DRAINAGE, STORMWATER, AND GROUNDWATER MANAGEMENT REPORT

CONCEPT PLAN— UNIVERSITY OF TECHNOLOGY SYDNEY (UTS) BROADWAY

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ARUP

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REFER TO THE APPENDICES PROVIDED WITH REPORT NO. 12 UTILITIES AND INFRASTRUCTURE.

1.0 EXECUTIVE SUMMARY

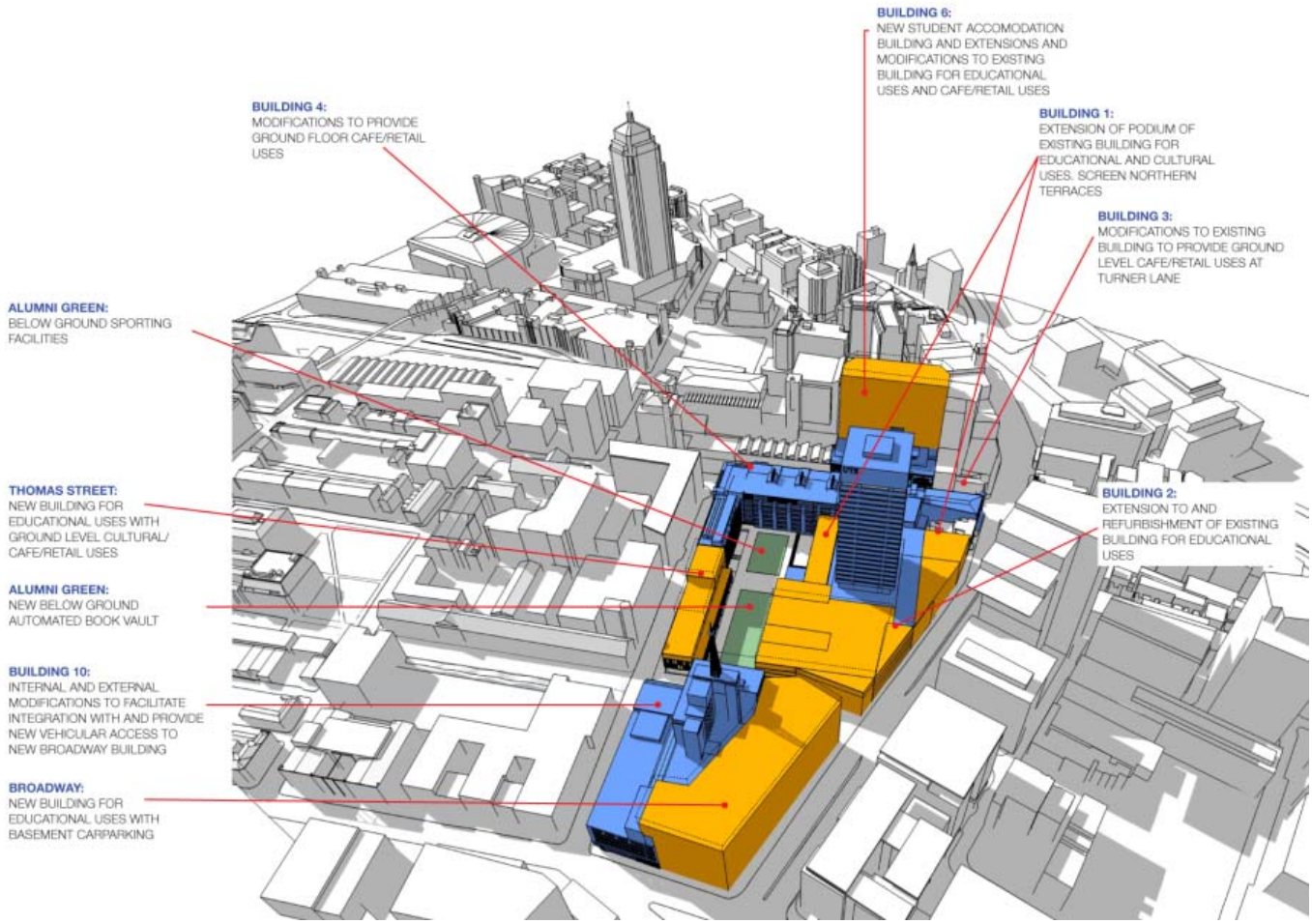

FIGURE 1 (ABOVE) UTS CITY CAMPUS

The University of Technology Sydney competes in a global field of leading-edge academic institutions and, as such, has accepted responsibility for developing new buildings on its urban campus based upon high standards of design and environmental sustainability.

The Broadway Precinct includes the development of two, new stand-alone buildings—the Broadway and Thomas Street buildings—and the expansion of Building 6 (CB06). There are also proposed expansions and refurbishments of Buildings 1 and 2 (CB01, CB02), which include an underground Book Storage Vault and Multipurpose Hall. These developments will incorporate a number of sustainable strategies to address drainage, stormwater and groundwater management in keeping with the environmental commitment of UTS to target 5 Star and 4 Star Green Star ratings for new and refurbishment buildings, respectively, and 6 Star Green Star for the Thomas Street Building. Please refer to the Concept Plan's ESD Report No. 10 for further information.

SUMMARY RESPONSE TO THE DIRECTOR-GENERAL'S REQUIREMENTS

► Adequate capacity in the stormwater systems has been identified for the Broadway Precinct. The Concept Plan proposes strategies like rainwater capture and green roofs to slow and prevent stormwater runoff associated with new building development at UTS.

► The Concept Plan proposes landscape strategies, a comprehensive drainage system, and stormwater capture systems to effectively mitigate drainage issues.

► Groundwater will be effectively dealt with through sump pumps where necessary in basement locations proposed for new buildings in the Concept Plan.

2.0 INTRODUCTION

REPORT SCOPE

This report is written in response to the Department of Planning Director-General's Requirements for the *Concept Plan - University of Technology Sydney* (Major project No. MP 08_0116).

More specifically, it addresses the Key Assessment Requirement No.13 as detailed below:

13. Drainage, Stormwater and Groundwater Management

- Identify drainage, stormwater and groundwater management issues.

3.0 UTS BROADWAY CONCEPT PLAN

UTS BROADWAY PRECINCT CONCEPT PLAN

The Concept Plan involves the demolition, construction and extension of certain buildings on the Broadway Precinct to enable UTS to provide an additional 84,750 m^2 of gross floor area of education, social and sporting facilities, including student housing. The proposal will also enhance existing open space and improve pedestrian, bicycle and vehicular access into the Campus. The project will deliver facilities for up to 15,000 EFTSL (equivalent full time student load) on the campus by 2015, up from 12,200 in 2008.

Concept approval is sought for the following, as illustrated in Figure 2:

Demolition of existing Building 11 (81 Broadway), Building 12 (113 Broadway) and Building 13 (115 Broadway).

Building 1—extension to podium of existing building to a height of 22.47 metres to provide an additional 4,050 m^2 of gross floor area for educational and cultural uses.

Building 2—extension to, and refurbishment of, existing building to a height of 24.24 metres to provide an additional 6,750 m^2 of gross floor area for educational uses.

Building 3—modifications to existing building to provide café or retail uses on Level 1.

Building 4—modifications to existing building to provide café, retail uses or public facilities on Level 1.

Building 6—extension and modifications to Levels 1-7 of the existing building to provide approximately 5,950 m^2 of gross floor area for educational, retail or café uses; construction of a new 69.20 metre high extension to provide approximately 19,300 m^2 of gross floor area for student accommodation; new pedestrian link between Harris Street and the Ultimo Pedestrian Network through Building 6.

Building 10—modifications to existing building to provide vehicular access into the new Broadway Building at basement level, and pedestrian access at ground and upper levels.

Broadway Building—construction of a new 44.47 metre high building to provide 34,650 m^2 of educational, and café or retail uses plus basement car parking for approximately 160 relocated spaces.

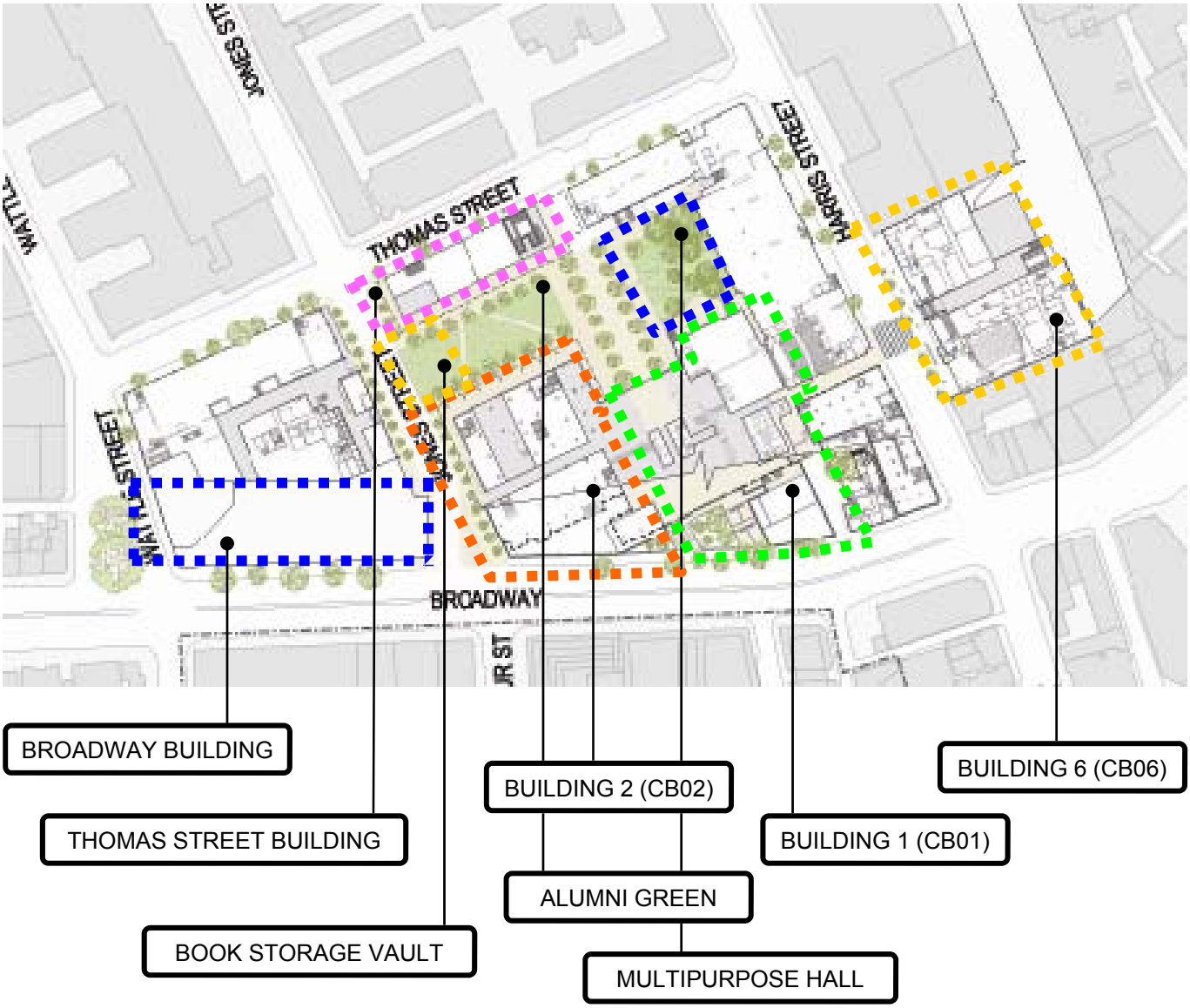

FIGURE 2 (ABOVE) A campus site plan showing the extent of development included in the UTS City Campus Broadway Precinct concept plan. Refer to the architectural concept plan documents for full extent of demolition and construction.

Thomas Street Building—construction of new 27.10 metre high building to provide 10,000 m^2 of gross floor area for educational, cultural and café or retail uses.

Alumni Green: landscaping; below ground book storage vault (2,250 m^2 of gross floor area); below ground multi-purpose sports hall (1,800 m^2 of gross floor area); public domain improvements to Broadway and Thomas, Harris, Wattle and Jones Streets.

4.0 STORMWATER

► STORMWATER: KEY ISSUES

There is an existing stormwater line on Thomas Street. This line would be used for a new Broadway Precinct connection that would take stormwater from Alumni Green, as well as overflow from the rainwater collection tanks proposed for both the Broadway and Thomas Street buildings (refer to FIGURE 3). The installation of a new rainwater collection system will also be investigated as part of the refurbishment of Building 2 (CB02). This would effectively reduce the stormwater output of that existing building below current levels. Rainwater storage and reuse systems would enable on-site detention to effectively maintain the existing stormwater output currently existing at UTS.

Stormwater runoff would be reduced with the proposed new development in the Broadway Precinct through a number of strategies. Chief among the proposed strategies is a new garden in an expanded Alumni Green area. In addition, green roofs will be investigated for the roofs of the Broadway and Thomas Street buildings would reduce and slow stormwater runoff.

ASSESSMENT

This report includes preliminary locations for stormwater lines that will be confirmed based on final programs and areas for each building as they are developed or refurbished during the implementation of the Concept Plan. The complete works for roof water and stormwater drainage shall be made to satisfy AS 3500, NSW Code of Practice, Authorities and manufacturer's requirements.

MANAGEMENT

The building services consultants will confirm the sizes and configurations of all stormwater lines with Sydney Water as part of schematic design for each building project of the Concept Plan.

UTS—STORMWATER TREATMENT OBJECTIVES	
Suspended solids	80% retention of average annual load
Total phosphorus	45% retention of average annual load
Total nitrogen	45% retention of average annual load
Litter	Retention of litter greater than 50mm for flows up to the 3-month ARI peak flow
Coarse sediment	Retention of sediment coarser than 0.1235mm for flows up to the 3-month ARI peak flow
Oil and grease	No visible oils for flows up to the 3-month ARI peak flow

TABLE 1 These stormwater treatment objectives are given by the book, "Australia Runoff Quality, A Guide to Water Sensitive Urban Design," published in 2006 by Engineers Australia. The design team for the Concept Plan will investigate treating all stormwater in accordance with these guidelines and with those contained in the CSIRO "Urban Stormwater Best Practice Environmental Management Guidelines" (1999) in order to eliminate pollution in stormwater that is released back into the Sydney stormwater system.

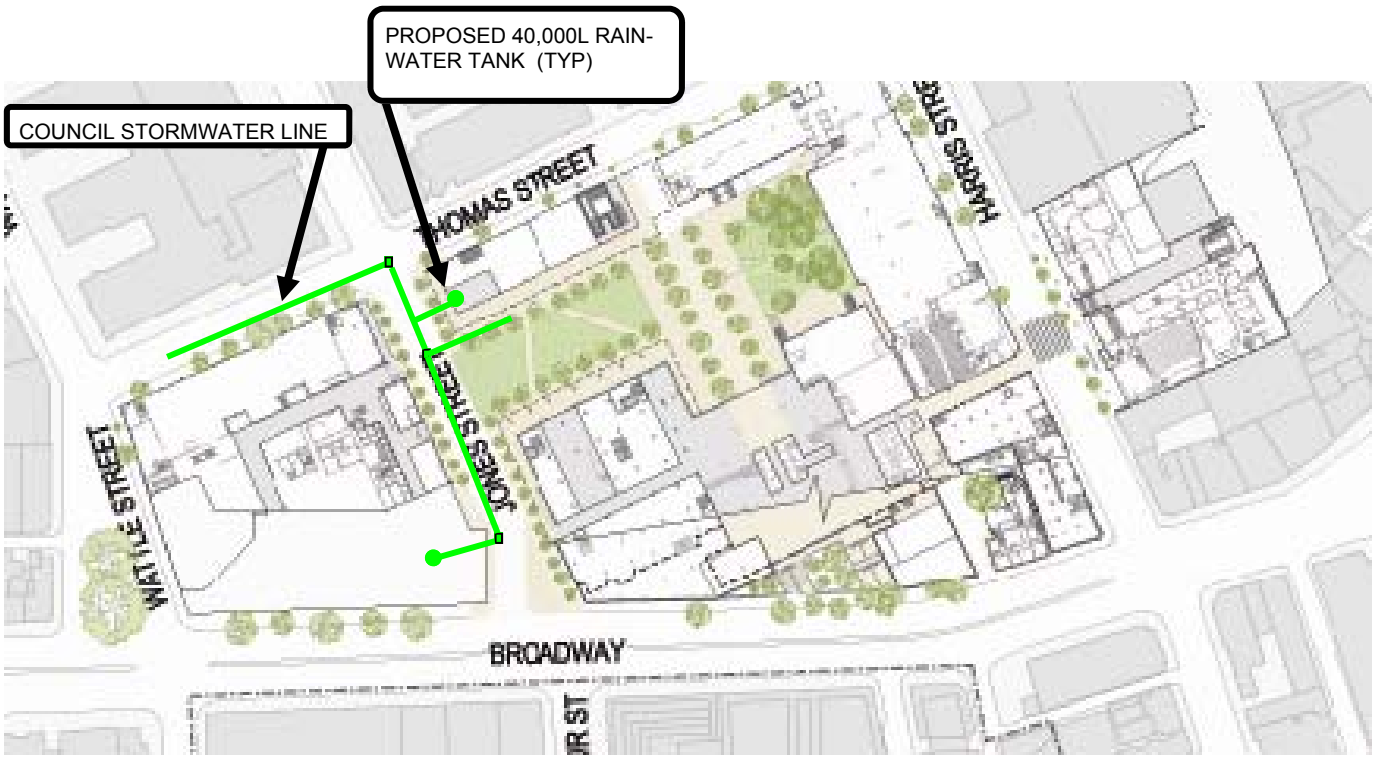

FIGURE 3 (ABOVE) **This site plan indicates the proposed new stormwater connections for the Broadway and Thomas Street buildings, as well as for the renovated Alumni Green public space. The incorporation of rainwater storage tanks in both new buildings will significantly decrease the stormwater runoff associated with the Broadway campus. The design team will perform a comprehensive site water balance report during detailed design in order to design appropriately sized stormwater retention and detention**

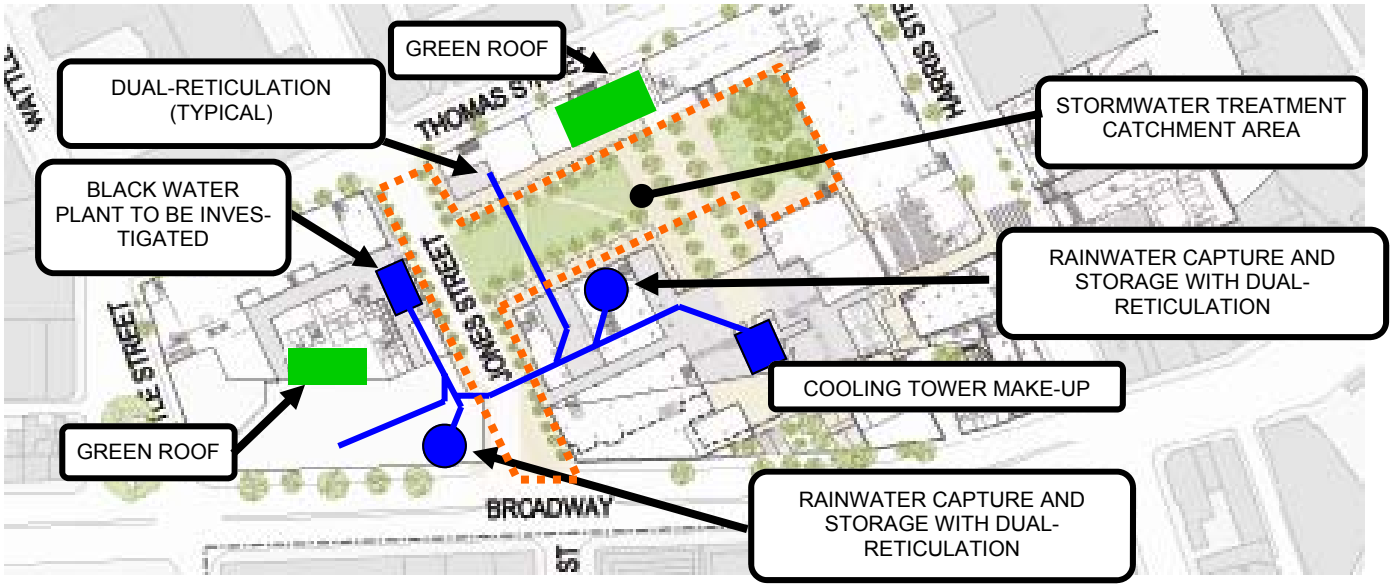

FIGURE 4 (ABOVE) **A Broadway Precinct site plan showing water strategies in a diagrammatic form only. Due to the difficulty and expense of retrofitting existing buildings with secondary hydraulics systems (otherwise known as "dual-reticulation"), there are limited options for incorporating black water and grey water systems. However, UTS has committed to investigate incorporating rainwater recycling systems in new buildings and in existing buildings that are undergoing a total refurbishment, such as CB02.**

5.0 DRAINAGE

► DRAINAGE: KEY ISSUES

A comprehensive drainage system will be implemented as part of the Concept Plan. This will include drainage systems for all new buildings and for the Alumni Green section of the Broadway Precinct. The drainage system will include drains, concealed pipes in buildings, treatment apparatuses, storage systems where feasible, and connections to existing municipal stormwater systems.

The Concept Plan includes the refurbishment and expansion of Alumni Green, which will create a large catchment area for stormwater. The design team will investigate capturing this stormwater from impervious services and storing it for use in irrigation systems on the campus. This stormwater would be filtered prior to use or prior to discharge to the Precinct stormwater system; at a minimum, this filtering would include a pollutant screen and sediment trap provided at the boundary, outlet pits from the site.

It is proposed that new trees will be provided with filter pits where stormwater can be collected and filtered prior to being drained. Much of Alumni Green exists over basement loading docks, the proposed Book Storage Vault, and the Multipurpose Hall, therefore pervious pavements will not be suitable; where Alumni Green occurs over solid ground, pervious paving materials will be used to increase drainage.

Hydraulic modelling of the existing drainage network has not been undertaken and will be required during more detailed design stages once a new drainage network has been proposed by services consultants. This is likely to include the confirmation of pipe sizes, freeboard and pit inlet capacities.

ASSESSMENT

This report includes preliminary drainage concepts indicating that the precinct's stormwater lines have adequate capacity for the proposed Concept Plan development; further, the capacity of each line will be confirmed based on detailed design for each building as they are developed or refurbished during the implementation of the Concept Plan. The complete works for roof water and stormwater drainage shall be made to satisfy AS 3500, NSW Code of Practice, Authorities and manufacturer's requirements.

MANAGEMENT

The building services consultants will confirm the sizes and configurations of all drainage systems with Sydney Water as part of schematic design for each building project of the Concept Plan.

6.0 GROUNDWATER MANAGEMENT

► GROUNDWATER: KEY ISSUES

Groundwater is present on site and currently dealt with through the use of sump pumps that are monitored with sensors to prevent failure and the potential for flooding. The design team will incorporate sump pumps and monitoring systems as part of the subterranean work associated with the Broadway Building, the Thomas Street Building, the Book Storage Vault, and the Multipurpose Hall.

ASSESSMENT

The groundwater management system shall be made to satisfy AS 3500, NSW Code of Practice, Authorities and manufacturer's requirements.

MANAGEMENT

The building services consultants will confirm the sizes and configurations of all groundwater management and control systems as part of schematic design for each building project of the Concept Plan.