Woolacotts.
CONSULTING ENGINEERS

Hydraulic services

Return brief for

Penshurst Public School

16 January 2018

Hydraulic services

Design intent

The hydraulic systems for the proposed development, shall be designed, documented and installed in accordance with the requirements of the Authorities having jurisdiction.

The reticulation and sizes of all services, fixtures and equipment is to be shown on design and workshop drawings, and submit for approval prior to commencement of any building work.

Consideration shall be taken in the selection of materials and equipment, its suitability, ease of installation. Ease of maintenance and life expectancy of the service.

System performance requirements

a) Stormwater Roof Drainage

All roof water, stormwater, shall be designed to comply with the minimum standards of governing authorities.

Stormwater systems shall be designed to the intensity as outlined in Australian Rainfall and Runoff complying with AS 3500.3 Australian Standard for Stormwater drainage.

Design Major and Minor stormwater systems to collect rainwater from all roofs, balconies, terraces, and the like.

Minor system - Eaves Gutters to drain 20 year ARI

Major system - Box and Valley gutters conveying stormwater up to 100 year ARI.

All stormwater drainage shall drain via on-site rain water reclamation / OSD tank used for irrigation and WC flushing.

c) Sanitary Plumbing and Drainage

A sanitary plumbing and drainage system shall be designed to contain the minimum amount of pipework necessary to carry away waste water from each fixture quickly and quietly, discharging to the authorities sewer main.

The design shall comply with the latest Australian Standards AS 3500.2 to satisfy local authority requirements.

The sanitary drainage and plumbing system shall connect to the Sydney Water Corporation sewer main.

A waste water system shall drain all sanitary fixtures, floor wastes, tundishes, mechanical overflows and the like and gravitate to the sewer main.

The system shall include all waste stacks, soil stacks, vents and horizontal drainage required to complete the system.

The capacity of the system shall be 25% greater than the design loading that includes all horizontal and vertical pipework.

All disused sewer connections are to be sealed off to the local authorities requirements.

d) Trade Waste

Canteen / Kitchen

Provide 1000 litre grease arrestor for kitchen /canteen area and connect treated waste water to sewer drainage system.

e) Cold Water

The cold water service shall provide the necessary quantity of water to each area or fixture. A system shall be designed with acceptable water velocity and pressure drops to deliver water at the minimum required flows and pressures as mentioned.

The design shall comply with the latest Australian Standards AS 3500.1 to satisfy local authority requirements.

Provide pressurised water to, but not limited to, the following areas:

- All amenity areas
- Staff areas – Kitchens
- Canteen

f) Design Criteria

The cold water system shall meet the following minimum operational and design criteria:

- pipework shall be copper tube to AS 1432.
- working velocities in pipes shall be limited to a maximum of 1.8 m/s for main services.
- maximum operational pressure 500 kPa.
- minimum operation pressure 220 kPa.
- the following minimum flow rates shall be provided to fixtures:

WC cistern	-	6.0 l/min
Basins	-	6.0 l/min
Sinks	-	6.0 l/min
Cleaners sink	-	12.0 l/min
Hose taps	-	18.0 l/min

Shower - 6.0 l/min

- provide backflow prevention devices to all incoming water supplies and all outlets with potential cross connections to AS 3500.1 and Sydney Water's requirements.
- Provide control valves to each group of fixtures located within the same room and level.

g) Non drinking water services

Non-drinking water services (especially recycled or reclaimed water installations) shall be installed so that the drinking water system cannot be contaminated.

Before commencing any work on any non-drinking water service, reference shall be made to the local supplier, the health authority and the environmental protection authority for the requirements determining the permitted use of non- drinking water.

h) Cross connection control

Non-drinking water installation shall be designed, installed and maintained to prevent a cross-connection with drinking water supply. Where a property is served by a non-drinking water supply, the following shall apply:

i) A backflow prevention device for the degree of hazard, and sized to suit the water service, shall be fitted at the meter on the drinking (potable) water supply.

ii) There shall be no cross-connection between any drinking or non-drinking water service.

iii) All external tap outlets on the drinking water service shall be fitted with hose connection vacuum breakers.

iv) Cross-connection protection for non-drinking water service shall meet the requirements of AS3500, Section 4.

i) Installation Requirements

Non Drinking Water Service – Hose Tap Outlets

Hose tap outlets shall:

i) Be clearly marked 'WARNING: NOT FOR DRINKING', in accordance with the requirements of AS1319.

ii) Be of a type that has a removable handle.

Marking & Labelling of Non Drinking Water Pipes & Outlets

All pipes, pipe sleeves, identification tapes, and outlets shall be coloured Lilac (P23) in accordance with AS2700.

All pipes, pipe sleeves and identification tapes shall be marked with the following, in accordance with AS1345:

WARNING: RECYCLED OR RECLAIMED – WATER – DO NOT DRINK

j) Testing & Commissioning A Non Drinking Water Service

The non-drinking water service shall be tested in accordance with AS3500, Section 16. The non-drinking service shall also be tested for cross-connection, prior to commissioning.

k) Hot Water

The hot water system shall be designed to be the most economical energy efficient for its proposed use and peak demand requirements.

The design shall comply with the latest of Australian Standards AS3500.4.

The hot water service shall comprise of a mounted centralised solar plant, hot water flow, hot water return, dual circulating pumps, balancing valves and insulation.

Maximum inlet supply pressure to all boilers is to be 500 kPA and maximum temperature supply shall be 65°C.

Insulation will have a zero flame and smoke index and be 25mm thick with a K value of 0.04 w/m K for all hot water flow and return pipework including all dead legs.

Dead legs in the hot water system shall be avoided and every hot water outlet shall have full temperature within 20 seconds.

All hot and cold water pipework in wall chases to be pre lagged, Kemlag type:

Hot water circulating pumps to be dual in operation with “duty pump” - “stand by” principle with pump run and pump fail. Pump sized to limit heat loss from system to 5°C.

Control valves to be provided to each group of fixtures located within the same room and level.

Balancing valves to be installed on all hot water return lines.

Provision for expansion and contraction to be provided on all hot water pipework.

Air release valves to be provided at highest point of main circuit complete with drain.

Pressure reduction valves to be provided on any branch line in excess of 500 kPa.

l) Design Criteria

The hot water system shall meet the following operational and design criteria:

- Pipework shall be copper tube to AS 1432.
- Working velocities in pipes shall be limited to a maximum of 1.8 m/s.
- Maximum operational pressure 500 kPa.
- Minimum operation pressure 220 kpa.
- The following minimum flow rates shall be provided to fixtures:

  Basins - 6.0 l/min

Sinks	-	6.0 l/min
Cleaners sink	-	12.0 l/min
Hose Taps	-	18.0 l/min
Shower	-	6.0 l/min

- Provide backflow prevention devices to all incoming water supplies and all outlets with potential cross connections to AS 3500.1 and Sydney Water's requirements
- Provide water hammer arrestors where necessary
- Thermostatic mixing valves to be provided to all amenities
- 50°C hot water to be provided to all staff areas
- 43.5 warm water to all student areas

m) Gas Service

A natural gas system shall be designed providing gas to all gas appliances including gas fired hot water units.

The whole of the system shall be designed to comply with AS 5601 and local authorities requirements

Extend the gas service to the roof plant rooms and connect to the hot water heaters.

A main Gas meter will be supply to service the whole site

A flame failure device to be installed on each appliance connected to the gas supply.

n) Fire Hydrant / Hose Reel Service

The fire hydrant/hose reel service shall be designed to provide all hydrants/hose reels with a fire flow and pressure to comply with the BCA, AS 2419, NSW Fire Brigade requirements and the local council requirements.

A diesel and electric pump will be provided to supply required pressure and flow.

Provide a hydrant jacking pump rated at 1.26 l/s for fire hose reels and for pressurising the system.

Fire hose reels shall be provided within 4 metres of each fire isolated exit and where required to maintain coverage of 36 metre hose length.

o) Sanitary Fixtures and Tapware

Supply and install fixtures, including showers, baths, tubs, basins, sinks, WC's and the like. Supply and fix accessories, including bolts, brackets, putty, mastic, mortar and the like, necessary for the correct installation for the fixtures.

All fixtures and tap ware to be as scheduled by the Architect.

Installation to manufacturer's recommendations.

p) Rainwater reclamation system

Rainwater from roofed areas is to be stored and recycled for WC flushing and irrigation purposes.

Rainwater is to be pre-treated by means of a first flush device prior to storage.

Filtration and disinfection of rainwater is to be utilised and incorporate the following equipment:

First stage primary filtration utilising dual auto backwash filters screening to SD 50 microns.

Second storage micro filtration utilising bag filtration down to 10 micron absolute. Pressure differential gauges are to be used with in-built alarm system when system is blocked and filters require replacement.

Third stage UV disinfection is to be utilised with dual UV units with in-built warning system if system fails.

An automatic potable water changeover control box is to be used when there is insufficient rainwater to supply the system.

Fire services

Authority compliance

The fire services will be designed in accordance with the requirements/recommendations of the following:

- Local Council
- WorkCover
- Sydney Water Corporation
- The Building Code of Australia (2017)
- The Australian Standard AS 2941.1
- The Australian Standard AS 2444
- The Australian Standard AS 3500.1

Extent of fire services (wet services only)

- Fire hydrant service
- Fire hose reels
- Portable fire extinguishers
- Fire hose reels

Portable fire extinguishers will be installed in accordance with the requirements of the Building Code of Australia, AS 2444 and the NSW Fire and Rescue. Generally, places of potential hazard will be provided with extinguishers, such as electrical switch room, mechanical and plant rooms.