

Building Code of Australia 2016

Report for BCA Compliance

PROJECT NAME: The University of Sydney – Chau Chak Wing Museum Project

DATE: 30 March 2017

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Revision History

Revision	Revision Date	Details	Authorised	
			Name/Position	Signature
A	21.02.2017	High Level Concept Review – DRAFT	Justin Jones-Gardiner / Director Paul Schenko / Associate	
B	30.03.2017	Final version	Justin Jones-Gardiner / Director Paul Schenko / Associate	

Table 1 – Revision History

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1.0 Executive Summary

The report is for the assessment of the new development known as The Chau Chak Wing Museum Project to assess compliance with the Building Code of Australia 2016 (“BCA”). The information submitted at this stage of the design is not considered to be detailed to the extent where the development of a full BCA report is possible and therefore this report is preliminary only, at high level. The information is considered more than sufficient for the purpose of the planning approval submission.

The following items have been noted as items of interest at this stage of the review. The items have been considered non-compliant require further review against the detailed design, or may be able to be justified as a Performance Solution:

Item No.	Query or DTS Non- Compliance	Suggested Resolution	BCA Clause	BCA Performance Requirements
1	Possible oversized Fire Compartment.	Further comment sought from the Fire Safety Engineer as to the feasibility of Performance Solutions. Post DA Submission.	C2.2	CP2
2	Extended travel distances to various areas.	Further comment sought from the Fire Safety Engineer as to the feasibility of Performance Solutions. Post DA Submission.	D1.4, D1.5, D1.9	DP4, EP2.2
3	Undersized exit widths in various areas.	The Fire Safety Engineer to confirm the feasibility of Performance Solutions to address this issue, post DA submission.	D1.6	DP6, EP2.2
4	Passing within unprotected openings of the building after discharge from the fire isolated stairs.	The Fire Safety Engineer to confirm the feasibility of Performance Solutions to address this issue, post DA submission.	D1.7	DP5
5	Fire Hydrant Booster located within 10m.	Further comment sought from the Fire Safety Engineer as to the feasibility of Performance Solutions. Once the specific location of	E1.3	EP1.3

Item No.	Query or DTS Non- Compliance	Suggested Resolution	BCA Clause	BCA Performance Requirements
		the booster has been confirmed.		
6	Illuminate exit and directional signs are to be positioned above 2.7 m in some areas.	Further comment sought from the Fire Safety Engineer as to the feasibility of Performance Solutions.	E4.5, NSW E4.6, E4.8	EP4.2
7	Rationalisation of certain BCA required Atrium and other smoke hazard management fire safety systems and separation. For example, smoke exhaust.	The Fire Safety Engineer to comment that such omissions will be justified within the Fire Engineered Report.	G3.8, NSW E2.2b	CP2, EP2.2, EP1.4
8	The fire isolated stairs does not detail separation of rising and descending stair flights.	The Fire Safety Engineer to comment that such omissions will be justified within the Fire Engineered Report.	D2.4	DP5, EP2.2
9	The pump room on Lower Ground Level is not permitted to open into the fire isolated exit.	The Fire Safety Engineer to comment that such omissions will be justified within the Fire Engineered Report.	D1.7	DP5
10	Separation of classification on different storeys i.e. the floor that separates the Lower level 02 (collection storage (class 7b)), & Lower Level 01 (Gallery Class 9b) is required to have an FRL of at least 240/240/240 but is proposed to be reduced reduce to FRL120/120/120.	Further comment sought from the Fire Safety Engineer as to the feasibility of Performance Solutions. Post DA Submission.	C2.9	CP2

Table 2 – DtS Non-compliances

Note: the above BCA non-compliances is not a full list of all non-compliances for the building. The report in whole needs to be reviewed by the design team to obtain an understanding of all BCA issues.

In order for Group DLA to confirm the design complies with the BCA the following items listed in Table 3 below are required to be clarified, submitted, illustrated, etc. as the case may be:

Item No.	Item	Comment	BCA Clause
A	Detailed egress review.	Further review of the updated plans illustrating location of the required exits is required for comment on the level of egress compliance.	Part D1 & D2
B	Performance Solutions – General	The various design team members are requested to advise of any/all known alternative solutions at this stage of the design.	BCA
C	Fire Hydrant Booster located within 10m of the building.	Fire hydrant booster is to be located within a direct line of sight to the main entry and be located no closer than 10 m of the building. Further comment from the Fire Services Engineer and Fire Safety Engineer. A Performance Solution may need to be considered if deemed feasible by the Fire Safety Engineer.	E1.3, EP1.3
D	Fire Hydrant Booster Location and Planning Approval.	Booster location to be identified and illustrated within the planning submission.	E1.3
E	Title boundaries review.	The architectural plans are required to contain a site plan which illustrates all title boundaries. Title boundaries are considered BCA <i>fire source features</i> ¹ and if any are identified in this project area additional non-compliances may occur that will need to be dealt with.	Part C & D1 & D2.
F	Atrium Provisions review.	It is common practice for BCA required atrium provisions to be rationalised to suit the design of the building and allow for integration or use of other required or Fire Engineer design systems. If this is the case the Fire Safety Engineer will need to advise of the appropriate BCA DtS shortfalls in conjunction with the Fire, Electrical and Mechanical Services Engineer's.	Part G3
G	Section J	Building envelope plans are required for a further understanding of the extent of the potential JV3 report and confirmation of compliance.	Section J
H	BCA Section D & F	The design team is to confirm the size in metres squared (m2) of each room so that occupancy numbers can be determined. Once this is known	Clause D1.13, D1.6,

¹ Fire-source feature means— (a) the far boundary of a road, river, lake or the like adjoining the allotment; or (b) a side or rear boundary of the allotment; or (c) an external wall of another building on the allotment which is not a Class 10 building.

Item No.	Item	Comment	BCA Clause
		the required number of sanitary facilities and aggregate egress width can be determined. Better still if the University can confirm the maximum population of each floor an accurate assessment can be done.	F2.2.

Table 3 – Request for Further Information

2.0 Introduction

This BCA review has been limited to the CCW evolving Concept Drawings which do not detail sufficient information to allow a full BCA report to be produced. **The architectural plans are yet to be developed to the extent that a complete BCA assessment can be concluded and therefore this report is preliminary only.**

The report is prepared based on a review of the documentation listed in Table 4 and the information provided by the client and is intended for their use only.

Reporting Team

The information contained within this report was prepared by Paul Schenko, Accredited Certifier Grade A1 (BPB0365) and reviewed by Justin Jones-Gardiner, Accredited Certifier Grade A1 (BPB0204) from Group DLA.

Current Legislation

The applicable legislation governing the design of buildings is the Environmental Planning and Assessment Act 1979.

Whilst we await final confirmation on the building approval mechanism, we believe it is likely to be a Crown project. The provisions of Section 109R (Crown Building Work), of this act require that the building work be carried out in accordance with the Building Code of Australia (BCA). The application of compliance with the particular version of the BCA is the date on which tenders are issued. In this case the application of the provisions of the BCA 2016 is the relevant code as tenders will be issued during the period of 1 May 2016 to 1 May 2019.

The BCA is now updated every three years, the next updated will be BCA 2019 which will come into force on the 1st May 2019 and therefore is not relevant to this project.

All new works are required to comply with the relevant BCA. It is understood the design team have opted for compliance with BCA 2016.

In regards to BCA 2016, the changes are minimal that relate to this building and as such do not have a material effect on the design of the building. These changes have been outlined below in order to assist the relevant disciplines. Consultants are to be aware that it is expected that this building will be a BCA 2016 compliant building.

Changes as a result of BCA 2016 – Applicable to the CCW Project Only:

- Clause A1.1 – Performance Solution: The term Alternative Solution has changed to Performance Solution.
- Clause A1.1 – *Boiler*: A new defined term “*boiler*” has been inserted as a consequence of including Specification G2.2.
- Clause A1.1 – *Effective height*: The defined term has been amended to clarify the lowest storey selected for determination, in line with the way we determine *rise in storeys* of a building.
- Clause A1.1 – *Fire-protected timber*: A new defined term has been inserted as a consequence of including provisions for *fire-protected timber*.
- Clause A1.1 – Functional Statement & Objective – These terms have been deleted and are no longer used in the BCA.
- Clause A1.1 – Pressure vessel: A new defined term “*pressure vessel*” has been inserted as a consequence of including Specification G2.2.

- Clause A1.8 – Explanatory Information: A new Clause introduced to advise that any BCA detailed explanatory information is non-mandatory.
- Specification A3.1 – AS/NZS 1428.4.1-2014 Amendment 2 has been adopted. Design for access and mobility — Means to assist the orientation of people with vision impairment — Tactile ground surface Indicators.'
- Specification A3.1 – AS 1530.4-2014 has been adopted. Methods for fire tests on building materials, components and structures — Fire resistance tests for elements of construction.
- Specification A3.1 – AS 1668.1-2015 has been adopted. The use of ventilation and air conditioning in buildings — Fire and smoke control in buildings. Mechanical Engineer to note.
- Specification A3.1 – AS 1670.1-2015 has been adopted. Fire detection, warning, control and intercom systems — System design, installation and commissioning — Fire. Electrical and Fire Services Engineer to note.
- Specification A3.1 – AS 1670.4-2015 has been adopted. Fire detection, warning, control and intercom systems — System design installation and commissioning — Sound systems and intercom systems for emergency purposes. Electrical and Fire Services Engineer to note.
- Specification A3.1 – AS 1905.1-2015 has been adopted. Components for the protection of openings in fire-resistant walls — Fire-resistant doorsets.
- Specification A3.1 – AS 2293.3-2005 has been adopted. Emergency escape lighting and exit signs for buildings — Emergency escape luminaires and exit signs.
- Specification A3.1 – AS/NZS 3500.32015 has been adopted. Plumbing and drainage — Stormwater drainage. Hydraulic Engineer to note.
- Specification A3.1 – AS 5637.1-2015 has been adopted. Determination of fire hazard properties — Wall and ceiling linings. AS IOS 9705 has been deleted.
- Verification Method BV2 - A new Verification Method has been inserted to verify compliance with Performance Requirement BP1.1(a)(iii). BV2 is a means for verifying the structural robustness of a building.
- Clause C1.13 – New Clause included to allow fire-protected timber to be used wherever an element is required to be non-combustible, subject to certain things as noted in the clause.
- Specification C1.13 – New Specification included for fire-protective timber.
- Specification C1.10 – Amended to illustrate that we are no longer use AS IOS 9705 or AS/NZS 3837 for determining the materials group numbers for fire hazard properties. The new Standard is AS 5637.1.
- Clause D1.13 - The provision has been amended to clarify that it is to be used to determine the number of persons accommodated for certain Deemed-to-Satisfy Provisions. It is not intended to restrict the number of occupants using a building.
- Clause D2.13 – The provision has been amended to allow dimension tolerances for non-required stair (step construction.)
- Clause D2.25 – New Clause included to permit the use of timber within a fire-isolated stairway or fire-isolated passageway subject to certain conditions.
- Clause F2.3(a) - Clarification has been added that sanitary facilities for males and females must be separate unless otherwise permitted.
- Table F2.3 - Clarification has been added that sanitary facilities for patrons need not be provided in Class 6 and 9b buildings where the total number of persons accommodated in the building is not more than the 600.
- Verification Method FV4.1 - A new Verification Method has been inserted as an option to verify compliance with Performance Requirements FP4.3 and FP4.4(a). It is a means for verifying that a building ventilated with outdoor air has suitable indoor air quality.
- Verification Method FV4.2 – A new Verification Method has been inserted as an option to verify compliance with Performance Requirements FP4.3 and FP4.4(a). It is a means for verifying that a carpark ventilated with outdoor air has suitable indoor air quality. The new Verification Method is applicable to Class 7a buildings only.

Fire Brigade

Fire & Rescue NSW (“FRNSW”): The EP&A Regulations 2000, Clause 144, requires buildings the subject of Construction Certificate approval to be referred to FRNSW. Clause 144 refers to EP&A Regs defined Category 2 Fire Safety Provisions². If any of these measures are required to be considered as an alternative solution due to DtS non-compliances identified within a design, and the floor area of a fire compartment exceeds 2000 m² or the floor area of the building exceeds 6000 m², the Clause 144 referral to the FRNSW is required. **It is common practice to adopt this process on Crown projects under a voluntary submission.** This design currently contains the following DtS non-compliance Category 2 Fire Safety Provisions or BCA Performance Requirements: EP2.2, TBC.

The process involves initial input from FRNSW at the Fire Engineering Brief Questionnaire (“FEBQ”) stage and then official Lodgement of the Alternative Solution Report by the PCA or Crown Certifier.

Under recent changes to the legislation the brigade are required to respond within 10 days advising whether or not they will be proceeding with a review and providing the Initial Fire Safety Report. If so they have not more than 28 days from the initial lodgement to provide their report or the PCA can choose to invoke the provisions of Clause 144(6A)(c) and issue the Construction Certificate after 28 days of officially lodging the Clause 144 application; further consultation is required on this issue. This may see a requirement for a peer review by an independent C10 accredited fire safety engineer.

At this stage in the design we have noted possible Alternative Solutions that require report and consent to the brigade, i.e. egress issues, smoke control, shared fire services, etc.

Limitations

- This report did not include assessment of the documentation against the provisions of the Disability Discrimination Act 1992 or (access to premises buildings) Standards 2010.
- This assessment is limited to the developed documentation at the date of this report and as referenced within the “Documentation Assessed” section of the Report.
- Any roof top plant or the like has been assessed as open to the sky.
- The travel distances have been assessed on an open plan basis with an allowance made for travel around pending fitout partitions. It cannot be taken as accurate when considering future fitout parameters.

² Category 2 fire safety provision means the following provisions of the Building Code of Australia, namely, CP9, EP1.3, EP1.4, EP1.6, EP2.2 and EP3.2 in Volume One of that Code.

3.0 Building Description

The Site and Surrounds

The development site is located to the northeast of the University's grounds adjacent to the Parramatta Road entrance, within the area currently used as the Fisher Tennis Courts site. Parramatta Road runs in an approximate east to west alignment and borders the site to the north. University Place that runs in a north south direction is located to the west, beyond which is the University's main Quadrangle Building. University Avenue borders the site to the south, with Victoria Park located beyond the University grounds to the east.

The main portion of the site consists of three tennis courts, to the north of which is a small weatherboard tennis pavilion building. An area of lawn is located to the east of the site. The northern boundary between the University campus and Parramatta Rd features a retaining wall above which is a linear garden bed containing significant trees. Ground conditions of the area consist of a sloped garden bed.

The development site is bound on all sides by trees of varying significance.



Figure 1: Aerial view of site

The Project

The Project Proposal involves the co-location and consolidation of the Macleay Museum, Nicholson Museum and University Art Gallery as well as collections from a number of currently fragmented locations into a new single museum building to be known as the Chau Chak Wing Museum. Currently, the University's museums, galleries and collections are significantly fragmented and located in numerous buildings.

At the heart of the project is the University vision to:

- Upgrade the quality of Museum and Gallery facilities to promote object based learning and research.
- Create teaching and research space that can be shared across all faculties.
- Consolidate collections to promote education, research and conservation.
- Recognise and celebrate Aboriginal significance.
- Develop a healthy and sustainable Campus environment.
- Ensure equitable access to and through Campus.
- Respect the heritage "Sandstone University" significance.

The proposal comprises the construction of the new Chau Chak Wing Museum in the north eastern sector of the Camperdown campus. The proposed museum will comprise a new five level building (maximum of three storeys above ground) with central void and will include:

- Entry foyer and museum shop
- Gallery space
- CERC (Collections Education Research & Conservation Facility) space
- Collection storage and workshop areas
- Staff offices, facilities and boardroom
- Study rooms and schools education area
- A 130 seat Auditorium
- Café and terrace facilities
- Loading dock
- Plant rooms

The proposed works also include associated earthworks, tree removal, landscape works and augmentation to existing infrastructure and services.

This report is limited to a high level review of the Concept Plans for the CCW new building only.

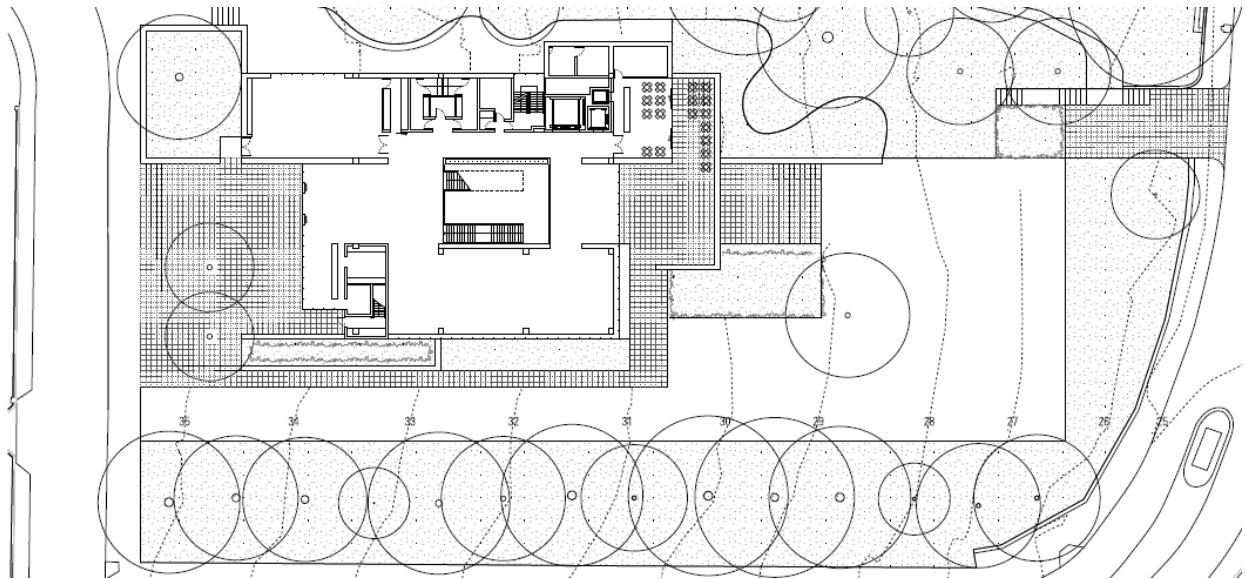


Figure 1 – Concept Image – CCW site plan

Building Description

Building Use & Class of Occupancy:	Class 9b (<i>Assembly building</i>), Class 7b (<i>Storage</i>), Class 6 (<i>Café is less than 10% therefore an ancillary use – confirm by JPW</i>), Class 5 (<i>Office</i>)
Type of Construction:	A
Floor Area of Building:	6000m ² (TBC by architect)
Max Fire Compartment Size:	4,800m ² (TBC by architect)
*Rise in Storeys:	Four (4)
*Levels Contained:	Six (6)
*Effective Height:	13.7m
Climate Zone:	5

Note*: The effective height has been taken from the lowest level at Lower Level 1 (25.5RL) to Upper Level (39.2m). The Workshops, Loading Dock & cafe have been considered as ancillary to the major Classification of the storey in which they are located due to their floor areas being less than 10% of that storey.

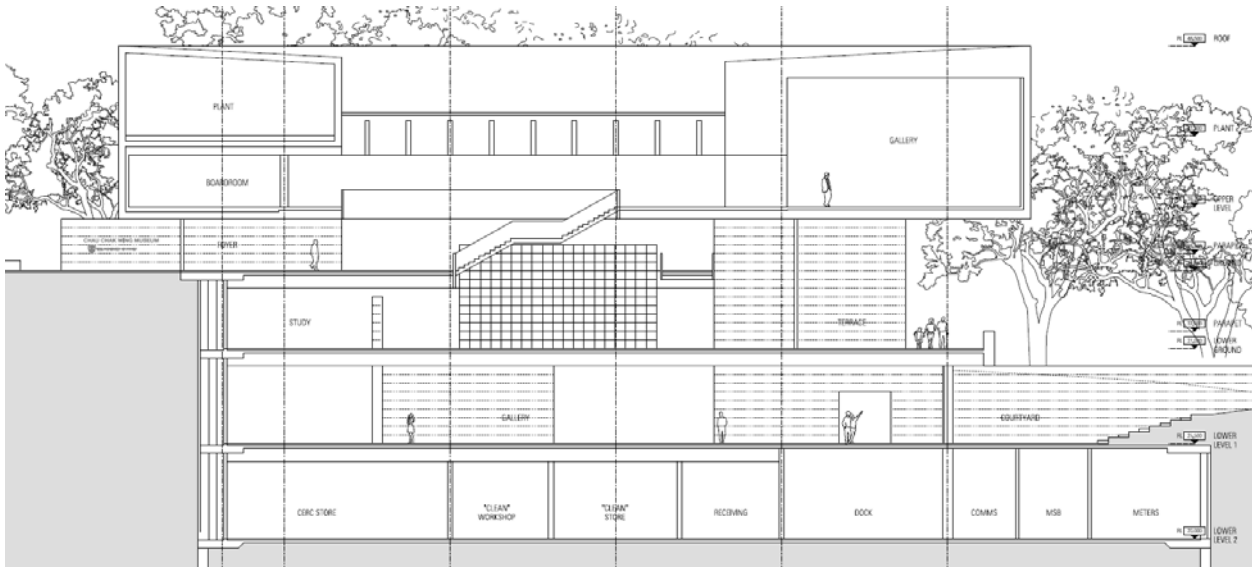


Figure 2 – Concept section - CCW

Documentation Assessed

This report is based on the following documentation prepared by JPW:

Description	Drawing No.	Revision	Date
Area Option 11 - Landscape Plan	JPW-SK-0100 P1	-	10/2/2017
Area Option 11 – Lower Level 02 Plan	JPW-SK-0100 P2	-	10/2/2017
Area Option 11 – Lower Level 01 Plan	JPW-SK-0100 P3	-	10/2/2017
Area Option 11 – Lower Ground Level Plan	JPW-SK-0100 P4	-	10/2/2017
Area Option 11 – Ground Level Plan	JPW-SK-0100 P5	-	10/2/2017
Area Option 11 – Upper Level Plan	JPW-SK-0100 P6	-	10/2/2017
Area Option 11 – Plant Level Plan	JPW-SK-0100 P7	-	10/2/2017
Section N01	JPW-SK-0100 P8	-	10/2/2017
Section W02	JPW-SK-0100 P9	-	10/2/2017
Title Boundary Plan	JPW-SK-0134 P1	-	17/3/2017
Café Area Sketch	JPW-SK-0132	-	27/3/2017

Table 4 – Documentation Assessed

4.0 BCA Requirements

The following assessment will provide an overview of compliance with the BCA and identify issues that require attention at this particular stage of the development.

The architectural plans are yet to be developed to the extent that a complete BCA assessment can be concluded and therefore this report is preliminary only. The plans are considered satisfactory for a planning submission.

Section B – Structure

All new works are required to comply with the requirements of this part of the BCA, including an assessment by the Engineer against the earthquake provisions.

Section C – Fire Resistance

C1 – Fire Resistance and Stability

Further assessment of the developed documentation is required before an assessment against this part of the BCA can be completed. Fire rating (FRL) plans will need to be developed as the design progresses. Fire ratings for this project are to be in accordance with Table 3 of BCA Specification C1.1, see Appendix A.

The various BCA Classifications contain various fire ratings and the highest FRL is to be applied throughout the development (i.e. Class 7b – Storage on Lower Level 02 = 240/240/240 FRL) unless:

- Appropriate fire compartmentation has been designed and implemented at the various project intersections; or
- Fire Engineered Alternative Solutions have been developed which justify the relevant BCA Performance Requirements; or
- A combination of both.

BCA Specification C1.1 Clause 2.4 & 4.1(b) illustrates the restrictions on using combustible wall cladding. Such non-compliant products include but are not limited to certain Alucabonds, Apolic, Kingspan, etc. Fire engineered alternative solutions may be possible but unlikely for areas around the exits and above the fire services. Please advise of any locations where such products are to be used in the form of colour coded elevations, for further assessment.

The Fire Hazard Properties of floor linings and floor coverings, wall and ceiling lining's, and other material as noted within Clause C1.10, must comply with the provisions of Specification C1.10 and NSW Specification C1.10, as noted in Table 5 below. This includes any specialist acoustic linings or treatments. It is recommended that the Fire Hazard Property Test Reports of the various linings and coverings are submitted to this office for a compliance check prior to installation. Notwithstanding this they will be required to be verified prior to the issuance of the OC, which is often too late in the case of the use of non-compliant materials.

Item	Location	Requirement
Floor linings or coverings	All floor areas throughout the complex, except fire isolated stairs	*CRF of no less than 1.2
Floor linings or coverings	Fire isolated stairs	CRF of no less than 2.2

Item	Location	Requirement
Wall and ceiling linings	Fire isolated stairs	**Group Number 1
Wall and ceiling linings	Public Space	Group Number 1 or 2
Wall and ceiling linings	General Areas	Group Number 1, 2 or 3

Table 5 – Fire Hazard Properties

Note*: CRF stands for critical radiant flux, which is a BCA defined term as follows – “Critical radiant flux means the critical heat flux at extinguishment as determined by AS ISO 92391.1 – 2003.” And for buildings not fitted with a sprinkler system complying with Specification E1.5, must have a maximum smoke development rate of 750 percent-minutes.

Note**: Group Number is a BCA defined term as follows – “Group number means the number of one of 4 groups of materials used in the regulation of fire hazard properties and applied to materials used as a finish, surface, lining, or attachment to a wall or ceiling.” The group numbers must be determined in accordance with AS 5637.1 - 2015 and for buildings not fitted with a sprinkler system complying with Specification E1.5, must have—

- a smoke growth rate index not more than 100; or
- an average specific extinction area less than 250 m²/kg.

Clause 3.6(b) requires rooflights and the like to be positioned not less than 3 m from any part of the building which projects above the roof unless that part is a fire wall and any openings have been protected in accordance with C3.4 below, for a distance of 6 m above.

C2 – Compartmentation and Separation

Further assessment of the developed documentation is required before an assessment against this part of the BCA can be completed. Fire rating (FRL) plans will need to be developed as the design progresses.

The actual permissible BCA floor area and volumes will need to be calculated by interpolation due to the varying BCA Classifications. This can only be completed after the fire compartmentation plans have been developed, but is expected to be:

- Max floor area: somewhere between 5,000 m² to 8,000 m².
- Max volume: somewhere between 30,000 m³ to 48,000 m³.

Therefore a non-compliance in relation to the maximum size fire compartment will not exist as the building has a floor area of approximately 6000m² (actual size to be confirmed once the FRL plans have been developed).

BCA Clause C2.6 - Vertical separation of openings in external walls, requires any part of a window or other opening in an external wall is above another opening in the storey next below and its vertical projection falls no further than 450 mm outside the lower opening (measured horizontally), the openings must be separated by a spandrel. If the building is not served by a sprinkler system complying with Specification E1.5 installed throughout than spandrels are required that comply with these BCA provisions.

BCA Clause C2.8 - Separation of classifications in the same storey requires the building since it has parts of different classifications located alongside one another in the same storey (i.e. Lower Ground Level has Classes 9b & 6) each building element in that storey must have the higher FRL prescribed in Specification C1.1 (i.e.

180/180/180) for that element for the classifications concerned. It has been confirmed by JPW that the café occupies less than 10% of the floor area therefore is now not a BCA non-compliance.

BCA Clause C2.9 - Separation of classifications in different storeys is required to be complied with since the building has parts of different classification that are situated one above the other in adjoining storeys (i.e. Class 7b – Lower Level 02 & Class 9b – Lower Level 01) they must be separated via the floor between these adjoining parts must have an FRL of not less than that prescribed in Specification C1.1 (240/240/240) for the classification of the lower storey. If this cannot be achieved than a performance solution will need to be developed by an accredited fire safety engineer.

With regard to any proposed rooms containing batteries, the electrical consultant is to confirm whether the above fire rating provision is applicable when considering the limitations of BCA Clause C2.12, i.e. Batteries exceeding 24 Volts and a capacity exceeding 10 ampere hours. Also the same applies to those rooms containing lift motors, emergency generators, central smoke control plant; & boilers.

The location of the sites fire hydrant fire pumps complying with the requirements of AS 2419.1 are also to be shown on the plans so that compliance can be verified.

If an electricity substation and/or main switchboard is proposed to be located within the building it must be separated from any other part of the building by construction having an FRL of not less than 120/120/120 & have any doorway in that construction protected with a self-closing fire door having an FRL of not less than –/120/30.

C3 – Protection of Openings

Openings located within 3 m of title boundaries (to be clearly shown on the site plan) require appropriate fire protection as nominated below in Clause C3.4.

Protection of openings in accordance with C3.4 consists of:

(a) *Where protection is required, doorways, windows and other openings must be protected as follows:*

(i) *Doorways—*

(A) *internal or external wall-wetting sprinklers as appropriate used with doors that are self-closing or automatic closing; or*

(B) *–/60/30 fire doors that are self-closing or automatic closing.*

(ii) *Windows—*

(A) *internal or external wall-wetting sprinklers as appropriate used with windows that are automatic closing or permanently fixed in the closed position; or*

(B) *–/60/– fire windows that are automatic closing or permanently fixed in the closed position; or*

(C) *–/60/– automatic closing fire shutters.*

(iii) *Other openings—*

(A) *excluding voids — internal or external wall-wetting sprinklers, as appropriate; or*

(B) *construction having an FRL not less than –/60/–.*

(b) *Fire doors, fire windows and fire shutters must comply with Specification C3.4*

Further assessment of the developed documentation is required before a full assessment against this part of the BCA can be completed.

Careful design consideration will need to be given to all penetrations, both services and structural, of the fire rated walls, floors and ceilings. Steel/timber columns, beams and members are not permitted to pass through the fire rated wall without fire rating the entire member and any member it is in touch with. This includes any steel bracing or other structural steel members. If steel structure passes through or above the fire compartment of bounding construction lines, a non-compliance may exist. Fire rating to a certain length along the steel rafter or purlin will not achieve DTS compliance.

Section D – Access & Egress

D1 – Provision for Escape

Further assessment of the developed documentation is required before an assessment against this part of the BCA can be completed. The required BCA defined exits are to be illustrated, along with their unobstructed width dimensions. It is required that all exits be illustrated therefore a complete egress assessment by Group DLA can be conducted. This assessment can be conducted post planning submission.

Performance Solutions are to be developed by the Fire Safety Engineer and are understood to consider items such as:

- Reduction in egress widths,
- Rationalisation of extended travel distances, to be confirmed on once the BCA required exits are fully confirmed along with unobstructed egress paths.

The BCA maximum permitted travel distances are 20 m to an exit or to a point in which travel in two different directions to two different exits is available, 40 m to the nearest exit of the two measure back from the starting point and 60 m between alternative exits measure through the point of choice. Table 6 below, whilst work in progress, illustrates the identified travel distance non-compliances at this stage. (Ref: BCA Clause D1.4 & D1.5)

Location	DTS Travel Distance Requirement	Actual
Lower Level 02	20/40/60	30m to a single exit
Ground Level	20/40/60	42m to a single exit
Upper Level	20/40/60	25m point of choice

Table 6 – Extended Travel Distances

It is expected that there will be further non-compliances with regard to these travel distances which will be identified as the design develops. Further comment from the Fire Safety Engineer will be required with regard to the feasibility of Performance Solutions once our final review of the plans illustrating the BCA defined exits has been completed.

Clause D1.7 requires openings of a building to be protected in accordance with Clause C3.4 and walls to contain an 60/60/60 FRL, where discharge from the fire-isolated stair necessitates passing within 6 m of building on the way to the road. This occurs to both fire isolated exit stairs. A Fire Safety Engineer is required to confirm the feasibility of Performance Solutions to address this issue, post DA submission.

Exits are required to discharge to open space. The BCA defines open space as an area open to the sky which provides direct connection to a road. All paths of travel from the discharge points of all exits to the road are to be shown on the plans so that compliance with the BCA can be assessed.

The central stairway is considered as a non-required non fire-isolated stairway therefore needs to comply with the requirements of BCA Clause D1.12 & since it forms part of a non-compliant atrium this needs to be addressed via a performance solution addressed by a fire safety engineer.

BCA Clause D1.13 provides various means for estimating the population of areas. The most accurate option from Clause D1.13 is (c). It is important to note that the Clause D1.13 assessment can only be used as a useful guide and that the determination of maximum permitted occupants is determined in the calculation of the lessor of the other relevant BCA factors such as:

- Available egress widths as determined in accordance with Clause D1.6; and
- Proposed Fire Engineering analysis in relation to Performance Requirements DP4, DP6 , EP2.2 and any other relevant Performance Requirement deemed appropriate as the design progress; and
- Mechanical outside air supply rates/capacity in accordance with AS 1668.2-2012; and
- Quantity of sanitary facilities in accordance with BCA Clause F2.

To accurately assess the number of persons per square meter as taken from Table D1.13 of the BCA, the plans are to show metre squared for each room. This can be used to assist the process of determining the maximum number of persons permissible as noted above.

D2 – Construction of Exits

Further assessment of the developed documentation is required before a full assessment against this part of the BCA can be completed, as noted above in D1.

BCA Clause D2.4 - Separation of rising and descending stair flights requires the fire isolated stairways must have no direct connection between a flight rising from a storey below the lowest level of access to a road or open space and a flight descending from a storey above that level. The plans indicate this occurring therefore needs to be re-designed showing compliance or A Fire Safety Engineer is required to confirm the feasibility of Performance Solutions to address this issue,

Clause D2.7 - Installations in exits and paths of travel, of the BCA requires access to service shafts and services other than to fire-fighting or detection equipment as permitted in the Deemed-to-Satisfy Provisions of Section E, must not be provided from a fire-isolated stairway. This occurs for the pump room on the lower ground level therefore needs to be re-designed showing compliance or A Fire Safety Engineer is required to confirm the feasibility of Performance Solutions to address this issue,

Balustrades for stairs are required to be no less than 1 m above landings and 865 mm above stair nosing lines and windows. Balustrade gaps in excess of 125 mm general are not permitted, however fire stair baluster gaps can be as much as 150 mm above the nosing or floor lines and 460 mm elsewhere. (*Ref: BCA Clause D2.16*)

It is worth noting at this stage that if fire-isolated stairs are also to be used as communication stairs then additional design requirements will also need to be consider in line with BCA Clause D3.3 and Clause 11/12 of AS 1428.1-2009. Such requirements include but are not limited to:

- Tactile Ground Surface Indicators.
- Handrails to both sides of the stair flights.
- Fully accessible handrails.

Table 8 illustrates the various requirements for the various stair scenarios for your convenience.

The space below a required non fire-isolated stairway (including an external stairway) or non fire-isolated ramp must not be enclosed to form a cupboard or other enclosed space unless the enclosing walls and ceilings have an FRL of not less than 60/60/60; and any access doorway to the enclosed space is fitted with a self-closing –/60/30 fire door. (*Ref: BCA Clause D2.8*)

Stair	Access for person with Disabilities	Handrails	Balustrade	Slip Resistance	Treads, Risers, Widths, Other	TGSI	Common Issues
Fire Isolated Stair	NO - Only minor provisions made for egress.	<p>YES - 1 handrail required which must resemble that required by the accessibility provisions, i.e. • 180° handrail turndown or return to wall, 300 mm past last riser.</p> <ul style="list-style-type: none"> • 30 to 50 mm diameter with a 270° clearance around the top of the handrail, • 50 mm clearance to back of handrail, and to a height of 600 mm above the handrail. • Located between 865 mm and 1 m above nosing line. And must be at consistent height through the stairs and landings. • Continuous rail, no handhold breaks. • Clear area for 270° to the top of the handrail. <p><i>Ref: BCA D2.17, D3.3(a)(iii) & Cl 12 of AS 1428.1-2009.</i></p>	<p>YES - No less than 865 mm above stair nosing lines, no less than 1 m above landings. No openings greater than 300 mm OR in the case of rails, top rail, mid rail and bottom rail required. No gaps greater than 150 mm above nosing line and 460 mm between rails.</p> <p><i>Ref: BCA D2.16(g)(h)(i)</i></p>	<p>YES - P3 rated slip resistance and highlighted nosing's to no less than 30% luminance contrast to the background. Nosing widths to be between 50 & 75 mm. Strip may be set back 15 mm from the front edge of the nosing but where it is not set back the luminance contrast must not extend down the riser by more than 10 mm. The lip between the tread and strip must not exceed 3 mm, or 5 mm where the edges are chamfered.</p> <p><i>Ref: BCA D2.13, D2.14, D3.3(a)(iii) & Cl 11, 7.2, 7.3 of AS 1428.1-2009.</i></p>	<p>Tread - 250 to 355 mm. Riser - 115 to 190 mm. Quantity - Must be between 550 to 700 when applying (2 x Riser + Tread.) Open Riser - Permitted to 125 mm. Stair Width - Minimum unobstructed width of 1000 mm, measured clear of handrails. Note: 1000 mm clear width will only allow for 100 persons, occupancy quantity review may be required. Stair Height Clearance - No less than 2 m.</p> <p><i>Ref: BCA D2.13, D1.6</i></p>	NO	<ul style="list-style-type: none"> - Lip of the nosing strip excessive in height. - No site allowance for balustrade tolerances. - If separate handrail and balustrade is not used, this usually causes a conflict with the requirement to have the same heights throughout the landings and stairs. - Tread and riser dimensions not constructed uniform in dimension.
Fire Isolated Stair & Communication Stair	YES	<p>YES - Fully accessible handrails required to both sides as follows:</p> <ul style="list-style-type: none"> • 180° handrail turndown or return to wall, • 30 to 50 mm diameter with a 270° clearance around the top of the handrail, • 50 mm clearance to back of handrail, and to a height of 600 mm above the handrail. • Located between 865 mm and 1 m above nosing line. And must be at 	<p>YES - No Less than 865 mm above stair nosing line, no less than 1 m above landings. No openings greater than 125 mm. No climbable members between 150 and 760 mm where the floor level is 4 m or more above the surface beneath.</p> <p><i>Ref: BCA D2.16(g)(h)(ii)</i></p>	<p>YES - P3 rated slip resistance and highlighted nosing's to no less than 30% luminance contrast to the background. Nosing widths to be between 50 & 75 mm. Strip may be set back 15 mm from the front edge of the nosing but where it is not set back the luminance contrast must not extend down the riser by more</p>	<p>Tread - 250 to 355 mm. Riser - 115 to 190 mm. Quantity - Must be between 550 to 700 when applying (2 x Riser + Tread.) Open Riser - Not permitted, must be opaque. Riser Splay back - Be vertical or max 25 mm. Stair Width - Minimum unobstructed width of 1000 mm, measured clear of handrails. Note: 1000 mm clear width</p>	<p>YES - Required to the top and bottom of landings. No requirement for the mid landing. Note: It is understood that BMPX are seeking an alternative solution to delete TGSI in this case. Access consultant to confirm.</p> <p><i>Ref: BCA D3.8, AS/NZS 1428.4.1-2009</i></p>	<ul style="list-style-type: none"> - Lip of the nosing strip excessive in height. - Outer handrail not continuous due to allowing for fire hydrant equipment. - No site allowance for balustrade tolerances. - If separate handrail and balustrade is not used, this usually causes a conflict with the requirement to have the same heights throughout the landings and stairs. - TGSI are not desirable in most cases and therefore an Alternative Solution by an accredited access consultant will be required.

Stair	Access for person with Disabilities	Handrails	Balustrade	Slip Resistance	Treads, Risers, Widths, Other	TGSI	Common Issues
		<p>consistent height through the stairs and landings.</p> <ul style="list-style-type: none"> • Continuous rail, no handhold breaks. • Clear area for 270° to the top of the handrail. <p><i>Ref: BCA D2.17, D3.3(a)(ii) & Cl 11 & 12 of AS 1428.1-2009.</i></p>		<p>than 10 mm. The lip between the tread and strip must not exceed 3 mm, or 5 mm where the edges are chamfered.</p> <p><i>Ref: BCA D2.13, D2.14, D3.3(a)(iii) & Cl 11, 7.2, 7.3 of AS 1428.1-2009.</i></p>	<p>will only allow for 100 persons, occupancy quantity review may be required. Stair Height Clearance - No less than 2 m.</p> <p><i>Ref: BCA D2.13, D1.6</i></p>		<p>which usually required dome indicator buttons on the handrails. - Tread and riser dimensions not constructed uniform in dimension.</p>
Interconnecting Communicati on Stair (between tenancy levels not required as fire egress/exit)	YES	<p>YES - Fully accessible handrails required to both sides as follows:</p> <ul style="list-style-type: none"> • 180° handrail turndown or return to wall, • 30 to 50 mm diameter with a 270° clearance around the top of the handrail, • 50 mm clearance to back of handrail, and to a height of 600 mm above the handrail. • Located between 865 mm and 1 m above nosing line. And must be at consistent height through the stairs and landings. • Continuous rail, no handhold breaks. • Clear area for 270° to the top of the handrail. <p><i>Ref: BCA D2.17, D3.3(a)(ii) & Cl 11 & 12 of AS 1428.1-2009.</i></p>	<p>YES - No Less than 865 mm above stair nosing line, no less than 1 m above landings. No openings greater than 125 mm. No climbable members between 150 and 760 mm where the floor level is 4 m or more above the surface beneath.</p> <p><i>Ref: BCA D2.16(g)(h)(ii)</i></p>	<p>YES - P3 rated slip resistance and highlighted nosing's to no less than 30% luminance contrast to the background. Nosing widths to be between 50 & 75 mm. Strip may be set back 15 mm from the front edge of the nosing but where it is not set back the luminance contrast must not extend down the riser by more than 10 mm. The lip between the tread and strip must not exceed 3 mm, or 5 mm where the edges are chamfered.</p> <p><i>Ref: BCA D2.13, D2.14, D3.3(a)(iii) & Cl 11, 7.2, 7.3 of AS 1428.1-2009.</i></p>	<p>Tread - 250 to 355 mm. (Public) Tread - 240 to 355 mm. (Private) Riser - 115 to 190 mm. Quantity - Must be between 550 to 700 when applying (2 x Riser + Tread.) Open Riser - Not permitted, must be opaque. Riser Splay back - Be vertical or max 25 mm. Stair Width - Minimum unobstructed width of 1000 mm, measured clear of handrails. Note: 1000 mm clear width will only allow for 100 persons, occupancy quantity review may be required. Stair Height - No less than 2 m.</p> <p><i>Ref: BCA D2.13, D1.6</i></p>	<p>YES - Required to the top and bottom of landings. And around base of stair stringer or stair when it can be considered as an overhead obstruction within 2 m from floor level.</p> <p><i>Ref: BCA D3.8, AS/NZS 1428.4.1-2009</i></p>	<ul style="list-style-type: none"> - Lip of the nosing strip excessive in height. - No site allowance for balustrade tolerances. - If separate handrail and balustrade is not used, this usually causes a conflict with the requirement to have the same heights throughout the landings and stairs.

Table 8 – BCA Stair Provisions

D3 – Access for People with Disabilities

Refer Access Consultants Report.

Table 8 above illustrates the specific requirements for the various stairs.

The proposed performance of hearing augmentation is required to be reviewed by the Access Consultant

The Access Consultant is to advise if there are any shortfalls in relation to BCA compliance for further consideration.

Section E – Services & Equipment

E1 & E2 – Fire Fighting Equipment / Smoke Hazard Management

Further assessment of the wet & dry fire, and mechanical services plans is required for confirmation of location and coverage compliance with regard to the fire sprinkler system, fire hydrant system, fire hose reel system, fire extinguishers, fire detection and mechanical systems.

The following firefighting and smoke hazard management equipment is required to be installed in this building, however is subject to modifications via the pending Fire Engineered Report for this project:

- Fire hydrants to Clause E1.3 and AS 2419.1-2005.
- Fire hose reels to Clause E1.4 and AS 2441-2005.
- Portable fire extinguishers to Clause E1.6, Table E1.6 and AS 2444-2001, as limited by Table E1.6.
- Sprinkler System to Clause E1.5 (as required BCA NSW Table E2.2b & BCA Clause G3.8), and AS 2118.1-2009 throughout the entire building. Fast response sprinklers heads may be required in accordance with the pending fire engineering strategy. **Sprinkler alarm valves must be located in a secure room or enclosure which has direct egress to a road or open space (to be shown on the plans).**
- If a combined sprinkler and hydrant system is proposed and be in accordance with AS 2118.1-1999, AS 2118.6-1995 & AS 2419.1-2005. Optional design, TBC by Fire Services Engineer.
- Sound System and Intercom System for Emergency Purposes to Clause E4.9, G3.8 and AS 1670.4-2015.
- Automatic air pressurisation system for the fire-isolated exits in accordance with AS/NZS 1668.1-2015.
- Smoke detection and alarm system complying with G3.8 and AS 1670.1-2015, including visual warning devices in accordance with Specification G3.8 Clause 5, Specification E2.2b Clause 5, break glass fire alarms in certain locations.
- Mechanical air handling system in accordance with AS/NZS 1688.1-2015. Specifics to be confirmed by the Fire Safety Engineer.
- Strobe lighting is also expected to high noise plant areas.
- Standby Power System in accordance with G3.8.
- Automatic shutdown of any air handling system which does not form part of the smoke hazard management system. (Ref: BCA NSW Table E2.2b)
- System monitoring connected to a fire station dispatch centre in accordance with AS 1670.3-2004.

- Smoke and fire dampers forming part of the compartmentation, smoke exhaust and or egress strategy, in accordance with AS/NZS 1668.1-2015.
- Automatic failsafe devices (hold open devices). *Ref: BCA Clause D2.21*

The following potential issues have been noted at this stage of the design however the fire design team services consultant is required to comment accordingly:

- Certain G3 related atrium provisions may not be met and this may or may not be dealt with via Fire Engineered Performance Solution(s), see G3 below for more comment.
- The CCW fire hydrant booster is to be located within a direct line of sight to the main entry which is considered as the southern facing Entrance Foyer doors, and be located no closer than 10 m of the buildings openings. Further comment from the Fire Services Engineer and Fire Safety Engineer. A Performance Solution may need to be considered if deemed feasible by the Fire Safety Engineer.
- Performance based smoke exhaust system.
- Location of the Sprinkler alarm valve to be located in a secure room or enclosure which has direct egress to a road or open space.

The fire services consultant is required to identify any areas that they believe smoke detection is not appropriate due to such detection causing spurious signals and provide details of how these areas will be provided for in terms of detection. Approval from this office, in conjunction with the Fire Safety Engineer is required before proceeding with the design. This is particularly important in the Loading Dock area as omission of detection is permitted to parts of these Levels but not all areas.

E3 - Lift Installations

The BCA requires the following lift provisions to be implemented for this development:

- Stretcher facilities in accordance with Clause E3.2.
- Fire Services Controls complying with Clause E3.7 and E3.10.
- Fire Services Recall Control Switch complying with Clause E3.9.
- Warning signage, i.e. "Do not use lifts if there is a fire"
- Landings are to comply with the access and egress provision of Section D of the BCA. Compliance appears to have been achieved.
- The lifts must be a type of lift noted in Table E3.6(a) of the BCA.
- The lifts must have features in accordance with Table E3.6(b), i.e. handrails, certain dimensions, etc, as stipulated within this table.
- The lift car must have emergency lighting.
- Cooling of the lift shaft to ensure that the dry bulb air temperature in the lift shaft does not exceed 40°C and if the cooling is by ventilated system, be provided with an air change rate determined using a temperature rise of no more than 5 K.
- Emergency access doors may be required for these single enclosed shafts, vertical transport consultant to advise when considering the multiple prerequisites of Specification E3.1 Clause 6.

The Vertical Transport Engineer is required to confirm compliance with the above at all stages of the project.

E4 – Emergency Lighting, Exit Signs and Warning Systems

Further assessment of the developed documentation is required before an assessment against this part of the BCA can be completed.

The BCA requires the following Emergency Lighting, Exit Signs and Warning Systems for this development, if the systems are proposed to be replaced or altered:

- Emergency lighting and exit signs are required to be installed throughout the building in accordance with the provisions of the BCA and AS 2293.1 - **2015**.
- Sound Systems and Intercom Systems for Emergency Purposes (SSIPSEP, formerly EWIS) in accordance with AS 1670.4-**2015**.

Any proposed exit signs installed at a height in excess of 2.7 m above floor level may require a Performance Solution from the fire safety engineer. Further confirmation from the electrical consultant is required.

Section F – Health & Amenity

F2-F2.4 Sanitary Facilities

Unfortunately there is inadequate plan detail included in the current revision to provide a definitive assessment against the relevant sanitary facility provisions. The following information is required in order to complete the assessment:

- Number of staff and gender ratio.
- Nomination of any separate staff toilets.
- All facilities to have the basins illustrated.
- All male facilities to have the urinals illustrated.
- Required wheel chair accessible sanitary facilities illustrated on all levels containing sanitary facilities.
- Ambulant facilities to be illustrated.
- Confirmation/comment on the patron maximum occupancy number.
- Room area amount (m2)

F3 – Room Sizes

The ceiling height must be not less than—

- Generally, 2.7 m; and
- More than 100 persons accommodating the area, 2.7m
- A habitable room excluding kitchen; 2.7m
- A corridor, passageway, or the like — 2.7m
- A bathroom, shower room, sanitary compartment, airlock, tea preparation room, pantry, store room, garage, car parking area, or the like — 2.1 m; and
- a commercial kitchen — 2.4m; and
- above a stairway, ramp, landing or the like — 2 m measured vertically above the nosing line of stairway treads or the floor surface of the ramp, landing or the like.

Further assessment of the pending detailed plans is required.

F4 - Light and Ventilation

Further assessment of the developed documentation is required before an assessment against this part of the BCA can be completed.

Artificial lighting must be provided to all rooms in accordance with AS/NZS 1680.0-2009.

The mechanical ventilation system must comply with AS 1668.2-2012.

The kitchen local exhaust system must comply with AS/NZS 1668.2-2015 & AS 1668.2-2012.

Section G – Ancillary Provisions

G3 – Atrium Construction

The design appears to contain an atrium due to the non-fire separated continuous connection between 4 levels. The Fire Safety Engineer is to comment on the feasibility of Performance Solutions to omit a number of the BCA DTS atrium provisions, with justification being places on the smoke compartmentation design amongst other things.

The BCA would require the following related fire safety systems and elements to be installed, however these will be modified via the pending Fire Engineered Report:

- Separating fire rated construction at each level of no less than 60/60/60; or
- Be constructed of fixed toughened safety glass, with any door openings fitted with smoke doors, the walls and doors protected with wall wetting drenchers and a fire barrier installed in the ceiling spaces above the wall; and
- The roof is to contain an FRL of 180/180/180 or be protected by a compliant sprinkler system; and
- A sprinkler system to be installed throughout the building in accordance with Specification E1.5; and
- Atrium floor sprinkler protection; and
- The glazed wall wetting drenchers at be in accordance with Specification G3.8 Clause 2.4;
- Mechanical air handling system in accordance with AS/NZS 1688.1-2015 and Specification G3.8 Clause 3, which includes a smoke exhaust system.

Section J - Energy Efficiency

Further assessment of the developed documentation is required before an assessment against this part of the BCA can be completed. This includes a review of the JV3 model for the development if proposed. The referenced building for the purpose of modelling would need to assume compliant BCA 2016 Part J measures for the existing building also, if services are shared. A review of the building envelope plans is also required.

5.0 Essential Fire & Other Measures

Below is a list of essential fire safety services that are required/expected to be installed / designed for the building, and the relevant standards of performance for each measure to be designed/constructed to.

This section is WORK IN PROGRESS (WIP) and is to be completed as the design evolves and is subject to rationalisation by the pending Fire Engineered Report.

Fire Safety Measure	Standard	BCA Clause(s)
Access panels, doors & hoppers to fire resisting shafts	AS 1530.4 – 2014	C3.13
Atrium provisions <ul style="list-style-type: none"> • Detection & alarm system • SSISEP • Sprinklers • Stair pressurisation 	AS 1670.1-2015 AS 1670.4-2015 AS 2118.1-2009 AS/NZS 1668.1-2015	G3.8, Spec G3.8
Automatic fail safe devices	-	C3.8, D2.21, Spec C3.4
Automatic fire detection & alarm systems	AS 1670.1 – 2015 AS/NZS 1668.1 – 2015	Spec E2.2b, G3.8
Automatic fire suppression systems	AS 2118.1 – 1999	E1.5, Spec E1.5, NSW Table E2.2b, G3.8
Emergency lighting	AS 2293.1 – 2015	E4.2, E4.4
Exit signs	AS 2293.1 – 2015 Alternative Solution, Report No. TBC, issued by, dated TBC	E4.5, NSW E4.6 & E4.8, EP4.2
Fire alarm monitoring system	AS 1670.3 – 2004 AS 4428.6 – 1997	Spec E2.2, Spec E1.5
Fire dampers	AS/NZS 1668.1 – 2015	Spec E2.2a
Fire doors	AS 1905.1 – 2015	Spec C3.4, C3.10
Fire hose reel systems	AS 2441 – 2005 Alternative Solution, Report No. TBC, issued by, dated TBC	E1.4, EP1.1
Fire hydrant systems	AS 2419.1 – 2005 Alternative Solution, Report No. TBC, issued by, dated TBC	E1.3, EP1.3
Fire seals (protecting openings in fire resisting components of the building)	AS 4072.1 – 2005 AS 1530.4 – 2014	C3.12, C3.13, C3.15
Lightweight construction	Alternative Solution, Report No. TBC, issued by, dated TBC	C1.8, Spec C1.8, CP1, CP2

Fire Safety Measure	Standard	BCA Clause(s)
Mechanical air handling systems <ul style="list-style-type: none"> • Auto shutdown • Stair pressurisation • Smoke exhaust 	AS/NZS 1668.1 – 2015 AS 1668.2 –2012	E2.2, Spec E2.2a, Spec E2.2b
Portable fire extinguishers & fire blankets	AS 2444 – 2001	E1.6
Smoke dampers	AS/NZS 1668.1 – 2015	C3.15, Spec G3.8
Sound systems and intercom systems for emergency procedures	AS 1670.4 – 2015 AS 4428.4 – 2004	E4.9, Spec G3.8
Standby power systems	-	Spec G3.8
Wall wetting sprinklers & drencher systems	AS 2118.1 – 1999	Spec G3.8
Warning and operational signs	-	C3.6, E3.3, D2.23 & Spec E1.8
??Paths of Travel	Alternative Solution, Report No. TBC, dated TBC	D1.6, DP4, DP5, DP6, EP2.2
Alternative Solution, Report No. TBC, issued by, dated TBC: <ul style="list-style-type: none"> • Reduction in FRL's to 120/120/120. • Oversized Compartmentation. • Extended travel distances. • Undersized exit widths. • Fire hydrant booster located within 10 m of the buildings openings. • Exit signs position in excess of 2.7 m above FFL. • Rationalisation of certain BCA required Atrium fire safety systems and separation. • Rationalisation of fire hose reel coverage • Rationalisation of smoke exhaust 	Alternative Solution, Report No. TBC, issued by, dated TBC.	CP1, CP2 CP2 DP4 DP6, EP2.2 DP5 EP1.3 EP4.2 CP2, EP2.2, EP1.4 EP1.1

Table 10 – Essential Fire Safety Measures

Appendix A

Fire Ratings Required

Table 3 – Type A Construction: FRL of Building Elements

Building Element	Class of Building – FRL (in minutes) Structural Adequacy/Integrity/Insulation			
	Class 2, 3 or 4 part	Class 5, 9 or 7 (car park)	Class 6	Class 7 (other than carpark) or 8
External Wall (including any column and other building element incorporated therein) or other external building element, where the distance from and fire-source feature to which it is exposed is:				
For Loadbearing Parts:				
Less than 1.5m	90/90/60	120/120/120	180/180/180	240/240/240
1.5m to less than 3m	90/60/60	120/90/90	180/180/120	240/240/180
3m or more	90/60/30	120/60/30	180/120/90	240/180/90
For Non-Loadbearing Parts:				
less than 1.5m	- /90/90	- /120/120	-/180/180	-/240/240
1.5m to less than 3m	- /60/60	- /90/90	-/180/120	-/240/180
3m or more	- / - / -	- / - / -	-/-/-	-/-/-
External Column not incorporated in an external wall, where the distance from any fire source feature to which it is exposed is:				
Loadbearing columns	90/-/-	120/-/-	180/-/-	240/-/-
Non-loadbearing columns	- / - / -	- / - / -	-/-/-	-/-/-
Common Walls and Fire Walls:				
	90/90/90	120/120/120	180/180/180	240/240/240
Internal Walls – Fire Resisting lift and stair shafts:				
Loadbearing	90/90/90	120/120/120	180/120/120	240/120/120
Non-Loadbearing	- /90/90	- /120/120	-/120/120	-/120/120
Bounding Public Corridors public lobbies and the like:				
Loadbearing	90/90/90	120/ - / -	180/ - / -	240/-/-
Non-Loadbearing	- /60/60	- / - / -	- / - / -	- / - / -
Between or Bounding Sole Occupancy Units:				
Loadbearing	90/90/90	120/ - / -	180/ - / -	240/-/-
Non-Loadbearing	- /60/60	- / - / -	- / - / -	- / - / -
`Ventilating, pipe, garbage and like shafts not used for the discharge of hot products of combustion:				
Loadbearing	90/90/90	120/90/90	180/120/120	240/120/120
Non-Loadbearing	- /90/90	- /90/90	- /120/120	- /120/120

Building Element	Class of Building – FRL (in minutes) Structural Adequacy/Integrity/Insulation			
	Class 2, 3 or 4 part	Class 5, 9 or 7 (car park)	Class 6	Class 7 (other than carpark) or 8
Other Loadbearing Internal Walls, Internal Beams, Trusses and Columns:				
	90/ - / -	120/ - / -	180/-/-	240/-/-
Floors:	90/90/90	120/120/120	180/180/180	240/240/240
Roofs:	90/60/30	120/60/30	180/60/30	240/90/60

See concessions in Spec C1.1 for concessions to these above tabulated requirements, as this may reduce or remove fire rating requirements subject to certain criteria, and haven't been captured in this report.