BUILDING CODE OF AUSTRALIA REPORT

Revision: B May 2018

IMAX Fitout at The Ribbon
31 Wheat Road, Darling Harbour

Prepared for: Grocon (Darling Harbour) Development Pty Ltd

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Date	Rev No	No. of Pages	Issue or Description of Amendment	Assessed By	Approved By	Date Approved
12.04.18	A	29	Draft DA Report	Vijay Perumal	Brigitte Thearle	12.04.18
2.05.18	B	28	DA Report	Vijay Perumal	Brigitte Thearle	2.05.18

Executive Summary

Development Overview

The proposed development comprises broadly the fitout of the IMAX cinema, as well as the entertainment use of the site.

Compliance Summary

As Accredited Certifiers, we have reviewed architectural design documents prepared by PMDL (refer appendix A) for compliance with the Building Code of Australia 2016 (Amendment one)

In this regard the following areas in particular require further review as the project develops:

No.	Items for review	Responsibility
1.	Please advise if there are any proposed alternative building solutions with regard to design of the building services for the project.	Services Consultants
2.	Final stair / handrail / barrier details required to be provided for review to determine compliance with BCA	Architect
3.	Confirmation to be provided confirming operation of latch of all doors in a required exit and forming part of a required exit to comply with D2.21 of the BCA	Architect
4.	Clause' H1.4 Seating Area' of the BCA. Dimensions as per clause to be confirmed by architect of the proposed seating area in the theatre	Architect
5.	Compartment drawings to be submitted to confirm the following as per 'NSW H101' of the BCA: • Theatre areas are separated from the other parts of the building by construction having an FRL of not less than 60/60/60 • Theatre Lobby to be separated from Theatre on L02, with construction not less than 60/60/60 • Theatre Lobby to be separated from Theatre on L03, with construction not less than 60/60/60 • VIP lounge to be separated from Theatrette on L01, with construction not less than 60/60/60 • The projection suite must be separated from all other internal parts of the building in which it is located by construction having an FRL of not less than 60/60/60. • The switchboard containing the main isolation switch must— (a) be located in a position that is readily accessible to authorised persons, and to the Fire Brigade in the case of an emergency; and (b) be enclosed by construction having an FRL not less than 60/60/60.	Architect
6.	Clause 'NSW H101.3 Foyer space' of the BCA. All Foyer spaces (excluding stairways and concession areas) must be provided on the basis of at least 0.25 m2 for each person that the auditorium (theatre/s) accommodates. Architect to confirm dimensions	Architect
7.	Clause 'NSW H101.11.2 Chairs' of the BCA. Architect to confirm dimensions of seating ensuring compliance as per the requirements in clause.	Architect

8.	Clause 'NSW H101.20 Lighting' of the BCA. All lighting requirements as per clause to be provided and confirmed by electrical engineer	Electrical engineer
9.	Fire service drawings required to be submitted for review	Fire Services Engineer
10 .	Section J Energy Efficiency report to be submitted for review	ESD Consultant

The assessment of the design documentation has revealed that the following areas are required to be assessed against the relevant performance requirements of the BCA. It shall be noted that the following items have already been adopted as part of the base building fire engineering analysis:

No.	Alternative Solution Description	DTS Clause	Performance Requirement
Fire Safety Items			
1.	**Fire Resistance (Base-building)** The raked flooring within the IMAX theatre on where the seats are supported is of plywood and steel plate topping and therefore does not achieve the required FRL.	Spec. C1.1	CP1, CP2
2.	**Protection of Openings (Base-building)** Between the IMAX and adjoining retail tenancies on the ground and first floor, one wall is proposed to achieve an FRL of 120 minutes in lieu of both walls (and openings) achieving an FRL of 60 minutes where perpendicular and within 4m of each other.	C3.3	CP2, CP8
3.	**Exit travel distances** The following extended travel distances as per the prescriptive requirements of the BCA are provided in the following locations: **Ground Floor** • 23 m to a point of choice (in lieu of 20m)	D1.4	DP4, EP2.2
4.	**Diminishing path of travel** Egress paths from the auditorium (theatre) are prescriptively required to aggregate for each storey, yet the stairways do not widen at the lower level	D1.6	DP4, DP6
6.	**Smoke hazard management** It is proposed to omit zone smoke control form the IMAX tenancy	E2.2	EP2.2
5.	**Egress doorways** Egress doors from auditorium (theatre) do not discharge directly to open space, or to a foyer giving access to open space	H101.12.6	DP4, DP6

The following items have been identified as part of the detailed fit-out review. The submission for Construction Certificate will need to include verification from a suitably accredited fire engineer: -

No.	Alternative Solution Description	DTS Clause	Performance Requirement
Fire Safety Items			
1.	**Number of exits required** As the building has an effective height of >25m each storey is required to be provided with 2x exits. The projection room on Level 5 is afforded with two exits, where one of the proposed is a ladder in lieu of stairway	D1.2, D1.16	DP2, DP4
2.	**Exit travel distances** The following extended travel distances as per the prescriptive requirements of the BCA are provided in the following locations: **Ground Floor** • 22.1m to a point of choice (in lieu of 20m) and total of 43.7m (in lieu of 40m) to the exit from Accessible sanitary facility **First Floor** • 38.7m to a point of choice (in lieu of 20m) and total of 41.3m (in lieu of 40) to an exit from Theatrette	D1.4	DP4, EP2.2
3.	**Travel via non-fire isolated stairways** Stair 2 does not provide direct egress via its own flights to the level of road or open space. Non-compliance with clause D1.9	D1.9	DP4, DP6
4.	**Fire Hose Reels** The proposed Fire Hose Reel located within the theatre is located more than 4m from a required exit	EP1.4	EP1.1
5.	**Height of rooms and other spaces** Due to increased structural and services requirements in the floor level above the corridor does not comply with F3.1. The corridor achieves a minimum 2300mm ceiling at one point of the ceiling, however the raking ceiling rises to 3400mm on the opposite side.	F3.1	FP3.1

6.	**Aisles and cross-overs** The minimum cross-over width has not been achieved in the following location as per the prescriptive requirements of the BCA: • Crossover width located on L02, currently indicates 1400mm in lieu of 1500mm. This is to be assessed as part of the performance solution by the accredited fire safety engineer. The fire safety engineer will need to confirm the feasibility and parameters of the performance solution.	NSW H101.11.6	DP4, DP6, EP2.2

An accredited fire safety engineer will need to confirm feasibility of the above performance solutions.

It is recommended that the above additional items are included in the base building fire engineering report. Should the owner require the fire engineering for the IMAX to be separated from the main building fire engineering, it is recommended that all items relating to the IMAX be included in one fire engineering report.

The fire engineered solution relating to EP2.2 will be subject to consultation with the NSW Fire Brigade as part of the Construction Certificate process under Clause 144 of the Environmental Planning & Assessment Regulation 2000.

The application for Construction Certificate shall be assessed under the relevant provisions of the Environmental Planning & Assessment Act 1979 (As Amended) and the Environmental Planning & Assessment Regulation 2000.

1.0 Introduction

The proposed development comprises of the fitout and use of the IMAX cinema within `The Ribbon' development at 31 Wheat Road, Darling Harbour

This report is based upon the review of the design documentation listed in Appendix A of this Report

The report is intended as an overview of the relevant provisions of the Building Code of Australia for assistance only. Detailed drawings and associated review will still be required as the final design is developed.

1.1 Current Legislation

The applicable legislation governing the design of buildings is the Environmental Planning and Assessment Act 1979. This Act requires that all new building works must be designed to comply with the BCA.

The version of the BCA applicable to the development, is version that in place at the time of the application to the Certifying authority for the Construction Certificate. For the purposes of this Report, BCA 2016 Amendment 1 has been utilised as the version of the BCA applicable at the time of preparation this Report.

2.0 PRELIMINARIES

2.1 Building Assessment Data

Summary of Construction Determination: -

Part of Project	Whole Building
Classification	A
Number of Storeys	25
Rise In Storeys	25
Type of Construction	A
Effective Height (m)	86

Summary of the floor areas and relevant populations where applicable: -

Part of Project	BCA Classification	Approx. Floor Area (m^2)	Approximate Volume (m^3)	Assumed Population
Level 0	9b	638.4m2	TBC	242
Level 1	9b	710m2	TBC	129
Level 2	9b	653m2	TBC	438 seats serving theatre (as per architectural details)
Level 3	9b	As above		As above
Level 5	9b	126.4m2	TBC	5

Notes:
1. Maximum population numbers of patrons and staff to be confirmed by the client / architect.
2. Floor areas and volumes to be confirmed by the architect

3. The above populations have been based on the floor areas and calculations in accordance with Table D1.13 of the BCA without including ancillary areas such as sanitary facilities, corridors, shelving and or racking layouts in storage areas.

2.2 Structural Provisions (BCA B1)

Any new structural works are to comply with the applicable requirements of AS/NZS 1170.1.

Glazing is to comply with AS1288, and AS2047.

Prior to the issue of the Construction Certificate structural certification is required to be provided, including determination of the importance level of the development.

This is to include assessment against the provisions of BCA Clause B1.6 – Construction of Buildings in Flood Areas

2.3 Development Approval

A Development Approval will be required from the Local Authority for the development. A copy of the Development Permit conditions and approved drawings will be required prior to the issuing of the Building Approval for that component of works.

The proposed development must not be inconsistent with the endorsed drawings and all relevant conditions will need to be satisfied and accurately reflect the construction issue drawings.

2.4 Copy of Certificate of Title:

A copy of the current Certificate of Title and Registered Plan / Plan of Subdivision is required. Where it is proposed to construct any part of the building work within an easement, the consent of the relevant authority and /or Council is required prior to the issue of the Construction Certificate.

3.0 FIRE PROTECTION

3.1 Fire Compartmentation (BCA C1.1)

The BCA stipulates three levels of fire resistant construction, which is based upon the rise in storeys and classification of the building. Each of these types of construction has maximum floor area and volume limitations as per BCA Table C2.2.

Based upon the rise in storeys and use of the Building, the building is required to be Type A Construction in accordance with Table 3 of Specification C1.1 of the Building Code of Australia 2016 Amendment 1.

The building has been assessed on the basis of the following fire separation/ compartmentation within the development;

- Separation between the cinema portions and all other portions of the building by construction of achieving a FRL of 120/120/120;
- Fire compartmentation of the building at each floor level

The raked flooring within the IMAX theatre on where the seats are supported is of plywood and steel plate topping and therefore does not achieve the required FRL. This item has already been adopted as part of the base building fire engineering analysis.

The maximum floor area and volume limitations of a fire compartment as nominated in the deemed to satisfy provisions are as follows:

Classification		Type of Construction
		A
9b assembly building	max floor area—	8 000 m^2
	max volume—	48 000 m^3

3.2 Fire Resistance (BCA C1.1)

The building should be constructed generally in accordance with the relevant provisions of Specification C1.1 of the BCA applicable to Type Construction, Please refer to Appendix C which outlines the required fire rating to be achieved by the development.

Other passive fire protection issues that will need to be addressed in detailed documentation phase include:

- Lift Motor Rooms,
- Emergency Power Supply,
- Emergency Generators,
- Electricity Supply,
- Boilers or Batteries,

The above areas are to be separated from the remainder of the building by construction achieving a minimum fire resistance level of 120 minutes.

3.3 Fire Hazard Properties (BCA C1.10 and BCA C1.12)

The fire hazard properties of fixed surface linings and mechanical ductwork will also need to be addressed within the detailed documentation phase pursuant to specification C1.10 Building Code of Australia. The following requirements apply:

External Wall Cladding

As the building is of Type A construction the external walls, including any external and internal claddings & linings must be non-combustible as determined by AS1530.1. 1994.

The following materials may be used wherever a non-combustible material is required:

a) Plasterboard.
b) Perforated gypsum lath with a normal paper finish.
c) Fibrous-plaster sheet.
d) Fibre-reinforced cement sheeting.
e) Pre-finished metal sheeting having a combustible surface finish not exceeding 1 mm thickness and where the Spread-of-Flame Index of the product is not greater than 0.
f) Bonded laminated materials where—
    i. each lamina, including any core, is non-combustible; and
    ii. each adhesive layer does not exceed 1 mm in thickness and the total thickness of the adhesive layers does not exceed 2mm; and
    iii. the Spread-of-Flame Index and the Smoke-Developed Index of the bonded laminated material as a whole does not exceed 0 and 3 respectively.

The BCA does nominate that ancillary elements may be fixed to an external wall that is required to be non-combustible unless they comprise of the following:

a) An ancillary element that is non-combustible.
b) A gutter, downpipe or other plumbing fixture or fitting.
c) A flashing.
d) A grate or grille not more than 2 m² in area associated with a building service.
e) An electrical switch, socket-outlet, cover plate or the like.
f) A light fitting.
g) A required sign.
h) A sign other than one provided under (a) or (g) that—
    i) achieves a group number of 1 or 2; and
    ii) does not extend beyond one storey; and
    iii) does not extend beyond one fire compartment; and
    iv) is separated vertically from other signs permitted under (h) by at least 2 storeys.

It is recommended that once material selections are made, copies of the fire test certificates/reports be provided for review and approval.

3.4 Protection of Openings in External Walls (BCA C3.2)

The prescriptive provisions of the BCA stipulate that any external opening within 3m of the fire source feature requires protection by -/60/- fire rated construction, or externally located wall wetting sprinklers.

Where a building is separated into fire compartments, the distance between parts of external walls and openings within them must be not less than the table below unless those parts of each external wall has an FRL not less than 60/60/60 and openings are protected.

Angle Between Walls	Minimum Distance
0° (walls opposite)	6m
More than 0° to 45°	5m
More than 45° to 90°	4m
More than 90° to 135°	3m
More than 135° to 180°	2m
More than 180°	Nil

Between the IMAX and adjoining retail tenancies on the ground and first floor, one wall is proposed to achieve an FRL of 120 minutes in lieu of both walls (and openings) achieving an FRL of 60 minutes where perpendicular and within 4m of each other. This item has already been adopted as part of the base building fire engineering analysis.

Fire source feature is defined as;

a) The far boundary of a road, river, lake or the like adjoining an allotment,
b) The side or rear boundary of the allotment,
c) The external wall of another building on the allotment which is not a class 10 building.

3.5 Protection of Openings in fire rated building elements (BCA C3.5 and BCA C3.10)

The prescriptive provisions of the BCA stipulate that openings within building elements required to have an FRL shall be protected as follows:

a) Penetrations through fire rated floors to be protected either by a tested prototype (e.g. fire collar, fire damper, etc) or be installed within a fire rated shaft achieving an FRL of 120 minutes

b) Any penetration through a wall or room required to have an FRL (e.g. substation, boiler room, apartment separating wall etc) is to be protected either by a tested prototype (e.g. fire collar, fire damper, etc) or be installed within a shaft achieving an FRL of 120 minutes (or 120/120/120 where it is a room such as a substation);

c) Self-closing -/60/30 fire doors to the doors opening to the fire isolated stairs (note that this also includes the access doors to the condenser units on the plant platforms).

Note that where fire dampers, fire collars, etc are utilised, allowance needs to be made for access hatches to be provided within the walls / ceilings to ensure that maintenance access is provided.

As the design develops, details will need to be included in relation to sealing of penetrations / construction of fire rated shafts.

4.0 EGRESS PROVISIONS

4.1 Provisions for Escape (BCA D1)

The egress provisions from the proposed building are provided by:

- External perimeter doorways
- Required non-fire isolated stairways
- Horizontal exits

It is noted that Stair 2 does not provide direct egress via its own flights to the level of road or open space. Where design amendments cannot be achieved to comply with the above prescriptive requirements of the BCA, a Performance Solution to BCA Performance Requirements DP4 & DP6 may be feasible. The fire safety engineer will need to confirm feasibility and parameters for any performance solution.

Other detailing issues that will need to be addressed include:

- Door Hardware
- Exit door operation
- Stair construction
- Handrail and balustrade construction

The current base-building has an effective height of >25m each storey is required to be provided with two (2) exits. The projection room on Level 5 is afforded with two exits, where one of the proposed is a ladder in lieu of stairway. Where design amendments cannot be achieved to comply with the above prescriptive requirements of the BCA, a Performance Solution to BCA Performance Requirements DP4 & EP2.2 may be feasible. The fire safety engineer will need to confirm feasibility and parameters for any performance solution.

4.2 Exit Travel Distances (BCA D1.4)

The locations of the proposed exits would appear to indicate that the deemed to satisfy requirements in terms of travel distances, distances between alternative exits and egress widths would be satisfied.

The travel distances to exits should not exceed:

Class 9b

- 20m to a single exit or point of choice and where two exits are provided, a maximum of 40m to one of those exits; and
- exits shall be located to not be more than 60m apart and not closer than 9m

The locations of the proposed exits indicate that the deemed to satisfy requirements in terms of travel distances would be satisfied, with the exception of the following:

Ground Floor

- 23 m to a point of choice (in lieu of 20m)

The above extended distance has already been adopted as part of the base building fire engineering analysis.

Ground Floor

- 22.1m to a point of choice (in lieu of 20m) and total of 43.7m (in lieu of 40m) to the exit from Accessible sanitary facility

First Floor

- 38.7m to a point of choice (in lieu of 20m) and total of 41.3m (in lieu of 40) to an exit from Theatrette

Where design amendments cannot be achieved to comply with the above prescriptive requirements of the BCA, a Performance Solution to BCA Performance Requirements DP4 & EP2.2 may be feasible. The fire safety engineer will need to confirm feasibility and parameters for any performance solution.

Separation of exits does not fully comply in the following areas:

- Paths of travel of alternative exits serving the upper levels converge to less than 6m at Main lobby area, at ground level. These exits are alternative exits serving the theatre levels, as prescribed in clause D1.4 (c), and are required not to converge to less than 6m, as prescribed in clause D1.5 (d) of the BCA.

Where design amendments cannot be achieved to comply with the above prescriptive requirements of the BCA, a Performance Solution to BCA Performance Requirements DP4, DP6 & EP2.2 may be feasible. The fire safety engineer will need to confirm feasibility and parameters for any performance solution.

4.3 Dimensions of Exits (BCA D1.5 & D1.6)

Minimum dimensions of 1000mm and 2000mm height to be provided within exits, with the paths of travel should provide a minimum width of 1000mm (note that all maintenance access, cat walks, etc may comply with AS1657 in which case a 600mm clear width is required).

The following table summarises the exit widths required by BCA Clause D1.6:

Storey	Number of People	Exit Width Required	Exit Width Provided
L00	242 (lobby area)	2.5m for storey Total of 8.5m for aggregating purposes	5.4m
L01	97 (lobby area) + 32 (theatrette)	1.5m for storey Total 6m for aggregating purposes	4.2m
L02	438 (theatre)	4.5m	5.3m
L03	As above	As above	As above
L05	5	1	1

8.5m of egress width is required to be provided at the ground floor main entry to accommodate aggregating widths (lobby patrons and stairs to theatrette and theatre.

The two fire stairs serving IMAX does not aggregate on ground floor for discharge. This item has already been adopted as part of the base building fire engineering analysis.

Doorways are permitted to contain a clear opening width of the required width of the exit minus 250mm, with a height of 1980mm as part of egress requirements. Access for persons with disabilities however requires a clear doorway opening width of 850mm (i.e minimum 920 mm doors).

4.4 Balustrading and Handrails (BCA D2.16 and BCA D2.17)

Generally

Balustrading to a height of 1000mm with a maximum opening of 125mm in any direction should be provided adjacent to balconies, landings, corridors etc where located adjacent to a change in level exceeding 1000mm.

Where it is possible to fall more than 4m to the surface below, the balustrade shall not contain any horizontal or near horizontal members that facilitate climbing between 150 – 760mm above the floor.

Handrails should generally be provided at a minimum height of 865mm alongside of all ramps and stairs.

The public stairs and ramps located along an accessible path of travel should be designed in accordance with the requirements of AS1428.1 for persons with disabilities. This requires a handrail on each side of the stair and ramp and for the handrail to extend approximately 550mm – 600mm past the last tread / end of ramp.

Further review will be undertaken to ensure compliance as the design develops.

4.5 Slip Resistance

The adoption of BCA 2014 introduced a requirement for slip resistance of stairway treads and ramp surfaces. The requirements are as follows:

Table D2.14 SLIP-RESISTANCE CLASSIFICATION

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

Further review will be undertaken to ensure compliance as the design develops.

5.0 ACCESS FOR PEOPLE WITH DISABILITIES

5.1 General Building Access Requirements (BCA D3.1)

Access for people with disabilities shall be provided to and within the building in accordance with the requirements of Clause D3.2, D3.3 and D3.4 of the BCA 2016 Amendment 1. Parts of the building required to be accessible shall comply with the requirements of:-

- AS1428.1-2009 General Requirements for Access – New Building Work;
- AS1428.4-2009 Tactile Ground Surface Indicators
- AS2890.6-2009 Car Parking for People with Disabilities

Access for persons with a disability is to be provided as follows:-

Class 9b – Entertainment building (cinema)

To all required wheelchair seating spaces and to all areas normally used by occupants except tiers or seating areas or platforms not containing accessible wheelchair seating areas.

5.2 Provision for Access to Buildings

The BCA prescribes access to be provided to and within the building as follows:

- Via the principle public entry and at least 50% of all other entrances
- From designated car parking spaces for the use of occupants with a disability.
- From another accessible building connected by a pedestrian link.
- All areas used by the public.

In buildings over 500m2 in floor area, a non-accessible entrance must not be located more than 50m from an accessible entrance.

And where a pedestrian entry contains multiple doors, the following is required;

- Entrance containing not more than 3 doors, at least one of the door leaves must be accessible.
- Where an entrance contains more than 3 doors, not less than 50% of the door leaves must be accessible.

A door is considered to be accessible if it is automatic (open and closing) or is more than 850mm in clear opening width and contains the required door circulation space.

5.3 Provisions for Access within Buildings (BCA D3.3)

A building required to be accessible is required to be equipped with either a 1428.1 compliant lift or 1428.1 compliant ramp, (but the maximum vertical rise of a ramp must not exceed 3.6m).

Within the building the following are required;

- Door circulation space as per AS1428.1 Clause 13.3 and as attached in appendix 1;
- Doorways must have a clear opening of 850mm;
- Passing spaces (1.8m wide passages) must be provided at maximum of 20m intervals
- Within 2.0m of end access ways/corridors, turning areas spaces are required to be provided.
- Carpet pile height of not more than 11mm to an adjacent surface
- Any glazed capable of being mistaken for a doorway or opening must be clearly marked (or contain chair rail, hand rail or transom as per AS 1288 requirements)

The design would generally comply with the prescriptive provisions of the BCA with additional ongoing review being undertaken as to door widths, circulation, etc.

An accessibility report prepared by an suitably qualified access consultant to be submitted for further review.

5.4 Tactile Indicators (BCA D3.8)

Tactile indicators are required to be provided to warn occupants of all stairs (except Fire Isolated stairs) and ramps regardless of public nature or private environment and where an overhead obstruction occurs less than 2.0m above the finished floor level.

Further review will be undertaken to ensure compliance as the design develops.

5.5 Seating in Assembly Buildings (BCA D3.9)

In a cinema wheelchair seating needs to be provided as follows:

Number of seats	Location of Spaces
Up to 300 seats	Must not be located in the front row
More than 300 seats	Not less than 75% of wheelchair seating must be provided in rows other than the front row

The location of wheelchair seats must cater for a representative range of seating provided.

In an assembly building, when fixed seating is provided, the wheelchair spaces to the following are required to be provided

Number of fixed seats in a room or space	Number of wheelchair seating spaces	Grouping and location
Up to 150	3 spaces	1 single space; and 1 group of 2 spaces
151 to 800	3 spaces; plus 1 additional space for each additional 50 seats or part thereof in excess of 150 seats	Not less than 1 single space; and not less than 1 group of 2 spaces; and Not more than 5 spaces in any other group.
801 to 10000	16 spaces; plus 1 additional space for each additional 100 seats or part thereof in excess of 800 seats	Not less than 2 single spaces; and not less than 2 groups of 2 spaces; and not more than 5 spaces in any other group; and The location of spaces is to be representative of the range of seating provided

5.6 Stairs (BCA D3.3 inter Alia AS1428.1)

Stairs shall be constructed as follows:

a) Where the intersection is at the property boundary, the stair shall be set back by a minimum of 900mm so that the handrail TGSIs do not protrude into the transverse path of travel.
b) Where the intersection is at an internal corridor, the stair shall be set back in 300mm, so the handrails do not protrude into transverse path of travel.
c) Stairs shall have opaque risers.

d) Stair nosing shall not project beyond the face of the riser and the riser may be vertical or have a splay backwards up to a maximum 25mm.
e) Stair nosing profiles shall-
   - Have a sharp intersection;
   - Be rounded up to 5mm radius; or
   - Be chamfered up to 5mm x 5mm
f) All stairs, including fire isolated stairs shall, at the nosing of each tread have a strip not less than 50mm and not more than 75mm deep across the full width of the path of travel. The strip may be set back a maximum of 15mm from the front of the nosing. The strip shall have a minimum luminance contrast of 30% to the background. Where the luminous contrasting strip is affixed to the surface of the tread, any change in level shall not exceed a difference of 5mm.

Further review will be undertaken to ensure compliance as the design develops.

5.7 Provisions for Accessible Sanitary Facilities (BCA F2.4)

Unisex Accessible Sanitary Facilities

An accessible unisex sanitary facility must be located so that it can be entered without crossing an area reserved for one sex only and provided in accordance with AS 1428.1-2009 and must contain a closet pan, washbasin, shelf or bench top and adequate means of disposal of sanitary towels and as per following.

Building Type	Minimum accessible unisex sanitary compartments to be provided
Class 9b	a) 1 on every storey containing sanitary compartments; and b) Where a storey has more than 1 bank of sanitary compartments containing male and female sanitary compartments, at not less than 50% of those banks.

Ambulant Facilities

At each bank of toilets where there is one or more toilets in addition to an accessible unisex sanitary compartment, a sanitary compartment suitable for a person with an ambulant disability in accordance with AS 1428.1-2009 must be provided for use by males and females.

Where male sanitary facilities are provided at a separate location to female sanitary facilities, accessible unisex sanitary facilities are only required at one of those locations.

An accessible unisex sanitary compartment or an accessible unisex shower need not be provided on a storey or level that is not provided with a passenger lift or ramp complying with AS1428.1-2009

Further review will be undertaken to ensure compliance as the design develops.

5.8 Signage (BCA D3.6)

As part of the detailed design package, specifications will need to be developed indicating:

- Sanitary Facility Identification Signs (note that they are to comply with BCA Specification D3.6 and include the use of Braille, Tactile, etc and be placed on the wall on the latch side of the facility);
- Directional / Way Finding signs to the Lifts, Sanitary Facilities, etc;
- Hearing Augmentation System;
- Identify each door required by BCA Clause E4.5 to be provided with an exit sign, stating 'EXIT' and 'Level" number

Further review will be undertaken to ensure compliance as the design develops.

5.9 Hearing Augmentation (BCA D3.7)

A hearing augmentation-listening system shall be installed throughout the building in accordance with the requirements of Clause D3.7 of the BCA, where ever in a 9b building, auditorium conference room, meeting room etc contain a PA system not used for emergency purposed or any ticket office or teller's booth or reception where the public is screened from the service provider.

Further review will be undertaken to ensure compliance as the design develops.

5.10 Lifts (BCA E3.6)

Lifts compliant to BCA E3.6 and BCA E3.7 must be provided, where required to be provided, with a minimum size of 1400 x 1600mm or 1100mm x 1400mm (whichever is appropriate) in size – with appropriate handrails and auditory commands.

6.0 FIRE SERVICES AND EQUIPMENT

The following section of this report describes the essential fire safety measures and the minimum performance requirements of those measures. A draft essential fire safety schedule can be found in Appendix B.

6.1 Fire Hydrants (BCA E1.3)

A system of Fire Hydrants is required to be provided in accordance with BCA Clause E1.3 and AS2419.1-2005 is required, please provide pressure and flow calculations for review.

Pressure and flow information will be required to confirm the required pressures and flow to the system, depending on the type of hydrant to be utilized;

- Feed hydrants (within 20m of hard stand for pumping appliance), 150 kPa
- Attack hydrant (within 50m of hard stand) 250 kPa
- Hydrants on a pump station, 700 kPa

The building is required to be provided with a booster assembly as part of the fire hydrant requirements. The booster is required to be located attached to the building at the main entry. If remote from the building, the booster is to be located at the main vehicle entry and within sight of the main entry of the building within 20m of a hardstand area.

Fire service drawings required to be submitted for further review and required coverage as per the prescriptive requirements of the BCA to be confirmed by the Fire Services Engineer.

6.2 Fire Hose Reels (BCA E1.4)

A Fire Hose Reel System is required to BCA Clause E1.4 and AS2441-2005

Fire hose reels are to be located within 4m of exits and provide coverage within the building based on a 36m hose length. Where required, additional fire hose reels shall be located internally as required to provide coverage.

Fire Hose reel are not to extend through Fire and Smoke Walls.

The proposed Fire Hose Reel located within the theatre is located more than 4m from a required exit. Where design amendments cannot be achieved to comply with the above prescriptive requirements of the BCA, a Performance Solution to BCA Performance Requirements EP1.3 may be feasible. The fire safety engineer will need to confirm feasibility and parameters for any performance solution.

6.3 Fire Extinguishers (BCA E1.6)

The provision of portable fire extinguishers is required to BCA Clause E1.6 and AS2444-2001 to provide coverage to the building

Table E.6 details when portable fire extinguishers are required:

Occupancy Class	Risk Class (as defined in AS 2444)
General provisions – Class 2 to 9 buildings (except within sole-occupancy units of a Class 9c building)	(a) To cover Class AE or E fire risks associated with emergency services switchboards. (Note 1) (b) To cover Class F fire risks involving cooking oils and fats in kitchens. (c) To cover Class B fire risks in locations where flammable liquids in excess of 50 litres are stored or used (not excluding that held in fuel tanks of vehicles).

Occupancy Class	Risk Class (as defined in AS 2444)
	(d) To cover Class A fire risks in normally occupied fire compartments less than 500m^2 not provided with fire hose reels (excluding open deck carparks). (e) To cover Class A fire risks in classrooms and associated schools not provided with fire hose reels. (f) To cover Class A fire risks associated with Class 2 or 3 building or class 4 part of building.

Fire extinguishers are to be located in accordance with AS 2444, often collocated with fire hydrants and/or fire hose reels.

Fire service drawings required to be submitted for further review and required coverage as per the prescriptive requirements of the BCA to be confirmed by the Fire Services Engineer.

6.4 Automatic Sprinkler Protection (BCA E1.5)

Automatic sprinkler protection is required to Specification E1.5 and AS2118.1-2017 to the following areas:

- Throughout the entire building where the effective height exceeds 25m;
- Throughout any fire compartment that exceeds 2,000m2 in floor area or 12,000m3 in volume where occupancies of excessive hazard are proposed

Location of pumps, tanks, FIP, control valves and booster assemblies will be subject to review.

An occupant warning system should be provided in accordance with BCA Specification E1.5.

6.5 Exit Signs and Emergency Lighting (BCA E4.2 and BCA E4.5)

Emergency Lighting and Exit Signs indicating exit location paths of travel to exits to be provided in accordance with AS2293.1-2005

Details are required to be provided for review.

6.6 Sound Systems and Intercom Systems for Emergency Purposes (BCA E4.9)

A Sound System and Intercom System is required in accordance with AS1670.4-2015 and BCA Clause E4.9

Details are to be provided for our review.

6.7 Fire Control Centre (BCA E1.8)

As the building has an effective height of greater than 25m, a fire control centre is required. Where the effective height of the building exceeds

Details are to be provided for our review.

6.8 Smoke Hazard Management (BCA E2.2)

Smoke hazard management shall be provided throughout the building by means of the following systems:

- Automatic Smoke Exhaust System activated by Automatic Smoke Detection & Alarm System in accordance with the requirements of BCA Spec E2.2a and AS1670.1-2015

In addition to the above, the following additional smoke hazard management provisions are required due to the building being a Class 9b Entertainment Venue (Cinema):

- Automatic shutdown of any air handling systems which does not form part of the smoke mazard management system an activation of smoke detection to Clause 5 of Spec E2.2a [AS 1670.1] or sprinklers to E1.5.

- Automatic Smoke Detection and Alarm System in accordance with the requirements of BCA Spec E2.2a and AS 1670.1-2004 to enable shutdown required above

It is proposed to omit zone smoke control form the IMAX tenancy. This item has already been adopted as part of the base building fire engineering analysis.

A fire indicator panel is required as part of the detection system. This panel is to be located within 4m of the main entry and should be incorporated within the fire control centre. Any variation to the prescriptive provisions will require the consent of the fire brigade and should form part of the fire safety engineering report to verify the performance requirements of the BCA.

7.0 HEALTH AND AMENITY

7.1 Sanitary Facilities (BCA F2.2 and BCA F2.3)

Sanitary facilities are required to be provided for both the staff and patrons.

The following facilities are required to be provided . Note these calculations include function area population, and consider the lobbies etc. as ancillary to the theatre and theatrette areas:

Sanitary Facilities Required / Provided				
Area & Total Population		Required		
		WC	Urinals	Basins
Staff Population: 20	Male	1	0	1
	Female	1	N/A	1
	Accessible	1	N/A	1
Cinema Patrons Population: 470	Male	1	3	2
	Female	5	N/A	2
	Accessible	1	N/A	1
Lobby Areas (L00 + L01)) Population: 338	Male	1	2	2
	Female	4	N/A	2
	Accessible	1	N/A	1

Note: Any Unisex facilities provided for people with disabilities may be counted once for each sex. These facilities are to be provided in accordance with AS1428.1-2009.

Sufficient facilities provided when accessible facilities are counted as one for each sex.

Bathroom Construction

Where bathrooms or rooms containing water closets have the WC within 1200mm of the doorway, the door shall be either sliding, open outwards, or be provided with removable hinges.

7.2 Floor Wastes (BCA F1.11)

Floor wastes to be provided within bathrooms and laundries where located above another sole occupancy unit. The floor shall be sloped towards these wastes.

Floor wastes are required to be provided where wall hung urinals are provided and the floor shall be sloped towards these wastes.

7.3 Heights of rooms and other spaces (BCA Part F3)

Due to increased structural and services requirements in the floor level above the corridor does not comply with F3.1. The corridor achieves a minimum 2300mm ceiling at one point of the ceiling, however the raking ceiling rises to 3400mm on the opposite side.

Where design amendments cannot be achieved to comply with the above prescriptive requirements of the BCA, a Performance Solution to BCA Performance Requirements FP3.1 may be feasible.

7.4 Light and Ventilation (BCA Part F4)

Class 5, 6, 7, 8 & 9

Natural Ventilation is required to be provided to rooms at a rate of 5% of the floor area in openings. Alternatively, mechanical ventilation is required in accordance with AS1668.2-2012. The architect is to provide calculations to verify compliance is achieved.

Artificial lighting complying with AS/NZS1680.0-2009 is to be incorporated with the final detailed design to be developed to confirm this.

8.0 ENERGY EFFICIENCY

The proposed development shall comply with Part J of the BCA. To achieve compliance, there are two options available:

1. The building can comply with the deemed-to-satisfy provisions of the BCA, relating to the following areas:
    - Building Fabric
    - Glazing
    - Building Sealing
    - Air Conditioning & Ventilation Systems
    - Artificial Lighting & Power
    - Hot Water Supply
2. The building can be verified against a reference building as per Verification Method JV3. This requires that the proposed building and its services be shown to have an annual energy consumption of equal or less than the reference building which has been modelled as per the requirements of Part J of the BCA.

Certification from an appropriately qualified engineer should be provided for either option with a report / computations outlining how compliance is achieved.

Access for maintenance is to be provided to the building in accordance with the requirements of BCA Part J8.

Appendix A - Design Documentation

The following documentation was used in the assessment and preparation of this report: -

Drawing No.	Title	Date	Drawn By	Rev
IMX-PMD-9005-02	Section – Overall Tenancy	18/1/18	PMDL	P2
IMX-PMD-2200-02	Interior Plan – L00 (Ground)	7/3/18	PMDL	A
IMX-PMD-2201-02	Interior Plan – L01	7/3/18	PMDL	A
IMX-PMD-2202-02	Interior Plan – L01	7/3/18	PMDL	A
IMX-PMD-2203-02	Interior Plan – L03	7/3/18	PMDL	A
IMX-PMD-2205-02	Interior Plan – L05	7/3/18	PMDL	A
IMX-PMD-SKT-1150	Section Plan	25/1/18	PMDL	3

Appendix B - Draft Fire Safety Schedule

	Essential Fire Safety Measures	Standard of Performance
1.	Access Panels, Doors and Hoppers	BCA Clause C3.13
2.	Automatic Fail Safe Devices	BCA Clause D2.19 & D2.21
3.	Automatic Fire Detection and Alarm System	BCA Spec. E2.2a & AS 1670.1 – 2015, AS/NZS 1668.1 - 2015
4.	Automatic Fire Suppression System	BCA Spec. E1.5 & AS 2118.1 – 2017, AS 2118.4 – 2012 (Residential) AS 2118.6 – 2012 (Combined sprinkler & hydrant)
5.	Building Occupant Warning System	BCA Spec. E1.5, BCA Spec. E2.2a & AS 1670.1 – 2015 – Clause 3.22
6.	Emergency Lighting	BCA Clause E4.2, E4.4 & AS/NZS 2293.1 – 2005 Amdt 1 & 2
7.	EWIS (Sound Systems and Intercom Systems for Emergency Purpose)	BCA Clause E4.9 & AS 1670.4 - 2015 & AS 4428.4-2004
8.	Emergency Evacuation Plan	AS 3745 – 2002
9.	Exit Signs	BCA Clauses E4.5, NSW E4.6 & E4.8 and AS/NZS 2293.1 – 2005 Amdt 1 & 2
10.	Fire Control Centres	BCA Spec. E1.8
11.	Fire Blankets	AS 2444 – 2001
12.	Fire Dampers	BCA Clause C3.15, AS/NZS 1668.1 – 2015 & AS 1682.1&2 - 1990
13.	Fire Doors	BCA Clause C3.2, C3.4, C3.5, C3.6, C3.7 & C3.8, Spec C3.4 and AS 1905.1 – 2015
14.	Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005 Amdt 1
15.	Fire Hydrant System	BCA Clause E1.3 & AS 2419.1 – 2005 Amdt 1
16.	Fire Seals, Collars	BCA Clause C3.15, C3.16 & AS 1530.4 – 2014
17.	Lightweight Construction	BCA Clause C1.8, C3.17 & AS 1530.3 – 1999
18.	Mechanical Air Handling System	BCA Clause E2.2, AS/NZS 1668.1 – 2015
19.	Paths of Travel	EP&A Reg 2000 Clause 186
20.	Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001
21.	Required Exit Doors (power operated)	BCA Clause D2.19
22.	Smoke Hazard Management System	BCA Part E2 & AS/NZS 1668.1 – 2015
23.	Smoke Dampers	AS/NZS 1668.1 – 2015
24.	Smoke Detectors and Heat Detectors	BCA Spec E2.2a & AS 1670.1-2015, AS/NZS 1668.1-2015
25.	Warning and Operational Signs	EP&A Reg 2000 Clause 183, BCA Clause C3.6, D2.23, E3.3 & H101.8

Appendix C - Fire Resistance Levels

The table below represents the Fire resistance levels required in accordance with BCA 2016 Amendment 1:

Table 3 TYPE A CONSTRUCTION: FRL OF BUILDING ELEMENTS

Building element	Class of building — FRL: (in minutes) *Structural adequacy/Integrity/Insulation*			
	2, 3 or 4 part	5, 7a or 9	6	7b or 8
EXTERNAL WALL (including any column and other building element incorporated within it) or other external building element, where the distance from any fire-source feature to which it is exposed is—				
For *loadbearing* parts—				
less than 1.5 m	90/ 90/ 90	120/120/120	180/180/180	240/240/240
1.5 to less than 3 m	90/ 60/ 60	120/ 90/ 90	180/180/120	240/240/180
3 m or more	90/ 60/ 30	120/ 60/ 30	180/120/ 90	240/180/ 90
For non-*loadbearing* parts—				
less than 1.5 m	–/ 90/ 90	–/120/120	–/180/180	–/240/240
1.5 to less than 3 m	–/ 60/ 60	–/ 90/ 90	–/180/120	–/240/180
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
EXTERNAL COLUMN not incorporated in an *external wall*, where the distance from any *fire-source feature* to which it is exposed is—				
less than 3 m	90/–/–	120/–/–	180/–/–	240/–/–
3 m or more	–/–/–	–/–/–	–/–/–	–/–/–
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
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