BLACKETT MAGUIRE+ GOLDSMITH

BCA ASSESSMENT REPORT

SYD05-06-07 DATA CENTRE
MAMRE ROAD, KEMPS CREEK

PREPARED FOR:

Arup

Revision 0

Date: 22 March 2021

Project No.: 210063

Address Suite 2.01,
22-36 Mountain St
Ultimo NSW 2007

Contact Ph: 02 9211 7777
Fax: 02 9211 7774

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REPORT STATUS				
DATE	**REVISION**	**STATUS**	**AUTHOR**	**REVIEWED**
22.03.2021	0	Preliminary Assessment	DG	TJ

Prepared by:

Dean Goldsmith
Director
Blackett Maguire + Goldsmith

A. Introduction

A.1 Background / Proposal

Blackett Maguire + Goldsmith Pty Ltd (BM+G) have been commissioned by Arup to undertake a preliminary review of the proposed development against the deemed-to-satisfy (DTS) provisions of the Building Code of Australia 2019 Amendment 1 (BCA) pursuant to the provisions of clause 145 of the *Environmental Planning & Assessment Regulation 2000* and *Building and Development Certifiers Act 2018*.

The proposed development comprises the construction of a two (2) building Data Centre Facility, containing multiple Data Halls and three (3) ancillary offices, electrical switch rooms, storage space, external car parking, loading docks and external infrastructure (including stand-alone generators, water tanks and an electrical switchyard). The larger of the two Data Centre buildings on the southern side of the site is known as SYD05-06, whilst the smaller building on the northern side of the site is known as SYD-07.

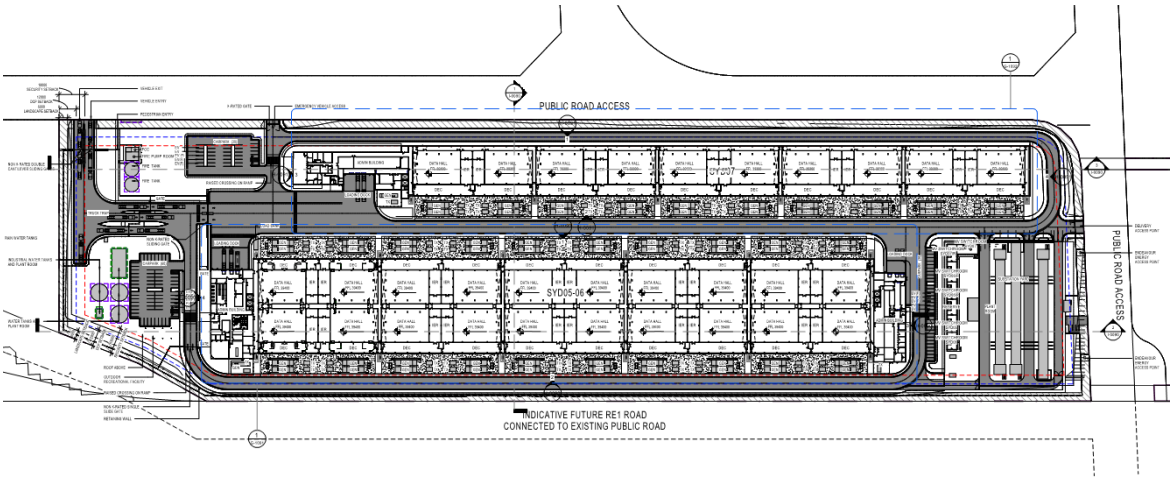

Figure 1 – Site Plan (Greenbox Drawing No. A-D-1091 Revision 2 dated 15.03.2021)

A.2 Aim

The aim of this report is to:

- Undertake an assessment of the proposed Data Centre facility against the Deemed-to-Satisfy (DtS) Provisions of the BCA 2019 Amendment 1.
- Identify any BCA compliance issues that require resolution/attention for the proposed development at the CC Application stage.

A.3 Project Team

The following BM+G Team Members have contributed to this Report:

- Tom Johnston (Building Surveyor)
- Sabine Blakeman (Junior Building Surveyor)
- Dean Goldsmith (Director)

A.4 Documentation

The following documentation has been reviewed, referenced and/or relied upon in the preparation of this report:

- BCA 2019 Amendment 1.
- Guide to the BCA 2019 Amendment 1
- Architectural plans prepared by Greenbox Architecture Pty Ltd:

Drawing No.	Revision	Date	Drawing No.	Revision	Date
SYD05-06-07-A-A-0090	1	15.03.2021	SYD05-06-07-A-G-1092	2	15.03.2021
SYD05-06-07-A-B-0090	1	15.03.2021	SYD05-06-07-A-H-0090	2	15.03.2021
SYD05-06-07-A-B-0091	1	15.03.2021	SYD05-06-07-A-H-0091	2	15.03.2021
SYD05-06-07-A-B-0093	2	15.03.2021	SYD05-06-07-A-H-0092	2	15.03.2021
SYD05-06-07-A-B-0095	1	15.03.2021	SYD05-06-07-A-H-0093	2	15.03.2021
SYD05-06-07-A-B-0097	1	15.03.2021	SYD05-06-07-A-H-0095	2	15.03.2021
SYD05-06-07-A-B-0098	1	15.03.2021	SYD05-06-07-A-H-0096	2	15.03.2021
SYD05-06-07-A-D-1091	2	15.03.2021	SYD05-06-07-A-I-0090	2	15.03.2021
SYD05-06-07-A-D-2092	2	15.03.2021	SYD05-06-07-A-I-0091	2	15.03.2021
SYD05-06-07-A-G-1091	2	15.03.2021	SYD05-06-07-A-I-0092	2	15.03.2021

A.5 REGULATORY FRAMEWORK

Pursuant to clause 145 of the Environmental Planning and Assessment (EPA) Regulation 2000 all new building work must comply with the current BCA however the existing features of an existing building need not comply with the BCA unless upgrade is required by other clauses of the legislation.

A.6 LIMITATIONS & EXCLUSIONS

The limitations and exclusions of this report are as follows:

+ The following assessment is based upon a review of the architectural documentation.
+ No assessment has been undertaken with respect to the Disability Discrimination Act (DDA) 1992. The building owner should be satisfied that their obligations under the DDA have been addressed. In this regard, however, the provisions of the DDA Access to Premises – Buildings Standards have been considered as they are generally consistent with the accessibility provisions of the BCA.
+ The Report does not address matters in relation to the following:
  - Local Government Act and Regulations.
  - NSW Public Health Act 1991 and Regulations.
  - Occupational Health and Safety (OH&S) Act and Regulations.
  - Work Cover Authority requirements.
  - Water, drainage, gas, telecommunications and electricity supply authority requirements.
  - DDA 1992.
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A.7 TERMINOLOGY

Alternative Solution

A Building Solution which complies with the Performance Requirements other than by reason of satisfying the DtS Provisions.

Building Code of Australia (BCA)

Document published on behalf of the Australian Building Codes Board. The BCA is a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia and is adopted in New South Wales (NSW) under the provisions of the EPA Act and Regulation. Building regulatory legislation stipulates that compliance with the BCA Performance Requirements must be attained and hence this reveals BCA's performance based format.

Construction Certificate

Building Approval issued by the Certifying Authority pursuant to Part 4A of the EP&A Act 1979.

Construction Type

The construction type is a measure of a buildings ability to resist a fire. The minimum type of fire-resisting construction of a building must be that specified in Table C1.1 and Specification C1.1, except as allowed for—

(i) certain Class 2, 3 or 9c buildings in C1.5; and
(ii) a Class 4 part of a building located on the top storey in C1.3(b); and
(iii) open spectator stands and indoor sports stadiums in C1.7.

Note: Type A construction is the most fire-resistant and Type C the least fire-resistant of the types of construction.

Climatic Zone

Is an area defined in BCA Figure A1.1 and in Table A1.1 for specific locations, having energy efficiency provisions based on a range of similar climatic characteristics.

Deemed to Satisfy Provisions (DtS)

Provisions which are deemed to satisfy the Performance Requirements.

Effective Height

The vertical distance between the floor of the lowest storey included in the calculation of rise in storeys and the floor of the topmost storey (excluding the topmost storey if it contains only heating, ventilating, lift or other equipment, water tanks or similar service units).

Fire Resistance Level (FRL)

The grading periods in minutes for the following criteria-

(a) structural adequacy; and
(b) integrity; and
(c) insulation,

and expressed in that order.

Fire Source Feature (FSF)

The far boundary of a road which adjoins the allotment; or a side or rear boundary of the allotment; or an external wall of another building on the allotment which is not a Class 10 building.

National Construction Code Series (NCC)

The NCC was introduced 01 May 2011 by the Council of Australian Governments. The BCA Volume One (Class 2 to 9 Buildings) is now referenced as the National Construction Code Series Volume One — BCA.

Occupation Certificate

Building Occupation Approval issued by the Principal Certifying Authority pursuant to Part 4A of the EPA Act 1979.

Open Space

A space on the allotment, or a roof or other part of the building suitably protected from fire, open to the sky and connected directly with a public road.

Performance Requirements of the BCA

A Building Solution will comply with the BCA if it satisfies the Performance Requirements. A Performance requirement states the level of performance that a Building Solution must meet.

Compliance with the Performance Requirements can only be achieved by-

(a) complying with the DtS Provisions; or
(b) formulating an Alternative Solution which-
    (i) complies with the Performance Requirements; or
    (ii) is shown to be at least equivalent to the DtS Provisions; or
(c) a combination of (a) and (b).

Sole Occupancy Unit (SOU)

A room or other part of a building for occupation by one or joint owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier and includes a dwelling.

B. Building Characteristics

B.1 Building Classification

The following table presents a summary of relevant building classification items of the proposed development:

▪ **BCA Classification:**	Class 5 (Office) Class 7b (Data Halls / Storage / Ancillary Uses) Class 10a (Generators, Pump Rooms and MV Switchrooms) Class 10b (Water Tanks and Switchyard)
▪ **Rise in Storeys:**	Three (3) (Note: See comments under Clause C1.2) – both buildings
▪ **Effective Height:**	Greater than 12m & Less then 25m – (RL53.4 – RL 39.4 = 14.0) – both buildings
▪ **Type of Construction:**	Type B – both buildings
▪ **Climate Zone:**	Zone 6
▪ **Maximum Floor Area / Volume:**	Greater than 18,000m^2 / 108,000m^3 (Note: The building is designated a Large Isolated Building under Clause C2.3)

Note: The following report relates to the Class 5 and Class 7b Data Centre in most areas with specific comments for the Class 10a Generator buildings in the various sections of the report.

B.2 Fire Source Feature

The distances from the nearest Fire Source Features associated with the Data Centre Facility are:

SYD-05/06 Building

Boundary	Distance to Fire Source Feature
North Boundary	>18m to the external wall of the SYD-07 Building
South Boundary	>18m to the rear boundary (Approx. 33m)
East Boundary	>18m to the external wall of the MV Switchroom Buildings
West Boundary	>18m to the side boundary (Approx. 25m to the nearest point of the western allotment boundary)

SYD-07 Building

Boundary	Distance to Fire Source Feature
North Boundary	>18m to the far boundary of the New Public Road
South Boundary	>18m to the external wall of the SYD-05/06 Building
East Boundary	>18m to the far boundary of the New Public Road
West Boundary	>18m to the side boundary (Approx. 160m to the nearest point of the western allotment boundary)

Note: It is noted that the Class 10a & Class 10b buildings are ancillary to the main Data Centre building and in turn are not considered a 'Fire Source Feature' except where specifically noted.

C. BCA Assessment

C.1 BCA Deemed-to-Satisfy Compliance Issues:

The following comments have been made in relation to the relevant BCA provisions relating to the compliance issues associated with the proposed Data Centre Facility.

SECTION B- STRUCTURE

+ **Part B1 – Structural Provisions**

Structural engineering details prepared by an appropriately qualified structural engineer to be provided to demonstrate compliance with Part B1. This includes the following Australian Standards (where relevant):

- AS 1170.0 – 2002 General Principles
- AS 1170.1 – 2002 Structural design actions
- AS 1170.2 – 2011 Wind loads
- AS 1170.4 – 2007 Earthquake loads
- AS 3700 – 2018 Masonry code
- AS 3600 – 2018 Concrete code
- AS 4100 – 1998 Steel Structures and/or
- AS 4600 – 2018 Cold formed steel.
- AS 2047 – 2014 Windows in buildings.
- AS 1288 – 2006 Glass in buildings.
- AS 3660.1 – 2014 Termite control (or confirmation no primary building elements are timber).

Comments: Structural design and certification will be required at CC application stage.

SECTION C – FIRE RESISTANCE

FIRE RESISTANCE AND STABILITY

+ **Clause C1.1 – Type of Construction Required**

The minimum type of fire-resisting construction of a building must be that specified in Table C1.1 and Specification C1.1 except as allowed for in this clause.

Comments: Type B Construction applies to the proposed Data Centre Facility (both buildings) as they have a rise in storeys of three (3) – see notes under Clause C1.2 and Spec. C1.1 below.

+ **Clause C1.2 – Calculation of Rise in Storeys**

The rise in storeys of a building is the sum of the greatest number of storeys at any part of the external walls of the building and any storeys within the roof space calculated in accordance with the requirements set out in this clause.

Comments: The buildings have a rise in stories of three (3), based upon the following assessment of the design:

- *The lift lobby enclosures on the Roof Level of each building over the Data Halls constitute a stand-alone storey.*
- *The **average** internal height of Level 1 & 2 in each building does not exceed 6m (due the installation of a ceiling within each Data Hall) and as such each storey is counted as one storey per C1.2(c). Given that the Data Halls do occupy the entire floor area of each storey in the COLO, the Architect is required to provide confirmation of the % of floor area dedicated to corridors and ancillary rooms where no ceiling is proposed to be installed. See mark-up over-page in Figure 1*

Note: The Trial Design of the Fire Engineering Report for the buildings will need to include a detailed specification for Cold Shell Data Halls that are not fitted out / completed and do not have ceiling installed at partial OC Application stages, to limit use and support the assessment of Clause C1.2(c) per dot point 2 above.

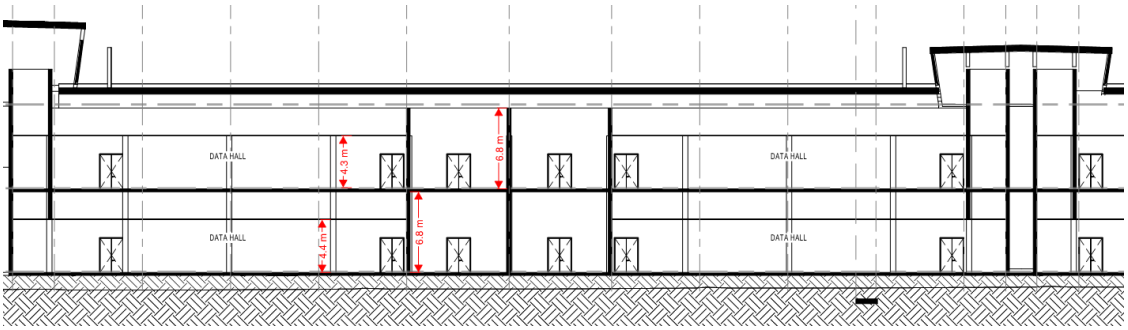


Figure 2 – Rise in Storeys Assessment (Greenbox Drawing No. A-I-0092 Revision 2 dated 15.03.2021)

+ **Clause C1.9 – Non-combustible Building Elements**

In a building of Type A or Type B Construction a number of building elements are required to be non-combustible including external walls & common walls (including elements incorporated in them including the façade coverings, framing and insulation), lift pit flooring and floor framing, services risers, load-bearing internal walls and fire walls.

Note: C1.9(e) provides a list of materials that may be deemed as non-combustible without the need for verification testing per AS 1530.1.

Comments: The external walls (including all elements incorporated in the walls) of the Data Centre buildings are required to be of non-combustible construction in accordance with C1.9 (a) & (b).

Note: The coloured architectural elevations indicate that Aluminium Panel Cladding is proposed to be used on the façade and as such details of the proposed product and confirmation of its compliance with Clause C1.9(e), and or Verification CV3 (along with all other materials incorporated in the external walls) will be required to be provided in the form of a schedule and/or External Wall Disclosure statement at CC Application stage.

+ **Clause C1.10 – Fire Hazard Properties**

The fire hazard properties of the linings, materials and assemblies outlined in this Clause in a Class 2 to 9 building must comply with **Specification C1.10** and the additional requirements of the **NSW Provisions** of the Code. Note: See NSW C1.10(a) & (b).

Comments: Design certification is required at CC application stage and installation certification (including relevant test reports confirming the critical radiant flux of floor linings; group number of wall and ceiling linings; spread of flame index for insulation materials; and flammability index for sarking materials) are required at OC stage in the form of a detailed schedule.

+ **Clause C1.14 – Ancillary Elements**

An ancillary combustible element must not be fixed, installed or attached to the internal or external parts of a non-combustible wall unless it is one of the concession items listed in items (b) – (m).

Comments: The ancillary elements in or attached to the Data Centre building facades will require review to confirm that the proposed internal & external attachments will achieve compliance with the non-combustibility requirements of this clause. See additional notes under Clause C1.9 above.

COMPARTMENTATION AND SEPARATION

+ **Clause C2.2 – General Floor Area and Volume Limitations**

This clause identifies the parameters for the maximum floor area and volume of fire compartments in Class 5, 6, 7, 8 & 9 buildings as required by sub-clauses (a), (b) & (c) and as listed in Table C2.2 - Maximum size of Fire Compartments or Atria.

Comments: The proposed buildings are a Class 5 & 7b Large Isolated Building of Type B Construction and as such the provisions for maximum fire compartment size under Table C2.2 do not apply. Refer to comments under C2.3 & C2.4 below in relation to the Large Isolated Building provisions applicable to the proposed Data Centre facility.

+ **Clause C2.3 – Large Isolated Buildings**

A Large Isolated Building that contain Class 5, 6, 7, 8 or 9 parts, is required to be—

(i) protected throughout with a sprinkler system complying with Specification E1.5; and

(ii) provided with a perimeter vehicular access complying with C2.4(b).

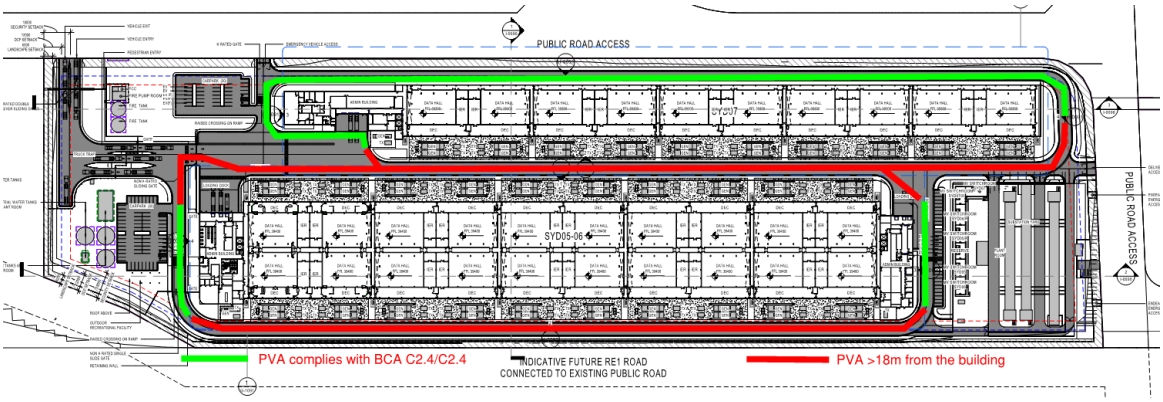
Comments: The proposed Data Centre buildings are required to be sprinkler protected throughout (see Clause E1.5 below) and provided with perimeter vehicular access in accordance with Clause C2.4 (see notes below) pursuant to its Large Isolated Building designation under this clause.

+ **Clause C2.4 – Requirements for Open Spaces & Vehicular Access**

Open space and vehicular access required by C2.3 must comply with the requirements of sub-clauses (a) & (b) of this Clause in that they must be 6m wide and within 18m of the building, as well as being of a suitable bearing capacity and unobstructed height to permit the operation and passage of FRNSW vehicles.

Comments: The proposed Data Centre building does not comply with the provisions of C2.4 in the areas identified in the mark-up below - we note a performance solution has been proposed by Arup in the FEBQ dated 01.05.2020 to address this issue:

+ *The furthest part of the vehicular access path is greater than 18m from the external walls of each of the Data Centre buildings as detailed in the mark-up below:*



Note 1: All gates are required to achieve no less than 6m unobstructed width or the reduced width.

Note 2: The driveways providing vehicular perimeter access must be designed with adequate loading capacities to withstand a fire truck and the gradients of the ramps should take into consideration the FRNSW Policy 4 Vehicular Access Guideline.

Note 3: The Trial Design for the Fire Engineered Performance Solution must take into consideration and detail the proposed security access to the site and how this may impact on FRNSW vehicular access.

+ **Clause C2.7 – Separation by Fire Walls**

Separation of Fire Compartments must be constructed in accordance with the following:

+ FRL in accordance with Table 4 of Spec. C1.1 and extend to the underside of a floor with the same FRL, or to the underside of a non-combustible roof covering.
+ Any openings in a fire wall must not reduce the FRL, except where permitted by the Deemed-to-Satisfy Provisions of Part C3 (i.e. fire doors; protection of services).
+ Building elements, other than roof battens with dimensions of 75 mm x 50 mm or less or sarking-type material, must not pass through or cross the fire wall unless the required fire resisting performance of the fire wall is maintained.

Comments: Details of any proposed fire walls per C2.8 below are to be included on the Construction Certificate plans. Note: Any openings in the proposed fire walls are required to be protected in accordance with C3.5 & C3.15 and structural elements may not cross the propose fire walls.

+ **Clause C2.8 – Separation of Classifications in the Same Storey**

If a building has parts of different classifications located alongside one another in the same storey, each element must have the required higher FRL for the classifications concerned.

Alternatively, the parts must be separated by a fire wall having the higher FRL for the classifications prescribed in Table 3 or 4 of BCA Specification C1.1 (for Type A or Type B Construction), or Table 5 for Type C Construction.

Comments: In accordance with C2.8(a), the building elements on Level 1 & 2 are required to achieve the FRL requirements of the Class 7b Data Hall & Storage areas as specified in BCA Specification C1.1 (4hr

fire ratings per Type B Construction). Alternatively, Fire Walls are required between the different classifications on each storey achieving the higher FRL of the different parts i.e. the Class 7b part must be separated from the Class 5 part on Level 1 & 2 by a Fire Wall of concrete or masonry construction (if loadbearing) achieving an FRL of 240/240/240.

+ **Clause C2.12 – Separation of Equipment**

Equipment as listed below must be separated from the remainder of the building with construction complying with (d), if that equipment comprises –

- Lift motors and lift control panels; or
- Emergency generators used to sustain emergency equipment operating in the emergency mode; or
- Central smoke control plant; or
- Boilers; or
- A battery system installed in the building that has a total voltage of 12 volts or more and a storage capacity of 200 kWh or more.

Note: Separating construction must have –

- an FRL as required by Specification C1.1, but not less than 120/120/120/; and
- any doorway protected with a self-closing fire door having an FRL of not less than -/120/30.

Comments: Where batteries which have a total voltage of 12 volts or more and a storage capacity of 200 kWh or more are installed in individual electrical switchrooms or other plant areas/enclosures, they must be separated from the remainder of the building by construction achieving an FRL as required by Spec C1.1, but no less than 120/120/120, and doorways protected with a self-closing fire door having an FRL of not less than -/120/30. Details demonstrating compliance are to be included in the CC Application plans.

Note: Refer to additional comments in Clauses E1.10 and E2.3 below regarding any proposed Lithium-Ion batteries that may be incorporated within the Data Halls

In addition, consideration will need to be given to fire separation in accordance with C2.12 for any proposed lift motor rooms or central smoke control plant serving each Data Centre Building and details demonstrating compliance will be required to be submitted with the CC Application.

+ **Clause C2.13 – Electricity Supply System**

(a) An electricity substation and main switchboard which sustains emergency equipment operating in the emergency mode, located within a building must –

(i) Be separated from any other part of the building by construction having an FRL of not less than 120/120/120; and

(ii) Having any doorway in that construction protected with a self-closing fire door having an FRL of not less then -/120/30

Note: Where emergency equipment is required in a building, all switchboards in the electrical installation, which sustain the electricity supply to the emergency equipment switchgear is separated from the non-emergency equipment switchgear by metal partitions designed to minimise the spread of fault from the non-emergency equipment switchgear.

Comments: Any substations located within the building and any main switchboards which sustain emergency equipment operating in the emergency mode are required to be separated from the remainder of the building by construction having an FRL of not less than 120/120/120 and have a doorway protected with a self-closing fire door having an FRL of not less than -/120/30. The compartmentation plans referenced in C2.8 above demonstrate compliance with the above requirements.

PROTECTION OF OPENINGS

+ **Clause C3.3 – Separation of External Walls and Associated Openings in Different Fire Compartments**

The distance between parts of external walls and openings within them in different fire compartments separated by a fire wall must not be less than that set out in Table C3.3, unless those parts of each wall have an FRL not less than 60/60/60 and any openings are protected in accordance with C3.4.

Comments: The provisions of C3.3 may apply where Fire Walls are proposed to address compliance with C2.8 – further details required to confirm compliance at CC Application stage.

+ **Clause C3.12 – Openings in Floors and Ceilings for Services**

This clause applies to the floors and ceilings in buildings of Types A, B & C Construction and sets out the methods required to limit the spread of fire though openings in these building elements, required to resist the spread of fire.

Comments: *Certification will be required at Occupation Certificate application stage as applicable.*

+ **Clause C3.15 – Openings for Services Installations**

All opening for services installations in building elements required to be fire-resisting with respect to integrity and insulation must be protected in accordance with the provisions of Spec. C3.15.

Comments: Note - Certification will be required at Occupation Certificate application stage as applicable.

SPECIFICATIONS

+ **Specification C1.1 – Fire Resisting Construction**

The new building works are required to comply with the requirements detailed under Table 4 of Specification C1.1 for Type B Construction. In this regard the proposed building elements are required to comply.

Comments: Compliance with the requirements of Spec. C1.1 for Type B construction is required – See Appendix 1 at the end of this report for applicable FRLs. We note that a Performance Solution to rationalise the FRL requirements applicable to all parts of the building, having regard to the provisions of Clause C2.8 may be considered by the Fire Engineer.

Internal loadbearing walls and columns on Level 1 & 2 will also be required to comply with the Arup FEBQ Performance Solution.

Note 1: The Structural Engineer is to advise on any load-bearing elements in external walls that are located within 18m of the side and rear allotment boundaries at the applicable CC Application stage.

+ **Specification C1.10 – Fire Hazard Properties.**

This Specification sets out requirements in relation to the fire hazard properties of linings, materials and assemblies in Class 2 to 9 buildings as set out in the Tables.

Comments: Refer to comments under Clause C1.10 above – certification will be required at both CC and OC Application stages.

+ **Specification C1.11 – Performance of External Walls in Fire**

This specification contains measures to minimise in the event of fire the likelihood of external walls collapsing outwards as complete panels and the likelihood of panels separating from supporting members.

Comments: Structural Design certification and details demonstrating compliance are required to be provided at CC Application stage.

SECTION D – ACCESS & EGRESS

PROVISION FOR ESCAPE

+ **Clause D1.2 – Number of Exits Required**

This clause requires the provision of sufficient exits to enable safe egress in case of an emergency. D1.2 provides that all buildings must have at least one exit from each storey and sets out circumstances in which more than one exit may be required (particularly in relation to Class 9 buildings). Note: Not less than 2 exits must be provided from each storey if the building has an effective height of more than 25m.

Comments: The current configuration is compliant with the requirements of this clause.

+ **Clause D1.3 – When Fire Isolated Stairways & Ramps are Required**

This clause specifies the requirements for when fire isolated stairs or ramps are required in buildings based upon the number of storeys that they interconnect and the classification of the building.

Comments: The exit stairs serving both buildings connect up to three storeys in a sprinkler protected building and as such are not required to be fire isolated in accordance with D1.3(b). All stairs serving Level 2 and the Rooftop level have been assessed as non-fire-isolated stairs and must achieve compliance with D1.9 below.

+ **Clause D1.4 – Exit Travel Distances**

This clause specifies the permitted travel distances allowable from Class 2 to Class 9 buildings. Sub-clauses (a) to (f) specify the maximum distances to be taken into account for the various uses in each Class of building.

Comments: The exit travel distances in the building are considered to be non-compliant with the requirements of Clause D1.4, in the following areas:

- *SYD-05/06 Building Levels 1 & 2 Central Corridor (worst case) – 75m to the nearest exit.*
- *SYD-05/06 Building Admin Office (West) – 48m to the nearest exit.*
- *SYD-07 Building Levels 1 & 2 Northern Corridor (worst case) – 75m to the nearest exit.*
- *SYD-07 Building Rooftop Level – 27m to a point of choice to alternative exits.*
- *SYD-07 Building Admin Office – 50m to the nearest exit and 34m to a point of choice to alternative exits from the western end.*

Note: The above extended exit travel distances are required to addressed as a Performance Solution by the Fire Engineer.

+ Clause D1.5 – Distances Between Alternative Exits

Exits required as alternative exits must be –

(a) not less than 9m apart; and

(b) not more than – 60m apart.

(c) Located so that the alternative paths of travel do not converge such that they become less than 6m apart.

Comments: The distances between alternative exits are considered non-compliant with the provisions of D1.5 when measured back through a point of choice, in the following areas:

- *SYD-05/06 Building Levels 1 & 2 Central Corridor (worst case) – 148m between alternative exits.*
- *SYD-07 Building Levels 1 & 2 Northern Corridor (worst case) – 150m between alternative exits.*
- *SYD-07 Building Admin Office – 95m between alternative exits.*

Note 1: The above assessment assumes egress is available back through the Data Halls and associated Corridors.

Note 2: We note that the extended distances between alternative exits identified above are required to addressed as a Performance Solution by the Fire Engineer.

Note 3: The distance between alternative exits has not been assessed on the rooftop level as this level is not an Occupiable Outdoor Area.

+ Clause D1.6 – Dimensions of Exits

This clause details the minimum dimensions such as height and width of paths of travel from Class 2 to 9 buildings. It also specifies the minimum dimensions of doorways from the various compartments and the width of exit doors from buildings depending on the uses and functions carried out within them.

Comments: Population numbers for the proposed Data Centre Facility (per Building) are required to be provided by Arup as detailed under Clause D1.13 below in order to confirm compliance with D1.6. In this regard however, given the number of exits proposed and the nature of use of the facility it is considered that compliance with the provisions of D1.6 is readily achievable.

Exit corridors and stairs and other paths of travel are to be a minimum 1m in width and 2m in height clear of any obstructions. The unobstructed height of any doorway may be reduced to not less than 1980mm and the width may be reduced by 250mm from the required exit dimensions listed below.

Note: See items further into the report in relation to the minimum ceiling heights for habitable and non-habitable spaces and required widths of doorways in an accessible part of the building.

+ Clause D1.9 – Travel by Non-fire-isolated Stairways or Ramps

Sub-clauses (a) to (f) set out the prescribed travel distances to be provided in required exits of Class 2 to 9 buildings and Class 4 parts of buildings. The sub-clauses set out the maximum distances to be taken into account for the various uses in each Class of building.

Comments: All stairs serving Level 2 and the Rooftop on each Building have been assessed as non-fire-isolated stairs and must achieve compliance with D1.9. The proposed non-fire isolated internal stairways and external stairways are capable of achieving compliance with D1.9 – further details are to be provided at CC application stage.

+ **Clause D1.10 – Discharge from Exits**

Requires that an exit must not be blocked at the point of discharge. Barriers such as bollards must be installed to prevent vehicles from blocking the discharge from exits.

This clause also provides the methods of construction, location and separation, at exit discharge points for all building Classes.

Comments: All discharge points from the building are required to be protected in accordance with the requirements of this clause.

+ **Clause D1.13 – Number of Persons Accommodated**

Clause D1.13 and Table D1.13 are used to calculate the anticipated number of people in particular types of buildings so that minimum exit widths and the required number of sanitary and other facilities can be calculated. This clause and table are not to be used for non-BCA purposes.

Comments: The maximum population of each proposed is required to be provided by Arup at the CC Application stage in order to confirm compliance with Clauses D1.6 and Table F2.3.

CONSTRUCTION OF EXITS

+ **Clause D2.3 – Non-fire-isolated Stairways & Ramps**

This clause requires that required non-fire-isolated stairways and ramps must be either constructed in accordance with D2.2 or the alternative options set out in D2.3 (a) to (c).

Comments: The requirements of D2.3 apply to all proposed internal & external non-fire-isolated stairs serving the building. Details are to be provided of the stair design at CC application stage.

+ **Clause D2.7 – Installations in Exits & Paths of Travel**

This clause restricts the installation of certain services in fire-isolated exits, non-fire-isolated exits and certain paths of travel to exits. Sub-clauses (a) to (e) prescribes which services **shall not be installed** as well as the circumstances in which certain services **may be installed** in fire-isolated and non-fire-isolated exits.

Comments: This requirement applies to all cupboards containing electrical distribution boards or comms. equipment that are located in a path of travel to an exit. In this regard, such cupboards are to be enclosed in non-combustible materials and are to be suitably sealed against the spread of smoke.

+ **Clause D2.8 – Enclosure of Space Under Stairs & Ramps**

A space below a required fire-isolated stairway or ramp in a fire-isolated shaft must not be enclosed to form a cupboard or other enclosed space. If the required stairway or ramp is non-fire-isolated, (including an external stairway) any cupboard underneath must have an FRL of 60/60/60, with a self-closing -/60/30 door.

Comments: Applies to the proposed Cleaners Cupboard under the non-fire-isolated stair in the front entry lobby and any enclosures under the external stairs. Details demonstrating compliance are to be included on the CC plans – Architect to note.

+ **Clause D2.13 – Goings & Risers**

This clause sets out the detailed requirements for the construction and geometry of the goings and risers in required stairways. These details are set out in sub-clauses (a) to (c) and Table D2.13 Riser and Going Dimensions.

Comments: All stairs are to have solid risers, and are to have contrasting nosings, slip resistant surfaces throughout in accordance with clause 11 of AS1428.1-2009. Refer to the slip resistance for stairs below under Clause D2.14.

Note: Although not specifically required the stairs serving the raised platform areas around the Class 10a buildings may be compliant with Table D2.13 or AS 1657 per Clause D2.18.

Riser and Going Dimensions (mm)			
	Riser (R)	**Going (G)**	**Quantity (2R + G)**
Maximum	190	355	700
Minimum	115	250	550

+ **Clause D2.14 – Landings**

The dimensions and gradients of landings in stairways are set out in this clause; the configuration will depend on the proposed use of a building.

Landing surfaces must be slip resistant OR have slip resistant nosings not less than that listed in Table D2.14 when tested in accordance with AS4586.

Comments: Architect to note.

Application	Surface conditions	
	Dry	Wet
Ramp steeper than 1:14	P4 or R11	P5 or R12
Ramp steeper than 1:20 but not steeper than 1:14	P3 or R10	P4 or R11
Tread or landing surface	P3 or R10	P4 or R11

+ **Clause D2.15 – Thresholds**

The threshold of a doorway must not incorporate a step or ramp at any point closer to the doorway than the width of the door leaf unless –

(i) the doorway opens to a road or open space, external stair landing or external balcony; and

(ii) the door sill is not more than 190mm above the finished surface of the ground, balcony, or the like, to which the doorway opens.

Comments: Architect to note. Details demonstrating compliance will be required to be included in the CC plans.

+ **Clause D2.16 – Balustrades or Other Barriers**

This clause details where balustrades are required to be provided and sets out in specific detail the construction requirements. Typically, the following will apply to this class of building:

+ Balustrades are required where the fall to the level below is more than 1m in height. The minimum height of a balustrade is 1m above the floor of the landing, walkway or the like; and 865mm above the floor of a stairway or a ramp.
+ For a fall of more than 4m to the surface level below, a window sill must be a minimum of 865mm in height above the height of the floor surface.
+ Where the floor is more than 4m above the surface beneath the balustrade any horizontal or near horizontal members between 150mm and 760mm above the floor must not facilitate climbing.
+ Balustrades must be constructed so as to not permit a sphere of 125mm diameter to pass through. The exception to this is within fire isolated exits within the building, or within a class 7 or 8 building, where the rails can be positioned a maximum of 460mm apart, so long as a bottom rail is located so a sphere of 150mm cannot pass through the opening between the nosing of the stair treads and the rail or between the floor of the landing, balcony or the like.

Comments: Details demonstrating compliance are to be submitted with the CC Application drawings for assessment against the above criteria.

Note: All non-fire-isolated external stairs and internal stairs must have gaps no greater than 125mm with no climbable elements between 150mm and 760mm above the floor (measured from the nosing) where the fall to the surface beneath is 4m or more.

+ **Clause D2.17 – Handrails**

This Clause sets out the requirements regarding the location, spacing and extent of handrails required to be installed in buildings.

Comments: Details of the proposed handrails are to be provided for assessment with the application for the Construction Certificate.

Note 1: Refer to Part D3 for additional requirements for handrails associated with accessible compliant stairways, in all areas other than those subject to a D3.4 concession.

Note 2: A handrail is required where the external egress paths of access to the street have a gradient greater than 1:20. See additional comments under Clause D3.3 below, noting consideration will need to be given to the accessibility requirements of AS1428.1-2009.

Note 3: The external egress stairs from Level 2 are required to have a handrail compliant with this Clause unless a D3.4 concession applies – see notes below.

+ **Clause D2.18 – Fixed Platforms, Walkways, Stairways and Ladders**

A Fixed Platform, Walkway, Stairway and/or Ladder may comply with AS 1657 in lieu of Part D2 where it services plant rooms, machinery rooms or the like.

Comments: Details of where AS 1657 is to be applied are to be included on the CC Application plans, including in relation to the Class 10a buildings as referenced above.

+ **Clause D2.19 – Doorways and Doors**

This clause applies to all doorways and refers to the types of doors that cannot be used in buildings of prescribed uses, the use of power operated doors and the force required to operate sliding doors.

If the door is also power operated, it must be opened manually under a force of not more than 110N if there is a malfunction or failure to the power source; or upon the activation of a fire or smoke alarm anywhere in the fire compartment served by the door.

Comment: Compliance readily achievable – design certification required at CC Application stage.

+ **Clause D2.20 – Swinging Doors**

A swinging door in a required exit or forming part of a required exit must be installed to the requirements of sub-clauses (a), (b) & (c). This clause only applies to swinging doors in doorways serving a required exit or forming part of a required exit. It does not apply to other doorways – see notes in the Guide to the BCA.

Comments: The proposed egress doors are required to swing in the direction of egress in accordance with D2.20(a) – compliance is readily achievable.

+ **Clause D2.21 – Operation of Latch**

A door in a required exit or forming part of a required exit and in a path of travel to a required exit must be readily openable without a key from the side that faces a person seeking egress, by a single downward action or pushing action on a single device which is located between 900mm & 1.1m from the floor. This clause prohibits the use of devices such as deadlocks and knobs where knobs must be operated in a twisting motion in accordance with sub-clauses (a) & (b). D2.21 also sets out exceptions in relation to buildings where special security arrangements are required in relation to the uses carried out.

Comments: Architect to note. Details demonstrating compliance will be required to be included in the CC plans.

Note 1: A fail-safe device which automatically unlocks the door upon the activation of the sprinkler system or fire alarm system may be installed to any door that is required to be locked from the side that faces a person seeking egress. A Performance Solution may be required to be provided by the Fire Engineer for any doors in an egress path that do not automatically unlock on fire trip due to specific security requirements.

Note 2: Although not specifically required the provisions of D2.21 for nominated egress doors in the Class 10a building is recommended.

ACCESS FOR PEOPLE WITH A DISABILITY

+ **Clause D3.2 – Access to Buildings**

Access must be provided to and within all areas normally used by occupants (as required by Clause D3.1) within this building from the main points of pedestrian entry at the allotment boundary; from another accessible building connected by a pedestrian link; and any accessible car parking space.

Access must be provided through the principal pedestrian entrance and through not less than 50% of all pedestrian entrances (including the principal pedestrian entry).

In addition, as the building is greater than 500m2, a non-accessible entrance must not be greater than 50m from an accessible entrance.

The minimum width of an accessible doorway must have a clear opening width of not less than 850mm in accordance with AS1428.1.

Comments: Compliant Access is required throughout all areas in the proposed building in accordance with AS 1428.1-2009 with the exception of those areas subject to a D3.4 concession. Details demonstrating that each main entrance to the buildings are compliant with AS 1428.1-2009 (including all security lobbies and man-traps) are to be provided at CC Application stage.

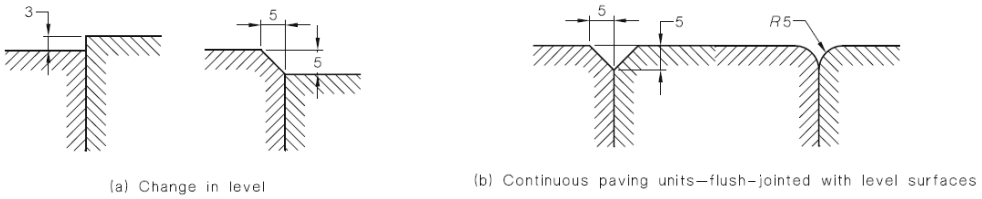
+ Clause D3.3 – Parts of the Building to be Accessible

This part specifies the requirements for accessways within buildings which must be accessible.

Comments: As indicated above, the proposed building is required to be accessible throughout in accordance with AS1428.1-2009. It is noted that compliance with the requirements of D3.3 and AS 1428.1-2009 is readily achievable; however, details and design certification from an Access Consultant will be required to be provided at CC Application stage.

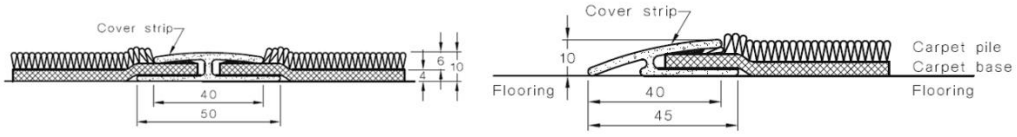
The following is a summary of some of the key matters which need to be considered from Clause D3.3 and AS 1428.1-2009:

+ *The lifts accessing Level 2 are required to be provided with facilities in accordance with Table E3.6a/b and have minimum dimensions of 1400mm wide by 1600mm deep.*
+ *The minimum width of an accessible doorway must have a clear opening width of not less than 850mm in accordance with AS1428.1.*
+ *All doorways on a continuous path of travel shall have a minimum luminance contrast of 30% provided between: door leaf and door jamb; or door leaf and adjacent wall; or architrave and wall; or door leaf and architrave; or door jamb and adjacent wall. The minimum width of the area of luminance contrast shall be 50mm.*
+ *In accordance with Clause D3.3; the non-fire-isolated stairways must comply with Clause 11 of AS 1428.1-2009 and the passenger lifts must comply with Clause E3.6.*
+ *All finished floor surfaces are to be trip free; the following details demonstrate the tolerance level for floor finishes:*



Source – Section 7.2 of AS1428.1-2009

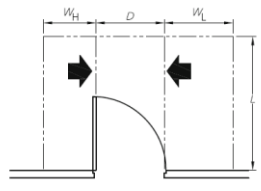
+ *Clause D3.3(g) and (h) requires that the pile height or pile thickness shall not exceed 11mm and the carpet backing thickness shall not exceed 4mm. Moreover, the carpet pile height or pile thickness dimension shall not exceed 11mm, the carpet backing thickness dimension shall not exceed 4mm and their combined dimension shall not exceed 15mm.*



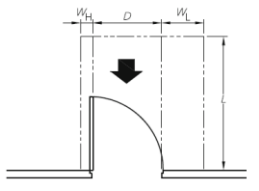
Source – Section 7.4.1 of AS1428.1-2009

Circulation space requirements at doorways

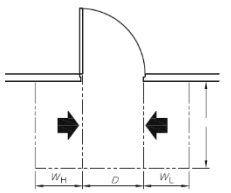
+ *Circulation space to the doorways that are required to be accessible are to comply with Section 13 of AS1428.1-2009, examples of which are as follows:*



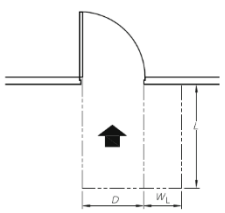
Dimension D	Dimension L	Dimension W_H	Dimension W_L
850	1670	660	900
900	1670	610	900
950	1670	560	900
1000	1670	510	900



Dimension D	Dimension L	Dimension W_H	Dimension W_L
850	1450	110	530
900	1450	110	530
950	1450	110	530
1000	1450	110	530



Dimension D	Dimension L	Dimension W_H	Dimension W_L
850	1240	560	660
900	1210	510	660
950	1175	460	660
1000	1155	410	660

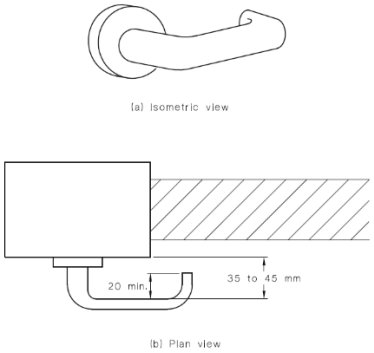


Dimension D	Dimension L	Dimension W_H	Dimension W_L
850	1450	0	510
900	1450	0	510
950	1450	0	510
1000	1450	0	510

+ *Turning Spaces and Passing Spaces in all areas are required to be provided on each level of the building in accordance with Clauses 6.4 & 6.5 of AS 1428.1-2009.*

Door hardware

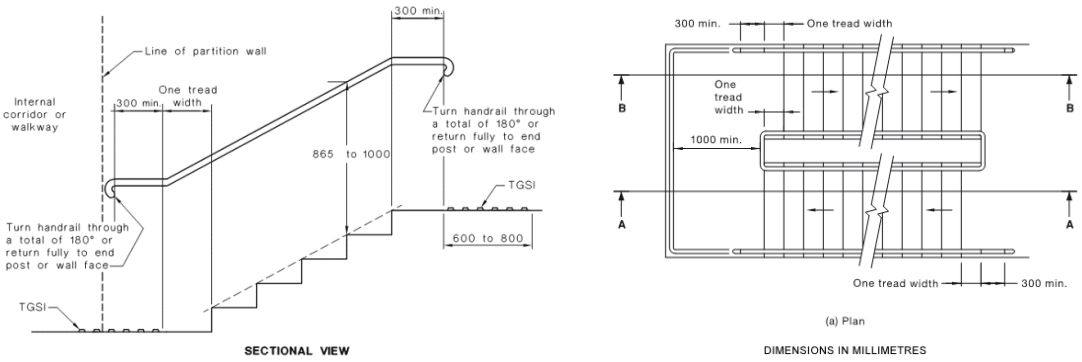
+ *All door handles and related hardware to new doorways required to be accessible shall be of a type that allows the door to be unlocked and opened with one hand in accordance with AS1428.1-2009:*



Source – Section 13.5.2 of AS1428.1-2009

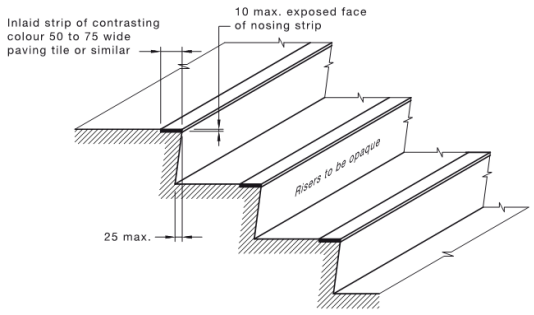
Stairways

+ *Every stairway must be constructed in accordance with Clause 11 of AS1428.1, except if they are within a fire isolated exit in which case only Clauses 11(f) and (g) are applicable. As such, all stairways must be designed to comply with the accessibility requirements of Clause 11 of AS1428.1-2009 and details will need to be confirmed on the plans for CC.*



Stairway and handrail requirements

+ *Stairs shall have opaque risers (i.e. Solid) and Stair nosing's shall comply with the following diagram, which achieve a colour contrast luminance of 30% to the background (tread):*



Stairway nosing requirements

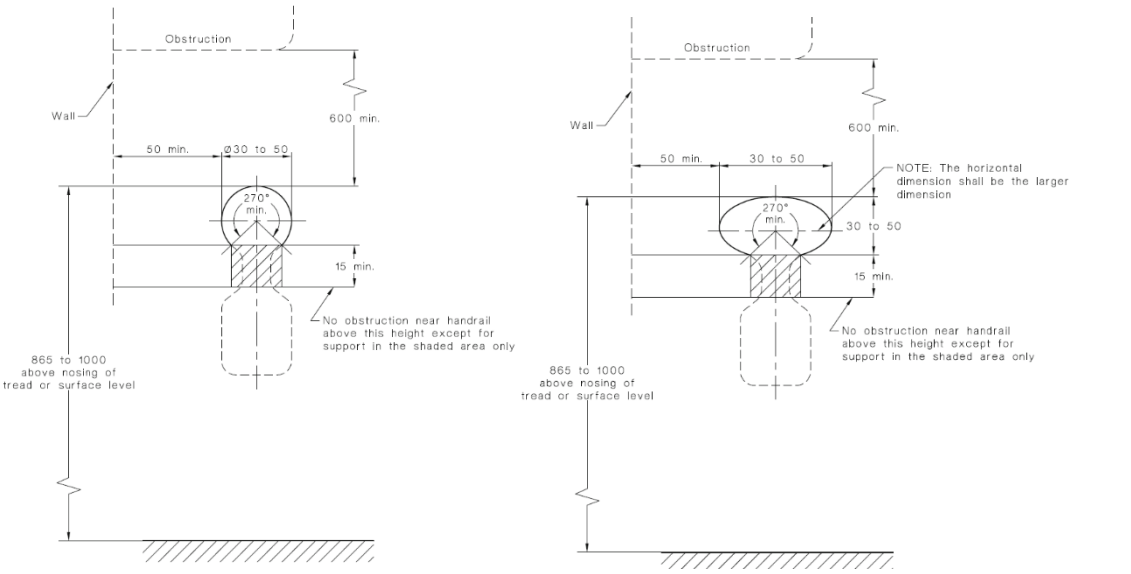
+ *Stairways are to be served by Tactile Ground Surface Indicators in accordance with AS1428.4.1, except if they are within a fire isolated exit.*

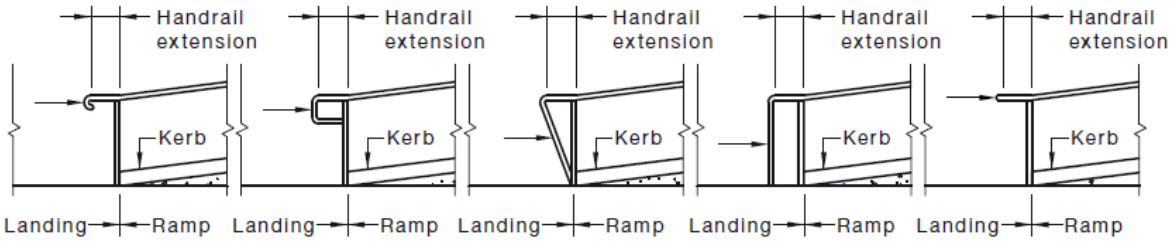
Walkways and Ramps

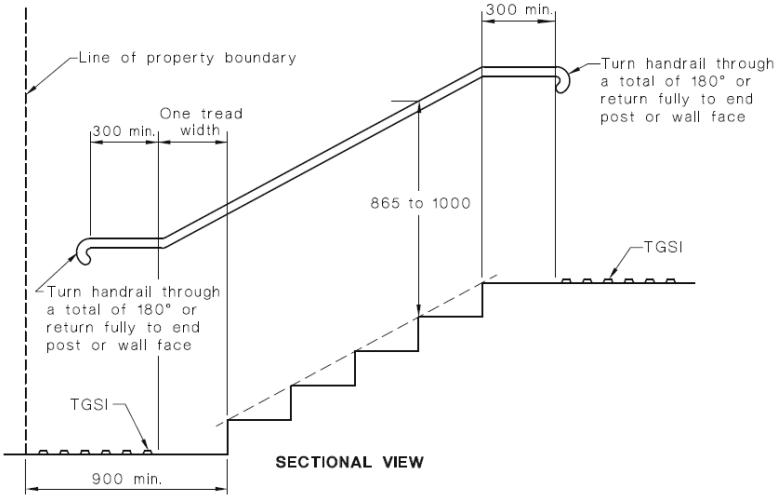
- *Walkways and ramps are required to be constructed in accordance with Clause 10 of AS1428.1-2009.*

Handrails

- *Handrails shall be installed along stairways and ramps as follows:*
  - *Shall be continuous through the flight and where practicable, around landings and have no obstruction on or above up to a height of 600mm,*
  - *Installed along both sides of the stairways and ramps (giving consideration also to 1m unobstructed width).*
  - *Shall have a compliant hand clearance in accordance with Figure 29 of AS 1428.1-2009 (below).*







Source – Section 11.1 and 12 of AS1428.1-2009

+ **Clause D3.4 – Exemptions**

This part provides exemptions to the Deemed-to-Satisfy provisions for access by people with a disability and details on buildings or parts of buildings not required to be accessible under the BCA where providing access would be inappropriate because of the nature of the area or the tasks undertaken.

Comments: It is recommended that advice be obtained from an Access Consultant at the CC Application stage in this regard; however, consideration to an exemption for the Data Halls (on health & safety risk basis) may be appropriate on this project. Confirmation from the operator of the facility will be required that includes a request for concession, where this would be applied and the reasons why it would be inappropriate for access for people with disabilities within the facility.

+ **Clause D3.5 – Accessible Carparking**

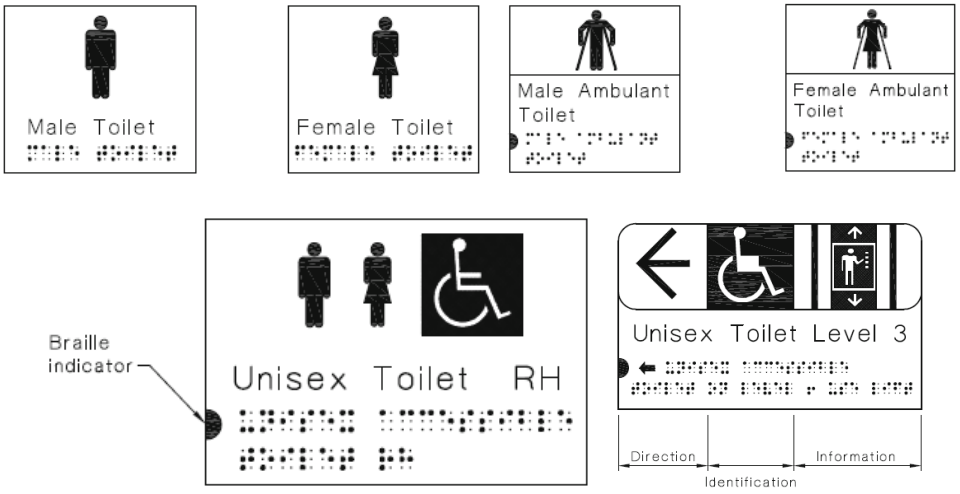
This part provides details of the number of accessible carparking spaces required in a carpark depending on the classification of the building.

Comments: In the case of Class 5 & 7b buildings 1 compliant accessible space is required for every 100 parking spaces or part thereof. In this regard, the design is currently compliant with 2 accessible spaces provided at each main office entry carpark.

+ **Clause D3.6 – Signage**

This section provides requirements for signage in buildings required to be accessible by Part D3.

+ *Comments: Signage, including Braille & tactile signage where appropriate, is required to comply with BCA clause D3.6 and Section 8 of AS 1428.1-2009 for sanitary facilities, ambulant facilities and disabled car parking spaces. In addition, the signage to the accessible toilet facilities is to also identify the facility for left and right-handed use.*



Source: Section 8 of AS1428.1-2009

+ **Clause D3.8 – Tactile Indicators**

This clause provides for the installation of tactile indicators in buildings required to be accessible and must be provided to warn people who are blind or have a vision impairment that they are approaching a stairway, escalator, passenger conveyor, ramp, overhead obstruction or an accessway meeting a vehicular way, except for areas exempted by D3.4.

Comments: Compliant tactile indicators are required in all areas of the buildings to all ramps, stairs, paths approaching a driveway and any overhead obstructions less than 2m in height.

+ **Clause D3.11 – Ramps**

Ramps may be used as part of an accessway where there is a change of level and must comply with the requirements set out in AS1428.1.

Comments: Architect to note. Details demonstrating compliance will be required to be included in the CC plans.

+ **Clause D3.12 – Glazing on an Accessway**

On an accessway, where there is no chair rail handrail or transom, all frameless or fully glazed doors, sidelights and any glazing capable of being mistaken for a doorway or opening, must be clearly marked in accordance with AS 1428.1.

Comments: Glazing capable of being mistaken for an opening as listed above must be clearly marked for their full width with a solid and non-transparent contrasting line being not less than 75mm wide and the lower edge must be located between 900mm and 1000mm above the plane of the finished floor level.

SECTION E – SERVICES AND EQUIPMENT

FIRE FIGHTING EQUIPEMENT

+ **Clause E1.3 - Fire hydrants**

E1.3(a) – A fire hydrant system must be provided to serve a building having a total floor area greater than 500m² and where a fire brigade is available to attend a building fire.

E1.3(b) – Requires that the fire hydrant system must be installed in accordance with the provisions of AS2419.1 and also details where internal hydrants must be located.

Comments: The proposed Data Centre is required to be served by a compliant hydrant system incorporating a ring main. Details demonstrating compliance with the provisions of AS 2419.1-2005 are required to be provided at CC Application stage.

Hydrant booster assemblies are required to be accessible to the brigade, located within sight of the main entry of each building, at least 10m from any proposed substation, and adjacent to the main vehicular and pedestrian entry into the site.

We note that a Performance Solution may be required for the location of the hydrant booster assembly not being in sight of all main entries to the buildings on site. Further review of the design of the hydrant system by the Hydraulic Engineer and Fire Engineer may also result in the need for additional Performance Solutions by the Fire Engineer if additional AS 2419.I-2005 non-compliances are proposed.

+ **Clause E1.4 – Fire hose reels**

A fire hose reel system must be provided to serve a building where one or more internal fire hydrants are installed or in a building with a floor area greater than 500m².

This clause requires that the fire hose reel system must be installed in accordance with AS 2441 and sets out the details for the location and use of fire hose reels.

Comments: The proposed Data Centre & Storage portions of the buildings are required to be served by a compliant fire hose reel system; however, the Office areas do not require coverage as they are subject to the Class 5 concession. Details demonstrating compliance are to be provided at the CC application stage.

Note: We note that a performance solution may be considered for deletion of Fire Hose Reels in the Data Hall portions of the building.

+ **Clause E1.5 – Sprinklers**

A sprinkler system must be installed in a building or part of a building when required by Table E1.5 and comply with Specification E1.5. Table E1.5 sets out which types of building occupancies and Classes which require to have sprinkler systems installed in them.

Specification E1.5 sets out requirements for the design and installation of sprinkler systems.

Comments: The proposed Large Isolated Buildings are required to be sprinkler protected throughout in order to address the requirements of Clause C2.3 and Table E1.5.

Details demonstrating compliance with AS2118.1 - 2017 are to be provided at the CC application stage.

In accordance with Clause 4.14.1 of AS2118.1-2017, the sprinkler booster is required to comply with the requirements of AS2419.1-2005 for a hydrant booster, which may need to be addressed as a Performance Solution from the Fire Engineer depending on the final configuration. Details to be provided for further assessment.

Note: If alternative fire suppression systems are proposed in any parts of the Large Isolated Buildings that are not AS 2118.1-2017 compliant, a Performance Solution will be required to be prepared by the Fire Engineer.

+ **Clause E1.6 – Portable fire extinguishers**

Portable fire extinguishers must be provided as listed in Table E1.6 and must be selected, located and distributed in accordance with Sections 1, 2, 3 and 4 of AS 2444.

Comments: Fire extinguishers will be required to be installed in the proposed building in accordance with Table E1.6 and AS2444 including to the Class 5 Office areas (including Ops Offices).

+ **Clause E1.10 – Provision for Special Hazards**

Suitable provisions are to be made for firefighting in a building if special problems of fighting fire could arise due to the nature or the quantity of goods stored, displayed or used; and/or the proximity of the building to a firefighting water supply.

Comments: It is noted that if Lithium-Ion batteries (or equivalent) are proposed to be stored/utilised within Data Halls in significant quantities, details will be required from both the sprinkler system designer and the fire engineer confirming that the proposed firefighting systems have the required capability to address the additional hazard resulting from the Lithium-Ion battery storage.

SMOKE HAZARD MANAGEMENT

+ **Clause E2.2 – General Requirements**

Class 2 to 9 buildings must comply with the provisions of this Clause to remove smoke during a fire, to control the operation of air handling systems and to prevent the spread of smoke between compartments.

Buildings must comply with the provisions of **Table E2.2a**, as applicable to Class 2 to 9 buildings. It deals with the design and construction of air handling systems that are part of a smoke hazard management system and air handling system that are not part of a smoke hazard management system.

The details relating to the installation and operation of the systems are set out in **Specifications E2.2a**, **E2.2b** and **E2.2c**.

Comments: As the area and volume of the Data Centre buildings are both greater than 18,000m^2 and 108,000m^3 respectively, the provision of a compliant smoke exhaust system in accordance with Spec. E2.2b and AS 1668.1-2015 is required to be provided. It is noted that consideration may be given to a Performance Solution in relation to the Smoke hazard Management Systems in the building by the Fire Engineer.

+ **Clause E2.3 – Provisions for Special Hazards**

Additional smoke hazard management measures may be required in a building to address any additional risk that result from special characteristics, functions, type of quantities of storage or mix of classifications within a fire compartment.

Comments: It is noted that if Lithium-Ion batteries (or equivalent) are proposed to be stored/utilised within Data Halls in significant quantities, details will be required from both the mechanical system designer and the fire engineer confirming that the proposed smoke hazard management systems have the required capability to address the additional hazard resulting from the Lithium-Ion battery storage in the buildings.

LIFT INSTALLATIONS

+ **Clause E3.2 – Stretcher Facilities in Lifts**

Stretcher facilities, complying with this clause, must be provided in lifts in at least one emergency lift as required by E3.4 or in a storey above an effective height of 12m.

A stretcher facility must accommodate a raised stretcher with a patient lying on it horizontally by providing a clear space not less than 600mm wide x 2000mm long x 1400mm high above the floor level.

Comments: The lifts within each building serve the rooftop storey which is above an effective height of 12m and as such they need to accommodate a stretcher in accordance with the requirements of the clause above. Design certification required at CC Application stage

+ **Clause E3.3 – Warning Against use of Lifts in Fire**

Warning signs required be provided must be displayed where they can be readily seen and must comply with the details and dimensions of **Figure 3.3**.

Comments: Lift Contractor to note.

- **Clause E3.5 – Landings**

  E3.5(c) Access and egress to and from lift well landings must comply with the Deemed-to-Satisfy Provisions of Part D

  Warning signs required to be provided must be displayed where they can be readily seen and must comply with the details and dimensions of **Figure 3.3**.

  Comments: *Compliance is readily achievable. Details to be confirmed with the documentation provided with the Construction Certificate application.*

- **Clause E3.6 – Passenger Lifts**

  In an accessible building, every passenger lift must be one of the types identified in **Table E3.6a,** have accessible features in accordance with **Table E3.6b** and not rely on a constant pressure device for its operation if the lift car is fully enclosed.

  Comments: Lift Contractor to note – design certification required at CC Application stage confirming compliance with Table E3.6a and E3.6b.

EMERGENCY LIGHTING, EXIT SIGNS AND WARNING SYSTEMS

- **Clause E4.2 – Emergency Lighting Requirements**

  This clause details when emergency lighting must be installed in Class 2 to 9 buildings. The requirements for buildings and parts of buildings are detailed in sub-clauses (a) to (i) and each sub-clause must be considered as more than one may apply to any single building

  Comments: Emergency lighting is required throughout the proposed Data Centre buildings in accordance with E4.2, E4.4 and AS/NZS 2293.1-2018.

- **Clause E4.4 – Design & Operation of Emergency Lighting**

  Every required emergency lighting system must comply with AS2293.1.

  Comments: Electrical Consultant to note – design certification required at CC Application stage.

- **Clause E4.5 – Exit Signs**

  An exit sign must be clearly visible to persons approaching the exit and must be installed on, above or adjacent to each door providing egress from a building. Sub-clauses (a) to (d) set out the situations where exit signs are required to be installed.

  Comments: Electrical Consultant to note. Details demonstrating compliance will be required to be included in the CC plans.

- **Clause E4.6 – Direction Signs**

  If an exit is not readily apparent to persons occupying or visiting the building then exit signs must be installed in appropriate positions in corridors, hallways, lobbies, and the like, indicating the direction to a required exit.

  Comments: Electrical Consultant to note. Details demonstrating compliance will be required to be included in the CC plans.

- **Clause E4.8 – Design & Operation of Exit Signs**

  Every required exit sign must comply with AS/NZS 2293.1 and be clearly visible at all times when the building is occupied by any person having the legal right of entry into the building.

  Comments: Electrical Consultant to note – design certification required at CC Application stage

SECTION F – HEALTH & AMENITY

DAMP AND WEATHERPROOFING

- **Performance Requirement FP1.4**

  A roof and external wall (including openings around windows and doors) must prevent the penetration of water that could cause

  - Unhealthy or dangerous conditions, or loss of amenity for occupants; and

- Undue dampness or deterioration of building elements.

Note 1: There are no Deemed-to-Satisfy provisions for this Performance Requirement in respect to External Walls.

Note 2: Refer to Clause F1.5 for roof coverings.

Comments: Design statement and a documented Performance Solution is to be provided with the Construction Certificate application, either by using:

- *The Verification Methods in Clause FV1; or*
- *Other verification methods deemed acceptable by the Certifier; or*
- *Evidence to support that the use of the material or product, form of construction or design meets the Performance Requirements or the DTS provisions, such as a Certificate of Conformity (eg. CodeMark); or*
- *By way of Expert Judgement.*

- **Clause F1.1 – Stormwater drainage**

Stormwater drainage must comply with AS/NZ 3500.3.

Comments: Details of stormwater disposal are required to be prepared by a suitably qualified consultant and submitted with documentation for the CC.

- **Clause F1.5 – Roof Coverings**

This clause details the materials and appropriate standards, with which roofs must be covered with. The roofing requirements are set out in sub-clauses (a), (b) (c), (d), (e) & (f) which set out the types of materials that may be used and the adopted Australian Standards that apply to their quality and installation.

Comments: Note.

- **Clause F1.6 – Sarking**

Sarking-type materials used for weatherproofing of roofs must comply with AS/NZS 4200 parts 1 and 2.

Comments: Note.

- **Clause F1.7 – Waterproofing of Wet Areas**

This clause requires that wet areas in Class 2 to 9 buildings must be waterproofed. It prescribes the standards to which the work must be carried out in sub-clauses (a) to (e) with emphasis in sub-clauses (c), (d) & (e) on the construction of rooms containing urinals and their installation.

Note: Figures F1.7(1) & F1.7(2) of the Guide to the BCA contain diagrams indicating the areas of walls and floors to be protected around baths, washbasins and showers.

Comments: Note.

- **Clause F1.9 – Damp-proofing**

  - This sub-clause requires that moisture from the ground must be prevented from reaching certain parts of buildings as listed.
  - This sub-clause requires that all damp-proofing materials and termite shields used as damp-proofing must comply with AS/NZS 2904 and AS 3660.1.
  - This sub-clause lists the buildings and parts of building that do not need to comply with (a).

Comments: Note.

- **Clause F1.10 – Damp-proofing of Floors on the Ground**

If the floor of a room is laid on the ground or on fill, moisture from the ground must be prevented from reaching the upper surface of the floor and adjacent walls by the insertion of a vapour barrier in accordance with AS 2870. Damp-proofing need not be provided if weatherproofing is not required or the floor is the base of a stair, lift or similar shaft which is adequately drained by gravitation or mechanical means.

Note: Figure F1.10, of the Guide to the BCA, illustrates a method of installing damp-proofing in sub-floor structures.

Comments: Note.

+ **Clause F1.12 – Sub-floor Ventilation**

The sub-floor space between the suspended floor of a building and the ground must be in accordance with sub-clauses (a) to (g). This clause specifies the minimum sub-floor ventilation openings and the height of sub-floor timbers above the ground level for the three climatic zones set out in **Figure F1.12** of the BCA.

Comments: Note.

+ **Clause F1.13 – Glazed Assemblies**

Glazed assemblies in an external wall must comply with AS2047 requirements for resistance to water penetration for windows, sliding doors with a frame, adjustable louvres, shop fronts and windows with one piece framing

Comments: Note.

SANITARY AND OTHER FACILITIES

+ **Clause F2.2 – Calculation of Number of Occupants & Facilities**

This clause sets out the requirements for the calculation of the number of occupants and the number of sanitary facilities required to be installed in Class 2 to 9 buildings. The parameters for the calculation are set out in sub-clauses (a) to (d).

Comments: Noted – refer to D1.13, confirmation of population numbers required.

+ **Clause F2.3 – Facilities in Class 3 to 9 Buildings**

This clause provides the requirements for sanitary facilities to be installed in Class 3, 5, 6, 7, 8 and 9 buildings in accordance with **Table F2.3**. The requirements and variations are set out in sub-clauses (a) to (h).

Comments: As indicated above, the maximum population numbers are required to be provided by Arup or the Operator of the facility for the proposed buildings to assess if the toilet facilities are adequate to achieve compliance with Table F2.3.

Details of the proposed sanitary facilities are to be provided at CC Application stage; however, it is considered compliance is readily achievable based on the current design.

+ **Clause F2.4 – Accessible Sanitary Facilities**

Accessible unisex sanitary compartments must be provided, in accordance with **Table F2.4(a)** and unisex showers must be provided in accordance with **Table F2.4(b)**, in buildings or parts that are required to be accessible. The details for the provision of disable facilities and the standard, AS 1428.1, are set out in sub-clauses (a) to (i).

Comments: Accessible unisex sanitary compartments are required at each bank of toilets where one or more toilets is provided. In addition to an accessible unisex sanitary compartment at that bank of toilets, an ambulant sanitary facility is required to be provided for use by male and female persons per AS 1428.1-2009. Where multiple banks of toilets are provided on a storey, at least 50% of the banks must comply with the above. Additionally, at least 1 accessible unisex sanitary compartment must be provided on every storey containing sanitary compartments, including Level 1 & 2. Design certification is to be provided at CC application stage demonstrating that the design of each facility complies with AS 1428.1-2009, however, it is considered compliance is readily achievable based on the current design.

+ **Clause F2.5 – Construction of Sanitary Compartments**

- Other than in an early childhood centre sanitary compartments must have doors and partitions that separate adjacent compartments and extend –
  - (i) from floor level to the ceiling in the case of a unisex facility; or
  - (ii) a height of not less than 1.5m above the floor if primary school children are the principal users; or
  - (iii) 1.8 above the floor in all other cases.
- The door to a fully enclosed sanitary compartment must-
  - (i) open outwards; or
  - (ii) slide: or
  - (iii) be readily removable from the outside of the sanitary compartment,

  unless there is a clear space of at least 1.2m, measured in accordance with **Figure F2.5** between the closet pan within the sanitary compartment and the doorway.

Comments: Details demonstrating compliance are to be submitted with documentation for the CC Application.

+ **Clause F3.1 – Height of Rooms and Other Spaces**

The ceiling heights in Class 2 to 9 buildings must not be less than required in sub-clauses (a) to (f) of this clause.

The minimum ceiling heights for a Class 5 & 7 buildings are as follows:

+ Corridor or Passage, Bathroom, storeroom, etc. – 2.1m
+ Remainder – 2.4m.

Comments: Architect to ensure compliance. Ceiling heights to be reviewed at the Construction Certificate stage with the detailed section drawings.

LIGHT AND VENTILATION

+ **Clause F4.4 – Artificial Lighting**

Artificial lighting is required where it is necessary to minimise the hazard to occupants during an emergency evacuation. Sub-clauses (a), (b) & (c) sets out the places where artificial lighting is always required in all classes of buildings and the standard to which it must be installed.

Comments: Design certification to be submitted at CC Application Stage.

+ **Clause F4.5 – Ventilation of Rooms**

A habitable room, office, shop, factory, workroom, sanitary compartment, bathroom, shower room, laundry and any other room occupied by a person for any purpose must have natural ventilation complying with F4.6 **or** a mechanical or air-conditioning system complying with AS1668.2 and AS/NZS 3666.1.

Note: NSW F4.5(b) a mechanical ventilation or air-conditioning system complying with AS 1668.2 – the reference to AS/NZS 2666.1 is deleted from the BCA in NSW as the need to comply with this standard is regulated under the relevant section of the Public Health Act 1991.

Comments: Design certification to be submitted at CC Application Stage.

+ **Clause F4.6 – Natural Ventilation**

Natural ventilation provided in accordance with F4.5(a) must consist of openings, windows, doors or other devices that can be opened with a ventilating area not less than 5% of the floor area of the room required to be ventilated and open to a suitably sized court or space open to the sky, an open verandah, carport or the like or an adjoining room in accordance with F4.7.

Comments: Design certification to be submitted at CC Application Stage.

SECTION J – ENERGY EFFICIENCY

+ **Part J1 – Building Fabric**

The provision of insulation of the building envelope will be required in the proposed Building, in accordance with **Clauses J1.0 to J1.**6, and the **Tables therein**, including Thermal Construction General, Roof and Ceiling Construction, Rooflights, Walls, and Floors. Design details and/or certification of design will be required to be provided in this regard.

Comments: This section applies to any air-conditioned spaces proposed within the Data Centre buildings. Design details and/or certification of building envelope design will be required to be submitted with the application for a Construction Certificate.

+ **Part J3 – Building Sealing**

The proposed building envelope will be required to be sealed to prevent air infiltration in accordance with the requirements of **Clauses J3.0 to J3.6**. Details or certification that the proposed building design complies with the requirements of **Part J3** is required to be provided.

*Comments: This section applies to any air-conditioned spaces proposed within the Data Centre buildings. Details or certification that the proposed design complies with the requirements of **Part J3** will need to be submitted with the application for a Construction Certificate.*

+ **Part J5 – Air-Conditioning & Ventilation Systems**

Details and/or design certification which confirm that any proposed air-conditioning system or unit within the proposed building achieves compliance with the relevant requirements of **Part J5** will be required to be provided from the mechanical engineer.

Comments: Details or certification demonstrating compliance will need to be submitted with the application for a Construction Certificate.

+ **Part J6 – Artificial Light & Power**

Details and/or design certification which confirm that all artificial lighting, power control, and boiling/chilled water units within the proposed building achieves compliance with the relevant requirements of **Part J6** will be required to be provided from the electrical engineer.

Comments: Consultant certification required at CC Application Stage.

+ **Part J7 – Hot Water Supply, & Swimming Pool & Spa Pool Plant**

Details and/or design certification which confirm that any proposed hot water supply system within the proposed building achieves compliance with the relevant requirements of **Part J7** (Section 8 of AS 3500.4) will be required to be provided from the hydraulic engineer.

Comments: Consultant certification required at CC Application Stage.

+ **Part J8 – Facilities for Energy Monitoring**

Provision for monitoring of energy consumption must be provided to a building where the floor area exceeds 500m², and must be capable of recording the consumption of gas and electricity. In addition, where the floor area of the building exceeds 2,500m² the energy monitoring facilities must be capable of individually recording air-conditioning, lighting, appliance power, central hot water supply, lifts/escalators, and other ancillary plant.

Comments: Consultant certification required at CC Application Stage.

D. Summary of Key Compliance Issues

The following comprises a summary of the key compliance issues identified under the assessment contained above that require Performance Solutions or further consideration at CC Application stage.

D.1 Matters Addressed as Performance Solutions

	BCA Clause/s	Description
1.	Spec. C1.1 / C1.2 / C2.8 /C2.7 / C3.3	Rationalisation of fire separation between classifications in regards to the Type B Construction required FRL's to a number of building elements, along with consideration to the impact of completed Cold Shell Data Halls on the C1.2 assessment of rise in storeys in the building.
2.	C1.9/C1.14	Confirmation of compliant non-combustible external wall materials and ancillary elements.
3.	C2.4	The following compliance issues have been identified with respect to the proposed perimeter vehicular access serving the Site: + The vehicular access is greater than 18m from the external walls of both buildings.
4.	D1.4 /D1.5	The current plans indicate that exit travel distances, and distances between alternative exits within both buildings will not comply with D1.4 & D1.5.
5.	D1.6 /D1.13	Population Numbers in both Buildings are to be confirmed by Arup/Operator.
6.	Part D3	Consideration to the provisions of D3.4 to the various parts of the building, and the provision of DDA compliant access to both buildings.
7.	E1.3 (inter alia AS 2419.1-2005) / E1.5	Hydrant System design compliance and hydrant and sprinkler booster locations.
8.	E1.4	Limited Fire Hose Reel coverage and/or deletion of Fire Hose Reels to Data Halls
9.	E1.5	Potential Use of alternative Fire Suppression systems in lieu of Sprinklers.
10.	E1.10	Provision additional fire services requirements to address additional hazard resulting for any proposed battery storage/use.
11.	E2.2/E2.3	Rationalised automatic smoke exhaust system in both the buildings taking into consideration any additional hazard resulting for any proposed battery storage/use.
12.	FP1.4	Weatherproofing Performance Solution required for the facades of both buildings.
13.	F2.3	Population Numbers in both Buildings are to be confirmed by Arup/Operator to assess compliance of proposed sanitary facilities numbers.

E. CONCLUSION

This report contains an assessment of the referenced architectural documentation for the proposed Data Centre Facility at Kemps Creek against the Deemed-to-Satisfy Provisions of the BCA 2019 Amendment 1. Arising from the review, it is considered that the proposed development can readily achieve compliance with the relevant provisions of the BCA. Where compliance matters are proposed to comply with the Performance Requirements (rather than DtS Provisions), the development of a Performance Solution Report will be required prior to the issue of the Construction Certificate.

The following fire safety measures are required for both proposed new Data Centre buildings:

Statutory Fire Safety Measure	**Design / Installation Standard**
Alarm Signalling Equipment	AS 1670.3 – 2018
Automatic Fail-Safe Devices	BCA Clause D2.21
Automatic Fire Suppression Systems	BCA Spec. E1.5 & AS 2118.1 – 2017
Building Occupant Warning System activated by the Sprinkler System	BCA Spec. E1.5, Clause 8 and / or Clause 3.22 of AS 1670.1 – 2018
Emergency Lighting	BCA Clause E4.4 & AS 2293.1 – 2018
Exit Signs	BCA Clauses E4.5, E4.6 & E4.8; and AS 2293.1 – 2018
Fire Dampers	BCA Clause C3.15, AS 1668.1 – 2015 & AS 1682.1 & 2 – 2015 and manufacturer's specification
Fire Doors	BCA Clause C2.12, C2.13, C3.4, C3.5, C3.8 and AS 1905.1 – 2015 and manufacturer's specification
Fire Hose Reels	BCA Clause E1.4 & AS 2441 – 2005
Fire Hydrant Systems	BCA Clause E1.3 & AS 2419.1 – 2005
Fire Seals	BCA Clause C3.15, AS 1530.4 – 2014 & AS 4072.1 – 2005 and manufacturer's specification
Lightweight Construction	BCA Clause C1.8 & AS 1530.3 – 1999 and manufacturer's specification
Mechanical Air Handling Systems	BCA Clause E2.2, AS/NZS 1668.1 – 2015 & AS 1668.2 – 2012
Paths of Travel	EP&A Regulation Clause 186
Perimeter Vehicular Access	BCA Clause C2.4
Portable Fire Extinguishers	BCA Clause E1.6 & AS 2444 – 2001
Smoke Exhaust	BCA Spec. E2.2b and AS 1668.1-2015
Stretcher Lifts	BCA Clause E3.2
Smoke Detectors (auto shutdown)	Clause 6(b) of Spec. E2.2a & AS 1668.1 - 2015
Warning & Operational Signs	Section 183 of the EP&A Regulation 2000, AS 1905.1 – 2015, BCA Clause D2.23, D3.6 & E3.3

Appendix 1

Table 4 TYPE B 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 therein) 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/ 30	120/ 90/ 60	180/120/ 90	240/180/120
3 to less than 9 m	90/ 30/ 30	120/ 30/ 30	180/90/ 60	240/90/ 60
9 to less than 18 m	90/ 30/–	120/ 30/–	180/60/–	240/60/–
18 m or more	–/–/–	–/–/–	–/–/–	–/–/–
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/ 30	–/ 90/ 60	–/120/ 90	–/180/120
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

Fire-resisting stair *shafts*					
	Non- *loadbearing*	–/ 90/ 90	–/120/120	–/120/120	–/120/120
Bounding *public corridors*, public lobbies and the like—					
	Loadbearing	60/ 60/ 60	120/–/–	180/–/–	240/–/–
	Non- *loadbearing*	–/ 60/ 60	–/–/–	–/–/–	–/–/–
Between or bounding *sole-occupancy units*—					
	Loadbearing	60/ 60/ 60	120/–/–	180/–/–	240/–/–
	Non- *loadbearing*	–/ 60/ 60	–/–/–	–/–/–	–/–/–
OTHER LOADBEARING INTERNAL WALLS					
and COLUMNS—		60/–/–	120/–/–	180/–/–	240/–/–
ROOFS		–/–/–	–/–/–	–/–/–	–/–/–