



# Hydraulic Services

## Concept Design Report

### Social and Affordable Housing – Stage 2

### 9-15 Northumberland Street, Liverpool

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# 1 Executive Summary

## 1.1 Summary

This hydraulic services concept design report outlines the scope of works, design criteria, components and materials which will be adopted by Insync Services for completion of the hydraulic services design and documentation for the proposed Social and Affordable Housing – Stage 2 development site at 9-15 Northumberland Street, Liverpool.

The report will form the basis for communication of design principles to the Client for review, comment and sign-off, such that the hydraulic services design and documentation can be completed for the project.

## 1.2 Code Compliance

The hydraulic services covered by this report will be designed to comply with the following requirements;

Hydraulic Services	Design Codes	Proposed Compliance
Sub-Soil Drainage Service	NCC, AS3500.3, Local Council Policy, Environmental Protection Authority.	Deemed to Satisfy
Stormwater Drainage Service	NCC, AS3500.3, Local Council Policy, Environmental Protection Authority.	Deemed to Satisfy
Rainwater Plumbing Service	NCC, AS3500.3, Local Council Policy, Environmental Protection Authority, BASIX.	Deemed to Satisfy
Sanitary Drainage Service	NCC, AS3500.2.	Deemed to Satisfy
Sanitary Plumbing Service	NCC, AS3500.2.	Deemed to Satisfy
Potable Cold Water Service	NCC, AS3500.1, SWC Multi-Level Individual Metering Guide.	Deemed to Satisfy
Rainwater Reuse Water Service	NCC, AS3500.1, BASIX.	Deemed to Satisfy
Potable Hot Water Service	NCC, AS3500.4, BASIX.	Deemed to Satisfy
Natural Gas Service	NCC, AS5601, Jemena Medium Density & High Rise Residential Metering Guide.	Deemed to Satisfy
Fire Hose Reel Service	NCC, AS2441.1	Deemed to Satisfy

\*NCC – National Construction Code which includes:

- Volume 1 – Building Code of Australia – Class 2 to Class 9 Buildings
- Volume 2 – Building Code of Australia – Class 1 and 10 Buildings
- Volume 3 – Plumbing Code of Australia

## 1.3 Authority Infrastructure

Preliminary investigations indicate that hydraulic services for the proposed development should be able to be adequately serviced from the existing Sydney Water Corporation water and Jemena gas infrastructure adjacent to the development site.

Final confirmation for water and sewer connections will be sought via a Section 73 application to Sydney Water after the Development Approval has been issued by Council.

Service	Assessment	Comments
Stormwater Drainage Service	Refer To Civil Engineer	Refer To Civil Engineer.
Sanitary Drainage Service	✓	225mm junction on site.
Potable Cold Water Service	✓	200mm cold water main adjacent to site within Northumberland Street.
Natural Gas Service	✓	50mm gas main opposite to site within Northumberland Street.

Infrastructure Services have been assessed as follows;

- ✓ Infrastructure connection is readily available.
- Infrastructure connection requires minor adjustment of existing services.
- ✗ Infrastructure connection requires significant amplification or diversion of existing services.

## 1.4 System Design

The proposed development will be provided with hydraulic services generally summarised as follows;

### 1.4.1 Site Infrastructure

- Stormwater Connection – refer to Civil Engineer
- Sewer Connection – will be a new 225mm connection to the existing 225mm Sydney Water sewer junction within the site boundary.
- Water Connections – will be a new 100mm connection to the existing 200mm Sydney water main within Northumberland Street.
- Gas Connection – will connect to the existing Jemena 50mm 210kPa gas main within Northumberland Street.

### 1.4.2 Hydraulic Services

- Stormwater Drainage – a new main connection, on-site stormwater detention tank, rainwater tank and water quality measures will be provided by the Civil Engineer. A gravity drainage service will be provided across podium and ground levels throughout the site. All basement levels below the gravity drainage system will discharge to a stormwater pumping station. This will be pumped back to the gravity system for discharge to the OSD tank. Roof level areas will be collected by gravity or syphonic drainage systems and conveyed to the rainwater tank. Apartment balconies will be provided with dedicated gravity downpipes and in floor rainwater outlets.
- Sanitary Drainage – a new main connection will be provided with a 225mm boundary trap assembly and 150mm overflow relief gully. A 225mm house drainage service will extend into the building, including provision for connection of the retail tenancies and connection of the sanitary plumbing stacks rising throughout the building. Typically sanitary drainage stacks will be provided to each individual apartment, located within the bathroom pod services ducts, and accessed via fire rated access panels from the common corridors. Any fixtures and fittings unable to drain to the gravity sanitary drainage system will discharge to a sewer pumping station. This will be pumped back to the gravity system.
- Potable Cold Water Service – a new main connection will be provided with a 100mm incoming customer service feeding a 100mm Authority water meter and reduced pressure zone backflow prevention device located at ground level. A dedicated 25mm branch will be provided to ground floor retail tenancy, capped with private meter for future extension by the tenant. A dedicated 32mm branch will be provided to ground floor office tenancy, capped with authority meter for connection of amenities etc. The main cold water service will be boosted with dual variable speed pumps located at ground level. A main riser will be installed in the common area servicing individual floor branches and continuing up to the roof level hot water plants. Individual floor branches will be located every second floor servicing connection to apartment both on the floor of the branch and the floor

above. Individual metering will be provided to each apartment with meters located in the bathroom pod service ducts, and accessed via fire rated access panels from the common corridors. Pressure within the system will be controlled by 250kPa pressure limiting valves installed on each individual apartment branch.

- SAFH Potable Hot Water Service – a gas fired central hot water plant will be provided at basement level. The flow and return hot water service will be circulated with dual adjustable speed pumps located at the hot water plant. A main riser will be installed in the common area servicing individual floor branches, located every second floor servicing connection to apartment both on the floor of the branch and the floor above. Dedicated hot water return will be provided from each on floor branch to the hot water plant. Individual metering will be provided to each apartment with meters located in the bathroom pod service ducts, and accessed via fire rated access panels from the common corridors. Pressure within the system will be controlled by 250kPa pressure limiting valves installed on each individual apartment branch. Hot water will be delivered within each apartment via Thermostatic Mixing Valves and Tempering Valves as required.
- STRATA Potable Hot Water Service – a gas fired central hot water plant will be provided at basement level. The flow and return hot water service will be circulated with dual adjustable speed pumps located at the hot water plant. A main riser will be installed in the common area servicing individual floor branches, located every second floor servicing connection to apartment both on the floor of the branch and the floor above. Dedicated hot water return will be provided from each on floor branch to the hot water plant. Individual metering will be provided to each apartment with meters located in the bathroom pod service ducts, and accessed via fire rated access panels from the common corridors. Pressure within the system will be controlled by 250kPa pressure limiting valves installed on each individual apartment branch. Hot water will be delivered within each apartment via Thermostatic Mixing Valves and Tempering Valves as required.
- Rainwater Reuse – portions of the roof area will discharge into the rainwater tank via first flush diverters (if required by Civil Engineer). All surface areas shall bypass the rainwater tank and discharge to the OSD tank.
- Natural Gas Service – a new main connection will be provided with a 50mm incoming customer service feeding a 210kPa to 5kPa boundary regulator and meter assembly located at ground level. A dedicated unmetered 32mm (500MJ/h) branch will be provided to each ground floor retail tenancy, capped for future extension and Authority meter installation by the tenant. A main riser will be installed in the common area continuing up to the SAFH and STRATA hot water plants. A gas meter will be provided to the each hot water plant.
- Fire Hose Reel Service – will be provided throughout non-residential areas of the development. This will be connected to the cold water service.
- Fire Service Water Supply – a new main connection will be provided with a 150mm incoming customer service feeding a 150mm 4-way fire brigade booster assembly and double detector check backflow prevention device located at ground level. A 150mm branch will be extended into the fire services pump room and capped for extension by the fire services contractor.

## **2 Introduction**

### **2.1 Background**

Anglicare has engaged Insync Services to provide building services consultancy for the proposed Social and Affordable Housing – Stage 2 development site at 9-15 Northumberland Street, Liverpool. Specifically, Insync Services Pty Ltd have been engaged to provide engineering consultancy concept design reports to cover the following building services disciplines;

- Electrical Services
- Fire Services
- Hydraulic Services
- Lift Services
- Mechanical Services

### **2.2 Aims**

The aim of this concept design report is to provide a detailed description of the hydraulic services design proposals associated with development. Specifically, the report is intended to provide a summary of the following;

- Identification of services to be provided.
- Description of the codes to which they will be installed.
- Description of the basis for design.
- Description of the required performance.
- Description of the materials to be used.
- Budget estimate for installation
- Coordination of design with other disciplines

This document shall form the basis for communication of design principles and specific building services design requirements to the Client and wider design team, such that the building services design principles can be fundamentally incorporated into the architectural planning proposal to be submitted for the development.

### **2.3 Briefing Documents**

The hydraulic services engineering elements considered within this report have taken into account the following preliminary documentation and investigations;

- National Construction Code.
- Relevant Australian Standards.
- Authority design and guidelines.
- Authority Main Diagrams
- Preliminary architectural drawings prepared by Group GSA Pty Ltd.
- Anglicare Standards

### **2.4 Development Description**

The proposed development scheme is yet to be finalised however for the purposes of this review we have made the following assumptions;

1. The development will contain 1 level of partially undercover carparking.
2. The development will contain ground floor retail.
3. The development will contain ground floor child care.
4. The development will contain approximately 99 SHAF rentals.
5. The development will contain approximately 48 private rentals.
6. The development will be more than 25m in effective height as Classified by the National Construction Code.

7. The development will comply with Basix requirements, in terms of environmental performance.

## 2.5 Associated Services

The associated services engineering elements to be considered in conjunction within this report are as follows;

- Fire Detection and Alarm Services as detailed by the Electrical Engineer.
- Emergency Communication and Warning Services as detailed by the Electrical Engineer.
- Building Management Systems (BMS) as detailed by the Mechanical Engineer.
- Fire Rated Construction as detailed by the Architect and Structural Engineer.
- Acoustic Performance as detailed by the Acoustic Engineer.
- Fire Hydrant/Fire Sprinkler Services as detailed by the Fire Sprinkler Services Engineer.
- Fire Engineering Report as detailed by the Fire Engineer.

## 3 Design Principles

### 3.1 Background

Anglicare have specific requirements in terms of building services outcomes with regard to this development including the following areas;

- Cost & Efficiency
- Quality & Longevity
- Uniformity
- Serviceability

All design shall be prepared with due regard to building services design such that the clients overall objectives for the development can be realised. In particular, the spatial requirements for building services shall be determined and incorporated into the architectural proposals from first principles so that further development of the architectural proposals can be undertaken as the design progresses without the need to backtrack and compromise architectural integrity of the submission as a result of building services requirements that have not previously been adequately considered.

### 3.2 Cost & Efficiency

The client has aggressive cost benchmarks which will be required to be achieved for the procurement of this development. These benchmarks are not able to be achieved without the fundamental integration and coordination of building services concurrent with development of the architectural design. Specific areas for consideration include the following;

- Equipment location for maximum efficiency.
- Adequate floor to floor heights.
- Vertical alignment of services risers.
- Standardised design forms that bring cost savings through repetition.
- Development of typical components that can be pre-fabricated off site.
- Continuity of wet area locations at typical floor changes to reduce bulkheads below.
- Modular design of plant where applicable to match proposed construction staging.
- Selection of standard manufacture equipment that is readily available.
- Selection of low maintenance plant & equipment.
- Duplication of equipment where required to provide operational redundancy in critical aspects of the buildings operation.

### 3.3 Quality & Longevity

The client requires a building that is fit for purpose in terms of the requirements for its ongoing operation. **Selection of plant and equipment shall provide trouble free operation over the duration of its life cycle, aside from the regular maintenance program.** Equipment shall be selected with due consideration to having demonstrated proven reliability on similar installations, in similar operating conditions. Equipment supply shall be via companies that can demonstrate a long-term trading history in the Australian market, and have local agents capable of providing the necessary technical support and parts availability as will be required throughout the equipment's life cycle.

### 3.4 Uniformity

Uniformity of type and manufacture of each specific type of equipment and accessory shall be preserved throughout the whole installation. Where possible, the number of types of equipment provided by an individual supplier shall be maximised.

### 3.5 Serviceability

The client requires a building that is fit for purpose in terms of the requirements for its ongoing operation. Spatial allocation for plant and equipment shall provide due consideration for all ongoing



maintenance requirements of the equipment, including total replacement of the equipment at completion of its life cycle. Adequate clearance shall be provided around all equipment for maintenance access, with due consideration given to aspects of Safety In Design principles as may be applicable. Access shall be arranged so as to provide minimal disruption to the normal operation of the building and minimise any inconvenience to the building occupants. **Any need to alter or damage building fabric to effect equipment maintenance shall be avoided under all circumstances.**

## 4 Scope of Works

### 4.1 Extent of Services

The extent of hydraulic services required throughout the development shall include the following:

- Sub-Soil Drainage Service
- Stormwater Drainage Service
- Rainwater Plumbing Service
- Sanitary Drainage Service
- Trade Waste Drainage Service
- Sanitary Plumbing Service
- Potable Cold Water Service
- Rainwater Reuse Water Service
- Hot Water Service
- Natural Gas Service
- Fire Hose Reel Service

### 4.2 Code Compliance

The proposed code compliance for hydraulic services required throughout the development shall include the following:

Hydraulic Services	Design Codes	Proposed Compliance
Sub-Soil Drainage Service	National Construction Code A.S. 3500.3 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Stormwater Drainage Service	National Construction Code A.S.3500.3 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Rainwater Plumbing Service	National Construction Code A.S. 3500.3 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Sanitary Drainage Service	National Construction Code A.S. 3500.2 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Trade Waste Drainage Service	National Construction Code A.S. 3500.2 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Sanitary Plumbing Service	National Construction Code A.S. 3500.2 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Potable Cold Water Service	National Construction Code A.S. 3500.1 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Rainwater reuse water Service	National Construction Code A.S. 3500.1 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Potable Hot Water Service	National Construction Code A.S. 3500.3 – 2015 Plumbing Code of Australia	Deemed to Satisfy
Natural Gas Service	National Construction Code A.S. 5601 – 2004	Deemed to Satisfy
Fire Hose Reel Service	National Construction Code A.S. 2441 – 2005	Deemed to Satisfy

### 4.3 Scope of Work – Sub-Soil Drainage

The scope of work required shall include, but not be limited to, the following:

- Provide sub-soil drainage below all slabs on ground.
- Provide sub-soil drainage behind all retaining walls.
- Provide blue metal trench with subsoil drainage around the perimeter of each basement carpark.
- Provide pollution control and treatment devices as required.
- Provide clearouts and pits as required to effectively maintain all parts of the sub-soil drainage service.
- Provide a sub-soil collection pit. The collection pit shall be cast in-situ concrete sized to suit the catchment it collects.
- Provide dual submersible sub-soil pumps and controls to facilitate automatic operation.
- Provide sub-soil rising mains.
- Provide a connection into the stormwater drainage system.
- Test all sub-soil drainage services to meet Authority requirements and ensure operational serviceability.

### 4.4 Scope of Work – Stormwater Drainage

The scope of work required shall include, but not be limited to, the following:

- Provide Authority approval of the stormwater drainage service design, prior to installation.
- Provide a new connection into the Authority stormwater drainage service.
- Provide pollution control and water quality treatment devices as required to achieve Council pollution reduction targets.
- Provide grated outlets to all slabs on ground exposed to rainfall.
- Provide planter outlets to all planter boxes, including drainage cell and geotextile fabric.
- Provide grated outlets to all basement slabs.
- Provide clearouts and pits as required to effectively maintain all parts of the stormwater drainage service.
- Provide drainage as required to fire service test facilities.
- Provide points for connection of the sub-soil drainage service.
- Provide points for connection of the rainwater plumbing service.
- Provide appropriate warning signage for all On-Site Detention (OSD) systems and Confined Spaces.
- Provide all fire stop collars as required to ensure fire isolation to the structure.
- Test all stormwater drainage services to meet Authority requirements and ensure operational serviceability.

### 4.5 Scope of Work – Rainwater Plumbing

The scope of work required shall include, but not be limited to, the following:

- Provide syphonic stormwater system to collect all roof areas and discharge into rainwater tank.
- Provide downpipes to all roof and awning gutters.
- Provide rainwater outlets to all suspended slabs.
- Provide rainwater outlets to all balconies and terraces.
- Provide planter outlets to all planter boxes, including drainage cell and geotextile fabric.
- Provide first flush diverter upstream of rainwater reuse tank where required by Council.
- Provide a rainwater reuse tank to collect roof areas only. All surface areas shall bypass rainwater reuse tank. Rainwater Tank design shall be in accordance with local Council and BASIX requirements.
- Provide clearouts as required to effectively maintain all parts of the rainwater plumbing service.
- Provide connections into the stormwater drainage service.
- Provide all fire stop collars as required to ensure fire isolation to the structure.
- Test all rainwater plumbing services to meet Authority requirements and ensure operational serviceability.

## 4.6 Scope of Work – Sanitary Drainage

The scope of work required shall include, but not be limited to, the following:

- Provide Authority approval of the sanitary drainage system design, prior to installation.
- Provide all sanitary drainage works required to obtain Sub-Divider/Developer Compliance Certificate.
- Disconnect existing redundant sanitary drainage connections to the site.
- Provide a new connection into the Authority sewer.
- Provide boundary traps as required.
- Provide overflow relief gullies as required.
- Provide sanitary drainage based upon drainage principles.
- Provide points for connection of all fixtures and appliances.
- Provide points of connection for all future “adaptable” fixtures within adaptable units. Points shall be capped flush with structural slab level for future connection.
- Provide inspection openings as required to effectively maintain all parts of the sanitary drainage service.
- Provide sewer pumping station for all fixtures too low to connect to the gravity drainage system.
- Provide dual submersible sewer pumps and controls to facilitate automatic operation.
- Provide a sewer collection pit sized to provide a minimum of one days’ storage in the event of a failure. The sewer pumping station pit shall be pre-fabricated fibreglass.
- Provide a sewer rising main connection into the gravity sewer drainage system.
- Provide discharge connection from the sanitary plumbing service into the sewer drainage service.
- Provide vents and air admittance valves to systems as required.
- Provide foaming prevention device in floor waste riser where charged by laundry tub.
- Provide appropriate warning signage for all Confined Spaces.
- Provide all fire stop collars as required to ensure fire isolation to the structure.
- Test all sanitary plumbing services to meet Authority requirements and ensure operational serviceability.

## 4.7 Scope of Work – Sanitary Plumbing

The scope of work required shall include, but not be limited to, the following:

- Provide Authority approval of the sanitary plumbing system design, prior to installation.
- Provide sanitary plumbing system based upon one of the following:
  - Fully-vented modified system requirements.
- Provide points for connection of all fixtures and appliances.
- Provide a tundish under the Laundry Tub in all strata residential units for the collection of A/C condensate.
- Provide points of connection for all future “adaptable” fixtures within adaptable units. Points shall be capped flush with structural slab level for future connection.
- Provide inspection openings as required to effectively maintain all parts of the sanitary plumbing service.
- Provide discharge connection from the sanitary plumbing service into the sewer drainage service.
- Provide vents and air admittance valves to systems as required.
- Provide foaming prevention device in floor waste riser where charged by laundry tub.
- Provide all fire stop collars as required to ensure fire isolation to the structure.
- Test all sanitary plumbing services to meet Authority requirements and ensure operational serviceability.

## 4.8 Scope of Work – Trade Waste Drainage

The scope of work required shall include, but not be limited to, the following:

- Provide Authority approval of the Trade Waste plumbing service design, prior to installation.
- Provide points for connection of all Trade Waste fixtures and appliances.

- Provide points for connection of all Retail Tenancies.
- Provide Trade Waste vent points at high level for connection of all Retail Tenancies.
- Provide Trade Waste pre-treatment devices as follows:
- Grease Arrestors for Retail Food Outlets – quantity and volume to be in accordance with SWC requirements.
- General Purpose Pits shall be provided for all Car Wash Bays.
- Grease Arrestors shall be modular type (Halgan or similar) to ensure plant rooms with low head height still provide suitable servicing access. Where head height is not an issue, single Grease Arrestor may be used.
- Provide inspection openings as required to effectively maintain all parts of the Trade Waste plumbing service.
- Provide automatic hot water flush for grease waste system where drainage lengths exceed 30m. Hot flush shall be located at the high end of the drainage system.
- Provide all fire stop collars as required to ensure fire isolation to the structure.
- Test all Trade Waste plumbing services to meet Authority requirements and ensure operational serviceability.

#### 4.9 Scope of Work – Potable Cold Water

The scope of work required shall include, but not be limited to, the following:

- Provide Authority approval of the cold water service design, prior to installation.
- Provide all cold water service works required to obtain Sub-Divider/Developer Compliance Certificate.
- Disconnect existing redundant water service connections to the site.
- Provide a new water service connection into the Authority main.
- Provide new water meter assemblies in accordance with the Sydney Water Corporation Multi-Level Individual Metering (MLIM) guidelines.
- Cold water isolation valves provided for each residential unit shall be located within the corridor cupboard. Additional isolation valves are not required within the unit.
- Provide capped service for each retail tenant. Authority water meters for all Retail tenancies shall be provided by the tenant during fitout.
- Provide a reduced pressure zone backflow prevention device for site containment.
- Provide dual variable speed cold water service booster pumps and controls to facilitate automatic operation.
- Provide individual unit cold water meters and all associated meter reading equipment in accordance with SWC requirements.
- Provide isolation valves as required to effectively maintain all parts of the cold water service.
- Provide points for connection of all fixtures and appliances.
- Provide points for connection of all hot water services.
- Provide points for connection of all mechanical plant.
- Provide points for connection of all fire hose reel services.
- Provide point for connection of all garbage chute cleaning systems.
- Provide pressure limiting valves throughout cold water system as required. Pressure limiting valves shall be installed on a floor by floor basis and shall be located upstream of the Unit meters in the common corridor cupboard. Allow to install high flow and low flow limiting valves to ensure correct operation of the valves. Where pressure exceeds 1000kPa in the water supply system, allow for dual stage pressure reduction.
- Provide a cold water top-up to the rainwater reuse water tank, including a private cold water meter. Rainwater reuse water supply shall be from the rainwater reuse tank with top-up supply from cold water system. An air gap, solenoid valve and private water meter shall be provided on the top-up to the rainwater reuse tank. Rainwater reuse water shall be used for:
  - Irrigation supply.
- Provide hose tap, including reduced pressure zone device, in each of the following:
  - Grease arrestor rooms.
  - Garbage Rooms
  - Loading docks.
- Provide hose tap, including double check valve, in each of the following:

- Mechanical plant rooms.
- Fire pump rooms.
- Hot water plant rooms.
- Test all cold water services to meet Authority requirements and ensure operational serviceability.

#### 4.10 Scope of Work – Rainwater Reuse Water

The scope of work required shall include, but not be limited to, the following:

- Provide a rainwater reuse water service to supply the irrigation system.
- Provide submersible pumps in rainwater reuse tank to provide adequate pressure to rainwater reuse water system.
- Provide cold water supply back-up to the rainwater reuse water supply using a solenoid valve over a tundish (with air gap) connected to tank levels controllers. Private cold water meter shall be provided in the cold water supply.
- Provide dual automatic backwash filters on rainwater reuse water supply downstream of pumps.
- Provide dual bag filters on rainwater reuse water supply downstream of pumps.
- Provide dual (2) ultra-violet (UV) disinfection lamps on rainwater reuse water supply downstream of pumps where spray or atomiser/misting irrigation is used.
- Provide private water meter on rainwater reuse service downstream of filtration.
- Provide capped rainwater reuse water service, with isolation valve, for future extension by irrigation contractor. Size of capped service shall suit area of irrigation.
- Provide isolation valves as required to effectively maintain all parts of the rainwater reuse water services.
- Provide adequate signage to all rainwater reuse water supply points indicating that water “Not suitable for Drinking”.
- Provide all fire stop collars as required to ensure fire isolation to the structure.
- Provide trace wire on all inground plastic pipework.
- Test all rainwater reuse water services to meet Authority requirements and ensure operational serviceability.
- Certify all rainwater reuse water services to meet Authority requirements and ensure operational serviceability.

#### 4.11 Scope of Work – Potable Hot Water

The scope of work required shall include, but not be limited to, the following:

- A centralised SAFH gas-fired plant.
- A centralised STRATA gas-fired plant.
- Localised electric hot water units in:
  - basement garbage rooms,
  - cleaner’s rooms,
  - common Retail amenities.
- Provide authority hot water metering system in accordance with Jemena requirements. Hot water meters will be provided to each residential apartment and shall be located within common corridors. Hot water meters within corridors shall be located to minimise “dead legs” such that hot water delivery times in residential apartments are within a range of 20-45 seconds.
- Hot water isolation valves provided for each residential unit shall be located within the corridor cupboard. Additional isolation valves are not required within the unit.
- Provide tempering valves to effectively limit hot water supply temperatures for all general fixtures.
- Provide thermostatic mixing valves to effectively limit hot water supply temperatures for all accessible fixtures.
- Hot water flow and return systems shall be designed to have a maximum drop of 5°C through the loop before returning to the hot water unit.
- Provide dual circulating pumps on all flow and return hot water systems.
- Provide thermal balancing valves on all interconnecting hot water return lines.
- Provide pressure limiting valves throughout hot water system as required. Pressure limiting

valves shall be installed on a floor by floor basis and shall be located upstream of the Unit meters in the common corridor cupboard. Allow to install high flow and low flow limiting valves to ensure correct operation of the valves. Where pressure exceeds 1000kPa in the water supply system, allow for dual stage pressure reduction.

- Provide isolation valves as required to effectively maintain all parts of the hot water service.
- Provide access panels for all hot water balancing valves.
- Provide thermal insulation to all hot water pipework as required.
- Test all hot water services to meet Authority requirements and ensure operational serviceability.

#### 4.12 Scope of Work – Natural Gas

The scope of work required shall include, but not be limited to, the following:

- Provide Authority approval of the gas service design, prior to installation.
- Disconnect existing redundant gas service connections to the site.
- Provide a new gas service connection into the Authority gas main.
- Provide a boundary regulator and meter set as required by the Authority to drop pressure from 210kPa to 5kpa for reticulation throughout development. This regulator set **MUST** be located externally and have ventilation in accordance with Jemena requirements.
- An unmetered 5kPa gas service shall be extended to each Retail tenancy and capped for future extension by the tenant. An Authority Meter shall be provided by the tenant during fitout.
- Provide Jemena Authority gas meters for the residential central gas-fired hot water plant.
- Ensure that there are **NOT** any ignition sources in the gas meter cupboards. This includes MDL Panels and General Power Outlets (GPO's). These shall be located within Comms cupboards.
- Provide phone line for modem for each metering system as required by Jemena.
- Provide isolation valves as required to effectively maintain all parts of the gas service.
- Provide points for connection of all appliances.
- Test all gas services to meet Authority requirements and ensure operational serviceability.
- Complete and submit necessary forms to the Authority regarding "Confirmation of Installation of Gas Central Hot Water System" (Jemena form ADG-003C) for Residential hot water system.

#### 4.13 Scope of Work – Fire Hose Reels

The scope of work required shall include, but not be limited to, the following:

- Provide a new fire hose reel service.
- Provide fire hose reel protection for all areas of the building except areas with a BCA classification 2, 3 or 4.
- Provide backflow prevention on fire hose reel service where connected to the potable cold water supply.
- Fire hose reel system to ensure 2 x fire hose reels can operate simultaneously.
- Provide isolation valves as required to effectively maintain all parts of the fire hose reel service. All isolation valves shall be locked in the open position with suitable signage.
- Test all fire hose reel services to meet Authority requirements and ensure operational serviceability.
- Certify all fire hose reel services to meet Authority requirements and ensure operational serviceability.

#### 4.14 Retail Tenancy Provisions

The scope of work required shall include, but not be limited to, the following:

Tenancy	Sanitary Drainage	Trade Waste Drainage	Cold Water	Natural Gas
Retail Tenancy	100mm capped sewer drainage point + 65mm vent capped at high level.	100mm capped trade waste drainage point + 65mm vent capped at high	32mm supply capped at high level with isolation valve.	500MJ/h supply capped at high level with isolation valve.

<b>AngliCare Tenancy</b>	level. 100mm capped sewer drainage point + 65mm vent capped at high level.	40mm supply capped at high level with isolation valve.
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## 5 Authority Infrastructure Requirements

### 5.1 Stormwater Drainage

This will be documented by the Civil Engineer including OSD Tanks, water quality treatment and discharge point.

### 5.2 Sanitary Drainage

#### 5.2.1 Existing Authority Infrastructure

Sydney Water are the Authority who provide sanitary drainage infrastructure in the locality of the development site. Currently there is an existing 225mm sewer main located parallel to and inside of the western boundary.

#### 5.2.2 Sanitary Drainage Requirements

The proposed development will provide facilities in accordance with the Schedule of Accommodation as detailed previously within this report.

We have based our sanitary drainage load estimates upon the following allowances;

Unit Size	Fixture Units per Unit	Qty of Units	Fixture Units
Studio	14	68	952
1 Bed	14	26	364
2 Bed	14	27	392
3 Bed	14	1	0
4 Bed	23	0	0
<b>Total</b>		<b>112</b>	<b>1708</b>

The sewer connection, based on 1708FU, will require a 225mm sewer connection (with a minimum grade of 1.65%) to the Authority main.

#### 5.2.3 Anticipated Connection

Our preliminary assessment of the available Authority infrastructure is that the existing 225mm sewer junction within the property will have adequate capacity for the sanitary drainage requirements of the proposed development. Sydney Water however may vary this requirement at their discretion, and therefore a Section 73 application must be lodged to confirm Sydney Water requirements in regard to this particular development.

All Sydney Water sewer main works are required to be designed by a Sydney Water accredited Water Servicing Coordinator. We recommend that contact be made with a suitable Water Servicing Coordinator during the Development Application phase to further develop and assess the various sanitary drainage connection options.

### 5.3 Potable Cold Water

#### 5.3.1 Existing Authority Infrastructure

Sydney Water are the Authority who provide potable cold water infrastructure in the locality of the development site. Currently there are two water mains located within close proximity to the development site, described as follows;

- **Northumberland Street 200** – an existing 200mm water main runs on the western side of Northumberland Street, parallel with the sites eastern boundary. The main is accessible for the full length of the sites eastern boundary.

We have commissioned statement of available flow and pressure from Sydney Water for both

mains, however the results have not been provided in the required time frame for inclusion within this report.

### 5.3.2 Potable Cold Water Requirements

The proposed development will provide facilities in accordance with the Schedule of Accommodation as detailed previously within this report.

We have based our potable cold water service load estimates upon the following allowances;

- 0.49L/s Per Residential Apartment (diversity to be applied)
- 0.30L/s per retail tenancy
- No Mechanical services water supply.

Potable cold water service connection sizes should be based upon the total building probable simultaneous flow rate which we have estimated as detailed below;

Category	Residential
Probable Simultaneous Flow	8.18L/s
Main Connection	100mm tee
Customer Service	100mm
Meter	100mm

### 5.3.3 Anticipated Connection

In accordance with the Water Supply Code of Australia, a connection will need to be sourced from an Authority water main of at least 200mm diameter. Sydney Water however may vary this requirement at their discretion, and therefore a Section 73 application must be lodged to confirm Sydney Water requirements in regard to this particular development.

It is proposed that a connection into the existing 200mm water main on the western side of Northumberland Street will be sufficient for the proposed development.

All Sydney Water Corporation water main works are required to be designed by a Sydney Water accredited Water Servicing Coordinator. We recommend that contact be made with a suitable Water Servicing Coordinator during the Development Application phase to further develop and assess the various water main connection options.

## 5.4 Natural Gas

### 5.4.1 Existing Authority Infrastructure

Jemena are the Authority who provide natural gas infrastructure in the locality of the development site. Currently there is one natural gas main located within close proximity to the development site, described as follows;

- **Northumberland Street** – an existing 50mm nylon 210kPa gas main runs on the eastern side of Northumberland Street, parallel with the sites eastern boundary. The main is accessible for the full length of the sites eastern boundary.

### 5.4.2 Natural Gas Requirements

The proposed development will provide facilities in accordance with the Schedule of Accommodation as detailed previously within this report.

We have based our natural gas service load estimates upon the following allowances;

- 1230MJ/h SAHF Residential Hot Water Plant (no diversity applied)
- 410MJ/h STRATA Residential Hot Water Plant (no diversity applied)
- 500MJ/h per Retail Tenancy (no diversity applied)

Natural gas service connection sizes should be based upon the total building probable simultaneous load which we have estimated as detailed below;

Category	Loads
Apartments	0MJ/h
Hot Water	1640MJ/h
Retail	1000MJ/h
Mechanical Services	NA
<b>Totals</b>	<b>2640MJ/h</b>
Connection	Jemena
Index Length (m)	160
Pressure Loss (kPa)	1.5kPa
Primary Site Service	80mm

NOTE: Incoming 210kPa medium pressure gas mains and main connections will be confirmed by Jemena.

#### 5.4.3 Anticipated Connection

Our preliminary assessment of the available Authority infrastructure is that the existing 50mm gas main within Northumberland Street will have adequate capacity for the natural gas service requirements of the proposed development. This will be confirmed with Jemena upon gas connection application.

All Jemena gas main works are required to be designed by Jemena. We recommend that contact be made with Jemena during the Development Application phase to further develop and assess the various gas main connection options.

## 6 Sub-Soil Drainage Service

### 6.1 Sub-Soil Drainage Generally

Specifically, this section of the Concept Design report shall cover the following services:

- Sub-Soil Drainage

### 6.2 System Design

A system of sub-soil drainage will be installed below concrete slabs when installed below natural ground level, and behind all retaining walls.

All sub-soil branches shall be terminated with a bolted trap screw removable access cover at the upstream end. Access covers shall be located in accessible locations to facilitate future maintenance and cleaning of the sub-soil drainage system.

Sub-soil branches shall be terminated into pre-cast concrete sub-soil pits at the downstream end. Sub-soil pits shall be located at maximum 30 metre intervals, and shall be interconnected within stormwater pipework having a minimum diameter of 150mm.

Discharge from the sub-soil drainage system shall be directed through a pollution control device capable of removing sediments and oils, prior to being connected into the stormwater drainage system for disposal.

Discharge from the sub-soil drainage system shall be collected in a strategically located collection well. The collection well shall have adequate capacity to store discharge from all connected pipework during a 10-year ARI storm event of 2 hours duration. In any case the collection well shall have a minimum effective storage capacity of 3,000 litres, or 24,000 litres where fire service test water is connected.

Dual submersible pumps shall be installed within the collection well to transfer sub-soil discharge into the stormwater drainage system. Pumps shall be sized as a duty/standby arrangement whereby each pump has the capacity to provide the full required duty, therefore providing 100% redundancy to the system in the event of a single pump failure. Pumps shall be automatically controlled via a dedicated sub-soil pump control panel, complete with an interface connection to the Building Monitoring System. Pumps shall be sized to the required inflow rate, but in any case shall have a minimum duty of 10L/s each pump.

### 6.3 Sizing

Sub-soil drainage shall be located and sized in consultation with the geotechnical engineer, to determine actual sub-soil flow rates for the particular development site.

### 6.4 Installation

Sub-Soil drainage pipework shall be installed within neatly excavated trenches, overwrapped with geotextile fabric, and covered on all sides to a depth of 150mm with blue metal backfill. Sub-soil pipework shall be installed at a minimum grade of 0.5%.

### 6.5 Materials

Sub-Soil Drainage services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Sub-Soil Drainage	In-Ground	All	DWV Grade Slotted UPVC with solvent welded joints.

The above-nominated materials have been selected for the durability, cost effectiveness and

intended purpose and are in line with current trade practice.

## 7 Stormwater Drainage Service

### 7.1 Stormwater Drainage Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Stormwater Drainage

### 7.2 System Design

A system of stormwater drainage will be provided in accordance with code requirements, to collect discharge from the rainwater plumbing system and other connected stormwater discharges throughout the development.

Stormwater drainage pipework will be routed and collected through the buildings as necessary before connecting to the Civil stormwater drainage system. Roof areas shall discharge into rainwater tanks sized in accordance with Basix requirements. All other surface areas shall bypass the rainwater tanks. All site stormwater shall discharge through the On-Site Detention (OSD) tanks as provided by the Civil contract.

Stormwater drainage pipework crossing fire compartment boundaries shall be fitted with fire collars.

Stormwater drainage pipework located within sensitive areas will be acoustically lagged in accordance with the Acoustic Engineer's requirements.

### 7.3 Sizing

Stormwater drainage pipework shall be sized with adequate capacity to convey discharge from all connected pipework from the rainwater plumbing system, and other connected discharges. Typically, the pipe capacity tables shall be used from AS 3500.3, for pipes flowing full at 1.0% grade. In addition, pipework shall be of adequate size to limit flow velocities within the pipework to a maximum of 2.0m/s.

### 7.4 Inground Installation

Stormwater drainage pipework shall be installed within neatly excavated trenches, covered on all sides to a depth of 150mm with blue metal backfill. Stormwater drainage pipework shall be installed at a minimum grade of 1.0%.

### 7.5 Suspended Installation

Stormwater drainage pipework shall be installed neatly in straight runs with constant fall, and include adequate brackets to prevent any variation in pipework alignment. Stormwater drainage pipework shall be installed at a minimum grade of 1.0%.

### 7.6 Materials

Stormwater Drainage services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Stormwater Drainage	In-Ground	<300mm	DWV Grade UPVC pipework with solvent welded joints.
Stormwater Drainage	In-Ground – Footpath Crossing	100mm x 100mm	Galvanised Mild Steel (GMS) Square Hollow Section (SHS)
Stormwater Drainage	Suspended	<300mm	DWV Grade UPVC pipework with solvent welded joints.

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 8 Rainwater Plumbing Service

### 8.1 Rainwater Plumbing Generally

Specifically, this section of the Concept Design report shall cover the following services:

- Rainwater Plumbing Service

### 8.2 System Design

A conventional gravity rainwater plumbing system will be provided in accordance with code requirements.

The system shall be sized with adequate capacity to convey discharge from all connected pipework during a 20-year ARI storm event of 5 minutes' duration for eaves gutters and balcony outlets in non-critical areas (areas with a suitable overflow), and during a 100 year ARI storm event of 5 minutes' duration for box gutters and balcony outlets in critical areas (areas without a suitable overflow).

Rainwater plumbing roof outlets shall be sized to accept discharge from the fire hydrant service during pressure and flow testing of the system.

Rainwater plumbing pipework crossing fire compartment boundaries shall be fitted with fire collars.

Rainwater plumbing downpipes located within sensitive areas will be acoustically lagged in accordance with the Acoustic Engineer's requirements.

Rainwater plumbing downpipes shall have removable sealed access openings provided at the base of each downpipe, and shall discharge into stormwater drainage system.

### 8.3 Sizing

Rainwater plumbing pipework shall be sized with adequate capacity to convey discharge from all connected outlets. Typically, the pipe capacity tables shall be used from AS 3500.3, for pipes flowing full at 1.0% grade. In addition, pipework shall be of adequate size to limit flow velocities within the pipework to a maximum of 2.0m/s.

### 8.4 Installation

Rainwater plumbing pipework shall be installed neatly in straight runs with constant fall, and include adequate brackets to prevent any variation in pipework alignment. Rainwater plumbing pipework shall be installed at a minimum grade of 1.0%.

### 8.5 Materials

Stormwater Drainage services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Rainwater Plumbing Exposed Rainwater Downpipes	Gravity	<300mm	DWV Grade UPVC pipework with solvent welded joints.
	Gravity	All	DWV Grade UPVC pipework with solvent welded joints or Colourbond.

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 9 Sanitary Drainage Service

### 9.1 Sanitary Drainage Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Sanitary Drainage

### 9.2 System Design

A system of sewer drainage will be provided in accordance with code requirements. Wastewater produced from sanitary fixtures and appliances within the proposed development shall be combined into common sewer lines before connecting via gravity to the Authority sanitary drainage system.

For areas of the development unable to drain via gravity, dual submersible pumps shall be installed within a collection well to transfer sewer discharge into the Authority sewer drainage system. Pumps shall be sized as a duty/standby arrangement whereby each pump has the capacity to provide the full required duty, therefore providing 100% redundancy to the system in the event of a single pump failure. Pumps shall be automatically controlled via a dedicated sewer pump control panel, complete with an interface connection to the Building Monitoring System.

Overflow relief devices shall be strategically located within the system to prohibit the unwanted surcharge of sewerage into the building in the event of a blockage in the downstream network.

Vent pipes shall be strategically located within the system to maintain the integrity of fixture trap seals whilst conveying sewer gases to the atmosphere.

### 9.3 Sizing

Sewer drainage shall be sized with adequate capacity to convey discharge from all connected fixtures and appliances. Typically, the fixture unit method of load estimation shall be used from AS 3500.2.

### 9.4 Inground Installation

Sanitary drainage pipework shall be installed within neatly excavated trenches, covered on all sides to a depth of 150mm with blue metal backfill. Sanitary drainage pipework shall be installed at a minimum grade of 1.65% for 100mm pipework and 1.00% for all larger pipe sizes.

### 9.5 Suspended Installation

Sanitary drainage pipework shall be installed neatly in straight runs with constant fall, and include adequate brackets to prevent any variation in pipework alignment. Sanitary drainage pipework shall be installed at a minimum grade of 1.65% for 100mm pipework and 1.00% for all larger pipe sizes.

### 9.6 Materials

Sanitary Drainage services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Sanitary Drainage	In-Ground	<300mm	DWV Class UPVC pipework with solvent welded joints.
Sanitary Drainage	Suspended	<300mm	DWV Class UPVC pipework with solvent welded joints.

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.



## 10 Sanitary Plumbing Service

### 10.1 Sanitary Plumbing Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Sanitary Plumbing

### 10.2 System Design

Wastewater produced from sanitary fixtures and appliances within the proposed development shall be combined into common sanitary plumbing lines and gravitate to the sewer drainage service.

A combination of both aerial drainage and fully vented modified stack systems shall be used to achieve the most economical sanitary plumbing installation.

A ventilation network fitted to the sanitary plumbing network will maintain the integrity of fixture trap seals whilst conveying sewer gases to the atmosphere.

Inspection openings shall be installed at all major directional change locations and at intervals not exceeding 30 metres.

Sanitary plumbing pipework crossing fire compartment boundaries shall be fitted with fire collars.

Sanitary plumbing pipework located within sensitive areas will be acoustically lagged in accordance with the Acoustic Engineer's requirements.

### 10.3 Sizing

Sanitary plumbing shall be sized with adequate capacity to convey discharge from all connected fixtures and appliances. Typically, the fixture unit method of load estimation shall be used from AS 3500.2, with sanitary plumbing pipework to be installed at a minimum grade of 1.65%.

### 10.4 Installation

Sanitary plumbing pipework shall be installed neatly in straight runs with constant fall, and include adequate brackets to prevent any variation in pipework alignment. Sanitary plumbing pipework shall be installed at a minimum grade of 1.65%.

### 10.5 Materials

Sanitary plumbing services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Sanitary Plumbing – Sovent system and Stacks	Suspended	All	High Density Polyethylene pipework with fusion welded joints.
Sanitary Plumbing – Graded discharge pipes	Suspended	All	DWV Class UPVC pipework with solvent welded joints.

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

# 11 Trade Waste Drainage

## 11.1 System Design

A system of trade waste drainage will be provided in accordance with code requirements, typically including the following;

Process Generation	Waste Type	Primary Treatment Solution
Retail	Grease	Grease Trap, In-Sink Dry Basket Arrestors & Bucket Trap Floor Wastes
Car Wash bays	Oil and Hydrocarbons	General Purpose Pit

Wastewater produced from trade waste fixtures and appliances within the proposed development shall be combined into common trade waste lines and gravitate pre-treatment devices prior to discharge into the sanitary drainage service.

On-grade gravity drainage shall be the preferred method of connection for all trade waste drainage discharge into the existing sewer drainage system on site.

Vent pipes shall be strategically located within the system to maintain the integrity of fixture trap seals whilst conveying trade waste gases to the atmosphere.

## 11.2 Pre-Treatment

Trade waste drainage shall be pre-treated by grease arrestors and general purpose pits prior to waste discharge into the sanitary drainage system. Grease arrestors shall be provided for the combined retail tenancies (located as required to provide adequate gravity drainage provisions to all tenancies). Separate, stand-alone, grease arrestors shall be provided for the Supermarket and the Hotel.

## 11.3 Sizing

Trade waste drainage shall be sized with adequate capacity to convey discharge from all connected fixtures and appliances. Typically, the fixture unit method of load estimation shall be used from AS 3500.2, with trade waste drainage pipework to be installed at a minimum grade of 1.65%.

## 11.4 Inground Installation

Trade waste drainage pipework shall be installed within neatly excavated trenches, covered on all sides to a depth of 150mm with blue metal backfill. Trade waste drainage pipework shall be installed at a minimum grade of 1.65%.

## 11.5 Suspended Installation

Trade waste drainage pipework shall be installed neatly in straight runs with constant fall, and include adequate brackets to prevent any variation in pipework alignment. Trade waste drainage pipework shall be installed at a minimum grade of 1.65%.

## 11.6 Materials

Trade waste Drainage services for this development shall be constructed from materials as follows;

Pipework	Location	Diameter	Material
Trade waste Drainage	In-Ground	<300mm	High Density Polyethylene pipework with fusion welded joints.
Trade waste Drainage	In-Ground	>300mm	High Density Polyethylene pipework with fusion welded joints.

<b>Trade waste Drainage</b>	Suspended	<300mm	High Density Polyethylene pipework with fusion welded joints.
<b>Trade waste Drainage</b>	Suspended	>300mm	High Density Polyethylene pipework with fusion welded joints.

<b>Plant &amp; Equipment</b>	<b>Make</b>	<b>Model</b>
<b>Bucket Trap Floor Waste</b>	SPS	Q300NA
<b>Garbage Room Floor Waste</b>	SPS	Q300NA

<b>Pumps</b>	<b>Make</b>	<b>Model</b>	<b>Duty</b>
<b>Trade Waste Drainage Pumps</b>	Mono	TBC by Contractor	TBC by Contractor

## **12 Potable Cold Water Service**

### **12.1 Potable Cold Water Service Generally**

Specifically, this section of the Concept Design report shall cover the following services;

- Potable Cold Water Service

### **12.2 System Design**

A combination of ring mains and main supply risers shall be used to achieve the most economical potable cold water service installation, in conjunction with a system design that provides for flexibility and redundancy in supply.

### **12.3 Sizing**

Potable cold water services shall be sized with adequate capacity to convey water supply to all connected fixtures and appliances. Typically, the loading unit method of load estimation shall be used from AS 3500.1.

Potable cold water service pipework shall be sized such that the maximum velocity within any pipework is as follows;

<b>Location</b>	<b>Maximum Velocity</b>
External Locations in Ground	2.4m/s
Internal Locations in Walls and Ceilings	1.5m/s

### **12.4 Operating Pressures**

Potable cold water services shall be designed to ensure that a minimum outlet pressure of 250kPa is available at every fixture within the proposed development. Where required, pressure limiting valves shall also be provided to ensure that a maximum of 500kPa is available at any fixture within the proposed development.

### **12.5 Water Supply**

Potable cold water service water supply shall be drawn from the existing 200mm Sydney Water main within Northumberland Street as described in the Authority Infrastructure section of this report.

### **12.6 Metering**

A single connection to the water main shall be made which will extend into the site and then pass through and isolation valve, Authority meter and backflow prevention valves.

Individual Authority water meters shall be installed for each Residential unit within the common corridors. Meters will be installed and read in accordance with the SWC Multi-Level Individual Metering Guide.

### **12.7 Booster Pumps**

Booster pumps shall be provided to ensure adequate pressure within the Residential potable cold water service. Pumps shall be located downstream of the Authority meter. Pumps shall be sized as a duty/standby arrangement whereby each pump has the capacity to provide 100% of the full required duty, therefore providing 100% redundancy to the system in the event of a single pump failure. Pumps shall be automatically controlled via a dedicated potable cold water service pump control panel, complete with an interface connection to the Building Monitoring System.

### **12.8 Backflow Prevention**

Three levels of backflow protection shall be provided to the potable cold water supply for this development in accordance with the requirements of AS 3500.1 – Water Services.

Site containment backflow prevention shall be provided immediately downstream of the Authority water meter. The required backflow prevention device shall be a reduced pressure zone device.

Zone backflow prevention shall be provided on potable cold water supplies to the following areas within the development;

- Fire Hose Reel Water Supply

Individual fixture backflow prevention shall be provided as required on potable cold water supplies to the various plant and equipment within the development.

## 12.9 Flow Rates

Potable cold water supply to fixtures within the proposed development shall be based upon the Basix requirements.

## 12.10 Materials

Potable cold water services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Potable Cold Water Service	In-Ground	All	Type B Copper (Soldered or Press-Fit System)
Potable Cold Water Service	Suspended Mains	All	Type B Copper (Soldered or Press-Fit System)
Potable Cold Water Service	Rough-In	All	Type B Copper (Soldered or Press-Fit System) or Polyethylene

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 13 Rainwater Reuse Water Service

### 13.1 Rainwater Reuse Water Service Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Rainwater Reuse Water Service
- Requirements to be confirmed with Basix report and Civil Engineer Concept report

### 13.2 System Design

A combination of supply mains and main supply risers shall be used to achieve the most economical rainwater reuse water service installation, in conjunction with a system design that provides for flexibility and redundancy in supply. Rainwater reuse water shall be reticulated to service the following connections;

- Landscape Irrigation
- Toilet Flushing TBC

### 13.3 Sizing

Rainwater reuse water services shall be sized with adequate capacity to convey water supply to all connected fixtures and appliances. Typically, the loading unit method of load estimation shall be used from AS 3500.1. Rainwater reuse water service pipework shall be sized such that the maximum velocity within any pipework is as follows;

Location	Maximum Velocity
External Locations in Ground	2.4m/s
Internal Locations in Walls and Ceilings	1.5m/s

### 13.4 Operating Pressures

Rainwater reuse water services shall be designed to ensure that a minimum outlet pressure of 250kPa is available at every fixture within the proposed development. Where required, pressure limiting valves shall also be provided to ensure that a maximum of 500kPa is available at any fixture within the proposed development.

### 13.5 Water Supply

Rainwater reuse water service water supply shall be drawn from a rainwater harvesting tank size yet to be confirmed, with an automatic change-over/automatic top-up to potable cold water supply during periods when the rainwater storage tank supply has been consumed.

### 13.6 Metering

A private meter shall be provided on the potable water backup to the rainwater reuse water plant within the development. All private meters shall be pulse type meters suitable for connection into the Building Monitoring System. Typically, private sub-meters shall be provided to the following connections;

- Landscape Irrigation Service

### 13.7 Filtration

A three stage filtration process shall be provided to the rainwater reuse water service as follows:

- Primary filtration shall be provided via fifty (50) micron automatic backwash screen filters.
- Secondary Filtration shall be provided via twenty-5 (20-5) micron gradient bag filters.

All water filtration devices shall include duplicate equipment installed in parallel to provide redundancy during maintenance.

### 13.8 UV Treatment

Final water quality control shall be provided to the rainwater reuse water service via the installation of Ultra-Violet (UV) water treatment devices. Each device shall be fully self-monitoring, to ensure minimum internal UV levels, and shall be complete with an alarm signal suitable for connection into the Building Monitoring system.

All water treatment devices shall include duplicate equipment installed in parallel to provide redundancy during maintenance.

### 13.9 Booster Pumps

Booster pumps shall be provided to ensure adequate pressure within the rainwater reuse water service. Pumps shall be located downstream of the rainwater storage tank. Pumps shall be sized as a duty/standby arrangement whereby each pump has the capacity to provide 100% of the full required duty, therefore providing 100% redundancy to the system in the event of a single pump failure. Pumps shall be automatically controlled via a dedicated rainwater reuse water service pump control panel, complete with an interface connection to the Building Monitoring System.

### 13.10 Backflow Prevention

Zone backflow protection shall be provided to the rainwater reuse water supply for this development in accordance with the requirements of AS 3500.1 – Water Services. The required backflow prevention device shall be a reduced pressure zone device or an air gap.

### 13.11 Isolation of Wet Areas & Fixtures

All individual fixtures where possible will be controlled via (chrome plated where exposed) right-angled mini cistern taps. All groups of fixtures within designated wet areas will be controlled via in-wall recessed domed covered isolation valves generally at 2200mm above FFL or as near as practicable to the basin they serve.

### 13.12 Thermal Insulation

Where required, rainwater reuse water service pipework shall be thermally insulated to prevent heat gain within the service, and to prevent condensation on the pipework surface.

### 13.13 Materials

Rainwater Reuse Water services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Rainwater Reuse Water Service	All	All	PVC Pressure Pipe or Polyethylene. <b>Copper pipe and fittings shall not be used.</b>

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 14 Potable Hot Water Service

### 14.1 Potable Hot Water Service Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Potable Hot Water Service

### 14.2 System Design

A combination of ring mains and main supply risers shall be used to achieve the most economical potable hot water service installation, in conjunction with a system design that provides for flexibility and redundancy in supply.

A central gas-fired residential potable hot water plant shall be provided in the basement plant room. Potable hot water for all apartments uses within the residential development shall be provided from the central plant, with reticulation throughout the development via flow and return pipework and dual circulating pumps. Hot water discharge from the plant shall be 65 degrees and hot water return to the plant shall be a minimum of 60 degrees.

Hot water within the basement levels will be provided by local hot water heaters.

### 14.3 Potable Hot Water Capacity

In order to cover peak demands, hot water plant shall be sized with capacity to deliver hot water for a 1-hour peak period. The plant shall incorporate a combination of continuous flow hot water heaters combined with storage tanks. The stored water shall be maintained at a temperature of 65 degrees whilst in the storage vessels.

Hot Water Plant – RHEEM Tankpac internal water heater plant complete with 8 x 205MJ/h instantaneous water heaters and dual 430 litre storage tanks, providing an hourly hot water recovery of 4936 litres at 50°C temperature rise.

### 14.4 Sizing

Potable hot water services shall be sized with adequate capacity to convey water supply to all connected fixtures and appliances. Typically, the loading unit method of load estimation shall be used from AS 3500.1.

Potable hot water service pipework shall be sized such that the maximum velocity within any flow and return pipework is as follows;

Location	Maximum Velocity
Internal Locations in Walls and Ceilings	1.2m/s

### 14.5 Operating Pressures

Potable hot water services shall be designed to ensure that a minimum outlet pressure of 250kPa is available at every fixture within the proposed development. Where required, pressure limiting valves shall also be provided to ensure that a maximum of 500kPa is available at any fixture within the proposed development.

### 14.6 Metering

Authority hot water sub-meters shall be provided for each Residential unit.

### 14.7 Circulation Pumps

Potable hot water circulation pumps shall be provided to maintain the required temperature within flow and return potable hot water pipework systems. Pumps shall be sized as a



duty/standby arrangement whereby each pump has the capacity to provide 100% of the full required duty, therefore providing 100% redundancy to the system in the event of a single pump failure. Pumps shall be automatically controlled via a dedicated potable hot water service pump control panel, complete with an interface connection to the Building Monitoring System.

#### 14.8 Backflow Prevention

A single level of backflow protection shall be provided to the potable hot water supply for this development in accordance with the requirements of AS 3500.1 – Water Services.

Fixture backflow prevention shall be provided as required on potable cold water supplies to the various plant and equipment within the development.

#### 14.9 Thermal Insulation

Thermal insulation shall be provided to all potable hot water service pipework.

#### 14.10 Flow Rates

Potable cold water supply to fixtures within the proposed development shall be based upon the Basix requirements.

#### 14.11 Temperature Control

Generally, there are four main potable hot water usage requirements within the proposed development as follows;

- 50°C tempered water to all ablution fixtures.
- 43.5°C tempered water to all accessible fixtures.

Temperatures shall be controlled by the following:

- Thermostatic Mixing Valves for accessible areas.
- Tempering Valves for all other areas.

#### 14.12 Materials

Potable hot water services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Potable Hot Water Service	Suspended Mains	All	Type B Copper (Soldered or Press-Fit System)
Potable Hot Water Service	Rough-In	All	Type B Copper (Soldered or Press-Fit System) or Polyethylene

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 15 Gas Service

### 15.1 Gas Service Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Natural Gas Service

### 15.2 System Design – Embedded Network

An authority gas Boundary Regulator/Meter assembly will be provided at the site boundary for the residential service. This will drop the gas pressure to 2.75kPa for reticulation to the residential portions of the building. Individual gas meters shall NOT be provided for each unit.

A dead-leg main pipework configuration will be provided for connection to the base of each individual natural gas risers from buildings above, to achieve the most economical natural gas service installation, in conjunction with a system design that provides for flexibility and redundancy in supply.

Main riser isolation valves will be provided at the base of each riser for maintenance or emergency shutdown. Residential unit isolation valves shall be provided in common corridor cupboards on each floor of the residential towers.

### 15.3 Sizing

Gas services shall be sized with adequate capacity to convey gas supply to all connected appliances. The pipe sizing methods from AS 5601 (2004) shall be used.

Gas service pipework shall be sized using the following parameters;

Location	Value
Pipe Type	Copper
Index Length	Variable depending on design layout
Pressure Drop	0.75kPa (to suit 5kPa reticulation pressure)
Gas Load	As per above and design layout

### 15.4 Materials

Gas services for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Gas Service	In-Ground	All	Polyamide (Nylon) or Type B Copper (Soldered or Press-Fit System)
Gas Service	In-Wall	All	Type B Copper (Soldered or Press-Fit System)
Gas Service	Above Ground	All	Type B Copper (Soldered or Press-Fit System)

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 16 Fire Hose Reel Service

### 16.1 Fire Hose Reel Service Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Fire Hose Reel Service

### 16.2 System Design

A dedicated fire hose reel service will be provided throughout the building to achieve coverage in accordance with Building Code of Australia requirements. However, Fire Hose Reels need not be installed in the following parts of the building:

- Class 2, 3 or 4 parts of the building.
- Substations.

Fire hose reels shall be located such that every point of non-residential areas can be reached by the nozzle end of a 36 metre hose reel laid out in the actual path of travel to the point of coverage.

Fire hose reels shall be typically located within 4 metres of all required fire exists, and as otherwise necessary to achieve full coverage throughout the building.

Fire hose reels shall not pass through fire doors or smoke doors. Where required, fire hose reels shall be provided on each side of fire and smoke doors as necessary to achieve full coverage.

A system of main supply risers and on floor reticulation shall be used to achieve the most economical fire hose reel service installation.

### 16.3 Sizing

Fire hose reel service shall be sized to provide a flow rate of 0.33L/s at the most disadvantaged fire hose reel. In addition, the mains shall have capacity to provide for two fire hose reels to operate simultaneously. Fire hose reel service pipework shall be sized such that the maximum velocity within any pipework is as follows;

Location	Maximum Velocity
External Locations in Ground	2.4m/s
Internal Locations in Walls and Ceilings	1.5m/s

### 16.4 Operating Pressures

Fire hose reel services shall be designed to ensure that a minimum outlet pressure of 250kPa is available at every fire hose reel within the proposed development. Where required, pressure limiting valves shall also be provided to ensure that a maximum of 500kPa is available at any fire hose reel within the proposed development.

### 16.5 Water Supply

Water supply to the fire hose reel service shall be a dedicated supply drawn from the metered shared service potable cold water service.

### 16.6 Backflow Prevention

Individual backflow protection shall be provided to the fire hose reel service water supply for this development in accordance with the requirements of AS 3500.1 – Water Services. The required backflow prevention device shall be a reduced pressure zone device.

### 16.7 Materials

Fire hose reel service for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Fire Hose Reel Service	In-Ground	All	Type B Copper (Soldered or Press-Fit System)
Fire Hose Reel Service	Suspended Mains	All	Type B Copper (Soldered or Press-Fit System)

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 17 Fire Service Supply

### 17.1 Fire Hydrant/Fire Sprinkler Service Generally

Specifically, this section of the Concept Design report shall cover the following services;

- Fire Hydrant/Fire Sprinkler Service Supply

### 17.2 System Design

A shared 150mm fire hydrant/fire sprinkler supply will be provided to the building in accordance with Building Code of Australia requirements.

The supply pipework shall be capped within the Fire Brigade Booster Valve cupboard at Ground level on the property boundary. The extension of the fire hydrant/fire sprinkler service shall be documented within the Fire Services package.

### 17.3 Sizing

Fire hydrant/fire sprinkler service pipework shall be sized such that the maximum velocity within any pipework is as follows;

Location	Maximum Velocity
All Locations	4.0m/s

### 17.4 Water Supply

Fire hydrant/fire sprinkler water service water supply shall be drawn from the existing 200mm Sydney Water main within Northumberland Street as described previously in the Authority Infrastructure section of this report.

### 17.5 Materials

Fire hydrant/fire sprinkler service for this development shall be constructed from materials as follows;

Service	Location	Diameter	Material
Fire Hydrant/Fire Sprinkler Service	In-Ground	All	Type B Copper (Soldered or Press-Fit System) or UPVC Pressure Pipe
Fire Hydrant/Fire Sprinkler Service	Suspended Mains	All	Type B Copper (Soldered or Press-Fit System) or Galvanised Mild Steel

The above-nominated materials have been selected for the durability, cost effectiveness and intended purpose and are in line with current trade practice.

## 18 Spatial Requirements

**Project:** 9-15 Northumberland Street Liverpool  
**Client:** Anglicare  
**Project Number:** 20180079  
**Engineer:** GT  
**Revision:** A

### Stormwater Drainage:

Item	Description	Area	Configuration	Comments
1	Stormwater Pollution Control Device	??m <sup>2</sup>	TBC	Refer to stormwater drainage documentation provided by Civil Engineer
2	Stormwater Detention Tank	??m <sup>2</sup>	TBC	Refer to stormwater drainage documentation provided by Civil Engineer
3	Rainwater Tank	??m <sup>2</sup>	??	Rainwater tank as required to satisfy minimum Basix requirements
4	First Flush Diverter	??m <sup>2</sup>	??	

### Sanitary Drainage:

Item	Description	Area	Configuration	Comments
1	Authority Sewer Connection	1.5m <sup>2</sup>	1.5m x 1m	External 225mm boundary trap connection to existing Sydney Water 225mm sewer main within ground level landscaped area in north west corner of site.

### Trade Waste Drainage:

Item	Description	Area	Configuration	Comments
1	Grease Arrestor	3.0m <sup>2</sup>	3m x 1m	3,000 litre grease arrestor installed inground within landscaped area adjacent to rear of site.

### Potable Cold Water Service:

Item	Description	Area	Configuration	Comments
1	Potable Cold Water Meter	1.5m <sup>2</sup>	3m x 0.5m	100mm Sydney Water meter assembly complete with reduced pressure zone backflow prevention device installed within ground level landscaped area.
2	Potable Cold Water Pump Room	7.5m <sup>2</sup>	3m x 2.5m	Cold water pumproom at basement level 1.

### Rainwater Reuse Water Service:

Item	Description	Area	Configuration	Comments
1	Rainwater Reuse Water Pump Room	7.5m <sup>2</sup>	3.0m x 2.5m	Plant room located at basement level adjacent to Rainwater Tank. Includes: <ul style="list-style-type: none"> <li>• RR Water Pump</li> <li>• Automatic backwash filter</li> <li>• Bag filter x 2</li> <li>• Automatic top-up for rainwater tank with air gap.</li> </ul>

### Hot Water Service:

Item	Description	Area	Configuration	Comments
1	Hot Water Plant	9.0m <sup>2</sup>	4.5m x 2.0m	Tankpak Series II with 8 x 205MJ/hr commercial outdoor continuous flow heaters and 2 x 430L storage tank located in B1 plantroom.
2	Garbage Room	1m <sup>2</sup>	1m x 1m	50 litre electric water heater wall mounted at high level on copper safe-tray.

### Natural Gas Service:

Item	Description	Area	Configuration	Comments
1	Gas Meter/Regulator Assembly	7.5m <sup>2</sup>	3m x 2.5m	Plant room located at ground level with direct external access.

### Fire Hose Reel Service:

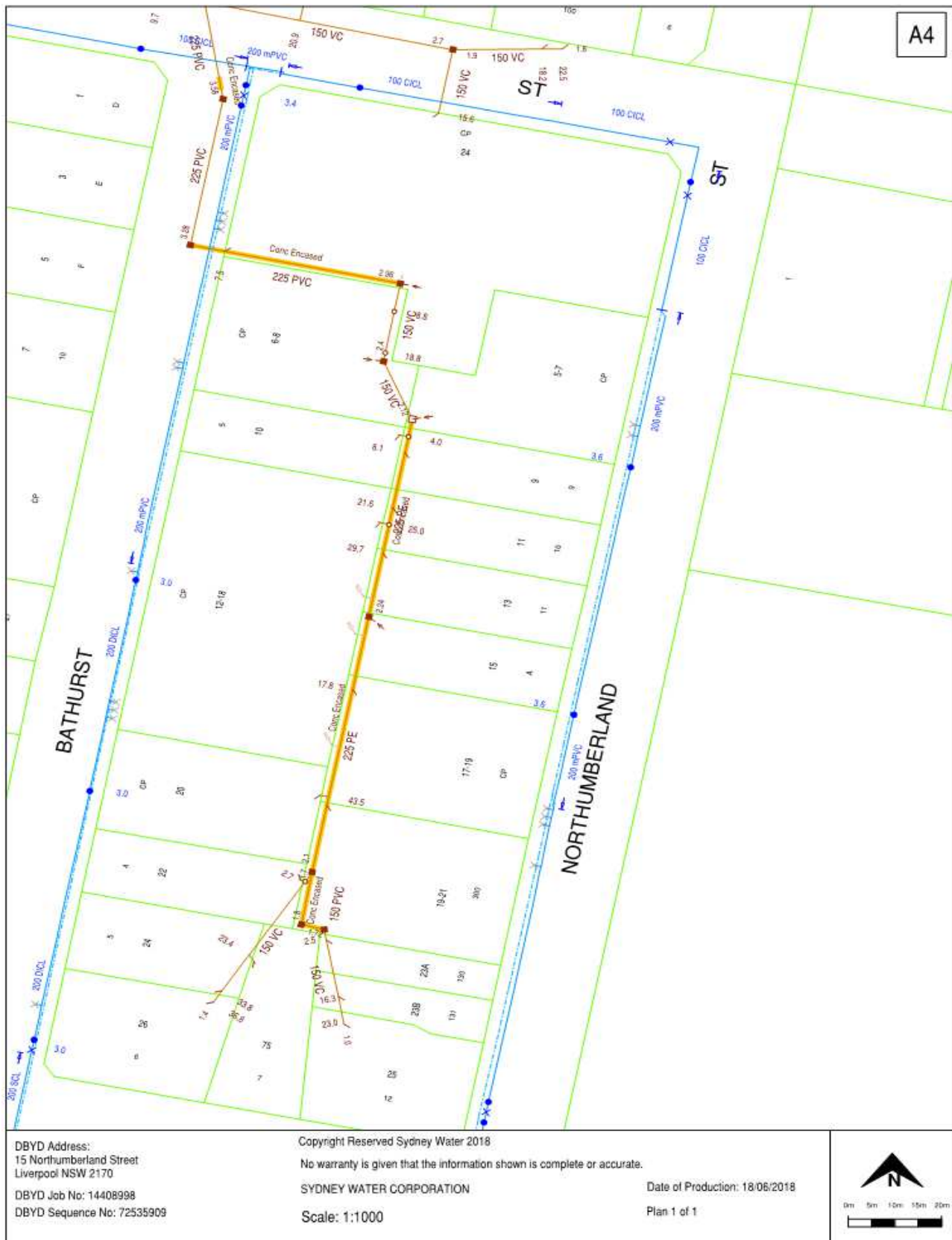
Item	Description	Area	Configuration	Comments
1	Fire Hose Reel Cupboards	0.45m <sup>2</sup>	0.9m x 0.5m	Fire hose reel wall mounted within 4m of the entry and as otherwise required to provide coverage of carpark level using 36m hose reels.

### Hydraulic Risers:

Item	Description	Area	Configuration	Comments
1	Unit Hydraulic Risers	0.1m <sup>2</sup>	0.45m x 0.25m	Risers located at the rear of each bathroom pod for installation of drainage stack, cold water meter and hot water meter.
2	Core Hydraulic Riser	0.6m <sup>2</sup>	1.2m x 0.5m	Main riser located adjacent to each lift core.

# 19 Appendix

## 19.1 Sydney Water Mains Diagram





[illegible]

## 19.3 Hydraulic Calculations



### Statement of Available Pressure and Flow

**Administrator Administrator**  
**89 York Street**  
**Sydney, 2000**

**Attention: Administrator Administrator**

**Date:** 13/09/2018

**Pressure & Flow Application Number: 471286**

**Your Pressure Inquiry Dated: 2018-07-30**

**Property Address: 15 Northumberland 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: Northumberland Street	Side of Street: West
Distance & Direction from Nearest Cross Street	120 metres North from Campbell Street
Approximate Ground Level (AHD):	12 metres
Nominal Size of Water Main (DN):	200 mm

#### EXPECTED WATER MAIN PRESSURES AT CONNECTION POINT

Normal Supply Conditions	
Maximum Pressure	53 metre head
Minimum Pressure	38 metre head

WITH PROPERTY FIRE PREVENTION SYSTEM DEMANDS	Flow l/s	Pressure head m
Fire Hose Reel Installations (Two hose reels simultaneously)	0.66	38
Fire Hydrant / Sprinkler Installations (Pressure expected to be maintained for 95% of the time)	5	41
	10	41
	20	40
	25	39
	30	39
	40	38
	50	36
	60	35
Fire Installations based on peak demand (Pressure expected to be maintained with flows combined with peak demand in the water main)	5	38
	10	37
	20	36
	25	36
	30	35
	40	34
	50	32
	60	31
Maximum Permissible Flow	84	26

(Please refer to reverse side for Notes)

**For any further inquiries regarding this application please email :**

[swtapin@sydneywater.com.au](mailto:swtapin@sydneywater.com.au)

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