Grant Robinson
PROPERTY SERVICES

BCA Report

75 Castlereagh Street
Penrith

Demolition of existing residence and the Construction of a 12 Bedroom New Generation Boarding house.

By Grant Robinson
20 March 2019

1.0 INTRODUCTION

1.1 General

This report relates to the construction of a new boarding house located at 75 Castlereigh Street, Penrith

1.2 Purpose of Report

The purpose of this report is to identify the extent to which the design documentation complies with the relevant prescriptive provisions of the Building Code of Australia (BCA) Volume 1, edition 2016.

This report is based upon, and limited to, the information depicted in the documentation provided for assessment, and does not make any assumptions regarding 'design intention' or the like.

1.3 Report Exclusions

It is conveyed that this report should not construed to infer that an assessment for compliance with the following has been undertaken:

I. Work Health & Safety Act and Regulations;
II. WorkCover Authority requirements;
III. Structural and Services Design Documentation;
IV. The individual requirements of service authorities (i.e. Telecommunication Carriers, Sydney Water, Energy Australia);
V. The Disability (Access to Premises - Buildings) Standards 2010;
VI. The Disability Discrimination Act (DDA) 1992; and
VII. The relevant Accessibility and Energy Efficiency Provisions as contained within the BCA.

2.0 DEVELOPMENT DESCRIPTION

2.1 General

In accordance with the BCA, the assessment undertaken relates to the construction of a boarding house located at 75 Castlereagh Street Penrith.

For the purpose of the BCA the subject development may be described as contained below.

2.2 Building Description

Building Classification:	Class 3 Boarding House		
Storeys Contained:	Two (2)		
Rise in Storeys:	Two (2)		
Type of Construction:	Type B		
Effective Height:	~2.4m		
Floor area	~65.62 + 71.58 = 137.2m^2		Ground Floor
	~236.9 m^2	Level 1	
	~374.03 m^2	Total	
Volume	~329.3 m^3	Ground Floor	
	~568.4 m^3	Level 1	

2.3 BCA Assessment – Interpretation Notes

To provide the reader with additional context, the following information regarding the assessment methodology used in this assessment is provided below:

(i) The building has not been treated as having an air-handling system which recycles air from one (1) fire compartment (i.e. sole-occupancy unit) to another fire compartment or operates in a manner that may unduly contribute to the spread of smoke from one (1) fire compartment to another fire compartment;
(ii) Exits have been treated as coinciding with being open to the sky (unroofed);
(iii) The building has been treated as not having any employees;
(iv) The doorway at the 'Common Room' has been treated as a required exit for the purposes of determining exit travel distance and directional swing of door; and
(v) The timber screens located at the balconies have been identified as sunscreens that are not attached to a building element having a required FRL.

3.0 BCA ASSESSMENT SUMMARY – CLASS 2-9 BUILDINGS

3.1 General

The following table summarises the compliance status of the architectural design in terms of each *applicable* prescriptive provision of the BCA and indicates a capability for compliance with the BCA. Although, it should be recognised that instances exist where 'Prescriptive non-compliance' occurs, or 'Additional design input' is required. Such instances should not necessarily be considered BCA deficiencies; but matters which need to be considered by the design team and any assessment authority at relevant stages of design and/or assessment. For those instances of either 'prescriptive non-compliance' or 'additional design input', a detailed analysis and commentary is provided within Part 4 of this report.

3.2 Section B - Structure

BCA CLAUSE		COMPLIES	DOES NOT COMPLY	DESIGN DETAIL
B1.1	resistance to actions			√
B1.2	determination of individual actions			√
B1.4	materials and form of construction			√
B1.6	construction of buildings in flood hazard areas			√

3.3 Section C - Fire Resistance

BCA CLAUSE		COMPLIES	DOES NOT COMPLY	DESIGN DETAIL
C1.1	fire resisting construction			√
C1.8	structural tests for lightweight construction			√
C1.10	fire hazard properties			√
C2.13	electricity supply system			√
C2.14	public corridors in class 2 and 3 buildings			√
C3.2	protection of openings in external walls			√
C3.4	acceptable methods of protection			√
C3.11	bounding construction: class 2, 3 and 4 buildings	√		
C3.12	openings in floors and ceilings for services			√
C3.15	openings for service installations			√
C3.16	construction joints			√
C3.17	columns protected with lightweight construction to achieve an FRL			√

3.4 Section D - Access and Egress

BCA CLAUSE		COMPLIES	DOES NOT COMPLY	DESIGN DETAIL
D1.2	number exits required	√		
D1.3	when fire-isolated stairways and ramps are required	√		
D1.4	exit travel distances	√		
D1.5	distance between alternative exits	√		
D1.6	dimensions of exits and paths of travel to exits			√
D1.9	travel by non- fire-isolated stairways or ramps	√		
D1.10	discharge from exits			√
D2.3	non-fire-isolated stairways and ramps			√
D2.7	installations in exits and paths of travel			√
D2.13	goings and risers			√
D2.14	landings			√
D2.15	thresholds			√
D2.16	balustrades			√
D2.17	handrails			√
D2.19	doorways and doors			√
D2.20	swinging doors	√		
D2.21	operation of latch			√
D2.24	protection of openable windows			√

3.5 Section E - Services and Equipment

BCA CLAUSE		COMPLIES	DOES NOT COMPLY	DESIGN DETAIL
E2.2	general provisions			√
E4.2	emergency lighting requirements			√
E4.5	exit signs			√
E4.6	direction signs			√

3.6 Section F - Health & Amenity

BCA CLAUSE		COMPLIES	DOES NOT COMPLY	DESIGN DETAIL
F1.0	external weatherproofing			√
F1.1	stormwater drainage			√
F1.4	external above ground membranes			√
F1.5	roof coverings			√
F1.6	sarking			√
F1.7	waterproofing of wet areas in buildings			√
F1.9	damp-proofing			√
F1.10	damp-proofing of floors on the ground			√
F1.11	provision of floor wastes			√
F1.13	glazed assemblies			√
F2.1	facilities in residential buildings			√
F2.5	construction of sanitary compartments	√		
F3.1	heights of rooms and other spaces	√		
F4.1	provision of natural light	√		
F4.2	methods and extent of natural lighting	√		
F4.4	artificial lighting			√
F4.5	ventilation of rooms	√		
F4.6	Natural Ventilation	√		
F4.8	restriction of position of water closets and urinals	√		
F4.9	airlocks			√
F5.4	sound insulation rating of floors			√
F5.5	sound insulation rating of walls			√
F5.6	sound insulation rating of services			√
F5.7	sound insulation of pumps			√

3.7 Section G - Ancillary Provisions

BCA CLAUSE		COMPLIES	DOES NOT COMPLY	DESIGN DETAIL
G5.2	construction in bushfire prone areas	√		

4.0 BCA DETAILED ASSESSMENT – CLASS 2-9 BUILDINGS

4.1 General

With reference to the 'BCA Assessment Summary' contained within Part 3.1 of this report, the following detailed analysis and commentary is provided.
This commentary is formulated to enable the design documentation to be further progressed, for the purpose of evidencing the attainment of compliance with the relevant provisions of the BCA.

4.2 Section B – Structure

B1.1	The resistance of a building or structure shall be greater than the most critical action effect determined by B1.2 of the BCA, AS/NZS 1170.0-2002 and B1.4 of the BCA.
B1.2	The structural design of the building are required to be determined in accordance with the varying "actions" considerations contained within this clause (i.e. permanent actions, imposed actions, wind / snow / earthquake actions).
B1.4	The structural resistance of materials and forms of construction shall be determined in accordance with the following: (i) Masonry - AS3700-2011 (ii) Concrete construction - AS3600-2009 (iii) Footings and slabs – AS2870-2011 (iv) Steel construction - AS4100-1998 or AS/NZS 4600-2005 (v) Termite Risk Management - AS3660.1-2014 (vi) Piling - AS2159-2009 (vii) Glazed assemblies - AS2047-2014 (external) and/or AS1288-2006 (internal)
B1.6	If the building is located in a flood hazard area, the building are required to comply with the ABCB Standard for Construction of Buildings in Flood Hazard Areas

4.3 Section C – Fire Resistance

C1.1	Following on from the above the proposed building elements are required to incorporate the following fire resistance levels (FRL) and characteristics: ❑ *External walls (including any column and other building element incorporated therein)* (i) FRL of 90/90/90 (if loadbearing) or --/90/90 (if non-loadbearing), where located less than 1.5m or more from a fire-source feature (i.e. adjoining allotment boundary); or (ii) FRL of 90/60/30 (if loadbearing) or --/60/30 (if non-loadbearing), where located more than 1.5m to less than 3m from a fire-source feature (i.e. adjoining allotment boundary); or (iii) FRL 90/30/30 (if loadbearing) or --/--/-- (if non-loadbearing), where located more than 3m to less than 9m from a fire-source feature (i.e. adjoining allotment boundary); or (iv) FRL of 90/30/-- (if loadbearing), where located more than 9m to less than 18m from a fire-source feature (i.e. adjoining allotment boundary). ❑ *External columns* FRL of 90/--/-- (if loadbearing), where located less than 18m from a fire-source feature. ❑ *Internal Walls* (i) FRL of 60/60/60 (if loadbearing) or --/60/60 (if non-loadbearing) bounding public corridors, public lobbies and the like; (ii) FRL of 60/60/60 (if loadbearing) or --/60/60 (if non-loadbearing) between or bounding sole-occupancy units. ❑ *Other loadbearing internal walls, internal beams, trusses and the columns* FRL of 60/--/--. ❑ *Roof* Nil on the basis the roof covering is non-combustible **Generally** ❑ *Notes* (i) Internal walls required to have an FRL are required to extend: • To the underside of the floor next above if the floor has an FRL of at least 30/30/30; or • To the underside of a roof covering if it is non-combustible and must not be crossed by timber or other combustible building elements, expect for roof battens with dimensions of 75mm x 50mm or less or sarking-type material; or • A ceiling that is immediately below the roof and has a resistance to the incipient spread of fire to the roof space between the ceiling and the roof of not less than 60 minutes; or • 450 mm above roof covering if it is combustible.(ii) External walls are required to be non-combustible;

C1.1 continued	(ii) External walls are required to be non-combustible; (iii) Any loadbearing internal wall is required to be of concrete or masonry or fire-protected timber; (iv) A non-loadbearing internal wall required to achieve an FRL is required to be of non-combustible construction; (v) A shaft which is not for the discharge of hot products of combustion and not load-bearing is required to be of non-combustible construction; (vi) Building elements are required to achieve an FRL from both sides. ❑ *External facade treatments / linings* The attachment of a facing or finish to a part of a building required to have an FRL is required to comply with C1.10, if it is not located near or directly above a required exit so as to make the exit unsuitable as an exit and it does not otherwise constitute an undue risk of fire spread via the facade of the building.
C1.8	Any lightweight construction to internal walls required to achieve an FRL or protection to steel columns required achieve an FRL are required to be tested for resistance in accordance with this clause.
C1.10	The fire hazard properties for materials are as follows: ❑ *Floor linings and floor coverings* (i) A critical radiant flux not less than 2.2 kW/m^2 for any floor materials; (ii) A maximum smoke development rate of 750 percent-minutes; and (iii) Group 1 or 2 material in accordance with AS5637.1 for any portion of the floor covering that continues more than 150mm up a wall. ❑ *Wall linings and ceiling linings* A material used as a finish, surface, lining or attachment to a wall or ceiling is required to: (i) Be a Group 1 or Group 2 material for public corridors; (ii) Be a Group 1 or Group 2 or Group 3 material in specific areas (i.e. units); (iii) Be a Group 1 of Group 2 of Group 3 material for other areas; and (iv) Have a smoke growth rate index of not more than 100 or average specific extinction area less than 250m^2/kg. ❑ *Air-handling ductwork* Rigid and flexible ductwork is required to comply with the fire hazard properties set out in AS4254-2012 Parts 1 and 2. ❑ *Other materials* (i) Sarking-type materials are required to have a Flammability index not more than 5; and

	(ii) Other materials and insulation materials are required to have a Spread-of-Flame Index of not more than 9 and a Smoke-Developed Index of not more than 8 if the Spread-of- Flame Index is more than 5.
C2.13	(i) If the main electrical switchboard is to sustain any emergency equipment, then the switchboard is required to be separated with construction achieving an FRL of 120/120/120 and have any access doorway protected with a self-closing fire door having an FRL of --/120/30; and (ii) All switchboards in the electrical installation, which sustain the electricity supply to the emergency equipment, must be constructed so that emergency equipment switchgear is separated from non-emergency equipment switchgear by metal partitions designed to minimise the spread of fault from the non-emergency switchgear.
C3.2	Windows in the external wall along the north east elevation are located less than 3m of the side allotment boundaries. The openings identified above are required to be protected in accordance with Clause C3.4. This is achieved by using fire rated glass brick windows.
C3.4	Where protection is required, doorways, windows and other openings must be protected as follows: (i) External wall-wetting sprinklers used with windows that are automatically closing or permanently fixed in the closed position; or (ii) Fire windows having an FRL -/60/- that are automatically closing or permanently fixed in the closed position; or (iii) External wall-wetting sprinklers used with doors that are self-closing or automatic closing; or (iv) Self-closing fire door having an FRL of --/60/30; or (v) Fire shutter achieving an FRL of --/60/--; or (vi) Pursue a BCA Performance Solution justifying the non-protection of openings.
C3.11	The doorways providing access from the sole occupancy units and from a room not within a sole occupancy unit to the public corridors must be protected with a self-closing, tight fitting, solid core door, not less than 35mm thick.
C3.12	Where a service passes through a floor required to have an FRL or a ceiling required to have a resistance to the incipient spread of fire (refer to C1.1), that service is required to protected by either a shaft that will not reduce the fire performance of the penetrated building element or in accordance with C3.15.
C3.15	Any openings for service installations (electrical, mechanical, plumbing, etc.) that penetrates a building element which is required to be of fire resisting construction is required to be protected (i.e. fire seals).

C3.16	Construction joints, spaces and the like in and between building elements required to be fire-resisting with respect to integrity and insulation are required to be protected in a manner identical with a prototype tested in accordance with AS1530.4-2014 to achieve the required FRL.
C3.17	Where a column is protected by lightweight construction to achieve the required FRL defined by C1.1 passes through a building element that is also required to have an FRL it is required to be installed using a method and materials identical with the prototype assembly of the construction which has achieved the required FRL.

4.4 Section D – Access and Egress

D1.6	The path of travel to an exit and any required exit is to have an unobstructed height throughout of not less than 2m (except a doorway, which can be 1980mm) and an unobstructed width not less than 1m (except a doorway, which can be 750mm in an area not required to be accessible and 850mm in an area required to accessible).
D1.10	The discharge points of the exits are required to have unobstructed width of 1m or required aggregate egress width and be via a stairway, ramp or other incline having a gradient of no steeper than 1:8 or complying with AS1428.1-2009 (where required to be accessible for people with a disability).
D2.3	The required non-fire isolated stairway must be constructed in accordance with D2.2, or only of – (i) reinforced or prestressed concrete; or (ii) steel in no part less than 6mm thick; or (iii) timber that – • Has a finished thickness of not less than 44mm; and • Has an average density of not less than 800 kg/m3 at a moisture content of 12%; and • Has not been joined by means of glue unless it has been laminated and glued with resorcinol phenol formaldehyde glue.
D2.7	(i) Gas or other fuel services shall not be installed within the required exits; and (ii) Any services or equipment (being electrical meters, distribution boards or the like) installed within the hallway are required to be enclosed by non-combustible construction or a fire-protective covering (i.e. 1 layer of 13mm fire-protective grade plasterboard) with doorway(s) or opening(s) suitably sealed against smoke spreading from the enclosure.

D2.13	The going, riser and steepness dimension of the stairways are required to be designed within the following range: Riser (R) Going (G) Slope Relationship (2R+G) **Max Min Max Min Max Min** 190 115 355 250 700 550 . (i) The risers and goings are required to be constant throughout the flight except variations of no greater than 5mm are permitted between adjacent risers or goings and no greater than 10mm are permitted between the smallest and largest goings or risers in a flight; and (ii) The stair treads are required to have a surface or nosing strip achieving a slip-resistance classification of P3 or R10 in dry or P4 or R11 in wet tested in accordance with AS4586- 2013.
D2.14	Stair landings are required to be a minimum of 750mm long with a gradient not steeper than 1:50 and have a slip-resistance surface or strip. The surface or strip is required to achieve a slip-resistance classification of P3 or R10 in dry surface condition or P4 or R11 in wet surface condition tested in accordance with AS4586-2013.
D2.15	The threshold of a doorway is not permitted to incorporate a step or ramp at any point closer to the doorway than the width of the door leaf. That is unless the doorway opens to a road or open space and: (i) In a building required to be accessible, is provided with a threshold or step ramp in accordance with AS1428.1-2009; or (ii) In all other cases, the door sill is not more than 190mm above the finished surface of the ground.
D2.16	Balustrades are required to be constructed as follows: (i) To a height not less than 865mm above the nosings of the stair treads or the floor of a ramp; (ii) 1000mm above the floor of any access path, balcony, landing or the like; (iii) Any opening does not permit a 125mm sphere to pass through it and for stairs, the space is measured above the nosings;
D2.17	Handrails are required to at least one side of the stairway flight. The handrails are required to be fixed at a height of 865mm – 1,000mm measured above the nosings of the stair treads and be continuous such that no obstruction on or above them will tend to break a hand hold.

D2.21	Any door in a required exit, forming part of a required exit or in the path of travel to a required exit are required to be readily operable without a key from the side that faces a person seeking egress and: (i) By a single hand pushing or downward action on a single device located between 900mm and 1100mm from the floor; ▪ Be such that the hand of a person who cannot grip will not slip from the handle during the operation of the latch; and ▪ Have a clearance between the handle and the back plate or door face at the centre grip section of the handle of not less than 35mm nor more than 45mm; or ▪ A single hand pushing action on a single device which is located between 900mm and 1.2m above the floor; or (ii) Fitted with a fail-safe device which automatically unlocks the door upon the activation of any sprinkler system or detection system deemed suitable in accordance with AS1670.1-2015 installed throughout the building.
D2.24	Window openings to bedrooms require protection, if the floor below the window is 2m above the surface beneath. Protection need not be provided where the lowest level of the window is 1.7m or more above the finished floor level. (i) Protection can be in the form of the following: • The openable portion of the window must be protected with a device to restrict the window opening or a screen with secure fittings; • The device or screen must not permit a sphere greater than 125mm is permitted to pass through; • Resist the outward horizontal action of 250N against the window or screen; • Have a child resistant release mechanism is able to be removed, unlocked or over ridden; and (ii) A barrier with a height of not less than 865mm above the floor is required to an openable window: • In addition, to window protection as per (i) above; • Where the floor below the window is 4m or more above the floor or if the window is not covered above; and • Any horizontal or near horizontal elements between 150mm and 760mm must not facilitate climbing and have no gaps greater than 125mm.

E4.2	Emergency lighting complying with AS2293.1-2005 is required to be installed in the corridor and in non-fire-isolated stairway.
E4.5	Exit signage complying with AS2293.1-2005 are required to be installed above or adjacent to any doorways serving as required exits from the building.
E4.6	If an exit is not readily apparent to persons occupying or visiting either the building, then exit signs complying with AS2293.1-2005 are required to be installed in appropriate positions in corridors, hallways, lobbies and the like, indicating the direction to a required exit.

4.6 Section F – Health & Amenity

F1.0	Weatherproofing of external wall(s) are required to comply with Verification Method FV1 (i.e. certificate of conformity).
F1.1	Stormwater drainage must comply with AS/NZS3500.3-2015.
F1.4	Waterproofing membranes for external above ground use (i.e. balconies and roof) are required to comply with AS4654-2012.
F1.5	A roof must be covered in accordance with the following: (i) Concrete roof tiles – AS2049-2002 (ii) Terracotta roof tiles – AS2049-2002 (iii) Cellulose cement corrugated sheeting – AS/NZS 2908.1- 2000 (iv) Metal sheet roofing – AS1562.1-1992 (v) Plastic sheet roofing – AS/NZS4256 Part 1,2,3 & 5 and ASNZS1562.3-1996 (vi) Asphalt shingles – ASTM D3018-90, Class A
F1.6	Any sarking-type materials used for weatherproofing of roofs and walls are required to comply with AS/NZS4200-1994.
F1.7	Building elements in wet areas must be water-resistant or waterproof in accordance with Table F1.7 and comply AS 3740- 2010.

F1.9	Moisture from the ground must be prevented from reaching – (i) The lowest floor timbers and the walls above the lowest floor joists; and (ii) The walls above the damp-proof course; and (iii) The underside of a suspended floor constructed of a material other than timber, and the supporting beams or girders. A damp-proof course must consist of a material complying with AS/NZS2904-1995 or impervious sheet material in accordance with AS3660.1-2014.
F1.10	A floor laid directly onto ground or fill must be provided with a vapour barrier complying with AS2870-2011.
F1.11	Bathrooms and laundries located above a sole occupancy unit or public space must have a floor waste and have the floor graded to the floor waste to permit drainage of water.
F1.13	Glazed assemblies in an external wall must comply with AS2047- 2014 for resistance to water penetration.
F2.1	Each sole occupancy unit is to be provided with – (i) a bath or shower; (ii) a closet pan; and (iii) a washbasin
F2.5	All bathrooms which have a clear space of less than 1.2m between the closet pan and the doorway will have a door that - (i) open outwards; or (ii) slides; or (iii) is readily removable from the outside of the sanitary compartment unless there is a clear space of 1.2m between the closet pan and the doorway (i.e. lift off hinges).
F3.1	Unobstructed ceiling heights are required as follows: (i) Kitchen, laundry, corridor, passageway or the like – 2.1m; (ii) A habitable room, excluding a kitchen – 2.4m; (iii) A bathroom, sanitary compartment, store room or the like – 2.1m; (iv) Above a stairway, ramp, landing or the like – 2m.
F4.1	Provision of natural light must be provided to all bedrooms within the building – refer F4.2 for methods in providing natural light.

F4.2	Natural lighting can be provided by either: (i) Window(s) having a light transmitting area (exclusive of framing members) of not less than 10% of the floor area of the room with an appropriate setback from the wall of the same building and/or allotment boundary; (ii) Roof light(s) having a light transmitting area (exclusive of framing members) of not less than 3% of the floor area of the room; or (iii) A combination of both.
F4.4	Where compliant natural lighting is not provided to all rooms that are frequently occupied, spaces required to be accessible, stairways, and corridor and the like, artificial lighting complying with AS/NZS1680.0-2009 is required.
F4.5	Any habitable room, sanitary compartment, bathroom, laundry and any other room occupied by a person for any purpose must have either: (i) Natural ventilation (i.e. opening(s) having an openable area of 5% of the room being served); or (ii) Mechanical ventilation complying with AS1668.2-2012.
F4.8	Sanitary compartments which opens directly into the kitchen must be provided with measures required by F4.9
F4.9	The sanitary compartment identified in F4.8 must be provided with – (i) Access by an airlock, hallway or other room; or (ii) Mechanical exhaust ventilation.
F5.4	The floors separating residential sole-occupancy units require an $R_w + C_{tr}$ (airborne) not less than 50 and an $L_{n,w}$ (impact) not more than 62.
F5.5	Internal walls are required to be constructed as follows – (i) The walls that separate sole-occupancy units require an Rw + Ctr (airborne) of not less than 50; (ii) The walls that separate sole-occupancy units from public corridors, internal exit stairways, lift and other rooms or the like require an R_w (airborne) of not less than 50; (iii) Be of discontinuous construction if the wall separates a bathroom, sanitary compartment, laundry or kitchen in a sole-occupancy unit from a habitable room (other than a kitchen in an adjoining unit) or lift shaft; (iv) Doorways providing access to units from public corridors require an R_w of not less than 30; (v) Services must not be chased into concrete or masonry elements; and (vi) A wall required to have a sound insulation must be constructed such that it continues to the underside of: (a) The floor above; (b) A ceiling that provides the same sound insulation required for the wall; or (c) The underside of the roof above.

F5.6	Any duct, soil, stormwater, waste or water supply pipe (including a duct or pipe that is located in a wall or floor cavity) serving or passing through more than one (1) sole-occupancy unit, is required to be separated from the rooms of any sole-occupancy unit by construction with an $R_w + C_{tr}$ (airborne) not less than: (i) 40 if the adjacent room is a habitable room (other than a kitchen); or (ii) 25 if the adjacent room is a kitchen or non-habitable room.
F5.7	A flexible coupling shall be used at the point of connection between the service pipes in a building and any circulating or other pump.

4.7 Section G – Ancillary Provisions

G5.2	If the building is located in a designated bushfire prone area, the building must comply with AS3959-2009

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