

Umow Lai

The University of Sydney – Health Precinct Stage 1

SSDA Infrastructure Management Report

REPORT AUTHORISATION

**PROJECT: THE UNIVERSITY OF SYDNEY – HEALTH PRECINCT STAGE 1
SSDA INFRASTRUCTURE MANAGEMENT REPORT**

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1.0 INTRODUCTION

This Infrastructure Management Report has been prepared by Umow Lai for Laing O'Rourke and the University of Sydney in response to the Secretary's Environmental Assessment Requirements (SEARS) for SSDA for the University of Sydney Health Precinct Stage 1 building, Item 13, "Utilities", and Stage 1 (CIP) Consent (SSD 6123) Condition B28.

1.1 REFERENCE DOCUMENTS

The following documents have been referenced in the preparation of this Infrastructure Management Report:

- Architectural Drawings prepared by Billard Leece Partnership / Diller Scofidio & Renfro (New York)
- The University of Sydney Design Standards
- The University of Sydney Design Brief as published, including Addenda, and site infrastructure information
- Survey Information and Dial Before You Dig Information.

1.2 EXISTING SERVICES

The proposed site for the Health Precinct Development is currently occupied by the Blackburn, Bosch 1A and Bosch 1B buildings to the south of the grandstand overlooking Oval No 1, and to the east of the Royal Prince Alfred Hospital, in Camperdown, NSW as shown in Figure 1 below.

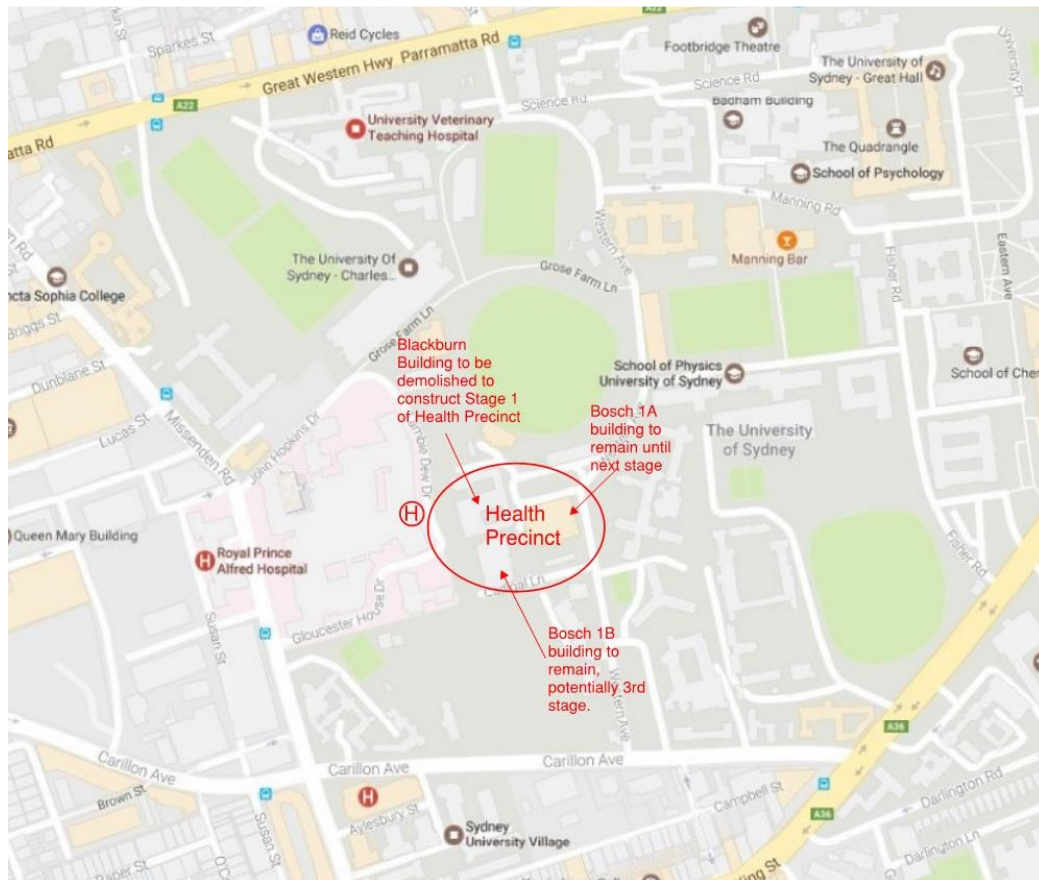


Figure 1 Site Context

All existing services affected by the construction of the Health Precinct will be:

- Identified, capped, sealed, made safe, and removed if redundant; or
- Identified, isolated and relocated if the services is to be removed.

All works associated with the diversion, capping, connecting or modification to the existing Utility or University services infrastructure will be coordinated with Campus Infrastructure Services (CIS) or the relevant Authority or Utility prior to any works proceeding.



Figure 2 Existing Site Survey (Provided November 2016 University of Sydney)

Further information regarding the major Utility and Authority routes and their proposed modification and augmentation is detailed in later sections of this report.

2.0 ELECTRICAL

2.1 EXISTING SITE HV INFRASTRUCTURE

The existing Health Precinct is served by two substations:

- an indoor chamber substation (S2497) in Bosch 1A building, which serves local campus street lighting, Bosch Building 1A and the Blackburn Building; and
- a kiosk type substation (S35927) to the north of Cadigal Lane which serves the Bosch 1B building, the greenhouse, campus lighting, and the car park under the St Andrew's Oval.

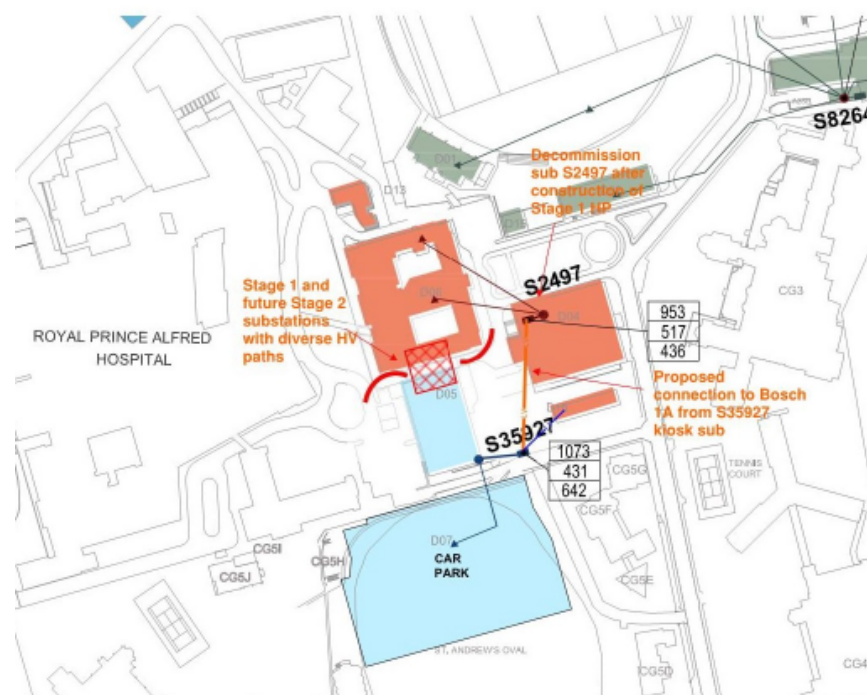


Figure 3 Existing and Proposed Ausgrid substations

It is proposed to disconnect the Blackburn Building from the indoor substation, and to supply the retained Bosch buildings from the kiosk substation which has ample capacity (some 600kVA) to cater for the present loads of approximately 400kVA in the two remaining Bosch buildings.

This will enable the high voltage supply capacity serving the Bosch buildings to be reallocated and dedicated to a new indoor substation in the new Stage 1 Health Precinct Building at the end of construction. It is proposed to implement diverse paths where possible, subject to further discussions with Ausgrid and the University of Sydney as the design is progressed.

During construction phase the indoor substation can be dedicated to construction loads, thereby minimising impact on the University's day to day operations in the precinct.

2.2 PROPOSED ELECTRICAL INFRASTRUCTURE

A new dual or triple chamber Ausgrid substation giving a total capacity for the Stage 1 building of 3MVA will be installed to meet the Ausgrid and USyd standards in the ground level of the Stage 1 building, with road access provided from the west to enable routine and emergency maintenance to be provided. The substation will be located above the Q100 flood level with 500mm freeboard.

Substation space will be provided for future expansion of the Health Precinct by the addition of further transformers in a further 3MVA shell. 24 hour compliant access for Ausgrid will be provided.

Ausgrid have advised verbally that there is insufficient capacity to cater for the 6MVA ultimate capacity for the Health Precinct. They have suggested that a new HV feeder will be required from the Camperdown Zone substation. Application to Ausgrid for formal confirmation of this advice has commenced and further advice is awaited from Ausgrid.

3.0 COMMUNICATIONS

New in-ground communications 'conduit & pit' infrastructure will be deployed to the Health Precinct Stage 1 building in accordance with the detailed scope outlined in the University of Sydney "Capital Works-2016-08-26-10-24-09-931" and "0200_001" documents. This work will be performed as part of an Early Works package undertaken directly by the University of Sydney.

Once the new in-ground communications infrastructure has been deployed, the University will arrange for the necessary diversions and cutover of existing communications services to be performed, so as to render redundant any remaining in-ground communications infrastructure within the new facility's construction envelope. Once all diversions are completed, work in connection with delivery of the new building communications infrastructure will commence.

The delivery of all copper and optical fibre cabling links (both primary and redundant secondary feeds in accordance with University of Sydney standard requirements) to the Health Precinct Stage 1 building from the existing University of Sydney campus infrastructure will be undertaken directly by the University of Sydney ICT Department, entering the new facility via physically diverse conduit access points which then connect to both the Main and Secondary Communications Rooms

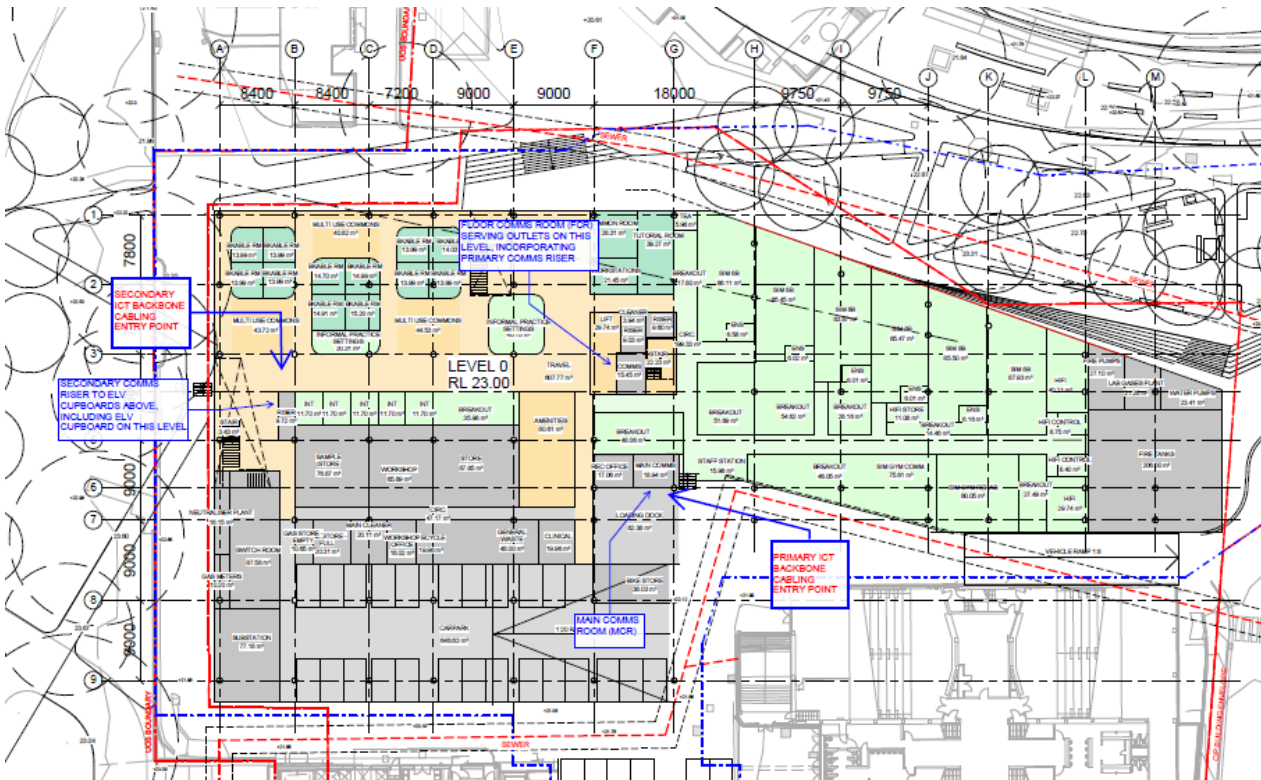


Figure 4 Proposed Communications Infrastructure Entry Points to Health Precinct Stage 1 Building

4.0 WATER, SEWER AND GAS SERVICES

4.1 WATER SERVICE

A 450mm diameter DICL Sydney Water water main is located within Western Avenue adjacent to the proposed Health Precinct Stage 1 Building generally as indicated in Figure 5 below. This main has capacity to serve the proposed precinct as initial flow assessment indicates large volumes of water supply available.

A feasibility assessment is to be undertaken by an approved Sydney Water services co-ordinator but initial works to provide a tapping connection to the site has been undertaken by Warren and Smith Consultants.

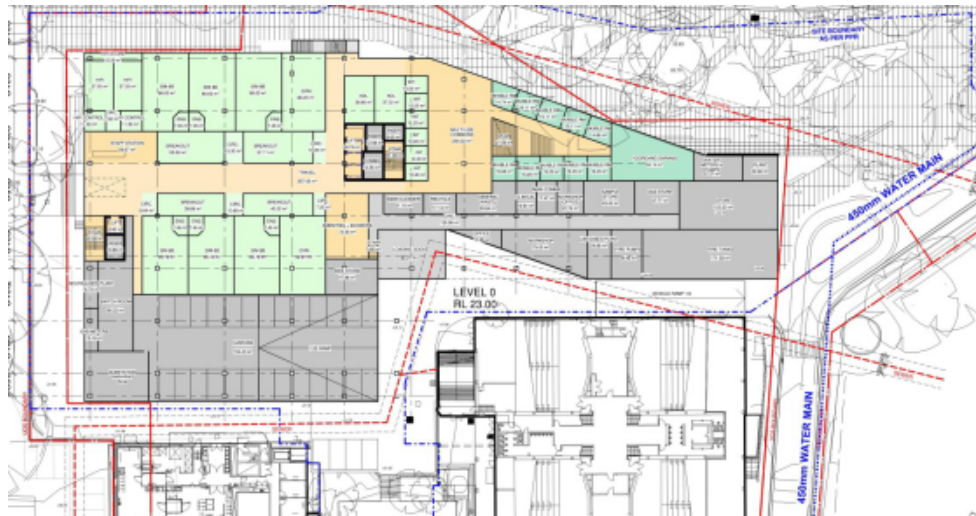


Figure 5 Existing 450mm Sydney Water Main

The Warren and Smith documentation indicates that a new 200mm fire service water supply tapping and 250mm diameter potable water main tapping extending from the 450mm Sydney Water main located in Western Avenue as part of the early works package.

Below indicates the approximate location of the hydraulic water services connection into the existing and proposed University of Sydney Infrastructure for the Health Precinct Stage 1 Building at the intersection of Blackburn Circuit with Western Avenue. (Refer to Figure 6 below).

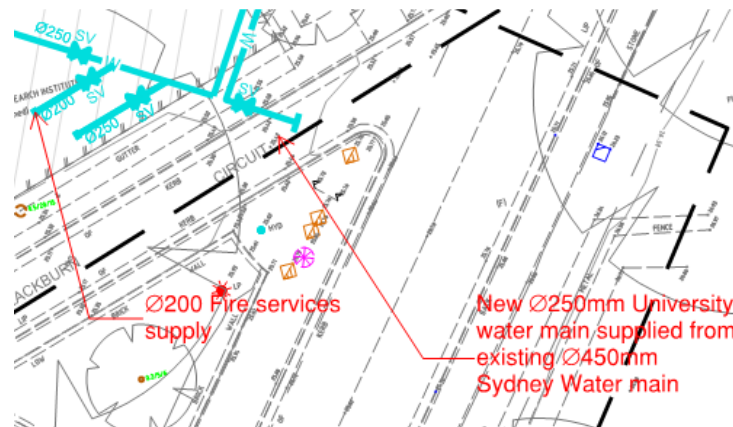


Figure 6 Fire and Potable Water Connections

4.2 FIRE WATER SUPPLY INFRASTRUCTURE

A Grade 1 water supply will be provided to serve the fire services system throughout the building. The water supply will comprise a primary water supply as noted above from the existing water main, and a secondary water supply from fire tanks and associated pumps located in Level 0 of the Stage 1 building, and provided with compliant Fire & Rescue NSW access.

The primary fire service water supply will be from a 200mm diameter take-off from the 250mm diameter University water main in Blackburn Circuit provided as part of the proposed Early Works package. The 250mm water main will be supplied from the existing 450mm diameter DICL Sydney Water main in Western Avenue as shown in Figure 5 above.

4.3 SEWER DRAINAGE

There are currently two significant main sewer reticulation sewer drainage pipe systems that traverse the site. The sewer drains are indicated on the part plan below.

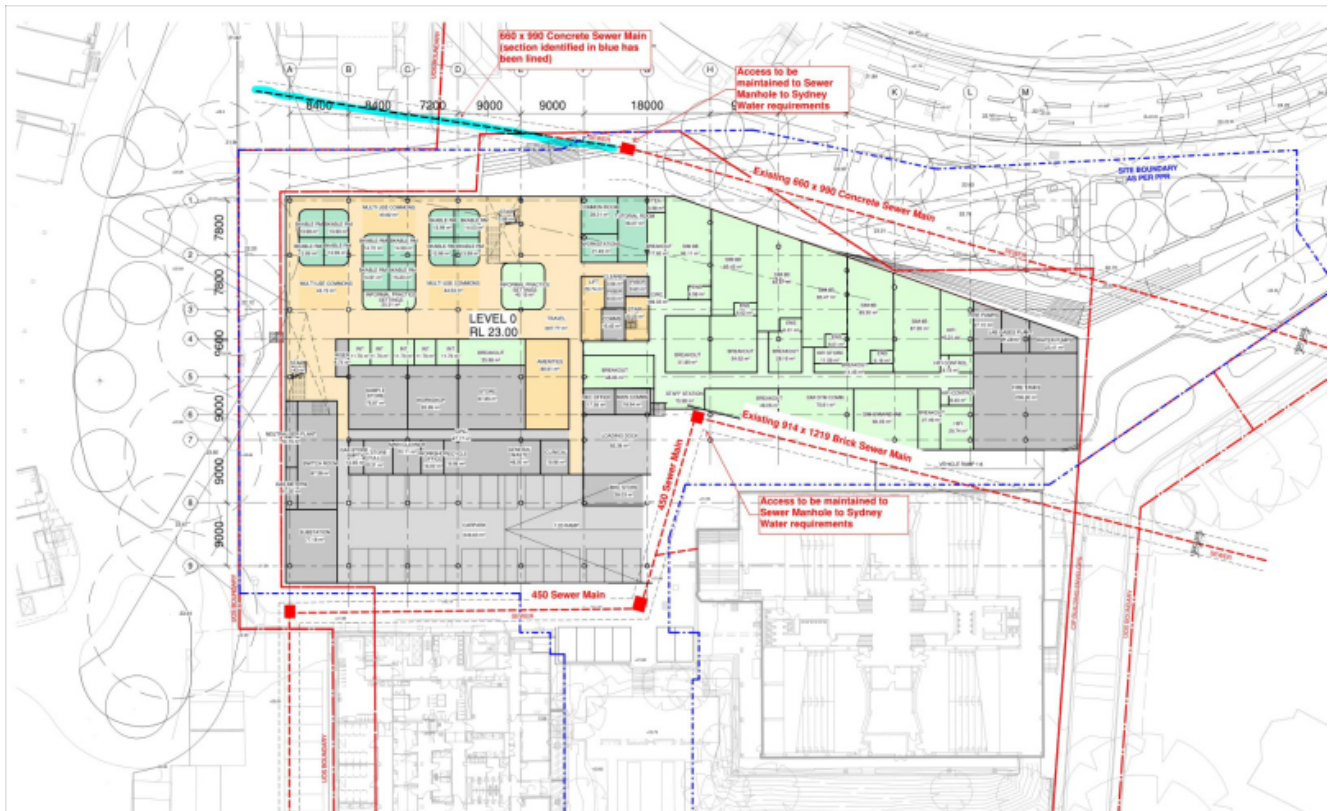


Figure 7 Location of Existing Sewer Infrastructure

To the north of the new building is a nominal 900x600 concrete sewer main and the outline of Level 0 of the new building will be designed to avoid the need to build near or over this sewer in order to maintain compliant Sydney Water access to the sewer.

The other sewer main to the south of the new building comprises a 450mm diameter sewer main that interconnects with a nominal size 1200x900 brick old (and fragile) sewer main at a manhole currently located in Blackburn Circuit. The outline of Level 0 of the Stage 1 building is designed to avoid the need to build near or over this sewer.

It is noted that a Sydney Water-Approved Design Engineer has been consulted in relation to the alignment of the building footprint to avoid the build over of any sewers and structures (pits). The current alignment of the building envelope in relation to the sewer mains has been set out to meet the Sydney Water guidelines for sewer infrastructure as advised by the Engineer.

This capacity of the sewer mains on initial discussions with the Sydney Water Design Engineer appear adequate to serve the proposed precinct given the large size of the sewer mains. A feasibility assessment however is to be undertaken by an approved Sydney Water Services Engineering Co-coordinator to confirm adequacy and building works in proximity to the sewers.

4.4 NATURAL GAS

Natural gas will be extended from the University of Sydney private gas service network supply located in the road network around the proposed Stage 1 building.

The incoming supply will incorporate a gas meter assembly and regulator system to control gas pressures. Isolation valves will be installed to all main lines and branches for maintenance purposes prior to any appliance.

The anticipated loading of the proposed Natural Gas system for the new Health Precinct Stage 1 building has been calculated at nominally 12,000 MJ/hr.

The private gas system network operated by the University will be assessed in conjunction with University of Sydney facility management to confirm adequacy of capacity.

This gas load for the new facility is made up of:

- Mechanical/ Heating Hot Water
- Domestic Hot Water Heating
- Allowance for Cafe or other tenancy as directed.

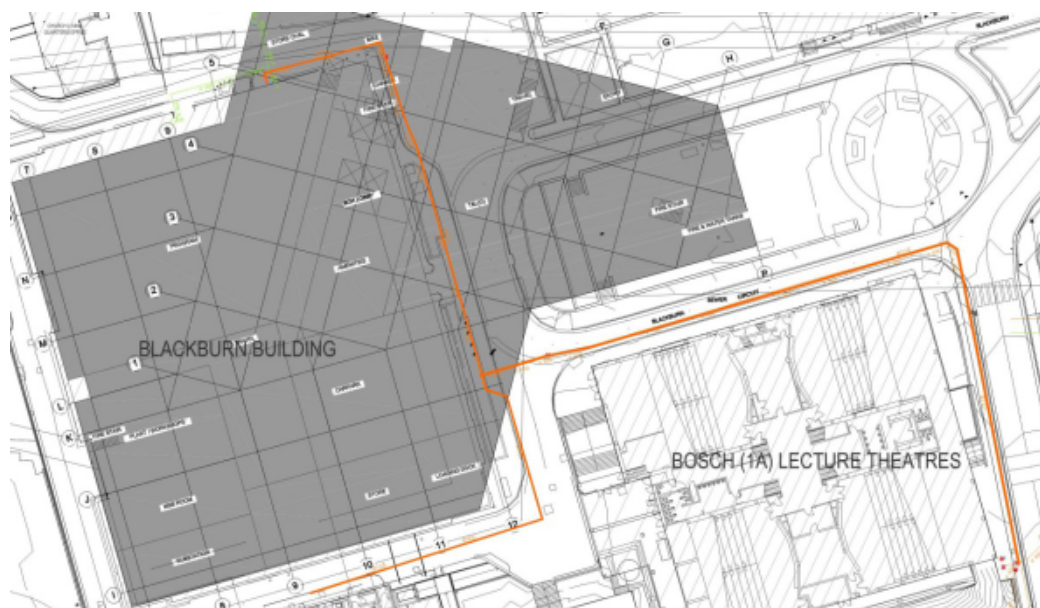


Figure 8 University Private Gas Main Network around Blackburn Circuit

APPENDIX A REPORT CONDITIONS

Exclusive Use

This report has been prepared by Umow Lai, at the request of the University of Sydney and Laing O'Rourke ("the Client") exclusively for the benefit and reliance of the Client.

This report is an engineering report prepared in accordance with the Client's directions, having due regard to the assumptions that Umow Lai may be reasonably expected to make in accordance with sound engineering practice and exercising the obligations and the level of skill, care and attention required of it under the terms of the engagement.

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This report is prepared exclusively in accordance with instructions given by or on behalf of our Client. Umow Lai therefore excludes any responsibility for the use of, or reliance on, the report by any third party and the use of, or reliance on, the report by any third party is at the risk of that party. Any third party wishing to act upon any material contained in this report should first contact Umow Lai for detailed advice which will take into account that party's particular requirements.

It is not possible to make a proper assessment of this report without a clear understanding of the terms of engagement under which the report has been prepared, including the scope and directions given to, and the assumptions made by, Umow Lai in the preparation of this report.

This report is provided strictly on the basis that the information that has been provided can be relied on is accurate, complete and adequate. However, we accept no liability for the accuracy or otherwise of this information, except where Umow Lai expressly indicates in the report that it has verified the information to its satisfaction.

Nothing in this report shall be read or applied so as to purport to exclude, restrict or modify, or have the effect of excluding, restricting or modifying the application of all or any of the provisions of the Trade Practices Act 1974 or any other legislation which by law cannot be excluded, restricted or modified.

Hazardous Materials

Umow Lai expressly excludes investigation or advice in relation to the actual or potential presence of pollution, contamination or asbestos, or the actual or potential risk of any incident affecting the safety of operation. Umow Lai recommends that the services of a registered occupational hygienist be commissioned to carry out investigations and prepare the necessary report in respect of the presence of asbestos or other hazardous building materials.

Limits on Cost Estimates

Umow Lai has no control over the cost of labour, materials, equipment or services furnished by others, contractors' methods of determining prices, or competitive bidding or market conditions. Any cost estimates provided in this report represent our best judgement as an experienced and qualified professional consultant, familiar with the relevant industry. Umow Lai cannot guarantee that proposals, bids or actual construction costs will not vary from the cost estimates provided.

Commercial Feasibility

Nothing in this engineering report should be construed as an opinion concerning the commercial feasibility of the property or asset.

Compliance with Current Building Codes, Regulations and Standards

Building Codes, Regulations and Standards (Regulations), particularly with respect to fire safety systems, may have changed since the original construction. Buildings constructed in accordance with the Regulations in force at the time, may not now comply with current Regulations.

The report may identify areas of non-compliance with current Regulations but it does not purport to provide a comprehensive analysis of compliance with current Regulations. Accordingly Umow Lai recommends that the Client should seek specialist regulatory/building code advice to confirm any non-conformances.


Accuracy

If the reader should become aware of any inaccuracy in or change to any of the facts, findings or assumptions made in this report, the reader is requested to inform Umow Lai so that we may assess its significance and review the report's comments and recommendations.

Exclusions

The following specialist consultancies are outside the scope of this report and it is therefore recommended that specific advice be sought.

- Structural Engineering
- Civil Engineering
- Fire Safety Engineering
- Acoustic Consultancy
- DDA Advice
- OH & S Measures
- Safety in Design Consultancy
- Building Regulations Advice
- Traffic Consultancy
- Architectural Advice
- Hazardous Materials & Dangerous Goods Advice



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