



Brewery Yard

Multi Discipline Design Brief

Prepared for:

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1. Introduction

This Engineering Services Design Brief for Multiple Disciplines has been prepared at the request of Sam Gill/Natali Boskovska for the Brewery Yard development.

This Engineering Services Design Brief sets out the parameters of Wood & Grieve Engineers' technical design and client service for the design and documentation of the above project.

This document serves as the benchmark which our services must achieve. We request you read this carefully so that you have a clear understanding of the scope of our works.

We would welcome any comments or queries you may have on the information provided in this Engineering Services Design Brief so that it may be updated to suit.

This Engineering Services Design Brief has been prepared based on the following information:

- Architectural drawings received from TZ on 21/11/2018
- Consultants Meetings conducted to date

2. Overview

The project comprises of the construction of a new Commercial development at Irving Street, Chippendale NSW 2008. The works include refurbishment of the existing buildings on levels B2 to Level 06. The existing heritage building will be converted to a mix of retail and commercial.

3. Specific items of Risk and to consider/approve

The following list highlights specific design elements that require confirmation or have been identified as a project risk, which without early discussion could affect GFA or milestones;

- Finalisation and application negotiations with relevant authorities and CTP.
- Grease arrestor size to be confirmed based on finalised seating density in the food and beverage areas.
- Gas sizing to retail areas based on retail expectancy/usage.
- Commercial kitchen exhaust rate.
- Finalisation and application negotiations with relevant authorities and CTP.

4. Hydraulic Services

4.1 Design Standards

- Hydraulic services to comply with the Building Code of Australia 2016.
- Hydraulic services to comply with all current statutory requirements and guidelines including Sydney City Council, Sydney Water, Fire and Rescue New South Wales (FRNSW), NSW Health Department and Department of Environmental Protection.
- Hydraulic Services to comply with current Australian Standards where applicable and particularly the following:

AS 3500	:	National Plumbing and Drainage Code incorporating:
Part 1	:	2015 Water Supply
Part 2	:	2015 Sanitary Plumbing and Drainage.
Part 3	:	2015 Stormwater Drainage.
Part 4	:	2015 Heated Water Services.
AS 2441	:	2005 Fire Hose Reel Installations.
AS 5601	:	2004 Gas Installations.

4.2 Design Criteria

- Hot Water :

	:	Supply Temperature to ablution fixtures maximum 50°C
	:	Supply Temperature to disabled facilities maximum 43°C

4.3 Sanitary Waste and Drainage

- Provision for the collection of all domestic waste discharges from fixtures and fittings via PVC fixture and branch wastes and including:
 - Toilets.
 - Hand basins.
 - Urinals.
 - Cleaner's sink.

Note: Exposed fixture wastes shall be chrome plated copper.
- Provisional capped off points are to be provided on the commercial floors off the core riser for future tenancy fitout connection.
- Provision for all required floor wastes and tundish wastes, maintenance access and inspection openings.
- Provision for all required fire stop collars to services passing through structural slabs, fire walls and floors.
- Provision for all required sanitary waste and drainage ventilation services terminating to atmosphere at roof level.
- Provision for below ground PVC sanitary drainage services collecting waste discharges from waste stacks, fixture wastes, etc, with gravity connection to the sites sanitary drainage services infrastructure and incorporating all required maintenance and inspection openings.

4.4 Industrial Waste and Drainage

- Provision for the collection of all grease waste from food and beverage tenancies areas via fixture wastes from food preparation sinks, hand wash basins, washdown and condensate waste drains, bucket traps and industrial floor wastes discharging to 2 off 1,500 litre capacity filtered grease trap/arrestors in the basement and ground floor (north).

Note: Fixture wastes from glass washers, dishwashers and pre-rinse sinks will discharge directly to the domestic sanitary drainage system so that excessive and high temperature waste water discharges bypass the grease trap. Grease arrestor room to be provided with remote pumping facilities – suction pipe and kam-lok fitting is to be provided for the grease removal contractor in the loading bay area.
- Provision for a 15mm hose connection tap located within 6m of the grease/dilution chamber to assist maintenance cleaning and complete with required backflow prevention device.
- Provision for a 240 volt, 10 amp, 3 pin weatherproof GPO to be located within 2m of the grease/dilution chamber industrial waste sampling point to assist the Authorities use of sample and monitoring process equipment.

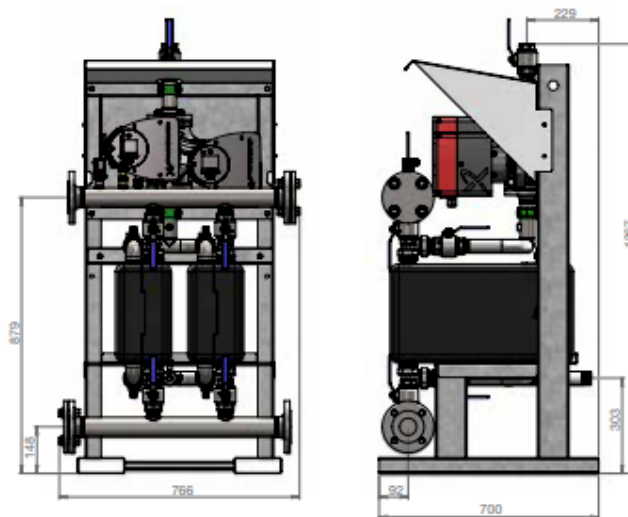
- Provision for independent venting to atmosphere of grease chamber.

4.5 Cold Water Services

- Provision for reticulated cold water supplies to all sanitary fixtures, fittings and tapware as required incorporating all required maintenance isolation valves.
- Provisional capped off points are to be provided on the commercial floors off the core riser for future tenancy fitout.
- Provision of cold water booster set (triplex – duty, duty and standby) to serve the development.
- Provision for external branch connections terminating in valve boxes for future extension to landscape irrigation systems. Allow for all required backflow prevention devices.
- Provision for all required backflow prevention devices to mechanical equipment, hot water units, hose taps, etc.
- Provision for fluid aprons to all tap breaches in walls and ducts.

4.6 Hot Water Services

- Provision for hot water heating integration to existing tri-generation plant to the following areas:
 - Public male/female and disabled toilet amenities including Cleaner's room.
 - Waste Rooms.
- Provision for reticulated hot water services with connections to all fixtures and tapware and incorporating all required maintenance isolating valves and temperature control devices.
- Provision for insulation to all reticulated hot water services as required.
- Temperature control devices are to be utilised to restrict hot water temperatures to the following areas:
 - Disabled Facilities max 43°C
 - Common amenities max 50°C
- Provision for all required backflow prevention devices and temperature relief valves.
- Provision for hot water heating plant comprising of the following:
 - Heat Exchanger System



Heat exchange to be integrated with existing tri-generation hot water heating supply on the primary side with a in-line boost via the heat exchanger to serve common areas.

- **Note:** Food and beverage tenancies and café operators to have localised hot water systems as apart of the fitout design.

4.7 Tenant Services

- Provision for a 100mm capped domestic waste point left 100mm above finished floor level for future connection by the tenant on the commercial office floors.

- Provision for a 100mm capped industrial (grease) waste point left 100mm above finished floor level for future connection by tenant to affected food and beverage tenancies.
- Provision for a 25mm capped and valved water supply point (capable of 30 litres/minute) left within the ceiling space for future connection by the tenant on the commercial office floors as well.
- Provision for a 32mm capped and valved gas supply point (capable of 800 Mj/hr) left within the ceiling space for future connection by the tenant for food and beverage tenancies.

4.8 Fire Hose Reel Services

- Provision for all required fire hose reels providing first aid Fire Fighting Protection to all areas and located within 4m of a fire exit and allowing full coverage from a 4m hose stream issuing from a 36m fire hose and nozzle throughout the building.
- Fire hose reel supply to extend off the metered domestic cold water supply.

4.9 Gas Services

- Provision of master metering and regulation devices provided to hot water plant and commercial food and beverage areas only.
- Provision for reticulated gas services to all gas equipment including:
 - Retail Areas.
 and complete with all required isolation valves, first and second stage regulation.

4.10 Rainwater Drainage

- Provision of all required eaves/box gutters, gutter sumps, overflows, expansion joints and downpipe modifications shall be made by the roofing contractor and covered in the Architectural documents. Termination to below ground civil stormwater systems.

Wood & Grieve Engineers will assist the architect with minimum size of all required gutters, number and location of downpipes, overflow requirements and expansion joints.

- Provision for the collection of all storm water run-off from main roof areas, podium, canopies and balconies via external downpipes terminating at ground level to civil stormwater systems.

4.11 Site Services

- Property sewer services incorporating:
 - A 150mm gravity connection to be maintained to the existing Authorities main sewer infrastructure located in Irving Street. Further negotiations are to be discussed with Sydney Water pending Section 73 approval for adequacy to re-use the existing connection based on new building fixture loadings.
- Domestic Cold Water Supplies incorporating:
 - A 65mm connection to the Authorities water main infrastructure located on Irving Street complete with main isolation valve, backflow prevention device (RPZD) and water master meter. Master meter and RPZD to be located adjacent to pressure set in the basement.
 - On-site pumping equipment to be provided in the basement.
- Gas Services incorporating:
 - A 65mm connection to the Authorities gas main infrastructure located on Irving Street at 7 kPa complete with main isolation path valve. Localised metering and regulator devices are to be provided for the commercial tenancies and domestic & mechanical hot water plant areas.
- Fire Services incorporating:
 - A 150mm connection to the Authorities water main infrastructure located in Irving Street complete with main isolation valve and backflow prevention device.
 - Provision for a 6 point 150mm brigade booster set in cabinet for the fire contractor.

Note: The above connections are pending confirmation of authority negotiations required post DA to ascertain which authority utility is of best suitability for connection.

5. Fire Protection

5.1 Critical Issues

- Provision of a fire control centre
- Allocation of services risers and ceiling spaces
- Confirmation of existing fire system water supply pumped flow capability

5.1.1 Existing Fire System Infrastructure Capability

The fire protection services design is based on the assumption that the existing water supply infrastructure is capable of supplying the design flows and pressures necessary for the Brewery Yard development.

5.1.2 Alternative Solutions

We anticipate that the following Alternative Solutions relevant to the fire protection design will be implemented.

- Use of fast response sprinklers to assist with egress.
- Variation of the DTS requirements for provision of dry sprinkler protection within lift shafts.
- Location of the Fire Control Centre relative to the Ground Floor (FIP and emergency control panel).
- FRNSW access to the Fire Pump Room (this is an existing condition).
- Variation of the DTS requirements for provision of SSISEP speech intelligibility where the nature of the structure and architecture will work against the acoustic performance of the sound system.
- Provision for optical beam detection within atrium space

Note that our design will utilise Extended Coverage sprinkler heads where this technology provides cost savings from a design and installation perspective. Fire Engineering modelling must be completed on the basis that the maximum area per sprinkler will be 18.49m² (4.3m x 4.3m).

5.2 Fire Protection Systems Infrastructure

The extent of Fire Protection Systems and major fire services infrastructure will be as follows:

- A 150mm fire sprinkler booster assembly (existing)
- A 150mm hydrant booster assembly (existing)
- Sprinkler fire pump located in the existing Fire Pump Room.
- Hydrant fire pump located in the existing Fire Pump Room
- Fire sprinkler system throughout the building served by Sprinkler Control Valves located in the existing Sprinkler Valve Room
- Hydrant Landing valves located on stair landings at each floor level to provide coverage to all areas of the building. Where this is not achievable supplementary hydrant landing valves will be located on the floors outside of the stairwells.*
- Portable fire extinguishers.
- Fire Alarm System comprising smoke detectors.
- Main Fire Indicator Panel located in the Fire Control Room.
- Fire Fan Control Panel located in the Fire Control Room.
- MIMIC Panel located in the building main entry Machine Hall.
- Sound System and Intercommunication System for Emergency Purposes (SSISEP)
- Master Emergency Control Panel located in the Fire Control Room.

5.3 Design Criteria

- Fire services to comply with the Building Code of Australia 2016 Amendment 1
- Fire services to comply with all current statutory requirements and guidelines including Council, Water Authority, Fire and Rescue NSW and Department of Environmental Protection.

- Fire Services to comply with current Australian Standards where applicable and particularly the following (unless alternative solutions are provided as a departure to the deemed to satisfy provisions of the BCA):

System	National Construction Code (NCC) Clause Reference	Applicable Australian Standards
Fire Hydrants	Spec E1.3	AS 2419.1-2005
Fire Sprinklers	Spec E1.5	AS 2118.1-2017
Fire Hose Reels	Spec E1.4	AS 2441-2005
Portable Fire Extinguishers & Fire Blankets	Spec E1.6	AS 2444-2001
Fire System Pumpset	-	AS 2941-2013
Maintenance of Fire Protection Equipment	-	AS 1851-2012
Fire Detection, warning, control and intercom systems	Spec E2.2a	AS 1670.1-2015
Sound Systems and Intercom Systems for Emergency Purposes	Spec E4.9	AS 1670.4-2015

The project will be designed to satisfy the above mentioned Australian Standards and the National Construction Code (NCC).

Fire Services system requirements have been established on the premise that the building is classified as Class 5 & Class 6 as per the NCC Part A3.

Information provided in this brief is subject to change on the issue of any Fire Engineering Report or per the determinations of a Building Certifier.

5.4 Fire Protection Services Information

5.4.1 Fire Protection Services Infrastructure

Water supply for the sprinkler and hydrant system will be a grade 3 supply as defined in AS 2118.1-2017 and comprise a single connection from the water authority town main.

5.4.2 Fire Sprinklers

Automatic Fire Sprinkler Systems will be provided throughout all areas of the building. Protection will be in accordance with the AS 2118.1-2017 requirements. The hazard classifications will be:

- Ordinary Hazard 3 for retail areas and
- Light Hazard for office areas.

Sprinkler control valve assemblies will be located in the existing sprinkler valve room.

A 40 mm fire sprinkler drain will be located adjacent to the fire sprinkler riser pipe to perform maintenance and drain downs of each floor when required.

Isolation valves will be incorporated to ensure the disruption to service that occurs when alterations are required is minimised.

Flush mounted sprinklers will be incorporated in Lobbies/corridor areas and semi-recessed sprinklers within the office areas.

Concealed space sprinkler protection will be provided wherever required in compliance with Standard requirements. There may be some savings gained by installing fire and draft baffles within concealed spaces and these will be evaluated and discussed as the design progresses.

External sprinklers may be incorporated over external window openings subject to the outcome of the Fire Engineering study. Should external sprinklers be required they will be designed in accordance with DTS requirements i.e. in accordance with AS2118.1:2017 rules for external sprinkler protection that requires 18 simultaneously operating heads discharging 74lpm each to be considered. External sprinkler head operation will be treated as an independent event that does not require consideration of operation of other fire protection services within the building.

5.4.3 Wall Wetting Sprinklers

Wall wetting sprinklers may be incorporated within the building subject to the outcome of the Fire Engineering study. Should they be installed protection will be in accordance with AS 2118.2-2010 requirements.

Wall wetting sprinklers will be installed on the internal side of external windows and be located in accordance with code requirements that stipulate sprinkler defectors will be mounted 50-100mm below the underside of the window transom.

Each wall wetting sprinkler considered to be operational will deliver a minimum of 100lpm flow. The system will be independently reticulated from the combined hydrant sprinkler ring main that runs through the fire stairs. At the connection point wall wetting drencher reticulation will be equipped with a padlocked and labelled isolation valve.

The extent of operation of wall wetting sprinklers will be determined through the fire Engineering process and will require consideration of the operation of other fire protection services within the building. Preliminary performance scenarios have indicated that the Fire Engineering Solution will not create a requirement to increase the level of on site fire system water storage above the 80m³ currently required.

5.4.4 Fire Hydrants

Fire hydrants will generally be located in fire isolated stairs at each landing level taking connection directly from the combined hydrant sprinkler ring main.

Where coverage from positions within stairwell is insufficient to cover an area completely, an additional hydrant will be installed in purpose constructed fire services cupboards in readily accessible locations.

5.4.5 Fire Extinguishers

Fire Extinguishers will be located in accordance with the requirements of BCA E1.6.

5.4.6 Fire Alarm System

Smoke detection will be provided throughout the building in accordance the requirements for Zone Smoke Control Systems.

Detectors will be designed at 15m centres throughout all circulation spaces and will be located within code distance requirements from lift doors and stairwell entrances. Note that where heritage structure is to be maintained and exposed to view a "bay" situation is created that will significantly increase the quantity of smoke detectors required for code compliance.

5.4.7 Sound System and Intercommunication System for Emergency Purposes

Speakers will be installed throughout the building to provide speech intelligibility in accordance with code requirements.

Warden Intercommunication Phones (WIP's) will be installed on each for level adjacent one of the Fire Hose Reels.

Emergency Call Points will be collocated with WIP's and Fire Hose Reels.

5.5 Fire Protection Services Space Requirements

Item	Location	Size	Comments
Fire Pump Room	As existing.	As existing.	As existing.
Risers – Wet Fire	Service Core	1.25m x 0.3 m in service core	Fire systems will house risers within the service core area to distribute mains to various zones
Risers – Dry Fire	Service Core	0.3m x 0.3m in service core	2 risers required to provide physically remote return path.
Fire System Distribution pipework	Above false ceilings	200mm depth	A fire services zone is required to allow clear access path for all fire services equipment.
Fire Indicator Panel	Internal wall inside main building entry	700 (w) x 350 (d) x 2100 (h)	Location to be confirmed with Fire Brigade.

5.6 Works by Other Trades

The following works and/or materials will be provided by other trades free of charge to the Fire Contractor.

Details of these associated works, however, shall be provided to the respective trades by the Fire-Contractor in the form of dimensioned drawings, sketches and memorandums.

5.6.1 Work Provided by Builder

- Wall, slab, partition and baffle penetrations and making good as required.
- Build in all sleeves for penetrations and subsequent making good. The Sub-Contractor to supply all sleeves and provide adequate detailed drawings.
- Concrete plinths under equipment, including tanks and pumps, 150mm high.
- Removal of tiles and ceiling suspension, as required for removal or installation of sprinklers, detectors and EWIS speakers.
- Excavation, backfilling and making good for all in ground pipework.
- Concrete thrust blocks, for inground pipework.
- Underflashing for roof equipment penetrations. The Sub-Contractor shall provide over flashings.
- Removable panels and access hatches in plaster ceilings for access to equipment.
- Kerb surrounding floor drain in sprinkler valve room.
- Use of hoist to raise equipment to upper floors.
- Use of scaffolding when it is in place for Builder's use.
- Security storage and site shed accommodation.
- Temporary lights.
- Temporary 240 Volts and 415 Volt power supply.

- Toilets and temporary water.
- Preparation of Contract documents.
- Supply one (1) set of Structural and Architectural drawings.
- Holes as required in ceiling for sprinkler heads and speakers to detailed drawings supplied by the Sub-Contractor including cutting ceiling tiles.
- Building in of Unistrut pipe supports.
- Access platform to detectors in high false ceilings.
- Access to roof for maintenance.
- Assistance setting out.
- Casting in of holding down bolts to templates provided.
- Eyebolts above specific items of equipment.
- Supervision of building services co-ordination.
- The following signs as detailed by the Architect:
 - Location Plate Sign shall be located on an external wall as near as possible to each Sprinkler Valve Arrangement. The sign shall read "SPRINKLER STOP VALVE INSIDE" shall be in raised letter or other approved type. The words "Sprinkler Stop Valve" should be in letters minimum size 35mm high and the word inside should be in letters minimum 25mm high. It is recommended that the words be painted white on a black background.
 - Where the fire indicator panel is obscured by a door, that door shall be marked with the words "FIRE INDICATOR PANEL" in letters not less than 50mm high. No other lettering shall be on the door.
- Supply a master key to the fire brigade for emergency access to all fire protection equipment.

5.6.2 Work Provided by Hydraulics Sub-Contractor

- Adequate floor drains and pits in the Sprinkler Pump room (to Stormwater)
- Adequate floor drains and pits adjacent the Sprinkler System drain down (to Sewer)
- Test drain for sprinkler flow tests.
- Drawings to other trades for co-ordination.
- Provision of a Gas Solenoid Valves capable of receiving a fire alarm signals to shut off.
- Provision, design and installation of Fire Hose Reels.

5.6.3 Work Provided by Mechanical Services Sub-Contractor

- Controls for air conditioning shutdown and start-up of smoke exhaust systems from Mechanical Services Switchboard.
- Controls within air conditioning switchboards for time trip interfaces.
- Mechanical ventilation to fire control room and the Sprinkler Pump Room.
- Penetrations in air conditioning ductwork for sprinkler heads and smoke detectors including sealing after installation.
- Drawings to other trades for co-ordination.
- Technically competent personnel, instruments and materials, to test air conditioners and air handling equipment start/stop procedures; in co-ordination with the Fire Protection Contractor.
- BAS/BMS computer and software.
- Terminal strips within mechanical services switchboard for connection of input and output signals between Mechanical Services installation and fire alarm system.

5.6.4 Work Provided by Electrical Services Sub-Contractor

- 240V single-phase to the Fire Pump Control Panels. Wiring to be fire rated. Fire Protection Contractor to make all connections. Switches for these circuits shall be clearly marked "FIRE PUMP MOTOR SUPPLY - DO NOT SWITCH OFF".
- 240V single-phase to the Fire Indicator Panel and MECP located in the Fire Control Room. Wiring to be fire rated. Fire Protection Contractor to make all connections.
- 240V single-phase general power outlets in the Fire Control Room.
- 240V single-phase general power outlets in the Fire Pump Room.
- Wiring, terminals and connections from the Direct Brigade Alarms to telephone mainframe. Electrical Contractor to obtain all necessary authorisations. Wiring to be fire rated.
- Emergency lighting to the Fire Control Room.
- Drawings to other trades for co-ordination.

5.6.5 Work Provided by the Lift Services Sub-Contractor

- Cut out and installation of a WIP phone unit within Emergency Lift Cars. The WIP's shall be provided by the Fire Services Contractor and free issued to the Lift Services Contractor.
- Cut out and installation of an speaker within lift cars.
- Speakers shall be provided by the Fire Services Contractor and free issued to the Lift Services Contractor.
- Screened trailing cable between the WIP phone and EWIS speaker and a termination box outside the lift machine room.
- Termination only of interconnecting cabling between the MECP and the lift machine room provided by the Fire Services Contractor.
- Access to each lift shaft for the installation of smoke detectors and sprinklers (head and base of shaft).

6. Fire Engineering

6.1 Design Standards

WGE has been engaged to develop a performance based fire safety strategy for the proposed Commercial building which consists of a redevelopment and expansion of two existing heritage building located at Irving St, Chippendale NSW 2008. The fire safety objective of this strategy is limited to achieving compliance with the Performance Requirements of the Building Code of Australia (BCA 2016). Fundamentally the BCA aims to protect life safety, prevent fire spread to adjacent buildings, and facilitate Fire Brigade operations.

Our approach to Fire Engineering is in accordance with the International Fire Engineering Guidelines (IFEG) [2]. WGE adopt worldwide best practice and standards as outlined in Section 0.1.1 (of the IFEG), and using the document as general guidance on the analysis process without strictly following each individual sub-system as per Section 1.3 of the IFEG, which permits different approaches to demonstrate compliance. In this light guidance documentation such as the New Zealand Verification Method 2 and C/AS2 – C/AS7 Acceptable Solutions for Buildings, British Standard PD 7974 Series, Society of Fire Protection Engineering Handbook of Fire Protection Engineering, CIBSE guide E and the NFPA Series are all referenced.

6.2 Fire Engineered Solutions

The following are the fire engineering solutions that are proposed to be developed over the course of the project.

Item	Description of Alternative Solution
1	Reduction of Fire-Resistance Levels throughout the building: <ul style="list-style-type: none">Basement StorageFloor plates above 6th floor
2	Permit non-compliant stair pressurization/smoke control design at Basement and Ground levels
3	Permit extended exit travel distance in excess of 20 m to a point of choice and more than 40 meters total travel to an exit
4	Permit the use of fire extinguishers in lieu of fire hose reel systems
5	Permit for than 2 storeys connected above the level of discharge
6	Permit non-compliant construction within 3 m from the boundary (Levels 7 through 12)
7	Permit convergence of rising (basement and descending (floors above ground) stairwells in the same fire exit
8	Rationalisation of fire hydrant/sprinkler booster provisions
9	Assessment of fire control room provisions
10	Assessment of Fire-resistance Level requirements for existing supporting-steel and wooden-floor structures

7. Mechanical Services

7.1 Design Criteria

The design criteria for the Mechanical Services are as follows:

7.1.1 External Conditions

The design temperatures under which plant will maintain internal conditions are:

Summer : 30.1°C Dry Bulb
: 22.7°C Wet Bulb
: Full Solar Load

Winter : 6.4°C Dry Bulb
: No Solar Load

BCA Climate Zone: 5

7.1.2 Internal Conditions

Cooling : Nominal 24°C Dry Bulb
: 40 - 60% relative humidity anticipated by virtue of cooling coil performance

Heating : 21°C Dry Bulb
:

Control Tolerance: Plus or minus 1.5°C at the point of control for heating and cooling.

7.1.3 Population

General Office Areas : 10 m² per person
Retail Areas : 3.5 m² per person
Commercial Areas : 10 m² per person
Food Retail Areas : 1.5 m² per person

Note: Base building design to cover open plan layout only, additional offices, meeting rooms etc or increased populations to be covered by fit out design.

7.1.4 Ventilation

Outside air Ventilation: : 10 L/s introduced outdoor air per person has been used for the purpose of concept only for all occupied spaces.

Restrooms : 10 L/s/m² for sanitary compartment (minimum to AS 1668.2-2012)

Plant Spaces : 5 l/s/m² (To meet AS1668.2-2012 requirements)

7.1.5 Acoustic Criteria

General office areas, meeting rms 40-45 dB(A)
Rest Rooms 40-45 dB(A)
Small retail stores (general) 50 dB(A)

Where there is a discrepancy between the noise levels specified in this brief and the acoustic brief, the acoustic brief shall take precedence.

7.1.6 Lighting & Power

The below loads will be updated as required in later design stage with input from WGE Sustainability team to meet the requirements of Green Star

Office Lighting	:	15 W/m ²
Office Equipment	:	15 W/m ²
Retail Lighting	:	15 W/m ²
Retail Equipment	:	40 W/m ²
Commercial Lighting	:	15 W/m ²
Commercial Equipment	:	40 W/m ²

7.1.7 Glazing and Building Fabric

Final building fabric performance to be determined in design stage by façade engineer, ESD consultant and architect. In interim, WGE will assume the following U-values:

- Roof – U Value 0.3125 W/ m².K; Surface Density 350 Kg/m²
- External wall – U Value 2 W/ m².K; Surface Density 1500 Kg/m²
- Internal floor/ceiling – U Value 30.5 W/ m².K
- Partitions – U Value 0.5 W/ m².K
- Glazing – U Value 5.5 W/ m².K (Shading Factor – 0.69)

7.1.8 Wall Construction

The building is an existing Heritage Building, as such it has been assumed that the existing heritage walls and glazing are to be retained. Any changes or upgrades required need to be advised from ESD consultant or BCA consultant and have not been allowed within this concept.

7.1.9 Redundancy

Incoming Heating and Cooling Supply	:	Minimum 60% using dual Plant Heat Exchangers
Other Mechanical Plant	:	No redundancy

7.1.10 Particular Authorities Compliance

New South Wales Fire Brigade (NSWFB).

The National Construction Code (NCC) 2015 and in particular the “deemed to satisfy” conditions of:

- NCC 2016 Section J3.5 & J3.7 “Building Sealing - Exhaust Fans & Evaporative Coolers”
- NCC 2016 Section J5 “Air Conditioning and Ventilation Systems”
- NCC 2016 Section J8 “Access for Maintenance”
- NCC 2016 Specification J5.2 “Ductwork Insulation and Sealing”

7.1.11 Applicable Standards and Codes

The mechanical services shall be designed to comply with the following Standards and Codes.

AS 1668.2-2012	The use of mechanical ventilation and air conditioning in buildings. Part 2: Mechanical Ventilation in buildings (Including Carpark Exhaust and Supply Systems)
AS 1668.1-2015	The use of mechanical ventilation and air conditioning in buildings. Part 1: Fire and smoke control in multi-compartment buildings
AS 1677	Refrigerating Systems
AS 2107	Acoustics
AS 3000	SAA wiring rules
AS 3013	Electrical installations, wiring systems for specific applications.
AS 4254	Ductwork for Air Handling Systems
AS 1324-1996	Air Filters for use in Air Conditioning and General Ventilation.

AS 1682	Fire Dampers
AS 1851	Maintenance of Fire Protection Systems
AS 3666.1&2	Air Handling and Water Systems of Buildings – Microbial Control
AS 4254.1	Flexible Ductwork – Fire resistance & Sealing only.
AS 4254.2	Solid Ductwork – Fire resistance & Sealing only.

7.2 Incoming Chilled and Heating Hot Water Services

7.2.1 Chilled Water Generation

Description

Chilled water supply to the building is provided by the centralised district cooling and heating system serving the precinct, with incoming chilled water temperature at 6degC and return temperature of 13degC.

The internal building distribution is decoupled from the district system to the building system through dedicated plate heat exchangers. The plate heat exchangers are arranged in parallel and each plate heat exchanger can satisfy 60% of the total building design load.

Arranging the plate heat exchangers in parallel, enables continued operation of a single exchanger should a unit fail or need to be isolated for maintenance, providing a reduced cooling supply to the building. The plate heat exchangers have a specified approach temperature of 1degC. The resultant building chilled water service has flow temperature of 7degC and the return temperature of 14degC.

The tenant is required to provide thermal and flow meters on the CHW and HHW on the client side of the HEX. A BMS point will be required for the Thermal Energy group to connect.

7.2.2 Heating Hot Water Generation

Description

Heating hot water supply to the building is provided by the centralised district cooling and heating system serving the precinct, with incoming temperature at 82degC and return temperature of 62degC.

The internal building distribution is decoupled from the district system to the building system through plate heat exchangers. The plate heat exchangers are arranged in parallel and each plate heat exchanger can satisfy 60% of the total building design load.

Arranging the plate heat exchangers in parallel, enables continued operation of a single exchanger should a unit fail or need to be isolated for maintenance, providing a reduced heating supply to the building. The plate heat exchangers have a specified approach temperature of 2degC. The resultant building heating hot water service has flow temperature of 80degC and the return temperature of 60degC.

7.2.3 Chilled and Heating Hot Water Distribution

Description

The internal building heating and cooling systems will consist of circulation pumps for each system, a hot and chilled water vertical distribution via common risers, and on floor pipework distribution to serve mechanical equipment.

The water from the plate heat exchangers will be pumped from the basement plant rooms through the pipework to each floor. It is proposed to locate a common riser to maintain vertical continuity through the building whilst maintaining a central location. Then the water will be distributed to each tenancy fit out air handling unit using pipework to cool or heat the air respectively. Then the return water will return to the plate heat exchanger through the common riser.

7.3 Air Conditioning

7.3.1 Façade fed AHU's

Description

The proposed mechanical system will consist of multiple ceiling mounted AHU's serving individual spaces.

To meet base building demand, outside air enters through the façade via louvres designed in keeping with the heritage aesthetics of the building. An outside air unit will precondition the air, then the conditioned air will be distributed throughout the space via supply ductwork hung directly below the steel beams. The return air follows the supply air path back to the respective local air handling unit. The local air handling units in each space will be controllable and shut down when not in use. This allows full isolation of the space when it is unoccupied.

Local FCU's will provide supplementary heating and cooling in each space during tenancy fit out.

7.4 Mechanical Ventilation

Based on the data provided from Bureau of Meteorology for Sydney, the prevailing wind speed and direction will impact the East and South elevations in the morning and will impact the West and South elevations in the afternoon. This results in the exhaust air being ideally discharged from the North elevation should façade discharge be provided. However, due to the glazed wall in the North elevation, it will be problematic to discharge the exhaust air through a façade louvre. Therefore, WGE propose to discharge to the north façade where feasible and the east and west where necessary. Strictly no louvres must be installed on the south facing wall.

7.4.1 Toilet Exhaust

Toilets will be mechanically ventilated in accordance with AS1668.2. Each toilet area (Male, Female and Accessible) will be served with an exhaust fan, ducted direct to the local façade.

7.4.2 Waste Exhaust

Waste room, currently indicated on the basement, will be mechanically ventilated in accordance with AS1668.2. Central exhaust fans will be provided to serve the Waste Room via a dedicated exhaust duct riser. The central exhaust fans shall operate continuously to maintain AS:1668.2 requirements. Exhaust system will be discharged vertically. Make up air system will replenish exhausted air to balance the system. The make up air ductwork will reticulate to the first floor and terminate at the façade.

7.5 Building Management System

A central building management system will be provided to control and monitor common landlord plant.

Should individual air conditioning systems to serve the Tenancies be provided, then these will be provided with their own proprietary air conditioning controllers which allow operation control of the respective air conditioning systems. Mechanical exhaust systems to have dedicated controls.

7.6 Zone Pressurisation

We understand that the building is a mixture between class 5 and class 6, and is greater than 25m in effective height, however it is provided with a sprinkler system and therefore does not require zone smoke control.

7.7 Stair Pressurisation

Stair pressurisation system is required for stairwells for BCA DTS compliance for buildings with an effective height greater than 25m.

Stairwell pressurisation will be provided to the eastern internal stairs.

No stairwell pressurisation is required to the external stair or norther stair.

Lift shaft pressurisation will not be provided.

8. Vertical Transportation Services

8.1 The Development

The proposed development comprises of 7 levels, 1 level of retail (ground floor) and commercial office (remaining floors) within what was previously a brewery. The total NLA is approximately 6,100 square metres.

The architectural plans (Tzannes dated 21 November 2018) indicate four lifts. Three of these lifts are intended to operate as a group and the fourth lift is for primarily for bin movements.

Two of these lifts serve levels G and 1 through to 6, and the third lift serves levels G and 1 through to 3.

It is understood that one of the three lift shafts is existing. Measurement of the architectural plans indicates shaft dimensions of 2.35m wide x 2.6m deep. The actual dimension will need to be confirmed via survey prior to installation of new lifts.

8.2 Design Criteria

8.2.1 Code Requirements

Stretcher Access

A stretcher facility in lifts must be provided when passenger lifts are installed to serve any storey above an effective height of 12m. A 2000mm deep lift car is suitable to accommodate stretcher access.

Fire Service controls

All passenger lift cars must be provided with fire service controls as per AS 1735.2 and the BCA.

Accessible Lift Provisions

In accessible building every passenger lift must have lift floors dimensions:

- not less than 1400mm x 1600mm when lift travel is more than 12m
- not less than 1100mm x 1400mm when lift travel is less than 12m

Accessible features complying AS1735.12 as referenced by BCA Table E3.6b including:

- handrail
- passenger protection system
- lift car and landing controls
- lighting
- automatic audible information within each car to identify the level each time the lift stops
- audible and visual indication at each landing to indicate the arrival of the lift car

8.3 Lift Traffic Design Criteria

The proposed lifting solution for the development was against the PCA 2018 Grade A criteria for lifts that nominates:

- Population density : 1 person per 10sqm
- Average Waiting Time (AWT) : ≤ 30 seconds
- Handling Capacity (HC) : ≥ 13%

The results of the lift traffic analysis are as follows:

	HC (%)	AWT (s)
--	--------	---------

Grade A Criteria	≥ 13	≤ 30
2 lift at 1.6m/s	13	21
3 lifts at 1.6m/s	13	7

The results indicate that two lifts provide a high quality of service. Three lifts would provide even better service and would suit higher occupant densities too.

8.4 Lift Proposal

Three lifts serving the upper levels are understood to be client and tenant preference for this building. Not all lifts service all floors, hence, control methods to ensure that users reach their intended levels are necessary. A Destination Selection Control (DSC) system is proposed.

The following lift car selection suits both the space available in each shaft and the requirements of the PCA.

Lift Core / Option		A
Service		Passenger / Goods
Lift No.		1, 2 & 3
No. off		1
rating	kg	1400
type		MRL
rated speed	m/s	1.0
car config.		single entry
car size (w x d) (shell)	mm	1500 x 2000
shaft size (w x d)	mm	2350 x 2600
pit depth	mm	1500
headroom	mm	4200
CW location		Side
door type		2P CO
door size (w x d)	mm	1000 x 2100
Controls		DCS
Emergency lift		2 off
BCA Accessible		y
BCA Stretcher		y

Notes

- Headroom measured up from top level served.
- Pit measured down from bottom level served.
- Car size to EN81.20 (to walls prior to finish). Application of wall finishes, handrails & bumprails will reduce overall clearance
- MRL: Machine room-less
- 2P CO: 2 piece, centre opening doors

Lift service is shown schematically in the following image:

Level	FFL	Description	Passenger Lifts			Bin
Rf						
6	39.87	commercial NLA			- r	
5	36.52	commercial NLA			- r	
4	32.87	commercial NLA		- r	- r	
3	29.37	commercial NLA	- r	- r	- r	
2	23.61	commercial NLA	- r	- r	- r	
1	19.48	commercial NLA	- r	- r	- r	
G	13.69	Main entry, retail	x -	x -	x -	x - r
B1	10.61	Void to basement plant				x -
B2		Basement plant / Lift Pit				

The bin lift will be selected to suit the shaft space available and requirements for a through lift. A lift car size approximately 1700 x 2000 will suit.

9. Electrical Services

9.1 Design Criteria

The electrical services will be design in accordance with the following:

- Electrical services to comply with the Building Code of Australia 2016
- Electrical services to comply with all current statutory requirements and guidelines including Council, Supply Authorities, Fire and Emergency Services Authority and Department of Environmental Protection.
- Electrical Services to comply with current Australian Standards where applicable and particularly the following (unless alternative solutions are provided as a departure to the deemed to satisfy provisions of the BCA):

System	National Construction Code (NCC) Clause Reference	Applicable Australian Standards
Emergency Lighting	Spec E4.4, E4.8	AS 2293.1 – 2005
Interior lighting		AS 1680.1 - 2006
Electrical wiring systems		AS 3000 – 2018
Electrical installations	C2.13	AS 3013 – 2005
Lightning protection		AS 1768 - 2005

9.2 Power Supply

Supply is planned to come from the CTP embedded generation as the understood power available from the adjacent Ausgrid Substation Central Park Ave No.2 S.48270 has insufficient power for the new buildings loads as this is limited to around 200kVA (Approx. 290Amp / Phase) in capacity.

WGE understand this capacity has been matched within the CTP, but with the option to increase if required (subject to negotiation), a new 800Amp circuit breaker will be required, this could be set at 0.95 to provide a 800Amp supply to the Brewery building.

Based on the maximum demand that has been calculated in accordance with AS3000, Table C3 the load equates to double the current allowances at 766Amps (approx. 610kVA). A summary of the calculated maximum demand is as below:

MAXIMUM DEMAND CALCULATION		12.12.2018		
PROJECT NO	38311			
AS/NZS 3000:2007 Wiring Rules Appendix C3				
TABLE C3				
Type of occupancy		Average, VA/m ²	Square meters	Average
Tenancy Area	Light and Power	50	6951	347550
Chilled & Heating water from CTP	Ventilation/pumps	15	6951	104265
	-cooling	35		0
	-reverse cycle	25		0
	-variable volume	20		0
Communal spaces (incl. Basement)	Light and power	10	440	4400
Total Building power				456215
Total Building Amps				635
Passenger Lifts	46 A each		3	115
Garbage lift	32		1	16
Total Building Load				<u>766</u> A

Work within Central Plant area would need to use Central Plant approved vendor ARA Electrical.

Contact : Aaron Taylor

Mobile: 0423 024 721

Email: Aaron Talyor@araelect.con.au

A set of new mains will be required from CTP to the new Brewery Yard main switchboard. Cables to be run within underground conduits via a new pit to be constructed near the existing chimney on ground floor. Final location to be coordinated on site. Refer spatial for proposed location. All underground conduit and pits to be seal with water ingress and drainage in new pit.

9.3 Main Switch Room and electrical Reticulation Riser Cupboards

Main Switchroom located either on basement level.

As the switchboards will be supplying safety services the consumer mains and switch room need to have a FRL of 120/120/120.

As per AS 3000 (2.10.2.2), the switch room is to have 2 egress paths (i.e. 2 outward opening, self closing fire doors).

Main Switchboards to be designed in accordance with AS 3439 and will be of Form 3B construction, front or back connection. Fault level: 50kA

Main Switchroom Dimension

- Clear Internal dimension of 4,000mm x 1,500mm with minimum height of 2,700mm
- Construction to have an FRL of 120/120/120
- Doors to have an FRL of -/120/30, door opening to be 900mm(w) x 2200mm(h) minimum
- Door to be fitting with self-closing device signage

Electrical Riser Cupboards per level

- Clear Internal dimension of 1,200mm x 500mm
- No Fire rating, but doors to cupboard to be non-combustible (metal backed) and fitted with smoke seals
- Cupboards to be vertically stacked
- A clearance of 600mm to be maintained beyond door swings

Switchboard shall be made for transportation to the main switch room via the fire stair.

9.4 Standby Power

No standby power is being provided.

9.5 In-Building Mobile Coverage (Distributed Antenna System)

Distributed Antenna System (DAS) to be provided for the building

The DAS shall be based on MCF2014 (www.mcf.amta.org.au/files/MCF-DAS-Guidelines-PDF.pdf) with following additions, clarifications and exceptions.

1. General
 - The DAS is to provide coverage to all floor spaces in the building for all frequencies and bandwidth as specified in the Mobile Carriers Forum (MCF) 2014.
 - The DAS is to be a Multiple Input Multiple Output (MIMO) system.
 - The DAS shall be a passive DAS.
 - The DAS is to cater to 3G and 4G services.
2. Coverage areas
 - All areas shall be covered
 - 95% of all floor space to meet the KPI of the MCF2014.
3. Coverage KPI details

- The KPI of the MCF2014 shall be met for all technologies and frequencies as per MCF2014 including LTE2300 and LTE2600.
- The design shall include propagation predictions in form of heat maps for UMTS 850, LTE1800, UMTS2100, LTE2300 and LTE2600.
- To provide coverage inside the lifts, each lift lobby shall have at least one dedicated antenna per floor. To calculate coverage KPI in lifts a total lift loss of 25dB for 700 – 900MHz, 30dB for 1800 to 2100MHz is to be assumed. Frequencies above 2100MHz do not need to meet any KPI.
- General exclusion areas for LTE 2300 and LTE 2600MHz can be washrooms, plant rooms and emergency staircases.
- Washrooms and plant rooms may be designed as a Single Input Single Output (SISO) DAS
- Exclusion zones for dominance maybe defined as a result of strong outside macro interference.
 - A walk test shall be performed once the first floor of the building is accessible and a report shall be submitted outlining possible exclusion zones
 - A final walk test shall be performed and a report shall be submitted as part of the As-Built documentation outlining any exclusions zones. Technologies are limited 3G and 4G for the 850MHz, 900MHz, 1800MHz, 2100MHz, 2300MHz and 2600MHz bands.

DAS Room requirements

- Clear Internal dimension of 5,000mm x 4,000mm
- Construction to have an FRL of 120/120/120
- 1 x door with FRL of -/120/30

The DAS shall utilise the communication riser cupboards to provide vertical reticulation.

9.6 Communications Systems

9.6.1 Carrier Services

An allowance for two carriers to service the site.
A Building Entrance Facility/MDF shall be provided

Main Building Entrance Facility/MDF Room requirements

- Clear Internal dimension of 4,000mm x 2,500mm
- 1 x outward opening doors

9.6.2 Base Building Communication Reticulation

Communications riser cupboards are to be located on each level. The communication cupboards to be 900mm x 500mm Deep clear internal and the risers are ideally to be vertically continuous where possible.

Building will be designed to cater for NBN services to each level.

Client to advise if third party fibre operator will be used to provide the required communication services to the building.

9.6.3 MATV

MATV system to be provided. Headend to be located at roof level of the Macquarie street building.
MATV services shall be reticulated within one of the communications risers with tap-offs located on each level.
Space for PayTV services will also be allowed for in the communications risers.

9.7 Security

9.7.1 Security/FM Room

This room is to be co-ordinated with the Architect and is required **only if separate security room is need**. Space provision required for CCTV and access control headend racks, monitoring of CCTV, BMCS headend and workstation. Alternate, security equipment can be housed in the main comms rooms and with remote access

The room size will be dependent on number of proposed personnel.

Minimum recommended room size is 4000mm x 3000mm

9.7.2 Access Control

The access control to consist of the following:

- Proximity type cards
- Main Entry Doors.
- Nominated internal doors and lifts.
- All Lift cars to incorporate surface mounted card readers

System will have the following additional features:

- The alarm panel dialer for remote monitoring.
- Door alarm monitoring of all external doors.
- Input signal from the building FIP to enable unlocking of egress path doors in the event of an emergency.
- Head end equipment to have battery backup for minimum 24 hours.

The existing Central Thermal Plant is using Titan Security System.

Titan security system is recommended so that CTP staff security can be programmed into the system to allow access to the roof CTP cooling plant. Provide pre-programmed card to CTP for access to the roof cooling plant.

Client to confirm if any preferred security system.

9.7.3 CCTV

The CCTV system shall provide real time and digitally recorded surveillance throughout specific areas including the following:

- Main entry and exits.
- Main corridors and lift landings.

Cameras shall be connected to IP streamers, via the security LAN, to enable recording and administrative tasks in security room. The digital CCTV system shall be software controlled with logical camera selection and automatic video recording with time and date generation.

Client to confirm if any preferred CCTV system.

9.8 Metering

9.8.1 Supply Authority Metering

Supply authority Metering to be allowed for as follows:

- House services (meter located in Main Switchroom)
- Tenant meter (meter located in Main Switchroom)

9.8.2 Private energy metering

Private metering to be allowed for as follows:

- Separate Metering to allow for multiple tenants and NABERS Energy monitoring and reporting
- BCA J8.3 monitoring specifically all large loads mechanical / hydraulic boards etc.

9.9 Lightning Protection

A lightning risk analysis has been undertaken and a lightning protection system is required to the buildings. Surge protection on incoming connection to the building is required. Lightning protection system to comply with AS1768.

Risk Assessment for Lightning Protection

Standards Australia Version 3.0 Date: 17/02/2017

Structure Identification **brewery yard**

<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Structure Dimensions</p> <p>Length (m) 50</p> <p>Width (m) 50</p> <p>Height (m) 40</p> </div> <div style="border: 1px solid black; padding: 5px; margin-top: 5px;"> <p style="text-align: center; margin: 0;">Structure Attributes</p> <p>Risk of Fire or Physical Damage Low</p> <p>Risk of Dangerous Discharge High</p> <p>Internal Wiring Type Unscreened</p> </div>	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Service Lines</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Power Line</p> <p>Service Underground</p> <p>Cable Type Unscreened</p> <p>Transformer at Structure No Transformer</p> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Other Overhead Services</p> <p>Number 0</p> <p>Cable Type Unscreened</p> </div> <div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center; margin: 0;">Other Underground Services</p> <p>Number 2</p> <p>Cable Type Unscreened</p> </div> </div>	<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Loss Categories</p> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Category 1 - Loss of Human Life</p> <p>Special Hazard 10 Fire Damage Factor 0.05 Overvoltage Damage Factor 0</p> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Category 2 - Loss of Essential Services</p> <p>Fire Damage Factor 0 Overvoltage Damage Factor 0</p> </div> <div style="border: 1px solid black; padding: 2px; margin-bottom: 5px;"> <p style="text-align: center; margin: 0;">Category 3 - Loss of Cultural Heritage</p> <p>Fire Damage Factor 0.5</p> </div> <div style="border: 1px solid black; padding: 2px;"> <p style="text-align: center; margin: 0;">Category 4 - Economic Loss</p> <p>Fire Damage Factor 0.3 Acceptable Risk of Economic Losses 1.E-03</p> <p>Overvoltage Damage Factor 1.E-03 Step & Touch Potential Damage Factors 0</p> </div> </div>																									
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<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center; margin: 0;">Overall Risk</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th></th> <th>Calculated Risk (R)</th> <th>Acceptable Risk (Ra)</th> <th>Direct Strike Risk (Rd)</th> <th>Indirect Strike Risk (Ri)</th> </tr> </thead> <tbody> <tr> <td>Loss of Human Life</td> <td style="text-align: center;">5.95E-06</td> <td style="text-align: center;">1.0E-05</td> <td style="text-align: center;">5.95E-06</td> <td style="text-align: center;">0.00E+00</td> </tr> <tr> <td>Loss of Essential Services</td> <td style="text-align: center;">0.00E+00</td> <td style="text-align: center;">1.0E-03</td> <td style="text-align: center;">0.00E+00</td> <td style="text-align: center;">0.00E+00</td> </tr> <tr> <td>Loss of Cultural Heritage</td> <td style="text-align: center;">4.52E-06</td> <td style="text-align: center;">1.0E-03</td> <td style="text-align: center;">4.52E-06</td> <td style="text-align: center;">0.00E+00</td> </tr> <tr> <td>Economic Loss</td> <td style="text-align: center;">3.60E-06</td> <td style="text-align: center;">1.0E-03</td> <td style="text-align: center;">2.86E-06</td> <td style="text-align: center;">7.38E-07</td> </tr> </tbody> </table> </div>				Calculated Risk (R)	Acceptable Risk (Ra)	Direct Strike Risk (Rd)	Indirect Strike Risk (Ri)	Loss of Human Life	5.95E-06	1.0E-05	5.95E-06	0.00E+00	Loss of Essential Services	0.00E+00	1.0E-03	0.00E+00	0.00E+00	Loss of Cultural Heritage	4.52E-06	1.0E-03	4.52E-06	0.00E+00	Economic Loss	3.60E-06	1.0E-03	2.86E-06	7.38E-07
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9.10 Electrical Spatial Requirements

The following minimum spatial allocations should be made: SPACE OR ROOM					
	SIZE	FIRE INTEGRITY OF SPACE OR ROOM	DOORS	COMMENTS	CODE OR STANDARD REFERENCES
Main Switchboard Room.	Single room 4,000mm x 1,500mm headroom of 2,700mm	FRL 120/120/120 Doors in a path of exit, are to fitted with smoke seals.	Two single doors, spaced apart, opening outwards, self-closing. Doors 900mm wide x 2,100mm high.	Room to have positive mechanical ventilation. Room to be free of island or intruding columns. Ideally be positioned near electrical risers. Two doors in paths of exit, are to fitted with smoke seals	AS.3000, clauses 2.9.2 BCA clause C2.13(b) & (c) and D2.7(d).
Communications Room (Entrance Facility/MDF Room)	Room, 4,000mm x 2,500mm with clear headroom of 2,300mm	FRL 120/120/120 where batteries within room exceed BCA C2.12 requirements.	One and a half leaf doorway required (1,300mm clear door opening), Minimum 2,100mm high.	Doors to be solid core. Additional authority requirements may apply. Room requires ventilation, needs conditioning. Doors in a path of exit, are to fitted with smoke seals.	BCA clause C2.12 and D2.7(d).
Distributed Antenna System (DAS) Room	Room, 4,000mm x 5,000mm with clear headroom of 2,300mm	FRL 120/120/120 where batteries within room exceed BCA C2.12 requirements.	One and a half leaf doorway required (1,300mm clear door opening), Minimum 2,100mm high.	Doors to be solid core. Additional authority requirements may apply. Room requires ventilation, needs conditioning. Doors in a path of exit, are to fitted with smoke seals.	BCA clause C2.12 and D2.7(d).
Security Room (if separate room is required)	TBC in conjunction with Architect PCA A grade Requirement	No requirement	One and a half leaf doorway required (1,300mm clear door opening), Minimum 2100mm high.		AS4806 Clauses 5 AS2201 Clause 2
Distribution Board Cupboards	Cupboard 1,200mm x 500mm.	Fire seal floor penetrations.	One set of full height double doors Minimum 2,100mm high	Cupboards to be vertically stacked. Doors in a path of exit, are to be non-combustible and fitted with smoke seals.	AS.3000, clauses 2.9.9 and 2.9.10. BCA clause D2.7(d).

Communications Riser Cupboard	900mm x 500mm deep	Fire seal floor penetrations.	One set of full height double doors Minimum 2,100mm high	Cupboards to be vertically stacked. Doors in a path of exit, are to be non-combustible and fitted with smoke seals.	BCA clause D2.7(d).
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