UNSW

Biological Sciences Project - Stage 2

Hydraulic and Fire Services Design Report

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Contents

Page

1 Hydraulic and Fire Services 1

1.1 Executive Summary 1
1.2 Hydraulic and Fire Services 2
1.3 Domestic and Non-potable Cold Water 2
1.4 Hot Water 3
1.5 Reverse Osmosis Water 3
1.6 Bore Water 3
1.7 Natural Gas 3
1.8 Stormwater Drainage 4
1.9 Sewer and Sanitary Plumbing 4
1.10 Grease Waste 4
1.11 Laboratory Plumbing 5
1.12 Fire Water Supply 5
1.13 Fire Hydrant 5
1.14 Automatic Fire Sprinklers 5
1.15 Automatic Fire Detection and Alarm 6
1.16 Portable Fire Extinguishers 6
1.17 Sound system & intercom system for emergency purposes (SSISEP) 6
1.18 Fire Hose Reels 6

1 Hydraulic and Fire Services

1.1 Executive Summary

This report has been prepared to describe the hydraulic and fire services systems proposed for the UNSW Biological Sciences Project – Stage 2 and how they respond to the State Significant Development Application.

The hydraulic and fire services in the proposed UNSW Biological Sciences Project – Stage 2 will be designed with separate hydraulic plant and interconnected fire services between Stage 1 and 2. Water efficient design principals such as water efficient fixtures, tap ware and bore water supply will be utilised to minimise potable water use.

All hydraulic services designed are to provide convenient, safe, serviceable and durable systems during use.

All systems are to be provided to meet the performance requirements of Australian Standards and UNSW Design and Construction Requirements.

1.2 Hydraulic and Fire Services

The following is a description of the hydraulic and fire services being provided for the UNSW Biological Sciences Stage 2 project.

The Hydraulic systems will include the following:

- Domestic and Non-Potable Cold Water,
- Domestic and Non-Potable Hot Water,
- Reverse Osmosis Water,
- Bore Water,
- Natural Gas,
- Storm Water Drainage,
- Sanitary Plumbing and Drainage,
- Grease Waste Plumbing and Drainage, and
- Laboratory Plumbing and Drainage.

The Fire Systems will include the following:

- Fire Hydrants,
- Automatic fire sprinklers system,
- Automatic fire detection and alarm system,
- A Sound System and Intercom System for Emergency Purposes (SSISEP),
- Fire Hose Reels, and
- Fire Extinguishers.

1.3 Domestic and Non-potable Cold Water

The domestic cold water (DCW) service will be supplied from the University infrastructure via an existing water connection available at the Lower Ground Floor. A new water meter and RPZD will be provided for the building.

The estimated tank size for potable water is 20kL and 10kL non-potable water. These sizes will be further verified during detailed design phase based on user group requirements and building loads.

The domestic cold water serves all fixtures on site requiring potable water and provides make-up to the non-potable water system (via a Reduced Pressure Zone Device – RPZD). Control valves will be provided so that individual fixture groups may be shut down without affecting the wider system.

Water to each large user including cooling towers, amenities and hot water services will be individually metered via water sub meters and monitored by the BMCS.

The cold water supply will generally be supplied vertically via two (2) main hydraulic service risers providing water to all areas of the building. Each riser duct has isolation valves to facilitate maintenance shut downs.

1.4 Hot Water

A circulating hot water service will be provided to the building with a dual hot water circulating pump set located in the roof top plant room. Hot water will reticulate to the building by two main service risers providing water to all areas of the building. Each riser duct will have isolation valves to facilitate maintenance shut downs.

All pipework will be insulated to minimise heat loss; this is to include pipework up and down stream of TMVs.

Warm water will be provided with thermostatic mixing valves housed in recessed stainless steel wall boxes which incorporate hot and cold water isolation valves. Warm water will be provided at all basins and showers.

1.5 Reverse Osmosis Water

A new reverse osmosis system including RO tanks is proposed to serve the new building.

RO plant will be centrally located in the roof-top plant room and a circulated RO service will be reticulated to all laboratories.

The raw water will be obtained from the UNSW bore water system complete with backflow prevention, sub-meter, filtration, UV disinfection and micro-filtration prior to the RO process.

1.6 Bore Water

Treated bore water will be used as source for non-potable laboratory water including RO systems and Cooling Towers.

Air gaps and backflow prevention will be provided to eliminate risk of cross contaminating potable water.

The bore water will be connected from the UNSW bore water system to all new user points where significant quantities of non-potable water are expected to be used including supply to water flushing system, cooling towers, reverse osmosis plant and laboratory cold water system.

1.7 Natural Gas

A natural gas supply will be delivered to the building for mechanical plant, hot water heating and laboratory use. The existing low pressure gas connection will be extended from the Lower Ground Floor to all required points. The existing 100kPa gas service is to remain.

A new gas connection from existing gas infrastructure will incorporate a shut off isolation valve with a spare valve key located in the gas meter room. Property isolating valves will be utilised before and after the meter along with filters and regulators. The meter will be fixed in the gas meter room.

Emergency safety shut off gas guard devices will be installed to branch lines supplying appliances with open flames.

Gas flues from hot water heaters and boilers will extend through the roof to terminate to atmosphere. All rooms containing gas-burning appliances will be adequately ventilated.

1.8 Stormwater Drainage

Stormwater drainage to the building will be comprised of the roof water and canopy roof.

The stormwater design is based on rainfall intensities of:

- 231mm/hr for eaves gutters (1 in 20 year ARI, with 10% added for design safety);
- 297mm/hr for downpipes (1 in 100 year ARI, with 10% added for design safety).

The roof drainage design will incorporate roof gutters drained by a gravity downpipe system. The main stormwater downpipes are to be located within the core plant areas of the building. Roof water will be directed to new and existing stormwater pits provided as part of the Stage 1 works and Stage 2 works.

The Level 1 canopy overhanging the northern ground level façade will be drained via box gutter at edge of façade. Downpipes are to gravity feed either exposed downpipes adjacent to the façade or built-in to the facade and will be directed to existing stormwater pits provided as part of the Stage 2 works.

All external stormwater works including overland flow, new stormwater pits and connection to existing infrastructure will be integrated with the Civil Works.

1.9 Sewer and Sanitary Plumbing

The sewer drainage system connections will be a minimum 150mm diameter service. All sewer drainage is to be connected into new and existing sewer manholes or drainage pipes. Final sizes to be determined by calculations in accordance with AS3500-2003.

The sewer connections from the building have been connected to the UNSW sewer infrastructure at multiple connection points.

The sewer drainage system will be provided in accordance with AS3500.2.

A fully vented modified sanitary drainage system designed to comply with AS3500 will be installed to the building to offer flexibility to the system and future refurbishments. The sanitary drainage stacks will be separated into:

- Toilet stacks and kitchenette stacks draining directly to the sewer system;
- Laboratory Stacks draining to the existing 5,000L dilution/stabilisation pit.

1.10 Grease Waste

A grease waste system will be required to the cafe located at Ground floor level. Grease waste will be collected in a separate drainage system complying with the requirements of the statutory codes and connected to the existing 5,000L Grease Arrestor, located at Lower Ground Floor installed as part of Stage 1 works.

1.11 Laboratory Plumbing

The sanitary plumbing to the laboratory sinks, laboratory basins, fume cupboards and laboratory equipment will be discharged to separate laboratory drainage system connected to the existing 5,000L dilution pits. Materials used will be chemical resistant HDPE.

It is proposed to provide 3sqm space provisions for future Ph correction system if required.

1.12 Fire Water Supply

All water supplies to the campus are metered, including fire hose reel, hydrant and sprinkler water supplies. UNSW maintains double check valves at the boundary connection to the Sydney Water Infrastructure in accordance with Sydney Water requirements. The water connection for fire services for Stage 1 and 2 will be fed from the Stage 1 fire pump room. The UNSW campus is supplied off two independent water supplies from the Sydney Water 750mm main in High Street and in Botany Street. A Sydney Water sectioning valve located between the two supply points enables this connection to satisfy the Grade 2 requirements of the Fire Sprinkler Code –AS2118-1995.

Grade 1 water connection required for Stage 1 and 2 under “one building approach” will be provided as a combination of direct connection to UNSW infrastructure and fire storage tanks (25kl hydrant and 25kl sprinkler) provided as secondary supply.

1.13 Fire Hydrant

A fire hydrant system will be provided to protect the building in accordance with the requirements of the BCA 2014, AS2419.1-2005, Sydney Water Corporation and the Fire and Rescue NSW.

A common Fire Brigade Booster is proposed to be installed serving Stage 1 and 2. The Fire Brigade Booster will be located on the Lower Ground Floor of E26 in compliance with AS2419.1-2005, and the FR NSW requirements.

A 25,000 litre fire services storage tank located on Stage 1 roof top will provide an alternate water supply source for combined buildings, Stage 1 and 2.

Hydrant valves will be located within the fire stairs and one additional on typical floors to provide required coverage.

The Fire Hydrant strategy has been discussed and supported in principle by the Fire Brigade.

1.14 Automatic Fire Sprinklers

A fire sprinkler system is required to protect the building. The systems will be designed to comply with the requirements of the BCA 2015 Clause E1.5 & Spec. E1.5, AS 2118.1-1999 all relevant Australian Standards and will incorporate requirements of the Fire Engineering Report.

The sprinkler system will be supplied from Stage 1 and boosted by the Stage 1 sprinkler booster assembly located on the Lower Ground Floor.

The Fire Sprinkler strategy has been discussed and supported in principle by the Fire Brigade.

1.15 Automatic Fire Detection and Alarm

A fire detection system will be provided within the building as per the requirements of AS1670, the BCA, the fire engineered solution and the FR NSW.

The automatic smoke and heat detection and alarm system will protect the whole of the building and associated facilities for smoke hazard management control.

Detectors will be spaced and located in accordance with AS1670. Heat detectors will be provided in areas not suitable for smoke detectors.

1.16 Portable Fire Extinguishers

Portable fire extinguishers will be provided to satisfy clause E 1.6 of the Building Code of Australia, AS2444 and local government requirements.

Generally fire extinguishers will be distributed throughout the building in areas of specific hazard and within fire hose reel cupboards.

1.17 Sound system & intercom system for emergency purposes (SSISEP)

A Sound System and Intercom System for Emergency Purposes (SSISEP) will be provided throughout the building with emergency audio message broadcasting through the PA system using the options of pre-recorded messages and live announcements.

The SSISEP will be developed with UNSW FM to ensure interconnections with neighbouring Campus buildings.

1.18 Fire Hose Reels

A fire hose reel service will be provided to comply with the deemed to satisfy provisions of Clause E1.4 of the Building Code of Australia, AS2441-2005.

Fire hose reels are to be located within 4m of required exits.

Water to fire hose reels will be supplied from the domestic cold water system.