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BCA CAPABILITY REPORT

FOR

Hassall Ltd

PREMISES

Penrith Health Campus Redevelopment

ICU

Date: 27 August 2009

Ref. No. J090142-ICU-3

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1.0 Executive Summary

1.1 – Report purpose

This report has been prepared to identify the extent of compliance achieved by the architectural documentation depicting the proposed construction works against the relevant provisions of the Building Code of Australia (BCA) 2009. The works will be carried out to the North Block of the existing Nepean Hospital.

The subject works are required to comply with the technical provisions of the State's building laws under Section 116G of the Environmental Planning and Assessment Act 1979.

This report provides guidance as to the necessary provisions that must be adhered to as part of the approval process.

1.2 – Report methodology

This report has been prepared on the basis of architectural documentation prepared by Hassall reflecting the proposed works as detailed in Part 6.0 of this report.

For the purposes of this report, the various ramifications of the construction of the proposed training area above the new ICU module have not been considered.

1.3 – Recommendations

To achieve compliance with the relevant provisions of the Building Code of Australia it is recommended that the following matters be addressed.

(i) Alternative solutions must be evaluated by a fire safety engineer with regard to the following aspects of the design

a. The provisions for egress via the non-fire-isolated stairway serving the Level 3 area against BCA Performance Requirements DP4 & EP2.2

b. The provision of horizontal exits providing egress into fire compartments not having direct egress to open space against BCA Performance Requirement DP4.

c. The omission of sprinklers and zone smoke control from the design against BCA Performance Requirement EP2.2

d. The construction of the existing external wall of West Block adjacent to new building against BCA Performance Requirement CP2.

e. The configuration of the fire wall separation between South Block and North Block against BCA Performance Requirement CP2

(i) Separation in the form of fire wall construction and the protection of openings as appropriate must be provided between fire compartments and buildings to the requirements of BCA Part C2.

(ii) All exit doorways and horizontal exits must swing in the direction of egress

(iii) Statutory fire safety measures must be provided to the building as detailed in Section 4 of this report

(iv) All proposed building elements must achieve compliance with the requirements of BCA Section J

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2.0 Property Description

2.1 – Location

The proposed works will be completed to the ICU area on Levels 2 & 3 of the existing North Block of Nepean Hospital, the hospital being situated at Derby Street, Kingswood.

2.2 –Description of works

The proposed works comprise the construction of a new single level addition to the existing ICU area, the refurbishment and alteration of the existing ICU and SSVU & ICU Support areas and the construction of a Level 3 research & training facility.

2.3 – Building Description

Use/Classification	The building area the subject of this report has been assessed as being classified as follows • Class 5 – Administration offices • Class 9a – Health care building – treatment area • Class 9b – Training assembly areas
Rise in Storeys	The existing building has a rise of two (2) storeys. The proposed works will result in a building having a rise in storeys of three (3). Note that the existing building is separated from adjoining buildings having a rise in storeys in excess of 2 by fire walls complying with the requirements of BCA Clause C2.7. The proposed works compromise the effectiveness of that construction as detailed under Section 3.1 of this report.
Type of Construction	Type A construction required
Floor Area	The maximum permissible floor area of a fire compartment 5,000m² Additional compartmentation requirements are contained in BCA Clause C2.5.
Effective Height	The building has an effective height of less than 25m.

3.0 Building Code of Australia Assessment

3.1 – Fire Resistance (BCA Section C)

Item	Comment
Fire Resistance	The new structural walls and columns must achieve a fire resistance level to comply with the requirements of Clause C1.1 and Specification C1.1, for building of Type A construction. Generally this will require a fire rating of 2 hours to all structural elements. By virtue of the additional level, the type of construction required for North Block will be increased to Type A Construction. This increase in the construction type incorporates a necessity to provide a 120/120/120 to floors within the building. A visual inspection of the existing building indicates that there is a likelihood that the existing structure already achieves this rating. The lightweight roof need not achieve an FRL under the concession contained in Clause 3.5 of BCA Specification C1.1. With the exception of the 120/120/120 fire walls, the internal structure of the building situated immediately below the lightweight roof of the building need not achieve an FRL under the concession contained in Clause 3.7 of BCA Specification C1.1.
Compartmentation and Separation	The existing building is separated from the adjoining hospital buildings by fire walls having an FRL not less than 120/120/120 that are continuous through the full height of the building. In the areas where the proposed additional building area will abut the existing West Block, the fire wall dividing the buildings must extend at least 6m above the roof level of the proposed North Block addition, or to the underside of the West Block roof covering, whichever is lower. Any openings in that portion of the wall must be protected in accordance with BCA Clause C3.5. The proposed construction of the ICU will generally incorporate construction as necessary to achieve the necessary separation however the following limitations will be applicable (i) The existing construction of West Block may not be capable of achieving the necessary separation for that part of the building over the proposed new ICU. (ii) The extension of the ICU over Level 1 of the South Block building compromises the vertical continuity of the fire wall separating the north block and south block buildings.

	(iii) The wall that acts as the interface between North Block & South Block (taken to be the wall bounding the ICU areas and the new corridor) contains large window openings that will not be able to achieve the necessary insulation fire rating of 30 minutes without the use of fire rated glass. The design of the proposed fire wall separation of buildings, whilst not complying with the deemed-to-satisfy requirements of the BCA, may be acceptable where verified by a fire safety engineer against the provisions of BCA Performance Requirement CP2. The patient care areas will be separated into fire compartments of less than 2,000m² by walls having an FRL not less than 120/120/120. This compartmentation is achieved. All fire walls must be constructed to the requirements of BCA Clause C2.7. All door and window openings that are adjacent to an adjoining fire compartment must be protected by fire doors or drenchers as appropriate to the requirements of BCA Clause C3.3 & C3.4. This protection is required regardless of whether or not the adjacent wall achieves an FRL. This protection may be omitted as an alternative solution where the adjacent wall achieves an FRL that is sufficient to ensure that the transfer of fire will not occur via the opening in question. The proposed treatment area compartmentation must incorporate separation into areas of less than 1,000m² by smoke walls as required Smoke proof walls and any associated openings must be constructed to the requirements of BCA Specification C2.5. Smoke doors and fire doors must be installed to comply with BCA Specification C3.4 and AS 1905.1-2005.
Openings in fire rated elements for service penetrations	Services penetrating fire rated elements of the building must be protected to the requirements of BCA Clause C3.15 and Specification C3.15. The construction of lightweight fire rated walls containing service penetrations for medical gases and other equipment are to be provided with protection as appropriate to maintain the fire resisting performance of the wall.

Openings in fire rated walls	All fire doors located within fire walls are to achieve an FRL not less than -/120/30. All fire doors located in fire rated walls other than fire walls must achieve an FRL for the integrity criterion (middle number) not less than the fire rating required for the wall. Where fire doors are to be provided as automatic closing doors, that automatic closing operation must be activated by a smoke detector located within 1.5m of each side of the door as well as the detection system in either of the fire compartments located on each side of the door. Doors provided to fire isolated exits must achieve an FRL not less than -/60/30.
Fire hazard properties	The fire hazard properties of wall and floor linings are to comply with Specification C1.10 and C1.10a.

3.2 – Access & Egress (BCA Section D)

Item	Comment
Number of exits required, exit travel distance and distance between alternative exits	The following exit travel distance requirements are applicable to the building: <u>Administration areas</u> Maximum of 20m to a point where a choice of travel in different directions to alternative exits is available – Complies Maximum distance of travel of 40m to the nearest exit and maximum of 60m between alternative exits – will comply with the provision of horizontal exits. <u>Patient care areas</u> Maximum of 12m to a point where a choice of travel in different directions to alternative exits is available – Complies Maximum distance of travel of 30m to the nearest exit and maximum of 45m between alternative exits – will comply with the provision of horizontal exits. The proposed exit system will utilise a number of horizontal exits formed through the construction of fire walls that compartment the patient care areas. The horizontal exits require the following (i) The fire walls in which the horizontal exits are situated must be constructed to the requirements of BCA Clause C2.7. (ii) The exit doorways must swing in the direction of egress <u>Non-fire-isolated stairway to Level 3 training room</u> The total distance of travel, via the non-fire-isolated stairway, to open space exceeds 80m and as such does not comply with BCA Clause D1.9 (c). The discharge point of the non-fire-isolated stairway is located more than 40m from a doorway being an exit to open space. It is recommended that where the egress system cannot be redesigned to achieve a compliant exit system, the proposed design should be reviewed by a fire safety engineer against BCA Performance Requirements DP4 & EP2.2.
Dimensions of exits	The dimensions of the proposed exits generally comply with the requirements of BCA Clause D1.6. Any horizontal exit doorway serving the patient care area must have a clear width not less than 1250mm.

Horizontal exits	BCA Clause D1.11 permits the use of horizontal exits within a Class 9a building where the adjacent fire compartment is provided with at least one exit that is not a horizontal exit, being either an egress stairway or an exit direct to open space. The likely compartmentation will generally comply with this requirement however there are likely to be circumstances where the horizontal exits provide egress into fire compartments that do not contain an exit other than a horizontal exit. The guide to the BCA produced by the Australian Building Codes Board indicates that the reason for this requirement is to ensure that occupants that egress from a fire affected compartment do not need to re-enter that fire affected compartment in order to escape the building. Notwithstanding this technical aspect of non-compliance, egress will be available to a compliant exit other than a horizontal exit without having to re-enter the compartment from which the occupant is seeking to egress. As such, whilst a technical non-compliance exists the intent of the clause is achieved and the design will be assessed as being compliant.
Egress Doors	All exit doorways and doorways in the path of travel to an exit are swinging doors as specified by BCA Clause NSW D2.19. All doorways servings as exits must swing in the direction of egress. As such, it may be necessary for horizontal exit doors to be installed as dual-swing doors.
Stairway design	The non-fire-isolated stairway serving the Level 3 research & training area must be constructed of concrete or steel no less than 6mm thick. The stairway must have goings and risers designed to the requirements of BCA Clause D2.13.
Balustrades and handrails	Balustrades complying with BCA Clause D2.16 must be provided to all stairways and other areas where occupants may fall more than 1m. Handrails must be provided to at least one side of all corridors used by patients.
Latches	Latches to exit doors and doors in the path of travel to an exit are to be operable without a key with a single handed downward or pushing action on a single device in accordance with BCA Clause D2.21.

	For double-leaf doors this requirement is only applicable for one of those leafs provided that the other leaf is no held closed by a locking mechanism and is readily openable. Where special arrangements are made for security within the building the doors may be unlocked by the operation of a fail-safe control switch, not within a protective enclosure or by hand by a person specifically nominated for the task. Doors may also be automatically unlocked by a fail-safe device on activation of a detection system installed within the building.
Access for people with disabilities	Access must be provided to the building to the degree recommended by the appointed accessibility consultant.

3.3 – Services and Equipment (BCA Section E)

Item	Comment
Hydrant system	The existing fire hydrant service must be extended to serve the proposed new areas of the building. Coverage to the refurbished areas of the building must be maintained.
Fire hose reels	Fire hose reels must be provided to serve the proposed new areas of the building. Coverage to the refurbished areas of the building must be maintained. Fire hose reels must be located within 4m of an exit in a location that provides full coverage to the building without having a fire hose pass through a fire or smoke door.
Sprinklers	Not applicable
Portable Fire Extinguishers	Portable fire extinguishers are to be provided as appropriate to the fire risk in accordance with the requirements of AS2444-2001.
Smoke Hazard Management	The building must be provided with a smoke detection and alarm system complying with BCA Specification E2.2a and AS 1670.1-2004. The mechanical system serving the area must be automatically shut-down on activation of the smoke detection system. The existing zone smoke control system serving the South Block must be extended to serve those parts of the proposed building that are situated on the South Block side of the fire wall separating the North & South Blocks. Resulting from the proposal to construct consulting rooms & training rooms and a plant room to Level 3 above the existing ICU in North Block, the building as proposed will contain three storeys. The additional area to Level 3 will not be occupied by patients that will require assistance and as such need not be classified as a Class 9a health care building. The area in question will be classified as being Class 5 & 9b and will have a floor area of approximately 600-700m².

	The Building Code of Australia requires a Class 9a building containing more than 2 storeys to be provided with either of the following: a) A sprinkler system; or b) A zone smoke control system In this case, whilst the building contains more than 3 storeys and is predominately Class 9a, the additional area, making up the entirety of the third storey of the North Block building, will not be classified as Class 9a. Were the remainder of the building to have a similar classification to the area in question the BCA would not require the provision of the services in question. It is proposed that the current design (having sprinklers and zone smoke control omitted) be evaluated against the provisions of BCA Performance Requirement EP2.2 on the basis that the proposed use (being Class 5 & 9b) and configuration of that additional area does not result in such a danger to fire safety that it warrants the provision of sprinklers or zone smoke control to the entirety of the North Block building.
Emergency Lighting	Emergency lighting must be provided to all areas in accordance with BCA Clause E4.4 and AS2293.1-2005.
Exit Signs	Exit signs must be provided within the building to suit the proposed layout in accordance with BCA Clause NSW E4.6 and AS 2293.1-2005.
Sound Systems and Intercom Systems for Emergency Purposes (formally EWIS)	The building must be provided with a 'Sound system and intercom system for emergency purposes' to the requirements of AS 1670.4-2004.

3.5 – Health & Amenity (BCA Section F)

Item	Comment
Damp proofing	All wet areas must be provided with waterproofing to the requirements of AS 3740-2004.
Sanitary facilities	Staff sanitary facilities have been provided to the requirements of BCA Table F2.3.
Ventilation	Ventilation must be provided to the building to the requirements of AS 1668.2-1991.

3.6 – Energy Efficiency (BCA Section J)

Item	Comment
Section J Energy efficiency	All proposed building must achieve compliance with the requirements of BCA Section J. In that regard the following requirements will be applicable ▪ The roof/ceiling structure must achieve an R rating not less than 3.2 ▪ Ceilings that are situated below a non-conditioned space such as a plant room or the like must achieve an R rating not less than 1.6 ▪ External walls must achieve an R rating not less than R1.8 ▪ All glazing must be selected using the Australian Building Codes Board glazing calculator http://www.abcb.gov.au/index.cfm?objectid=F8CA7C6C-91EA-77BE-D49C7FBD3306C1B3 ▪ The building must be sealed to the requirements of BCA Part J3 ▪ Any mechanical ventilation or air-conditioning system must comply with the requirements of BCA Part J5. ▪ The lighting power load achieved must be within the limitations of BCA Part J6

4.0 Fire safety and other measures

4.0 – Fire Safety Measures

The following schedule represents the likely fire safety measures that will be required for the area of the building being the subject of the proposed works

Fire Safety Measure	Standard of performance
Automatic doors	BCA Clause C3.4
Automatic fail safe devices	BCA Clause C3.4, D2.21, AS 1670.1-2004
Automatic fire detection and alarm system	BCA Spec E2.2a, AS 1670.1-2004
Emergency lighting	BCA Clause E4.2 & E4.4, AS 2293.1-2005
Emergency warning and intercommunication system	BCA Clause E4.9 AS 1670.4-2004
Exit signs	BCA Clause E4.5 & E4.8, AS 2293.1-2005
Fire dampers	AS/NZS 1668.1-1998, AS1682.1&2 -1990
Fire doors	BCA Spec C3.4, AS 1905.1-2005
Fire hose reel system	BCA Clause E1.4, AS 2441-2005 & alternative solution report
Fire hydrant systems	BCA Clause E1.3, AS 2419.1-2005
Fire seals (protecting openings in fire resisting components of the building)	BCA Clause C3.15
Lightweight fire rated construction	BCA Clause C1.8, BCA Spec C1.8
Mechanical air handling systems Automatic shutdown	AS/NZS 1668.1-1998
Portable fire extinguishers	BCA Clause E1.6, AS 2444-2001
Smoke control system (to South Block areas only)	AS/NZS 1668.1-1998
Smoke dampers	AS/NZS 1668.1-1998, AS1682.1&2 -1990
Smoke doors	BCA Spec E3.4, AS 1905.1-2005
Wall wetting sprinkler and drencher systems	BCA Clause C3.4, AS 2118.2-1995
Warning and operational signage (eg stairway notices)	BCA Clause D2.23

5.0 Recommendations & Conclusion

5.1 – Recommendations

Subsequent to the above assessment, it is recommended that the following matters be addressed in the design of the proposed east block building

(i) Alternative solutions must be evaluated by a fire safety engineer with regard to the following aspects of the design

a. The provisions for egress via the non-fire-isolated stairway serving the Level 3 area against BCA Performance Requirements DP4 & EP2.2

b. The provision of horizontal exits providing egress into fire compartments not having direct egress to open space against BCA Performance Requirement DP4.

c. The omission of sprinklers and zone smoke control from the design against BCA Performance Requirement EP2.2

d. The construction of the existing external wall of West Block adjacent to new building against BCA Performance Requirement CP2.

e. The configuration of the fire wall separation between South Block and North Block against BCA Performance Requirement CP2

(ii) Separation in the form of fire wall construction and the protection of openings as appropriate must be provided between fire compartments and buildings to the requirements of BCA Part C2.

(iii) All exit doorways and horizontal exits must swing in the direction of egress

(iv) Statutory fire safety measures must be provided to the building as detailed in Section 4 of this report

(v) All proposed building elements must achieve compliance with the requirements of BCA Section J

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5.0 – Conclusion

Following an assessment of the proposed building works it is the opinion of this office that on the completion of design works in accordance with the recommendations of this report the building design will comply with the relevant requirements of the Building Code of Australia.

Author,

Mark Brentnall
for **Vic Lilli & Partners**

6.0 References

6.1 – Basis of Report

This BCA Capability report has been prepared on the basis of the following-

(i) Architectural Plans as prepared by Hassall Limited

Drawing No.	Title	Revision
ICU-A-121	Floor plan Level 2 – sheet 1	03
ICU-A-122	Floor plan Level 2 – sheet 2	03
ICU-A-131	Floor plan Level 3 – sheet 1	01
ICU-A-132	Floor plan Level 3 – sheet 2	01
ICU-A-171	Elevations	01
ICU-A-201	Sections – sheet 1	01
ICU-A-202	Sections – sheet 2	01

(ii) Building Code of Australia (BCA) 2009;

(iii) Environmental Planning and Assessment Act, 1979, and Regulations;