goldfish&bay

Infrastructure Delivery, Management and Staging Plan Report

Project Details

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I Joseph Kong confirm this Services Design Intent Report addresses the requirement of SEAR 21 Infrastructure Requirements and Utilities requirements regarding sewer, potable water and natural gas. This report addresses relevant State and local legislation, policies, and guidelines including all Authorities listed in section 2.4 of this report. I further confirm that none of the information contained in the Services Design Intent Report is false or misleading.

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1 Introduction

1.1 GENERAL

This Infrastructure Delivery, Management and Staging Plan accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the *Environmental Planning and Assessment Act 1979* (EP&A Act), in support of a State Significant Development Application (SSDA) for the construction and operation of proposed mixed-use development, reference SSD-74670720.

This report addresses the Secretary's Environmental Assessment Requirements (SEARs) issued for the project, notably:

SEARs 21 Requirement	Section of Report where response is provided
Infrastructure Requirements and Utilities	3.2,3.3 and 3.5

1.2 PURPOSE

The Services Design Intent Report serves as a formal reference outlining the agreements between Goldfish and Bay and the Client and/or their representatives. This document encapsulates the commitments and understandings reached during the planning phase, ensuring all parties have a clear and consistent framework to follow. Our primary objective in developing the concept design is to provide value-added advice, focusing on value engineering, comprehensive assessment of authority service utilities, and enhancing constructability. By integrating these elements, we aim to deliver solutions that are both cost-effective and practical for implementation. This report strives to present a clear, concise, and coherent description of the scope of services to be designed. It is not meant to serve as a Specification or Bill of Materials, nor does it include detailed selections of the primary equipment. Rather, it offers a comprehensive overview of the services to be implemented within the building, ensuring that the end outcomes align with the client's expectations and requirements.

The intent of this document is to formalize and confirm the agreed-upon building services to be provided by Goldfish and Bay Service Engineers for this development. It stands as a testament to our commitment to delivering high-quality, efficient, and effective building services tailored to the development's needs.

This report will also provide hydraulic Infrastructure Requirements and Utilities in consultation with relevant service providers:

- assess the impacts of the development on existing utility infrastructure and service provider assets surrounding the site.
- identify any infrastructure required on-site and off-site to facilitate the development and any arrangements to ensure that the upgrades will be implemented on time and be maintained.
- provide an infrastructure delivery and staging plan, including a description of how infrastructure requirements would be coordinated, funded and delivered to facilitate the development

2 PROJECT BACKGROUND

The proposed development (**SSD-74670720**) is located on Gamaraygal Country, in the Metropolitan LALC and seeks approval to construct a shop top housing development that includes in-fill affordable housing, comprising the following:

- Site preparation works including demolition of existing structures, tree and vegetation clearing, and bulk earthworks;
- Anderson Street Building (Tower A) - Construction of a 31-storey shop-top housing development comprising:
  - 155 residential dwellings (including XX IAH apartments);
  - Private penthouse rooftop terraces; and
  - Top of podium (level 2) communal open space and amenities.
- McIntosh Street Building (Building B): Construction of a 21-storey shop-top housing development comprising:
  - 103 residential dwellings (including XX IAH apartments);
  - Private rooftop terraces; and
  - Top of podium (level 2) communal open space and amenities.
- Construction of a two-storey non-residential podium, with provision for commercial and retail uses, substation, lift core, lobbies and building services.
- Construction of a six-level basement with 434 carparking spaces comprising:
  - 313 residential spaces (including 17 accessible spaces);
  - 39 residential visitor spaces (including 1 accessible spaces);
  - 82 commercial and retail spaces (including 2 accessible spaces);
  - 29 motorcycle spaces; and
  - 37 bicycle spaces.
- Associated landscaping and public domain works, and
- Services and infrastructure improvements, as required.

2.1 Qualifications

All analyses conducted for this report are based on the premise of achieving a high level of seamless integration with the overall development.

Information regarding the existing infrastructure detailed within this report has been sourced from Dial-Before-You-Dig (DBYD), Utility Geographic Information Systems (GIS), provided survey documents from utility companies, which include:

- **Electricity Utility**: Ausgrid
- **Water Utility**: Sydney Water
- **Gas Utility**: Jemena

The electrical utility requirements for the development have been evaluated with the following considerations:

- **Assessment of Existing Utility Infrastructure and Assets**: The Accredited Service Provider level 3 is currently undertaking this assessment.
- **Coordination with Ausgrid**: It is advised to initiate early coordination with Ausgrid to facilitate the implementation of upgrades and new infrastructure in alignment with the current development program. Early engagement will assist in ensuring that all necessary adjustments and installations are planned and executed effectively.

All sewer and potable water connection works will be designed by WSC and approved by Sydney water prior to construction. The Hydraulic utility requirements for the development are mentioned in the hydraulic section of this report.

2.2 Authority Utilities

The table below are the Authority of utilities in this area of the proposed development. The below notification table was obtained through Before You Dig Australia portal.

Referral ID (Seq. no)	Authority Name	Phone	Status
252711749	Ausgrid	(02) 4951 0899	NOTIFIED
252711753	Jemena Gas North	1300 880 906	NOTIFIED
252711747	NBN Co NswAct	1800 687 626	NOTIFIED
252711750	Nextgen NCC - NSW	1800 262 663	NOTIFIED
252711755	Optus and or Uecomm Nsw	1800 505 777	NOTIFIED
252711752	Sydney Water	13 20 92	NOTIFIED
252711754	Telstra NSW Central	1800 653 935	NOTIFIED
252711751	TPG Telecom (NSW)	1800 786 306	NOTIFIED
252711748	Willoughby City Council	(02) 9777 1000	NOTIFIED

3 Hydraulic Services

3.1 STANDARDS AND CODES

The hydraulic assessment is based on the below relevant standards and codes

Referencing Document	Description
AS3500.1:2021	Plumbing and Drainage Part 1: Water Services
AS3500.2:2021	Plumbing and Drainage Part 2: Sanitary Plumbing and Drainage
AS3500.3:2021	Plumbing and Drainage Part 3: Stormwater Drainage
AS3500.4:2021	Plumbing and Drainage Part 4: Heated Water Services
AS5601:2022	Gas Installations
AS2441:2005	Installation of Fire Hose Reels
NCC 2022	National Construction Code
Sydney Water Regulations	
Jemena Network Operating Rules	
Willoughby City Council	
Fire & Rescue NSW	

3.2 SANITARY DRAINAGE

3.2.1 Required Development Load

The main reticulated sewer drainage line serving the development will be designed in accordance with AS/NZS 3500.2-2021 and preliminary proposed fixture unit calculations are as follows:

Area	Units	Fixture Units
Residential	258	5,160
Commercial	n/a	500
Subtotal sewer connection		**5,660**
225mm @ 1.45% Capacity		**5,810**

A network of sewer drainage systems will transfer sewerage waste from all levels of the proposed building to the nominated sewer connection. The following section will provide more detail on the existing mains that could service the development along with a preliminary sewer diversion concept by the Water Servicing Coordinator.

3.2.2 UTILITIES

As illustrated in Figure 1, the proposed site is currently bisected by an existing 150mm VC sewer main which will need to be diverted around the project site.

During the detailed design phase, it is crucial to coordinate with the Water Servicing Coordinator (WSC) to finalize the incoming sewer connection points. This coordination will ensure that the necessary adjustments are made to accommodate the proposed development. This practice cannot be conducted at this stage as the WSC will need to provide a full design for Sydney Water approval.

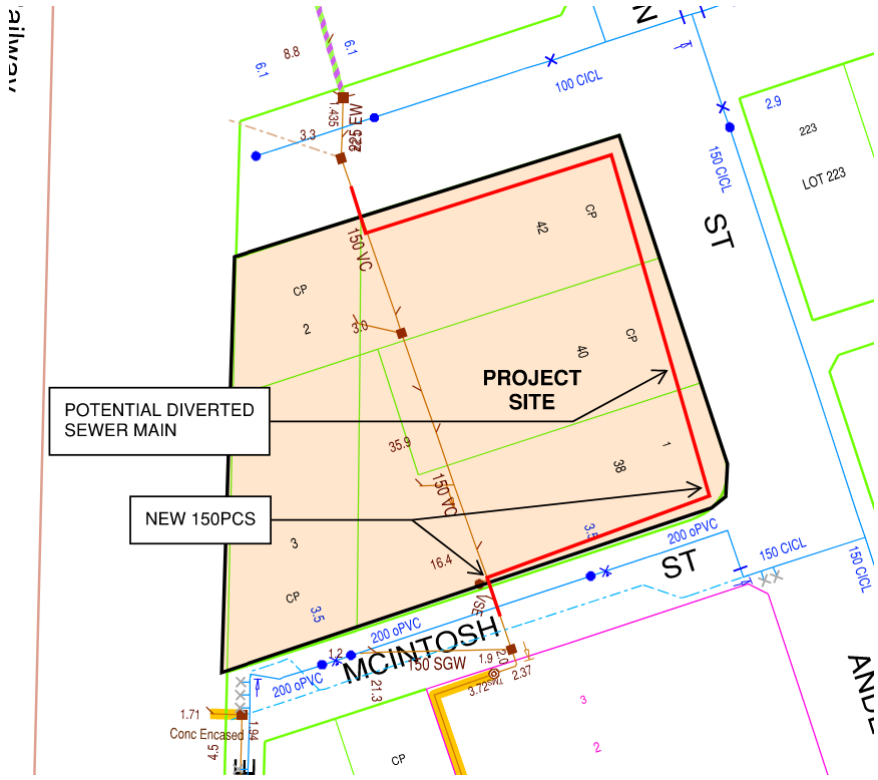

Figure 1 - Hydra Sewer Map (by Sydney Water)

Engaging a Water Servicing Coordinator (WSC) at the earliest opportunity is highly recommended. The WSC will provide a design proposal to Sydney Water for consideration, facilitating a streamlined approval process and ensuring the sewer infrastructure meets the requirements of the development.

Based on experience working with similar projects, the proposed diversion works and connections will be as follows:

- Works will include the diversion of the two 150mm sewer mains encroaching the property into a single sewer line and multiple 150mm connections will be provided for the development.

In summary, the existing sewer infrastructure should be able to cater for this development, subject to WSC assessment

3.2.3 RESIDENTIAL

All sanitary fixtures located within the residential buildings will direct wastewater to the new sewer connection point using pressure attenuator systems. These systems are essential for managing the flow and pressure of wastewater to ensure efficient and safe transport within the sewer network.

Pressure attenuator systems, help to regulate and control the pressure of wastewater as it moves from various sanitary fixtures to the main sewer line.

1. **Gravity Flow and Pressure Regulation**:
    - In residential buildings, wastewater from sanitary fixtures such as toilets, sinks, and showers generally flows downward by gravity to lower points within the plumbing system.
    - As wastewater collects and moves through the system, it can build up pressure, particularly in high-rise buildings or large complexes.
    - Pressure attenuators are installed at strategic points to reduce this pressure to a safe and manageable level before the wastewater enters the main sewer line. This prevents potential damage to the infrastructure caused by high-pressure surges.
2. **Flow Control and Consistency**:
    - Pressure attenuators ensure a consistent flow rate of wastewater, which is vital for the proper functioning of the sewer system.
    - By maintaining an even pressure, they help prevent issues such as backflow (where wastewater flows backward into the building) and ensure smooth transport of waste to the sewer connection point.
3. **Protection of Sewer Infrastructure**:
    - High-pressure wastewater can cause significant wear and tear on pipes and fittings, leading to leaks, bursts, and other maintenance issues.
    - Pressure attenuators absorb and dissipate excess pressure, thereby protecting the sewer infrastructure and extending its lifespan.
4. **Enhanced Wastewater Management**:
    - With pressure attenuator systems in place, the entire sewer system operates more efficiently. This leads to fewer blockages and reduces the need for frequent maintenance.
    - It also ensures that wastewater is effectively directed to the main sewer connection point without causing disruption or damage.

Implementation in Residential Buildings

In the context of residential buildings, the pressure attenuator systems are implemented as follows:

- **At Individual Fixtures**: Each sanitary fixture can be equipped with a pressure attenuator to regulate the pressure of wastewater as it enters the sewer pipes. This is especially useful in large or high-rise buildings where the pressure can vary significantly at different levels.
- **Main Sewer Lines**: Larger pressure attenuators are installed along the main sewer lines that collect wastewater from multiple fixtures. These attenuators ensure that the combined flow of wastewater from all fixtures is maintained at a consistent pressure level before it reaches the primary sewer connection point.

By employing pressure attenuator systems, the residential buildings ensure that all sanitary fixtures efficiently and safely direct wastewater to the new sewer connection point. This systematic approach not only enhances the reliability and longevity of the sewer infrastructure but also contributes to better overall wastewater management.

3.2.4 Retail

All sanitary fixtures within the retail areas will convey wastewater to the new sewer connection point via pressure attenuator systems, consistent with the residential system, as the entire building is served by a single sewer system.
Each tenancy will be provided with a capped Ø100mm sewer drainage point for future tenant extensions. These capped services will be situated at the rear of each tenancy and will discharge to the new sewer connection point.
Additionally, all retail tenancies will be equipped with a trade waste drainage provision, utilizing a Ø110mm HDPE connection. This connection will be strategically placed to cover 70% of the tenancy area, allowing for gravity discharge.
The scope of base building and integrated fit-out sewer drainage services must be confirmed with prospective tenants during the detailed design phase.

3.2.5 Commercial

All sanitary fixtures within the commercial areas will convey wastewater to the new sewer connection point via pressure attenuator systems, consistent with the residential system, as the entire building is served by a single sewer system.

Each tenancy will be provided with a capped Ø100mm sewer drainage point for future tenant extensions. These capped services will be situated at stacks that pass through the tenancy. Stacks are strategically located to allow for 80% coverage of that floor area.

The scope of base building and integrated fit-out sewer drainage services must be confirmed with prospective tenants during the detailed design phase.

3.2.6 Material

Piping System	Use / Location	Material	Nominal Pipe Size (mm)
Sewer Drainage	Below Ground	uPVC[1] Class DWV SCJ SN8	100 - 225
Sewer Drainage	Above Ground	uPVC[1] Class DWV SCJ SN4	100 - 150
Sanitary Plumbing	Above Ground	HDPE Electrofusion joints	40 - 100
Sewer Vent	Above Ground	uPVC[1] Class DWV SCJ SN4	40 - 100
Sewer Drainage/Plumbing	High temperature	HDPE Electrofusion joints	40 - 100
Sewer Rising main	Below/Above Ground	Class 12 Pressure PVC	50-65
[1] uPVC to comply with 'Best Practice Guidelines for PVC in the Built Environment'			

All materials are subject to change based on application and load requirements.

3.2.7 PLANT AND EQUIPMENT

All sanitary fixtures located within the residential buildings will direct wastewater to the new sewer connection point using pressure attenuator systems. These systems are essential for managing the flow and pressure of wastewater to ensure efficient and safe transport within the sewer network. All trade waste drainage will be pretreated using grease arrestor units as indicated in the below table.

System	Proposed Equipment
Sewer Pump Stations	Kwikflo polyethylene tank with with submersible macerator pumpset in duty/standby arrangement connected to BMS. Pumps will be located in ground for SID purposes.
Grease Arrestors	HALGAN™ MGTS™5000 GREASE TRAP

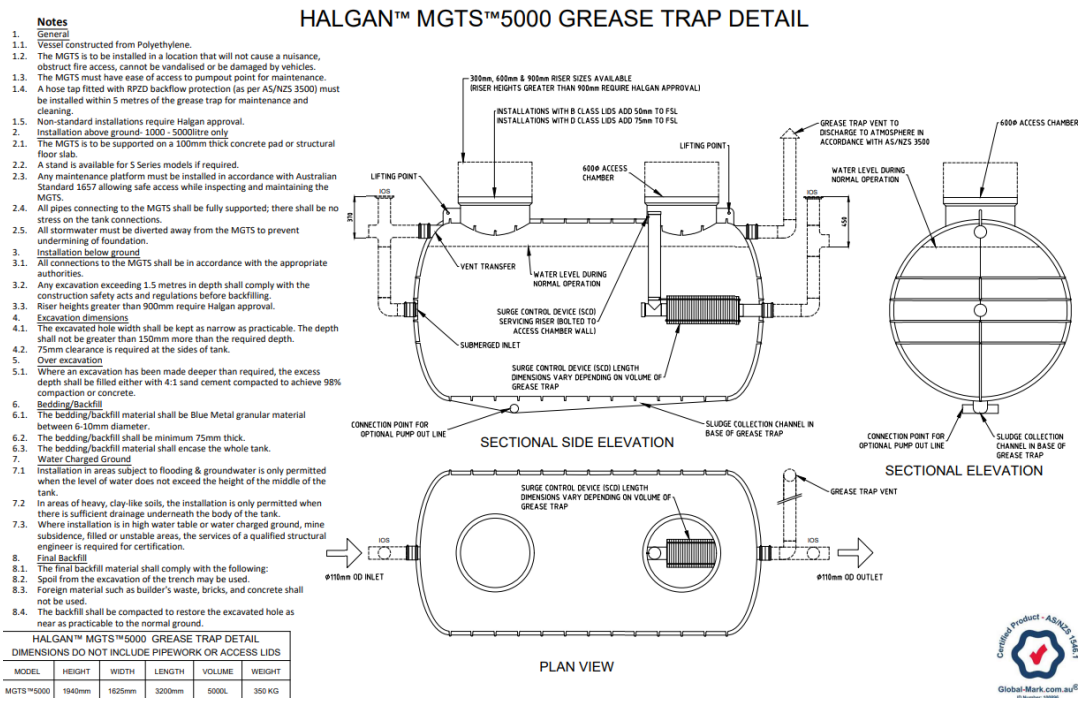

Figure 2- grease arrestor detail

3.3 POTABLE COLD-WATER SUPPLY

3.3.1 REQUIRED DEVELOPMENT LOAD

The main reticulated water supply serving the development will be designed in accordance with AS/NZS 3500.1-2021. The parameters for sizing cold water services have been determined utilizing the following criteria:

Location	Design Velocity	Maximum Velocity	Minimum Pressure	Maximum Pressure
In ground	2.4 m/s	3.0 m/s	250kPa	500kPa
Internal in walls and ceilings	1.6 m/s	3.0 m/s		

Potable cold-water services will be sized with adequate capacity to convey water supply to all fixtures and appliances. A preliminary assessment of the probable simultaneous flow rates has been calculated as follows:

Area	PFSR (L/s)	Pipe Size (mm)
Residential	15.1	100
Commercial	2.5	65

It is important to note all stratums' usage will be metered individually to provide accurate consumption figures for each. The stratums will have separate water supply grids to ensure undependability.

3.3.2 UTILITIES

As illustrated in Figure 3, it is proposed the site's potable water is serviced via a 150mm connection to the 200mm oPVC water main in McIntosh Street. We note there is also potential to connect to the 150mm CICL water main in Anderson Street. Final connection is to be confirmed via the Section 73 NOR.

During the detailed design phase, it is crucial to coordinate with the Water Servicing Coordinator (WSC) to finalize the incoming water connection point. This coordination will ensure that the necessary adjustments are made to accommodate the proposed development.

Engaging a Water Servicing Coordinator (WSC) at the earliest opportunity is highly recommended. The WSC will provide a design proposal to Sydney Water for consideration, facilitating a streamlined approval process and ensuring the water infrastructure meets the requirements of the development. This practice cannot be conducted at this stage as the WSC will need to provide a full design for Sydney Water approval.

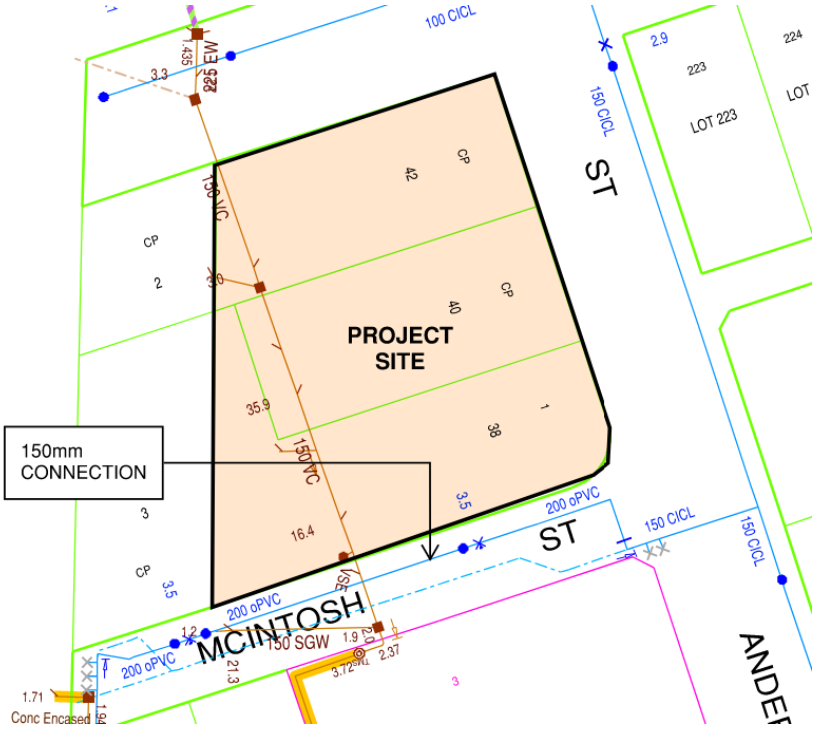

Figure 3 - Hydra Water Map (by Sydney Water)

In summary, the existing water supply infrastructure will be able to cater for this development.

In modern building developments, ensuring a reliable and adequate water supply is crucial for both residential and commercial applications. This involves not only connecting to the municipal water mains but also incorporating systems to manage and distribute water effectively within the building. Key components of this infrastructure include booster pump sets, pressure reduction valves, and strategically designed piping systems to meet varying pressure and flow requirements.

Given the limited pressure available from the incoming water service, it is essential to implement measures to ensure that both commercial and residential areas receive adequate water pressure. This will be achieved through the installation of variable speed pump sets, which will boost the pressure of the incoming water supply to meet the minimum pressure requirements specified in the project brief.

To prevent excessive pressure at lower levels, which can cause damage to fixtures and plumbing systems, pressure reduction valves (PRVs) will be installed. These valves will ensure that the pressure does not exceed 500 kPa at any fixture, thereby safeguarding the plumbing infrastructure and maintaining operational efficiency.

3.3.3 Residential

In high-rise residential developments, ensuring a reliable and efficient potable water supply system is crucial due to the increased demand and complexity associated with building height. Modern water service systems often employ a combination of direct boosting and transfer pumping to maintain consistent water pressure and quality across all levels of the building.

The cold-water system in the building from the basement up to roof level. Water is directly boosted from the town's main supply using triplex booster pumps. These pumps are designed to handle the demand and pressure requirements of the lower levels, ensuring consistent water delivery to all fixtures.

The design of water service systems in high-rise buildings is governed by principles of hydraulic engineering and fluid dynamics. Key considerations include maintaining adequate pressure, preventing backflow, and ensuring redundancy to avoid service disruptions. Break tanks are commonly used in high-rise buildings to provide a buffer and ensure stable water pressure throughout the system. The use of booster pumps allows for efficient water distribution without the need for excessively high pressure at the source, which could lead to pipe damage or leaks.

3.3.4 Retail

Potable water supply to the retail tenancies will be sourced from the main stratum meter provided by the relevant authorities. This supply will be extended to each tenancy through individual submeters, which will be installed in meter cupboards situated in common areas throughout the building.

For future connections, each tenancy will be equipped with a capped potable water outlet, located at a high level in the back-of-house area. These outlets will be fitted with isolation valves to facilitate easy and secure connection when needed.

3.3.5 COMMERCIAL

Potable water supply to the commercial tenancies will be sourced from the main stratum meter provided by the relevant authorities. This supply will be extended to each tenancy through individual submeters, which will be installed in meter cupboards situated in common areas throughout the building.

For future connections, each tenancy will be equipped with a capped potable water outlet, located at a high level in the back-of-house area. These outlets will be fitted with isolation valves to facilitate easy and secure connection when needed.

3.3.6 MATERIAL

Piping System	Use / Location	Material
Water Supply	Incoming Supply	MDPE Blue Stripe PN16
Cold Water	Below Ground	MDPE Blue Stripe PN16
Cold Water	Above Ground	Type A & B copper Tube Grade 316 stainless steel
Cold Water	Above Ground	Peroxide cross linked polyethylene with compression sleeve connections for roughin pipework
Reuse Water	Below Ground	MDPE Lilac Stripe PN16
Reuse Water	Above Ground	Type B copper Tube
Reuse Water	Above Ground	Peroxide cross linked polyethylene with compression sleeve connections for roughin pipework

All materials are subject to change based on application and load requirements.

3.3.7 PLANT AND EQUIPMENT

Stratum	Title	Description/ Performance
Non-Residential	Supply Pumps	variable speed booster pumps complete with control panel and pressure vessel
Residential	Supply Pumps	variable speed booster pumps complete with control panel and pressure vessel

3.4 POTABLE HOT WATER SUPPLY

3.4.1 REQUIRED DEVELOPMENT LOAD

The main reticulated hot water supply serving the development will be designed in accordance with AS/NZS 3500.4-2021. The parameters for sizing hot water services will be determined utilizing the following criteria:

Pipework	Design Velocity	Maximum Velocity	Minimum Pressure	Maximum Pressure
Hot water service	1.2 m/s	3.0 m/s	250kPa	500kPa
Circulating pipework	1.0 m/s	1.2 m/s		

Potable hot water services have been sized with adequate capacity to convey water supply to all fixtures and appliances.

Typically, the loading unit method of calculated has been utilized from AS3500.1-2021.

Dead legs will be minimized and the industry standard of maximum of 30 seconds will be targeted, and we intend to minimize deadlegs further with implementing the Comet product by Meteorite which will be further developed in detailed design. This system will deliver hot water within 10 sec. Pressure reduction valves will be supplied adjacent to ensure 500kPa is not exceeded at any fixture along with the cold-water services.

3.4.2 RESIDENTIAL HOT WATER SYSTEM OPTIONS

Option 1 will be the use of heat pumps as a centralized hot water plant located on the roof of each tower.

Figure 4- Typical heat pump set up

Option 2 will be the use of gas fired storage tanks as a centralized hotwater plant located on the roof of each tower.

Figure 5 - typical gas hot water plant

Metering of hot water will be provided for each unit in the lobby areas via meter cupboards and supplied by the embedded network provider.

Fixture outlet temperatures shall be provided in accordance with the following table:

Area	Fixture Outlet	Temperature Set
Accessible amenities	Wash basins, baths and showers	43.5℃
BOH areas	Dirty utilities cleaner sink, dispensers	60℃
Ablution fixtures	Wash basins, baths, showers, sink, laundry tub	50℃

Temperature control for all fixtures at 43.5℃ will be provided via thermostatic mixing valves located in recessed wall boxes located at 1500mm AFFL and tempering valves for all fixtures requiring tempering to 50℃.
Potable hot-water services will be sized with adequate capacity to convey water supply to all fixtures and appliances.

It is important to note all stratums' usage will be metered individually to provide accurate consumption figures for each. The stratums will have separate water supply grids to ensure undependability.

3.4.3 RETAIL

No potable hot water will be provided to the individual retail tenancies by the base building infrastructure. Each retail tenant is responsible for supplying and installing their own hot water units as part of their fit-out works. Typically, this will involve the installation of an electric hot water storage tank.

All common areas amenities for the commercial section of the development will be provided with electric instantaneous units (Stiebel Eltron) provided at the amenity's areas accordingly.

3.4.4 COMMERCIAL

No potable hot water will be provided to the individual commercial tenancies by the base building infrastructure. Each retail tenant is responsible for supplying and installing their own hot water units as part of their fit-out works. Typically, this will involve the installation of an electric hot water storage tank.

All common areas amenities for the commercial section of the development will be provided with electric instantaneous units (Stiebel Eltron) provided at the amenity's areas accordingly. Figure 6 is an illustration of the proposed instantaneous device.

Figure 6 - Stiebel Eltron electric instantaneous heater (can be located in hidden areas)

3.4.5 MATERIAL

Piping System	Use / Location	Material
Hot Water	Above Ground	Type B copper Tube/ stainless steel 316
Hot Water	Above Ground	Peroxide cross linked polyethylene with compression sleeve connections for roughing pipework

All materials are subject to change based on application and load requirements.

3.4.6 Plant and Equipment

Area	Title	Description/ Performance	Selected Item
Residential Stratums	Hot Water Plant- Apartments Option 1	External Heat Pump System	Rheem heat pump air to water
	Hot Water Plant- Apartments Option 2	External/ Internal gas fired hot water plant	Rheem Tankpak Series, complete with Storage Cylinders
	Secondary Hot Water Circulating Pumps	Secondary circulating system to maintain +- 5°C within loop.	Dual Grundfos UPS 32-80B (Duty & Stand-by), complete with control panel.
	Tempering Valves	Regulate temperature to all Sanitary fixtures	Caleffi series 5213
Commercial Office	Accessible WC & Parents Room	Instantaneous electric 3 phase hot water unit	Stiebel Eltron DHE 27 AU
Retail	n/a	n/a	n/a
Carpark	Garbage Rooms	electric hot water storage tank	Electric Rheem 50L

3.5 NATURAL GAS

3.5.1 Required Development Load

Gas services will be sized with adequate capacity to convey gas supply to all connected appliances. The pipe sizing methods from AS5601 – 2022 will be used. Gas service pipework will be sized using the following parameters:

Pipework	Operating pressure
Residential	2.75 KPa
Non-Residential	5 KPa

It is important to note all stratums' usage will be metered individually to provide accurate consumption figures for each. The stratums will have separate gas grids to ensure undependability.

3.5.2 Utilities

As illustrated in Figure 12, the proposed site is surrounded by the following gas mains:

- A 75 NY 210 kPa gas main located in Queens Road, which could serve as a potential connection point for the North Precinct. The site is currently connected to this main. A gas disconnection application will be required prior to demolition work.
- A 100 ST 1050 kPa gas main located in William Street, which could serve as a potential connection point for the North and South Precinct subject to Jemena Approval. An isolated service which formally service this site is located incoming from the high pressure main (this might be used for a future connection)
- A 110 NY 7 kPa gas main located in Parramatta Road. The existing main is unlikely to be utilized due to its insufficient pressure capacity. The current infrastructure is incapable of handling the increased load demands imposed by the new development. As a result, an alternative solution will need to be considered to ensure adequate pressure and reliability for the project's requirements.

The embedded networks provider will need to apply for a "complex works" application to obtain formal approval to connect from Jemena (Gas Authority)

In summary, the existing gas supply infrastructure will be able to cater for this development subject to Jemena approval

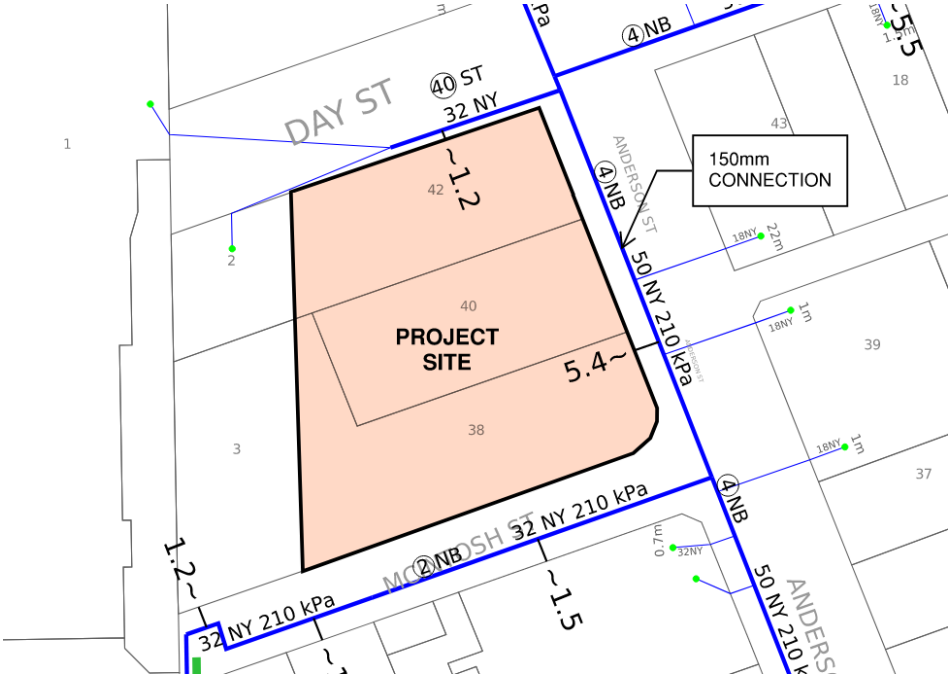

Figure 7- Gas Infrastructure map (by Jemena)

3.5.3 Residential Hot water System Options

The residential stratums will be serviced through a shared "Embedded Network" arrangement. This system includes a Volumetric Boundary Meter equipped with an outlet regulator designed to maintain an outlet pressure of 2.75 kPa. The low-pressure gas supply from the regulator outlet will then be distributed as follows:

- Centralized Domestic Hot Water Plants: The low-pressure supply will connect to the inlets of four centralized domestic hot water plants. Each of these plants will be equipped with a private sub-meter to monitor individual consumption.
- Apartment Isolation Valves (individual): The low-pressure supply will also extend to individual apartment isolation valves, which will be strategically located in the corridors on each apartment floor. Within each apartment, gas usage will be restricted to gas cooktops only.

This configuration ensures efficient and regulated gas distribution to both the centralized hot water plants and individual apartment units, providing precise control and monitoring of gas consumption.

3.5.4 Retail

Natural gas supply for the retail tenancies will be extended directly from the boundary regulator to within each tenancy, where it will be capped for future connection by the tenant. This extension will be unmetered at the point of delivery to the tenancies. However, meter spacers will be provided in common area meter cupboards for future installation. A dedicated gas line will also be used to feed the mechanical heater boilers required for space heating.

Each gas connection point will be designed to supply a capacity of 800 MJ/hr to meet the needs of the tenancy.

3.5.5 Commercial

Commercial tenancies will not be supplied with a gas provision.

3.5.6 Material

The following schedule specifies the minimum requirement for gas pipework materials.

Location	Material
Reticulated pipework and fittings (above ground)	Type B Copper & Peroxide cross linked polyethylene with compression sleeve connections for roughing pipework
Reticulated pipework and fittings (in ground)	Polyethylene PN20 pipe with electro fusion joints

4 Fire Services

4.1 STANDARDS AND CODES

The fire assessment is based on the below relevant standards and codes.

Referencing Document	Description
National Construction Code (NCC) – 2022	
AS 2118.1-2017	Automatic Fire Sprinklers Systems – General systems incorporating amendment 1 and 2 (Ref. NCC Clause Specification 17)
AS 2419.1-2021	Fire Hydrant Installations – System design, installation, and commissioning (Ref. NCC E1D2)
AS 2118.6-2012	Automatic fire sprinkler systems – Combined sprinkler and hydrant systems (Ref. NCC Clause: E1D4 & Specification 17)
AS 2941 – 2013	Fixed Fire Protections – Pumpset Systems
AS 2444-2001	Portable Fire Extinguishers and Fire Blankets – Selection and location (Ref. NCC Clause E1D14)
AS 1670.1-2018	Smoke Detection, Warning, Control, and Intercom Systems incorporating amendment 1(Ref. NCC Clause Specification 20, S20C4 & S20C5)
AS 1670.4-2018	Emergency Warning and Intercom Systems incorporating amendment 1 (Ref. NCC Clause E4D9)
NSW Service and Installation Rules	
Work Cover Authority requirements;	
Local Council regulations having jurisdiction on this project;	
Requirements of the NSW Fire Brigade via FEBQ and FER reports	
Principals Project Requirements (PPR)	

4.1.1 Proposed Fire Systems

The installation of a Combined Fire Hydrant and Fire Sprinkler system is proposed for each precinct, as depicted in figure 13. This system will comply with AS 2118.6:2012, AS 2419-2021, and AS 2118.1-2017 standards.

A new combined system fire brigade booster assembly will be installed in a dedicated cupboard within the building façade at each precinct. This booster will be positioned for easy access by the fire brigade and will be located no more than 10 meters from a truck hardstand. The booster assembly will include a compliant double check valve (backflow prevention device) as the fire truck will draw water from the proposed Water Mains. The assembly will consist of a 4-point feed hydrant arrangement (each hydrant operating at 12.5 L/s) and three 4-point booster connection standpipes to pressurize the precinct's three pressure zones.

This booster assembly's arrangement and location will be part of a performance solution prepared by a Fire Safety Engineer, based on the following considerations: (a) the location of the booster assembly against the façade of a development with multiple buildings and entry points, and (b) the availability of a Class 3 or Aerial Pumper from FRNSW, capable of utilizing a 4-point booster assembly operating at 12.5 L/s per feed/boost point.

The primary water source for the fire systems will be a compartment fire water storage tank, installed in the basement level of each precinct. These tanks will be sized to hold the primary sprinkler supply (18 operating

sprinkler heads) and at least 36 kL of fire hydrant water supply. The preliminary calculated size of the primary fire water tank will be 88 kL, subject to the water main connections being able to provide 45 L/s.

The fire water tank will feature an automatic infill from the water main, with an infill rate of 45 L/s during fire system operation. This infill will ensure the provision of hydrant water for 4 hours and sprinkler water for 1 hour.

Adjacent to the tank, the fire services pump room will be accessible via a dedicated stairway from the ground floor. This pump room will house the multi-outlet diesel pumps (two required for the combined system), the electric jockey pump, pressure reducing valves, and the pump test pit.

4.1.2 Utilities

Refer to section 3.3.2 for existing water utilities.

4.1.3 Automatic Fire Sprinkler Component

An Automatic Fire Sprinkler System will be installed throughout the development in compliance with AS 2118.1-2017 standards. The hazard classification will vary across different areas: majority of the residential and commercial spaces will be classified as Light Hazard, plant rooms and storage areas will be classified as Ordinary Hazard 1, carpark areas as Ordinary Hazard 2, and retail areas as Ordinary Hazard 3. An addition of wall wetting sprinklers may be required as part for fire engineer solutions the total water flow for wall wetting sprinklers will be confirmed during the detailed design stage of the project.

The sprinkler system will require a water supply with a demand of 18 L/s, sourced from a water storage tank proposed to be installed in the basement. The hazard classifications for different areas are as follows:

Occupancy	Hazard Class	Assumed Area of Operation
Commercial	Light Hazard	6 heads
Residential	Light Hazard	4 Residential Heads
Car park	Ordinary Hazard 2	12 heads
Retail	Ordinary Hazard 3	18 heads
Plant Spaces	Ordinary Hazard 1	6 heads

A combined Fire Hydrant/Sprinkler system will feature a 150 mm diameter main pipe that will run through each fire stair of the building. Typically, in each building's fire stair, a sprinkler alarm valve assembly will be connected to this main riser on each level. From these alarm valves, sprinkler distribution pipes will branch out and extend throughout the building. Isolation valves will be installed to minimise service disruptions during tests or alterations. Sprinkler heads will utilize the latest fast/quick response technology.

The sprinkler distribution pipes, branching from the alarm valves, will supply water to both concealed space and ceiling-mounted sprinkler heads, ensuring comprehensive coverage throughout the building.

4.1.4 Sprinkler Control Valve Assemblies

Sprinkler control assemblies will be strategically positioned on each floor within a common, fire-rated exit as stipulated by AS 2118.6. In buildings equipped with scissor stairs, valve assemblies will be installed in a manner that ensures all alarm valves are accessible from a single fire stair core.

The sprinkler control valve assembly will include all necessary components for system functionality, which must include, but are not limited to:

- Main Stop Valve: A butterfly valve with either a flange or roll-grooved connection, equipped with a handwheel and designed for right-handed operation.
- A connection to the fire indicator panel.
- An arrangement of flow switch and solenoid valve with a system test drain.
- Installation pressure gauges.
- A block plan.
- Emergency instructions.
- A location plate.
- A prominently placed notice above the main stop valve that details the installation and the area served by it.

Each flow switch will be individually wired to the Fire Indicator Panel under separate alarm zone facilities, in line with AS 1670.1. These specific alarm zones will trigger the Gas Guards (installed by the hydraulic trade) to cut off the gas supply to the building in the event of sprinkler activation.

4.1.5 Fire Hydrant Component

The fire hydrant system throughout the building will adhere to the requirements of AS 2419.1:2021 and AS 2118.6:2012 standards. The primary locations for hydrants will be within fire-isolated stairwells to ensure they are protected and accessible during an emergency. However, where the coverage provided by these stairwell hydrants is insufficient to fully cover a specific area, additional hydrants will be strategically installed.

These supplementary hydrants will be placed in specially constructed fire service cupboards located in accessible and visible areas to ensure quick and easy access by the fire brigade and building occupants. The placement of these additional hydrants will follow specific guidelines: they will be positioned within 4 meters of a required exit or within 25 meters of a fire hydrant located within a fire stairwell. This strategic placement ensures comprehensive coverage and quick access in case of an emergency.

The hydrant system will include all necessary components to ensure full functionality and compliance with the standards, including:

- Fire hydrant outlets located in accessible areas for easy operation by fire brigade personnel.
- Signage and indicators to clearly mark the location and operational instructions for each hydrant.
- Appropriate protective enclosures and cabinets to safeguard the hydrants while ensuring they remain readily accessible.
- Integration with the building's fire safety systems to ensure coordination and efficiency during emergency responses.

4.1.6 Fire Hydrant Parameters

Application	Criteria
Operating pressures at fixture outlets.	Minimum - 700kpa Maximum – 1200kpa
Operating Velocities through pipework.	Maximum – 4m/sec
Minimum number of Hydrants to operate simultaneously	3
Minimum operating flow rate	30L/s

4.1.7 Smoke Detection System

A smoke detection and alarm system will be installed in accordance with the National Construction Code (NCC) and AS 1670.1-2018 Amendment 1. This system will be an automatic, fully addressable fire detection and alarm system, controlled and monitored by a Main Fire Indicator Panel (MFIP) located in the Fire Control Room of each precinct. Additionally, Sub-Fire Indicator Panels (SFIPs) will be installed in the lobby entrances of each building.

All fire panels will be networked together, creating a high-level interface that allows for a comprehensive display and readout of fire event information on the FIP display screen, regardless of the level where the fire event occurs.

Each fire control room (North & South Precincts) will house a Main-FIP equipped with Alarm Signalling Equipment (ASE). The ASE will facilitate the fire brigade call-out and provide the brigade with the address, directing them to the Fire Control Room and booster assembly using visual alarm strobes.

Site block plans and the addressable detection system notification on the FIP will guide Fire and Rescue NSW (FRNSW) around the site and directly to the alarm source.

A fully addressable fire detection system, designed and installed in compliance with AS 1670.1-2018, will be installed throughout the buildings. Smoke detectors will be placed in all non-residential areas, including car parks, commercial and retail spaces, plant rooms, and any residential areas outside of sole occupancy units (SOUs). Each SOU will have an independent mains-powered residential smoke alarm, not connected to the dry fire system, providing local alarms to the residents.

The smoke detection system will interface with mechanical, electrical, and security systems to initiate hazard management operations such as equipment shutdown and door security. The Fire Fan Control Panel (FFCP) interface will be integrated within the Main Fire Indicator Panel in the fire control room, incorporating all necessary interfaces with the smoke hazard management systems in accordance with AS 1668.1.

The fire alarm system will also interface with wet fire system components to provide monitoring and annunciation functions as required by relevant Australian Standards. The Fire Indicator Panels will be designed with a minimum of 20% spare capacity to allow for future expansion.

4.1.8 Emergency Warning and Intercom System

An emergency warning and intercom system (EWIS) will be installed throughout the entire building, designed and implemented in compliance with AS 1670.1-2018 Amendment 1, as required for buildings exceeding 25 meters in height.

The system will be controlled and monitored by a Master EWIS panel located in the Fire Control Room within each precinct, positioned adjacent to the Main Fire Indicator Panel (MFIP). Supplementary EWIS panels with additional amplifiers will be installed adjacent to each Sub Fire Indicator Panel (SFIP), including those in the residential towers.

The EWIS will activate an audible and visual warning system throughout the building, in accordance with AS 1670.4-2018 Amendment 1. Speakers will be installed throughout the building to provide the required sound pressure levels and speech intelligibility as specified by the code. In areas where speech intelligibility cannot be

achieved due to layout constraints, visual indicators will be used instead. Warden Intercommunication Phones (WIPs) and manual call points will be installed in each alarm zone with in 4m of an exit.

Visual indicators will be placed in areas where speech intelligibility is not feasible, such as car parks, plant rooms, and service areas. EWIS speakers will be installed in apartments to achieve a sound level of 75 dBA throughout each unit. Typically, this will include one speaker per bedroom and two speakers in the main living area, depending on the apartment size. Evacuation diagrams will be displayed around the building to highlight fire equipment locations and exits, ensuring compliance with standard requirements.

EWIS speakers, horns, and visual alarm devices will also be installed in common areas outside the apartments, including car parks, commercial spaces, retail areas, and plant/service rooms.

The EWIS system will be automatically triggered by the combined sprinkler and hydrant system, as well as the Automatic Smoke Detection System. Manual activation will be possible via white emergency manual call points (MCPs). The EWIS panels will include a minimum of 20% spare capacity to accommodate future needs.

4.1.9 Portable Fire Extinguishers

Portable fire extinguishers and fire blankets will be provided throughout the development to meet the requirements of the Building Code of Australia, Fire & Rescue NSW, and local authorities. These provisions will comply with AS 2444-2001 and NCC Clause E1.6 standards.

In the residential areas, dry chemical powder extinguishers will be installed within unlocked hydraulic water meter cupboards, ensuring they are within a 10-meter travel distance from the entrance doorway of any sole-occupancy unit.

4.1.10 Portable Fire Extinguisher Selection and Location

Risk	Equipment Type and Rating	Preferred Location
Essential Service Switchboards	4.5 kg Dry Chemical Powder (4A 60B:(E)) or Carbon Dioxide 5 kg (5B(E))	Between 2m and 20m from essential service switchboards.
Electrical Switch Rooms	4.5 kg Dry Chemical Powder (4A 60B:(E)) or Carbon Dioxide 5 kg (5B(E))	Adjacent to and internal side of entry door between 2m and 5m maximum.
Plant Rooms	4.5 kg Dry Chemical Powder (4A 60B:(E)) or Carbon Dioxide 5 kg (5B(E))	Adjacent to and internal side of entry door between 2m and 5m maximum.
Commercial Kitchens (cooking oils and fats)	7Ltr Wet Chemical (2A:4F) including 1.8 m x 1.8 m Fire Blanket.	Adjacent to exit door and accessible from cooking area, between 2m and 20m maximum.
Residential levels	2.5kg Dry Chemical Powder	Within 10m of all residential entry points
Throughout the entire site	4.5kg Dry Chemical Powder (4A 60B:(E))	Within 2m of each Fire Hose Reel.

4.1.11 Interface with Other Systems

The operation of the building services in fire mode necessitates integration with other systems. Interfaces will be established between the fire detection system and the following building services:

- Mechanical ventilation systems used for smoke hazard management.
- General air conditioning systems
- Electric vehicle switchboards
- Security and access control devices
- Automatic door operators
- Gas meters

5 Electrical Services

5.1 STANDARDS AND CODES

The electrical design for the development will adhere to the following standards and codes

1. Building Code Australia 2022 and the referenced Australian Standards
2. DA conditions, to be met and exceeded where required by the BCA
3. AS/CA S009 – Telecommunications Wiring Rules

Standards

1. AS3000 – Wiring Rules
2. AS3008 – Selection of Cables
3. AS2293 – Emergency Lighting and Exit Signs for Buildings
4. AS 1768 – Lightning Protection
5. AS1158 – Lighting for Roads and Public Spaces
6. AS1680 – Interior and Workplace Lighting
7. AS4282 – Control of Obtrusive Effects of Outdoor Lighting
8. AS 61439 – Switchgear and Control gear Enclosures
9. AS 62386 – Digital Addressable Lighting Interface
10. Ausgrid NS109 for the location of the main switch rooms adjacent to the substations.
11. NBN Design Guidelines

5.2 DESIGN OVERVIEW

This document will outline key electrical infrastructure and systems proposed for the subject development and provide technical design characteristics forming GFB design intent while considering, cost optimization, performance, end-user satisfaction, safety and compliance to necessary local and national rules, regulations and standards listed above:

1. Site Main Electrical Low-Voltage Infrastructure
2. Site Wide LV Cabling and Distribution
3. General Indoor and External Lighting
4. Emergency and Exit Signage
5. Security, CCTV and Access Control
6. Lightning protection
7. Telecommunications
8. Retail/Commercial Tenancies Electrical Provisions
9. Residential Units Electrical Provisions

5.3 ELECTRICAL DESIGN CRITERIA

GFB have performed a maximum demand calculation with consideration of no gas provision to the development and utilization of electrical distribution system for the overall site services provisions including cooking and hot water generation. Summary of the maximum demand allowances are

included in the table below following by a summary table indicating the overall demand across the two lots:

Area/ Equipment	Design Allowance	Calculation Method
Basement Carpark (Including Mechanical Ventilation)	10 VA/m2	Power Density
Communal Internal Areas	15 VA/m2	Power Density
Lobbies & Corridors	15 VA/m2	Power Density
F&B Retail Tenancies	150 VA/m2	Power Density
Large Commercial Tenancies	100 VA/m2	Power Density
Residential SOU's	60 VA/m2	Power Density
Lifts & Escalators	50A/each	125% rating of first lift + 75% rating of second lift + 50% rating of the remainder
Hot Water Generation – Residential Heat Pump	0.9A/per unit	Allowance
EV Charging	1.5kW/per bay	Allowance
Site Wide Diversity	85%	Utilisation Allowance

Based on the latest architectural concept plans received, GFB have produced the maximum demands as per below: -

OVERALL SITE DEMAND		
LEVELS	A	kVA
Tower A - Anderson (Residential)	856	1236
Tower B - Mclntosh (Residential)	743	858
Base Building	218	315
Retails	314	563
EV Charging Provision	545	786
TOTAL	2675	3758
	A	KVA

5.3.1 SITE MAIN ELECTRICAL LOW-VOLTAGE INFRASTRUCTURE

5.3.1.1 SITE MAIN SWITCHROOM

It is projected that the site will consist of a chamber substation, pending confirmation from the ASP Level 3 consultant. Accordingly a main switchrooms will be assigned for the termination of consumer mains from the substation. The switchroom must adhere to the requirements outlined in NCC section C3D14 and AS3000, which includes providing 2hrs FRL and two separate egress paths with a minimum of one double-swing door per path, having minimum door dimensions of 0.9 meters in width and 2.2 meters in height. To prevent unnecessary increases in the switchgear's IP rating, no services, aside from mechanical ventilation serving the room, shall traverse these rooms, particularly hydraulic and other water services.

The preference is for the electrical main switch rooms to be centrally located within the lot footprint to ensure efficient and cost-effective cable installation while emphasising on shorter runs and star distribution.

5.3.1.2 MAIN SWITCHBOARD ARRANGMENT

It is anticipated that each room will accommodate 2-3 main switchboards accordingly dependant of final authority confirmation of substation LV arrangement. GFB will further assess the required load groups during the detail design and finalise each main switchboard accordingly with consideration of house, retail, commercial, safety services, base building services and residential load.

5.3.1.3 ELECTRICAL RISER ARRANGMENT

It is anticipated that each room will accommodate GFB strategy is to provide dedicated residential and commercial/retail electrical riser for equipment installation vertical cable reticulation, tee-off boxes and access provisions. This strategy will provide segregation between different stratums and facilitate the need of restricting access by other entities if multiple strata management is proposed for this site in the future.

The preference is for the electrical riser to be located adjacent to lift cores and not immediately close to mechanical risers to minimise transition points and potential services clashes during detailed design. Access to be provided to all electrical risers at each rise in the floor including construction in accordance with NCC section D3D8. Safe work zone of 600mm-1000mm is to be maintained to the front of each riser access door in accordance with AS3000 requirement.

5.3.1.4 ELECTRIC VEHICLE CHARGING INFRASTRUCTURE

In accordance with latest NCC revision, EV charging infrastructure will be in designed and documented to ensure compliance is achieved inline with section J9. Considering the size if the basement level and quantity of carpark bays subject to receiving such infrastructure, it is anticipated that a busduct system will be designed and utilised to assist with potential voltage drop issues and required demand specifically for the carpark areas nominated for class 2 carpark bays. The supply to the future EV charging distribution boards will be from un-metered section of the main switchboards. This is to provide flexibility for the future development starta management to facilitate such infrastructure or have the capacity to hand over to EV charging management companies if necessary.

An EV dynamic load management system including utility management system will be documented to further assist with maximising charging capacity of the infrastructure to the benefit of the tenants and ensure electricity usage is captured accordingly for billing and financial purposes.

A local addressable network infrastructure compromising of distribution communications cabinets, patch panels, cable management and break out trays will be documented to assist with data reading and transferring information locally to necessary head-end units accordingly. these infrastructures are to be placed in necessary EV charging cupboards.

5.3.1.5 Photo-Voltic Solar System

The proposed site is to receive spare compartment within each main switchboard on the house services section for future PV system including battery storage installation.

As part of this project, there is a potential of a small scale PV system to be proposed by the BASIX certificate. This requirement is to be captured accordingly at a later stage. GFB intention is to connect the generated power back to the house services to benefit the tenants and reduce the cost of electricity usage within the common areas accordingly. all necessary inverters, DC/AC switches and panels are to be roof mounted in an accessible area for future maintenance.

5.3.2 Site Wide LV Cabling and Distribution

5.3.2.1 House Services

General house services will be provided via rising main arrangement and tee-off boxes installed inside respective risers. Dedicated rising mains will be nominated per respective stratum.

Safety house services will be provided by dedicated supplies and from safety chassis of respective main switchboards.

Major submains will reticulate via suspended cable tray/ladder arrangement. Cable tray installation will extend within the risers for vertical reticulation for the full extend of the cable. Fire rated cabling and trays to NCC section C3D14 and AS3013 will be nominated for safety house services.

Sub-circuit cabling for lights and general power within basement levels will be via cast-in power conduits and junction boxes. Where ceiling void is available, GFB will document for electrical cabling to run within the void accordingly for ease of access and maintenance in the future.

In-ground cable reticulation will be in accordance with AS3000 underground wiring systems requirement to nominate minimum dept of cover and further detailing the trench layout.

Considering the full electric nature of this development, riser space available and long cable runs, it is anticipated that low voltage busduct system with tap-off boxes maybe proposed to ensure necessary voltage drop is achieved.

This site is subject to overall 7% voltage drop from the point of supply to the final sub-circuit. All cabling will be sized to achieved VD below nominated number accordingly. all cabling will be sized to their respective maximum demand and circuit breaker size plus 25% spare capacity throughout

the site. General supply cabling will be of XLPE/PVC type and Safety services will have 2hrs fire rating accordingly.

5.3.2.2 Un-metered Services

Residential units are to be supplied via riser meter panel arrangement. Residential rising mains and tee-off box arrangement is to be documented. Each riser meter panel can supply up to 16 units depending on final equipment provisions and hot-water generation strategy.

Retail tenancies to receive grouped meter panels or dedicated metering dependant on the final calculated maximum demand and/or future tenant supply rating requested for loads in excess of 100A/3ph. NMI rated kWh meters will be provided for billing purposes. Supplies above 100A/3ph are to receive CT metering and dedicated kWh enclosure within the vicinity of the tenancy accordingly and from communal spaces for authority and electricity retailer personnel access in the future.

Commercial and office type tenancies to receive dedicated supply via CT metering and separate kWh metering enclosure within electrical commercial riser accessible from the common corridor. Each tenancy will also receive a general distribution board having split chassis for light and power. It is anticipated that the mechanical is supplied via base building via dedicated essential/non-essential mechanical services switchboards.

5.3.2.3 Power Factor Correction Unit

Service and installation rules NSW indicates the necessity of power factor correction units if the site power quality is not achieved accordingly. since at design stage this can not be calculated accordingly. GFB will be documenting space provision for CT chamber and circuit breaker for future installation. It is landlord responsibility to test ad measure power factor across all main switchboards after 12 months of practical completion and if compliance is not achieved, engage a consultant to design a system accordingly.

5.3.3 General Indoor and External Lighting

The preliminary lighting services design shall be configured generally as follows.

- Internal lighting will be designed in accordance to Australian Standard AS1680 and Section J7 of the NCC. Consideration to people with disability lighting levels and glare will be emphasized and implemented.
- Intelligent lighting controls is proposed throughout the building.
- External lighting will be designed in accordance to Australian Standard AS1158 and AS4282 as well as Section J6 of the NCC. These standards focus on road lighting and consider public safety regarding:
    - better visibility during the night,
    - theft,
    - security and crimes within a given suburb and
    - preventing disturbances via glare emitting from the luminaires to the neighboring sites.
- Where security and CCTV coverage is of paramount importance, post-top lighting will be in place to provide vertical illumination accordingly.

- Lighting control strategy is to provide combination of motion sensors, timeclock, PE cells and local switches to comply with NCC Section J7 requirements.
- Lighting control to retail and commercial tenancies will also be via motion sensors and local override-off switch suitable for a cold-shell tenancy fit-out.
- Power to external lighting will be reticulated via flexible conduit pathways within soft-landscaped areas for ease of installation, access and maintenance.

Table below is provided to summarise the design criteria, require light levels and control accessories:

Area	Lighting Performance	Luminaires	Control System	Maximum Power Density
Carpark Entry	800 Lux for first 15m during daytime 160 Lux for first 15m during night-time 160 Lux for next 4m	LED	Time Clock Daylight Sensor Motion Sensor	NCC Section J7
Car Park Isles and Parking Spaces	100 Lux	LED	Time Clock Motion Sensor	NCC Section J7
Entrance Lobbies/ Foyers	240 Lux	LED	Time Clock Motion Sensor	NCC Section J7
Egress Corridors	160 Lux	LED	Time Clock Motion Sensor	NCC Section J7
Stairs/ Fire Stairs	120 Lux	LED	Motion Sensor	NCC Section J7
Offices/ Commercial	20 Lux – Cold shell	LED	Motion Sensor Light Switch	NCC Section J7
Retail	20 Lux – Cold shell	LED	Motion Sensor Light Switch	NCC Section J7
Services Plant Rooms	240 Lux	LED	Light Switch	NCC Section J7
Amenities/ Toilets	120 Lux	LED	Motion Sensor	NCC Section J7
Balconies	N/A	LED	Light Switch	NCC Section J7
External Security	50 Lux	LED	Time Clock Daylight Sensor	NCC Section J7
External Lighting	To AS1158 & AS4282	LED	Time Clock Daylight Sensor	NCC Section J7

Note that AS1680 does not provide guidance associated with lighting levels within SOUs, however, below table is included to ensure consistency is achieved across all units and the client is to receive a cost-effective and optimised solution within the residential section.

Area	Lighting Performance	Luminaires	Control System	Maximum Power Density
Bedrooms	160 Lux	LED	Light Switch	NCC Section J7
Bathrooms/ Ensuites	80 Lux	LED	Light Switch	NCC Section J7
Laundries	80 Lux	LED	Light Switch	NCC Section J7
Lounge/ Dining	160 Lux	LED	Light Switch	NCC Section J7
Studies	160 Lux	LED	Light Switch	NCC Section J7

5.3.4 Emergency and Exit Signage

The preliminary lighting services design shall be configured generally as follows.

- Emergency luminaires and exit signs shall comply with AS2293 and be National Construction Code (NCC).
- Each emergency lighting unit will be of the self-contained single point type complete with LED light source, batteries, dual rate battery charger, inverter, test switch and light emitting diode to indicate that the charger is operating.
- Where emergency lighting units are contained within normal luminaires, the batteries and associated control equipment will be housed on a separate metal enclosure attached to the luminaire and located so that the batteries are not affected by the high temperatures generated within the luminaire during normal operation.
- Emergency exit luminaires will be of the 'Running Man' pictorial type complete with arrows as required and classified by an approved authority in accordance with AS/NZS2293.1, with the classification being clearly identified on the luminaire label.
- Central monitoring system will be fitted to this development in order to reduce the maintenance cost and allow for ease of installation using systems enhancing wireless technology. GFB will provide segregation of the monitoring system between retail/commercial and residential component to allow for multi strata management unless advised otherwise.
- Where exit signage is to be mounted above nominated height in AS2293, GFB will be documenting jumbo fittings with increased viewing distance (typically 40m).
- Where exit signage is has potential of obstruction via other services provisions, GFB will be documenting signage installation wall mounted at lower height below the services to ensure visibility is achieved accordingly.
- If suspension is deemed necessary, rod suspension is to be documented instead of wire suspension.

5.3.5 Security, CCTV and Access Control

Provision of security system is typically driven by client's direction and DA consent, having said that, GFB approach to design the system will be in accordance with below table unless advised otherwise.

System	System Type & Description
Access Control	Proximity card access control for; • Main entry doors residential • Main entry doors commercial/retail • Retail tenancies • Commercial and office tenancies • Carpark entry doors • Carpark entry boom gates • Lifts • Stair doors (only monitoring)
Intercom	Video intercom to; • Carpark entry doors • Loading docks • Receiver station with door release function to the building managers office

CCTV	Closed circuit television to; • Main entry points • Entry lobby • External surrounding and hiding spots • Car park entry • Car park circulation aisles • All common areas • Loading docks • All lifts • Building managers office

The overall system is a networked based (IP)solution with capabilities to have third-party system integration in the future. All head end units will be located within the main communications room and integrated via local addressable network. Inline with other services, the security, CCTV and access control system will also be segregated between retail/commercial and residential to allow for multi strata management capabilities in the future.

An un-interruptible power supply system will be proposed for 1hrs autonomy in case of power failure to maintain system integrity accordingly.

A fire trip signal will be provided to the system from the fire control room to ensure that access-controlled doors are released accordingly in fire mode to ensure safe evacuation of the buildings accordingly.

5.3.6 LIGHTNING PROTECTION

Considering the height of proposed buildings, electrical infrastructure to be installed on site to provide electricity and extend of the site, it is very likely that this development will require lightning protection system. This is to be further confirmed by GFB through lightning risk assessment. Having said that, if such system is required. GFB will be designing a conventional system in accordance with AS1768. Conventional lightning protection system is designed to safeguard buildings and structures from lightning strikes by providing a controlled path for the electrical discharge to follow, thereby minimising damage and ensuring safety. The key components of a conventional lightning protection system include:

Air Terminals (Lightning Rods):

These are pointed metal rods placed at the highest points of the structure, such as rooftops, chimneys, and towers. They serve as the initial contact point for lightning strikes, capturing the electrical charge and directing it safely towards the ground.

Conductors:

These are thick, conductive wires or cables that connect the air terminals to the ground. They provide a low-resistance pathway for the electrical current to travel from the air terminals to the ground electrodes. Conductors are typically made of copper or aluminum.

Ground Electrodes (Grounding Rods):

These are metal rods or plates buried deep in the ground, often made of copper or galvanized steel. They dissipate the electrical charge into the earth, away from the protected structure. Ground electrodes are crucial for safely transferring the lightning current into the ground.

Bonding:

Bonding ensures that all metal parts of the structure are electrically connected, preventing potential differences that could lead to side flashes. This includes metal roofs, pipes, and other conductive materials within the building. Proper bonding reduces the risk of electrical hazards and ensures the system's effectiveness.

Surge Protection Devices (SPDs):

SPDs are installed at key points within the electrical system to protect against surges caused by lightning strikes. These devices help prevent damage to electronic equipment and electrical systems by diverting excess voltage and current away from sensitive components.

Inspection and Maintenance:

Regular inspection and maintenance of the lightning protection system are essential to ensure its ongoing effectiveness. This includes checking for corrosion, loose connections, and damage to components. Proper maintenance ensures that the system remains capable of handling lightning strikes.

Overall, a conventional lightning protection system provides a comprehensive approach to mitigating the risks associated with lightning strikes, protecting both the structure and its occupants.

5.4 TELECOMMUNICATIONS

5.4.1.1 Incoming Telecommunications Infrastructure (NBN/Opticomm)

NBN and Opticomm are widely used within Australia to provide FTTP (Fibre to the Premises) infrastructure. Both these services are readily available for this site. NBN Co has requirements to install their passive equipment on premises inside a secured and dedicated room. This service is reticulated from available street provisions into the development via in-ground conduits and further reticulate on cable tray to building fibre device (BFD). Topology of NBN distribution internally is via star distribution comprising of equipment installed in communications risers such as Fibre Distribution Terminals (FDT) and Splitter Distribution Terminals (SDT) with final fibre termination inside tenancies via Network Terminal Devices (NTD). NBN does not require dedicated NTDs for safety services such as emergency lifts and fire control rooms as a mobile sim coverage will provide connectivity to necessary emergency department and services. GFB will be documenting NTDs associated with security, house and retail/commercial base building services to maintain segregation between different stratums.

Additionally, Opticomm has provisions for communications rack installation to accommodate active equipment on site. Depending on Deicorp preference, GFB can document spatial provisions accordingly.

Note that all necessary conduit reticulation to tenancies (retail, commercial and residential) from associated communications risers at each level is via in-slab 25mm communications

conduit in coordination with structural engineer's approval. This is to minimise clashes with other services and provide a less Labour-intensive installation.

5.4.1.2 Base Building Communications Equipment

In order to facilitate different network infrastructure and provide connectivity within the overall site, it is necessary to install passive communications infrastructure to provide such connection points. GFB will be documenting communications racks in main communications room to distribute fibre cabling throughout. Communications risers within basement, ground and level 1 will have small communications racks installed to provide connection link back to the base building head-end units in basement level. Each rack will receive fibre-breakout tray, patch panels, cable management and power rail including dedicated captive screw power outlet at high level connected to house services. Small, localised UPS system will be documented if a communications rack has connection link to CCTV, Access Control and Security system at that level/area.

Two separate networks will be documented to provide segregation between retail/commercial and residential sections of the development.

A wireless local addressable network will be documented to further enhance wireless connectivity within basement levels, ground and level 1 excluding residential portion. This is to further assist users with internet connectivity in locations well cellular internet coverage is limited or non-existent.

5.4.1.3 Fibre TV

Since NBN and Opticomm provide TV over fibre, GFB will be documenting a fibre TV system instead of traditional MATV/PayTV infrastructure. This approach will provide TV connections with no coaxial cabling and additional TV equipment inside risers. Media conversion will take place within tenancies through NTDs accordingly to achieve the same outcome as the traditional system.

This will also remove provisions of any roof top antenna and dish installations

5.4.2 Retail/Commercial Tenancies Electrical Provisions

Table below is summarising electrical, communications and lighting provisions to retail/commercial tenancies in accordance with cold shell fit out requirement

Services	Electrical	Communications	Lighting
Retail (including food and beverage)	1 x Tenant DB with split chassis (size TBC) 1 x DGPO for NTD	1 x NTD 1 x Intercom by the entrance door	LED batten including emergency and non-emergency. Exit signage as required. Motion sensor with override-off local switch by the entry door.

Commercial/ Office	1 x Tenant DB (size TBC) 1 x DGPO for NTD	1 x NTD 1 x Intercom by the entrance door	LED batten including emergency and non-emergency. Exit signage as required. Motion sensor with override-off local switch by the entry door.

Size of distribution boards to be confirmed during detail design stage.

5.4.3 Residential Tenancies Electrical Provisions

Table below is summarising electrical, communications and lighting provisions to residential tenancies.

Apartment Electrical Provisions

Services	Power	Communications	Lighting
Living	2 x DGPOs for TV 2 x DGPO general use	1 x Double Data 1 x TV Outlet	downlights with local light switches
Dining	1 x DGPOs	1 x NTD 1 x Double Data	downlights with local light switches
Kitchen	2 x DGPOs above bench 1 x GPO for dishwasher in-joinery 1 x GPO for microwave in-joinery 1 x GPO for others in-joinery 1 x GPO for oven in-joinery 1 x GPO for cook-top in-joinery	1 x Double Data above bench	Downlights, pendant and in-joinery strip lighting with local light switches
Master Bedroom	1 x DGPOs for TV 2 x DGPO general use	1 x Double Data 1 x TV Outlet	downlights with local light switches
Bedroom 2	1 x DGPOs for TV 2 x DGPO general use	1 x Double Data 1 x TV Outlet	downlights with local light switches
Bedroom 3	1 x DGPOs for TV 2 x DGPO general use	1 x Double Data 1 x TV Outlet	downlights with local light switches
Study	1 x DGPOs for TV 1 x DGPO general use	1 x Double Data 1 x TV Outlet	downlights with local light switches
Bathrooms	1 Double GPO integrated in joinery	NA	Downlights and in-joinery strip lighting with local light switches
Laundry	1 x DGPOs for washer/ dryer 1 x DGPO general use	NA	Downlights and in-joinery strip lighting with local light switches
Hallway	NA	Intercom	downlights with local light switches

6 Conclusion

This report has provided an analysis with relevant service providers to ensure that the proposed development is supported by the necessary infrastructure. The following key points summarize the conclusions reached:

Notification of Relevant Utility Authorities:
Notification has been undertaken with relevant authorities and service providers, and their guidelines have been incorporated where appropriate. In cases where recommendations are pending, these will be subject to further assessment and confirmation, particularly in the areas of wastewater and power.

Assessment of Development Impacts:
The impact of the development on existing infrastructure has been assessed, with consideration given to both current capacities and the cumulative effects of surrounding existing and future developments. This ensures that the infrastructure supporting the development is robust and future-proof. We have identified that the existing services surrounding the site will be capable of accommodating the development's services needs without disruption to surrounding buildings. This can be achieved with standard upgrades to the Authority infrastructure system.

Infrastructure Requirements (Onsite and Offsite):
The report has identified the necessary onsite and offsite infrastructure to support the development. Where existing infrastructure requires upgrades to meet the demands of this development, those requirements have been defined and are aligned with the recommendations of service authorities and future studies by the WSC and Level 3 ASP designers.

Infrastructure Delivery and Staging Plan:
A concept Infrastructure Delivery and Staging Plan has been provided, outlining how the infrastructure needs will be coordinated and delivered throughout the project build. Where uncertainty exists, contingency options and further assessments are planned to ensure flexibility and compliance with the development's infrastructure requirements.

Where the report has not fully addressed these elements, particularly in terms of detailed assessments or pending recommendations, further consultation and confirmation will be sought in accordance with SEARs 21 requirements.