

MATERIAL SCIENCE & ENGINEERING BUILDING, UNSW KENSINGTON

DA SUBMISSION

HYDRAULIC AND FIRE SERVICES REPORT

Issue	Reason	Date	By	Status
01	For Information	October 2012	Mathew Swindon	Current

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1. INTRODUCTION

Warren Smith & Partners have been engaged by UNSW to complete a Building Services Investigation Report related to the proposed new Material Science & Engineering Building, Master plan.

The purpose of the Report is to access Authorities infrastructure as well as the Universities lower Campus' existing mains and their adequacy to supply and service the proposed Redevelopment Master Plan.

The Report also encompasses existing underground services that may need to be diverted and relocated due to the proposed construction zone of the proposed building.

The Report encompasses Hydraulic and Fire Services.

The investigation was based on visual site inspections, existing services plans and Authorities Services diagrams.

2. AUTHORITY SERVICES

2.1 Sydney Water, Water & Sewer Infrastructure

The potable water supply to the University site is currently serviced by multiple water supply connections to the Sydney Water Corporation (SWC) water main through various locations along Botany Street, High Street, Anzac Parade and Barker Street. Each connection is fitted with individual water meters to monitor water usage and connected to the Universities SCADA system.

Backflow prevention to the Universities Campus' potable cold water service is achieved via dual Reduced Pressure Zone Devices (RPZD) at all points of connection.

The University's Campus' Fire services supply is provided from potable cold water reticulation throughout the site. The new Building will need a Double Detector Check Valve Assemblies (DDCV) on each incoming Fire service supply to be provided for backflow prevention and protection to all existing Buildings.

A statement of available pressure and flow has been obtained from UNSW FM internal consultant (ANA Technical Services P/L) for the 150mm diameter water services supply proposed to reticulate the new Building.

The minimum / maximum flows available are 0.66 L/sec to 60 L/sec with a maximum / minimum pressure available are 47 m/head to 28 m/head. The flows and pressures stated are adequate to supply the new Buildings demands for water and fire services, while the pressures obtained indicate that there is need for the provision of pressure booster pumps for domestic cold water and fire services to be provided to the new Material Science & Engineering Building.

The sewer drainage for the University site is currently serviced by multiple connections to the Sydney Water Corporation (SWC) sewer main through various locations along Botany Street, High Street, Anzac Parade and Barker Street.

A 300mm diameter SWC sewer main connection is located on the eastern side of Anzac Parade adjacent to the Tyree Building. This main then extends west and connects to the Sydney Water 300mm diameter sewer main.

A Sydney Water Section 73 Feasibility Application has been lodged with Sydney Water to confirm the adequacy of its sewer and water main network to supply the additional water and sewer demands that the development will produce.

2.2 Jemena Natural Gas Network

The University's' site is currently serviced by a 100mm diameter Jemena secondary high pressure natural gas main located in Botany Street and High Street. Staging regulators and gas meter positioned adjacent to the authority's mains connections, provide the 100kPa natural gas supply to the all existing buildings and surrounding facilities.

Jemena have verbally advised that there is adequate capacity within the Natural Gas Network System to supply the proposed Development.

Written application for additional gas loading will need to be lodged to the Universities current Natural Gas retailer.

3. BUILDING SERVICES REPORT

The following services shall be covered within the investigation:-

HYDRAULIC SERVICES

- Sewer and Trade Waste Drainage
- Potable Cold and Hot Water
- Bore Water
- Treated Bore Water
- Natural Gas Service

FIRE SERVICES

- Fire Hydrant Service
- Fire Hose Reel Service
- Fire Sprinkler & Detection System
- Fire Detection & Alarm System
- Sound System and Intercom System for Emergency Purposes / Building Occupant Warning

3.1 Hydraulic Services

3.1.1 Sewer and Trade Waste Drainage

The existing site drainage drains from the new Building within Union Road in a westerly direction via a 225mm diameter sewer main and connects to the existing 300mm diameter SWC sewer main crossing Anzac Parade from Day Avenue. Further study and information is required to confirm that the 225mm diameter sewer drainage passing under the Law Building is of an adequate size to accommodate any additional load.

Existing 'live' private sewer mains were evident in the proposed building construction zones. These drainage lines will require to be diverted and or removed.

3.1.2 Potable Cold Water

The existing site is serviced with a mains pressure water service supplied via the multiple water supply connections to SWC water mains. 100mm diameter water meters complete with wireless monitoring and dual RPZD's are situated at the Buildings incoming Potable Cold Water Service.

Site investigations have determined that existing 'live' private water mains were evident in the proposed building construction zones. These service lines will require to be diverted and or removed.

The following water saving conservation devices will be explored for use within the development:-

- ❑ 3/4.5 Litre WC cisterns
- ❑ 0.8 L/sec automatic urinal flushing
- ❑ Water efficient tapware and appliances
- ❑ Collection and treating rainwater for sanitary flushing
- ❑ Reuse of waste reverse-osmosis water for sanitary flushing
- ❑ Reuse of sprinkler and hydrant test water for sanitary flushing
- ❑ Water metering of all major water uses and monitoring by the BMCS for leak detection

The potable cold water service will be designed and constructed in accordance with The Plumbing Code of Australia, AS 3500.1, National Plumbing and Drainage Part 1: Water Supply and Sydney Water requirements.

3.1.3 Potable Hot Water

Investigations have indicated that the Universities Campus is not supplied from a centralized hot water plant, and that each building is currently serviced by its own hot water plant. The new Building will be provided with new Natural Gas boosted hot water storage plant, installed in the Roof top Plant room of the proposed Building. From the Building hot water plant, reticulated hot water flow and return systems will be provided with individual TMV's provided to all ablution fixtures requiring warm water control.

3.1.4 Non Potable Cold Water (Bore Water/ Treated Bore Water)

The existing site is serviced with a mains pressure Bore Water and Treated Bore Water service supplied via the University's Campus' water bores. Bore Water is to be the primary supply of non-potable cold water for sanitary flushing and mechanical plant while the Treated Bore Water will supply all Laboratories within the new Building. Storage tanks are to be provided for both the non-potable cold water and the laboratory cold water with a secondary supply to the storage tanks from the potable cold water services.

Site investigations have determined that existing 'live' bore water mains were evident in the proposed building construction zones. These service lines will require to be diverted and or removed.

3.1.5 Natural Gas Service

The Universities Campus is serviced via a 100kPa medium pressure gas main reticulating the Universities Campus. Investigations have indicated that the existing internal 100mm diameter natural gas pipe located within International Lane supplying the Universities lower Campus will not have the required capacity for the new and future stages.

Calculations of the existing natural gas service loadings and pipeline capacities will be required to be undertaken which will determine if natural gas pipelines are required to be amplified to cater for additional gas consumption to proposed buildings. It is estimated that a new 150mm diameter natural gas service ring main with sufficient branches to proposed locations be provided to service the existing, new buildings and other future developments within the Universities Campus site.

In the event that a Co-generation or Tri-generation energy plant is incorporated within the scope, a separate authority connection and service will be required to operate this plant.

3.2 Fire Services

3.2.1 Fire Hydrant Service

The Materials Science Building shall be provided with a Fire Hydrant Service.

The incoming water supply will be provided by a Grade 1 supply and taken from the 200mm diameter UNSW combined potable water / fire main in College / Gate 2 Roads. A 25,000 Litre Secondary Water Storage tank plus Primary Diesel and Secondary Electric full duty fire pumps situated in a two (2) hour fire rated Fire Pump Room will be provided to satisfy statutory requirements. The Fire Pump Room will provide direct access to a road or open space either at Ground Level or via a dedicated Fire isolated exit as required by Specification E1.3. of the NCC.

A mains pressure Fire Brigade booster valve assembly incorporating suction outlets is proposed to be installed adjacent the southern entry to the Building and in an accessible location for a brigade connection. Discussion and approval will be sought with Fire & Rescue NSW as to the final location.

The fire hydrants will be installed within designated fire stairs and within four (4) metres of compartment exits as required under the NCC.

The Fire Hydrant System will be designed to incorporate the following requirements of Australian Standard AS 2419.1 – 2005:-

- Fire Hydrant System to all areas (except as modified by Fire Engineering Alternative Solutions).
- Anti-tamper monitoring of fire services isolation valves and fire pump monitoring in order to reduce the ongoing maintenance costs to the development.

3.2.2 Fire Hose Reel System

The existing Fire Hose Reel System provides for hose reels throughout all buildings on the Campus. The existing fire hose reels are assumed to be connected to the domestic water supply system.

New Fire Hose Reels will be provided to all new and refurbished buildings from a metered service in accordance with AS 2441, the NCC and the NSW Plumbing & Drainage Code of Practice.

3.2.3 Fire Sprinkler Service

The Materials Science Building shall be provided with a Fire Sprinkler Service.

The incoming water supply will be provided by a shared Grade 1 supply and taken from the 200mm diameter UNSW combined potable water / fire main in College / Gate 2 Roads. A 75,000 Litre Secondary Water Storage tank plus Primary Electric and Secondary Diesel full duty fire pumps situated in a two (2) hour fire rated Fire Pump Room will be provided to satisfy statutory requirements. The Fire Pump Room will provide direct access to a road or open space either at Ground Level or via a dedicated Fire isolated exit as required by Specification E1.5 of the BCA.

A mains pressure Fire Brigade booster valve assembly incorporating suction outlets is proposed to be installed adjacent the southern entry to the Building and in an accessible location for a brigade connection. Discussion and approval will be sought with Fire & Rescue NSW as to the final location.

The Fire Sprinkler System will be designed to incorporate the following requirements of Australian Standard AS 2118.1 – 1999:-

- Fire Sprinkler System to all areas (except as modified by Fire Engineering Alternative Solutions).

-
- Anti-tamper monitoring of fire services isolation valves and fire pump monitoring in order to reduce the ongoing maintenance costs to the development.

3.2.4 Fire Detection & Alarm Systems

An automatic smoke detection system to the requirements of Section E2.21 and Section G of the NCC / BCA.

The automatic smoke detection system would consist of the following:-

- Main Fire Indication Panel located in the main Foyer area in a clearly visible location as part of a Fire Control Centre.
- Addressable Analogue smoke detectors provided throughout the building including ceiling voids as required. A selection of smoke detectors will be to the requirements of Specification E2.2a of the NCC / BCA.
- Monitoring of the Fire Sprinkler System.
- Shutdown of the Mechanical Ventilation System or Control as required by AS 1668.1 in the event a Smoke Exhaust is installed.
- Red Fire Alarm Strobe at the front entry point.
- Manual Call Points installed in evacuation routes.

Smoke Detectors

- Smoke detectors and probe type sampling detectors shall be compatible with the analogue addressable Fire Indication Panel. Probe type detectors shall be complete with detector housing and PVC sampling probes. Photo optical type detectors will be located as required by Specification E2.2a of the NCC / BCA.

3.2.5 Sound System & Intercom System for Emergency Purposes (SSSEP)

General

- The SSSEP will be provided throughout the new Materials Science Building to comply with the requirements of AS 1670.1 – 2004 as required by E4.9 of the NCC.

Master Emergency Control Panel (MECP)

- One (1) MECP shall be equal in manufacture to the Vigilant QE90 or Inertia 2000 located in the Fire Control Centre within the Ground Floor Entry Foyer.

Warden Intercommunication Phone (WIP)

- The WIP shall be equal in manufacture to the A-Phone and shall be red in colour.

Loudspeakers

- Two (2) types of speakers shall be used where appropriate:

Plantrooms - Round type reflex horn type speakers. They shall be weatherproof and have the following adjustable sound output - 107dB SPL, 110dB SPC, 113dB SPL measured at 1 metre from the horn mouth. The frequency range shall be 300 to 8000Hz.

False Ceilings – Office areas - 125mm round recessed panel high fidelity cone speakers. Type: Bosch or equal.

They shall have the following sound output 87dB SPL, 90dB SPL, 93dB SPL, 96dB SPL, 99dB SPL measured at 1 metre from the speaker cone. This frequency range shall be 50Hz to 15kHz.

All loudspeakers shall be adjusted for sound output in accordance with AS 1670.4.

Cables and Wiring

Wiring types to be used:

- Radox two hour fire rated cable for wiring runs from MECP to all loudspeakers on each floor and shall also be used in plant areas. Minimum 1.5mm conductors.
- 240V grade double insulated fixture 0.75mm² for speaker cabling intra floor.
- All cabling shall be installed in accordance with AS 3000 and AS 1670.4.

Inter-floor Cabling

- Provide galvanised steel metal riser ducts or galvanised cable tray.

18 September 2012

University of NSW
c/- WARREN SMITH & PARTNERS PTY LTD

FEASIBILITY LETTER

Developer: University Of NSW
Your reference: 3921000
Development: Anzac Parade, Kingsford
Development Description: Construction of a new Material Science and Engineering building to be located on the UNSW Campus.
Your application date: 11 September 2012

Dear Applicant

This Feasibility Letter (Letter) is a guide only. It provides general information about what Sydney Water's requirements could be if you applied to us for a Section 73 Certificate (Certificate) for your proposed development. **The information is accurate at today's date only.**

If you obtain development consent for that development from your consent authority (this is usually your local Council) they will require you to apply to us for a Section 73 Certificate. You will need to submit a new application (and pay another application fee) to us for that Certificate by using your current or another Water Servicing Coordinator (Coordinator).

Sydney Water will then send you either a:

- Notice of Requirements (Notice) and Developer Works Deed (Deed) or
- Certificate.

These documents will be the definitive statement of Sydney Water's requirements.

There may be changes in Sydney Water's requirements between the issue dates of this Letter and the Notice or Certificate. The changes may be:

- if you change your proposed development eg the development description or the plan/site layout, after today, the requirements in this Letter could change when you submit your new application; and
- if you decide to do your development in stages then you must submit a new application (and pay another application fee) for each stage.

What You Must Do To Get A Section 73 Certificate In The Future.

To get a Section 73 Certificate you must do the following things. You can also find out about this process by visiting www.sydneywater.com.au > Building and Developing > Developing Your Land.

1. **Obtain Development Consent from the consent authority for your development proposal.**
2. **Engage a Water Servicing Coordinator (Coordinator).**

You must engage your current or another authorised Coordinator to manage the design and construction of works that you must provide, at your cost, to service your development. If you wish to engage another Coordinator (at any point in this process) you must write and tell Sydney Water.

For a list of authorised Coordinators, either visit www.sydneywater.com.au > Building and Developing > Developing Your Land or call **13 20 92**.

The Coordinator will be your point of contact with Sydney Water. They can answer most questions that you might have about the process and developer charges and can give you a quote or information about costs for services/works (including Sydney Water costs).

3. **Developer Works Deed**

It would appear that your feasibility application is served from existing mains and does not require any works to be constructed at this time. Sydney Water will confirm this with you after you have received Development Approval from Council and your Coordinator has submitted a new Development application and Sydney Water has issued you with a formal Notice of Requirements.

4. **Water and Sewer Works**

4.1 **Water**

Your development must have a frontage to a water main that is the right size and can be used for connection.

Sydney Water has assessed your application and found that:
The current drinking water system does have sufficient capacity to serve the proposed development.

- The proposed development can connect to the existing drinking water connections for each lot.

4.2 Sewer

Your development must have a sewer main that is the right size and can be used for connection. That sewer must also have a connection point within your development's boundaries.

Sydney Water has assessed your application and found that:

The current wastewater system does have sufficient capacity to serve the proposed development.

- The proposed development can connect to the existing wastewater water connections for each lot.

5. Ancillary Matters

5.1 Asset adjustments

After Sydney Water issues this Notice (and more detailed designs are available), Sydney Water may require that the water main/sewer main/stormwater located in the footway/your property needs to be adjusted/deviated. If this happens, you will need to do this work as well as the extension we have detailed above at your cost. The work must meet the conditions of this Notice and you will need to complete it **before we can issue the Certificate**. Sydney Water will need to see the completed designs for the work and we will require you to lodge a security. The security will be refunded once the work is completed.

5.2 Entry onto neighbouring property

If you need to enter a neighbouring property, you must have the written permission of the relevant property owners and tenants. You must use Sydney Water's **Permission to Enter** form(s) for this. You can get copies of these forms from your Coordinator or the Sydney Water website. Your Coordinator can also negotiate on your behalf. Please make sure that you address all the items on the form(s) including payment of compensation and whether there are other ways of designing and constructing that could avoid or reduce their impacts. You will be responsible for all costs of mediation involved in resolving any disputes. Please allow enough time for entry issues to be resolved.

OTHER THINGS YOU MAY NEED TO DO

Shown below are other things you need to do that are NOT a requirement for the Certificate. They may well be a requirement of Sydney Water in the future because of the impact of your development on our assets. You must read them before you go any further.

Stamping and approval of your building plans

Please note that the building plans must be stamped and approved when each lot is developed. This can be done at a Quick Check agency. For an agency list visit www.sydneywater.com.au > Building and Developing > Quick Check or call 13 20 92).

This is not a requirement for the Certificate but the approval is needed because the

construction/building works may affect Sydney Water's assets (e.g. water, sewer and stormwater mains).

Where a Sydney Water stormwater channel, pipe or culvert is located within ten (10) metres of your development site it must be referred to Sydney Water for further assessment.

Your Coordinator can tell you about the approval process including:

- Possible requirements;
- Costs; and
- Timeframes.

Note: You must obtain our written approval before you do any work on Sydney Water's systems. Sydney Water will take action to have work stopped on the site if you do not have that approval. We will apply Section 44 of the *Sydney Water Act 1994*.

Disused Sewerage Service Sealing

Please do not forget that you must pay to disconnect all disused private sewerage services and seal them at the point of connection to a Sydney Water sewer main. This work must meet Sydney Water's standards in the NSW Code of Practice for Plumbing and Drainage (the Code) and be done by a licensed drainer. The licensed drainer must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Soffit Requirements

Please be aware that floor levels must be able to meet Sydney Water's soffit requirements for property connection and drainage.

Requirements for Business Customers for Commercial and Industrial Property Developments

If this property is to be developed for Industrial or Commercial operations, it may need to meet the following requirements:

Trade Wastewater Requirements

If this development is going to generate trade wastewater, the property owner must submit an application requesting permission to discharge trade wastewater to Sydney Water's sewerage system. You must wait for approval of this permit before any business activities can commence.

The permit application should be emailed to Sydney Water's Business Customer Services at businesscustomers@sydneywater.com.au

It is illegal to discharge Trade Wastewater into the Sydney Water sewerage system without permission.

A **Boundary Trap** is required for all developments that discharge trade wastewater where arrestors and special units are installed for trade wastewater pre-treatment.

If the property development is for Industrial operations, the wastewater may discharge into a sewerage area that is subject to wastewater reuse. Find out from Business Customer Services if this is applicable to your development.

Backflow Prevention Requirements

Backflow is when there is unintentional flow of water in the wrong direction from a potentially polluted source into the drinking water supply.

All properties connected to Sydney Water's supply must install a testable **Backflow Prevention Containment Device** appropriate to the property's hazard rating. Property with a high or medium hazard rating must have the backflow prevention containment device tested annually. Properties identified as having a low hazard rating must install a non-testable device, as a minimum.

Separate hydrant and sprinkler fire services on non-residential properties, require the installation of a testable double check detector assembly. The device is to be located at the boundary of the property.

Before you install a backflow prevention device:

1. Get your hydraulic consultant or plumber to check the available water pressure versus the property's required pressure and flow requirements.
2. Conduct a site assessment to confirm the hazard rating of the property and its services. Contact PIAS at NSW Fair Trading on **1300 889 099**.

For installation you will need to engage a licensed plumber with backflow accreditation who can be found on the Sydney Water website:

<http://www.sydneywater.com.au/Plumbing/BackflowPrevention/>

Water Efficiency Recommendations

Water is our most precious resource and every customer can play a role in its conservation. By working together with Sydney Water, business customers are able to reduce their water consumption. This will help your business save money, improve productivity and protect the environment.

Some water efficiency measures that can be easily implemented in your business are:

- Install water efficiency fixtures to help increase your water efficiency, refer to WELS (Water Efficiency Labelling and Standards (WELS) Scheme,
- <http://www.waterrating.gov.au/>
- Consider installing rainwater tanks to capture rainwater runoff, and reusing it, where cost effective. Refer to <http://www.sydneywater.com.au/Water4Life/InYourBusiness/RWTCalculator.cfm>
- Install water-monitoring devices on your meter to identify water usage patterns and leaks.

- Develop a water efficiency plan for your business.

It is cheaper to install water efficiency appliances while you are developing than retrofitting them later.

Contingency Plan Recommendations

Under Sydney Water's [customer contract](#) Sydney Water aims to provide Business Customers with a continuous supply of clean water at a minimum pressure of 15meters head at the main tap. This is equivalent to 146.8kpa or 21.29psi to meet reasonable business usage needs.

Sometimes Sydney Water may need to interrupt, postpone or limit the supply of water services to your property for maintenance or other reasons. These interruptions can be planned or unplanned.

Water supply is critical to some businesses and Sydney Water will treat vulnerable customers, such as hospitals, as a high priority.

Have you thought about a **contingency plan** for your business? Your Business Customer Representative will help you to develop a plan that is tailored to your business and minimises productivity losses in the event of a water service disruption.

For further information please visit the Sydney Water website at:

<http://www.sydneywater.com.au/OurSystemsandOperations/TradeWaste/> or contact Business Customer Services on **1300 985 227** or businesscustomers@sydneywater.com.au

Fire Fighting

Definition of fire fighting systems is the responsibility of the developer and is not part of the Section 73 process. It is recommended that a consultant should advise the developer regarding the fire fighting flow of the development and the ability of Sydney Water's system to provide that flow in an emergency. Sydney Water's Operating Licence directs that Sydney Water's mains are only required to provide domestic supply at a minimum pressure of 15 m head.

A report supplying modelled pressures called the Statement of Available pressure can be purchased through any Quickcheck agent and may be of some assistance when defining the fire fighting system. The Statement of Available pressure, may advise flow limits that relate to system capacity or diameter of the main and pressure limits according to pressure management initiatives. If mains are required for fire fighting purposes, the mains shall be arranged through the water main extension process and not the Section 73 process.

Large Water Service Connection

A water main are available to provide your development with a domestic supply. The size of your development means that you will need a connection larger than the standard domestic 20 mm size.

To get approval for your connection, you will need to lodge an application with a Quick Check Agent. You, or your hydraulic consultant, may need to supply the following:

- A plan of the hydraulic layout;
- A list of all the fixtures/fittings within the property;
- A copy of the fireflow pressure inquiry issued by Sydney Water;
- A pump application form (if a pump is required);
- All pump details (if a pump is required).

You will have to pay an application fee.

Sydney Water does not consider whether a water main is adequate for fire fighting purposes for your development. We cannot guarantee that this water supply will meet your Council's fire fighting requirements. The Council and your hydraulic consultant can help.

Disused Water Service Sealing

You must pay to disconnect all disused private water services and seal them at the point of connection to a Sydney Water water main. This work must meet Sydney Water's standards in the NSW Code of Practice for Plumbing and Drainage (the Code) and be done by a licensed plumber. The licensed plumber must arrange for an inspection of the work by a NSW Fair Trading Plumbing Inspection Assurance Services (PIAS) officer. After that officer has looked at the work, the drainer can issue the Certificate of Compliance. The Code requires this.

Other fees and requirements

The requirements in this Notice relate to your Certificate application only. Sydney Water may be involved with other aspects of your development and there may be other fees or requirements. These include:

- plumbing and drainage inspection costs;
- the installation of backflow prevention devices;
- trade waste requirements;
- large water connections and
- council fire fighting requirements. (It will help you to know what the fire fighting requirements are for your development as soon as possible. Your hydraulic consultant can help you here.)

No warranties or assurances can be given about the suitability of this document or any of its provisions for any specific transaction. It does not constitute an approval from Sydney Water and to the extent that it is able, Sydney Water limits its liability to the reissue of this Letter or the return of your application fee. You should rely on your own independent professional advice.

END