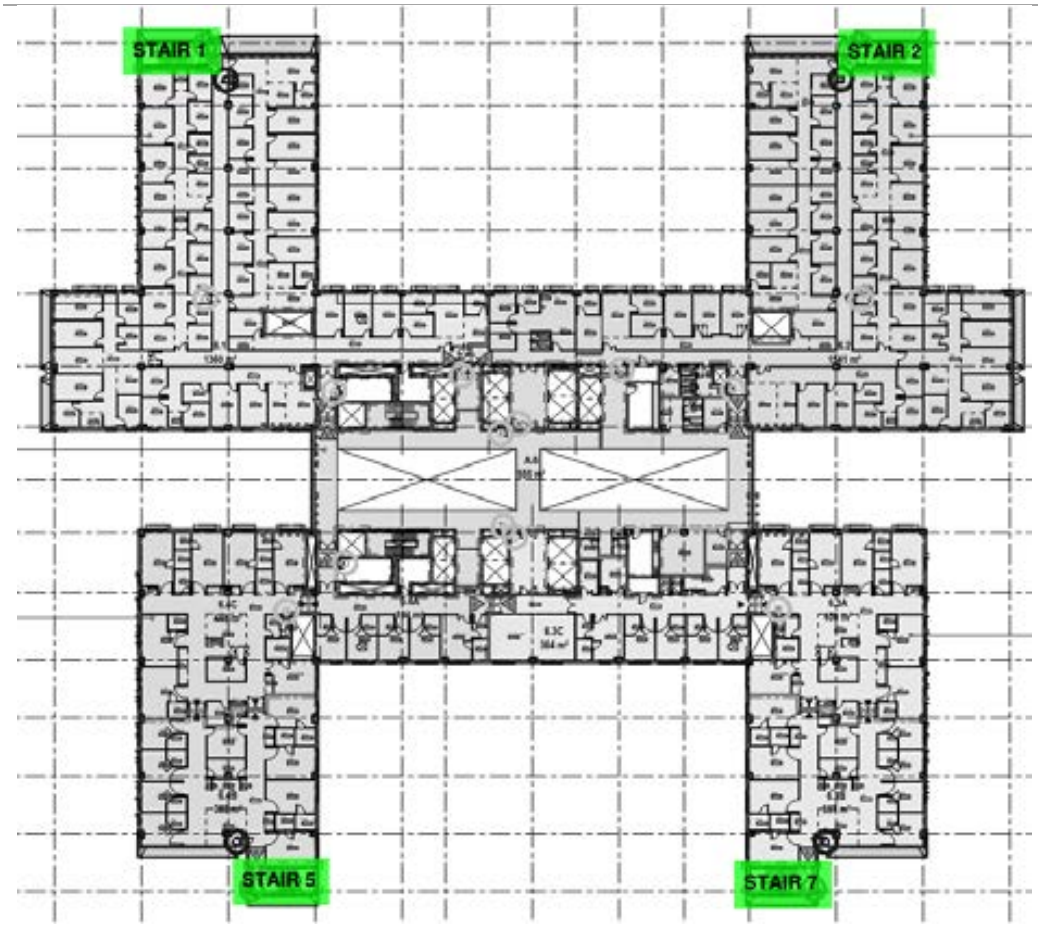
Proposed Alternative Solution and Trial Design Requirements ⇩

Fire stairs 1, 2, 5 and 7 providing egress from Level 6 to the level of discharge to the outside will be external fire stairs instead of fire-isolated stairs. Three sides of the stairs bounding the building will be of concrete and have an FRL of 120/120/120. The fourth side, facing the façade, will be vented to the outside using louvres. Each stair shall achieve a minimum average free open area of 50 % (based on the width and height of the longest side of the stair). The level of discharge to the outside does not have to be vented to the outside provided that it does not have doors

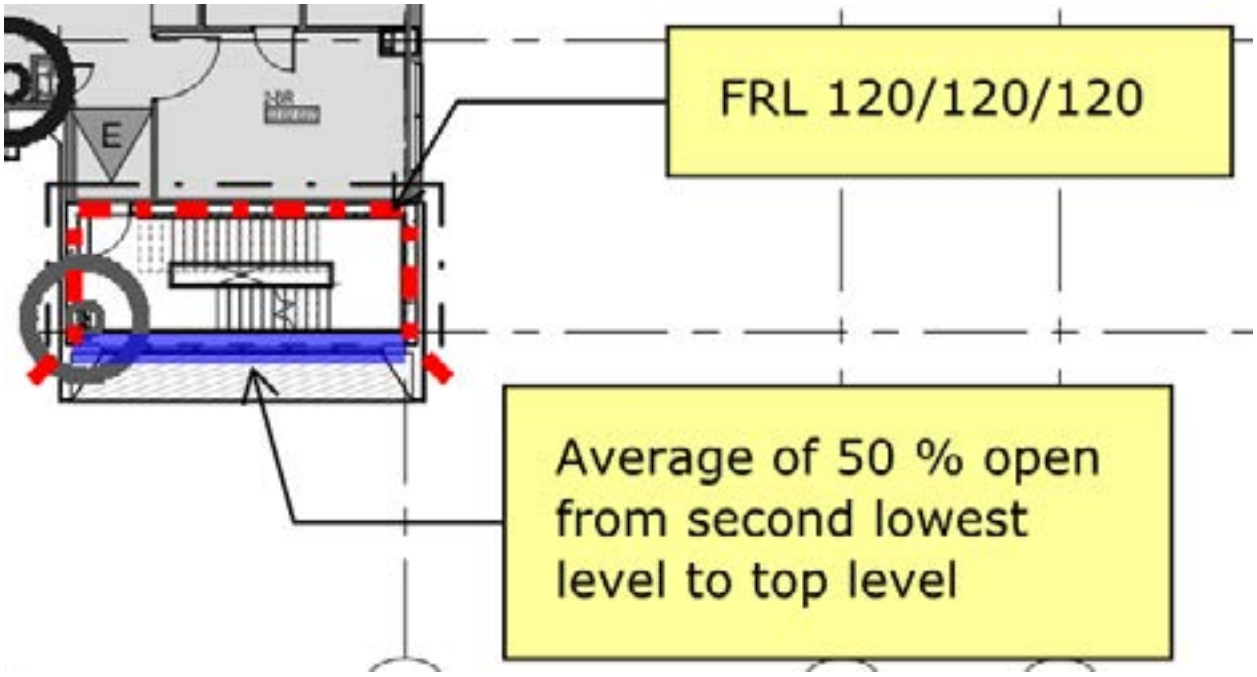
opening into it from this level. The second lowest level is allowed to have a free open area of no less than 39 %. Façade areas that are obstructed by slabs between floors do not need to be included when calculating the free open area. This is a departure from BCA Clauses D1.3 and D1.8 and will be addressed by a fire engineered solution.

The external fire stairs are to be provided with:

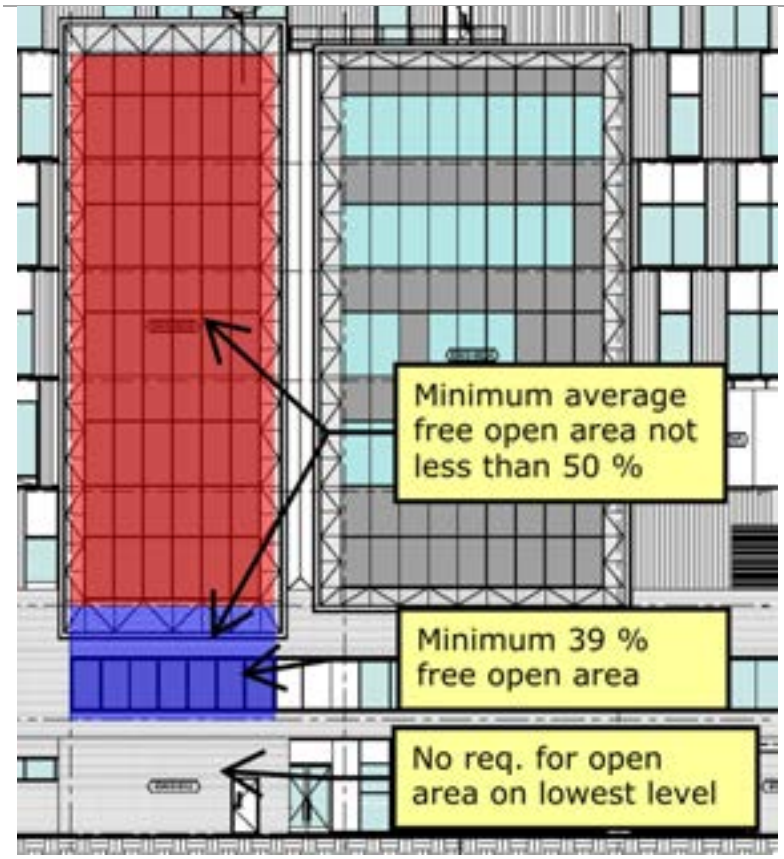
- Adequate means of weather protection to restrict rain entering the stair
- Adequate drainage to remove any water entering the stair or slip protection for occupants
- Door re-entry on Levels 4 and 6 (doors not permitted to be locked from stair side)



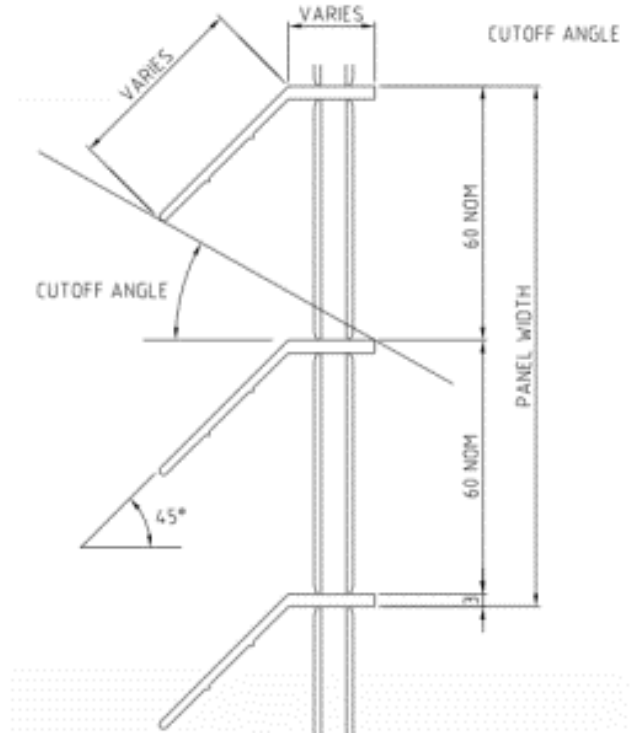
Location of Fire Stairs 1, 2, 5 and 7 (on Level 6)



FRL and openness requirements for fire stairs



FTypical venting solution for fire stairs (illustrates fire stair 5)



Detail of louvre for external stair venting

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS)

FRNSW comment: In the FEBQ meeting, it was discussed that the zone smoke control system may assist in preventing smoke spread into the stairway. FRNSW recommend that a quantitative assessment be carried out to demonstrate that smoke spread into the stair will be prevented by the zone smoke system, and tenable conditions within the stair will be maintained.

FRNSW recommend that the quantitative assessment should address smoke ingress whilst the door to the stairs is held open. Wind effects should also be considered. Any wind conditions used in the assessment should be justified and referenced.

The assessment should also address the risk of vertigo, with regard to the occupant characteristics.

RED: The zone smoke control system will indeed assist with preventing smoke spread into the external stairs. The FER will contain a qualitative assessment discussing the physics governing the flows within the fire-affected compartment.

We believe that the BCA intends to mitigate acrophobia rather than vertigo for external stairs.

Acrophobia and other relevant factors to consider when substituting the fire-isolated stair for an external stair will be assessed in the FER.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	6. Sliding doors and door swings against egress in patient care areas

Performance Requirement & DtS Clauses ⇩

DtS Clauses: D2.19, D2.20

Performance Requirements: DP2, EP2.2

Details of Departures from DtS Provisions ⇩

Departure 11 - Allow the use of sliding doors in patient care areas. Sliding doors to be installed to:

- Ground Floor: Triage rooms
- Level 1: ICU suites, Corridors in interventional suites areas

Departure 12 - Certain doors in patient care areas swing against the direction of egress. Doors swinging against the direction of egress in:

- Ground Floor: Ambulance entrance, Corridors in adult acute areas
- L1: Corridors in interventional suites areas
- L4: Corridors in medical/surgical inpatient unit areas
- L5: Corridors in medical/surgical inpatient unit areas

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	E		

Acceptance Criteria

Acceptance criteria ⇨	Doors not impeding egress in affected areas.
Factors of safety? ⇨	N/A

Fire brigade intervention & tenability criteria? ⇨	N/A (Fire brigade not affected by departures)

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 9a patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)

FRNSW comment: The above design fire sizes and growth rates should be justified and referenced.

RED: The FER will contain justification for the design fire sizes and growth rates.

Proposed Alternative Solution and Trial Design Requirements ⇩

Doors swinging against the direction of egress will be provided with one of the following measures; emergency push open buttons, be fail-safe open (incl. open on power loss or GFA), on hold open devices with located smoke detectors or provided with a sign "Pull to open" in the doors. The proposed measures varies depending on the location of the door(s) swinging against the direction of egress.

Sliding doors will be provided with one of the following measures; an alternative door complying with D2.20, doors fail-safe open (incl. open on power loss or GFA) and openable manually under a force not more than 110 N, or openable manually under a force not more than 110 N.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (not considered relevant to departures)

FRNSW Comment: FRNSW recommend that pictorials identifying the locations of all non-compliant doors be provided in the FER (or Version 3 of the FEBQ if applicable).

RED: The grid locations of each door being a DtS departure will be explicit in the FER.

FRNSW comment: During the FEBQ meeting FRNSW were advised that:

- Automatic push button devices will be provided adjacent to the non-compliant swing doors.
- Sliding doors (not between compartments) will auto-open during fire trip

Pease provide detail on the operation of the doors during power failure.

RED: As discussed in the FEBQ meeting, automatic push button devices will be provided for doors swinging against direction of egress where patients are required to be evacuated across the smoke/fire compartmentation. If the door is only served by staff and the number of staff requiring to use this door for egress, additional signage will be provided for such doors only.

Sliding doors not located in fire/smoke compartment are to be fail-safe to the fully open position. In the event of power supply loss or fire trip or upon General Fire Alarm, the doors are to change into a fully open position. If such change requires power, the power supply to the door opener shall be provided using a local battery sufficient to open to a fully open position and then latch in the fully opened position. The doors shall have a break out function as defined by AS 5007-2007 and be openable manually under a force not more than 110 N. BCA DtS compliant egress width of the door set shall be achieved in the 'broken out' state.

Non-power operated sliding doors, such as to ICU suites, shall be openable under a force not more than 110 N.

Details of this solution will be provided in the FER.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	7. Fire-isolated passageways in basement

Performance Requirement & DtS Clauses ⇩

DtS Clauses: D1.7

Performance Requirements: DP5, EP2.2

Details of Departures from DtS Provisions ⇩

Departure 13 - Fire-isolated passageways in basement with more than two doorways opening into them not to be provided with pressurisation system or smoke lobbies.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	B, E F		

Acceptance Criteria

Acceptance criteria ⇨	Occupants are provided with sufficient level of safety to be able to safely evacuate in the event of a fire.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention shall not be negatively affected by departure.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 9a non-patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a non-patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)

Proposed Alternative Solution and Trial Design Requirements ⇩

No pressurisation system or smoke lobbies will be provided to the fire-isolated corridors.

Non-patient care areas will be provided with a smoke detection and alarm system.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparative to DtS compliant building)

FRNSW Comment: FRNSW were advised at the meeting that sprinklers and non required smoke detection will be provided in the corridors and that smoke seals will be provided to plant room doors that open onto the fire isolated passageway.

RED: Sprinklers are provided in fire-isolated passageways and smoke/heat detection is provided in the basement levels, both measures above DtS prescribed measures. Smoke seals to be provided to fire doors to fire-isolated passageway except doors that open to the external stairs or to a public corridor.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	8. Fire stairs discharging to rooftop

Performance Requirement & DtS Clauses ⇩

DtS Clauses: D1.10

Performance Requirements: DP5, EP2.2

Details of Departures from DtS Provisions ⇩

Departure 14 - Fire-isolated stairs 8 and 9 and Level 7 plant rooms discharge to Level 6 rooftop instead of to open space instead of to open space on the same level as public road.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	E		

Acceptance Criteria

Acceptance criteria ⇨	Occupants are to be able to evacuate safely without a fire blocking all exits. Sufficient safety measures shall be provided to enable to occupants to easily identify the egress path and to ensure that occupants are not stranded on a blocked egress path.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention shall not be negatively affected by departure.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

A fire occurring on rooftops used for egress will be assumed in the assessment. Different fire locations will be evaluated qualitatively.

Proposed Alternative Solution and Trial Design Requirements ⇩

The entire Level 6 roofs being used as egress paths will be required to achieve a minimum FRL of 120/120/120 and not have any roof lights or other openings within three meters of the path of travel to the fire stairs.

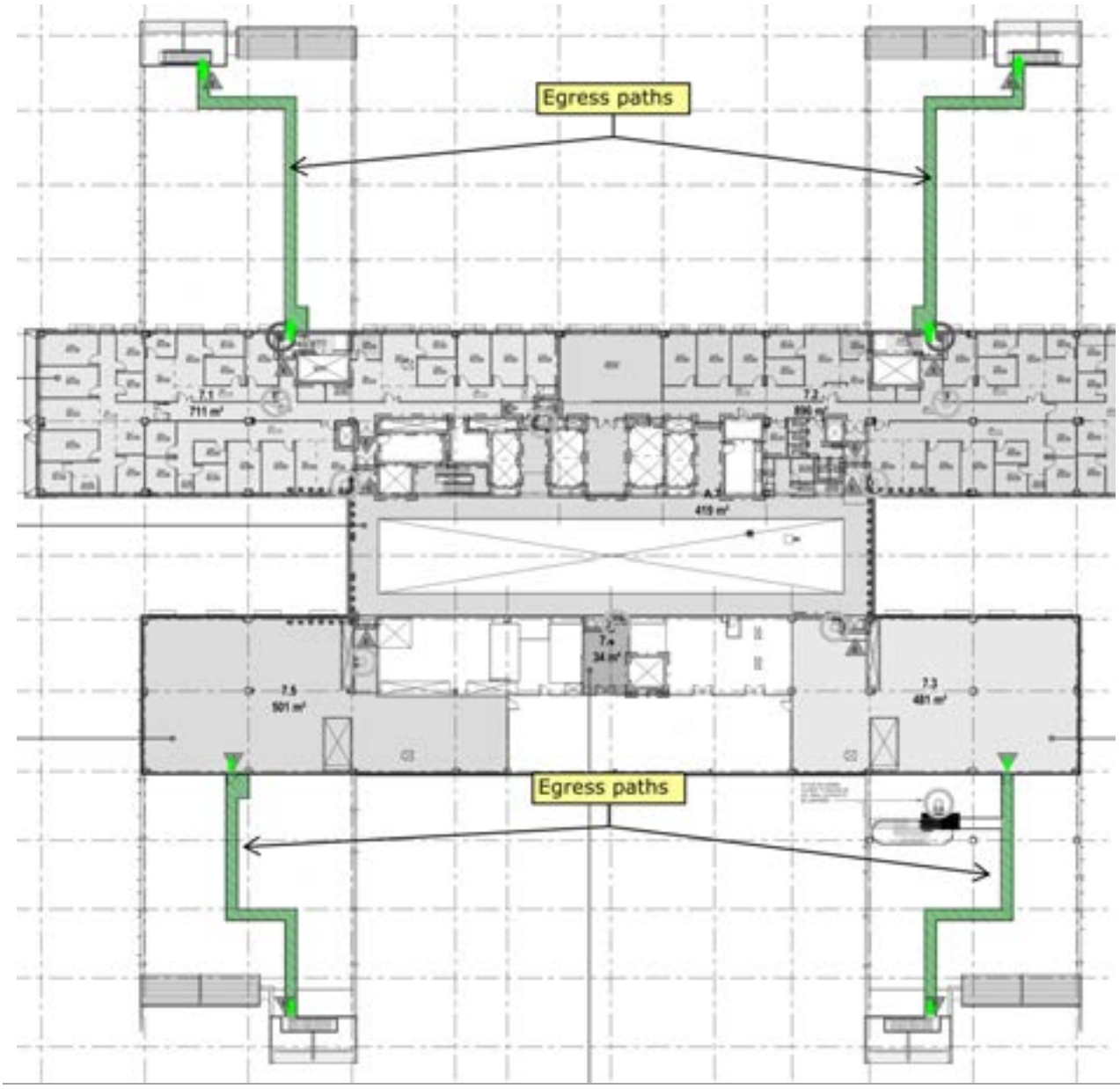
Adequate drainage to remove any water on the egress paths or slip protection for occupants must be provided to avoid the accidental falls while evacuating.

The egress paths on the Level 6 roof shall also be provided with:

- Emergency lighting. The illuminance at floor level shall be not less than 1 lux in the centre line of the egress paths on the Level 6 rooftops. This emergency lighting shall activate upon GFA. The emergency lighting shall be able to operate for 120 minutes in the event of loss of power.
- Emergency signage.

No combustible materials are permitted on the roofs used for egress.

To ensure that occupants egressing are not stranded on the Level 6 rooftops in the unlikely event of a fire blocking the egress path of the roof, doors to stairs 1, 2, 5, 7, 8 and 9 on Level 7 and between plant rooms and roofs on Level 7 are not permitted to be locked.



Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩
N/A (not considered different to DtS compliant design)

FRNSW recommend that signage be provided at the roof top to prevent storage of combustible materials. FRNSW recommend the signage be listed as an Essential Fire Safety Measure on the Fire Safety Schedule and listed in the buildings Management In Use Policy.

As discussed at the FEBQ meeting the egress pathways over the roof will be dedicated walkways enclosed by hand rails.

RED: Regular inspections of the roofs will be regularly inspected and this will form part of the Essential Safety Measures schedule.

The egress paths will be enclosed by handrails and also provided with emergency lighting and exit signage.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	9. Zone smoke control system departures

Performance Requirement & DtS Clauses ⇩

DtS Clauses: E2.2

Performance Requirements: EP2.2

Details of Departures from DtS Provisions ⇩

Departure 15 - Zone smoke control not being fully compliant with AS 1668.1 because:

- Motorised fire dampers used in instead of sub-ducts
- Basement level to be in shutdown mode except for kitchen and loading dock
- Atrium smoke compartment not to be part of zone smoke control system
- Change of fire mode operation for specific compartments (shut down mode instead of pressurisation).

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	B, E		

Acceptance Criteria

Acceptance criteria ⇨	Risk of occupants being exposed to smoke shall not be increased from the departures from AS 1668.1-1999.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Smoke spread, that can affect fire brigade intervention, shall not be more probable than an AS 1668.1-1999 compliant design.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 9a patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)

- Class 9a patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Class 9a non-patient care areas – Worst credible fire (medium t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a non-patient care areas – Robustness fire scenario (medium t^2 fire, max 2 MW, sprinklers assumed to fail)
- Class 7b loading dock – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 7b loading dock – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)

Proposed Alternative Solution and Trial Design Requirements ⇩

Fire dampers will be provided instead of sub-ducts to return air/smoke exhaust shafts. From the shafts, return air/smoke exhaust ducts will extend to each fire compartment and will be provided with fire dampers.

FRNSW comment: It is FRNSW current position that we do not support the use of motorised dampers in lieu of subducts, **at the return air/smoke exhaust shafts**, within new buildings, due to concerns that motorised dampers cannot achieve an equivalent level of reliability. FRNSW are of the view that subducts, being a passive system, with little to no maintenance requirements offers a higher level of reliability compared to an active damper system that is dependent on power supply, mechanical and electrical components and maintenance.
RED: The intent of sub-ducts is to provide protection against smoke spread in the event of the fan being in exhaust mode during a fire fails due to high temperatures. The sub-ducts together with the natural buoyancy of the hot gases in the ducts will limit spread of smoke and fire between compartments and floors to the degree necessary as required by AS 1668.1-1998. Where smoke spill risers extend to serve multiple compartments on a single floor, sub-ducts need to be provided in accordance with Figure 3.10 in AS 1668.1-1998 (see figure below). Fire dampers are not permitted on ducts provided with sub-ducts but air-control dampers are permitted. Normally such air-control dampers are closed to non-fire affected compartments and opened to fire-affected compartments in an AS 1668.1-1998 compliant design of zone smoke control systems. The failure position of such air-control dampers is 'open'. The failure modes of a DtS system are therefore as follows:

- Failure of the smoke spill fan – Protection of spread between compartments is relied on by a combination of sub-ducts, air control dampers and buoyancy driven flow in the vertical shaft. The buoyancy driven flow will depend on the amount of hot gases that is pushed into the vertical shaft, their temperature, the elevation between the duct entering the riser and the pressure drop over the failed fan. If the buoyancy is not greater than the pressure drop over the failed fan, smoke may spread into an adjacent sub-duct. Because air-control dampers have no required fire rating, their materials would allow them to fail at post-flashover temperatures. In such a scenario, smoke is allowed to be spread between compartments via the sub-ducts.
- Failure of the air-control damper – The air-control damper to an adjacent compartment (not being the fire-affected compartment) fails into an 'open' mode. The solution relies on the smoke spill fan being able to displace a flow high enough that the fire-induced flow into the duct from the fire-affected compartment does not cause a positive pressure in the duct. Because AS 1668.1-1998 does not demand that such calculations to be carried out, the DtS solution may have situations where the fire-induced flow in the ducts become positive and in such cases the DtS solution allows for smoke to be spread between different compartments.

In the proposed design, the sub-ducts as shown in Figure 3.10 in AS 1668.1-1998 are replaced by motorised fire dampers without fusible links. The motorised fire dampers to the smoke spill shafts are to be in a closed position during normal operation. For a fire-affected compartment, the motorised fire damper(s) open. All other fire dampers on smoke spill/return air ducts are to be closed. The motorised fire dampers are to be fail-safe in a closed position. The failure modes of the proposed solution are therefore as follows:

- Failure of the smoke spill fan – Protection between compartments is achieved by the motorised fire dampers to the non fire-affected compartments being in a closed position. Because these dampers are closed during normal operation, and because the fail-safe is a closed position, the likelihood of being failed open is negligible. The amount of smoke spread between compartments will correspond to permitted leakage for fire dampers, however this is an acceptable level as per the BCA.
- Failure of the fire damper – The fire damper to the fire affected compartment fails to drive open. Exhaust can therefore not occur from this compartment. However, positive pressurisation will still occur for adjacent non fire-affected compartments. The likelihood of the fire spreading smoke between compartments is therefore still small due to the pressure differential between the compartments. This is especially true in sprinkler protected hospitals where fires are expected to be controlled by the sprinklers and no significant pressure build up from a fire will occur.

Regular maintenance of the dampers will be provided and the dampers shall be provided in the ESM schedule.

It is therefore RED's view that the solution above meets the Performance Requirements.

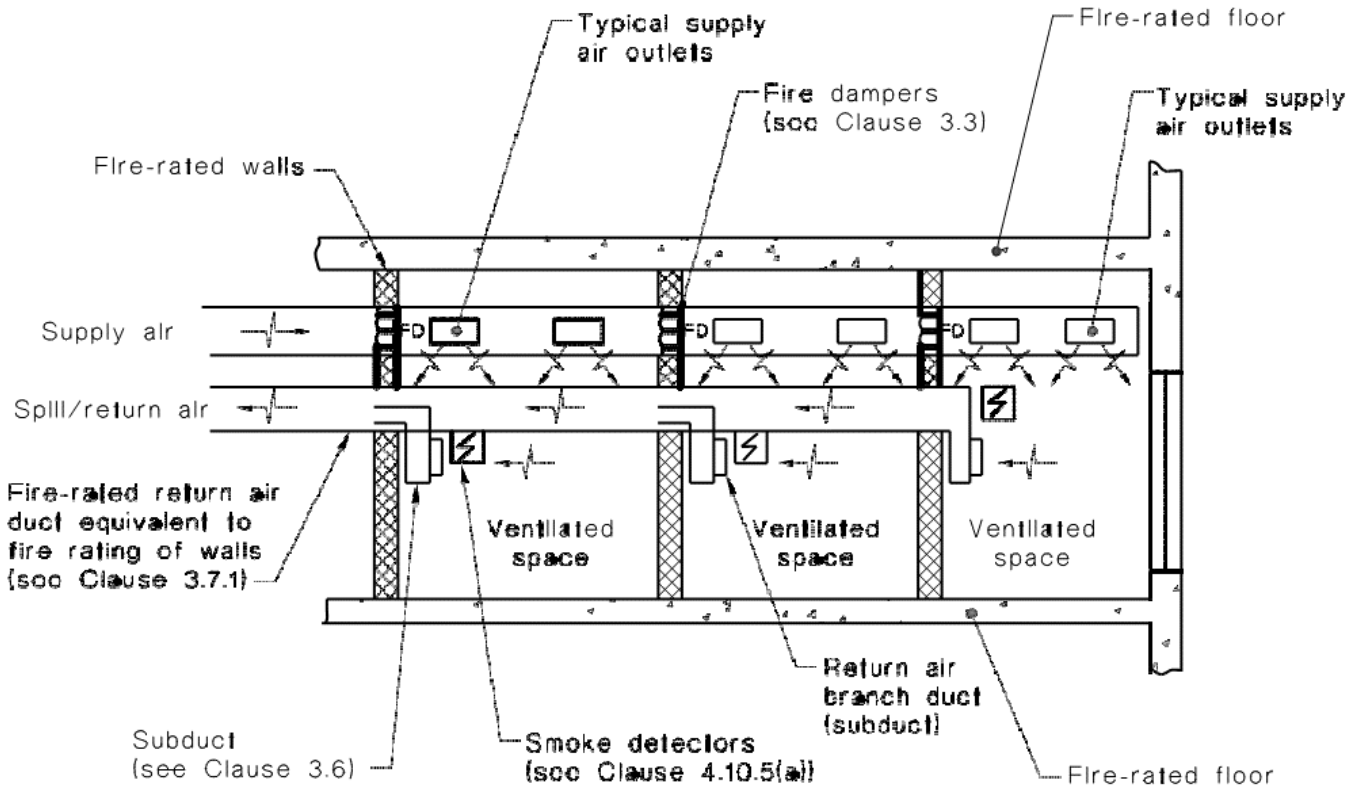


Figure 3.10 in AS 1668.1-1998

For compartments on Ground Level and upwards where shut down mode is proposed instead of pressurisation for the compartment(s), the pressure differential between the compartment in fire mode and a compartment in shut down mode shall be between 20 Pa and 100 Pa (discounting any pressure build up from a fire).

No zone smoke control is proposed for the basement level (with the exception of exhaust being provided from the kitchen and loading-dock).

FRNSW comment: As discussed in the FEBQ meeting, it is FRNSW understanding that the basement level is for non-patient uses only.
RED: Correct.

Non-patient care areas will be provided with a smoke detection and alarm system.

As the atrium is fitted with a bespoke smoke exhaust system it is not forming a part of the zone smoke control system. However, if the smoke detection system is activated in any other zone than the atrium smoke compartment, the mechanical supply air for the atrium smoke exhaust system shall operate at 100 %. Passive make-up air openings shall not open automatically. This will pressurise the atrium to a degree, however the system does not have to achieve a 20 Pa minimum pressure.

Floor	Comp. in fire mode	Departure from AS 1668.1-1998
Basement	B.1-B.4, B.7, B.8	Basement AHU's in shut down mode, i.e. no exhaust or pressurisation.
	B.5	Compartment B.5 in exhaust mode. All other compartments in the basement in shut down mode.
	B.6	Compartment B.6 in exhaust mode. All other compartments in shut down mode.
Ground – L7	All	All basement compartments in shut down mode.
Ground	All	0.4 in shut down mode.
	0.6	0.5A and 0.5B in shut down mode.
	0.8	0.7 in shut down mode.
Level 1	1.7B	1.7A in shut down mode.
Level 2	All	2.7A and 2.7B not served by central plant system and have separate FCUs. FCUs in 2.7A to supply outside air to this compartment when 2.7B is in fire mode. FCUs in 2.7B to supply outside air to this compartment when 2.7A is in fire mode.
	2.2	2.1A and 2.1B in shut down mode.
	2.1B	2.1A in shut down mode.
	2.3	All compartments on L1, L2 and L4 in shut down mode.
	2.6A	2.6B in shut down mode.
	2.6C	2.6D in shut down mode.
Level 3	3.1A	3.1B in shut down mode.
	3.1B	3.1A in shut down mode.
	3.1C	3.1A and 3.1B in shut down mode.
	3.5B	3.5A in shut down mode.
	3.4	3.5A, 3.5B and 3.6 in shut down mode.
Level 4	All	4.4 in shut down mode
	4.1B	4.1A and 4.1C in shut down mode.
	4.2C	4.2B and 4.2D in shut down mode.
	4.3A	4.3B in shut down mode.
Level 5	5.1B	5.1A, 5.1C and 5.2 in shut down mode.
	5.3B	5.3A, 5.3C and 5.2 in shut down mode.
	5.4A	5.4B and 5.4C in shut down mode.
	5.5C	5.5B and 5.5A in shut down mode.
Level 6	6.3A	6.3B in shut down mode. 6.3C to operate at 100 % outside air (but might not fully meet 20 Pa differential criteria).
	6.4C	6.4B in shut down mode. 6.4A to operate at 100 % outside air (but might not fully meet 20 Pa differential criteria).

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS compliant design)

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	10. Sprinkler system departures

Performance Requirement & DtS Clauses ⇩

DtS Clauses: Spec. G3.8, AS 2118.1-1999

Performance Requirements: CP2, EP2.2 EP1.4

Details of Departures from DtS Provisions ⇩

Departure 16 - Automatic sprinkler system not to fully comply with AS 2118.1-1999 due to:

- Maximum pressure at Basement Level is 1200 kPa instead of 1000 kPa
- Stop valves not provided to atrium sprinklers
- Sprinkler heads not provided at atrium roof level above void
- Sprinkler heads not provided electrical cupboards, UPS rooms and communications equipment rooms
- Only to provide wet system sprinkler head to bottom of lift shaft instead of dry system sprinklers to top and bottom of each lift shaft.
- Sprinklers not provided to external walkways/canopies.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	D		

Acceptance Criteria

Acceptance criteria ⇨	Sprinkler system performance not affected. Deletion of sprinklers not adding to risk of occupants being exposed to untenable conditions.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention not being negatively affected by variations.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Atrium fires will be discussed and assessed.

Proposed Alternative Solution and Trial Design Requirements ⇩

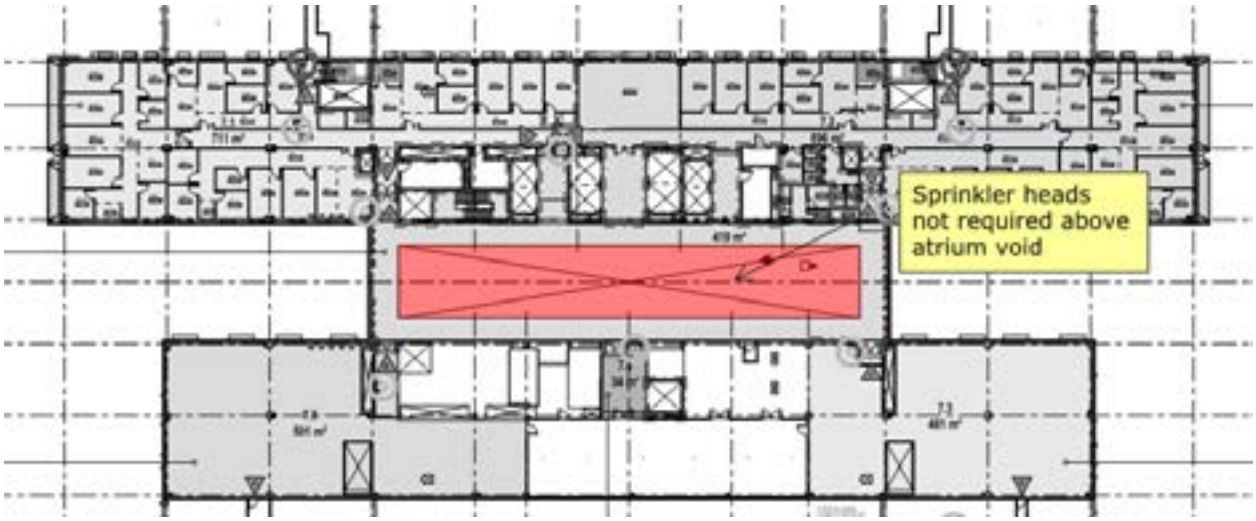
The sprinkler heads provided for the building will be required to be designed to work at a maximum pressure of 1200 kPa. This is also permitted in the 2006 version of the AS 2118.1 standard and is viewed as a technical departure as this version of the standard is not referenced by the BCA.

In the sprinkler system for the Northern Beaches Hospital, the sprinklers on each floor in the atrium will be part of the sprinkler zone on the same floor. Each such zone is provided with stop valve(s). As such, the atrium will technically be provided stop valves.

Sprinkler heads are not proposed in the atrium roof above the atrium void. The ceiling height from the bottom of the void (i.e. Ground Floor) is approximately 36 meters and as such it is very unlikely that a fire on the Ground Floor will activate these sprinklers due to low temperatures once the plume reaches the atrium ceiling.

FRNSW Comment: FRNSW notes the requirement for floor block plans to be provided in Clause 2.2.5 of AS2118.6-2012.

RED: Block plans to be provided.



Proposed deletion of sprinkler heads to atrium void

In lift shafts wet system sprinkler heads will be provided at bottom of the shafts instead of dry system type sprinklers. No sprinkler heads are to be provided at the top of each lift shaft.

FRNSW comment: As discussed in the FEBQ meeting, non-required detection will be provided at the top of the lift shaft in lieu of a sprinkler.

RED: Smoke detection will be provided.

FRNSW comment: The assessment should provide further justification for the deletion of sprinklers from the electrical cupboards, UPS and communication rooms. The assessment should detail room locations, fuel loads, potential for fire spread, etc.

RED: Justification will be provided in the FER.

External walkways/canopies on Ground Floor that connect to the main hospital building through physical building elements technically form a part of the hospital building and are therefore prescribed with sprinklers under the BCA DtS Provisions. The fire safety design includes deletion of the sprinklers to such external canopies/walkways. The external walkways/canopies are to be fully non-combustible.

FRNSW comment: The assessment should provide further detail on the locations, use, fuel loads, canopy sizes etc of the canopy areas.

RED: Justification will be provided in the FER which will discuss the likely paths of fire and smoke spread.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS compliant design)

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	11. Fire hydrant system departures

Performance Requirement & DtS Clauses ⇩

DtS Clauses: E1.3 (AS 2419.1-2005)
Performance Requirements: EP1.3

Details of Departures from DtS Provisions ⇩

Departure 17 - Fire hydrant system not to fully comply with AS 2419.1-2005 due to:

- Hydrant/sprinkler booster not being within sight of main entrance
- Fire hydrants to be in locked cupboards in mental health departments
- Fire hydrant shortfalls in compartments 2.1B and 3.2C
- Level 8 helipad being served by fire hydrant located at stair landing on level below.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	F		

Acceptance Criteria

Acceptance criteria ⇨	Fire brigade intervention not be delayed or negatively affected.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention not be delayed or negatively affected.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

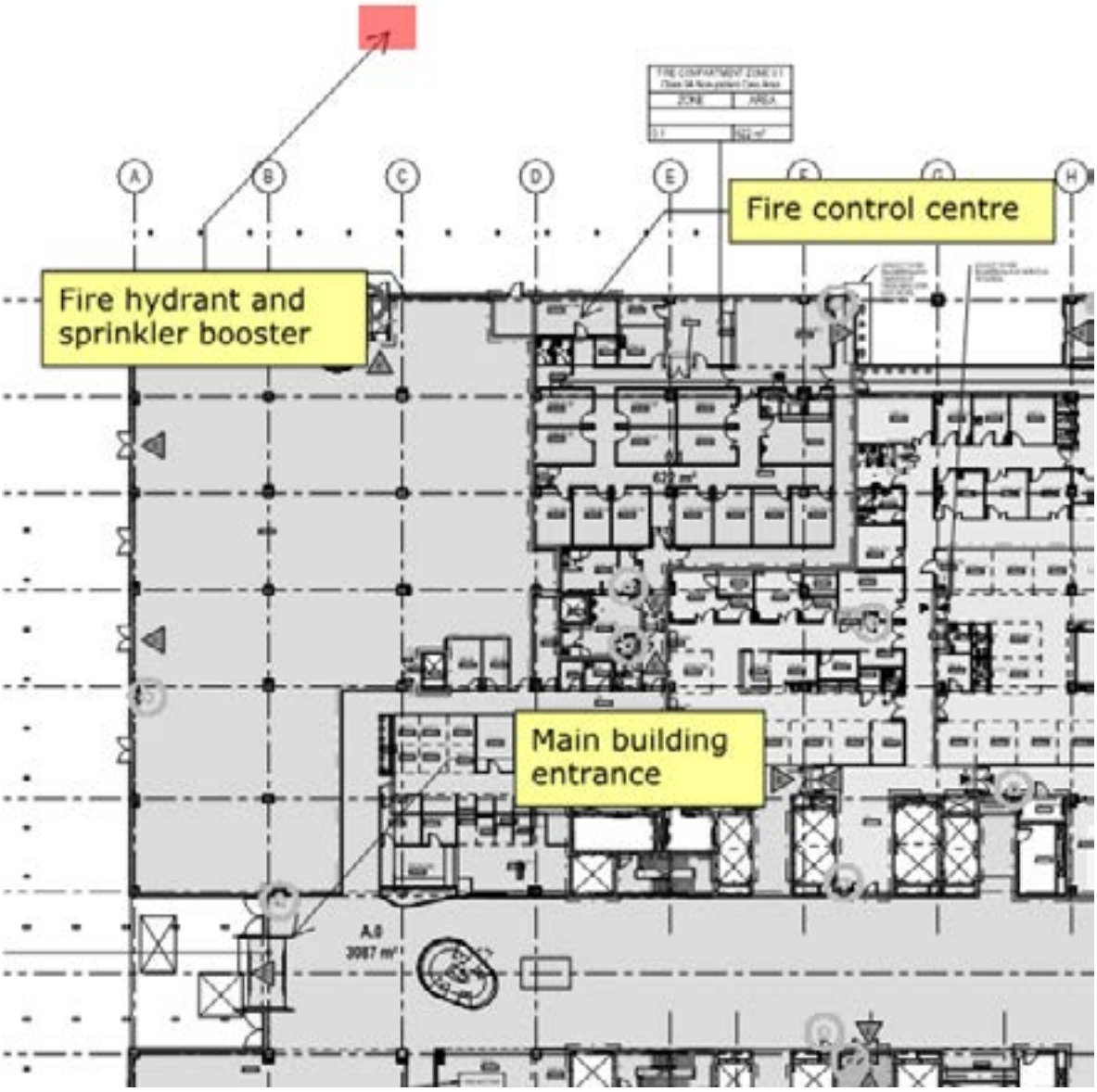
- Class 9a patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Class 9a non-patient care areas – Worst credible fire (medium t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a non-patient care areas – Robustness fire scenario (medium t^2 fire, max 2 MW, sprinklers assumed to fail)

Proposed Alternative Solution and Trial Design Requirements ⇩

The fire hydrant/sprinkler booster assembly is proposed to be located at Ground Floor level at the north side of the building near the fire control room.

FRNSW Comment: FRNSW were advised that the hardstand area for FRNSW appliances will be provided in accordance with Guide sheet no 5. The combined booster is proposed to be located on an internal roadway.

RED: Noted.

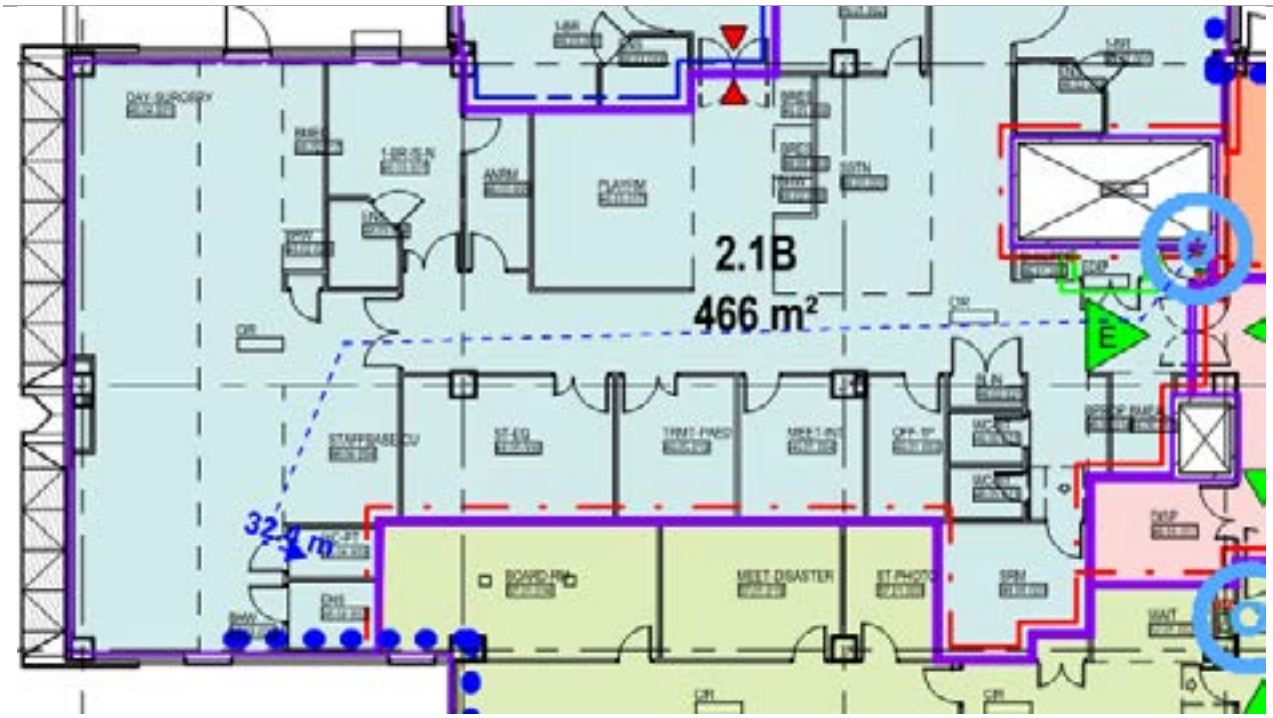


Approximate FH and sprinkler booster location in relation to main entrance

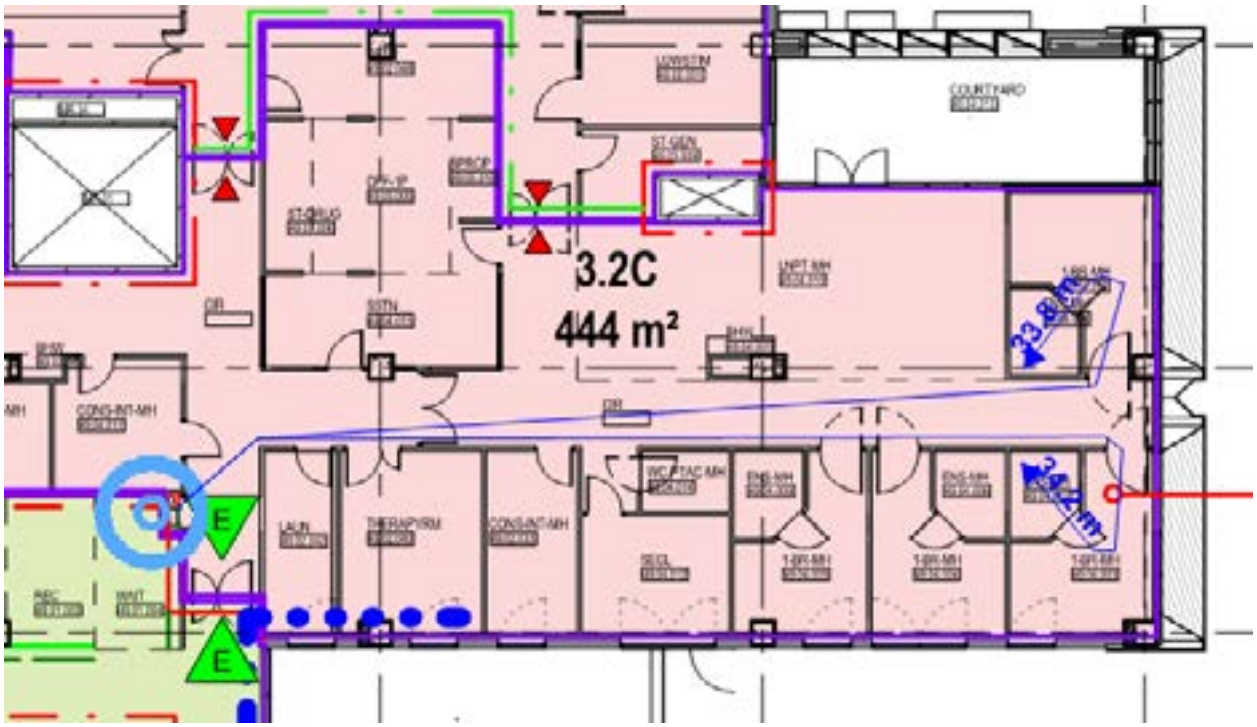
Fire hydrant and hose reel cabinets in mental health departments are permitted to be locked. A fire brigade 003 key shall open locks to such cabinets. Every member of staff in mental health departments shall have key access to the cabinets.

FRNSW Comment: Where a floor block plan is not located in accordance with Clause 2.2.5 of AS2118.6-2012, FRNSW recommends that a floor specific block plan be installed adjacent to the internal fire hydrants located within the fire isolated stairwells. The sole purpose of the block plans is to locate the *additional* internal hydrants on that level. The plans should be a minimum of A3 in size and be orientated to reflect the floor plate as being viewed facing the door with a "YOU ARE HERE" note
RED: Block plans to illustrate additional hydrants to be provided within fire stairs where this is required to achieve coverage.

Additional signage adjacent to the block plan in the stair stating that the *additional* hydrant on the floor plate is locked by a 003 lock. (Allowing FF to find a key or get second hose ready).
RED: Description that additional fire hydrant and fire hose cupboard is accessible with 003 key will be provided as described above.



Fire hydrant coverage departure in compartment 2.1B



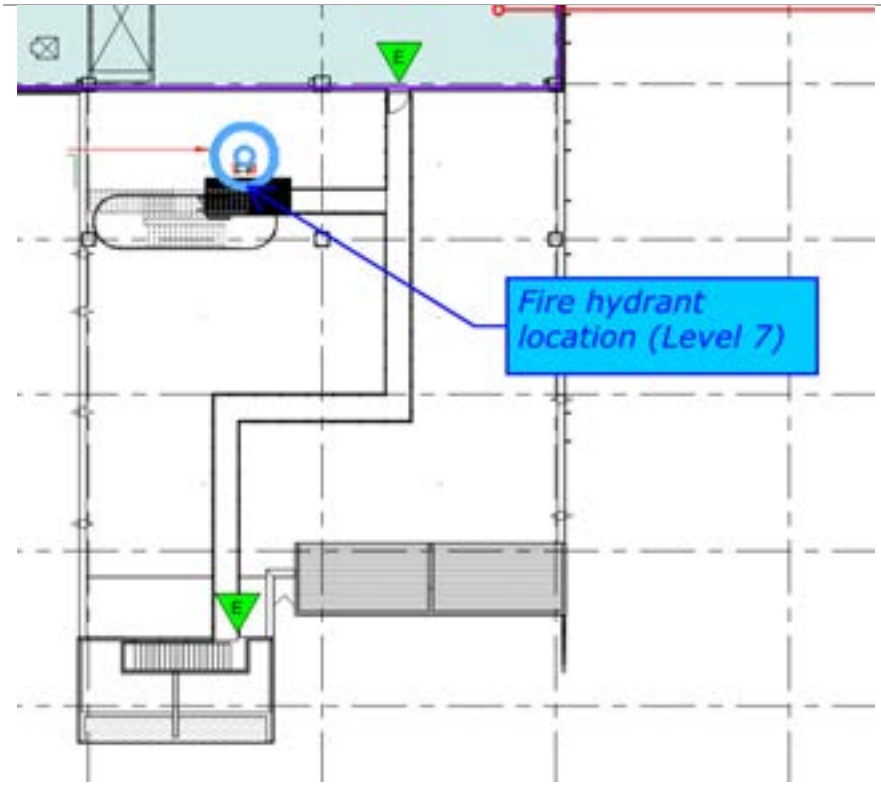
Fire hydrant coverage departure in compartment 3.2C

FRNSW Comment: FRNSW recommend the following should be detailed within the FER:

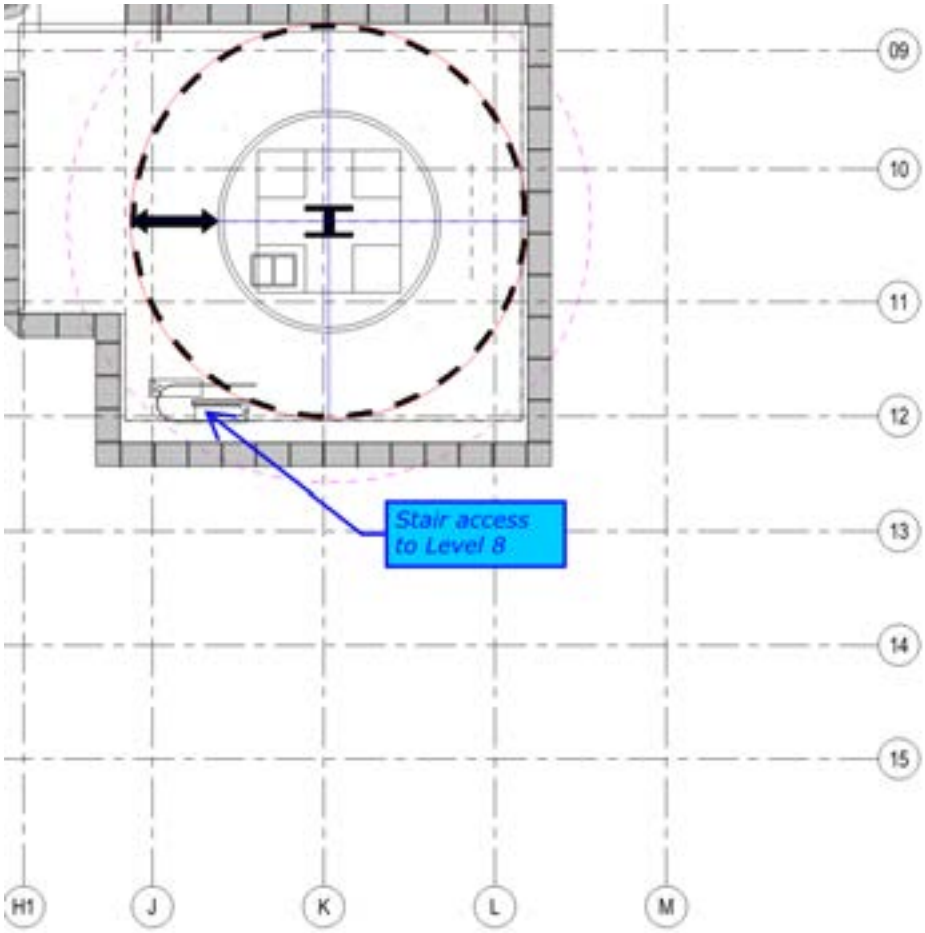
- How the shortfall in hose coverage will be addressed.
- What is the fire load in the areas

RED: This will be assessed in the FER.

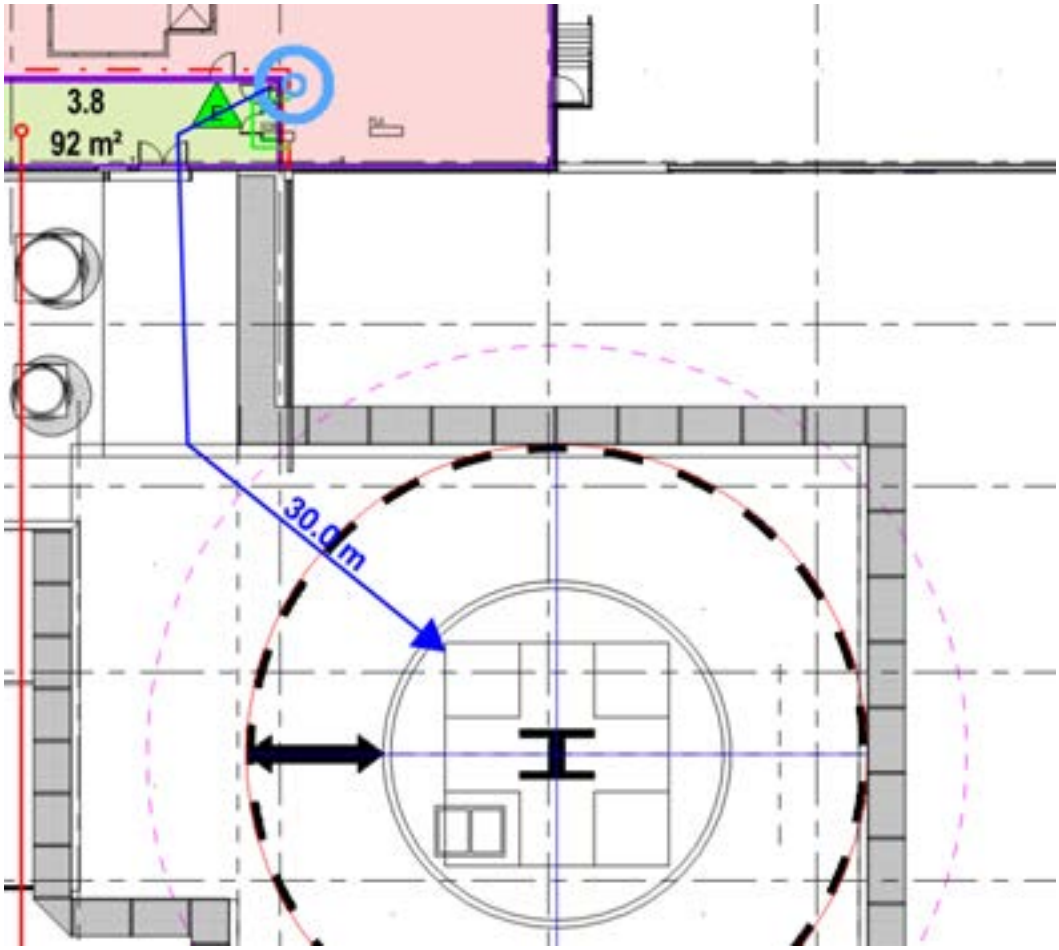
The Level 8 helipad is proposed to be served by fire hydrant located at stair landing on level below. The proposed solution is illustrated in the figures below.



Fire hydrant on Level 7



Stair access to helipad from Level 7



Fire hydrant coverage from lift lobby on Level 8

- FRNSW were advised at the meeting that there are two hydrant locations that can reach the helipad within 30m. Additionally there is proposed to be 50 L of foam to be provided. RED: Noted.
- FRNSW recommends that the location, type and quantity of foam be made available in the fire control centre through signage. RED: Noted.
- Additional fire safety measures and equipment such as the fire fighting foam required for the helipad be included in the Fire Safety Schedule, or, due to the application for Crown Building Works, please advise how all fire safety provisions will be documented and maintained (if differing to Clause 182 of the EP&A Regs). RED: Shall be included on ESM schedule.

In relation to the Helipad FRNSW provide the following comments for consideration:

- Details of the structure of the helipad to be provided in the FEBQ.
- The required design standards to be presented and referenced.
- FRNSW recommend the landing platform to be provided with a slight gradient to fall away from the hospital entry to prevent fuel spillage flowing into or towards the lobby;
- Bunding for the fuel to the capacity of the largest aircraft to use the facility;
- Run off through stormwater drains and containment within fuel/flame traps;
- Training of staff to deal with first response firefighting in jet fuel spillage incidents;
- Quantify the storage of portable foam extinguishing medium appropriate for the jet fuel capacity

RED: Refuelling of helicopter not permitted. Special drainage will be provided to collected leakage of fuel.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩
N/A (comparable to DtS compliant design)

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	12. Fire hose reel system departures

Performance Requirement & DtS Clauses ⇩

DtS Clauses: E1.4

Performance Requirements: EP1.1

Details of Departures from DtS Provisions ⇩

Departure 18 - Fire hose reel not to fully comply with AS 2441-2005 due to:

- Fire hose reels to be in locked cupboards in mental health departments
- ~~Fire hose reel shortfalls in compartment 3.4~~

FRNSW were advised in the FEBQ meeting that the above item is now DTS compliant.

- ~~Fire hose reels will be required to pass through a fire rated wall for the medical gases plant room~~

FRNSW were advised in the FEBQ meeting that the above item is now DTS compliant.

- Fire tank and pump room and building distribution room being provided with fire extinguishers instead of fire hose reels
- Level 8 helipad being served by fire hose reel located at stair landing on level below

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	C, D		

Acceptance Criteria

Acceptance criteria ⇨	Potential for occupant fire fighting not negatively affected.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Number of fires where fire brigade intervention is required shall not increase as a result of the departure.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 9a patient care areas – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a patient care areas – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Class 9a non-patient care areas – Worst credible fire (medium t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 9a non-patient care areas – Robustness fire scenario (medium t^2 fire, max 2 MW, sprinklers assumed to fail)

Proposed Alternative Solution and Trial Design Requirements ⇩

Fire hydrant and hose reel cabinets in mental health departments are permitted to be locked. Every member of staff in mental health departments shall have key access to the cabinets.

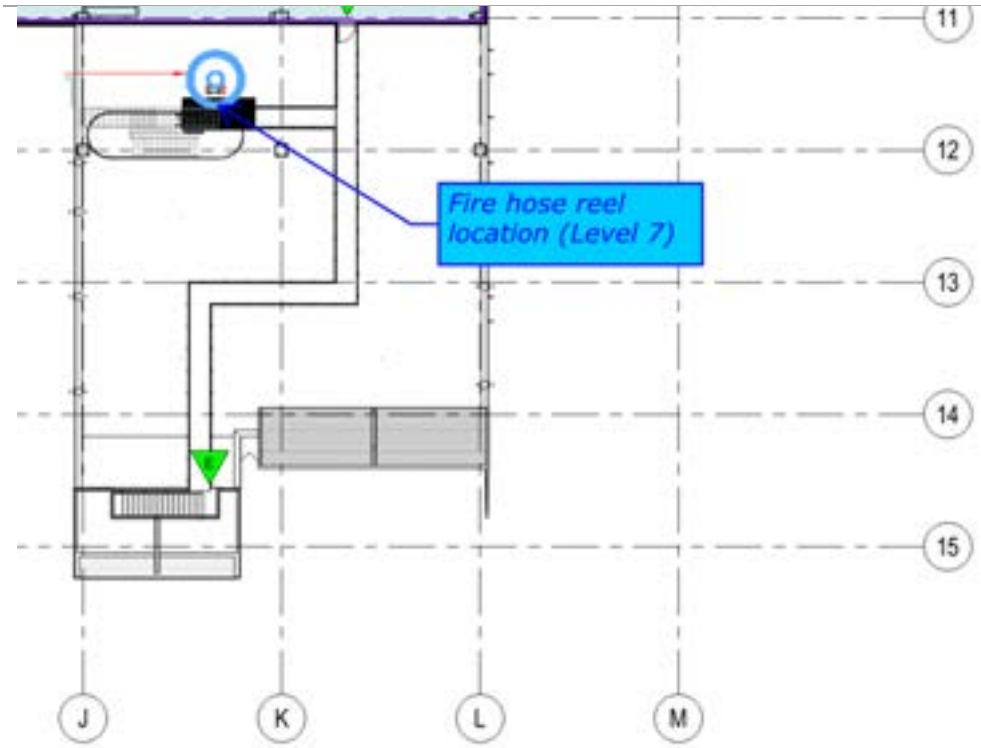
Fire extinguishers shall be provided in the:

- Fire tank and pump room (basement)
- Building distribution room (basement)

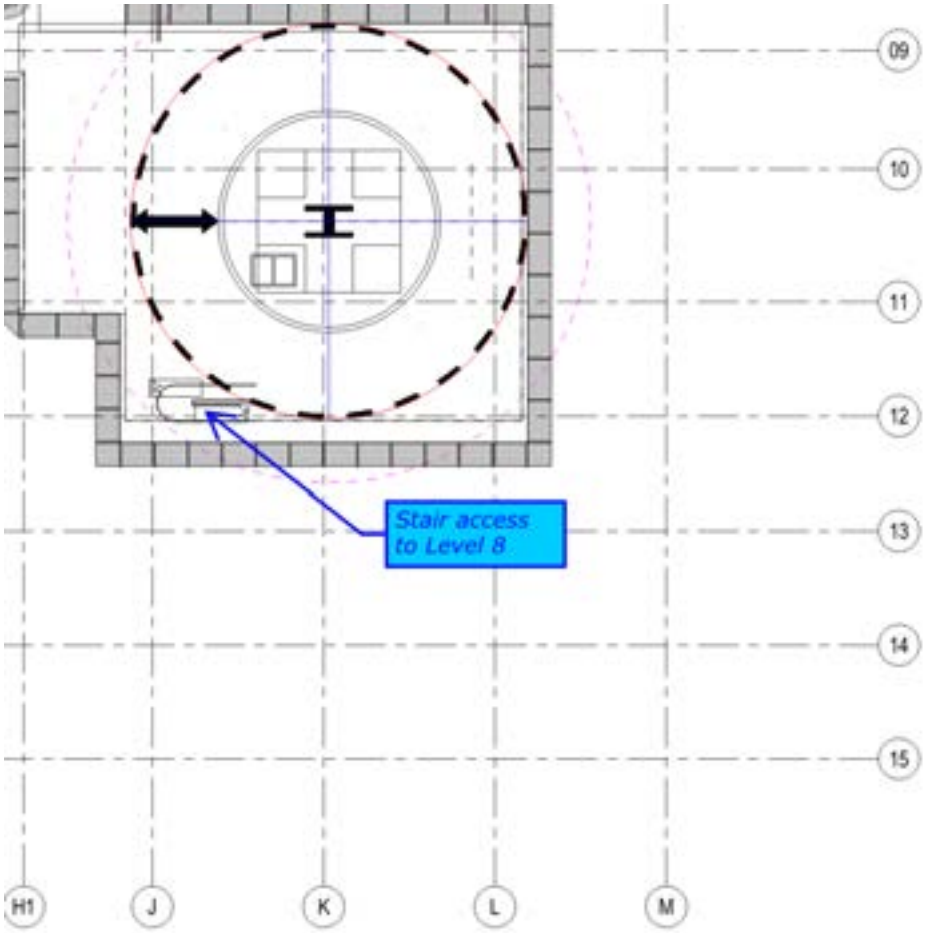
Fire hose reel shortfalls exist in compartment 3.4 with a maximum of 43 m instead of 30 m.

Fire hose reel coverage departure in compartment 3.4

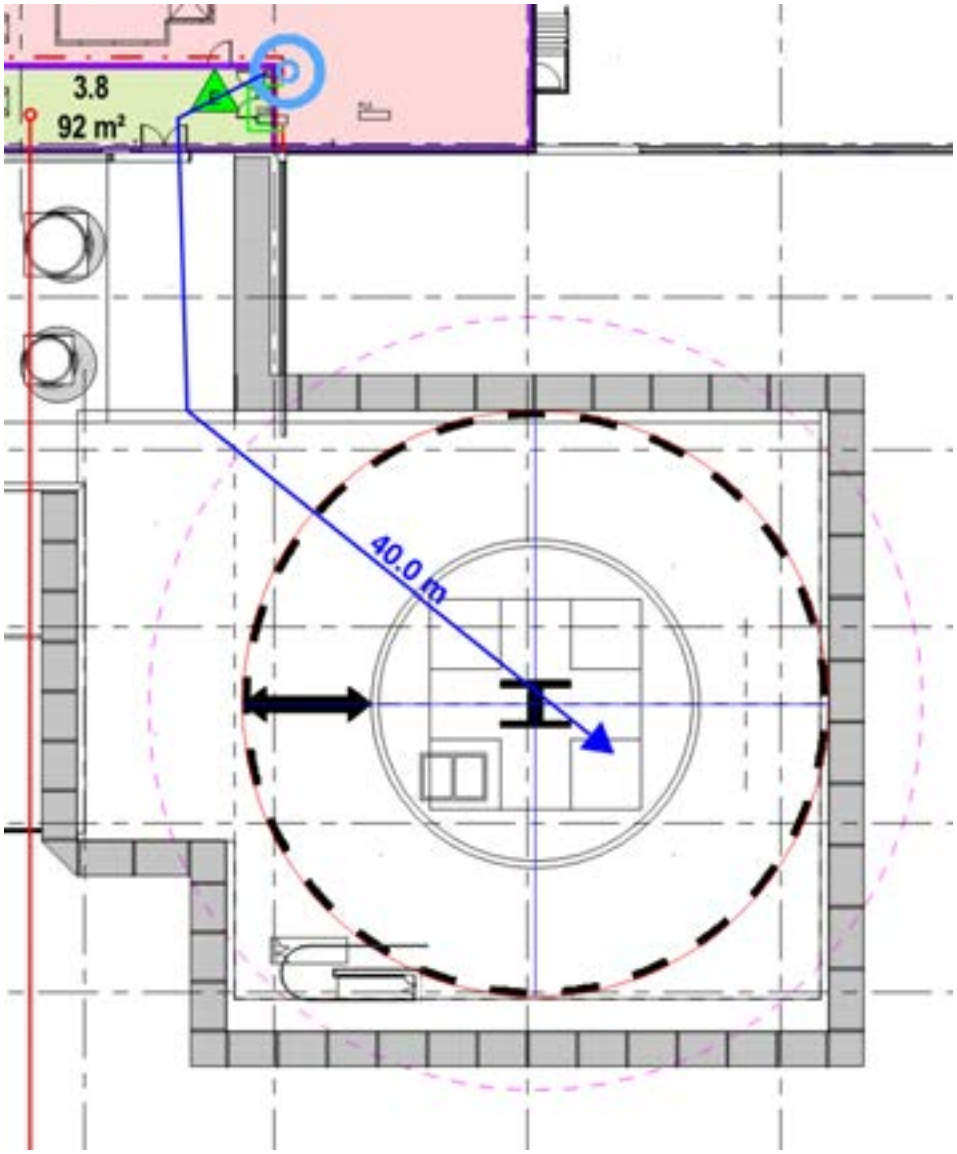
The Level 8 helipad is proposed to be served by fire hose reel located at stair landing on level below. The proposed solution is illustrated in the figures below.



Fire hose reel on Level 7



Stair access to helipad from Level 7



Fire hose reel coverage from lift lobby on Level 8

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩
N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability,	N/A

occupant characteristics, etc. ⇨	
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS compliant design)

FRNSW Comment: It was noted in the FEBQ meeting that cupboards are to be locked by 003 key, and all staff are to be provided with a 003 key.
RED: Correct.

FRNSW Comment: In principle support is provided subject to the analysis in the FER demonstrating compliance with the performance requirements of the NCC.
RED: Noted.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	13. Emergency warning system departures

Performance Requirement & DtS Clauses ⇩

DtS Clauses: E4.9, Spec. G3.8

Performance Requirements: EP4.3, EP4.2

Details of Departures from DtS Provisions ⇩

Departure 19 - Emergency warning or intercommunication system (EWIS) not to fully comply with AS 1670.4-2005 due to reduced sound intelligibility in plant rooms and loading docks.

Departure 20 - Delete the requirement for visual warning devices that displaying “EVACUATE” upon GFA.

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(c) ( )
Comparative or absolute? ⇨	Comparative		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	D, E		

Acceptance Criteria

Acceptance criteria ⇨	Occupants are provided with sufficient level of safety to be able to safely evacuate in the event of a fire.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention not negatively affected compared to DtS compliant design.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Atrium retail fire – Balcony spill plume scenario (fast t^2 fire, max 20 MW, sprinklers assumed to operate and limit fire growth)
- Atrium retail fire – Balcony spill plume scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)
- Atrium fire – Free burning fire scenario (fast t^2 fire, max 5 MW, no sprinklers able to limit fire growth)

- Class 7b loading dock – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 7b loading dock – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)

Proposed Alternative Solution and Trial Design Requirements ⇩

It proposed to delete the requirement for visual warning devices that displaying "EVACUATE" upon GFA in the atrium.

The sound intelligibility will be reduced in plant rooms and loading docks. A sound intelligibility below 0.5 STI is acceptable if a panel of listeners are able to perceive voice intelligibility during realistic use of these environments. Details of these intelligibility commissioning requirements will be produced in the FER. Visual warning strobes will be provided in these areas as additional measures to notify occupants of the fire hazard. The enhanced smoke/heat detection system will provide additional safety for these areas.

The atrium walls and doors will be fitted with woven vinyl and timber facings to make the doors blend in with the walls. Such doors used as exits must be provided with a sign stating “EXIT DOOR” in capital letters with a height no less than 50 mm against a white or silver contrasting background. Above each door used as an exit there shall be emergency signage in the form of an illuminated exit sign.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

N/A

Modelling/Assessment Tools

Zone? Provide details on “Zone Modelling Inputs” form ⇨	N/A
CFD? Provide details on “CFD Modelling Inputs” form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS compliant design)

FRNSW Comment: In principle support is provided subject to the analysis in the FER demonstrating compliance with the performance requirements of the NCC.

RED: Noted.

Departures from DtS Provisions

Repeat this 1 page section as required to identify all the non-compliance issues associated with the project. Please set each new DtS Provision as a new page.

Title of Departure from DtS Provisions & Title Number ⇨	14. Smoke detection system departures

Performance Requirement & DtS Clauses ⇩

DtS Clauses: E2.2
Performance Requirements: EP2.2

Details of Departures from DtS Provisions ⇩

Departure 21 - Automatic smoke detection and alarm system not to fully comply with AS 1670.1-2004 due to:

-
- Thermal detectors to be provided in external fire stairs instead of smoke detectors
- Smoke detectors will be deleted from ceiling voids greater than 800 mm in depth not used as return air paths

Assessment Method

A0.5 ⇨	(b) (i)	**A0.9**	(b) (ii)
Comparative or absolute? ⇨	Absolute		
Qualitative or Quantitative analysis? ⇨	Qualitative		
Deterministic or probabilistic? ⇨	Deterministic		
IFEG sub systems used in analysis? A B C D E F? ⇨	D		

Acceptance Criteria

Acceptance criteria ⇨	Smoke detection system not negatively affected.
Factors of safety? ⇨	N/A
Fire brigade intervention & tenability criteria? ⇨	Fire brigade intervention not negatively affected.

Fire Scenarios and Design Fire Parameters (1.2.11) (including fire sizes, growth rates, etc.) ⇩

Fire scenarios that will be evaluated are the following:

- Class 7b loading dock – Worst credible fire (fast t^2 fire, max 5 MW, sprinklers assumed to operate and limit fire growth)
- Class 7b loading dock – Robustness fire scenario (fast t^2 fire, max 2 MW, sprinklers assumed to fail)

Proposed Alternative Solution and Trial Design Requirements ⇩

In loading docks thermal detectors will be provided instead of smoke detectors. The purpose is to minimise the number of false alarms. Exhausted gases from vehicles in the loading dock are expected to cause spurious alarm signals if smoke detectors were used.

Thermal detectors will also be provided in the external fire stairs instead of smoke detectors. The location of the hospital has been identified as being in a bush-fire risk area. Therefore, in the event of a bush-fire, smoke from the bush-fire could be transported to the external fire stairs and activate a smoke detector. Thermal detectors will therefore be provided to minimise false alarms.

In ceiling voids greater than 800 mm in depth and where the ceiling void is not used as a return air path, smoke detectors will be deleted. The smoke detectors in such spaces constitute a major maintenance issue for the hospital due to the frequent testing regime for smoke detectors. Such testing will cause disruption to the care delivered by the hospital and inconvenience to patients and staff. The ceiling spaces are provided with sprinkler coverage instead of smoke detection. Sprinkler heads are not prescribed to such spaces under the BCA DtS provisions.

Redundancy/sensitivity analyses proposed? <u>If NO, why?</u> (the type of analysis needs to be justified) ⇩

N/A

Modelling/Assessment Tools

Zone? Provide details on "Zone Modelling Inputs" form ⇨	N/A
CFD? Provide details on "CFD Modelling Inputs" form ⇨	N/A
Evacuation? Provide details, e.g. program/model, distribution of occupants, assumed exit availability, occupant characteristics, etc. ⇨	N/A
Other? Provide details ⇨	N/A

FBIM analysis carried out? If not, justify how fire brigade intervention will be quantified or addressed. ⇩

N/A (comparable to DtS compliant design)

FRNSW comment: With regard to the deletion of detectors from ceiling voids, FRNSW provide in principle support on the basis that sprinkler coverage is provided, and subject to the analysis in the FER demonstrating compliance with the performance requirements of the NCC.
RED: Sprinkler protection will be provided to the ceiling spaces.

FRNSW comment: With regard to the use of thermal detectors in lieu of smoke detectors in the external fire stairs and loading docks, FRNSW provide in principle support subject to the analysis in the FER demonstrating compliance with the performance requirements of the NCC.
RED: Noted.

Standards of Construction, Commissioning, Management, Use & Maintenance (1.2.13)

Commissioning

Systems should be commissioned according to relevant Australian Standards and commissioning documentation maintained on site for future perusal.

How will this be achieved, confirmed and maintained? (Where new installations are joined to older installations should be specifically addressed) ⇩

Systems will be commissioned according to relevant Australian Standards and commissioning documentation maintained on site for future perusal.

Management & Use Programs

For example; ECO as per AS 3745, sterile/low fuel load areas. How will this be achieved, confirmed and maintained? (listed on FSS as essential or critical fire safety measure) ⇩

An emergency management plan shall be developed in accordance with AS3745-2010. Staff training shall also be in accordance with the standard. Training shall include:

- Checking all rooms for occupants.
- Manual fire fighting, if properly trained.
- Assisting patients on the Ground Floor to evacuate directly to outside where possible, or through a smoke/fire wall away from the fire.
- Where multiple patients require evacuation from the compartment where fire has been located, one or preferably two staff members should collect patients from their bedrooms and assist them through the fire door into the adjacent fire compartment before returning to collect the next patient. Other staff members should assist with taking patients downstairs and outside.

Management procedures shall be implemented to ensure that the exits are available and that the exit paths are free (i.e. no objects impeding/blocking egress).

Combustible materials are

- not permitted on the Level 6 roofs used for egress
- to be limited in the Ground Floor atrium
- within combustible free zones adjacent fire shutters (only applies to non-fixed materials)

Fire wardens shall regularly carry out inspection rounds to maintain free exits and limit combustible materials.

Maintenance

How will this be achieved, confirmed and maintained?

Final FER to be kept on site. A plain English Alt Sol summary to be provided (adjacent to FIP etc).

Details of Alternative Solutions to be included on the FSS ⇩

The Required Fire Safety Measures listed in the Fire Engineering Report are to be included in the Fire Safety Schedule and implemented into the design.

Final FER are to be kept on site and a plain English Alt Sol summary to be provided in fire control room.

Management procedures shall be implemented to ensure that all Essential Fire Safety Measures are maintained and regularly inspected in accordance with AS1851-2012.

Any in principle support extended for alternative solutions through consultation is contingent upon all assumptions, analyses and conclusions in the final Fire Engineering Report (FER) being fully justified and referenced as appropriate and the FER clearly demonstrating, through robust engineering and analysis, that all criterion in the relevant Performance Requirements have been satisfied to the extent required by the agreed Acceptance Criteria.

FRNSW Final Summary

Final FRNSW response to any queries relating to response to FEBQ. ⇩

Submitting Your Application

This application requires all mandatory supporting documents (denoted by 'M' in the table below) to be provided for the application to be complete and accepted by FRNSW for review and assessment. An incomplete application will be rejected with notification (email) and will require re-submission.
Applications should also be provided with additional supporting documents (denoted by 'A' in the table below) for expedient review and assessment. FRNSW may not be able to satisfactorily process this application if all required supporting documentation is not provided.

Checklist

☒ A completed Fire Engineering Brief Consultation Questionnaire form
☒ Building plans and specifications
☒ Either a BCA Report, or a letter from PCA stating that all non-compliances have been identified by the PCA
☐ Development Application Conditions of Consent (for existing buildings only)
☒ Hydrant/Sprinkler Block Plan/schematics where they have been developed
☒ CFD Modelling Inputs Form (if applicable)
☐ Zone Modelling Input Form (if applicable)

Thoroughly review this application and ensure all sections are completed. It is your responsibility to ensure that all necessary information is provided to FRNSW when you submit this application. Any application submitted without necessary documentation will be returned for re-submission.

Summary of scheduled charges

Clause 54 of the Fire Brigades Regulation 2008

FRNSW charge for the provision of services performed in connection with statutory fire safety as per the schedule of charges identified in Clause 54 and Schedule 2 of the Fire Brigades Regulation 2008.

What do you get?

Either:

- No Meeting, with a written report based on your FEBQ
- Telephone Meeting, with a written report based on your FEBQ and telephone conversation
- Face-to-face Meeting, with a written report based on your FEBQ and face-to-face meeting

Costs

Report Fee (which includes meeting time):
$2600 per day. The amount of $2,600 is the charge prescribed for each day (or part of a day) spent by the Commissioner or a fire brigade member providing advisory, assessment or consultancy services (for which a fee is not otherwise prescribed by this clause) in respect of:

- major infrastructure development (within the meaning of Part 3A of the Environmental Planning and Assessment Act 1979), or
- Crown building work (within the meaning of section 109R of the Environmental Planning and Assessment Act 1979), or
- other development.

Note:

- *GST is payable on all charges.*
- *An invoice will be sent following the FRNSW report/advice being issued, and must be paid as per the terms on the invoice (e.g. within 14 days).*
- *The applicant can seek to have the charges waived or reduced under Section 43(b) of the Fire Brigades Act 1989. Any such application must be made in writing to the Commissioner of FRNSW.*
- *Meeting charges are applied for each fire brigade member required to attend at the meeting. A minimum of two fire brigade members will be provided for every meeting (e.g. typically an engineer and a Fire Safety Officer).*
- *FEBQ charges relate only to FEBQ stage. Submission of FEBQ at IFSR stage will not incur a further charge.*

FRNSW Accounts Receivable

Name	Fire & Rescue NSW	**Address**	227 Elizabeth Street, Sydney NSW 2000
Phone	(02) 9265 2849	**Mail Address**	PO Box A249, Sydney South NSW 1232
Fax	(02) 9265 2989	**Email**	AccountsReceivable.NSWFB@fire.nsw.gov.au

Bank Details

Bank	Westpac Bank	**Branch Address**	NSW Government Department Level 3, 275 Kent Street Sydney NSW 2000
Account Name	Fire & Rescue NSW Operating Account		
BSB Number	032-001		
Account Number	205223		