Illoura Place, 28 Elizabeth St, Liverpool

Hydraulics, Fire Protection, Electrical, Mechanical

Services Design Report_DA submission

Prepared for: Altis Bulky Retail Pty Ltd ATF Trustee for Altis ARET Sub Trust 20

Attention: Nick Murdoch

Date: 29 October 2021

Prepared by: Antonio Lo Monte

Ref: 301350263

Stantec Australia Pty Ltd
Level 6, Building B, 207 Pacific Highway, St Leonards NSW 2065
Tel: +61 2 8484 7000 Web: www.stantec.com

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Stantec

Revision

Revision	Date	Comment	Prepared By	Approved By
001	5.10.21	Pre-DA Issue	ALM	ALM
002	29.10.21	Pre-DA Issue	ALM	ALM

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Contents

1. Introduction

28 Elizabeth Street, Liverpool, known as Illoura Place is being developed by Altis Bulky Retail Pty Ltd ATF Trustee for Altis ARET Sub Trust 20 (Altis).

As an overview, the Project consists of the following:

Site area	3,609m2
Proposed GFA	36,000m2
Building Height	~128m
Stories	33 Stories
Residential Units	312 Units
Parking	411 Residential
	100 commercial
	31 Retail
	65 Com bicycle
	312 Res Bicycle
	29 Motorcycle

This document sets out the parameters of Stantec technical design and documentation of the project.

This document serves as the benchmark our services design will achieve. We request that this document is read carefully by the project stakeholders such that there is a clear understanding of the scope of works.

The primary objectives of this document are:

- Identify the proposed building services for the project
- Determine the applicable design standards and criteria applicable to the various services installations
- Establish major routing of the services
- Identify cross-discipline interfaces for engineering services
- Outline optional systems where they exist for consideration of the project team.

This information contained within this report has been based on the following documents received to date:

- Client documents
- Turner Architectural documents
- Multiple design meetings and client discussion and coordination
- NCC 2019 Amendment 1
- Relevant codes and design standards for electrical, fire, hydraulic and mechanical services
- DBYD Existing Services

2. Electrical Services

2.1 Objectives

Electrical Services will be designed in accordance with the following criteria:

- Electrical services initial capital costs to be minimised to assist in achieving the overall project budget.
- Electrical services to provide flexibility and capacity to accommodate user requirements.
- Electrical services to be energy efficient to the extent possible within the budgetary constraints.

2.2 Electrical Design Standards and Criteria

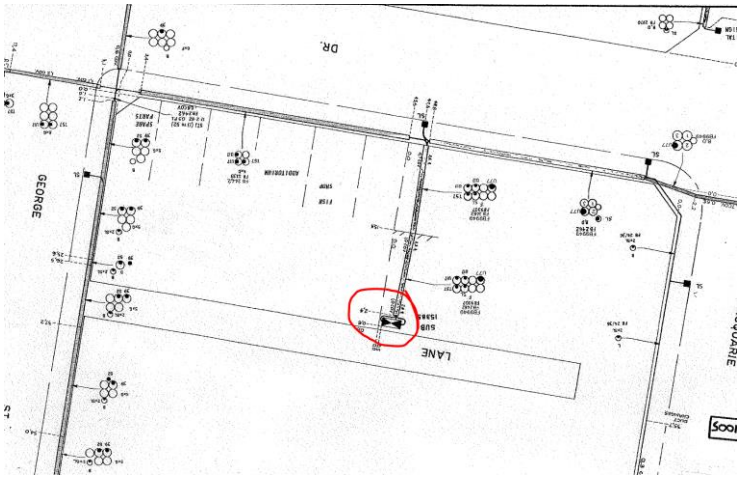
- Electrical services to comply with the National Construction Code (NCC, also knows as BCA, Building Code of Australia).
- Electrical services to comply with all current statutory requirements and guidelines including Endeavour Energy, Council. Fire and Rescue New South Wales.
- Electrical services to comply with NSW Service and Installation Rules
- Electrical services to comply with requirements of Australian Communications Authority (ACA) and Austel.
- Electrical services to comply with current Australian Standards where applicable, particularly the following:
    - AS 3000 Electrical Installation - Wiring Rules
    - AS 1680 Interior Lighting
    - AS 2293 Emergency Evacuation Lighting in Buildings
    - AS 3008.1 Electrical Installation - Selection of Cables
    - AS 3080 Telecommunications Installations for Commercial Premises.
    - AS 1768 Lightning Protection
    - AS 3013 Electrical Installations - Classification of the Fire and Mechanical Performance of Wiring System Elements
    - AS 1158 Pedestrian Area Lighting
    - AS 2293 Emergency Evacuation Lighting in Buildings
    - AS 4282 Control of Obtrusive Effects of Outdoor Lighting

2.3 Existing Electrical Infrastructure

2.3.1 Power

The Supply Authority for the site is Endeavour Energy.

A search on DBYD indicates that the site does not currently contain any substations, and that a substation is located adjacent within site 26 Elizabeth street, however Google maps indicates that the entire block is demolished.

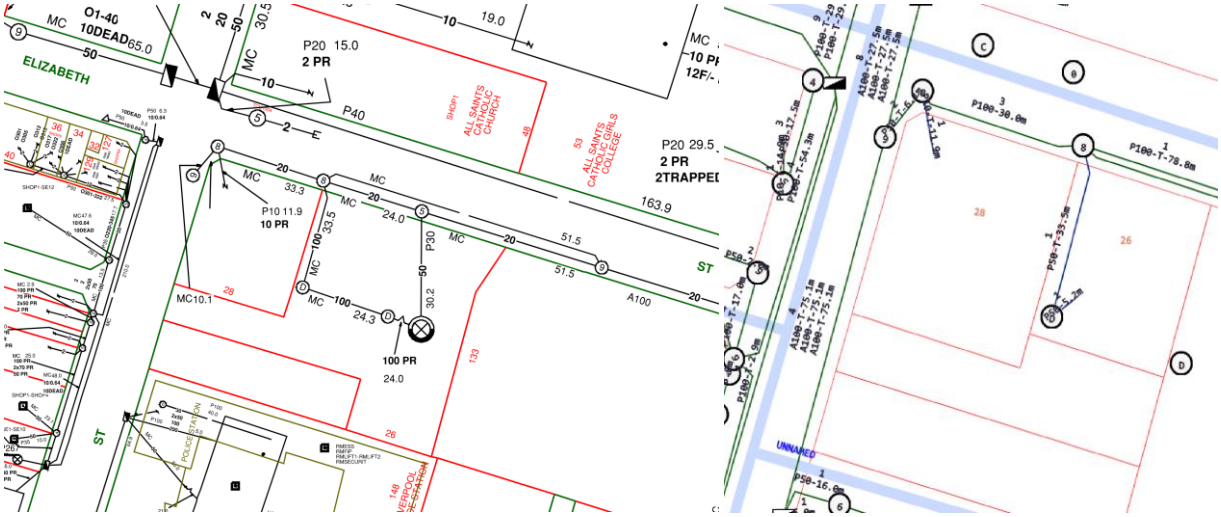


Endeavour Energy DBYD showing substation is adjacent site

Google Streetview showing that the existing block has been demolished.

2.3.2 Communications

A search on DBYD indicates that the site currently has various pit and pipe infrastructure servicing communication to the site, however these existing services will be removed as part of the demolition/basement excavation for the new development.



Telstra and NBN maps indicatiing existing provisions for the site

Based on the above, all new infrastructure will be required for the new development.

2.4 Proposed Supply Infrastructure

2.4.1 Substations

A preliminary maximum demand calculation for the new development has been calculated at around 6300A (~4400kVA).

MAXIMUM DEMAND CALCULATION DATE 01.10.2021

PROJECT NO 301350263

28 Elizabath Street Liverpool

AS/NZS 3000:2007 Wiring Rules Appendix C1

TABLE C1

		Actual No
Number of Units		311
Number of Units per Phase		104

	1	2	3	4	5	
LOAD GROUP	**DESCRIPTION**	**Single Domestic electrical installation**	**2 to 5 Units per Phase**	**6 to 20 Units per Phase**	**21 or more Units per Phase**	**LOAD**
Ai	Lighting	3A for 1 to 20 points + 2A for each additional 20 points or part thereof	6A	5A + 0.25 per unit	0.5 per unit	52
Aii	Outdoor lighting	75% of connected Load	No assessment for purpose			0
Bi	Socket Outlets not exceeding 10A	10A for 1 to 20 points + 5A for each additional 20 points or part thereof	10A + 5A per living unit	15A +3.75A per living unit	50A + 1.9A per living unit	247.6
Bii	Socket Outlets not exceeding 10A (SSO above 2.3m, perm installed heatering or combination SSO) in Buildings with Permanent heating/cooling	10A				0
Biii	Socket Outlets exceeding 10A (SSO above 2.3m or combination)	15A				
C	Appliances for cooking, instant water heaters, heating and cooling	50% of connected load	15A	2.8A per living Unit		291.2
		1 FULLL LOAD BURNER X25 % UNSE AT THE SAME TIME				339.1304348
D	Fixed space heating or air conditioning equipment, saunas or socket outlets rated at more than 10%	75% of connected load				1040
E	Instantaneous water heaters	33.3% of connected load	6A per living Unit		100A + 0.8A per unit	183.2
F	Storage water heaters	33.3% of connected load	6A per living Unit		100A + 0.8A per unit	0
G	Swimming Pools. Spas	75% of largest spa, plus 75% of largest swimming pool, plus 25% of remainder				0
Loading not associated with individual units - connected to each phase (communal lighting, laundry, lifts, motors etc)						
H	Communal Lighting	N/A	Full connected load			
I	Socket outlets not included in groups J and M below. Permanently connected electrical equipment not exceeding 10A	N/A	2A per point, up to maximum of 15A			
Ji	Appliances rated at more than 10A : Clothes dryers, water heaters, self heating washing machines	N/A	50% of connected load			
Jii	Appliances rated at more than 10A : Fixed space heating, air conditioners	N/A	50% of connected load			
Jiii	Appliances rated at more than 10A : Spa and swimming pool heaters	N/A	75% of largest spa plus 75% of largest swimming pool, plus 25% of remainder			
K	Lifts	Largest lift motor : 125%, nest largest lift : 75%, Remaining lift motors : 50%				259
		Residential lift	4	63 A each		
		Commercial lift	3	36 A each		
		Basement lift (garbage)	1	32 A each		
L	Motors	Largest motor : 125%, next motor : 75%, Remaining motors : 50%				
M	Appliances, including socket outlets other than those set out in groups A to L above	Connected load 10A or less : no assessment ; Connected load over 10A : By assessment	Connected load 10A or less : no assessment ; Connected load over 10A : By assessment			
Others	Carpark (B1-B2) general lighting & power)	20700	20 VA/m2			600.00
	Carpark (B1-B2) general lighting & power)	20700	20 VA/m2			600.00
	Commercial area (lighting & power)	10000	100 VA/m2			1449.28
	Commercial, Retail & share amenities HWU	By estimation (electric cooking and hot water unit)				250.00
	Retail on Ground (food & beverage)	1100	400 VA/m2			637.68
	Communal Power & Lighting	10746				351.23
				Total		**6300.32**

The max demand of the project assumes the following:

- Electrical Cooktop & HWU
- Limited to 600A for EV charging provision and on load management control
- Retail 400vA/m² (food and beverage) - subject to confirmation from Altis / Murdoch
- Commercial 100VA/m² - subject to final system selection and design, to be confirmed further as design progresses
- Total Mech loads: TBC - to be confirmed further as design progresses
- Total Hyd loads: TBC - to be confirmed further as design progresses
- Total Fire loads: TBC - to be confirmed further as design progresses

In order to service the expected max demand 3 off 1500kVA transformers are required and located within chamber substations around the site. In order to cater for future flexibility in supply and overcome any potential power restrictions on the site, we understand that the preference is to allow space for 4 transformer substations.

Refer to Appendix A for Endeavour Energy drawing showing the chamber substations. The final design/requirements of the substation shall be advised by the Level 3 ASP designer.

2.4.2 Power Factor

It is anticipated that power factor correction equipment is required for the development and spatial allocations will be provided.

2.4.3 Consumers Mains

Three new set of consumers mains will be provided from the substation to the new Main Switchboards.

New consumers mains will be fire rated as required.

Future consumers mains connected to the future substation will be provided in future stage as required.

2.4.4 Main Switch Room

Three new main switchboard is proposed to be located within new main switchroom on basement 1.

The main switchboard room shall be

- min 13000mm x 7000mm
- have 2 points of egress (spaced apart)
- be 2hr fire rated
- If located in the carpark drive, have bollards in front of doors to prevent cars from blocking the exits

2.4.5 Main Switchboard

Three new custom made main switchboards shall be provided as part of the new development and be located in the basement preferably close to the substation location and building electrical riser (to reduce the consumer mains and submain cabling requirements)

NOTE: the MSB dimensions will be further clarified as the electrical design progresses.

2.4.6 Power Distribution

Submains cabling from the Main Switchboard shall typically be reticulated to the core riser locations at high level in the basement using dedicated cabletrays. Cabletrays shall typically follow a straight route (where possible) below structural beams and other obstructions. Fire rated penetrations shall be provided for cable access from the basement to the levels above.

Cable risers/cupboards shall be used to house meter panels, tee-off boxes and distribution boards as required. In common areas the cupboards shall be enclosed by non-combustible and smoke sealed doors.

2.4.7 Meter Panels

Retail/Commercial Tenant Meter Panels

The Main Switchroom will contain the Supply Authority meters for the house services and the retail/commercial tenancies on ground floor.

Cabling to each of the retail/commercial tenants on ground floor shall emanate from the main switchboard to the tenancy DB location via B1 and penetrate through to the DB above.

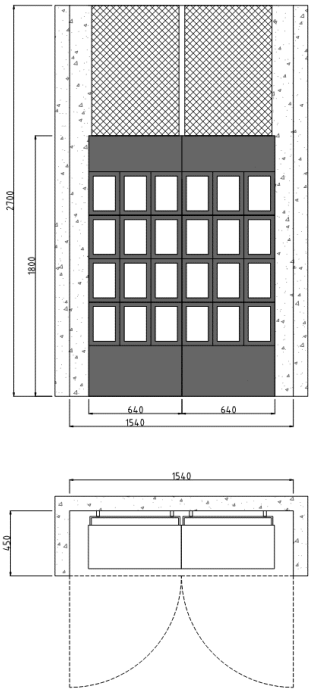
NOTE: all retail tenants are required to have CT metering if their power supply is more than 80A

Commercial level (Level 1 – Level 4) Meter Panels

Commercial level meter panels shall be distributed on level 1 to level 4 and generally be located in the electrical cupboards on each of the commercial levels and with house services DBs on each level. The riser space on each level is allowed to house maximum 2 sets of authority CT metering equipment or a standard metering panel for 4 x direct connected authority metering. As base building provision

Residential Meter Panels

Residential meter panels shall be distributed throughout the building and generally be located in the electrical cupboards on each of the residential levels and alternate with house services DBs.



Cabling to each apartment shall emanate from theses meterpanel locations and be reticulated to each apartment through the residential lobby ceiling space.

2.4.8 Distribution Boards

Distribution Boards provided throughout the development shall generally conform to the following segregation as per AS61 3439:

- Form 1 construction Less than 160A
- Form 2 construction 160A – 500A

- Form 3A construction 500A – 1,000A

Indicative dimensions of a distribution board is 600W x 250D. Where large amount of circuits are required, several distribution boards may be collocated together to allow for adequate pole capacity.

Concept Economy:

- Breaker type: Din-T only
- IP 40
- 1.0 mm steel
- Two-tone colour scheme
- Suits Din-T MCBs & RCDs
- Grey or orange door option
- Gloss white escutcheon standard with DIN cut-outs

Panelboards

Colour: grey

Chassis	Box size	Height	160 A Mainswitch Cat. No.	250 A Mainswitch Cat. No.
24 pole	1	700 mm	CON24M160G	CON24M250G
36 pole	2	800 mm	CON36M160G	CON36M250G
48 pole	3	900 mm	CON48M160G	CON48M250G
60 pole	4	1000 mm	CON60M160G	CON60M250G

Colour: orange

Chassis	Box size	Height	160 A Mainswitch Cat. No.	250 A Mainswitch Cat. No.
24 pole	1	700 mm	CON24M160O	CON24M250O
36 pole	2	800 mm	CON36M160O	CON36M250O
48 pole	3	900 mm	CON48M160O	CON48M250O
60 pole	4	1000 mm	CON60M160O	CON60M250O

House Services DBs

House services DBs will be distributed thoughout the building and be located in electrical cupboards as required.

On residential levels, house DBs will alternate with the residential meterpanels in the electrical cupboard locations.

House DBs will have segregated and separately metered lighting and power chassis in accordance with BCA requirements.

The following indicative distribution board allowances shall be considered:

- Plantrooms – 1/room (can be wall mounted pending spatial confirmation)
- Commercial/retail tenants – 1/tenant (can be wallmounted pending spatial confirmation)
- Basement levels – 1/level (can be wall mounted within basement or within a cupboard/main switch room)
- Typical resi floor level – 1/riser (within electrical riser cupboard)

Retail DBs

A 48pole DB will be provided as a base building provision to each retail.

Retail DBs will have segregated and separately metered lighting and power chassis in accordance with BCA requirements if retail space >500m2.

Commercial DBs

A 96 pole (24 lighting + 72 power) DB will be provided as a base building provision.

Commercial DBs will have segregated and separately metered lighting and power chassis in accordance with BCA requirements.

2.5 Other Equipment

2.5.1 Photovoltaic (PV) Generation

Solar PV provision is indicated on architectural drawings.

2.5.2 Standby Power

Standby diesel generator backup power facility will be provided to back up the house power and life safety equipment for the commercial component of the building as per Property council Grade A office requirement and a space of equivalent will be allowed for a future tenant generator.

2.5.3 Uninterruptible Power Supply (UPS)

It is anticipated that centralised UPS systems are not required on this project and that any UPS backup will be provided locally as required.

2.5.4 Surge Protection

Surge protection shall be provided at the main switchboard for the incoming supply to the building.

Surge protection to each of the individual apartments is anticipated to not be required.

2.5.5 Lightning Protection

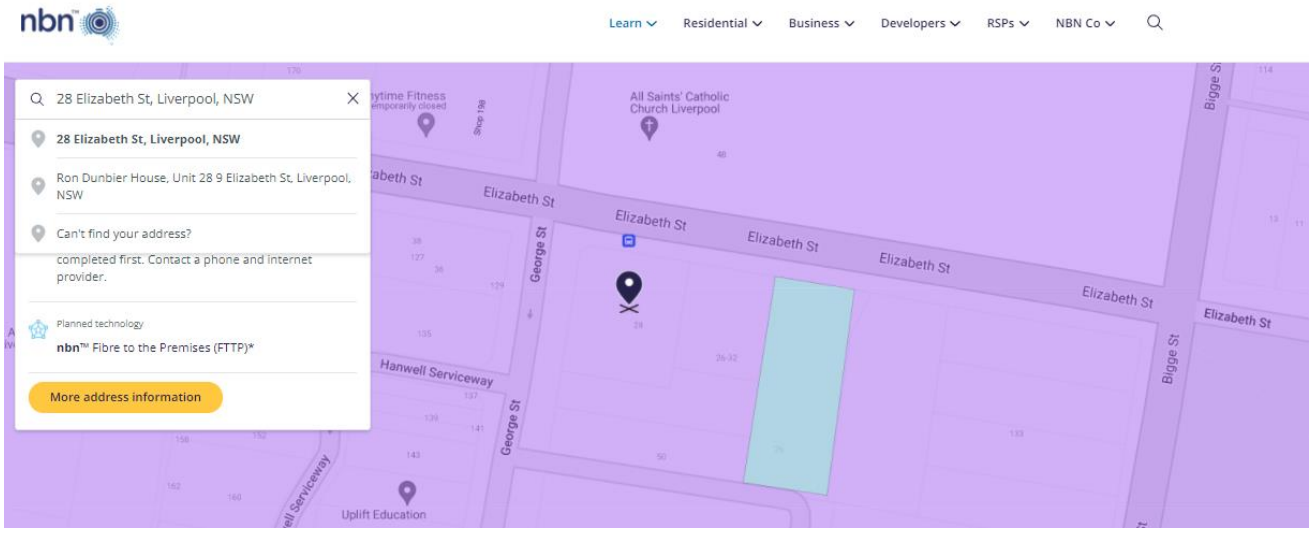
For the dimension and size of the building, lightning protection is expected to be required.

A lightning risk assessment shall be completed as part of the detailed design.

A conventional system to AS 1768 shall be provided.

2.6 Proposed Communications Infrastructure

A check on the NBNco website has confirmed that NBN infrastructure has been rolled out in the area, and that the technology being used will likely be Fibre-To-The-Premises (ie fibre will be provided to each tenant/apartment).



An application to NBN will be made in due course.

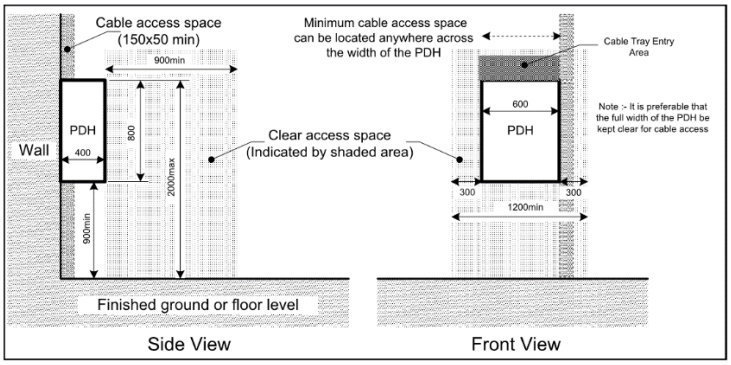
Specific requirements for the provision of NBN fibre to the new development are outlined in the NBN Building Design Guide – New Developments document. We have summarised these requirements below however the reader shall refer to the NBN document for specific requirements regarding the NBN installation.

2.6.1 Lead-in Fibre

Similar to the new consumers mains, new lead-in NBN / other fibre operator fibre shall enter the new development at basement level from the streets from 2 locations (1 from Elizebeth Street and 1 from George Street) as a grade A office building requirement. The lead-in fibre cable shall be reticulated to the Main Comms Room via a P100 lead-in telecommunications conduit laid on new cable tray/duct to the Main Comms Room as required. The telecommunications conduit shall run to the nearest NBN/Telstra pit in the road reserve and stop inside the private property with a marker to indicate the location.

2.6.2 Premises Distribution Hub

An NBN premises distribution hub shall be provided within the Main Comms Room. The incoming NBN fibre shall terminate into the PDH prior to being reticulated to the remainder of the development. The clearances required around the PDH are as follows:



2.6.3 Main Comms Room

A new main comms room will be required to service incoming carrier requirements for the building.

The comms room shall be

- min 5000mm(w) x 4000mm(d) x 3000mm(h)
- be ventilated
- If located in the carpark drive, have bollards in front of doors to prevent cars from blocking the exits
- Have double doors

2.6.4 Fibre Reticulation

Similar to the power cabling, fibre from the Main Comms Room shall generally be reticulated at high level through the basement using a dedicated communications cable tray. These cabletrays shall typically follow a straight route (where possible) from the Comms Room location to the riser locations and preferably be a level that is below any structural beams to avoid un-necessary fibre bends.

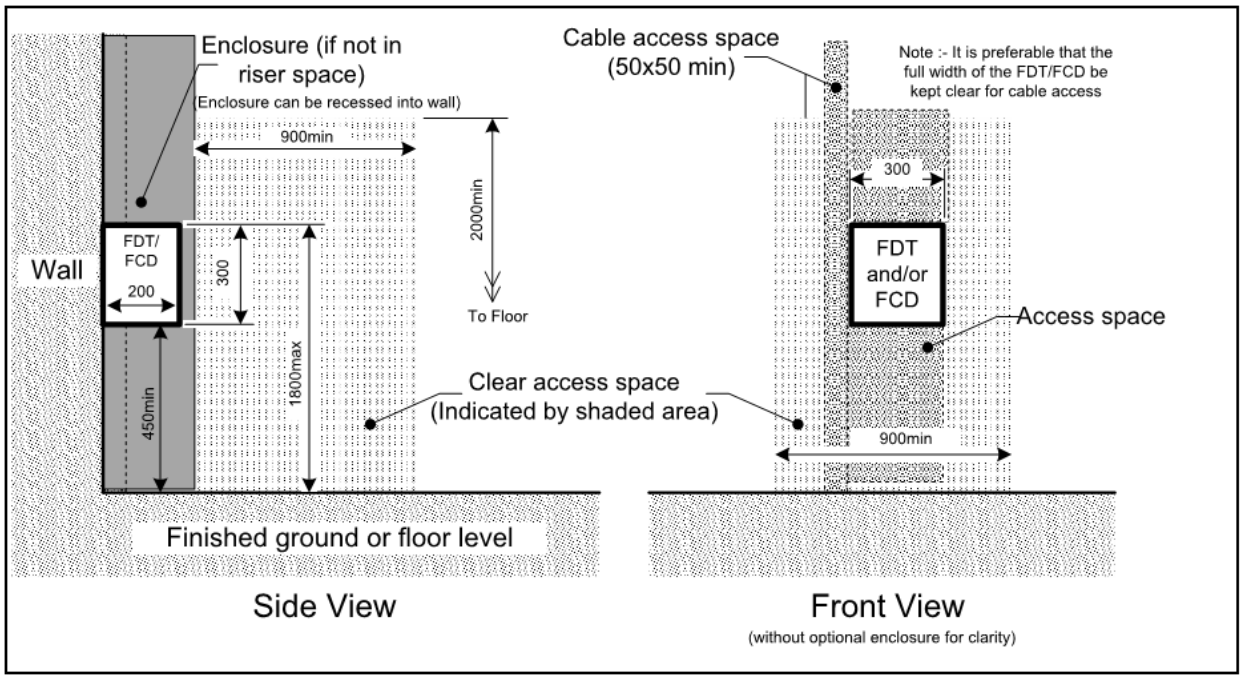
Rigid conduit shall be used where fibre cannot be reticulated via cabletray.

2.6.5 Communications Riser Cupboards

Communications riser cupboards shall be segregated from the electrical riser and be used to house NBN equipment such as the Fibre Collector Distributor and the Fibre Distribution Terminal, as well as other communications equipment such as MATV amplifiers/splitters, security/access control/CCTV controllers as required. A communications riser is required in each residential lobby on each floor of the building to house the communications equipment.

The FCD and FDT have the following minimum clearance requirements:

- Mounted no closer to the floor than 450mm from the bottom of the FCD/FDT, and no higher than 1800mm to the top of the FCD/FDT.
- Minimum of 900mm clear space in front of the FCD/FDT.
- Minimum of 300mm on each side of the FCD/FDT (or on each side of a grouping of FCD/FDTs).



2.6.6 Fibre Cabling to Apartments

Fibre to the apartments will be reticulated within conduits or on cabletray as required by the NBN guidelines.

Conduits shall be located within the slab.

2.6.7 MATV

A master antenna television system (MATV) shall be provided to the building consisting of MATV antenna mounted on the roof of the buildings' roof, splitters, amplifiers and TV outlets.

The cabling system will be capable of supporting satellite TV (5 cable vertical system with RG6 cable and taps and multi-switches), satellite TV receiver dish and amplifier.

Foxtel Specification backbone cabling (5 core cable vertical system with RG6 cable with taps and multi switches) will be installed in communications cupboards.

MATV equipment will typically be located within comms cupboards as required.

NOTE: final location of satellite and MATV antennae on roof are subject to a signal strength survey at the time of installation.

2.7 Intercom/Access Control/Security/CCTV

2.7.1 Intercom

A video intercom system shall be provided to each apartment, the ground floor entrance locations and the basement carpark entrance.

A single intercom handset/monitor shall be provided within each apartment and shall incorporate an intercom with door release pushbutton to release each of the foyer entry doors to enable lift access to the specific floor level and to allow visitor's access into the carpark.

This handset will provide two-way communication with each entry intercom and shall provide the following functions.

- Visitor access via ground floor entry doors and the basement lift lobbies
- Visitor access via lift (to specific floor only for a limited amount of time)
- Lift access from carpark to specific floor

The intercom system headend shall be located in the main comms room.

2.7.2 Access Control

An access control system will be incorporated with the intercom system and will include the following:

- Proximity card / individual ID radio frequency (RF) button key ring or proximity device for tenant entry into carpark and lobby entrances.
- Card reader will be provided in each lift car for residents to access their own floor.
- Visitors shall only be given access to the floor of the apartment they are visiting via the apartment intercom system.
- Reed switches will be fitted to all perimeter doors.

The access control headend shall be located in the main comms Room. There shall be provision for the Building Manager to have access to this system such that they can change the permissions on each of the access control cards and also issue new cards as required.

The number of access control proximity cards/key fobs required to be provided shall be as follows:

- 2 off for each 1 bedroom apartment
- 3 off for each 2 bedroom apartment
- 4 off for each 3 bedroom apartment
- 2 off for each retail tenancy
- 10 spare for the building manager

2.7.3 CCTV

CCTV shall be provided to monitor certain areas of the building and be incorporated within the intercom system. The CCTV system shall have the following functions:

- Have suitable resolution to recognise peoples faces from up to 20m
- Be suitably rated for their environment (eg external cameras shall be weatherproof and impact rated)
- Have the ability to capture images in low lighting conditions (eg night vision)
- Be an IP based system to allow for remote monitoring via a web interface
- Have suitable backup for up to four weeks of storage (which can be removed and stored if required)

The locations where CCTV cameras shall be located include:

- All external entrances
- Lobby entries

- Carpark entry locations

The CCTV headend shall be located in the main comms room.

2.8 Distributed Antenna System (DAS)

2.8.1 Lead-in conduit

Similar to the new fibre lead-in NBN / other fibre operator fibre, DAS cabling shall enter the new development at basement level from the streets from 2 locations (1 from Elizebeth Street and 1 from George Street) as a Grade A office building requirement. Each lead-in fibre cable shall be reticulated to the Main DAS Room with a set of 4 x P100 lead-in telecommunications conduit laid on new cable tray/duct to the Main Comms Room as required. The telecommunications conduit shall run to the nearest street pit in the road reserve and stop inside the private property with a marker to indicate the location

2.8.2 Main Comms Room

A new main comms room will be required to service incoming carrier requirements for the building.

The comms room shall be

- min 8000mm(w) x 6000mm(d) x 3000mm(h)
- be ventilated
- If located in the carpark drive, have bollards in front of doors to prevent cars from blocking the exits
- Have double doors

2.8.3 DAS Riser

Riser will be provided throughout the commercial building for signal distribution.

2.8.4 DAS equipment and cabling

DAS equipment and cabling shall be installed as required.

A DAS specialist is required to be engaged to detail system requirement.

2.9 Converged Network – GPON

Generally speaking, the traditional design of buildings of this nature uses separate cabling infrastructure for all IP based electrical systems (communications, intercom, CCTV, security, MATV) however modern technology means that all of these systems can be integrated together and reticulated using a shared fibre backbone to each apartment.

The benefit to this type of solution is that the cabling requirements are minimised however this solution often requires a specialist integrator to install the system on site.

2.10 Common Area Provisions

2.10.1 Common Area Power

Power shall be provided in the basement levels and common areas as required. As a minimum the following power provisions shall be provided:

- power to all electrical equipment in common areas (note that the ratings of the supplies shall be sufficient for the connected equipment):
  - garbage compactors
  - roller doors (Roller door to be 3 phase power opertated)
  - hydraulic pumps and other equipment

- lifts
- mechanical switchboard(s)
- irrigation equipment
- comms room equipment (including adequate spare outlets)
- main switchroom equipment (including adequate spare outlets)
- fire indicator panels and other essential fire services equipment
- other electrical equipment as required

- power to common areas for general cleaning and maintenance uses (note that the outlets shall be suitably IP rated for their environment)
  - within plant rooms
  - within garbage rooms
  - within basement carpark at carwash bays
  - within residential lobbies
  - other communal areas as required

2.10.2 Common Area Lighting

Basement Carparks – lighting to the basement carparks shall typically be surface mounted LED batten fittings. These fittings shall be automatically controlled with PIR detectors to turn off whenever there is no one present in the carpark. For security/safety purposes we propose that there be some nominated fittings that will remain on 24hrs. LED lowbay fittings will be used at the carpark entrance area to enhance the lighting as required by AS1680 requirements. These fittings shall be automatically controlled via a timeclock and PE cells to only come on in the daytime when it is dark.

Plantrooms – Lighting within plantrooms shall typically be surface mounted LED batten fittings to match those used in the basement carpark. These fittings shall be automatically controlled with PIR detectors to turn the fittings off whenever there is no one present within these spaces.

Residential Lobby – The lobby lighting strategy will typically be developed with the architect and will consist mainly of LED lighting to compliment the interior design**.** These fittings shall be automatically controlled with combined PIR/PE detectors to turn off whenever there is no one present.

External Lighting – The external lighting strategy will typically be developed with the architect and landscape architect and will consist mainly of LED lighting to compliment the external design. These fittings shall be automatically controlled through PE cells and timeclocks.

Emergency Lighting and EXIT Signs – Emergency lighting and exit signs shall be provided to all common areas in accordance with the Building Code of Australia and AS2293 and consist of a non-monitored standalone system with lithium batteries.

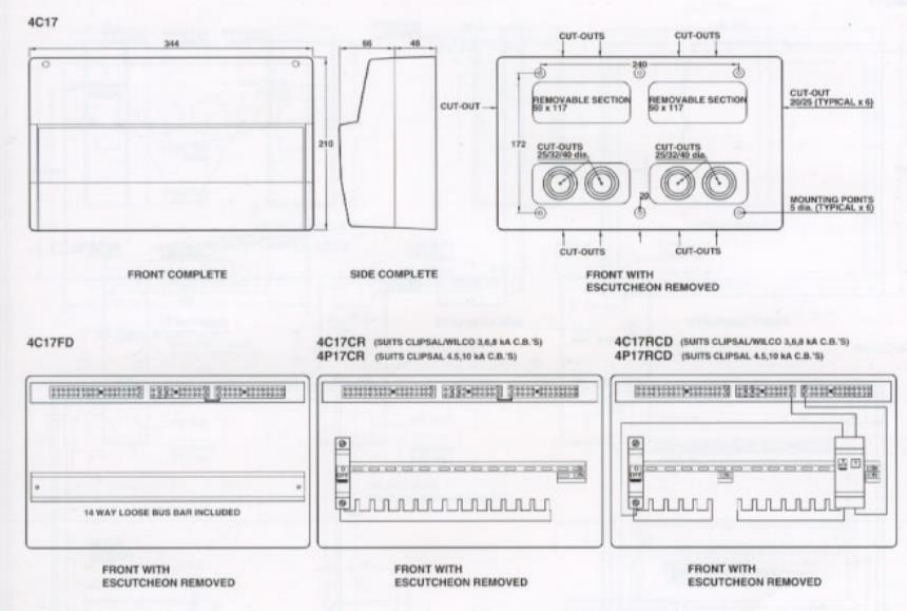
Emergency lighting within the firestairs shall typically be surface mounted LED fittings to match those used in the basement carpark with each fitting having its own battery and inverter. These fittings shall be automatically controlled with PIR detectors to dim to low level whenever there is no one present in the firestairs.

2.11 Apartment Provisions

2.11.1 Power

Power Supply - each apartment will be supplied with a single phase 63A supply fed from the residential meter panels within the riser. Submains to each apartment shall be reticulate through the lobby and shall terminate into each apartment DB for the final distribution of power and lighting circuits.

Apartment Distribution Boards - apartment DBs shall be similar to the Clipsal 4C17FD enclosure (as per image below) and shall be located in either a linen cupboard or joinery cupboard above the fridge location.



2.11.2 Apartment Communications/MATV

Fibre Termination – Cabling within each townhouse is required to terminate within the Network Termination Device (NTD). The spatial requirements of this equipment is as per below:

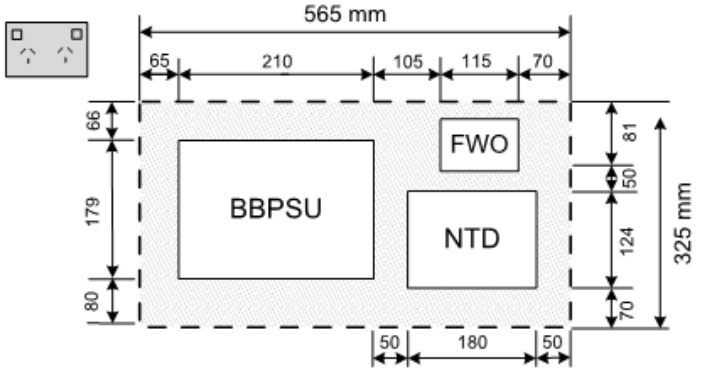
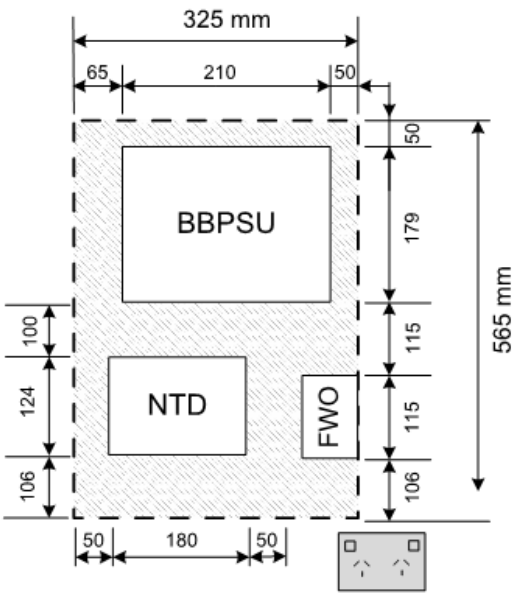
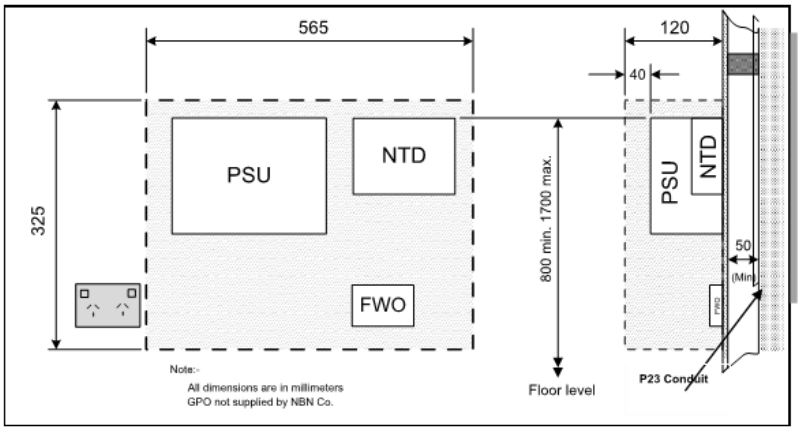
Parameter	Mounting Surface Template for Indoor NTD (I-240G-R)
Mounting Surface Template for a landscape orientation	

Figure 13 – Indoor NTD Landscape Orientation

Note: A GPO must be provided by the end user outside the area assigned for the installation of NBN Co's equipment.[4]

Parameter	Mounting Surface Template for Indoor NTD (I-240G-R)
Mounting Surface Template for a portrait orientation	 Figure 14 - Mounting Template Indoor NTD Portrait **Note:** A GPO must be provided by the end user outside the area assigned for the installation of NBN Co's equipment[5].



The NBN/network equipment can be mounted on an dedicated open panel (such as a custom built malamine panel) within the townhouse (typically within a linen cupboard or within a wardrobe) or it can be mounted within a specially designed enclosure such as the Clipsal NBN unit:

Clipsal Home Distribution Unit (3105PEN7440)

It is recommended that a shelf be provided near the NBN equipment to house the residents router/modem

2.11.3 Power Outlet Provisions

Living	4 x Double GPO. [1 x DGPO for TV, 1 x DGPO adjacent to TV, 1 x DGPO on opposite wall to
Bedrooms	2 x DGPO. [1 x DGPO on each side of bed]
Bathroom	1 x DGPO. [DGPO located in joinery cabinet]
Ensuite	1 x DGPO. [DGPO located in joinery cabinet]
Laundry	2 x GPO. GPO dedicated to dryer to have current load sensor to switch ceiling exhaust fan
Study	2 x DGPO
Kitchen	Allow the following outlets: 1 x 20A Oven, 1 x GPO Fridge 1x GPO Microwave 1 x GPO Dishwasher 1 x GPO for Range hood 1x GPO for electric cooktop 1 x GPO Gas igniter 2 x DGPO above bench
Balcony	1 GPO weatherproof
A/C Unit	***To be coordinated with mechanical design.***
Comms cabinet	2 x DGPO

2.11.4 Lighting Provisions

Living	Recessed downlights, dimmable, switched from near entrance door and lounge. (all apartments)
Main Bedroom	2 x recessed downlights, switched from door
Bedroom 2	2 x recessed downlights, switched from door
Bedroom 3	2 x recessed downlights, switched from door
Bathroom	IP rated recessed downlights, switched from door LED strip under & above joinery 300 lx to vanity basin
Ensuite	IP rated recessed downlights, switched from door LED strip under & above joinery 300lx to vanity basin
Laundry	1 x IP rated recessed downlight, switched at door.
Kitchen	recessed downlights, switched from suitable location near kitchen. 1 x joinery strip light above kitchen work surface, switched from suitable location. 300lx to surface of kitchen sink and cooktop or stove
Balcony	1 x weatherproof wall light and ceiling light switched from within living area.

2.11.5 Telephone/ Data Provisions

	Kitchen/Dining	Living	Study	Main Bedroom	Bedroom 2	Bedroom 3
	-	2 x Data [1xData located at TV and 1x Data located at opp DGPO]	1 x Data	1 x Data [1xData located at side of bed]	-	-

2.11.6 MATV & PTV Provisions

	Kitchen/Dining	Living	Bedroom 1	Study	Bedroom 2	Bedroom 3
	-	1 x FTA and PTV	1 x FTA and PTV	-	-	-

2.11.7 Smoke Alarm Provisions

	Living	Bedroom 1	Bedroom 2	Bedroom 3
Interconnected Smoke Alarms, separating living area from bedrooms	X No. as (required)	-	-	-

3. Fire Protection Services

3.1 Objectives

3.1.1 Overview

We understand the project objectives are:

- To provide Fire Services of high standard, comparable with other similar multi-story mixed use developments
- To achieve compliance with the tenant brief documents
- To provide Fire Services that minimises capital cost (to suit budget constraints) without excessively compromising quality or ongoing maintenance costs
- To provide Fire Services necessary for each area that satisfies the requirements of the Building Code of Australia

3.2 Design Criteria

The fire protection to the building shall be a wet system to the following design Standards and criteria:-

3.2.1 Design Standards

- Fire services to comply with the Building Code of Australia
- Fire services to comply with all current statutory requirements and guidelines
- Fire Services to comply with current Australian Standards where applicable and particularly the following:

Standard	Year	Name	
AS 1668.1	2015	The Use of Ventilation and Air Conditioning in Buildings	Part 1: Fire and Smoke Control in Multi-Compartment Buildings
AS 1670.1	2018	Fire Detection, Warning, Control and Intercom Systems – System Design Installation and Commissioning	Part 1: Fire
AS 1670.4	2018		Part 4: Emergency Warning and Intercom Systems
AS 2118.1	2017	Automatic Fire Sprinkler Systems	Part 1: General Requirements
AS 2118.6	2012	Automatic Fire Sprinkler Systems	Part 6: Combined Fire Systems
AS 2419.1	2005	Fire Hydrant Installations	Part 1: System Design Installation and Commissioning
AS 2441	2005	Installation of Fire Hose Reels	
AS 2941	2013	Fixed Fire Protection Installations – Pumpset Systems	
AS 3500.1	2003	Plumbing and Drainage	Part 1: Water Services

3.2.2 Water Supply Infrastructure

- Grade of Supply — Grade 1 / Dual Supply
- Water Storage — 1 x Rectangular Tank 5.5m (W) x 7.0m (L)
  Minimum effective capacity 83 m3

3.2.3 Fire Sprinkler System

- Ground Floor Retail spaces system designed to Ordinary Hazard Group 3 classification:
  - Ceiling / Under Slab Sprinkler spacing — 12 m² maximum
  - Assumed area of operation 216 m²
  - Density of discharge — 5 mm / minute

- Carpark system designed to Ordinary Hazard Group 2 classification:
  - Ceiling / Under Slab Sprinkler spacing — 12 m² maximum
  - Void Protection — not required
  - Density of discharge — 5 mm / minute

- Residential SOU's and commercial spaces designed to Light Hazard classification:
  - Ceiling Sprinkler spacing — 21 m² maximum, reduced to 12 m2 in plant areas
  - Void Protection — generally required
  - Number of operating sprinklers — 6
  - Minimum flow rate per head — 48 litres / minute

- Restaurants and Café's designed to Ordinary Hazard Group 1:
  - Ceiling / Under Slab Sprinkler spacing — 12 m² maximum
  - Void Protection — not required
  - Density of discharge — 5 mm / minute

- Concealed Space / Void Protection:
  - Void Protection — generally required / required within 1.5 m of plant / required where void exceeds 200 mm /
  - Sprinkler spacing — 21 m² maximum / 42 m2 maximum
  - Number of operating sprinklers — 6
  - Orifice Size / Minimum flow rate per head — 15 mm / 48 litres per minute

3.2.4 Fire Hydrant System

The fire hydrant system is to be designed based on the following:

- Number of operating hydrants — 2 outlets
- Minimum flow rate – pumped — 5 L / s each
- Minimum residual pressure — 700 kPa
- Minimum flow rate – boosted — 10 L / s each
- Water Storage — Water Storage 1 x Rectangular Tank 5.5m (W) x 7.0m (L)
  Minimum effective capacity 83 m3

3.2.5 Fire Hose Reels

Fire hose reels are to be designed based on the following, supplied from the fire hydrant system:

- Protected areas — all areas / car parks only / retail only / public areas
- Nominal Hose Diameter — 19 mm / 25 mm
- Minimum flow rate — 0.33 L / s each / 0.41 L/s each
- Minimum residual pressure — 220 kPa
- Number of operating hose reels — 2 most hydraulically disadvantaged

3.2.6 Portable Fire Extinguishers

Portable fire extinguishers are to be provided based on the following:

- Protected areas — Areas nominated in BCA Table E1.6 only
- Design Standard — Primary Protection / Complementary Protection
- Additional Requirements — Extinguishers provided to suit Fire Engineering requirements

3.2.7 Fire Detection System

The fire detection system is to be based on the following criteria:

- System type — Analogue addressable
- Smoke detector spacing – office areas — maximum 5.1 m from walls, 20.2 m between detectors
- Thermal detector spacing – office areas — maximum 3.6 m from walls, 7.6 m between detectors
- Smoke detector spacing – office areas — maximum 5.1 m from walls, 20.2 m between detectors
- Zoning – occupied space — Zoning in accordance with AS 1670.1 minimum one zone per floor zoning to match smoke exhaust zones
- Mechanical services detectors — Supply Air Fans and Return Air Ductwork
- Additional devices — tamper monitoring, flow and pressure switch monitoring
- Visual warning devices — to complement EWIS in areas with high ambient sound levels

3.2.8 Emergency Warning and Intercommunication System

The Emergency Warning and Intercommunication System is to be designed based on the following criteria:

• Evacuation zones	One per level
• Speaker types	White flush with ceiling to general areas
	Horns to plant areas
• Warden Intercom Points	Adjacent lift lobby each level
• Emergency Call Points	Adjacent each WIP handset

4. Hydraulic Services

4.1 Objectives

4.1.1 Overview

Hydraulic services to deliver the following services;

- Connection to authority services including sewer and water/fire
- Sanitary waste and drainage services incorporating:
  - Gravity flow system connecting to authorities sewer main.
  - Rising main for any sewer services unable to reticulate via gravity.
- Stormwater drainage incorporating:
  - Roof Catchment & Impervious areas with connection to Civil drainage systems.
- Cold water supply and distribution services.
- Hot water supply and distribution services.
- Backflow prevention.
- Natural gas supply and distribution services.
- Metering of water supplies will be individual with meters located in the common corridor hydraulic cupboard. The site master meter will be monitoring the entire site consumption with deductions applies for common area usage.
- Metering of gas supplies will be master metered at the boundary for the residential zone and individual meters located inside the retail tenancies.
- Fire hose reel services are to be provided to carpark (Class 7a). Retail (Class 6) and common areas only. Distribution services to be connected to the metered cold water supply.

4.2 Design Criteria

4.2.1 Design Standards

- Hydraulic services to comply with the Building Code of Australia 2019 Amendment 1.
- Hydraulic services to comply with all current statutory requirements and guidelines including Campbelltown City Council, Sydney Water, Fire and Rescue New South Wales and Department of Environmental Protection.
- Hydraulic 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):

AS 3500	:	National Plumbing and Drainage Code incorporating:
Part 1	*:*	*2018 Water Supply*
Part 2	*:*	*2018 Sanitary Plumbing and Drainage.*
Part 3	*:*	*2018 Stormwater Drainage.*
Part 4	*:*	*2018 Heated Water Services.*
AS 2419.1	:	2005 Fire Hydrant Installations

AS 2441 2005 Fire Hose Reel Installations

- National Construction Code – NCC/BCA

  Volume 1 : Class 2 to 9 buildings.

- *Volume 3 : Plumbing and drainage associated with all classes of buildings*
- *Section J : Specification J6.*

4.2.2 Design Criteria

- Hot Water : Storage Temperature (domestic use) minimum 60°C
- Stormwater:
- Roof Areas : Average recurrence interval (ARI) 1:100 years.

  \- : Intensity 270mm/hour.

  \- : Duration 5 minutes.

- Eaves Gutter Systems & Balconies : Average recurrence interval (ARI) 1:20 years.

  \- : Intensity 160mm/hour.

- Provision of fixtures and tapware conforming to the WELS (Water Efficiency Labelling Standards) which identifies the following maximum flow rates in accordance with required sustainability initiatives

4.3 Site Infrastructure Services

4.3.1 Sewer Services

There is currently a 300mm vitreous clay sewer servicing the site we will be connecting to this sewer connections

The 300mm sewer main traversing through the site will be classified as 'Asset Affected' by Sydney Water as it passing through the building footprint and excavation zone. A WSC is engaged to design the deviation around the site and as part of that design a sewer connection will be provided for connection to our internal sewer reticulation in the south east corner of the site. See Image 1

We anticipate the site will utilise 2x225mm connections, final locations and details to be determined in liaison with Sydney Water. The suitability of these connections will be validated by Sydney Water within the Notice of Requirements (NoR).

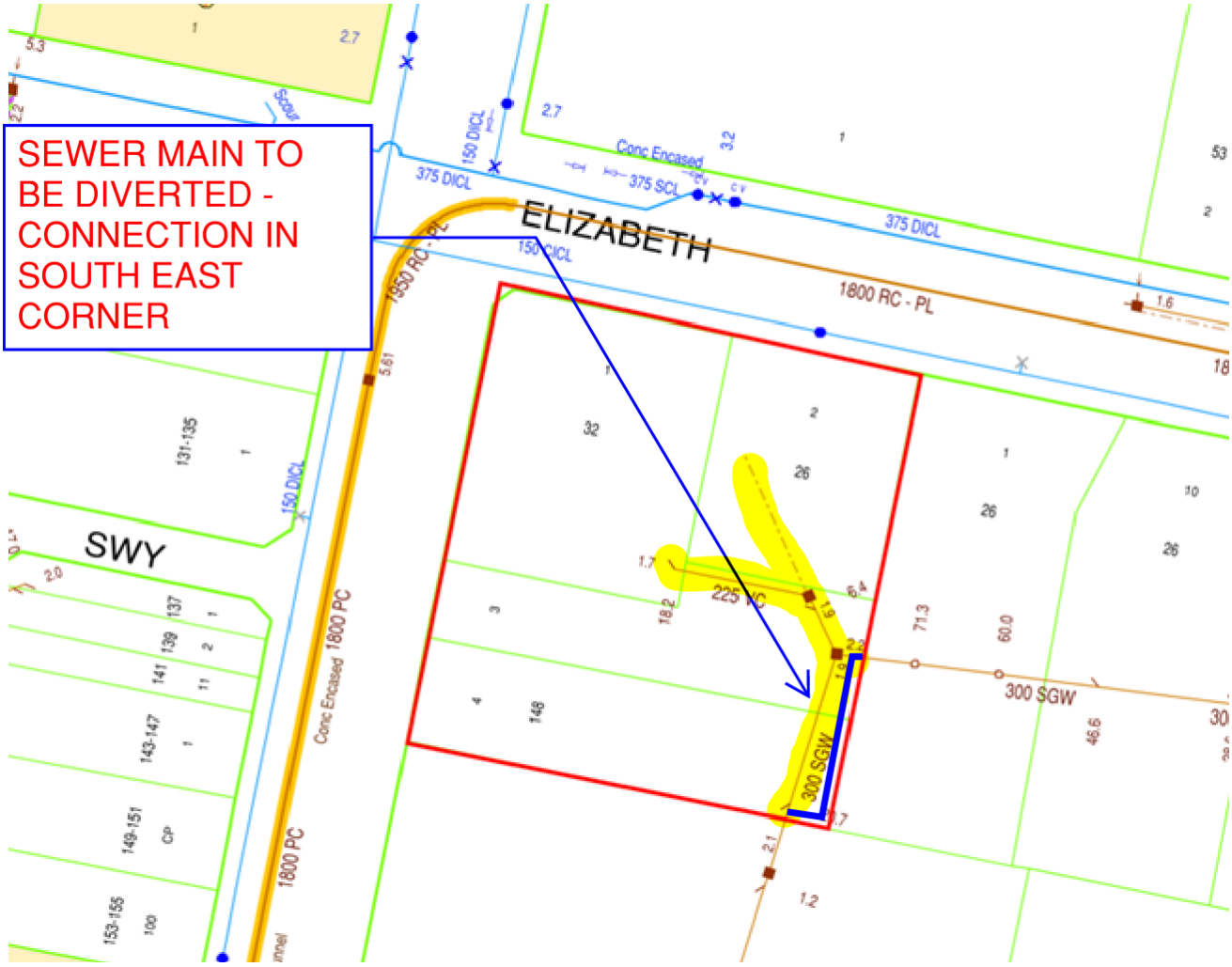


Image 1: Sewer intruding on site boundary: Source: DBYD

4.3.2 Water Services – Fire Services Water Supply

- A 150mm combined potable and fire connection will be main into the water 300mm water main located within Elizabeth St. The connection will be a new connection at the corner of Elizabeth and George Street to the proposed master water meter and fire hydrant booster assembly. See image 2.
- An RPZD (Reduced Pressure Zone Device) backflow prevention device will be required on the new incoming supply. Supplementary backflow prevention devices – RPZD's are to be provided in accordance with AS3500.1 requirements including hair dressing salon and dirty utility areas.
- Final connection details to be co-ordinated as apart of Section 73 process with Sydney Water

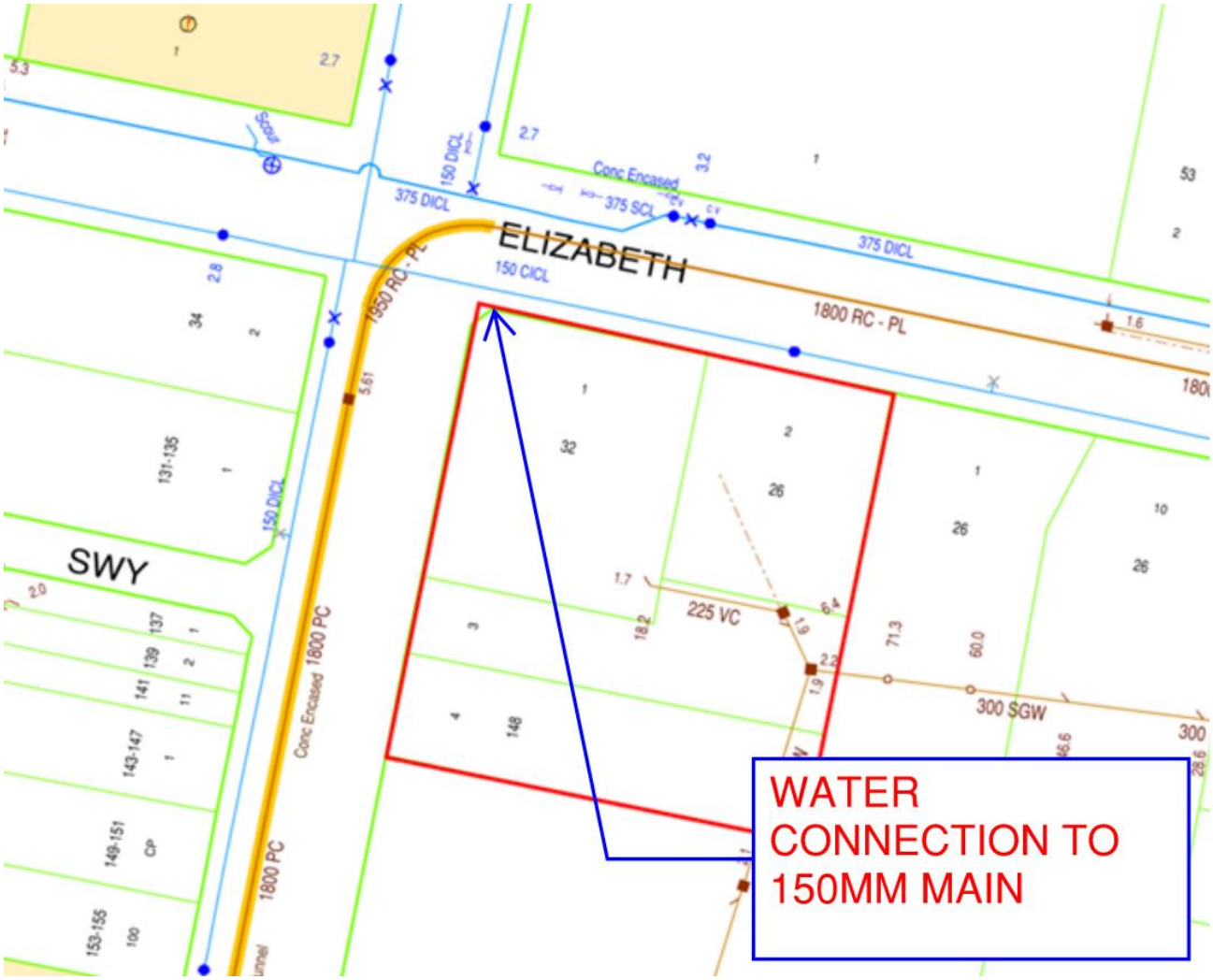


Image 2: **Available water main: Source: DBYD**

4.3.3 Gas Services

There is a 75dia, 7kPa network main owned and operated by Jemena within Elizabeth St. Current discussions with Jemena. A formal enquiry to Jemena has determined that there is no capacity to extend gas through to the building services, gas supply will be supplied to the retail tenancies only will be provided.

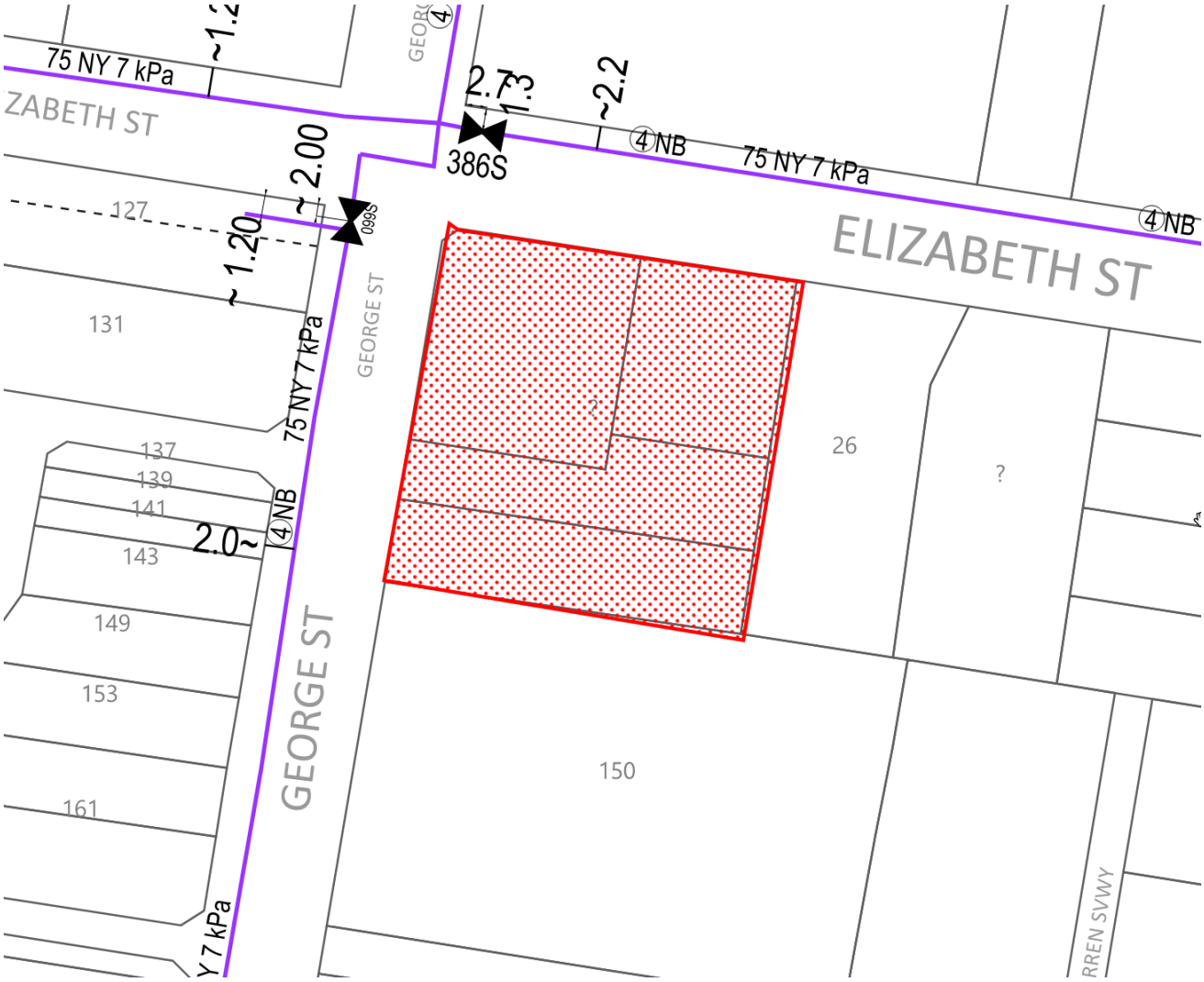


Image 3: **Available gas main: Source: DBYD**

4.4 Water Services - Cold Water System

- Provision for reticulated cold water supplies to all sanitary fixtures, fittings and tapware as required incorporating all required maintenance isolation valves.
- Provision for a triplex cold water booster pump set pending receipt of Sydney Water pressure and flow.
- Provision for all required external hose connection taps to assist general cleaning, wash down and minor landscape irrigation complete with vacuum breakers and all necessary backflow prevention devices. These hose taps will be located in the private courtyards on ground floor, central community space and roof top gardens only.
- Provision for all required backflow prevention devices to mechanical equipment, hot water units, hose taps, etc.

- Water hammer and its effects are to be eliminated by addressing the following issues:
    - Appropriate design of water service pipework to maintain water velocities to a maximum of 1.5 metres/second.
    - Appropriate use and spacing of pipe supports and fixings.
    - Minimising the specification of quick closing tapware such as ceramic disc, quarter and half turn tapware.
    - Utilising appropriate hammer arrester devices to items such as dishwashers, glasswashers and washing machines.
- Provision for individual private cold water meter spaces in the meter cupboards on each residential level.
- No hose taps are to be provided on residential balconies *Client to Confirm.*

4.5 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
    - Showers
    - Dishwashers
    - Kitchen sinks
    - Plant areas
    - Mechanical waste
    - Note: Exposed fixture wastes shall be chrome plated copper.
- 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.
- Provision for 1 x 2,000L below ground sewer pump stations to collect basement carpark fixtures.
- Fixtures and fittings to be nominated, supplied and installed by others:
    - *Washing machines*
    - *Dishwashers*
    - *Laundry Driers*
    - *Commercial Kitchen and Bar Equipment*

4.6 Industrial Waste and Drainage

- Provision for the collection of all grease waste from kitchen cooking and food preparation areas via fixture wastes from food and beverage retail areas discharging to 2 x 5,000 litre capacity filtered grease trap/arrestors. One grease arrestor is to be dedicated for a future major supermarket tenancy. Potential for further grease arrestor locations based on tenancy food & beverage requirements.

  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

- 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 each grease/dilution chamber.

4.7 Hot water services including plant

We are proposing to install centralised electrical heat pump and buffer storage hot water plant to serve all the residential dwellings and localised electric storage tanks to common areas (as required). The hot water systems are proposed are to accommodate a peak 2 hour supply.

Provision for hot water heating plant providing hot water to the following areas:

- Residential areas.

- Common Areas – 50l electric electric storage unit is proposed

- Commercial base building use – point of use electric units

- Thermostatic mixing valves shall be located in disabled facilities only within wall cavities adjacent to fixtures being served.

- 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
  - Residential Areas max 50°C
  - Common Areas- max 50°C

- Provision for all required backflow prevention devices and temperature relief valves.

4.8 Natural gas services

- Provision for reticulated gas services to all commercial tenancies.

4.9 Stormwater drainage.

- Stormwater drainage is to be designed to achieve compliance to the National Construction Code.
- We are proposing to collect all roof collected stormwater through vertical downpipes which extend external to the building and terminate at ground level. Extension to stormwater infrastructure is to be done by civil.
- Both pipework sets shall extend into the ground floor slab and reticulate to an agreed point of connection to the civil stormwater system.
- Balcony drains will be captured by cast-in outlets discharging to cast-in downpipes are connect to the civil system. All balcony outlets must be within 1500mm of the downpipe.
- Impervious areas i.e. balconies that are trafficable will extend to the in-ground civil stormwater system.
- Reticulation of irrigation supply to location nominated by the landscape architect

4.10 Fire hose reels

Fire Hose Reels and Extinguishers are to be designed to achieve compliance to the National Construction Code.

- Provision for all required internal fire hose reels providing building protection to all areas and located within 4m of a fire exit or fire stair door and allowing full coverage from a 4m hose stream issuing from a 36m hose. We propose to connect to the proposed domestic metered cold water system.
- Note: Fire hose reels are to be provided to non-residential portions of the building only including carpark, retail and other associated common areas in accordance with the NCC. Fire hydrants are to be provided by the fire contractor.

4.11 Tenant Services –

- Provision for a 100mm capped domestic waste point left 100mm above finished floor level for future connection by the tenant
- Provision for a 100mm capped industrial (grease) waste point left 100mm above finished floor level for future connection by tenant
- Provision for a 20mm capped and valved water supply point (capable of 20 litres/minute) left within the ceiling space for future connection by the tenant
- Provision for a 25mm capped and valved gas supply point (capable of 500 mj/hr) left within the ceiling space for future connection by the tenant

1. Mechanical Services

1.1 Objectives

1.1.1 Overview

Mechanical services include the provision of;

- Ventilation inclusive of:
  - outside air systems
  - general exhaust systems
  - local exhaust systems
- Air Conditioning inclusive of:
  - Comfort Cooling
  - Comms Room Cooling

1.2 Design Criteria

Air conditioning systems shall be designed to meet the following design criteria during normal operation with due allowance for solar loads, transmission loads, internal loads, occupancy level and infiltration loads.

All cooling and heating loads may incorporate a design/safety factor of 10%, which is to be added to the calculation of cooling and heating loads.

The design criteria proposed for the mechanical services will be based on the following parameters:

1.3 Mechanical Services Information

1.3.1 Design Temperatures

Ambient conditions - (Based on AIRAH "Comfort conditions)

Liverpool

Summer:	36.2°C DB /23.9°C WB/Full Solar Load
Winter (minimum)	5.8°C DB/No Solar Load

1.3.2 Internal Conditions

For all air-conditioned area

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 2°C at the point of control for heating and cooling.

1.3.3 Internal Loads

Population

Residential Level:

Apartment Lobbies	Transient space only
1 – bedroom Apartments:	2 people
2 – bedroom Apartments:	3 people
3 – bedroom Apartments:	4 people
Residential Communal Spaces:	3.5-5m^2 per person or per architectural layout

Retails/Commercials Level:

Commercials:	10m^2 per person or per architectural layout
Retails:	3.5m^2 per person or per architectural layout
Café/Restaurant:	1.5m^2 per person or per architectural layout
Parcel Room/Admin:	per architectural layout

Lighting & power

Space	Lights	Equipment
Residential communal spaces	10 W/m^2	10 W/m^2
Apartment units	5 W/m^2	5 W/m^2
Apartment lobbies	5 W/m^2	5 W/m^2
Retails/commercials/Childcare/Offices	10 W/m^2	10 W/m^2

1.3.4 Ventilation

Residential Level:

Apartment rooms:	10l/s/person or natural ventilation via operable windows
Apartment bathrooms:	40L/s to assist in removing steam from bathrooms, exhaust directly to facade
Apartment laundries:	40L/s, exhaust directly to facade
Apartment kitchen rangehoods:	120L/s.
Communal space:	10l/s/person
Residential lobbies:	1L/s/m2 or natural ventilation via operable windows.
Residential recycle bin rooms:	Assume no waste bins are stored within. Only recycle bins are placed. 5L/s/m2 per recycle bin rooms.

Retails/Commercials Level:

Retails/Commercials/Cafe:	10L/s/person. Façade louvres will be provided for base build for tenant's connection of ventilation systems during fit out
F&B commercial kitchen:	Currently we have allowed for the following:
	Retail 1A: 1 off kitchen exhaust, 3000L/s
	Retail 1B: 1 off kitchen exhaust, 3000L/s
	Retail 1C: 1 off kitchen exhaust, 3500L/s
	Retail 2: 1 off kitchen exhaust, 3000L/s
	Retail 3: 1 off kitchen exhaust, 2000L/s
Common toilet areas:	To AS requirement of the greater of 10L/s/m2 or 25L/s per fixture
Car park:	To AS1668.2 requirement via mechanical ventilation
Loading dock:	To AS1668.2 requirement via mechanical ventilation
Fire pump room:	800L/s for supply and exhaust. TBC with fire protection consultant.
Retail/Lift lobbies:	Mechanical / natural ventilation to lobbies & corridors
Storage:	5L/s/m^2
Basement plant room:	5L/s/m^2
Grease Arrester:	5L/s/m^2 or min 100L/s
Main switch room:	4L/s/m^2
FCR/substation:	to authority requirements
Generator room:	3050L/s exhaust, 1217L/s supply, and 750dia flue size as per supplier recommendation (Perkins 4008TAG1A)
Gas meters:	mechanical ventilation to Gas Code
Garbage room:	5L/s/m^2 or min. 100L/s. Part of the garbage chute exhaust system.
Lift shaft:	Natural ventilation via openable louvre

1.3.5 Acoustic Criteria

Mechanical services to be designed in accordance with acoustic engineer's advice.

1.3.6 Glazing and Building Fabric

1.3.7 Design Standards

Statutory Design Standards

The National Construction Code (NCC) 2019 and in particular the "deemed to satisfy" conditions of:

- NCC 2019 Section J3.5 & J3.7 "Building Sealing - Exhaust Fans & Evaporative Coolers"
- NCC 2019 Section F4.3,4.4,4.5 "Outdoor Air Supply, Mechanical Ventilation to Control Odours and Contaminants, Disposal of Contaminated Air"

- NCC 2019 Section J5 “Air Conditioning and Ventilation Systems”
- NCC 2019 Specification J5.2 “Ductwork Insulation and Sealing”

Australian Standards as follows:

- AS 1530 Methods for fire tests on building materials, components and structures
- AS 1668.1 The use of mechanical Ventilation and Air Conditioning in buildings -Fire and Smoke control in multi-compartment buildings
- AS 1668.2 The use of mechanical Ventilation and Air Conditioning in buildings - Mechanical Ventilation in buildings
- AS 1677 Refrigerating Systems
- AS 1682 Fire Dampers
- AS 1851 Maintenance of Fire Protection Systems
- AS 3000 SAA Wiring Rules
- 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.

Safety in Design - Design Standards

These standards may be referenced in Safety in Design reports, compliance with these standards will be used to mitigate the relevant Health and Safety Risks.

Australian Standards as follows:

- AS 1668.1 The use of mechanical Ventilation and Air Conditioning in buildings -Fire and Smoke control in multi-compartment buildings
- AS 1668.2 The use of mechanical Ventilation and Air Conditioning in buildings - Mechanical Ventilation in buildings
- AS 1677 Refrigerating Systems
- AS 3666.1&2 Air Handling and Water Systems of Buildings – Microbial Control
- AS 2865 Confined Spaces HB213 Guidelines for Working in Confined Space
- AS 1894 Storage and Handling of Non-Flammable Cryogenic and Refrigerated Liquids
- AS 1940 Storage and Handling of Flammable Combustible Liquids
- AS 5601 Gas Installations
- AS 3500 Plumbing & Drainage Codes
- AS 1228 Pressure Equipment - Boilers
- AS 1271 Safety Valves

Best Practice Design Standards

These standards will be followed where practical, Client to advise any standards which must be followed.

Australian Standards as follows:

- AS 1324 Air Filters for use in air conditioning and general ventilation
- AS 2107 Acoustics
- AS 3013 Electrical installations, wiring systems for specific applications
- AS 4254.1 Flexible Ductwork
- AS 4254.2 Solid Ductwork

1.4 Air Conditioning Scope of Work

Based on the details provided, we understand that the scope of works will involve the following:

Air Conditioning

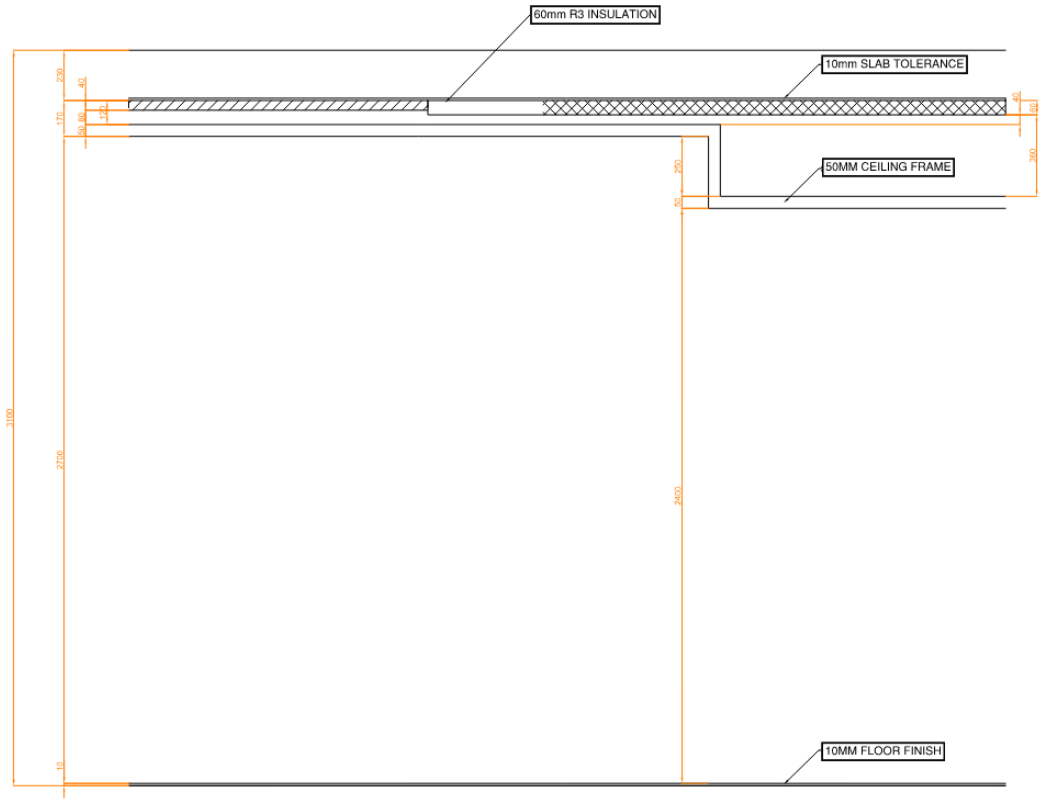
Air conditioning shall be provided to the following areas:

- Apartments
- Residential Communal Spaces
- Retails/Café Restaurant
- Commercials
- Parcel Room/Admin
- Comms Room

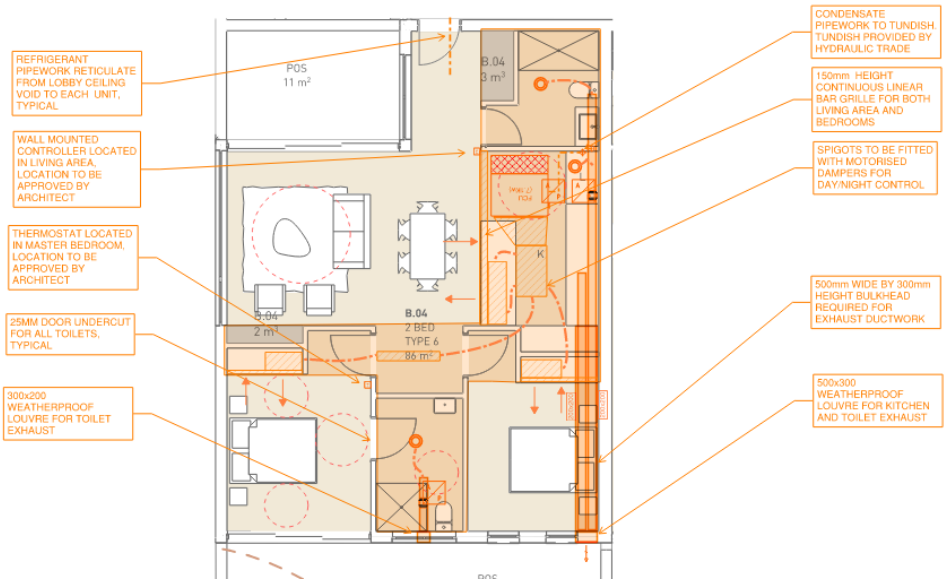
1.4.1 Apartment Fan Coil Unit Arrangement Options

Option 1: Ceiling Mounted Duct Type Fan Coil Unit-Day and Night Mode

Each apartment unit will be provided with a ceiling mounted ducted type FCU located above a 2400mm lowered ceiling (bulkhead), typically within the kitchen area to serve both living area and bedrooms. It is proposed that an FCU is designed complete with motorised dampers to enable day/night operation, additional motorised dampers can be included for zoning. For each ceiling mounted ducted type FCU, a minimum 400mm clear height ceiling space is required to accommodate the FCU, condensate drainage and ductwork, please note that all ductwork reticulating from the FCU to each bedroom will require a dropped ceiling to accommodate insulated ductwork. A local wall mounted controller is provided in living room and another thermostat is provided to the master bedroom to allow for local control with predetermined set point temperature. See image below for section details.



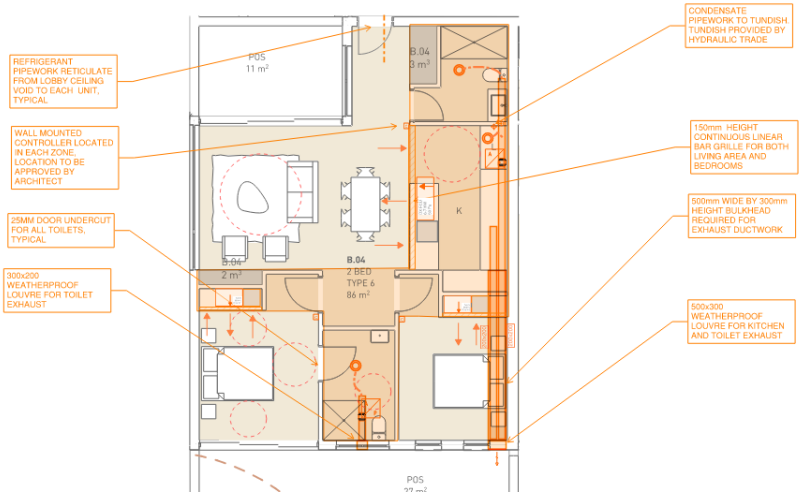
Section View for Drop Ceiling Area



Ceiling Mounted Duct Type Fan Coil Unit

Option 2: Compact Slim Type Fan Coil Unit-Full Load Mode

Each apartment unit will be provided with multiple slim type fan coil units located above kitchen area serving living area and above wardrobes serving bedrooms and study areas. For each slim type fan coil unit, a minimum 450x450 access panel is required to provide access to FCUs for maintenance. A minimum 650mm deep bulkhead is required to allow 150mm clearance for return air path to the rear of the FCU, as slim type fan coil units are all 450mm deep. A minimum 400mm clear height ceiling space is required to accommodate the FCU, condensate drainage and ductwork. Each living room and bedroom will be provided with a local wall mounted controller for individual temperature control. See image below for details:



Compact Slim Type Fan Coil Unit

System	Advantages	Disadvantages
Option 1 -Ceiling Mounted Ducted Type Fan Coil Unit	• Less capital cost for 2 or more bedrooms apartments. • Enable day/night mode, the condenser load can be sized based on the max cooling load of living areas or the combined cooling loads of all bedroom areas, meaning a smaller condenser unit can be installed. • Improved acoustics, fan noise is attenuated through ductwork and bends	• Low ceiling area need to be large enough to place FCU. • Low ceiling area need to be continuous for reticulation of rigid and flexible ductwork from kitchen area to bedroom wardrobes, as both living area and bedrooms are served with one FCU only. • No flexibility to provide AC coverage to all areas as the system is served by 1 off FCU and the control is based on day/night mode. Living area and bedrooms cannot be air conditioned at 100% load concurrently.
Option 2 - Compact Slim Type Fan Coil Unit	• This option Minimises low ceiling areas (2.4m ceiling) as no ductwork is required to be provided to each FCU for supply and return air. • Ease of buildability. No rigid ductwork or flexible ductwork needed to be installed, meaning a much lesser chance for clashing	• For 2 or more bedrooms apartments, the cost for installing multiple slim type fan coil units will be higher. • Potential acoustic issue. Compact slim type fan coil unit may create noise issues as there is no acoustic lining ductwork allowed to attenuate noise for this option.

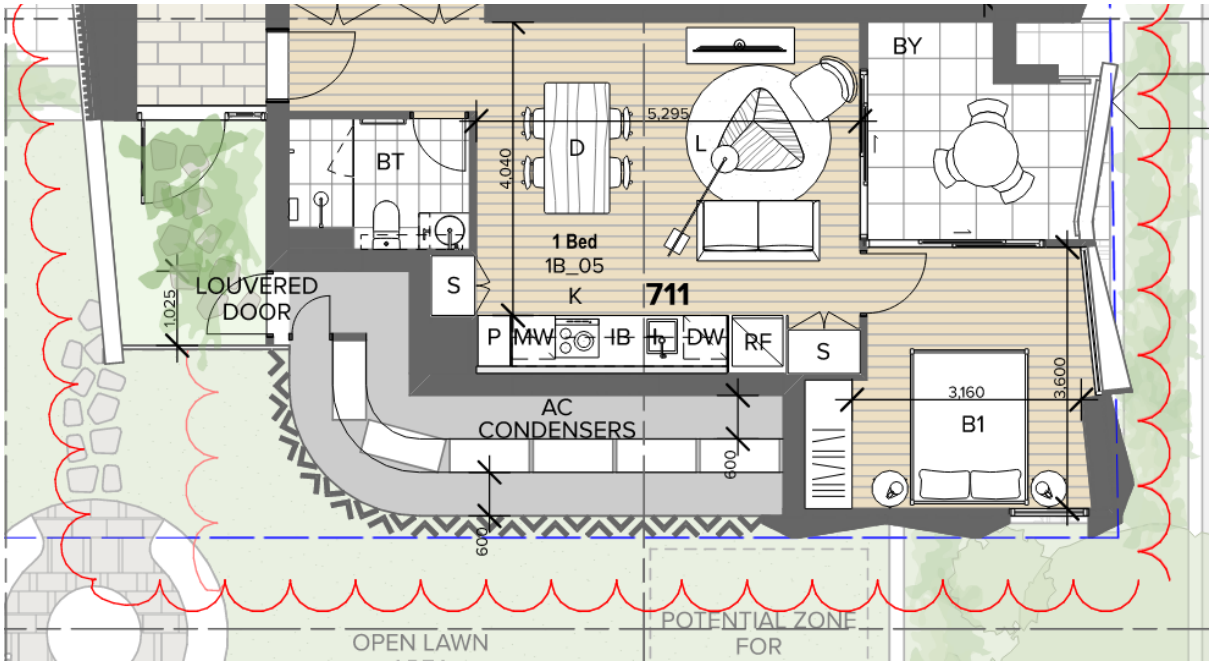
	between services during construction phase. This can potentially reduce construction cost and period • AC zone is provided with a wall mounted controller and therefore, each zone can be provided with different set point temperature (heating OR cooling only).	• Slightly higher capital cost

A decision was made to proceed with on floor plant room for both residential apartment and retail& commercials. Refer to ME-MEMO-002-AC option for options we have offered. See below section regarding the outdoor condenser plant proposal.

1.4.2 Apartment and GYM area Heat Rejection Plant Arrangement

On floor plant room located on each residential level

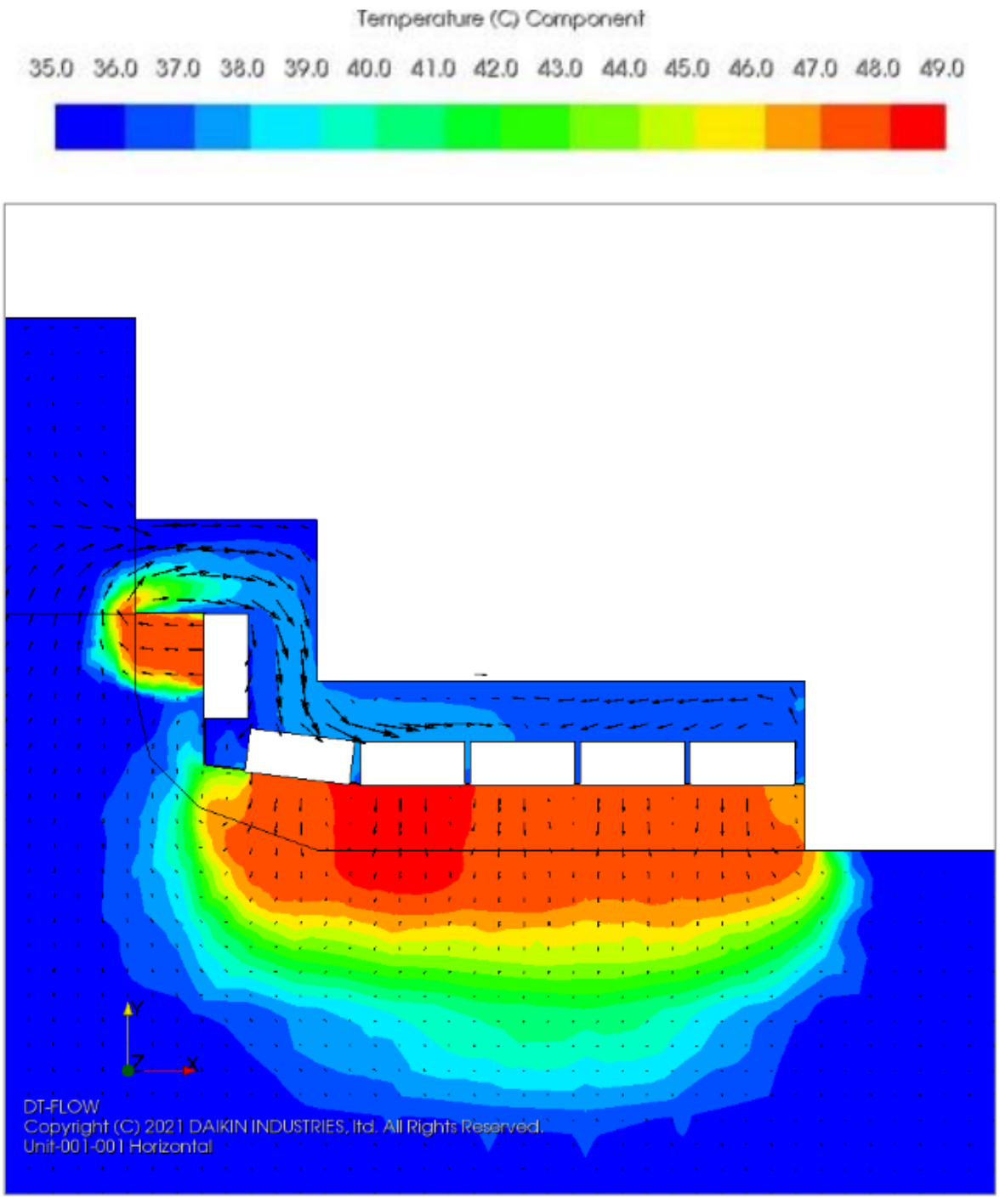
Condensers for each residential apartment and residential Gym area will be located on designated plant room on each level as shown below. The condensers will be double-stacked allowing a maximum of 11 condensers on one level, with a dedicated exhaust plenum built at the front for separation of intake air and exhaust air. In addition, full height louvre will be provided in front of condenser plant for discharge hot air into atmosphere and the make up air to the plant room will be via a louvered door.



A CFD analysis was performed by AC supplier Daikin and the results indicate that the inlet temperature and outlet temperature are within acceptable range.

4 SIMULATION

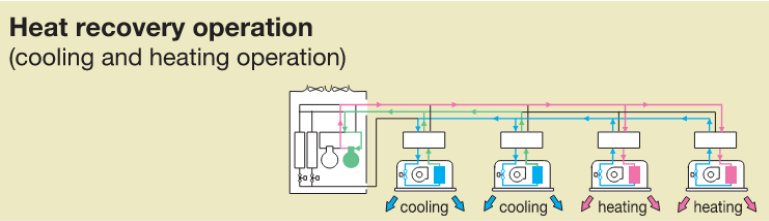
A simulation was performed on the layout proposed with all units operating at 100% load in cooling at an ambient temperature of 35°C.



4-1 – Horizontal Section Lower Tier (Level 5)

1.4.3 Commercials/Retails Heat Rejection Plant Arrangement

All other areas, including retails. Café/restaurant and commercials will be provided with VRV-heat recovery with on floor outdoor condenser plant located from level 1 to level 4. The physical size for each condenser is at 1657mmx930~1240mmx765mm (HxWxD) and the overall plant size is detailed in the combined spatial sketch. Each VRV heat recovery system consists of 1 off condenser, multiple indoor fan coil units, branch boxes, and refrigerant pipework. The VRV heat recovery enables the simultaneous operation of cooling and heating by controlling the branch box units that switch cooling and heating, which also substantially improves energy efficiency by recycling waste heat. (See figure below)



Typical Centralised VRV Heat Recovery System

1.4.4 Parcel Room, Admin & Comms Room Heat Rejection Plant Arrangement

Parcel room, admin and comms room air conditioning outdoor unit will be located at carpark level, as each condenser is side discharge type and the heat rejection air flow is small in general.

1.5 Ventilation Scope of Work

Ventilation

Ventilation shall be provided to the following areas:

- Residential living rooms and bedrooms
- Residential bathrooms
- Residential laundries
- Residential kitchen rangehoods
- Communal space/Gym
- Residential recycle bin rooms
- Garbage chute shafts and basement garbage rooms
- F&B commercial kitchens
- Common toilet areas
- Car park
- Loading dock
- Fire pump room
- Generator room

- Retail/lift lobbies
- Storage & plant room
- Grease arrester
- Main switch room
- FCR/substation
- Lift Shaft
- Retails/Commercials

Residential outside air system to living room and bedroom

Outside air ventilation to living rooms and bedrooms can via the following three proposed options

- Operable windows - Natural ventilation; or
- Outside air fans (ducted to air conditioning units FCUs) – Mechanical ventilation; or
- Heat recovery ventilation units – Mechanical ventilation.

Stantec has issued a technical memo (ME-MEMO_001 ventilation in residential buildings dated 30/03/2021) detailing the options for mechanical exhaust air, outside air and make up air to each apartment.

Residential Toilet and Laundry Exhaust

Mechanical exhaust ductwork will be provided to serve residential kitchen rangehood. The system consists of weatherproof louvre, ductwork, duct fitting. Exhaust fans will be provided to serve all apartment toilets and laundry via multiple exhaust systems. Each system will discharge horizontally to the façade via low profile duct. 150mm clearance will be required between exhaust fan location and discharge point to allow low profile duct to pass through.

Façade louvre discharge arrangement will need to be coordinated with architect and façade engineer to ensure sufficient discharge louvre area and connection height is provided. Depending on the nature of the façade system and window head, pelmet bulkhead may be required to accommodate exhaust plenum. Blind pelmets will not be utilised at the location of the discharge louvre.

Make up air to both toilet and laundry will be via doors undercut. Condensing dryers only are to be utilised for all the apartments.

Exhaust fans for toilets are to be interlocked with lighting circuit.

Exhaust fans for laundry are to be interlocked with dryer and a 5mins run on timer is applied after use.

Residential Kitchen Rangehood Exhaust

Kitchen range hood complete with fan and non-return damper and speed control will discharge horizontally to the façade. The supply of kitchen range hood is to be provided by other trade. Mechanical contractor is to supply exhaust ductwork connection from kitchen range hood to louvre discharge.

Façade louvre discharge arrangement will need to be coordinated with architect and façade engineer to ensure sufficient discharge louvre area and connection height is provided. Depending on the nature of the façade system and window head, pelmet bulkhead may be required to accommodate exhaust plenum. Blind pelmets will not be utilised at the location of the discharge louvre.

Residential Lobbies

Lobbies are to be naturally ventilated via openable windows if possible. If the minimum 5% free area on window opening cannot be met, the designated lobby will be ventilated via mechanical supply fan system from horizontal façade.

Residential communal space/Gym

Residential communal space/Gym will be provided with mechanical outside system connecting to each FCU it is serving. The intake louvre will be located at high level of communal space/Gym area. Mechanical outside air system will be interlock with associated FCU during operation.

Residential Recycle Bin Rooms, Garbage Chute Shafts and Basement Garbage Rooms

Basement garbage rooms and garbage chute will be ventilated via mechanical exhaust systems to roof. Roof mounted fans shall be provided above exhaust riser. Exhaust fan to be controlled via a weekly schedule that is initially set at 24/7 and can be user-adjusted to suit.

Residential recycle bin rooms on each level will be ventilated by a centralised exhaust system with vertical shaft that is located adjacent to bin rooms. Ventilation fan will be located on roof level and controlled via a weekly schedule that is initially set at 24/7 and can be user-adjusted to suit.

F&B Commercial Kitchens

Each commercial kitchen rangehood within each F&B will require dedicated kitchen exhaust system that reticulates into vertical fire rated shaft and discharge vertically. Make up air to each kitchen area is via high level façade louvre.

Currently we have allowed for the following design parameter for the project:

- Retail 1A: 1 off kitchen exhaust, 3000L/s
- Retail 1B: 1 off kitchen exhaust, 3000L/s
- Retail 1C: 1 off kitchen exhaust, 3500L/s
- Retail 2: 1 off kitchen exhaust, 3000L/s
- Retail 3: 1 off kitchen exhaust, 2000L/s
-

Common Toilet Areas

Common toilet area serving retail level from basement level to ground floor level will be provided with centralised toilet exhaust riser to discharge vertically. Exhaust fan to be controlled via a weekly schedule that is initially set at 24/7 and can be user-adjusted to suit.

Common toilet area serving commercial level from level 1 to level 4 will be provided with façade louvre at high level for each level. Exhaust fan to be controlled via a weekly schedule that is initially set at 7am – 7pm and can be user-adjustable to suit.

Carpark

Basement carparks will be ventilated by mechanical exhaust system and supply system.

The carpark exhaust and supply fan will be in dedicated fan plant rooms on basement level prior to rise through vertical shaft prior to discharge to / intake from atmosphere.

CO monitoring system will be provided for the carpark ventilation system.

Car park ventilation requirements calculated based on AS 1668.2 (2012).

Loading Dock

Loading dock located on ground floor will be naturally ventilated via roller door, as the rear of the docked vehicle is within 10m distance from the vehicle entrance opening in an external wall as per AS1668.2

Fire Pump Room

Fire pump room will be ventilated by mechanical supply and exhaust system as shown in combined spatial sketch. Both the supply and exhaust fan serving diesel pumps within the fire pump room will require interlock control.

Fire Control Room

Fire control room is to be ventilated by the following two options as stipulated in the NCC 2019:

- natural ventilation from a window or doorway in an external wall of the building which opens directly into the fire control room from a road or open space.
- A pressurization system that only serves the fire control rooms as per AS/NZS 1668.1.

Stantec recommends the fire control room to be located on ground floor and provided with natural ventilation.

Generator Room

General room is to be ventilated by mechanical supply and exhaust system as shown in combined spatial sketch. Both the supply and exhaust fan serving generator will require interlock control.

Retail/Lift Lobbies

Each retail/lift lobby is proposed to be provided with mechanical supply air fan system and the intake is preferred to be from ground floor level. Supply fan to be controlled via a weekly time schedule that is initially set at 24/7 and can be user-adjusted to suit.

Storage & Plant Room

Both storage and plant room will be ventilated via mechanical supply system from ground level. In addition, relief air shall be provided to each room by means of wall mounted grilles. Supply fan to be controlled via a weekly time schedule that is initially set at 24/7 and can be user-adjusted to suit.

Grease Arrester

Grease Arrester will be ventilated via mechanical exhaust system. Exhaust fan to be controlled via a weekly time schedule that is initially set at 24/7 and can be user-adjusted to suit.

Main Switch Room

Main Switch room will be ventilated via mechanical supply system from ground level. In addition, relief air shall be provided to switch room by means of door grille. Supply fan to be controlled via a weekly time schedule that is initially set at 24/7 and can be user-adjusted to suit.

FCR/Substation

Substation will be naturally ventilated/mechanical ventilated as per authority requirement

Lift Shaft

The NCC requires that the temperature in the lift shaft does not exceed 40oC. To meet this requirement, it is proposed to install high level grilles in each of the lift shafts.

Retails/Commercials

Retails/commercials will be provided with high level opening louvre for fresh air intake.

Additional Areas

Client to advise any other areas requiring mechanical ventilation if not already shown on the architectural drawings.

1.6 Smoke Hazard Management

Smoke Exhaust

Stantec understands smoke exhaust is not required for commercial areas. BCA consultant to confirm if there are any smoke exhaust requirements.

Stairwell Pressurisation

Stair pressurisation systems are required for stairwells for BCA DTS compliance in the following scenarios and will be provided accordingly:
- Where fire isolated stairs serve a building with an effective height of 25 metres or more
- Where fire isolated stairs serve three (3) or basement

3. Appendix 1 - Endeavour Energy Substation

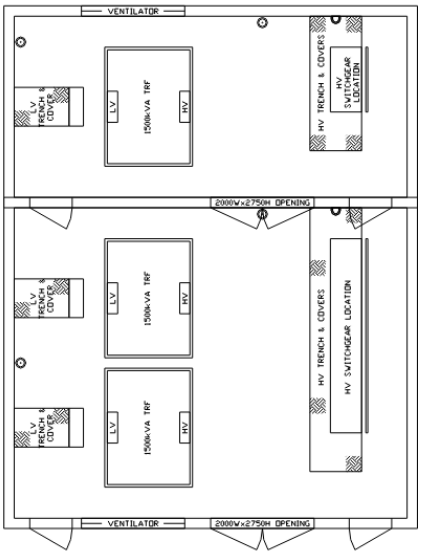


Figure 1:
Three (3) transformer substation

Figure 2:
Four (4) transformer substation

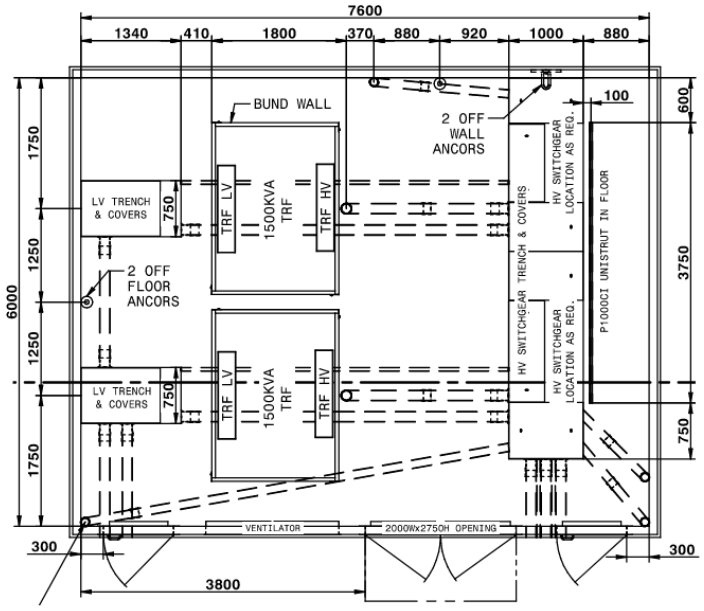


Figure 3 :
Two (2) transformer substation

Typical sizes for transformers and HV switchgear in one (1) room			
No. of transformers	Minimum internal room size, mm (approx.)		
	Width	Depth	Height
1	5700	4600	2700
2	6000	7600	2700
3 (Dry only)	8500	7600	2700
4 (Dry only)	11000	7600	2700

4. Appendix 2 – Sydney Water Pressure and Flow

Statement of Available Pressure and Flow

Sydney WATER

Catherine Jones
207 Pacific Highway
St Leonards, 2065

Attention: Catherine Jones Date: 26/04/2021

Pressure & Flow Application Number: 1094131
Your Pressure Inquiry Dated: 2021-03-19
Property Address: Elizabeth Street, Liverpool 2170

The expected maximum and minimum pressures available in the water main given below relate to modelled existing demand conditions, either with or without extra flows for emergency fire fighting, and are not to be construed as availability for normal domestic supply for any proposed development.

ASSUMED CONNECTION DETAILS

Street Name: Elizabeth Street	Side of Street: South
Distance & Direction from Nearest Cross Street	20 metres East from George Street
Approximate Ground Level (AHD):	14 metres
Nominal Size of Water Main (DN):	150 mm

EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	51 metre head
Minimum Pressure	39 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	39
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5 10 15 20 26 30 40 50	41 41 41 40 40 40 39 38
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main) Maximum Permissible Flow	5 10 15 20 26 30 40 50 67	39 39 39 39 38 38 37 36 34

(Please refer to reverse side for Notes)

For any further inquiries regarding this application please email :

swtapin@sydneywater.com.au

Sydney Water Corporation ABN 49 776 225 038
1 Smith St Parramatta 2150 | PO Box 399 Parramatta 2124 | DX 14 Sydney | T 13 20 92 | www.sydneywater.com.au
Delivering essential and sustainable water services for the benefit of the community

Design with
community in mind

Level 6, Building B
207 Pacific Highway
St Leonards NSW 2065
Tel +61 2 8484 7000

For more information please visit
www.stantec.com

Stantec