Warren Smith & Partners

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HYDRAULIC SERVICES
SSDA REPORT
Blacktown Mt Druitt Hospital Stage 2
Blacktown Campus Acute Services Building

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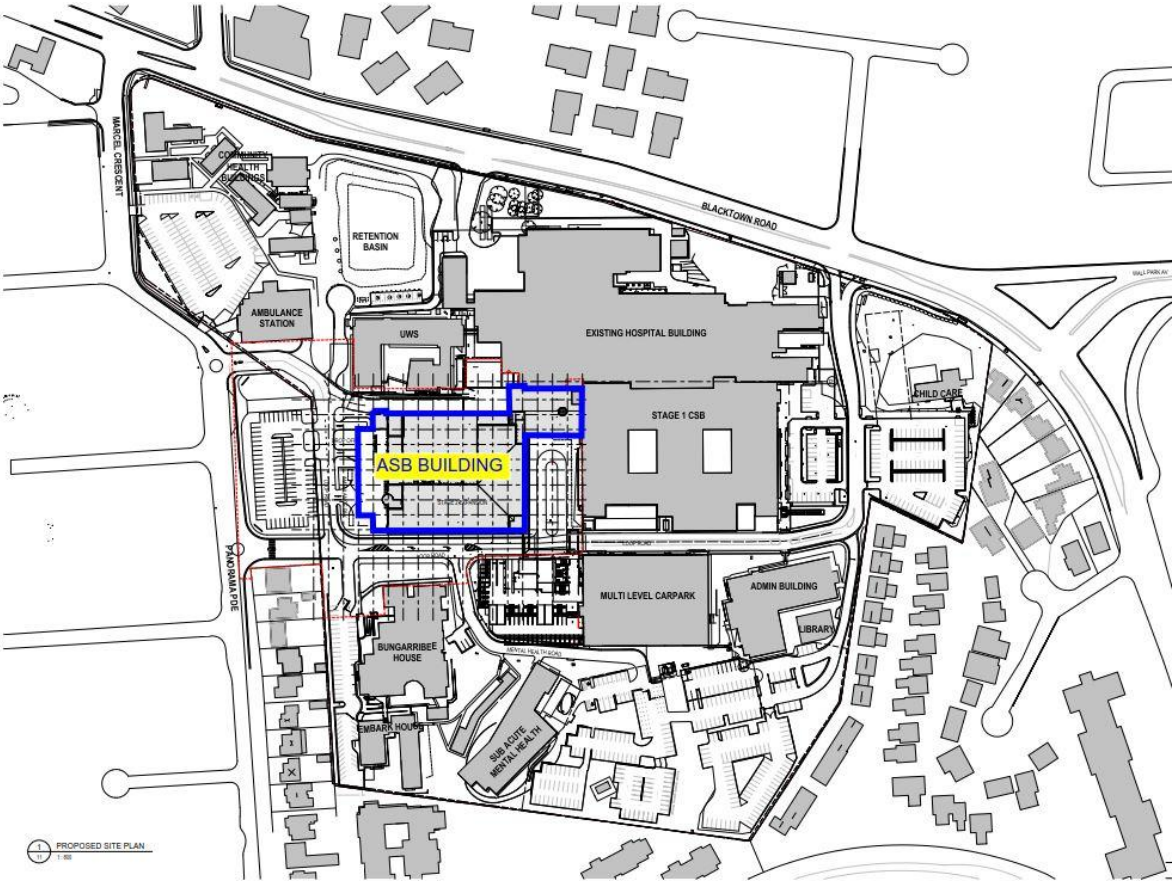
Contents

HYDRAULIC SERVICES

1. INTRODUCTION

Warren Smith and Partners have been engaged to document the Stage 2 Blacktown and Mount Druitt Hospital project to Scheme Design level by Health Infrastructure.

This report outlines the Hydraulic Services provided to the proposed New Acute Services Building.



1.1 Reference Documents

The Brief is based on the reference documents:

- Architectural documents prepared by Jacobs PTY LTD
- Site knowledge from previous scope of works on site
- Existing As-Built Drawings

1.2 Scope

Interface with the site infrastructure being installed as part of the Early Works. The Hydraulic Services that will be provided for the New Acute Services Building will include:-

- Sub-soil drainage (internal to the building);
- Stormwater drainage (internal to the building);
- Roof water drainage;
- Rainwater downpipes
- Sewer drainage;
- Sanitary plumbing and drainage;
- Potable cold water service;
- Potable hot water services;
- Warm water service using thermostatic mixing valves (TMVs);
- Non-potable cold water via localised potable water reduced pressure zone devices (RPZD);
- Non-potable hot water via localised potable water reduced pressure zone devices (RPZD);
- Reverse Osmosis (RO);
- Natural gas service;
- Sanitaryware fittings and fixtures;
- Taps and water outlets;
- Metering for Green Star.

1.3 Standards

The Hydraulic Services will be designed to a minimum of the following Standards:-

- National Construction Code (NCC)
- AS 3500 – Plumbing and Drainage Code
- NSW Code of Practice, Plumbing and Drainage
- AS 2419.1 – 2005 - Fire hydrant installations - Part 1: System design, installation and commissioning
- AS 2441 – 2005 - Installation of fire hose reels
- AS 5601 – Gas Installation Code
- EPA – Rules and Guidelines
- Sydney Water Trade Waste requirements
- Local Council Stormwater requirements
- TS 11 NSW Health Engineering Services and Sustainable Development Guidelines – 2007
- NSW Health Department Circulars

1.4 Other Considerations

Other considerations for the hydraulic services design are:-

- Maintenance
- Safety in design for construction and maintenance

1.5 Deliverables (Appendix 1)

Dwg No.	Drawing Title
BS2-HY-DG-9000	COVER SHEET, LEGEND & DRAWING LIST
BS2-HY-DG-9010	LEVEL 1 – SEWER & STORMWATER DRAINAGE
BS2-HY-DG-9020	LEVEL 2 – SEWER & STORMWATER DRAINAGE
BS2-HY-DG-9030	LEVEL 3 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9040	LEVEL 4 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9050	LEVEL 5 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9060	LEVEL 6 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9070	LEVEL 7 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9080	LEVEL 8 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9090	LEVEL 9 – SANITARY PLUMBING & DRAINAGE
BS2-HY-DG-9100	ROOF LEVEL – HYDRAULIC SERVICES
BS2-HY-DG-9210	LEVEL 1 – WATER & GAS SERVICES
BS2-HY-DG-9220	LEVEL 2 – WATER & GAS SERVICES
BS2-HY-DG-9230	LEVEL 3 – WATER & GAS SERVICES
BS2-HY-DG-9240	LEVEL 4 – WATER & GAS SERVICES
BS2-HY-DG-9250	LEVEL 5 – WATER & GAS SERVICES
BS2-HY-DG-9260	LEVEL 6 – WATER & GAS SERVICES
BS2-HY-DG-9270	LEVEL 7 – WATER & GAS SERVICES
BS2-HY-DG-9280	LEVEL 8 – WATER & GAS SERVICES
BS2-HY-DG-9290	LEVEL 9 – WATER & GAS SERVICES
BS2-HY-DG-9401	FIRE HYDRANT & HOSE REEL SCHEMATIC
BS2-HY-DG-9402	POTABLE COLD WATER SCHEMATIC
BS2-HY-DG-9403	POTABLE HOT WATER SCHEMATIC
BS2-HY-DG-9404	NATURAL GAS SCHEMATIC

2. SEWERAGE DRAINAGE SYSTEM

2.1 Existing Site Sewerage Drainage System Description

Existing Site Sewer Drainage System

The site is serviced by an existing Sydney Water sewer main passing through the North/West corner of the site. A 300mm and 225mm Authority main combine within the site and traverse through to Blacktown Road as a 300mm main. The sewer main gravitates through the site from Marcel Crescent to Blacktown Road. The Hospital has three (3) existing connections to the authority sewer in this area.

The majority of the site drains via a 225mm branch line running along the Blacktown Road frontage of the site from east to west. This site main is reported to have been replaced in 1997. Two (2) smaller 100mm and 150mm connections drain individual buildings in the north / west corner of the site.

The Day Centre and adjacent buildings drain to the eastern side of the site via a boundary trap to a 150mm board's sewer in Blacktown Road.

There are a number of house service sewer drainage lines that traverse through the New Acute Services Building site area:

1. A 225mm sewer servicing Bungarribee House, sub-acute mental health building and multi-level carpark runs south to north.

2. Side lines from this main also serve the Oncology Building and Regional Renal Dialysis Centre.

3. A new 225mm house service sewer drainage line from the New Clinical Services Building connects to the sewer main mentioned in item 1.

An existing 150mm house service sewer drainage line from the existing hospital runs externally along the southern wall of the existing hospital and connects to the sewer main mentioned in item 1.

Early Works – Sewer Drainage Services Diversion

The following works are being completed to divert the existing services to clear the New Stage 2 Acute Services Building site: (This is subject of a previous SSD for the Early Works)

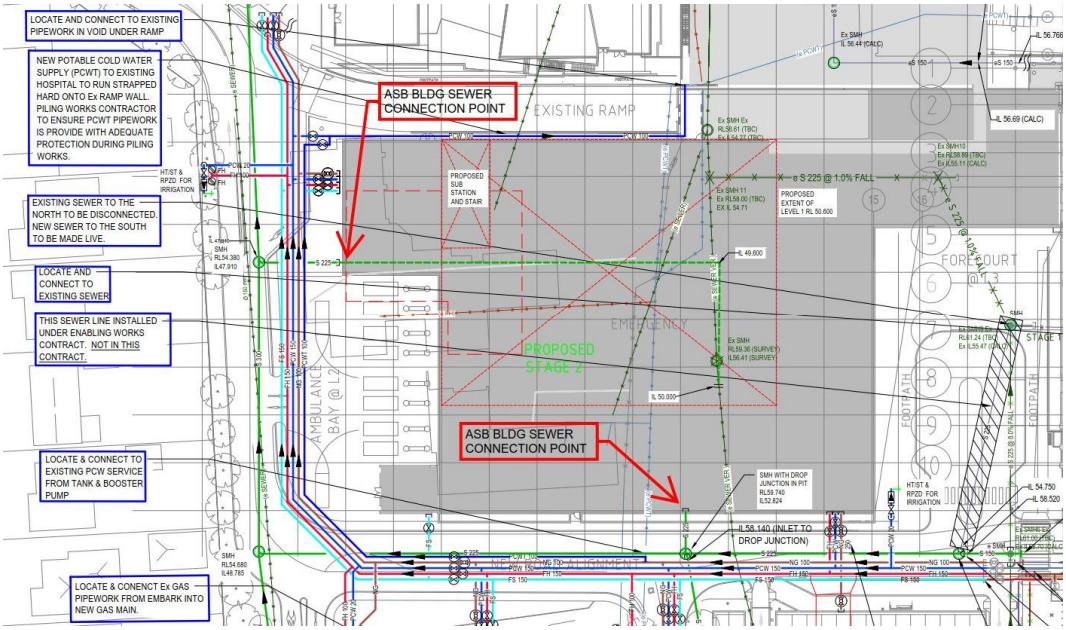
1. The 225mm sewer servicing Bungarribee House, sub-acute mental health building and multi-level carpark will be intercepted at the junction of the Loop Road and run west and then north following the proposed loop road extension and continue through to the existing sewer drainage connection at Blacktown Road.

2. The side lines serving the Oncology Building and Regional Renal Dialysis Centre will be capped off and disused.

3. The 225mm house service sewer drainage line from the New Clinical Services Building will be diverted to the south and connect up with the sewer drainage line in the Loop Road as discussed in item 1.

Advice from Sydney Water has been received which notes the current infrastructure can support the increased flows projected as a result of the BMDH stage 2 redevelopment.

Stage 2 development will connect to the existing inground sewer drainage system at Level 2 in the north west corner of the building.



2.2 Sewer Drainage and Sanitary Plumbing (Stage 2 ASB)

Sewer drainage pipe work from wet area groups will be configured so that waste fixture outlets will enter the main pipe on the upside of water closet connections where possible. This arrangement will ensure that waste matter from water closets is moved along with the increased flow of water.

Fixtures such as food tenancies, plaster room, etc. will be provided with trade waste pre-treatment facilities prior to connection to the sewer system.

The vertical sanitary plumbing pipe ducts will be provided in an arrangement that will allow future flexibility for installation of additional sanitary fixtures such as basins and toilets. Future structural provisional riser zones will be shown on structural drawings.

Soil and waste stacks and vent pipes will be located in close proximity to wet area facilities ensuring that horizontal pipe work lengths are kept to a minimum. Soil and waste stacks will be provided with

100mm diameter inspection access fittings close to the drainage connection and at each floor connection (450mm above FFL).

Soil and waste stacks, relief vents, horizontal pipe work, back vents, grease waste and trade waste pipes will be PVC pipes and fittings with solvent welded joints

2.3 Materials

In-ground sewer drainage pipework, suspended horizontal sewer drainage pipe work and back vents will be Unplasticised Polyvinyl Chloride (UPVC) pipes and fittings with solvent welded joints in all areas. For areas where sewer discharge is in excess of 70C then High Density Polyethylene (HDPE) pipes and fittings with fusion welded joints shall be used.

2.4 Sizing / Diversity

The sewer system will be sized in accordance with the requirements of AS 3500 based on fixture loading units incorporating diversity factor.

3. SUBSOIL DRAINAGE (INTERNAL TO THE BUILDING)

3.1 General

A system of piped sub soil drainage will be provided at the base of all retaining walls and where earth abuts walls of the building. Vertical drainage cells will be provided where earth is at the back of building walls.

Sub-soil drainage will also be provided under landscaped areas.

Piped sub-soil drainage will gravitate to the stormwater system designed under the Civil Services package.

3.2 Materials

Subsoil drainage pipework will be UPVC pipes and fittings.

4. RAINWATER DOWNPIPES

4.1 General

The internal rainwater drainage system will collect water from metal, concrete roofs, trafficable roofs, terrace areas and landscaped areas and gravitate by downpipes and horizontal stormwater drainage pipes to the stormwater drainage system designed by the Civil Consultant.

The rainwater drainage system will be sized for a 1:100 year rainfall intensity.

Overflows to roofs will be designed to allow for a full blocked piped stormwater system. The overflows would be through the facades of the building and a piped overflow system would only be considered for internal areas subject to rainfall.

4.2 Materials

Rainwater downpipes pipework will be UPVC pipes and fittings.

5. POTABLE COLD WATER SERVICES

5.1 General

Pipe work shall be sized to achieve flows with a maximum velocity of 1.5m/sec to minimise velocity noise and water hammer.

All risers and individual zones will be provided with isolation valves to allow engineering staff to shut off areas for maintenance or for future upgrades as necessary.

Pressure sensitive zones will be fitted with pressure limiting valves.

Backflow prevention valves will be provided into each area where zone protection is required in accordance with AS 3500.

Acoustic lagging will be provided on all pipe work in noise sensitive areas.

5.2 Existing Site Potable Cold Water Services

A 150mm potable water distribution main reticulation system has been installed in the Main Loop Road and a tee and valve connection has been provided for the New Acute Services Building development.

5.3 Potable Cold Water Service

General

A 65,000 Litre water storage tank shall be provided for the New Acute Services Building to provide 4 hour backup storage. This tank shall be located in the Level 1 Plantroom in the southeast of the building.

The pipework system shall be pressurised via a variable-speed drive triplex pumpset installed near the water storage tank. Water pressure to the fixtures outlets shall be minimum 200kPa and maximum 500kPa. Pressure sensitive zones will be fitted with pressure limiting valves.

Pipework will be sized to achieve flows with a maximum velocity of 1.6m/sec to minimise velocity noise and water hammer.

All risers and individual zones will be provided with isolation valves to allow engineering staff to shut off areas for maintenance or for future upgrades as necessary.

Backflow prevention valves will be provided into each area where zone protection is required in accordance with AS 3500.

5.4 Materials

Potable cold water pipework will be reticulated throughout the buildings using Table B copper pipe. Branch lines from the main risers will be PEX piping and fittings.

5.5 Sizing / Diversity

Pipe work will be sized to achieve flows with a maximum velocity of 1.5m/s in accordance with the Australian Standard utilising fixture loading units including diversity factors.

6. POTABLE HOT & WARM WATER SERVICES

6.1 General

Pipe work shall be sized to achieve flows with a maximum velocity of 1.5m/sec to minimise velocity noise and water hammer.

All risers and individual zones will be provided with isolation valves to allow engineering staff to shut off areas for maintenance or for future upgrades as necessary.

Pressure sensitive zones will be fitted with pressure limiting valves.

Backflow prevention valves will be provided into each area where zone protection is required in accordance with AS 3500.

Acoustic lagging will be provided on all pipe work in noise sensitive areas.

Heat lost from water within the potable hot water and warm water pipe work systems will be made up by pump recirculating water back to the hot water generation plant for reheating. The design criteria for return of water to the plant will be 5ºC loss.

All potable hot water pipe work will be insulated with 25mm thick fire rated non-toxic thermal insulation.

Hot water temperature to all dirty utility, Cleaner's rooms and fixtures as required by the Room Data Sheets will be 60ºC using the hot water circulating flow and return system detailed above.

For buildings utilising a potable hot water system network, thermostatic mixing valves (TMV) shall be used to limit temperature to outlets as follows:

- Staff 50^0C
- Public 50^0C
- Disabled Public 43^0C
- Patient care 43^0C

The use of thermostatic mixing valve in lieu of a central warm water system provides the following benefits.

- Failure of a valve only affects a small operational area and pipe work can be sterilised without shut down of the entire system.
- The central hot water system transports higher energy content and therefore requires smaller pipes resulting in less heat loss and smaller circulation pumps.
- Simpler to balance the system as the return temperature tolerance in the hot water system is 5^0C and not 2^0C as used in the warm water system.

6.2 Materials

Potable hot water pipework will be reticulated throughout the buildings using Table B copper pipe. Branch lines from the main risers will be PEX piping and fittings.

6.3 Sizing / Diversity

Pipe work will be sized to achieve flows with a maximum velocity of 1.5m/s in accordance with the Australian Standard utilising fixture loading units including diversity factors.

The design criteria for return pipework to the plant will be 5 C loss with a maximum velocity of 0.6m/sec.

7. REVERSE OSMOSIS

7.1 General

A reverse osmosis (RO) water supply plant will be located within the Pathology areas.

The reverse osmosis system will include water filtration plant, water softening plant, treated water storage tank, pressure pump set, pumps electrical control panel, individual plant and equipment electrical control wiring, interconnecting piping, valves, ancillaries, the entire recirculating treated water pipe work system to the point of connection to the dialysis equipment.

The RO plant shall be provided to the project by the LHD. As a separate contract to the LHD, an RO plant supplier (to the LHD's choosing) will provide and commission the RO plant. The plumber will install all pipework and dialysis boxes and shall be connected to the RO plant.

7.2 Water Treatment

The Schedule below nominates the typical water quality that shall be available prior to dialysis machine connection:-

Hardness	<0 dH
Iron	<0.1 mg/1
Manganese	<0.1 mg/1
Chloride	<100 mg/1
Silica	<25 mg/1
Total dissolved salts	<500 mg/1
Chlorine	<0.1 mg/1
Fouling Index (S.D.I)	<5

The RO System output shall be based on 1 L/min flow rate for each connected dialysis module or patient connection.

Water quality shall meet all required Health, Australian & International Standards.

7.3 Materials

The reverse osmosis distribution loop will be reticulated throughout the building using polypropylene pipe system with stainless steel or non-metallic fittings.

Pipework reticulation is to be lagged in accordance with the RO Plant Supplier requirements.

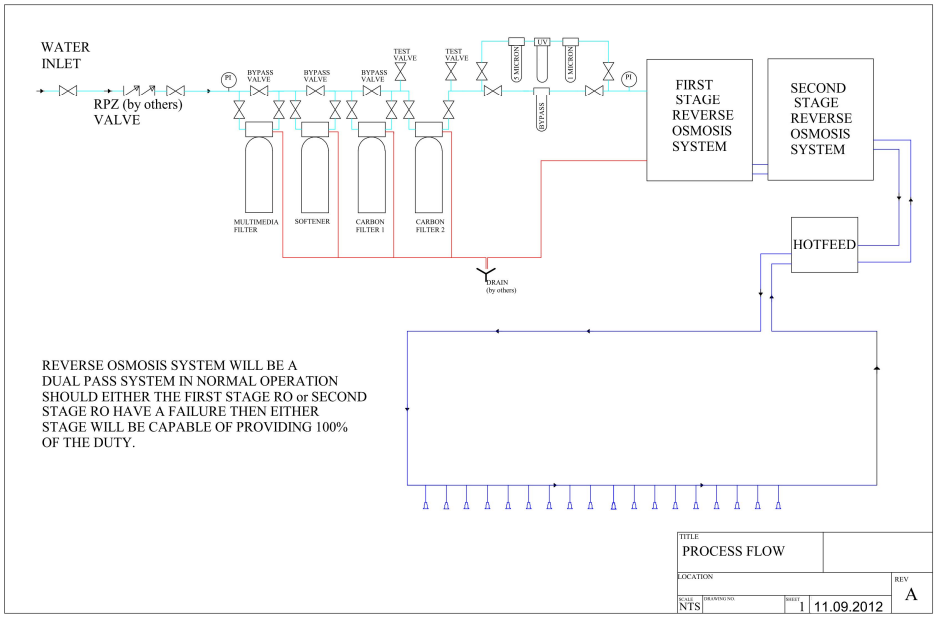


Fig. 7.1 Reverse Osmosis System Diagrammatic

8. NON POTABLE COLD WATER

8.1 General

Non-potable cold water will be supplied from the potable cold water service with a reduced pressure zone device preceding the first take off where zone protection is required in accordance with AS 3500.

9. NON POTABLE HOT WATER

9.1 General

Non-potable hot water will be supplied from the hot water flow and return main with a reduced pressure zone device preceding the first take off where zone protection is required in accordance with AS 3500.

10. METERING

10.1 General

Pulse water meters will be installed on all major users of water and wired to the BMCS for data collection. The meters will be installed on such items as cooling towers, heating water heaters, hot water generation plant, reverse osmosis plant, etc.

11. NATURAL GAS SERVICE

11.1 General

Natural Gas service to the Acute Services Building shall connect to mechanical boilers, domestic hot water generation plant, and possible retail tenancies.

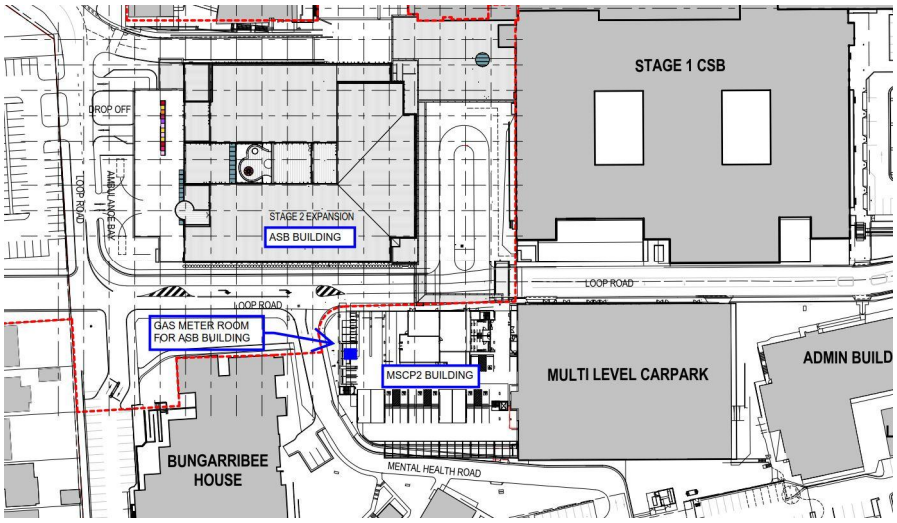
11.2 Existing Site Natural Gas Service

Natural gas service to the Blacktown Campus is supplied through the Jemena 75mm medium pressure gas main in Blacktown Road.

The incoming gas service connects to the Jemena gas meter and regulator assembly in the Hydraulic compound. The Hydraulic compound is located adjacent to the new site entry from Blacktown Road.

Natural gas is reticulated around the campus via a 100mm MDPE pipework at pressure of 35kPa.

A 100mm tee and valve connection shall be capped off for future connection to the New Acute services Building. The gas meter and regulator will be installed in the new Multi-Storey Carpark (MSCP) across the road form the new ASB.



11.3 Materials

Natural gas pipework will be reticulated throughout the buildings using Table B copper pipe and fittings.

11.4 Sizing / Diversity

The natural gas service will be sized in accordance with the requirements of AS/NZS 5601.1 – 2010 – Gas Installation, Part 1; General Installation, incorporating a diversity factor.

12. FIRE HYDRANT & HOSE REEL SERVICES

12.1 Existing Site Fire Hydrant Service

The existing fire service to the site is supplied from the 250 mm Sydney Water Corporation water main in Blacktown Road. A 150 mm branch line supplies the site. Supply is via a 150 mm double check detector assembly, 150 mm booster valve, and Diesel pump set located in the new Hydraulic Compound located adjacent to the new site entry from Blacktown Road built during the Stage 1 Works.

A 150 mm MDPE hydrant main is provided around the site. Individual fire hydrant supply connections are provided for the existing Hospital Building, Stage 1 CSB, multi-storey Carpark and Mental Health Sub-Acute.

A 150mm tee and valve connection shall be capped off for future connection to the New Acute services Building.

12.2 Fire Hydrant Service

A fire hydrant ring-main system shall be provided to the New Acute Services Building as the building is over 25 metres in height.

On Level 9, a 30,000 litre hydrant storage tank and diesel-electric pump set shall be provided to pressurise the system as per AS 2419 requirements.

Fire hydrant landing valves with storz coupling shall be located within fire stairs and each in fire compartments. The storz coupling is a requirement by the FRNSW.

12.3 Materials

Fire hydrant pipework will be reticulated throughout the building using galvanised mild steel pipework with Victaulic mechanical joints.

12.4 Fire Hose Reel Service

Fire hose reels will be installed throughout the Stage 2 New Build complying to NCC Part E1.4 and AS 2441 - 2005 requirements. The system will incorporate the following:

- Fire hose reels located in cupboards within 4.0 m of the building exits.
- Additional fire hose reels will be located elsewhere within the buildings to provide additional coverage as required.
- The fire hose reels will be provided with water from the metered potable water supply.

12.5 Materials

Fire hose reel pipework will be reticulated throughout the building using Table B copper pipe and fittings.

13. SANITARYWARE

13.1 General

The hydraulic services will comprise the complete supply and installation of sanitary fixtures as outlined in the Schedule of Sanitary and Tapware Fixtures. Work includes the supply and fixing of all fixtures, bolts, brackets, putty, silicone, cement and sundry material necessary for installation and connection of sanitary fixtures in accordance with the manufacturer's instructions.

Sanitary fixtures will be first quality high density vitreous china, 'P', 'S' or screw trap outlets as nominated on the Hydraulic Services drawings and white in colour. WC pans will have back flush inlets.

Sanitary fixtures will be sealed to walls and bench / counter tops with white anti-fungi silicone sealant.

WC's will be fitted with a concealed 'Key Seal' where the flush pipe joins the sanitary ware piece. Brackets used to support the sanitary ware pieces, special fixtures or stainless steel fixtures will be secured to walls with hexagon-headed zinc-plated bolts, or brass screws. Stainless steel fixtures will be first quality stainless steel.

Plug and washers for basins will be 40 mm diameter chrome-plated brass, complete with approved type plastic plug. Plug and washers for stainless steel sinks will be stainless steel on plastic type complete with approved type plastic plug.

Clinical basins, hand basins, disabled basins, medical basins and tea sinks will be provided with tapholes to suit the type of tapware required.

Recessed tap bodies, breeching pieces and threaded elbows will be fixed to basin mounting plates generally in the manner provided for by the detail drawing of mounting plates.

14. TAPS, WATER & GAS OUTLETS

14.1 General

The work will comprise the complete supply and installation of taps, water and gas outlets as required for the building and to suit the sanitaryware.

Unless noted otherwise exposed taps, water and gas outlets and other fittings will be bright chromium plated.

All taps will be equal to 'Caroma or Enware', loose jumper tap washer or ceramic disk type with lever handles in accordance with the schedule.

Tapware handles will be anti-vandal, chrome plated with indicator buttons in accordance with the following:

Cold water tap = Blue
Hot water tap = Red
Warm water tap = Yellow

Wall mounted and hob mounted taps will be fitted with extension spindles of sufficient length to enable top cover plates to be screwed onto spindles.

Wall flanges will be in accordance with the Tapware manufacturer's technical data.

Flanges will be provided to all taps and outlets at baths and showers.

Water outlets will be at the aerated type unless otherwise specified to be spray-type or neither aerated nor spray-type.

Tapware will be sealed to sanitary ware stainless steel fixtures, wall surfaces and bench / counter tops.

15. WORKS BY OTHER TRADES

The following work associated with the Hydraulic Services is performed by other trades.

15.1 Building Trade

- Access panels to ducts, inspection panels in walls and false ceilings.
- Sealing toilet room floors with specified epoxy membrane or method to the room floor waste.
- Provision of all shower bases and hobs where required.
- Roof Gutters.
- Overflows and spitters from roof, terrace and balcony areas.
- 150mm high hobs to Roof pipework penetrations.
- All concrete sumps that form part of the concrete floor slabs of the building or are constructed on top of concrete floor slabs of the building.
- All concrete sumps and grated drains that form part of the structural floor slab on suspended floors of the building.
- Forming up and construction of concrete hobs around pipe slot floor penetrations in plantroom floors.
- Concrete equipment plinths for all hydraulic equipment.
- Boxing in all exposed downpipes, soil stacks, vent pipes, etc.
- Casting in but not supply or locate any pipe cores or sleeves which are to be provided.
- Signage to all TMVs.
- Drainage cell to back of building walls.

15.2 Electrical Trade

Electrical power wiring to;

- Hydraulic equipment (from isolator to equipment)
- Hydraulic panels (into terminal strips)
- Sensor taps, chilled and boiling water units, and urinal sensors

15.3 Mechanical Trade

- Extensions of cold water service to A.C. plant from control valves provided.
- Extensions of condensate drainage from AC equipment and plant to tundishes or floor wastes provided.
- Mechanical ventilation of Pump Rooms.

15.4 Landscape Trade

- Drainage Cell to Planter Boxes and Landscaped areas.
- Automatic Landscape Watering System.

15.5 BMCS Trade

Wiring to all hydraulic plant and equipment;

- Water Meters
- Hydraulic Equipment

16. ESD Initiatives

16.1 Potable Water Demand Reduction

The following potable water demand reduction strategies could be considered:

- Selection of water efficient fixtures with appropriate WELS ratings shall be used;
- Fire Hydrant systems design to include for recycling of test fire water into the hydrant tank;
- Harvesting rainwater from metal and concrete roofs for re-use as toilet flushing and landscape irrigation ***(strategy is subject to a cost-benefit analysis during the design development stage)***;
- Installation of pulse water meters (to Sydney Water standards) for all major uses of water and wired to the BMCS for data collection and water-leak detection; and,
- Selection of drought tolerant landscape elements that require low irrigation water demand.

17. APPENDIX 1 (Hydraulic Services Schematic Design Drawings)