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BCA REPORT
Concept Design Phase

Taronga Zoo
The African Savannah & Congo Precinct



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TABLE OF CONTENTS

1.0	INTRODUCTION	3
1.1	Background	3
1.2	Objective of Report	3
1.3	Referenced Documentation	3
1.4	Limitations	3
2.0	PROJECT OVERVIEW	4
2.1	Description of Proposed Development	4
2.2	Approvals Pathway	4
2.3	Relevant Version of the BCA	4
3.0	BCA REVIEW	5
3.1	BCA Classification	5
3.2	Structure	5
3.3	Fire Resistance and Compartmentation	5
3.4	Provision for escape (Egress)	5
3.5	Construction of exits and safe movement	6
3.6	Access for People with Disabilities	7
3.7	Fire Services & Equipment	7
3.8	Health & Amenity	7
3.9	Energy Efficiency	8
4.0	MATTERS REQUIRING FIRE SAFETY ENGINEERED PERFORMANCE SOLUTIONS	8
5.0	CONCLUSION	9

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1.0 INTRODUCTION

1.1 BACKGROUND

This report comprises a review of the proposed Taronga Zoo African Savannah & Congo Precinct project against the NCC Building Code of Australia 2016 (BCA).

1.2 OBJECTIVE OF REPORT

The objective of this report is to:

- + Confirm that the referenced documentation has been reviewed by an appropriately qualified Building Surveyor and Accredited Certifier.
- + Identify high level BCA requirements for the proposed development that will need to be considered in the preparation of the detailed design documentation.
- + Identify indicative matters that are required to be addressed by Performance Solutions prior to issue of a Construction Certificate.
- + Identify the relevant essential fire safety measures that are applicable to the proposed development.

1.3 REFERENCED DOCUMENTATION

The following documentation was relied upon when preparing this Report:

- + NCC Building Code of Australia 2016 (BCA)
- + Guide to the Building Code of Australia 2016
- + TZG architectural plans issued 1 March 2017

1.4 LIMITATIONS

- + This report is based on a review of the referenced documents and a site inspection undertaken on the 1st December 2016.
- + It is not the intent of this report to identify all BCA provisions that apply to the development. This report comprises a high-level review of the development only.
- + This report relates to the requirements of the BCA deemed-to-satisfy (DTS) provisions only. Additional requirements may apply where fire safety engineered or accessibility Performance Solutions are proposed.
- + No assessment has been undertaken with respect to access for people with disabilities and the Disability Discrimination Act 1992 (DDA). The building owner should be satisfied that their obligations under the DDA have been addressed. In this instance, we note that an Access Consultant has been engaged to advise further in this regard.
- + The Report does not address issues in relation to the following:
 - i. The design, maintenance or operation of any existing electrical, mechanical, hydraulic or fire protection services.
 - ii. Occupational Health and Safety Act and Regulations.
 - iii. Water, drainage, gas, telecommunications and electricity supply authority requirements.
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3.0 BCA REVIEW

3.1 BCA CLASSIFICATION

The buildings are classified as follows:

	BCA CLASSIFICATION	STOREYS CONTAINED	RISE IN STOREYS	TYPE OF CONSTRUCTION	EFFECTIVE HEIGHT
+ GIRAFFE/ZEBRA EXHIBIT:	Class 9b	Two (2)	Two (2)	Type B	Less than 12m
+ MEERKAT & FENNEC BUILDINGS:	Class 5 & 7b	One (1)	One (1)	Type C	Less than 12m
+ CLIFF VILLAGE HUTS:	Class 9b	One (1)	One (1)	Type C	Less than 12m
+ LION EXHIBIT:	Class 5, 7b & 9b	Two (2)	Two (2)	Type C	Less than 12m
+ AFRICAN WATERHOLE:	Class 6 & 10a	One (1)	One (1)	Type C	Less than 12m
+ GORILLA EXHIBIT:	Class 5, 7b & 9b	One (1)	One (1)	Type C	Less than 12m
+ OKAPI EXHIBIT:	Class 5 & 7b	One (1)	One (1)	Type C	Less than 12m
+ OKAPI & GORILLA VIEWING SHELTERS:	Class 9b	One (1)	One (1)	Type C	Less than 12m

3.2 STRUCTURE

1. New building works are to comply with the structural provisions of the BCA 2016 and referenced standards including AS 1170.

3.3 FIRE RESISTANCE AND COMPARTMENTATION

1. As identified within Section 3.1 above, all buildings (other than the Giraffe/Zebra Exhibit) need only achieve Type C Construction. As these buildings are all situated more than 3m from a Fire Source Feature, fire resisting construction is not required to each structure.

With respect to the Giraffe/Zebra Exhibit, as Type B Construction applies, fire resisting c is required in accordance with clause 4 of BCA Specification C1.1. In summary, the following minimum fire ratings are required:

- + External walls (>18m from FSF): No FRL
- + Loadbearing internal walls and columns (Lower Ground Floor): 120/-/- FRL
- + Floor separating Lower & Upper Ground Floors: 30/30/30 FRL
- + Loadbearing internal walls and columns (Upper Ground Floor): No FRL
- + Roof: No FRL

2. The floor area and volume of each building is within the fire compartment limitations prescribed in BCA Table C2.2. As such, each building is considered a single fire compartment and fire compartmentation is not required.
3. Openings in external walls of each building do not require protection as they are situated more than 3m from a fire source feature in the case of the buildings requiring Type C Construction, and more than 6m from a fire source feature in the case of the building requiring Type B Construction.

3.4 PROVISION FOR ESCAPE (EGRESS)

1. The number of exits serving each building complies with BCA clause D1.2. In this regard, are areas accessed by the public are served by at least two (2) exits, and there is also alternative paths of travel available in different directions on all pathways connecting exhibits.
2. Exits serving each building, including exit stairways within the Lion Exhibit and Giraffe Exhibit, are not required to be fire isolated.



3. The existing Evacuation Diagram for Taronga Zoo is provided below.

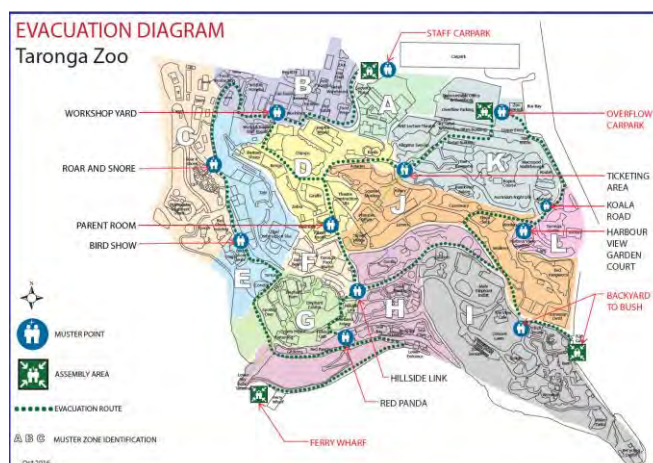


Figure 6: Existing Evacuation Diagram

The Evacuation Plan will need to be updated upon completion of the proposed development in show the new works, revised egress paths and also the location of any new Muster Points that may have been re-positioned.

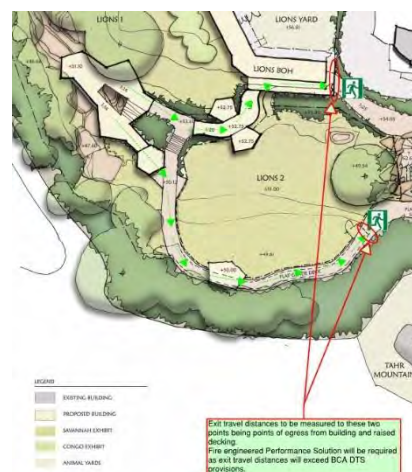
4. Exit travel distances generally comply with the BCA DTS provisions within each building.

Exit travel distances have also been measured where external pathways require passing back within a building to access *open space* (as defined by the BCA), such as at the Lion Exhibit (Zone 2). In this regard, a fire engineered Performance Solution will be required to address the following:

- + Exit travel distances to one of two alternative exits measured from within the Lions Visitors enclosure is approximately 66m in lieu of BCA DTS maximum of 40m.
- + Distance between alternative exits is approximately 120m in lieu of BCA DTS maximum of 60m.

It is considered that the Performance Solution will take into account the following (unique) building characteristics in demonstrating compliance with the relevant BCA Performance Requirements:

- + There are no dead-end spaces (i.e. there are two points of egress available from all areas).
- + The primary reason why the BCA prescribes maximum travel distances for egress to ensure occupants are given sufficient time to evacuate the building prior to fire spread and the onset of untenable conditions. Other than the relatively small portion that passes below the Lion Den, the walkways are essentially open to the sky and therefore the risk of fire spread is significantly reduced, and there is no risk of the onset of untenable conditions as fire/heat/smoke will disperse to open air.
- + Unlike a typical building with enclosed spaces, rooms and corridors, there is a good level of visibility to the walkways and therefore a fire/smoke in a remote location can be sighted early and occupants can move in the opposite direction to a place of safety and not inadvertently towards the hazard.



Further consultation will be required with a suitably qualified Fire Safety Engineer in this regard.

5. The aggregate egress width serving each building complies with BCA clause D1.6.
6. It is noted that various doors within the buildings will be secured to prevent the escape by animals. Further review will be required during detailed documentation to determine where fail-safe devices (that auto unlock doors upon fire trip) will be required to the respective doors, or other means to facilitate safe egress of occupants from the building. A Performance Solution may be required where compliance with the BCA DTS provisions is not possible having regard to the zoo's operation procedures.

3.5 CONSTRUCTION OF EXITS AND SAFE MOVEMENT

1. The construction of all stairways is to comply with BCA clause D2.13. Furthermore, all stairways accessible by the public are to be provided with handrails to both sides of the stairway in accordance with AS 1428.1-2009.



- Balustrades are required to all floors, walkways, platforms, landings, stairways, etc., where the fall to the level below exceeds 1m.

Balustrades are to comply with the following minimum requirements:

- + Must be a minimum 1m in height, or 865mm above the line of the nosings at a stairway.
- + Have no openings exceeding 125mm.
- + Where the fall to the level below exceeds 4m, must not incorporate any members that can facilitate climbing between 150mm & 760mm above the FFL.

Notwithstanding the above, given the nature of the facility, it is recommended that where possible balustrades should achieve a minimum 1.2m height above the FFL, and should not incorporate any members that can facilitate climbing between 150mm & 760mm above the FFL irrespective of height of fall to level below.

3.6 ACCESS FOR PEOPLE WITH DISABILITIES

- The Disability (Access to Premises-Buildings) Standards 2010 (the Access to Premises Standards) requires the building to comply with the Access Code (BCA Part D3 & AS 1428.1-2009).

With respect to the new works, compliance with the Access Code is achieved if the building complies with:

- + BCA clauses D3.1 to D3.12;
- + BCA clause E3.6;
- + BCA clauses F2.2 and F2.4.

Furthermore, the Access to Premises Standards also requires the 'Affected Part' to be upgraded to comply with the access code. In this regard, the Affected Part is the accessible path of travel from the principal entry to the new works.

Detailed documentation demonstrating compliance with the above BCA provisions and AS 1428.1-2009 will be required for assessment by the appointed Access Consultant.

3.7 FIRE SERVICES & EQUIPMENT

- The following comprises a summary of the fire safety measures that will need to be provided:

Statutory Fire Safety Measure	Design / Installation Standard	Buildings >500m ² in floor area	Buildings <500m ² in floor area
Automatic Fail Safe Devices	BCA Clause D2.21	✓	✓ ⁽¹⁾
Automatic Fire Detection & Alarm System	BCA Spec. E2.2a & AS 1670.1 – 2015	✓ ⁽²⁾	✓ ⁽²⁾
Emergency Lighting	BCA Clause E4.4 & AS 2293.1 – 2005	✓	
Exit Signs	BCA Clauses E4.5, E4.6 & E4.8; and AS 2293.1 – 2005	✓	✓
Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005	✓	
Fire Hydrant Systems	Clause E1.3 & AS 2419.1 – 2005	✓	✓ ⁽²⁾
Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001	✓	✓

Notes:

- Where applicable.
- Where required by Taronga Zoo as part of facility wide protection.
- Additional fire safety measures may be required arising from any fire engineered Performance Solutions.

3.8 HEALTH & AMENITY

- It is noted that new toilet facilities will be constructed within the African Waterhole zone. These facilities will serve the adjacent café and the general population.

While it is considered that there are sufficient facilities to serve the adjacent café, a site wide assessment would be required to determine if these facilities are adequate, in addition to the existing facilities provided on-site, to serve the overall zoo population.

- Separate male and female toilet facilities are proposed in accordance with the BCA requirements with the exception of the washbasins which are proposed to be communal. This arrangement does not comply with



BCA deemed-to-satisfy provisions, and it is considered that the proposed location of the communal basins could not be supported under a Performance Solution.

3. A minimum 2.7m ceiling height is required to parts accommodating more than 100 people. Otherwise, generally 2.4m ceiling height is required, and 2.1m is permitted to amenities and non-habitable rooms.
4. With respect to the African Waterhole and the applicability of swimming pool fencing, the Swimming Pools Act 1992 prescribes when pool fencing is required to be installed in accordance with AS 1926.1.

The following is an extract from the Act comprising the definition of a swimming pool.

swimming pool means an excavation, structure or vessel:

(a) that is capable of being filled with water to a depth greater than 300 millimetres, and

(b) that is solely or principally used, or that is designed, manufactured or adapted to be solely or principally used, for the purpose of swimming, wading, paddling or any other human aquatic activity,

and includes a spa pool, but does not include a spa bath, anything that is situated within a bathroom or anything declared by the regulations not to be a swimming pool for the purposes of this Act.

Having regard to b) above, provided that the waterhole is not being designed for swimming, wading, paddling or any other human aquatic activity, then a pool barrier complying with AS 1926.1 is not required under the Act.

The above does not take into consideration any be Safety in Design considerations that may apply. In this regard, I note that a barrier will be provided, albeit not necessarily in the form of a barrier prescribed under AS 1926.1.

3.9 ENERGY EFFICIENCY

1. The new building works subject to compliance with the Energy Efficiency Provisions of Section J relating to:

SECTION J PROVISIONS	APPLICABILITY
+ J1: Building Fabric	These provisions only apply where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning. For example, it is expected that these provisions would not apply to buildings such as the Cliff Village Huts.
+ J2: External Glazing	
+ J3: Building Sealing	
+ J5: Air-conditioning and ventilation systems	Only applicable where air-conditioning and ventilation systems are proposed to be installed in a building.
+ J6: Artificial lighting and power	Applicable to all buildings where artificial lighting is installed. Also requires power supply to a boiling water or chilled water storage unit must be controlled by a time switch.
+ J7: Heated water supply	These provisions require a heated water supply system for food preparation and sanitary purposes to be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.
+ J8: Facilities for Energy Monitoring	Will only apply to the buildings with a floor area of more than 500m ² in which case they must have the facility to record the consumption of gas and electricity.

The Construction Certificate documentation from the architect, mechanical, electrical, and hydraulic engineers are to incorporate details demonstrating compliance with the above provisions (as applicable to their respective disciplines).

Compliance with the BCA Section J can be achieved by way of complying with the BCA DTS provisions listed above or by way of a JV3 Verification.

4.0 MATTERS REQUIRING FIRE SAFETY ENGINEERED PERFORMANCE SOLUTIONS

The following BCA DTS non-compliances will necessitate a fire engineered Performance Solutions:

BCA CLAUSE/S	DESCRIPTION
1. D1.4	Exit travel distances to one of two alternative exits measured from within the Lions Visitors enclosure is approximately 66m in lieu of BCA DTS maximum of 40m.
2. D1.5	Distance between alternative exits within the Lions exhibit is approximately 120m in lieu of BCA DTS maximum of 60m



5.0 CONCLUSION

This report comprises a review of the proposed Taronga Zoo African Savannah & Congo Precinct project against the provisions of the Building Code of Australia 2016 (BCA 2016).

Arising from our review, it is considered that the proposed development can readily achieve compliance with the relevant provisions of the BCA, however further assessment of the design documentation will be required as the design is further developed to ensure that compliance with BCA is achieved.