

Fire Safety Engineering Design Review for DA Submission



Data Centre Development, Lane Cove West

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1. General

Scientific Fire Services has undertaken a preliminary review and assessment for the architectural drawings and concepts proposed for the Data Centre Development at 1 Sirius Road, Lane Cove West, NSW. The following provides a summary of the fire safety risk engineering aspects and 'in-principle' support for the proposed design.

2. The Project

The subject site is located at 1 Sirius Road, Lane Cove West where it is proposed to develop a new Data Centre. The overall development shall involve the construction of approximately thirteen (13) data halls distributed over three (3) building blocks with a rise in storeys ranging from two (2) to three (3) storeys. There is also an office building located at the western portion of the development. The main access to the site is provided through the access road located at the eastern end of the site. The overview of the site is shown in Figure 2.1.

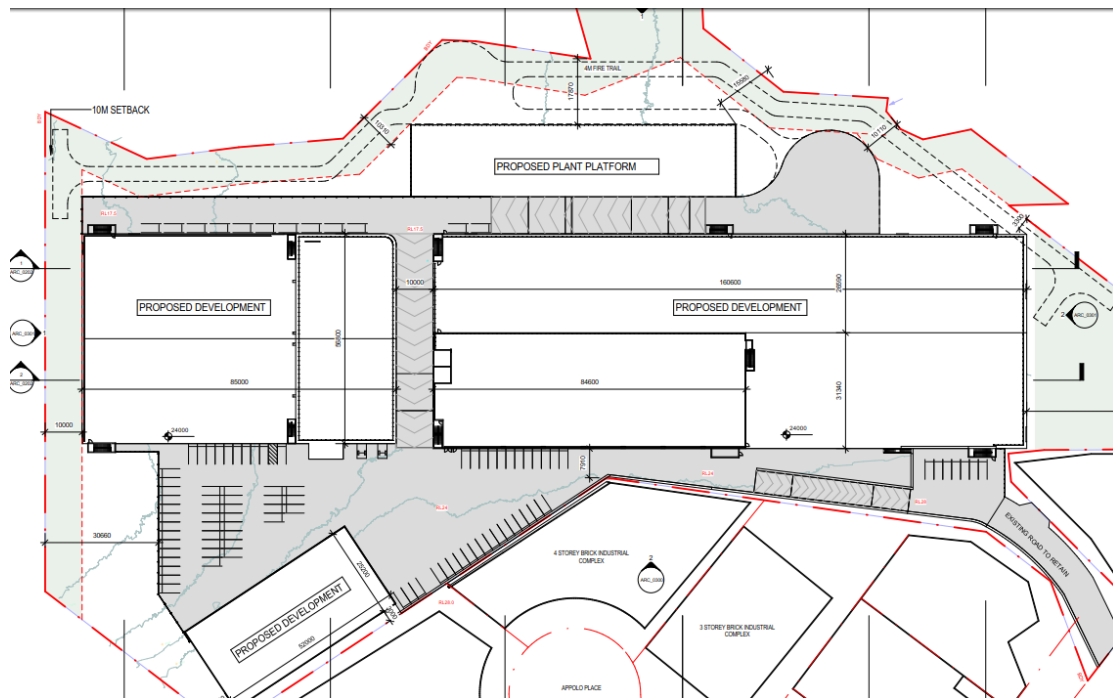


Figure 2.1: Overview of the Subject Site

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The data halls shall be mainly located at Ground Floor, Level One, and Level Two of the three (3) building blocks. The basement level shall mainly consist of plant rooms and store rooms. In addition to the plant rooms within the basement level, there will also be semi-open plant areas located at second floor. The overview of each level of the building is shown in Figure 2.2 to Figure 2.6.



Figure 2.2: Basement Level Layout

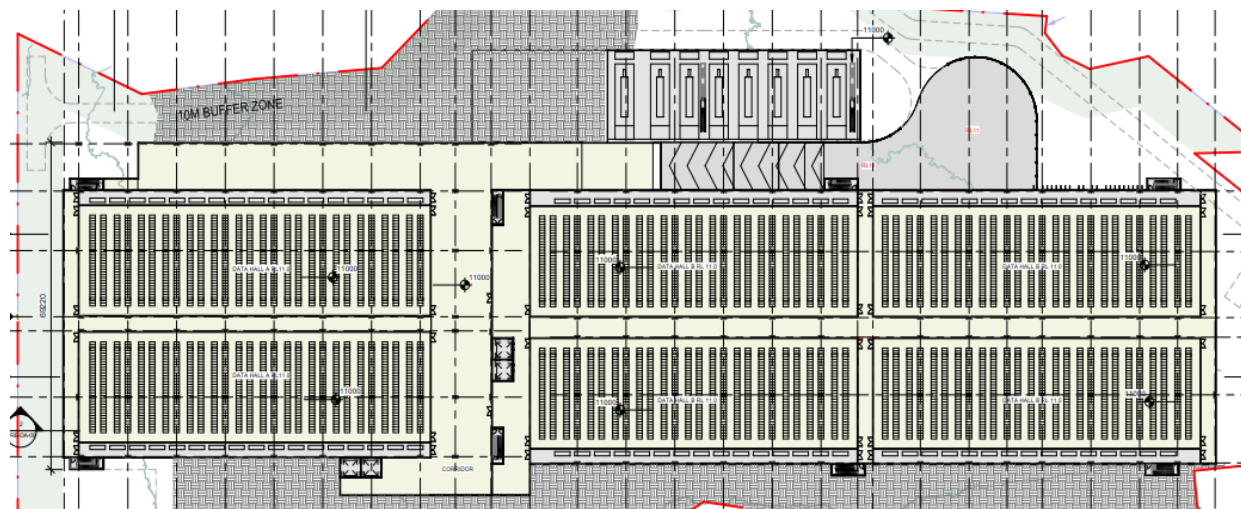


Figure 2.3: Ground Floor Layout

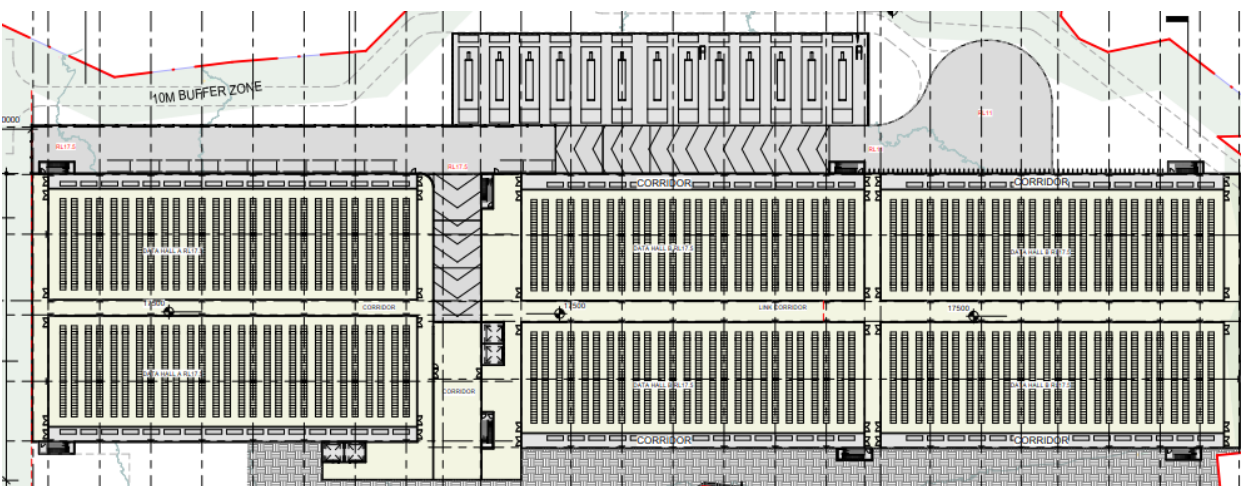


Figure 2.4: Level One Layout

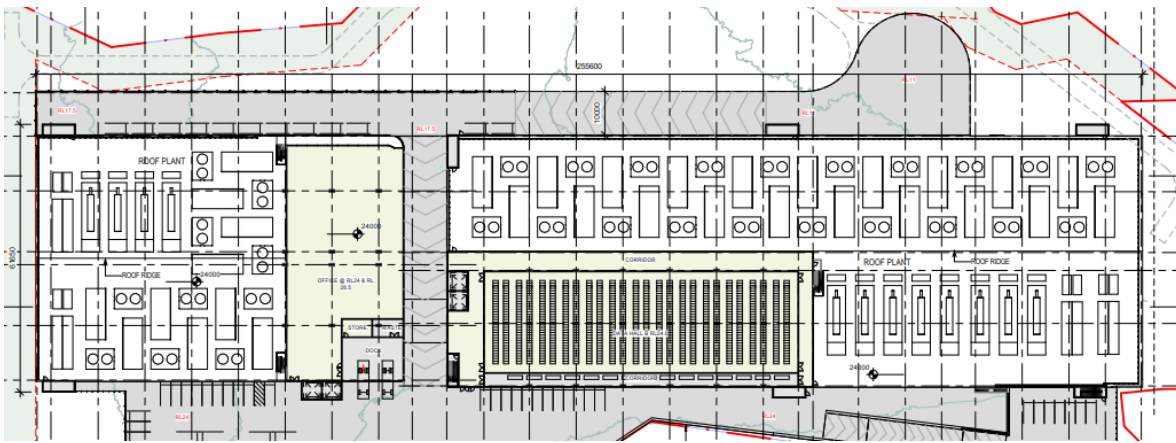


Figure 2.5: Level Two Layout

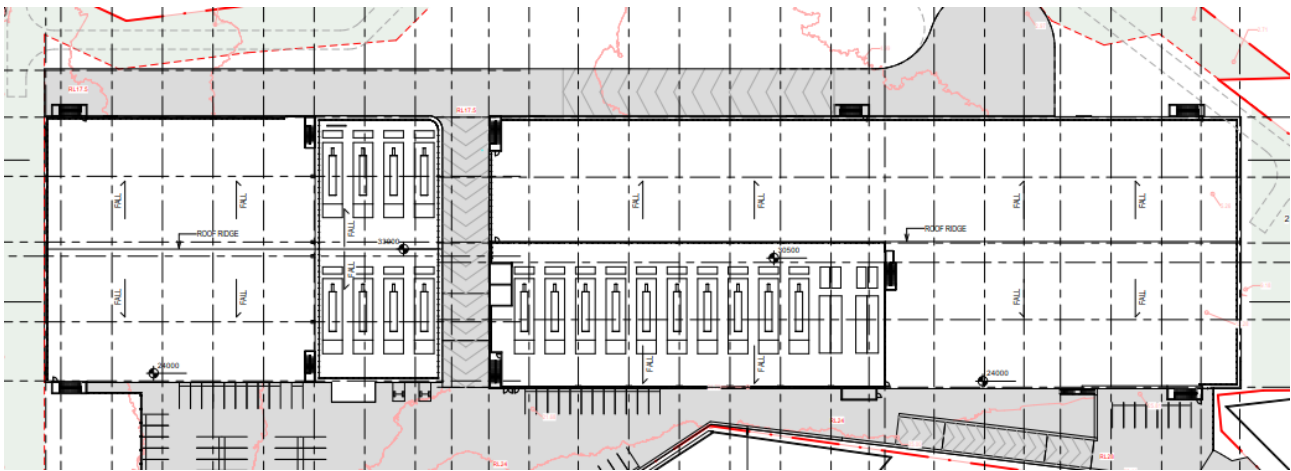


Figure 2.6: Roof Plan Layout

Outlined below is a summary of the overall building detail

Building Summary	Data Centre Development, 1 Sirius Road, Lane Cove West
Building Classification	Class 5 (Office), Class 7b (Generator Hall), Class 7b (Data Hall)
Rise in Storeys	Up to Three (3)
Type of Construction Required	Type B Construction
Effective Height	Less than 25m

3. Purpose

This preliminary fire safety engineering review has been undertaken to determine ‘in-principle’ whether the design will achieve compliance with the relevant *Performance Requirements* from Volume One of the Building Code of Australia (BCA) (ABCB, 2016). The design review relates to the fire-resisting construction, egress provisions and fire protection services proposed for the entire development.

The preliminary design issues which are likely to be identified to the subject building (refer to Appendix A) will be formally assessed through the application of the fire safety risk engineering process in accordance with the International Fire Engineering Guidelines (IFEG) (ABCB, 2005). It is the expectation that a suitable performance design solution will be developed and supported through robust fire engineering methodologies of the current design proposal.

In the context of fire resistance and construction, the proposed fire safety strategy is to rationalise Fire Resistance Levels (FRL) to building elements to achieve a uniform minimum FRL of 120 minutes. In the context of occupant egress, the proposed design is to permit extended exit travel distances based on the building configuration/internal layout and the provision of horizontal exits. It is also proposed to review rationalized egress width provisions within the data hall aisle

corridors and substantiated based on a statistical review of the space taken up by occupants during evacuation and the intermittently occupied nature of the space.

In the context of fire services and equipment, it is proposed to not provide fire hose reel coverage to the data halls yet substituted with the provision of suitable portable fire extinguishers in order to facilitate first aid firefighting. Finally, it is proposed to achieve full fire hydrant coverage to the data hall using two hose lengths (2) of fire hydrant hose from internal hydrants located at the corridor link.

In the context of smoke hazard management, it is proposed to permit the configuration of the fire isolated passageway serving the Basement Plant level that will exceed the BCA DtS prescribed length of 60m without the provision of a corridor pressurisation system.

3.1 Fire Resistance

3.1.1 Method and Type of Construction – Fire Resistance Levels (FRL)

It is proposed to review the method and type of construction of the new building elements throughout the building. More specifically, various building elements shall be reviewed and appropriately rationalised to the degree necessary which will also meet the relevant *Performance Requirements* from Volume One of the BCA. The *Performance Solution* shall consider the rationalisation of Fire Resistance Level (FRL) throughout the building (i.e. generally a minimum FRL of 120 minutes). This shall be demonstrated through the comparison of the anticipated fire-fighter intervention time and occupant evacuation time against the proposed minimum FRL of 120 minutes. Furthermore, burn-out calculations through recognized time-equivalent calculation methods shall be undertaken to demonstrate that the burn-out time anticipated in the fire compartments of the subject site is within the proposed FRL of 120 minutes.

Preliminary assessment undertaken by Scientific Fire Services indicates that the proposed FRL's can achieve an adequate means of protection and furthermore, limit/mitigate the impact of a potential fire while maintaining structural adequacy and achieve a level of life safety for occupant & fire-fighter such that the relevant *Performance Requirements* can be satisfied, namely CP1 & CP2.

3.2 Occupant Egress

3.2.1 Egress Provisions and Construction of Exits

It has been identified that the exit travel distance to a point of choice, exit travel distance to the nearest exit and travel distance between alternative exits shall exceed the BCA DtS prescribed distances. The *Performance Solution* to address the egress related design issues shall be based on the consideration of the straight-forward way finding of the data hall configuration to result in favourable evacuation time and the intermittently occupied nature of the data hall building with relatively low risk of fire. The availability of horizontal exits that results in building occupants in data hall being able to reach a place of relative safety prior to reaching the building's final exit point shall also be considered.

Further, reduced egress width within the hot aisle corridor in the hall shall be no less than 850mm in lieu of 1m. The *Performance Solution* to address the rationalized egress width shall take into consideration the high level of familiarity of the building staff utilizing the data hall whom are aware of the overall egress provisions throughout the building. Research information on typical space occupied by moving occupants shall demonstrate that the proposed rationalized egress width shall facilitate egress from this area of the building in a manner that is comparable to the BCA DtS provision.

Preliminary assessment undertaken by Scientific Fire Services indicates that the proposed egress provisions throughout the development can satisfy the relevant *Performance Requirements*, namely DP4, DP6 & EP2.2.

3.3 Fire Services & Equipment

3.3.1 Fire Hose Reel System

Fire hose reel system shall be provided within the office portions of the development however will be omitted from within the data halls and its associated link corridor to minimize the risk of water damage. Portable fire extinguishers suitable for data hall environment shall be provided where the provision of a fire hose reel system is not available. The portable fire extinguishers shall be suitably selected and mounted in accordance with the relevant codes and standards. Consideration shall be given to suitability of portable fire extinguishers in data hall environment where the risk of electrocution would be minimized when compared to a water based first-aid fire-fighting measure (i.e. fire hose reel system).

Preliminary assessment undertaken by Scientific Fire Services indicates that the proposed fire hose reel design can satisfy the *Performance Requirements*, namely EP1.1.

3.3.2 Fire Hydrant System

The subject building shall be provided with a fire hydrant system in accordance with the relevant codes and standards and to the satisfaction of the relevant fire authority. Furthermore, the fire hydrant design shall be further assessed via a *Performance Solution* to demonstrate that the proposed design meets the relevant *Performance Requirements* from Volume One of the BCA. Consistent with the typical approaches undertaken in similar data centre developments and to minimize potential water damage to the data hall, it is proposed to locate the internal fire hydrant outlet in the main link corridor and achieve the required coverage to the data hall by utilising two (2) lengths of 30m canvas fire hose for the purpose of achieving fire hydrant coverage. Consideration shall be given to the sterile nature of the link corridor where accessing the fire hydrant outlet from this area would not introduce additional risk to fire-fighting personnel. Signage shall be provided adjacent to the fire hydrant outlet(s) to notify fire-fighter personnel on the required two (2) fire hose lengths to achieve full coverage.

Preliminary assessment undertaken by Scientific Fire Services indicates that the proposed fire hydrant design can satisfy the *Performance Requirements*, namely EP1.3.

3.3.3 Smoke Detection and Alarm System

As required by the prescriptive provisions from Volume One of the BCA, the subject site shall be provided with an automatic detection and alarm system. The office portion of the building shall be provided with conventional point type smoke detection and alarm system in accordance with the BCA DtS provisions. In data hall environment where high air-flows are anticipated, an aspirating smoke detection system designed and installed in accordance with the relevant codes and standard is to be provided. The provision of smoke detection and alarm system to the subject site shall assist to facilitate early fire detection and building occupant notification and shall be considered as part of the overall fire strategy.

Preliminary assessment undertaken by Scientific Fire Services indicates that the proposed fire detection and warning design suitable for the specific environment can satisfy the *Performance Requirements*, namely EP2.2.

3.3.4 Smoke Hazard Management System

Smoke hazard management system provision for the subject site shall be generally provided to the extent as required by Part E2 from Volume One of the BCA. It is proposed to omit the provision of corridor pressurisation system to the fire isolated passageway exceeding 60m serving the basement plant level and address this via a *Performance Solution* demonstrating that the proposed design meets the relevant *Performance Requirements* of EP2.2 of the BCA. The performance solution shall be based on the intermittently occupied nature of the plant levels and also the provision of intermediate passive fire doors along the fire isolated passageway resulting in a configuration that is comparable to the BCA DtS compliant fire isolated passageway length.

Preliminary assessment undertaken by Scientific Fire Services indicates that the proposed fire isolated passageway design with the non-provision of stair pressurisation system can satisfy the *Performance Requirements*, namely EP2.2.

3.3.5 Client Objective Measures

With respect to the subject data centre development where business operation and continuity is a key consideration and consistent with common approach undertaken on data centre development, fire suppression measures suitable for data hall environments shall be provided in the data hall to minimize the potential risk of fire development and spread from the compartment of fire origin to the adjacent fire compartment. Further to this, each data halls will be constructed as a fire compartment achieving a two (2) way FRL of no less than 120 minutes. The proposed suppression measures shall be designed and installed in accordance with the relevant codes and standards.

4. Statement of Endorsement

The fire and life safety related design issues will be addressed through the performance based path of compliance. Scientific Fire Services can confirm that the proposed design will achieve fire safety design compliance to the Performance Requirements of CP1, CP2, DP4, DP6, EP1.1, EP1.3, EP2.2 from Volume One of the Building Code of Australia (BCA) (ASCB, 2016).

The formulation of the Fire Engineering Brief (FEB) represents the next step in the approvals process. Scientific Fire Services shall commence the process of developing this document and will provide a formal comprehensive FEB submission. A Fire Engineering Brief Questionnaire (FEBQ) document shall be prepared as required in accordance with the Fire and Rescue NSW proforma and formally submitted as part of the referrals process where mandated by the legislative provisions.

Finally, and in order to ensure that the client can obtain a Construction Certificate for the proposed building works, Scientific Fire Services will prepare a Fire Safety Engineering Report (FSER) incorporating stakeholder conditions, comments and advice to the satisfaction of the Principle Certifying Authority (PCA).

On the basis of the review of the proposed preliminary list design issues identified herein, Scientific Fire Services can confirm that the documentation in relation to the subject development will achieve fire safety design compliance to the relevant Performance Requirements of the National Construction Code Series – Volume 1, Building Code of Australia (BCA).

I trust the above is satisfactory for your current purposes. Should you have any queries, please do not hesitate to contact me on (+61) 427 392938 or email to parkan.behayeddin@scifire.com.au



Parkan Behayeddin
Director
Scientific Fire Services

BPB 0756 - C10 - Accredited Certifier – Fire Safety Engineering Compliance

Appendix A. Preliminary List of Design Issues

No.	Design Issue	BCA Clause	Performance Requirement
1.	It is proposed to rationalize the required Fire Resistance level (FRL) for the data halls to achieve a minimum FRL of 120 minutes in lieu of up to 240 minutes.	C1.1, Spec C1.1	CP1, CP2
2.	It is proposed to review extended exit travel distance to point of choice, extended exit travel distance to the nearest exit and extended travel distance between alternative exits of the proposed data centre development.	D1.4, D1.5	DP4, EP2.2
3.	It is proposed to permit the reduced egress width in the hot aisle corridor in the data hall to be no less than 850mm in lieu of the required 1000mm.	D1.6(b)	DP6
4.	It is proposed to achieve full hydrant coverage to the data halls utilising two (2) lengths of 30m fire hose from internal hydrant outlet.	E1.3 inter alia AS2419.1:2005	EP1.3
5.	It is proposed to omit the requirement for fire hose reels within the data halls and corridor link between the data halls. Portable fire extinguishers (i.e. powder type) shall be provided in lieu of fire hose reels.	Clause E1.4 inter alia AS2441:2005	EP1.1
6.	It is proposed to review the omission of corridor pressurisation system to the fire isolated passageway serving the basement plant level that exceeds 60m.	Clause E2.3	EP2.2

Appendix B. Architectural Drawings

Table B.1: Architectural drawings relied upon

Drawing No.	Title	Date / Revision
ATSYD2_SSD_DRG_ARC_0050	Master Plan	12/12/2018 / 1
ATSYD2_SSD_DRG_ARC_0100	Basement Floor Plan	12/12/2018 / 1
ATSYD2_SSD_DRG_ARC_0101	Ground Floor Plan	12/12/2018 / 1
ATSYD2_SSD_DRG_ARC_0102	First Floor Plan	12/12/2018 / 1
ATSYD2_SSD_DRG_ARC_0103	Second Floor Plan	12/12/2018 / 1
ATSYD2_SSD_DRG_ARC_0104	Roof Plan	12/12/2018 / 1