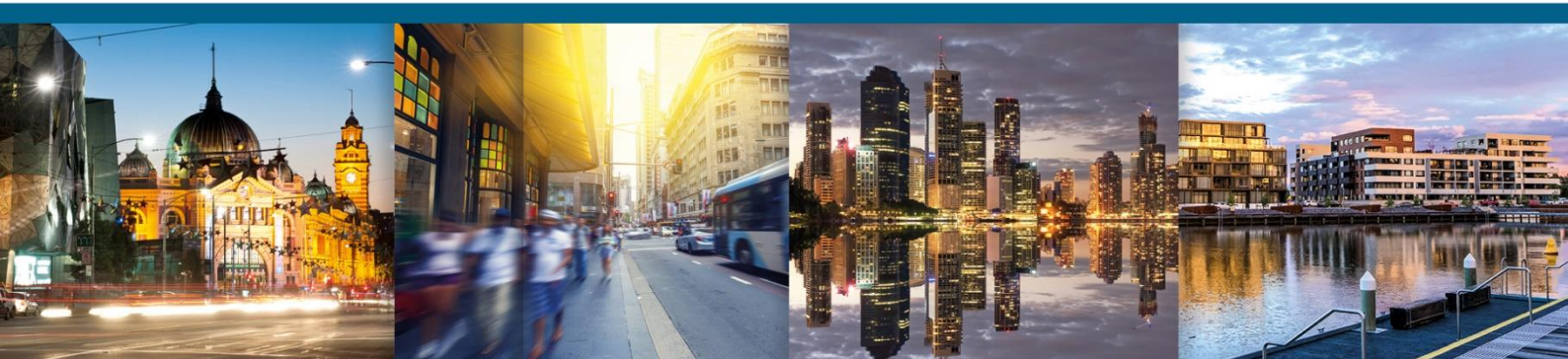




Stadium Australia Redevelopment

Sydney Olympic Park, Homebush

BCA Assessment Report to Accompany SSDA Submission



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1. Introduction

This report supports a State Significant Development (SSD) Development Application (DA) for the refurbishment of Stadium Australia, which is submitted to the Minister for Planning pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). Infrastructure NSW is the proponent of the SSD DA.

The report has been prepared against the Deemed-to-Satisfy (DtS) provisions of Building Code of Australia (BCA) 2019.

It has been prepared by building regulations consultants and certifiers Steve Watson and Partners on behalf of Infrastructure NSW.

2. Background of the proposal

The refurbishment of Stadium Australia will address deficiencies in the existing infrastructure and improve facilities to be in line with contemporary Australian venue standards. The works ensure the stadium remains a modern, globally competitive venue that achieves the requirements for a Tier 1 stadium. The refurbishment of Stadium Australia addresses the following project objectives:

- transform the stadium into a ‘fan favourite’ destination for experiencing and enjoying sports and entertainment events;
- maximise the direct and indirect economic, social and cultural benefits to NSW from the project, including securing major, economically beneficial events within NSW to ensure the economic sustainability of the stadium into the future;
- deliver a multi-use contemporary rectangular venue that meets the needs of patrons, hirers and other users for rugby, football, concerts and other new forms of entertainment, and reaffirms the status of the stadium as Australia’s largest purpose-built rectangular venue in Australia;
- improve the facility’s sensitivity to the environmental conditions of the site by providing a roof which provides cover to 100% of seats (to the drip line);
- provide new and refurbished corporate areas, members areas and general admission areas to enhance the patron experience;
- promote universal accessibility, safety and security such that the stadium is welcoming, inclusive and safe for all stadium users, including persons requiring universal access;
- promote environmental sustainability and embrace a whole of life approach to operations and maintenance; and
- achieve a high standard of design and reinforce the Stadium’s status and identity within the NSW stadia network, and more broadly, nationally and internationally.

3. Description of Proposed Development / Scope of works

The proposed works involves the major upgrades and refurbishment to the existing stadium. The scope of works comprises of the following:

- Reconfiguring the field of play to a permanent rectangular configuration;
- Redeveloping the lower and middle seating bowl to locate seating closer to the field and increase the pitch (steepness) of the seating bowl, which has the effect of reducing the capacity to approximately 70,000 seats (plus up to 20,000 persons on the field during concerts);
- Providing 100% drip-line roof coverage to all permanent seats by replacing the northern and southern sections of the roof and extending the existing eastern and western sections of the roof;
- Providing a new northern and southern public stadium entrance, including a new stadium facade and double-height concourse;
- Renewing the food and beverage concessions, bathrooms, team facilities including new gender neutral changerooms, members and corporate facilities, press and broadcast facilities, and back of house areas;

- Providing new signage, high-definition video replay screens, LED lighting, and other functional improvements; and
- Retaining the public domain areas surrounding the stadium that deliver a range of publicly accessible, event and operational areas, with minor works for tree removal.



Figure 1- Render of proposed stadium Australia (Courtesy of Cox Architecture)

4. Scope

The scope of this assessment is limited to the design documentation referenced in Appendix A of this report.

5. Limitations

The following limitations apply to the assessment:

- The report considers matters of a significant nature only and should not be considered exhaustive.
- The plans are assessed to the extent necessary to issue a construction certificate under Part 6 of The Act. This means the design has been assessed to be capable of complying with the BCA without necessarily having all the detailed design completed at this stage.
- Details in regard to access for people with disabilities have been assessed to the extent of the deemed-to-satisfy provisions of the BCA/Premises Standard only. A detailed assessment against AS 1428 series, AS/NZS 2890.6 – 2009 and AS 4299 – 1995 is outside the scope of this report
- Generally, the assessment does not incorporate a detailed assessment of the requirements of the Australian Standards.
- Structural and services documentation have not been reviewed.
- Appraisals are limited to the provisions of the BCA and the Premises Standards. Other legislative requirements have not been considered. It does not address additional or specific requirements stipulated under other areas such as Safety in Design, Construction Safety, Disability Discrimination, Planning and Environment, Occupational Health and Safety, Health, Dangerous Goods, etc, which may impact on the design and use of the building. It is recommended that appropriate advice from suitably qualified consultants should be obtained for further information on these areas.



6. Assessment Data Summary

The following basic assessment data has been drawn from the provisions of the BCA 2019.

6.1 Interpretations

The original stadium approval would have considered the building to a Place of Public Entertainment (POPE) but following the change in legislation to Entertainment Venue the stadium no longer falls into this definition. An entertainment Venue in accordance with definition listed within the Environmental Planning and Assessment Regulation 2000 is a building used as a cinema, theatre or concert hall or an indoor sports stadium.

7. National Construction Code 2019 –Volume 1: Building Code of Australia Class 2 to Class 9 Buildings

The National Construction Code (NCC) is a uniform set of technical provisions for the design and construction of buildings, structures and plumbing/drainage systems which is separated into 3 volumes. Volume 1 of the NCC is the Building Code of Australia (BCA) for Class 2 to 9 buildings which is the document to which the assessment in this report has been undertaken against. The BCA is legislated under The Act and specifies the Performance Requirements for the design and construction of Class 2 to 9 buildings that must be satisfied to achieve compliance. The Performance Requirements can only be satisfied by a Performance Solution, Deemed-to-Satisfy (DTS) solution or a combination of both.

8. Performance Solutions

The BCA is written in a performance format which allows performance-based buildings. This has allowed for innovation and variation from the prescriptive deemed-to-satisfy requirements of the BCA, whilst maintaining the principle levels of health, safety and amenity of building occupants.

Performance solutions are generally adopted when a nominated deemed-to-satisfy provision appears inappropriate for the design, or when a proposed design varies from the prescriptive requirements of the BCA. Subsequently, a performance solution supported by Fire Engineering analysis can determine whether a proposed design that varies from prescriptive requirements, will satisfactorily meet the performance provisions of the BCA. Ultimately, it is with the discretion of the relevant building surveyor whether to accept a deviation from the prescriptive code requirements.

Utilising the performance provisions may result in more economical and somewhat safer building, however alternative solutions may require additional on-going maintenance. It is in this instance that all parties, such as the building owner, insurance companies, proposed tenants, etc., are aware of this decision-making process and are kept informed of any additional requirements needed to maintain the level of safety.



9. Statutory Framework

The following table summarises the key statutory issues relating to fire safety and the BCA in relation to the certification of new building works.

Issue	Legislative reference	Comment
Existing building fire safety	EPAR 94	The approval authority may require upgrading in some circumstances
Alts and adds – no change in use	EPAR 143(3)	No reduction in the level of safety permitted
New Work	EPAR 145	All new works must comply
Access to premises	Disability (Access to Premises — Buildings) Standards 2010	Upgrade of the “Affected Part” to provide access for people with disabilities (Refer to comments associated with the report prepared by the accredited access consultant).
Development by the Crown	Section 6.28 of the Act	Certification at the time of tender that the design complies with the State’s building laws.

9.1 New Work

Clause 145 of the EPAR requires that all new work comply with the current requirements of the BCA. This means that all works proposed in the plans are required to comply but that existing features of an existing building need not comply with the BCA unless required to under other clauses of the legislation.

9.2 Consent authority may require building to be upgraded

When determining a development application, a Consent Authority (Council / Department of Planning) is required to assess fire safety in an existing building under Clause 94 of the EPAR.

The assessment must consider whether the measures contained in a building are inadequate

- (i) to protect persons using the building and facilitate their egress in the event of a fire or
- (ii) to restrict the spread of fire between buildings.

In determining a development application, the consent authority is to take into consideration whether it would be appropriate for the building to be brought into total or partial conformity with the BCA. Normally this discretionary power would only be enacted in the following circumstances:

- the proposed scope of works encompasses a large portion of the building so that a total building upgrade would not be considered an onerous requirement (ie ½ the total volume of the building including other works undertaken in the last 3 years);
- the upgrading measure(s) significantly increase the level of safety and are able to be cost-effectively incorporated into the proposed works so that they would not be considered an onerous requirement
- the existing level of safety is so deficient that the relevant consent authority consider a upgrade is necessary irrespective of the scope of works proposed.

9.3 No change of building use - structural strength and fire safety

Clause 143(3) of the EPAR prevents a certifying authority from issuing an approval if the proposed new work will result in a reduction to the fire protection and structural capacity of the building.



9.4 Access to premises

The Disability (Access to Premises – Buildings) Standards came into force via BCA2011 throughout Australia on 01 May 2011, and with it introduced a higher standard of access to that required by previous versions of the BCA. In prescribed circumstances, the legislation requires upgrade of access and facilities for persons with disabilities when building work is proposed. In particular, unless works are undertaken by a lessee who does not lease the entire building, proposed building work anywhere in the building could trigger a need for enhanced access at the main building pedestrian entry and from that entry to all areas of the building that are subject to the building work.

9.5 Development by the crown

Development by the Crown is regulated by Part 4 Division 4.6 and Part 6 Division 6.8 of the EP&A Act. Section 6.28 of the Act requires that any demolition or building work cannot be commenced unless the works are certified as complying with the State’s building laws at the date of calling for tenders. The above regulatory requirements generally still apply.

One means of ensuring compliance with the certification requirement is to obtain a construction certificate in relation to the works.

10. Summary of the BCA Parameters of the Stadium

Summary of Construction Determination	
BCA Classification	Main Use - Class 9b (Assembly building) Ancillary uses include – Class 5, Class 6, Class 7a & Class 7b
Number of storeys contained	8 Storeys (Level 7 only contain plant equipment)
Rise in storeys	7 Storeys
Type of construction required	Type A (Large Isolated Building (LIB))
Effective height	28.8m (Level 6 (RL137.500) - Level 0 (RL108.700))
Floor area	Exceeds provisions associated with Type A Construction and is required to be constructed and considered in the form of a LIB



11. Assessment

The following is a summary of an assessment of the proposed design against the relevant Deemed-to-Satisfy provision of the BCA.

Section B: Structure

The structural engineering design of the building will be required to comply with the structural provisions of Part B1 of the BCA.

The structural engineer upon considering design of the new works will also need to consider the state of existing structural elements to ensure compliance is met for current codes. Upon further design development of the project the details prepared by an appropriately qualified structural engineer are to be provided to demonstrate compliance with Part B1. This will include the following Australian Standards (where relevant):

- AS 1170.0 – 2002, General Principles
- AS 1170.1 – 2002, including certification for balustrading (dead and live loads)
- AS 1170.2 – 2011, Wind Actions
- AS 1170.4 – 2007, Earthquake Actions in Australia
- AS 3700 – 2018, Masonry Structures
- AS 3600 – 2018, Concrete Structures
- AS 4100 – 1998, Steel Structures
- AS 4600 – 2005, Cold Formed Steel Structures.
- AS 2159 – 2009, Piling – Design and Installation
- AS/NZS 1664.1 and 2 – 1997, Aluminium Structures
- AS 2047 – 2014, Windows and External Glazed Doors in Buildings
- AS 1288 – 2006, Glass in Buildings - Selection and Installation

The design of the structure must be based on the appropriate 'Importance Level' under BCA Table B1.2a. When considering the use of the proposed development an importance level of no less than 3 will need to be applied to all structural elements throughout the project.

Section C: Fire Resistance

PART C1 – FIRE RESISTANCE & STABILITY

- The stadium is required to be of Type A construction. Please refer to the schedule listed within Appendix C of this report. This schedule outlines the required Fire Resistance Levels (FRLs) which need to be considered when undertaking design development and assessing elements considered within Part C2 of the BCA;
- External wall construction needs to be considered for both the proposed and existing external walls. The makeup of the external walls need to be considered as non-combustible when tested to AS1530.1 and comply with the provisions of BCA Clause C1.9 & C1.14 unless provided a concession in one of these clauses. A formal material assessment of the existing buildings fabric will need to be undertaken as the existing stadium is currently clad in a material that is undetermined; and
- The proposed floor coverings and any proposed wall and ceiling lining materials must comply with the fire hazard properties nominated in Specification C1.10 of the BCA and associated test data provided by an accredited NATA laboratory.

PART C2 – COMPARTMENTATION & SEPARATION

- The building is considered to be a Large Isolated building and as such the provisions of Clause C2.3 & C2.4 apply. As no works around the perimeter of the building are being undertaken it is assumed that compliance has been maintained from the original approval;



- As some of the proposed compartments are large in both floor area & volume it is expected that some form of compartmentation is to be implemented upon further design development. This separation will need to be undertaken through means of either a compliant clause C2.7 fire wall or a performance-based method of separation assessed through the projects fire engineer; and
- Where different classifications are situated alongside each other or one above the other it is expected that compliance will be achieved with Clauses C2.8 & C2.9. Adequate fire separation per the schedule listed in Appendix C is required to be provided based around consideration of the higher FRL or alternatively through a performance-based method of separation assessed through the projects fire engineer.
- Adequate methods of fire separation (FRL of 120/120/120) for rooms which house equipment required to power emergency services are proposed or currently installed within the stadium.

Section D: Access and Egress

PART D1 – PROVISION FOR ESCAPE

- All areas throughout the stadium are required to be provided with no less than 2 exits;
- Travel within the stadium will exceed the distances listed within Clauses D1.4 and D1.5 of the BCA:
 - 20m to a single exit or point from which travel in different directions where 2 exits are available;
 - 60m to the nearest exit where 2 or more exits are available; and
 - 60m between alternative exitsA performance-based assessment of travel distances will be undertaken and justified through the projects fire engineer;
- A performance-based egress width analysis will be undertaken through the projects fire engineer. It should be noted however that the proposed capacity of patrons is less than the current capacity with no exits being removed as part of the works;
- All exits discharge in what appears to be a compliant manner to a road or open space however further assessment will be required upon review of further design development documentation

Should any deviation occur from the DTS provisions associated with either the BCA or the relevant Australian Standards then a performance solution will need to be considered through the projects fire engineer. This will then need to obtain in principle support approval through the NSW Fire & Rescue before considered as acceptable.

PART D2 – CONSTRUCTION OF EXITS

- The construction of the new stairways including goings, risers and slip resistance classification is to comply with Clause D2.13 of the BCA. Landings at the top and bottom of the stairway is to comply with Clause D2.14 of the BCA;
- Handrails are to be provided to the new stairs in accordance with Clause D2.17, D3.3 and Clause 11 and 12 of AS1428.1 – 2009; and
- Balustrades are to be designed and constructed in accordance with the requirements of Clause D2.16, AS1170.1 and AS1288-2006 (when glazed).

Due to the nature and use of the building sight lines are a critical part of the design. As is the case in most stadiums the proposed design will obtain performance-based assessments through an expert human movement consultant.

- Door hardware within an assembly building which has areas which occupy more than 100 persons will need to be served by push to exit bars in lieu of single action levers. Where areas are only occupied by no more than 100 persons single actions levers are permissible.

Should any deviation occur from the DTS provisions associated with either the BCA or the relevant Australian Standards then a performance solution will need to be considered through the projects fire engineer. This will



then need to obtain in principle support approval through the NSW Fire & Rescue before considered as acceptable.

PART D3 – ACCESS WITH PEOPLE WITH DISABILITIES

Access for people with disabilities is to be provided in accordance with the provisions of Part D3 of the BCA and AS1428.1 – 2009. Due to the major works being undertaken to the existing building there is also a requirement to consider Access to Premises upgrades/requirements. Detail of this have been discussed within the report prepared by MGAC which has also been issued to accompany the submission for DA.

Further assessment will need to be undertaken through an accredited access consultant to ensure compliance is met and that the provisions associated with the BCA and relevant Australian Standards are met.

Should any deviation occur from the DTS provisions associated with either the BCA or the relevant Australian Standards then a performance solution will need to be considered through the projects access consultant.

Section E: Services and Equipment

The building is required to be serviced by the following active fire services:

- A fire hydrant system that complies with the requirements associated with AS2419.1-2005;
- Fire hose reels that comply with the AS2441-2005;
- Portable Fire Extinguishers complying with AS2444-2001;
- An Automatic fire suppression system that complies with AS2118.1-2017;
- A smoke hazard management system that comprises of the following systems:
 - A smoke detection system to comply with AS1670.1-2018;
 - A stair pressurisation system complying with AS1668.1-2015;
 - A zone smoke control system complying with AS1668.1-2015;
 - Automatic shutdown of the air handling systems complying with NSW provisions of Table E2.2b of the BCA;
 - A mechanical ventilation system serving the carpark;
 - A smoke exhaust system complying with NSW provisions of Table E2.2b of the BCA;
- An emergency warning intercommunication system that complies with AS1670.4-2018;
- Emergency Lighting & Exit Signage complying with AS2293.1 & 2 - 2018;
- A Fire Alarm Monitoring System complying with AS1670.3-2018;
- Emergency Lifts complying with Clauses E3.1 – E3.10; and
- A Fire Control centre complying with the provisions of BCA Clause E1.8 & Specification E1.8.

While the new works need to comply with the provisions of BCA2019 and the associated supplementary standards referenced within this document (listed above), it is noted that the majority of the building will be serviced by a system that complied with the building when originally commissioned (late 1990's).

Due to major updates occurring within associated standards and legislation the services engineers will need to consider undertaking a gap analysis to determine the main infrastructure that will need to be updated to ensure compliance is met with the new works.

Should any deviation occur from the DTS provisions associated with either the BCA or the relevant Australian Standards then a performance solution will need to be considered through the projects fire engineer. This will then need to obtain in principle support approval through the NSW Fire & Rescue before considered as acceptable.



Section F: Health and Amenity

- Sanitary facilities throughout the development are being upgraded with additional amenities being provided as part of the scope of works proposed. A detailed design review will be undertaken through the design development phase to ensure adequate numbers are provided based around the population density considered.
- An accessible unisex sanitary compartment is required in accordance with Clause F2.4 of the BCA and AS 1428.1 – 2009. A male and female sanitary compartment suitable for a person with an ambulant disability is required in accordance with AS 1428.1 – 2009.
- An accessible adult change facility is required to be documented into the design of a venue such as Stadium Australia as it contains seating for more than 35,000 people. The facility is required to contain the following:
 - A Hoist;
 - A toilet pan, seat, backrest and grab rails;
 - A washbasin and tap;
 - Fixtures and Fittings;
 - A Change Table;
 - Changing Rails;
 - An Automatic sliding entrance door;
 - Signage; and
 - Operating instructions for the hoist and change table.
- Ceiling Heights:
 - When considering all classes of building other than Class 9b the minimum ceiling heights are to be 2.4m except where 2.1m is permitted in corridors, passageways, bathrooms, sanitary compartments, storerooms or the like; and
 - Where in a class 9b building the floor accommodates a population of less than 100 persons then the ceiling heights can be 2.4m and where the floor accommodates a population of more than 100 persons the ceiling heights need to be no less than 2.7m
- Artificial lighting is required to all rooms that are frequently occupied, all accessible spaces, all corridors and circulation spaces and path of egress in accordance with AS/NZS 1680.0 – 2009.
- Ventilation will be required to all rooms occupied by a person for any purpose by means of natural ventilation complying with Clause F4.6 of the BCA or mechanical ventilation/air-conditioning complying with AS 1668.2 –2012

Section G: Ancillary Provisions

The building contains atrium voids to both the Eastern & Western Stands. No works are proposed to these areas of the building and as such it is assumed that compliance has been maintained from the original approval.

Section H: Class 9b Buildings

- Detailed seating and platform plans are to be further developed to ensure compliance is met. Through the design development compliance will be achievable subject to the following which will be addressed through an expert Human Movement Consultant:
 - The angle of seating associated with the 4th tier is 32.9° in lieu of the permissible 30° considered in clause H1.4 of the BCA; and
 - The clearance between rows of fixed seats with a distance to an aisle will be less than 500mm.



Section J: Energy Efficiency

The buildings are to be designed to achieve compliance with the relevant provisions of Part J1 to J8 respectively. Key compliance items include:

- Roof and ceiling construction will be required to achieve compliance with Clause J1.3;
- External wall construction & glazing will be required to achieve compliance with Clause J1.5;
- Building sealing will be required to windows and doors in accordance with the relevant sections Part J3;
- Air-conditioning and mechanical ventilation systems will need to be designed in accordance with the relevant sections of Part J5;
- Artificial lighting and power will need to be designed in accordance with the relevant sections of Part J6;
- Heated water supply system for food preparation and sanitary facilities to be designed and installed in accordance with Part B2 of the Plumbing Code of Australia and Clause J7.2; and
- Facilities for energy monitoring in accordance with Clause J8.3.

Where compliance with the BCA is not achievable then a JV3 assessment report may be obtained to justify the deviations through meeting the specified Performance Requirements.



Potential Performance Solutions (Fire Engineer)

The following performance solutions need to be considered and addressed through the projects fire engineer:

- Use of combustible roof fabric (Clause C1.1 & Spec C1.1);
- Extended travel distances throughout the building – Distance to a point of choice, Distance to the nearest exit and distance between alternative exits – (Clause D1.4 & D1.5);
- A reduced egress width during both sports and concert events – (Clause D1.6);
- Use of an external stair / ramp in lieu of a fire isolated building in an over 25m building - (Clause D1.8) - If not already addressed;
- Use of a roller shutter within the path of travel to a required exit (Clause D2.19);
- Performance based Fire hydrant system including the use of 2 hose lengths, outlets located more than 4m from a required exit, not achieving adequate coverage to the pitch and provisions associated with the location of the booster assembly and pumps (Clause E1.3);
- Performance based fire hose reel including not achieving coverage to seating bowl and pitch and outlets located more than 4m from a required exit (Clause E1.4);
- Performance based sprinkler system including omission of sprinklers to aspects of the building and provisions associated with the location of the booster assembly and pumps (Clause E1.5);
- Location of the Fire Control Centre (Clause E1.8) – If not already addressed;
- Performance based smoke hazard management system – Rationalisation and omission to certain areas throughout the site (Clause E2.2 & Spec E2.2a & E2.2b);
- Exit and directional signage located at heights greater than 2.7m (Clause E4.8); and
- Reduced audible levels to Emergency warning and intercom systems – (Clause E4.9).

Please note the above list is not all performance-based assessments that will need to be considered. Additional items may need to be considered through the design development phase of works

Potential Performance Solutions (Human Movement)

The following performance solutions need to be considered and addressed through the projects Human Movement Consultant:

- Reduced egress widths to the stepped aisles due to a central handrail being implemented (Clause D1.6);
- Number of interconnected treads and the angle of the stairways associated with the stadium seating – (Clause D2.13);
- Reduced heights to balustrades – (Clause D2.16);
- Rationalisation of handrails and AS1428.1-2009 compliant handrails throughout the building (Clause D2.17); and
- Angle of the stairways associated with the tiered seating including the clearance between rows of seats – (Clause H1.4)

Please note the above list is not all performance-based assessments that will need to be considered. Additional items may need to be considered through the design development phase of works



Conclusion

This report has been provided to accompany the State Significant Development Application submission following a preliminary assessment of the proposed design. The development adequately satisfies the intent of being able to comply with the requirements of the BCA for the purpose of the SSDA submission.

We confirm the design as shown on the drawings referenced in Appendix A is capable of achieving compliance with the BCA subject to further detail at the design development stage. The design will be subject to a Crown Certificate approval process through section 6.28 of the EP&A Act 1979 to ensure all aspects of the design will comply with BCA requirements including any performance-based determinations.



Appendix A – Referenced Documentation

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

Drawing No.	Title	Issue	Date	Drawn By
-	Proposed L0 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed L1 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed L2 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed L3 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed L4 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed L5 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed L6 Floor Plan	-	15/08/2019	Cox Architecture
-	Proposed Roof Plan	-	15/08/2019	Cox Architecture
-	Proposed Elevations	-	15/08/2019	Cox Architecture
-	Proposed Sections	-	15/08/2019	Cox Architecture



Appendix B – Schedule of proposed statutory Fire Safety Measures

Measure	Standard of Performance
Access Panels, Doors And Hoppers To Fire Resisting Shafts	BCA2019 Clause C3.13 and tested prototypes (AS 1530.4 – 2014)
Automatic Fail Safe Devices	Scheduled devices release upon trip of smoke detection, fire detection and sprinkler activation in accordance with BCA2019 Clause D2.21.
Automatic Fire Detection And Alarm System (Smoke Detection System)	BCA2019 Clause 4 of Specification E2.2a and AS 1670.1 – 2018
Automatic Fire Detection And Alarm System (Within Atriums)	BCA2019 Specification G3.8 and AS 1670.1 – 2018
Automatic Fire Detection And Alarm System (Smoke Detection System To Operate Zone Smoke Control Or Stair Pressurisation System)	BCA2019 Clause 6 of Specification E2.2a and AS 1670.1 – 2018
Automatic Fire Detection And Alarm System (Smoke Detection System To Automatically Shutdown Air-Handling System)	BCA2019 Clause 6 of Specification E2.2a and AS 1670.1 – 2018
Automatic Fire Detection And Alarm System (Smoke Detection System To Activate Smoke Exhaust System)	BCA2019 Clause 5 of Specification E2.2a and AS 1670.1 – 2018
Automatic Fire Suppression Systems (Sprinklers)	BCA2019 Specification E1.5 and AS 2118.1 – 2017
Emergency Lifts	BCA2019 Clause E3.4
Emergency Lighting	BCA2019 Clause E4.2, E4.4 and AS/NZS 2293.1 – 2018
Emergency Warning And Intercommunication System	BCA2019 Clause E4.9, Specification G3.8 and AS 1670.4 – 2018
Exit Signs	BCA2019 Clause E4.5, NSW E4.6, E4.8 and AS/NZS 2293.1 – 2018
Fire Alarm Monitoring System	BCA2019 Clause 8 of Specification E2.2a and AS 1670.3 – 2018
Fire Control Centre	BCA2019 Specification E1.8
Fire Dampers	BCA2019 Clause C3.15 and AS 1668.1 – 2015 (AS 1682.1 – 2015 and AS 1682.2 – 2015)
Fire Doors	BCA2019 Specification C3.4 and AS/NZS 1905.1 – 2015
Fire Hydrants Systems	BCA2019 Clause E1.3 and AS 2419.1 – 2005
Fire Seals Protecting Opening In Fire Resisting Components Of The Building	BCA2019 Clause C3.15, Specification C3.15, AS 1530.4 – 2014, AS 4072.1 – 2005 and installed in accordance with the tested prototype.
Hose Reel System	BCA2019 Clause E1.4 and AS 2441 – 2005
Lightweight Construction	BCA2019 Specifications C1.8, Clause A2.3 and AS 1530.4 – 2014



Measure	Standard of Performance
Mechanical Air Handling System (<i>Automatic Shut Down Of Air-Handling System</i>)	BCA2019 Clause E2.2 and AS 1668.1 – 2015
Mechanical Air Handling System (<i>Automatic Air Pressurisation System</i>)	BCA2019 Table E2.2a and AS 1668.1 – 2015
Mechanical Air Handling System (<i>Zone Smoke Control System</i>)	BCA2019 Table E2.2a and AS 1668.1 – 2015
Mechanical Air Handling System (<i>Carpark Mechanical Ventilation System</i>)	BCA2019 Table E2.2a, Clause 5.5 of AS/NZ 1668.1 – 2015 and fans with metal blades suitable for operation at normal temperature may be used and the electrical power and control cabling need not be fire rated
Mechanical Air Handling System (<i>Automatic Smoke Exhaust System</i>)	BCA2019 Specification E2.2b
Perimeter Vehicle Access For Emergency Vehicles	BCA2019 Clause C2.4
Portable Fire Extinguishers	BCA2019 Clause E1.6 and AS 2444 – 2001
Smoke Dampers	BCA2019 Clause 3 of Specification C2.5 and AS 1682.1 – 2015 and AS 1682.2 – 2015
Smoke Doors	BCA2019 Specification C3.4
Stand-By Power Systems	BCA2019 Clause 6 of Specification G3.8
Warning And Operational Signs	BCA2019 Clauses D3.6, D2.23, E3.3, E3.9, E3.10 and E1.8



Appendix C – Fire-resistance levels

The below table contain the fire-resistance levels (FRL) required under Specification C1.1 of the BCA.

Type A Construction: FRL of Building Elements				
Building element	Class of building - FRL: (in minutes)			
	<i>Structural adequacy/Integrity/Insulation</i>			
	2, 3 or 4 part	5, 9 or 7a	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 1.5m	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 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-				
For loadbearing columns	90/ - / -	120/ - / -	180/ - / -	240/ - / -
For 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
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