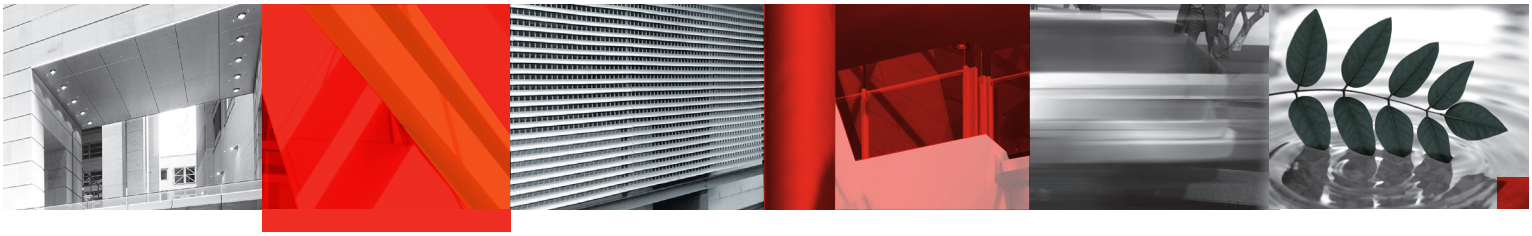
Environmental Assessment Report



Broadway Building, University of Technology Sydney
Project Application No. 09_0212

Submitted to NSW Department of Planning for Test of Adequacy
On Behalf of the University of Technology Sydney

March 2011 ▪ 10092

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JBA Urban Planning Consultants Pty Ltd operates under a Quality Management System. This report has been prepared and reviewed in accordance with that system. If the report is not signed below, it is a preliminary draft.

This report has been prepared by: Vivienne Goldschmidt

Signature  Date 15/03/11

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Statement of Validity

Prepared under Part 3A of the Environmental Planning and Assessment Act, 1979 (as amended)

Environmental Assessment prepared by	
Name	Vivienne Goldschmidt
Qualifications	BA (Hons) MPIA CPP
Address	Level 7, 77 Berry Street, North Sydney
In respect of	Project Application

Concept Plan	
Applicant name	University of Technology Sydney
Applicant address	PO Box 123 Broadway NSW 2007
Land to be developed	81-121 Broadway, Ultimo. Lot 1 DP 554602; Lot 1 DP 89492; Lot 1 DP 218673
Proposed development	Construction of new education building

Declaration	I certify that this Environmental Assessment has been prepared in accordance with the *Environmental Planning and Assessment Act 1979* and Regulation, and that to the best of my knowledge, is true in all material particulars and does not, by its presentation or omission of information, materially mislead.
Signature	
Name	Vivienne Goldschmidt
Date	15 March 2011

Executive Summary

This Environmental Assessment Report in relation to the development of the Broadway Building is submitted to the Minister for Planning pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) and State Environmental Planning Policy (Major Development) 2005 (the Major Development SEPP). The proponent is the University of Technology Sydney (UTS).

The Broadway Building is located on Broadway between Jones Street and Wattle Street in the Broadway Precinct of the UTS City Campus at Ultimo on the southern edge of the Sydney CBD. The area of the site being developed is approximately 3540 square metres.

Project Application

Approval is sought for the construction of a new building consisting of:

- 12 storeys to a maximum height of 46.82 metres (RL 54.550);
- 32,500 square metres of gross floor area (GFA) for education and associated ancillary uses;
- an architectural feature to a maximum height of RL 71.721 and
- parking for 160 vehicles over three basement levels.

The development includes modifications to the Building 10 car park to accommodate bicycle facilities for, and vehicle access to, the Broadway Building, and bridge access between the two buildings .

Project Outline

The project involves the construction of a new 12 storey single envelope building to accommodate the Faculty of Engineering and Information Technology. The Broadway Building will connect at ground and at several levels above with the existing UTS Building 10 to provide an integrated teaching environment.

The design incorporates an architectural feature in the form of tilted and angled perforated anodized aluminum screens which clad and rise above the four facades of the building. The screens enable the building to read as a single sculptural object with the floor levels veiled within its skin.

The building includes a substantial atrium at the ground levels and voids above criss-crossed with stairs and ramps linking the upper levels; through-site pedestrian connections between Jones Street, Wattle Street and Broadway; space for student union facilities and a café; and parking for 160 vehicles in three basements accessed from Building 10. In plan form the design is simple, avoiding complicated geometrics ensuring it is capable of adaption over time. The building is set back from the façade of Building 10 to its north to form a generous covered connection or laneway between Jones Street and Wattle Street.

The Broadway Building is to achieve a high standard of environmental performance and the university is targeting a 5 star Green Star Education v1 design rating certified by the Green Building Council of Australia. To this end, the design incorporates numerous energy efficiency measures including a gas fired trigeneration system; water sensitive urban design; measures to reduce waste and initiatives to encourage sustainable transport.

Statutory Planning Considerations

The development forms part of the Broadway Precinct of the UTS City Campus to which consent for a Concept Plan under Part 3A of the EP&A Act applies. The approved Concept Plan comprises a number of new development sites and extensions to existing buildings on the campus and establishes building envelopes

for all new and to be extended buildings. The Broadway Building is a significant element of, and the largest new building in, the Concept Plan.

The Minister for Planning approved the Concept Plan in December 2009. Subsequently, the University sought a Modification to the Concept Plan, in accordance with section 75W of the EP&A Act, to enable the bulk earthworks component of the Broadway Building to be undertaken ahead of the Project Application for the building. The Modification was approved on 15 March 2011.

Environmental Assessment

The assessment of the proposal has demonstrated that the development is consistent with the approved Concept Plan and that it will not generate any adverse environmental impacts. The design of the building and the range of sustainability measures included enable UTS to demonstrate its commitment to reducing its environmental footprint and to achieving a targeted 5 Star Green Star rating.

The Environmental Assessment concluded that:

- The site is suitable for the proposed development in that it is an underutilised university asset; was subject to extensive analysis through the development of the Concept Plan; is in the immediate vicinity of multiple public transport modes; adjoins other education uses and buildings; and makes economic use of existing infrastructure and space in the adjacent Building 10 for carparking and cyclist facilities.
- The design meets all the Design Quality Controls set by the Concept Plan, and the building envelope, height, gross floor area, and the dimensions of the architectural feature are all consistent with the Concept Plan.
- The impact on the building on views of the Building 10 Radio Tower and shadowing of Frasers Broadway are no greater than that considered in the Concept Plan.
- There are no impacts on traffic or the road network beyond those contemplated by the Concept Plan.
- Car parking will be wholly accommodated in the building, with bicycle facilities and delivery vehicles in the Building 10 car park.
- Roof plant will be shielded by the architectural feature and not be visible.
- The architectural feature will not create unacceptable glare for motorists, pedestrians and residents of nearby buildings, and the development will not generate unacceptable wind conditions.
- The building incorporates a raft of sustainability measures to conserve energy, water and waste, and some can be used for demonstration and education purposes.
- The development will comply with the Building Code of Australia's deemed to satisfy provisions.

A detailed construction management plan will be prepared to manage the potential impacts of construction activities including noise, traffic, dust, erosion and waste. The proposal includes a draft Statement of Commitments on future actions by the proponent.

The proposed development is considered to be in the public interest as State, regional and local needs will be met by effectively boosting the capacity of an existing, high quality tertiary institution. Given the planning merits above, the proposed development is justified and warrants the approval of the Minister for Planning.

1.0 Introduction

This Environmental Assessment Report (EAR) is submitted to the Minister for Planning (the Minister) pursuant to Part 3A of the *Environmental Planning and Assessment Act 1979* (EP&A Act) for the development of the Broadway Building) located in the Broadway Precinct of the UTS City Campus at Ultimo (81-117 Broadway, Ultimo).

The report has been prepared by JBA Urban Planning Consultants Pty Ltd, on behalf of proponent, the University of Technology Sydney (UTS), based on design information provided by Denton Corker Marshall Pty Ltd (DCM) and supporting technical documents provided by the expert consultant team.

The EAR describes the site, its environs, and the proposed development, and includes an assessment of the proposal in accordance with the Director General's Environmental Assessment Requirements. It should be read in conjunction with the supporting information appended to this report (see Table of Contents). A physical model and a materials and finishes sample board are submitted separately.

1.1.1 Project Overview

The project consists of the construction of a new 12 storey single envelope building providing 32,500 square metres of gross floor area to accommodate the Faculty of Engineering and Information Technology (FEIT) including a series of research laboratories. The Broadway Building will connect at ground and at several levels above with the existing UTS Building 10 to provide an integrated teaching environment. The design incorporates an architectural feature in the form of four tilted and skewed perforated aluminium screens which clad the four facades of the building.

In addition to the above, the Broadway Building includes the following features:

- a substantial atrium at the ground levels and voids above criss-crossed with stairs and ramps linking the upper levels;
- a through-site pedestrian connection between Jones Street and the corner of Wattle Street and Broadway, and a laneway between Jones and Wattle Streets adjacent to Building 10;
- space for student union facilities and a café; and
- parking for 160 vehicles in three basements accessed from Building 10.

Design Excellence

In accordance with its commitment to design excellence, UTS conducted a two stage Design Excellence competition in 2009 for the Broadway Building. The Design Competition jury comprised eminent professionals including nominees of the Department of Planning, Sydney City Council and UTS. The competition was won by Denton Corker Marshall and the firm's design is the subject of this project application.

1.2 Project Background and Chronology

1.2.1 Statutory Approvals

State Environmental Planning Policy (Major Development) 2005 identifies development to which Part 3A of the EP&A Act applies and which therefore requires approval from the Minister for Planning ("the Minister"). Clause 6 of the SEPP states that development, which in the opinion of the Minister is development of a kind referred to in Schedule 1 of the SEPP is declared to be a project to which Part 3A applies.

This proposal falls into the class of development described in Clause 20 of Schedule 1 (Classes of Development) - Educational facilities, namely "Development for the purpose of teaching or research (including universities, TAFE or schools) that has a capital investment value of more than $30 million".

Concept Plan approval

The development of the Broadway Building forms part of the Broadway Precinct of the UTS City Campus to which a consent under Part 3A of the EP&A Act applies. In summary, in May 2009 the University lodged an EAR for the Concept Plan for the development of the Broadway Precinct of the UTS City Campus with the Department of Planning (MP08_0116). The Concept Plan comprised a number of new development sites and extensions to existing buildings on the campus and established building envelopes for all new and to be extended buildings. The Concept Plan also incorporated details of the proposed architectural feature and cladding for the Broadway Building.

On 23 December 2009 the Minister for Planning approved the Concept Plan in accordance with section 75O of the Act.

Subsequent to the approval of the Concept Plan, UTS determined that in order to manage the risks inherent in the project, the development of the Broadway Building should be staged to separate the proposed bulk earthworks and associated stabilisation works from the development of the building itself. The Concept Plan had not contemplated this eventuality. Accordingly, the University sought a Modification to the Concept Plan, in accordance with section 75W of the EP&A Act, to enable the bulk earthworks component of the Broadway Building to be undertaken ahead of the Project Application for the building. The Modification was approved with conditions by a delegate of the Minister on 15 March 2011 - see Instrument of Approval at **Appendix A.**

It should be noted that as a consequence of the above modification to the Concept Plan, the excavation of the Broadway Building site and associated stabilisation works do not form part of this project application.

The Broadway Building is the second of the buildings to be developed on the campus. On 10 January 2010, in accordance with section 75F of the EP&A Act , the Director General of the Department of Planning issued his environmental assessment requirements for the Project Application for the development of the Broadway Building. (A copy of the Director General's Requirements (DGRs) are appended at **Appendix B**). It should be noted that a number of the requirements in the DGRs were addressed in the above Modification as identified in Section 5 of this report.

1.2.2 Project Objectives, Strategic Justification and Alternatives

The Broadway Building is a cornerstone of UTS's growth strategy and on completion will deliver around 40% of the new gross floor area envisaged in the UTS City Campus Concept Plan. Development of the site is also intended to create a positive interaction with neighbouring buildings and present a modern image of the university. Together with the slightly taller Frasers Broadway development, the Broadway Building is intended to enhance the southern approach to the Sydney CBD and form an important new gateway to the city.

The Concept Plan, referred to above, provided the objectives and strategic justification for the redevelopment of the Broadway Precinct and canvassed alternatives to development. The Broadway Building, as a significant element of, and the largest new building in, the Precinct formed part of that analysis and, as mentioned above, specifically included the proposed architectural feature in the form of an aluminium screen. In short, the objectives and justification for the project and the alternatives considered were as follows.

UTS recognised the need to upgrade the City Campus in 2000 in the 10 year strategic vision - *Setting the Pace: A Vision for the next Decade.* Amongst other things, the vision provided for significant upgrading of physical infrastructure, including new buildings with major new student spaces and state of the art technology. Subsequently, the *UTS Physical Concept Plan 2007* (FJMT Pty Ltd) proposed development envelopes for five sites across the UTS City Campus, including the Broadway Building site, and the *UTS City Campus Masterplan 2020* (BVN, 2008) provided a framework for refurbishments and new building works across the campus.

UTS has a limited number of options to accommodate growth on its land in the Broadway Precinct where approximately 65,500m^2 of additional floor area is required to accommodate growth in student and staff numbers, teaching, cultural, recreational and research areas. The *UTS City Campus Masterplan 2020* investigated a number of alternative strategies for locating the major components of this floor area, including maximising floor area in other locations such as Alumni Green.

The strategy adopted (that best met the objectives of the Masterplan) was to consolidate a major component of the required area on the Broadway site. This would not only allow the potential of Alumni Green - the only open space in the Broadway Precinct - to be fully realised, but enable a significant quantum of education floor space to be provided in one location in a modern cutting edge building appropriate for, and expressive of, the technology based teaching and research to take place within it.

Not progressing with the Broadway Building would significantly constrain UTS's ability to address space shortfalls – currently and in the future, not only restricting and limiting student services, but also innovation and research into new fields.

1.2.3 Education Infrastructure Fund

UTS has received funding from the Education Infrastructure Fund (EIF) to develop significant infrastructure on campus and assist the university to transform its teaching and research capabilities for the future. The Broadway Building will incorporate many initiatives and pieces of equipment to promote innovation in teaching and research and enable the building to become a 'Live Lab'.

As part of the learning objectives for the Broadway Building a number of initiatives are proposed to showcase certain technologies through the EIF. For example, three renewable energy generation technologies will be installed on the roof of the building to both generate energy and serve as educational demonstration systems: a vertical axis wind turbine, a solar trough hot water system, and a photovoltaic array.

In addition, sensors, displays and interactive monitors will allow staff and students to see how various components of the building operate, from structural movement to air quality.

1.3 Capital Investment Value

The capital investment value of the project is approximately $223M (see the Quantity Surveyor's report at **Appendix C**). Capital investment value is defined in the Major Development SEPP as the value of the development including all costs necessary to establish and operate the development, including design and construction of buildings, structures, associated infrastructure and fixed or mobile plant and equipment (but excluding land costs).

1.4 Project Team

The following consultants contributed to this environmental assessment report:

Urban Planning	JBA Planning
Architecture	Denton Corker Marshall Pty Ltd
Landscape Design	Taylor Brammer Landscape Architects Pty Ltd
Traffic and Transport	Halcrow Pacific Pty Ltd
ESD and Energy	Aurecon Australia Pty Ltd
Acoustics	Renzo Tonin & Associates Pty Ltd
Visual Impact	Denton Corker Marshall Pty Ltd
Wind Impacts	Cermak Peterka Petersen Pty Ltd
Reflectivity	Vipac Engineers & Scientists Ltd
Access and mobility	Morris-Goding Accessibility Consultants
Hydraulics and drainage	Arup Pty Ltd
Mechanical and electrical services	Waterman AHW (Sydney) Pty Ltd
Quantity Surveying	Davis Langdon Australia Pty Ltd
Community Consultation	Kathy Jones and Associates
Building Code of Australia	Davis Langdon Australia Pty Ltd

2.0 The Site

2.1 Location and Context

The Broadway Building site (hereafter referred to as 'the site'), at 81-121 Broadway, Ultimo, forms part of the Broadway Precinct of the UTS City Campus (see **Figure 1**) located on the southern edge of the Sydney Central Business District (CBD).

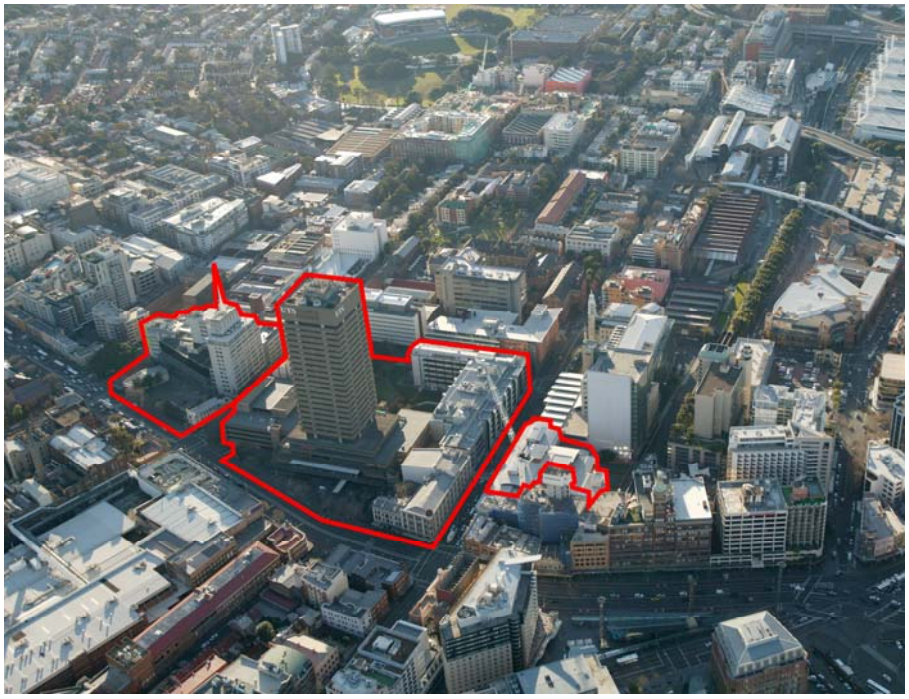

Figure 1 – The Concept Plan site (Source: BVN)

As shown in **Figures 2** and **3**, the approximately 3,540 square metre site is on the northern side of Broadway between Jones Street to the east and Wattle Street to the west. It is surrounded by a mix of medium to high rise commercial, residential, cultural and education buildings of no consistent scale or design. Opposite, on the southern side of Broadway, is the 5,795 hectare Frasers Broadway site approved for a large mixed use development to a height of 116 metres.

On the western side of the Frasers site is the education precinct of the UTS Blackfriars Precinct and the University of Notre Dame, while on the eastern side are several modern high rise hotels and Central Railway station and bus interchange. Beyond Frasers and to the south of Broadway is the suburb of Chippendale.

Neighbouring the site to the immediate north is UTS Building 10, and beyond on the northern side of Thomas Street various Sydney Institute of TAFE buildings and the light industrial and commercial precinct of Ultimo. UTS Building 2 is located on the opposite side of Jones Street to the east, with Building 1 and other university buildings further east along Broadway and Harris Street. Buildings 1 and 2 are to be redeveloped in the future in accordance with the Concept Plan approval. To the west of the site across Wattle Street are various retail, commercial and residential buildings.

Figure 2 – The Site and Building 10

Figure 3 – UTS Broadway Precinct and the Broadway Building site

2.2 Land Title and Zoning

The 3,450 square metre site consists of three lots owned by UTS at 81-121 Broadway, Ultimo (see site survey at **Appendix D)** legally described as:

- Lot 1 in DP 554602;
- Lot 1 in DP 89492; and
- Lot 1 in DP 218673.

The site is located entirely within the Sydney local government area and is currently zoned Residential-Business in the Ultimo-Pyrmont zoning map that forms part of the Sydney Local Environmental Plan 2005 (SLEP 2005), see **Figure 4.**
The Council of the City of Sydney has prepared and is currently exhibiting for public comment a new Local Environmental Plan in accordance with the Standard Instrument. For information, the site is to be zoned B4 Mixed Uses and educational establishments are permitted in this zone.

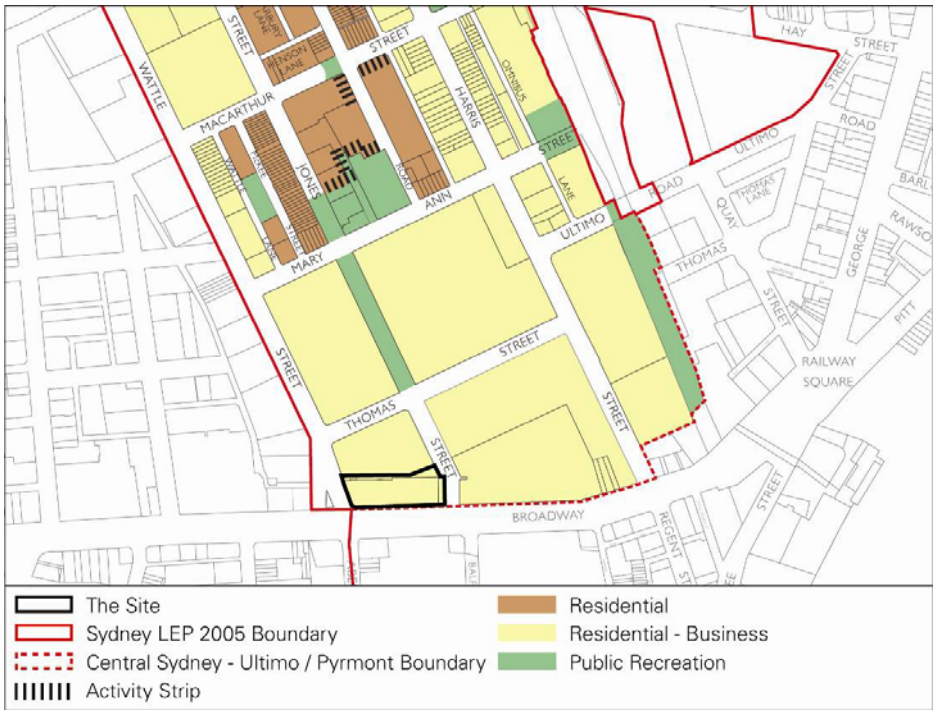

Figure 4 – Extract from Ultimo-Pyrmont zoning map, SLEP 2005

2.3 Existing Development

The site is highly modified and currently vacant. In accordance with the Minister's consent for the Concept Plan, the three buildings previously located on the site - Bradshaw Building (Building 11) and Buildings 12 and 13 - have been demolished, and the trees associated with these buildings were removed in accordance with City of Sydney tree removal requirements. As described earlier in Section 1.2.1, the Concept Plan approval was modified to enable the bulk excavation of the site to proceed.

2.4 Physical Conditions

Topography

The site significantly slopes from east (Jones Street) to west (Wattle Street), with the north western corner on Wattle Street some 6 to 7 metres lower than the Jones Street end. Prior to excavation the topography varied from RL 9.5 at Wattle Street and Broadway, to RL 14.24 at the corner of Jones Street and Broadway - see **Figure 5** and the survey plan is at **Appendix D.**

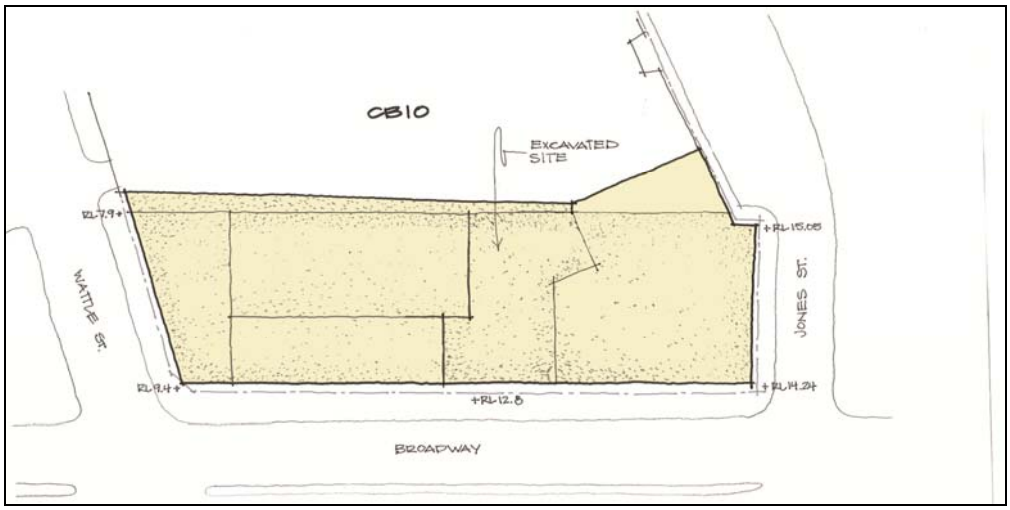

Figure 5 – Site topography (Source: DCM)

Geotechnical Conditions and Hydrogeology

The geotechnical investigation and hydrogeological assessment of the site, undertaken for the Modification to the Concept Plan by Jeffrey and Katauskas Pty Ltd, revealed that the subsurface profile of the site comprises predominantly asphaltic concrete pavements, fill and residual silty clays overlying weathered shale and sandstone bedrock at shallow to moderate depths between 1.5 and 5 metres. The groundwater below the site is located deep within the sandstone bedrock profile.

2.5 Access and Transport

The site has direct access to multiple car, bus, rail and bicycle routes, and is a short at grade walk to the other campus buildings in the Precinct via Broadway and Jones Streets.

Broadway is a major public transport corridor with regular bus services both during the week and over the weekends between the inner west and the Sydney CBD, including Central Railway Station. The site is about 500 metres from Central Railway Station via either the Devonshire Street Pedestrian Tunnel or along Broadway.

3.0 The Project

3.1 Project Application

Approval is sought for the construction of a new building, as illustrated in the architectural drawings prepared by DCM located at **Appendix E**, consisting of the following:

- 12 storeys to a maximum height of 46.82 metres (RL 54.550);
- 32,500 square metres of gross floor area for education and associated ancillary uses;
- An architectural feature to a maximum height of RL 71.721 and
- Parking for 160 vehicles over three basement levels.

The design also incorporates the following associated modifications to Building 10:

- the car park to accommodate bicycle facilities for, and vehicle access to, the Broadway Building; and
- access between the two buildings at grade and the upper levels (Levels 3 to 7 of both buildings).

3.2 Building and Design Overview

Along with the Frasers Broadway development, the Broadway Building is intended to enhance the southern entrance to the Sydney CBD. With a maximum height of 46.82 metres (measured in accordance with the provisions for Ultimo-Pyrmont in Sydney Local Environmental Plan 2005 [SLEP 2005]), the building provides 32,500 square metres of gross floor area for educational and associated uses. As a result of the sloping topography of Broadway, 12 storeys are able to be incorporated along the Wattle Street edge with 11 storeys along Jones Street.

The development includes an architectural feature cladding the four facades of the building (described in Section 3.5.2 below); a substantial atrium and pedestrian connections between Jones Street and Wattle Street and Broadway; space at the ground levels for the UTS Union and cafés; and basement parking for 160 vehicles.

The building will accommodate the Faculty of Engineering and Information Technology and as such will embody and display its environmental sustainability credentials in relation to water, energy, waste and the like.

The design provides a benchmark for best practice standards in educational environments. The ways this is achieved include the following:

- Flexible open floor areas within an overall rectangular volume of around 30 by 105 metres, generating typical floor plates of approximately 1,800 square metres useable floor area.
- Superior indoor environment quality including fresh air, good thermal comfort, sophisticated building services control systems, interior finishes that minimise levels of volatile organic compounds and formaldehyde, appropriate lighting levels and acoustic ratings, and ample natural light (with glare control).
- Light filled work and teaching spaces with good internal lines of sight.
- Open stairs located in the linear atrium (crevasse) to encourage internal department and inter-faculty circulation, enhancing interconnectivity and teamwork.

3.3 Design Criteria and Quality Controls

The approved Concept Plan for the Broadway Precinct of the UTS City Campus articulated a series of Urban Design Principles to guide the future built form of development within the Precinct complemented by specific design quality controls for the new buildings within the Precinct. The design quality controls applying to the Broadway Building are incorporated into the design and addressed in Section 5.2 of this report.

In addition, the architects' design responds to the following criteria for the building:

- Be an outstanding and innovative work of architecture in both appearance and performance.
- Be an outstanding work of urban design that creates a campus gateway activating and connecting the University with its community.
- Create a Faculty building that is highly inspiring, flexible, effective and accessible.
- Support creativity, learning and social interaction to help achieve the Faculty's vision for innovation and international leadership in spaces where technology and creativity intersect.
- Provide advanced performance in the operation of environmental systems utilising best available techniques and technologies for sustainable design.
- Create an urban form that achieves at least a 5 Star Green Star Rating.

3.4 Design and Built Form

DCM have prepared a Design Report for the Broadway Building which details its architectural genesis and design features (see **Appendix F).** The following describes the main features of the design and the building.

3.4.1 Built Form

The building consists of a single envelope to RL 54.550 in height set over three to four basement levels. The basic volume of the building has been broken in two with a 'crevasse' forming a light-filled linear atrium. The atrium occupies the lower levels and is then part filled-in above with bridges and stairs connecting the northern and southern parts of the building together, as well as with student lounge and research spaces.

In plan form the design is simple, avoiding complicated geometrics ensuring it is capable of adaption over time. The bridges and lounge areas across the crevasse create a dynamic interior experience.

The building is set back 3.525 metres from the façade of Building 10 to its north to form a generous covered connection or laneway between Jones Street and Wattle Street.

3.4.2 Architectural Feature

The design incorporates an architectural feature in the form of tilted and angled plates - perforated anodised aluminum screens - which clad the four facades of the building (see **Figures 6** and **7**). The architectural feature enables the building to read as a single sculptural object with the floor levels veiled within its skin. The surface of each plate is creased to form a series of gills – visually reinforcing the sense of skin and symbolically allowing the building to breathe. Openings are incorporated into the screens at street level to provide a visual connection to the activities at the ground levels and allow pedestrians to exit the undercroft.

The screen performs the following functions:

- provides affordable over-cladding to a simple, economical facade system;
- screens views into and from adjacent buildings;
- allows filtered light into the building skin;
- shades the full height curtain wall facade system behind;
- create the image and identity of the building and provide distinctive and memorable architecture at UTS's western extent.

Figure 6 – Broadway and Wattle Street frontage (Source: DCM)

Figure 7 – Corner of Jones Street and Broadway (Source: DCM)

Screen Height

As summarised in **Table 1** and illustrated at **Figures 6** and **7,** the feature consists of four screens with a different profile on the four façades of the building. The highest point of the feature will be along the Broadway frontage at 9.971 metres above the highest point of the building (that is the plant room - in accordance with the Standard Instrument) taken as a horizontal plane at RL61.750 The feature is deliberately designed to hide the lift over run and roof plant with the profile of the plant roof sloping to the west in unison behind the lowest point of the screen (at Wattle Street and the Laneway).

Table 1 – Height of architectural feature

Building façade	Height range above roof plant (m)	Max. height with feature (RL)
Broadway	(-0.214) – 9.971	71.721
Jones Street	4.994 – 8.077	69.827
Wattle Street	0.225 – 2.571	64.321
Laneway	0 750– 2.087	63.837

Screen texture and materials

The decoration of the feature is not arbitrary, but has an embedded meaning in that it incorporates the name of the building translated into binary code (zeros and ones) and then converted into square zeros and dashed ones. The material of the screen is anodised aluminium with a charcoal matte finish, laser cut from 4mm thick sheets of aluminium in 1400mm x 3800mm modules.

As illustrated in the images in the Design Report at **Appendix F,** the pattern embedded in the screen will read differently at different scales:

- human scale/ close up: transparent with clear visibility through the feature;
- building scale/ mid-distance: both semi-transparent and semi-opaque; and
- city scale/ far distance: uniform and continuous.

In order to make it difficult to climb, the open elements of the screen above street level will be in-filled with a fine perforation - appearing as part of the texture of the elevation rather than a response to a security risk. While this will deny any potential climber foot or hand holds on the facade, it will also structurally strengthen the panels where they are subject to impact loads.

The Broadway facade (near Jones Street) has the name UTS embedded in the screen as a flashing LED light (see **Figure 7).**

3.5 Numerical Overview

The following table provides a level by level numerical overview of the proposed development. This should be read together with the drawings at **Appendix E** which provide more detailed information.

Table 2 – Numerical overview of development

Level	Gross floor area (m^2)*	Main uses/features
B4	933	Parking; laboratories
B3	890	Parking; plant & services
B2	890	Parking; plant & services
B2 mezzanine	0	Plant
B1	2,378	Teaching space; plant & services
L00	2,397	Teaching space; student lounges; pedestrian connection; substation
L01	1,248	Teaching space; student union space; plant
L02	935	Teaching space; pedestrian connection; cafe
L03	1,608	
L04	2,368	Teaching space
L05	2,462	Teaching space; informal learning space
L06	2,395	Research & laboratory space; faculty office space
L07	2,382	Research & laboratory space; faculty office space
L08	2,310	Research & laboratory space; faculty office space
L09	2,332	Research & laboratory space; faculty office space
L10	2,363	Research & laboratory space; faculty office space
L11	2,296	Research & laboratory space; faculty office space
L12	2,313	Research & laboratory space; senior faculty offices; the Dean's wintergarden
Roof		Plant; rainwater tank; wind turbine and solar power collector
Total	32,500	

* GFA measured in accordance with Sydney LEP 2005

3.6 Internal Layout

Functional Use Distribution

Flexibility of spaces is a core operational objective of the University and thus for the Broadway Building. As illustrated in the architectural drawings, the internal spaces of the building are allocated logically and functionally with high volume student areas - such as teaching areas, lecture theatres and laboratories - at the lower levels up to Level 5, and lower volume spaces - such as research areas, research laboratories and academic staff accommodation - between Levels 6 and12.

The inherent flexibility in floor plans enables uses to be rearranged and allow adaptation during the life of the building. Key characteristics of the functional use distribution include:

- Providing direct access from the main foyer to the rest of the campus from the Jones Street and Laneway corner.
- Clustering heavily populated lecture theatres on Level 00 with good access to the campus and the public domain.
- Focusing the lecture spaces in a central linear form with informal learning and break-out areas immediately adjacent.
- Providing Student Union spaces on Level 1 to activate the crevasse and Laneway.
- Clustering classrooms on Levels 3, 4 and 5 with informal break out spaces close by.
- Mixing academic offices, teaching and research laboratories, seminar and break-out rooms on all floors above the lower levels.
- Placing administrative offices for the Faculty and the Dean's Unit on the uppermost floors with access to a wintergarden located at the top of the crevasse.

Glazed frontages to all three streets allow for visual connection to internal spaces. The ground levels contiguous with Jones Street, Wattle Street, Broadway and the new Laneway are activated by, and largely taken up with, student social spaces (Union, cafe etc) and uses, such as the Data Arena, showcasing the 'business' of the building (see **Figure 8).**

Stairs and escalators are provided between the lower and upper ground levels and the crevasse is spanned at all levels with bridges and stairs between floors - see **Figure 9**.

Roof Plant

The roof is largely occupied by plant. In addition, consistent with the building's ESD credentials and the teaching and research therein, it will also accommodate a water tank for harvested rainwater and three renewable energy technologies:

- a 7.89 metre high vertical axis wind turbine;
- a solar trough hot water system; and
- a photovoltaic array.

While the wind turbine will be largely used for teaching purposes, the solar trough and photovoltaic array will also generate some energy.

Figure 8 – Entry at corner of Broadway and Jones Street (Source: DCM)

Figure 9 – The Crevasse (Source: DCM)

3.7 Materials and Finishes

External building materials and finishes were selected for their durability, energy efficiency and life cycle costs. A materials and finishes sample board has been provided separately and is reproduced in the Design Report at **Appendix F** (pp.20-21).

3.8 Pedestrian Connections and Circulation

Pedestrian permeability is maintained and reinforced throughout the building and entries are located in direct response to pedestrian desire paths from elsewhere on the campus or from off-campus.

Entry Points and Address

There are three principal entry points and addresses to the building at the corners of:

- Broadway and Wattle Street;
- Broadway and Jones Street; and
- Jones Street and the Laneway.

Connections

The design incorporates two generous cross-building pedestrian thoroughfares:

- Between Jones Street and Wattle Street in the form of an at grade covered 3.525 metres wide Laneway adjacent to Building 10. A glazed roof at parapet height of Building 10 will provide weather protection between the two buildings, and an 'outdoor' terrace associated with the Student Union will promote activity in the Laneway. Access to the Laneway after hours will be security controlled.
- From the corner of Broadway and Wattle Street to Jones Street. The vertical transition between the grade separation is addressed by way of stairs and escalators between the upper ground (Level 2/3 - Jones Street) and lower ground (Level 00 - Wattle Street) floor plans.

As described earlier, ramps and stairs on all levels span the two parts of the crevasse and lift access is provided at every level.

In addition, the following connections are provided between the Broadway Building and Building 10:

- via pedestrian bridge links over the Laneway at Levels 3 to 7 (to the equivalent levels in Building 10);
- at grade in the Laneway between the Broadway Building Student Union area and the Student Services area in Building 10.

Covered Walkway

In order to maintain the visual strength and simplicity of the single plane facade an undercroft has been formed behind the screen at street level along Broadway, Wattle Street and Jones Street. The facade is set back from the site boundary by 2.2 metres at street level enabling pedestrians to circulate behind the screen protected from wind and rain. It also allows the image of the screen as a single element hitting the ground to be maintained (see **Figure 10).**

Figure 10 – Covered walkway at Wattle Street entry (Source: DCM)

Security

Crime Prevention Through Environmental Design (CPTED) measures are incorporated into the design in the following ways:

- clear lines of sight are provided between public and private places;
- the edges at ground level are activated
- effective lighting will be installed in public spaces
- entry / exit points will be security controlled after hours; and
- after-hours access to the Laneway will be security controlled.

3.9 Vehicular Access and Parking

A detailed transport and parking report for the proposal has been prepared by Halcrow (see **Appendix G).** As described in the report existing conditions around the site and proposed arrangements do not differ from those described in the approved Broadway Precinct Concept Plan

Access

The proposed layout of the Building 10 car park and the vehicle and pedestrian ramps between Building 10 and Level B1 of the Broadway Building car park are shown in the architects' drawings and indicatively illustrated in **Figure 11** below.

Vehicles will access the Broadway Building car park via the Building 10 car park entry on Thomas Street. To accommodate more vehicles and avoid queuing, the existing access point on Thomas Street will be reconfigured and the boom gates/ security card reader relocated to provide two entry lanes into the carpark. Egress will be through the existing exit on Level 00 of Building 10 onto Wattle Street. Drivers intending to park in the Broadway Building will proceed from Level 1 of Building 10 down to Level 00 and then via a new ramp to level B1 of the Broadway Building - see illustration in **Figure 11** below.

Both levels of the Building 10 car park are to be reconfigured to accommodate new circulation arrangements, the connection to the Broadway Building and to make space for bicycle parking and cyclist facilities. The car park layout in Building 10 has been designed with a single two-way circulation aisle in accordance with AS2890.1.

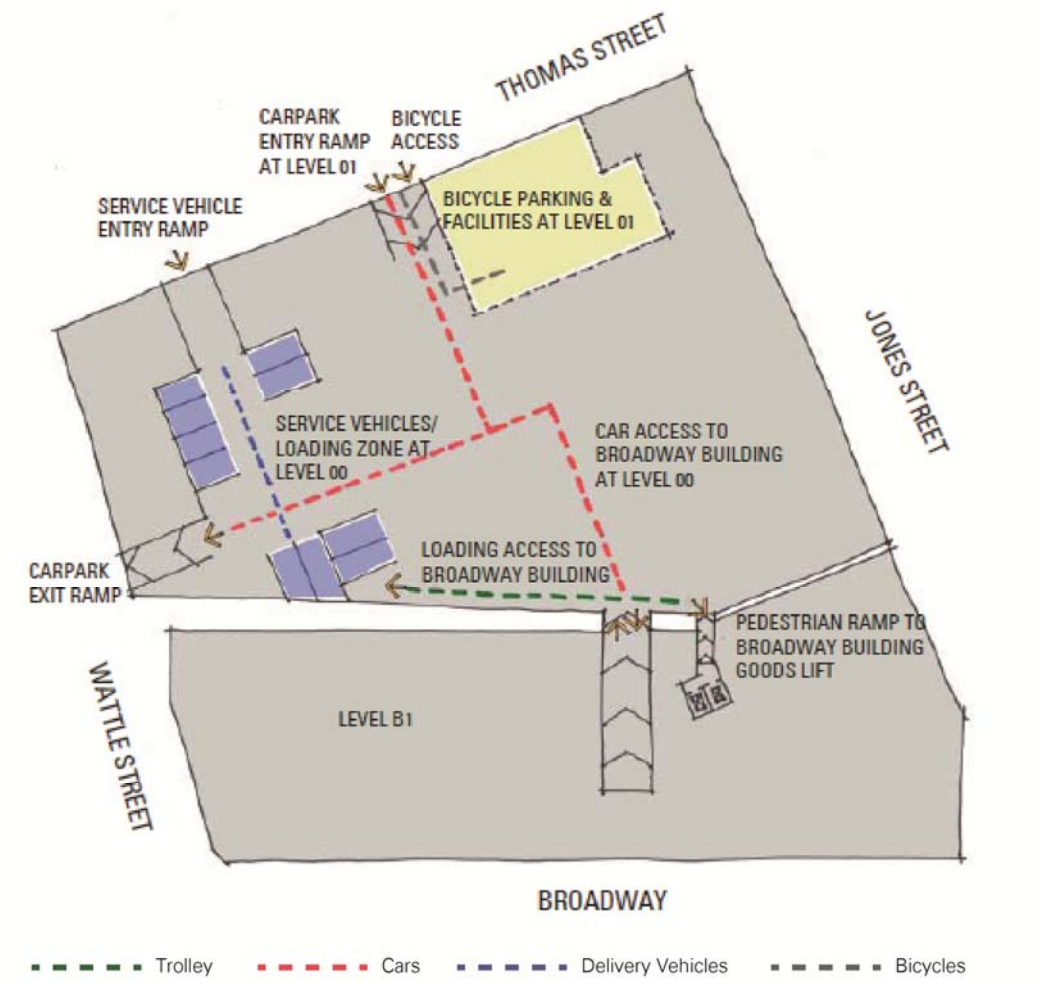

Figure 11 – Indicative illustration of car park arrangements (Source: DCM)

Parking

In accordance with the Concept Plan car parking provision within the UTS City Campus is not being increased. Essentially, the proposed quantum of parking replaces the same number of surface parking spaces lost as a result of the development of the Broadway Building plus others lost as a result of the redevelopment and reorganisation of other buildings around the campus.

A total of160 car spaces, including six (6) for persons with disabilities, as well at 18 motorcycle bays, will be provided in the Broadway Building. In support of the ESD objectives for the building:

- 40 spaces (25% of total car parking spaces) are to be allocated for small cars;
- 16 (10% of total car spaces) are to be designated for carpooling vehicles; and
- allowance has been made for recharge points for hybrid/electric vehicles.

Bicycles

Racks for 250 bicycles will be provided in the Building 10 basement car park - 102 for staff and 148 for students, as will cyclist facilities (showers, lockers and change rooms).

Deliveries and Loading

As shown in **Figure 11**, deliveries will be made through the basement servicing/loading areas on Level 00 of Building 10 which has the capacity and is considered suitable for both Building 10 and the Broadway Building. Deliveries will be moved by trolley via a delivery ramp to the goods lift in the Broadway Building. Likewise, the Building 10 basement will handle waste removal for the Broadway Building.

3.10 Landscaping

The site offers some limited opportunities for internal landscaping and planting - primarily in the Laneway, in the crevasse at ground levels, and in the Dean's wintergarden at Level 12.

The detailed design and specification for landscaping and greening the building will be undertaken as part of design development based on the criteria set out in the Landscape Design report prepared by Taylor Brammer Landscape Architects (see **Appendix H).** The criteria include the following:

- Demonstrate the role of planting in facilitating a clean indoor and surrounding environment.
- Provide innovative design solutions incorporating the aesthetic and functional qualities of plants.
- Filter and potentially remove some of the particulates and dust from air entering the crevasse, in particular from Broadway.
- Support air quality systems incorporated through the building, particularly in the crevasse.
- Accommodate the functional requirements of pedestrian circulation and space through the building.
- Provide planting that is low maintenance and capable of absorbing high pollution levels and enduring high volumes of pedestrian movement.

In relation to the public domain, street paving along Broadway, Jones Street and Wattle Street will be in accordance with City of Sydney requirements. Trees will be planted (and where necessary replaced) along these three streets in accordance with the approved Concept Plan for the UTS Broadway Precinct.

3.11 Environmentally Sustainable Development

To ensure that the future development and design of the UTS City Campus has a defined direction in terms of sustainable design and performance, UTS has a campus wide master plan - 'ESD Masterplan 2020' - which provides recommendations for the strategies, performance targets and technologies to be employed to meet the sustainability objectives of the University. The master plan sets out recommendations for energy and water consumption, ventilation, lighting, materials use in construction and operations, and waste disposal and recycling.

In addition, the UTS Design Guidelines outline a number of passive design initiatives to reduce energy consumption through building design and site selection, minimising life cycle costs and optimising engineering services design. These Guidelines have been used in the design of the Broadway Building and for its services and construction.

In keeping with the above initiatives, UTS is committed to achieving a high standard of environmental performance in the development of the Broadway Building and has set the following Sustainable Design objectives for the project:

- Achievement of 5 star Green Star Education v1 design rating certified with Green Building Council of Australia.
- Energy efficiency through implementation of appropriate technologies and passive design measures with reference to industry benchmarks for educational facilities.
- Water efficiency through the use of rainwater capture and reuse with reference to industry benchmarks for educational facilities.
- Improvement of the indoor environment.
- Minimisation of operational emissions.
- Alternative modes of transport for students and staff.
- Minimisation of waste production in construction and operation.

The key water and energy initiatives to be incorporated into the building to achieve the above objectives as well as the intended Green Star rating are summarised below. Further details are provided in the report by Aurecon at **Appendix I** and in Section 5.6 of this report.

Energy Efficiency

The key measures incorporated in the Broadway Building to conserve energy and reduce greenhouse gas emissions are summarised below.

- A gas fired trigeneration plant will provide electricity to the building with the waste heat used to provide heat and drive absorption chillers to provide cooling to the building. A new substation will provide the difference between the building's electrical load and the power supplied by the trigeneration plant.
- The building will incorporate an outdoor air economy cycle to provide the majority of cooling requirements when ambient conditions are mild.
- Mechanical cooling and heating systems will be designed to suit demand and will be limited to permanently occupied zones only with the addition of limited spot cooling and heating.
- A combination of floor by floor and central air handling units will serve the air conditioned spaces within the building. Lecture theatres, laboratories and the like will be separately zoned and automatically isolated when not in use to minimise energy waste.
- The crevasse provides natural day light so enabling artificial lighting to be reduced to this space during daylight hours.
- The internal stair system will reduce reliance on energy consuming lifting systems.
- All teaching spaces, offices and speciality areas are to be fitted with efficient fixtures and have reduced lighting densities where suitable, and an automated lighting control system will allow lights in unoccupied areas to be turned off or when natural day lighting is adequate.
- Sub-metering will record, measure and enable ongoing reporting of electricity consumption and - innovating, a digital display within the main foyer that will show the energy consumption of the facility in real time.

Water Efficiency

The efficiency measures to conserve water and reduce stormwater output from the site include the harvesting of rainwater for non-potable uses such as WCs, urinals, landscape irrigation and cooling towers. A 50kL – 100kL rainwater tank will be located on the roof.

Waste Management

The project is targeting diverting a minimum 80% of waste from landfill throughout the construction stage of the project.

As part of the Design Guidelines and the ESD Masterplan, UTS has a number of campus-wide waste reduction and disposal services. UTS aims to avoid unnecessary consumption; reduce and manage demand; reuse what it can on campus and donate or sell the balance; recycle as much as it can; and dispose of any non-recyclable and hazardous waste in a responsible manner.

3.12 Staging

Former buildings on the site have been demolished and the early works will be undertaken between April and October 2011.

The construction of the Broadway Building will not be staged. An approximate 22 months construction program is envisaged from March 2012 to December 2013, with occupation by the Faculty of Engineering and Information Technology intended for February 2014.

4.0 Consultation

The DGRs for this proposal required that an appropriate level of consultation be undertaken with various nominated relevant public authorities/agencies and utility providers 'having regard to previous consultation'. In addition to this, the proponent commenced a program of community engagement and consultation in February 2011 to complement the public exhibition of the Project Application.

4.1 Public Authorities

As required by the DGRs the following public authorities and utility providers were consulted by the proponent or its consultants. The issues raised are summarised below.

- City of Sydney
- Roads and Traffic Authority
- RailCorp
- Sydney Metro
- TransGrid
- Relevant utility providers.

Council of the City of Sydney

On completion of the design the subject of this EAR, UTS and DCM met with the Director City Planning & Regulatory Services and the Area Planning Manager. The officers indicated that the proposal and its approval will not be controversial from the City of Sydney's perspective, but also identified a number of minor design issues which UTS will address prior to approval. These include:

- the desirability of increased activation of the Laneway;
- corrosion resistance of the architectural feature;
- the safety of the screen where it meets the ground plane; and
- the degree of protection afforded to pedestrians within the space between the screen and the glazed external wall of the building.

Roads and Traffic Authority

No issues were raised other than consistency with the approved Concept Plan. In terms of impacts on traffic and the road network, the proposal is consistent with the Concept Plan.

RailCorp

Building on the consultation that was undertaken for the Concept Plan, UTS met with RailCorp in May 2010. In response to a request, UTS has informed RailCorp of the planned increase in student numbers.

Sydney Metro/Transport NSW

As part of the section 75W Modification to the Concept Plan there was extensive consultation by the proponent and its consultants with Transport NSW, the State government agency which assumed responsibility for the former Sydney Metro. Consultation was in connection with the reservation of an underground corridor for future West Metro. The issues were dealt with as part of the Modification to the Concept Plan - see Section 5.11 of this EAR.

Utility Providers and TransGrid

Table 3 below summarises the key issues from the consultation with Energy Australia, TransGrid and Sydney Water. Further information is provided in Sections 5.13 and 5.14 of this report.

Table 3 – Key consultation with utility providers

Issues	Comment / response
Energy Australia	
Establishment of substation	One 3x1500kVA substation will be required as a basement chamber. Further discussions are taking place to finalise UTS's requirements
Availability of electrical supply	Energy Australia agreed in principle with proposed supply taking into account that UTS will be looking at 2x1000kVA Tri Gen units
TransGrid	
Location of existing cables & tunnels	Proposed works will not impact on TransGrid services/infrastructure
Sydney Water	
Capacity of existing potable water, sewer and drainage infrastructure	All existing infrastructure has the capacity to service the needs of the building

4.2 The Community

UTS has commenced a program of engagement with the local community, students and staff of UTS, and other relevant stakeholders. This consultation, carried out by KJA Pty Ltd, complements the formal exhibition of the EAR by the Department of Planning. The intended outcomes of the communication and consultation strategy include:

- providing opportunities for stakeholders to provide feedback on the project;
- maintaining and enhancing the existing positive relationships between UTS, key stakeholders and the local community; and
- capturing and managing community and stakeholder issues and resolving concerns.

The consultation has two stages.

- The initial roll-out focuses on informing the community about the project and explaining the process for assessment. This includes a project notification letter to neighbouring residents and local businesses, provision of a 1800 community information line, and presenting project information on the UTS Masterplan website.
- The second phase supports the statutory exhibition and provides information on how to provide feedback. This includes two informal community information sessions and a display in the Tower Building on the Broadway campus to provide stakeholders with an opportunity to find out more about the project and speak with members of the project team. Display boards will be on exhibition prior to the information sessions from 28 February 2011 to 20 March 2011.

A report summarising the consultation undertaken and issues raised will be provided as part of the proponent's Response to Submissions Report following the statutory public exhibition of the proposal.

5.0 Environmental Assessment

This section of the report provides an assessment of the environmental impacts of the Concept Plan proposal in accordance with the Director-General's Environmental Assessment Requirements (DGRs). The draft Statement of Commitments complements the findings of this section.

Director-General's Environmental Assessment Requirements

Table 4 sets out the matters listed in the DGRs and identifies where each of these requirements has been addressed in this report and the accompanying technical studies.

It should be noted that as the bulk excavation of the site is no longer part of this Project Application and was the subject of the section 75W Modification to the Concept Plan, the assessment requirements pertinent and relevant to this element of the project are not addressed in any detail in this application.

Table 4 – Director-General's Environmental Assessment Requirements

Requirements	Location in Report
General Requirements	
(1) An executive summary;	Page vi
(2) Detailed description of the project including the:	
(a) project objectives and strategic justification for the project;	Sections 1.2.2; 3.2; 3.3
(b) description of the site including cadastral and title details;	Section 2
(c) textual and diagrammatic description of the proposal;	Section 3; Appendix E & F
(d) design, construction, operation, management and staging, as applicable; and	Sections 3.4; 3.5; 3.6; 3.7; 3.12
(e) alternatives considered	Section 1.2.2
(3) An assessment of the environmental impacts of the project, with particular focus on the Key Assessment Requirements specified below	Section 5
(4) Draft Statement of Commitments, outlining commitments to public benefits including State and local infrastructure provision or contributions, environmental management, mitigation and monitoring measures and clear indication of responsibilities;	Section 6
(5) Signed statement from the author of the EA confirming that the information is neither false nor misleading; and	Page v
(6) Report from a quantity surveyor identifying the capital investment value of the Concept Plan.	Appendix C
Key Assessment Requirements	
1. Urban Design and Built Form	
▪ Evidence that the design excellence process has been followed, including design competitions, and that the design is consistent with the design quality controls approved under the Concept Plan	Sections 5.1 & 5.2
▪ Detailed plans, elevations and sections showing height, bulk and scale of the proposed buildings in relation to existing and proposed site levels, adjoining buildings and surrounding locality including within the context of the Concept Plan.	Section 5.2; Appendix E & F
▪ 3D modelling and a physical model of the proposed building in accordance with the City of Sydney Model requirements.	Appendix E. Model provided separately
▪ Photomontages of key elements and views of the development from close-up and distant vantage points.	Appendix F

Requirements	Location in Report
▪ A materials/finishes sample board and detailed elevations confirming the application of materials and finishes.	Provided separately. See also Appendix F
2. **Transport and parking** ▪ Proposed traffic and parking arrangements ▪ Loading/delivery arrangements, including waste collection vehicles ▪ Bicycle parking and facilities ▪ Impacts of proposed vehicle access design on adjacent road network and pedestrian paths	Sections 3.9 & 5.4; Appendix G
▪ Any local road upgrades.	None
3. Solar Access ▪ Shadow diagrams to show existing and proposed impacts on the site, adjoining properties and the public domain during the midwinter (June 21). Elevation shadow diagrams are to be provided if shadows fall upon neighbouring residential buildings.	Section 5.3; Appendix F
▪ Solar access and amenity within the proposed buildings.	Section 5.3
4. Wind Effects ▪ Wind assessment to detail wind conditions on pedestrians within the site and public domain, and proposed mitigation measures.	Section 5.5; Appendix J
5. Energy Efficiency and ESD ▪ Energy efficiency report detailing measures to address energy efficiency and ESD in the design of the building. Measures should include water saving measures, energy efficiency, recycling and waste disposal.	Sections 3.11 & 5.6; Appendix I
6. Noise ▪ Noise impact assessment to detail excessive noise to be generated by the development and any mitigation measures.	Section 5.7; Appendix K
7. Reflectivity ▪ Analysis of the reflectivity impacts of the façade, including solar glare on occupants of nearby buildings, public areas and roadways. New buildings should not result in glare that causes discomfort or threatens the safety of pedestrian or drivers.	Section 5.8; Appendix L
8. Contamination ▪ A report in accordance with the requirements of SEPP 55, including a stage 2 detailed investigation, and where relevant, remediation action plan and validation and monitoring plan.	Undertaken for s.75W Modification. See Section 5.9.
9. Landscaping ▪ Plans of existing and proposed trees and landscaping both within the site and the public domain, including pavement, tree planting, awnings, bus shelters etc.	Section 3.10; Appendix H
10. Archaeological Assessment ▪ An archaeological assessment where excavation is proposed in accordance with the Heritage Office guideline "Archaeological Assessment Guidelines".	Undertaken for s.75W Modification. See Section 5.10
11. Sydney Metro ▪ Consultation with, and to take into account comments by Sydney Metro in relation to the potential impact of the Broadway Building on the proposed West Metro corridor. ▪ Any project application (or other application for approval under the Act) lodged in respect of the Broadway Building must have regard to the comments of Sydney Metro.	Undertaken for s.75W Modification. See Section 5.11

Requirements	Location in Report
12. Excavation and Construction Management ▪ An Excavation and Construction Management Plan is to include the following: - Demolition - Excavation work methods - Geotechnical report including any RailCorp and Sydney Metro requirements - Groundwater and water extraction - Noise and vibration – criteria to comply with and mitigation measures - Construction traffic management - Waste management - Construction hours.	Section 5.12; Appendix M & N. Some items relevant to s.75W Modification only
13. Utilities and Infrastructure ▪ Utility and infrastructure servicing, demonstrating development can be adequately serviced for water supply, wastewater, stormwater, electricity, gas and communications.	Section 5.13; Appendix O
14. Drainage, Stormwater and Groundwater Management ▪ Identify drainage and stormwater management regimes relating to the development.	Section 5.14; Appendix P
Consultation Requirements	
▪ Written evidence shall be submitted to demonstrate that an appropriate level of consultation has been undertaken with the following relevant parties during the preparation of the Environmental Assessment having regard to previous consultation. - City of Sydney; - Roads and Traffic Authority; - RailCorp; - Sydney Metro - TransGrid - All relevant utility providers	Section 4.1
▪ Document all community consultation undertaken to date or discuss the proposed strategy for undertaking community consultation. This should include any contingency for addressing any issues arising from the community consultation and an effective communications strategy. ▪ The consultation process and the issues raised should be described in the Environmental Assessment.	Section 4.2

5.1 Consistency with Approved Concept Plan

The proposal is consistent with the approved Concept Plan including the commitments made by UTS specific to the Broadway Building, as well as with the conditions applicable to the Broadway Building imposed by the Minister in the Instrument of Approval (as modified, 15 March 2011). **Table 5** provides a summary of consistency with the relevant elements of the Concept Plan and the Conditions of Approval.

Table 5 – Consistency with approved Concept Plan

Concept Plan element	Consistency/comment
Building dimensions	
Building height: 46.91 metres (as per SLEP 2005)	Maximum height is 46.82 metres
Maximum height of architectural feature: 10.7 metres above roof	Maximum height is 9.971 above the roof on the Broadway facade
Gross floor area: 34,650 sqm	GFA is under the maximum at 32,500 sqm
Car parking: 160 spaces	160 spaces are provided
Number of storeys: 11-12 storeys	11 on Jones Street; 12 on Wattle Street
Commitments	
Design excellence	
▪ Adopt the design excellence process and incorporate the design quality controls	The design of the building is the result of a design excellence competition and incorporates the design quality controls - see Sections 5.2.1 and 5.2.2.
Heritage	
▪ Limit built form of Broadway Building to maintain distant views of the Building 10 radio tower from the south and west	The views of the radio tower remain visible from the south and west - see Section 5.2.5
Transport	
▪ Investigate opportunities to consolidate bus shelters along Broadway	This is a longer term matter that would be best addressed once construction works on the campus are complete. It is not considered appropriate to locate bus shelter outside the Broadway Building.
▪ Provide facilities for cyclists	250 bicycle racks and other cyclist facilities are provided as part of the proposal
▪ Prepare Construction Traffic Management Plan	Construction Traffic Management Plan attached at **Appendix N**
▪ Consult with Sydney Metro re potential impacts on the West Metro tunnel alignment	Undertaken for section 75W modification, see Section 5.11 of this report
Visual impact	
▪ Use architectural treatment of facades to break down perceived scale and massing of new buildings	The building incorporates an architectural feature that breaks up the scale of the building and adds considerable interest.
▪ Retain street trees or provide additional mature plantings to improve streetscape	Trees along Broadway will be retained where possible, and/or will be replaced /augmented in accordance with the Concept Plan.
▪ Undertake reflectivity assessment of the Broadway Building architectural feature	Reflectivity assessment attached at **Appendix L.** The finishes for the architectural feature accord with the findings of the assessment, see Section 5.8

Concept Plan element	Consistency/comment
Solar access	
▪ Undertake detailed shadow impact study of the Broadway Building	There are no impacts on solar access beyond those described in the approved Concept Plan, see **Appendix F** and Section 5.3
Wind	
▪ Undertake detailed wind impact assessment of new buildings	Wind assessment attached at **Appendix J.** There are no unacceptable impacts on amenity as a result of the development, see Section 5.5
▪ Articulate facades Broadway Building to ameliorate impacts of westerly winds at ground level on Broadway	The architectural feature extends to ground level to provide a covered walkway so affording protection to pedestrians from wind and rain on Broadway.
▪ Locate pedestrian entrances to new buildings along internal pedestrian links to intercept strong wind flows	There are no unacceptable wind impacts at the proposed entrances to the building, see Section 5.5
Contamination	
▪ Undertake Stage 2 Environmental Assessment including soil and groundwater sampling	Undertaken for s.75W Modification, see Section 5.9
▪ Undertake waste classification for offsite disposal of soil and bedrock	Undertaken for s.75W Modification, see Section 5.9
ESD	
▪ Adopt 5 star Green Star Education target for the Broadway Building	The proponent is targeting a 5 Star rating as detailed in this report - see Sections 3.11 and 5.6
▪ Meet or exceed requirements of Section J of the BCA for energy efficiency in building fabric and environmental systems	Parts J1 to J8 of the BCA will be complied with but the design intent is to exceed Section J requirements.
Conditions of Approval	
B1 - Building plant setback 6m from façade or incorporated into the design of the building	The building plant is set back less than 6 metres from the façade of the building. However, all plant is incorporated into the building and screened by the architectural feature - see Section 5.2.4.
C1- Consultation with Sydney Metro	Dealt with as part of s.75W modification - see Section 5.11
D1 - Hours of work	Hours of work will be in accordance with the Conditions of Approval for the Concept Plan
D4 - Erosion and sediment control during construction	Measures to prevent erosion and sediment run-off are incorporated in the Construction Management Plan - see Section 5.12
D5 - Disposal of seepage and stormwater during construction	Disposal of seepage and stormwater is incorporated in the construction management plan - see Section 5.12
D6 - Dust control during construction	Measures to control dust are incorporated in the construction management plan - see Section 5.12
D7 - Waste management during construction	Waste will be disposed of in accordance with the construction management plan - see Section 5.12

5.2 Urban Design and Built Form

Chapter 3 of this report, the architectural plans prepared by DCM (at **Appendix E)** and the Design Report (at **Appendix F)** describe and illustrate in detail the design of the Broadway Building. A physical model and materials and finishes board are provided separately.

5.2.1 Design Quality Controls

The DGRs require that the proposal complies with the design quality controls applying to the Broadway Building in the approved Concept Plan. All are incorporated into the design as explained below.

1. Create a gateway to the city from the west and a distinctive building form which contributes positively to important views from the city, the west, Broadway and local streets.
The distinctive and unusual design of the building, particularly the architectural feature, creates a gateway to the City from the west and contributes positively to important views from the City, the west, Broadway and local streets - as shown in the photomontages at **Appendix F**.

2. Limit the height of the building to 54.11 metres from ground level (measured in accordance with the Standard Instrument)
The maximum height of the building is 49.015 metres from ground level (at Wattle Street) when measured in accordance with the Standard Instrument.

3. Maximise the extent of permeability of the ground plane through retail and student union shop fronts and student and public facilities.
As shown on the attached plans, there is a high level of permeability on the ground floors which incorporate a generous atrium (the crevasse), cross building pedestrian links, space for student union facilities, and a café.

4. Enable pedestrian connections through the site from Broadway through to Jones and Wattle Streets.
The design incorporates two major through site connections: between Jones Street and the corner of Wattle Street and Broadway, and between Jones Street and Wattle Street adjacent to Building 10.

5. Articulate the building façade along Broadway and Jones Street through openings and pedestrian connections, modulation and material quality.
As described in Section 3.4.2, the building facade is screened with a distinctive architectural feature which provides interest and excitement across all facades. The embedded decoration and skewed plates and gills provide modulation. Openings and pedestrian access are provided in three locations, and along Broadway, Jones Street and Wattle Street the feature is designed to provide pedestrian protection. The material for the feature is anodised aluminium and where visible behind the screen, the facade of the building is curtain wall or shopfront glazing.

6. Provide pedestrian protection along the length of the Broadway frontage, with additional protection on the Jones Street and Wattle Street frontages.
Weather protection is provided for the length of Broadway by way of a covered walkway between the glazed facade of the building and the architectural feature. Further pedestrian protection is provided across the site/building via the covered Laneway between Jones Street and Wattle Street.

7. Respond respectfully to the existing Building 10.
Building 10 is neatly integrated with the Broadway Building at ground level and via pedestrian bridges/ ramps at several levels above, and the southern facade forms part of the Laneway between the two buildings. A glazed roof at the parapet height of Building 10 provides weather protection between the two buildings and an 'outdoor' area associated with the Student Union will be accessible from both buildings. Distant views of the Building 10 radio tower are not obstructed.

8. Provide at grade and above ground pedestrian connections to Building 10.
Connections between the two buildings are provided via pedestrian bridge links over the Laneway at Levels 3 to 7 (to the equivalent levels in Building 10) and at grade on the Laneway between the Broadway Building Student Union area and the Student Services area in Building 10.

9. Provide vehicular connections to the new building through the Building 10 car park to avoid dangerous and unsightly driveways off Broadway and Jones Street.
Vehicular access to the building is through the (existing) Building 10 car park and there are no driveways off Broadway and Jones Street.

10. Incorporate design solutions to address wind conditions in the locality.
As discussed in Section 5.5 of this report there are no unacceptable wind impacts as a result of the development. Nevertheless, the proposed covered walkway along Broadway will provide additional weather protection.

5.2.2 Design Competition

UTS conducted a two stage Design Excellence competition in 2009 for the Broadway Building. The Design Competition jury comprised eminent professionals including nominees of the Department of Planning, Sydney City Council and UTS. The competition was won by Denton Corker Marshall and the firm's design was then incorporated into the Concept Plan for Broadway Precinct. The same design is the subject of this project application.

5.2.3 Building Form

The Broadway Building has been designed to complement its locality while creating a functional and sustainable learning environment that meets the future needs of UTS students and staff. It complies with the Concept Plan in respect of height and gross floor area, and as elaborated above, achieves the design quality controls set in the Concept Plan.

Gross Floor Area

The gross floor area (GFA) of the Broadway Building is 32,500 square metres measured in accordance with the Ultimo-Pyrmont provisions of SLEP 2005 - less than 34,650 square metres of GFA approved in the Concept Plan.

Building Height

The building consists of a single envelope to 46.82 metres in height when measured in accordance with the controls for Ultimo-Pyrmont in SLEP 2005. This complies with the maximum approved height in the Concept Plan of 46.91metres (SLEP 2005).

Architectural Feature

As described in detail in this report, an architectural feature consisting of four screens with different profiles on the four building façades rises above and clads the building. The highest point of the feature is along the Broadway frontage at Jones Street at 9.971 metres above the highest point of the building (that is the roof of the plant room when the height of the building is measured in accordance with the Standard Instrument).

On the Broadway facade the height of the architectural feature complies with the height proposed in the approved Concept Plan, as shown in the **Table 6**. There are very minor exceedances at the lower end of Jones Street facade, along Wattle Street and at the lower end of the Laneway which have arisen as a result of detailed design. None impact on distant views of the Building 10 Radio Tower (see Section 5.2.5 below) or result in overshadowing of other buildings. Moreover, the approved heights were estimates based on early concept design.

Table 6 – Height of Architectural Feature

Building façade	Approved height range (m)	Actual height range (m)*
Broadway	2.50 - 10.70	-0.214 – 9.971
Jones Street	4.90 - 10.70	4.994 – 8.077
Wattle Street	0 - 2.50	0.225 – 2.571
Laneway	0 - 4.90	0.750– 2.087

The lower (Wattle Street) end of the Broadway facade feature appears to dip below the top of the plant room roof. As illustrated in **Figure 12,** this is not the case. The maximum height of the plant roof has been set as the horizontal plane 7.2 metres above the ceiling of Level 12. At the Wattle Street end the plant room roof slopes down to 3.965 metres, still well behind the feature - which at this point is over 2 metres above the plant. When viewed from the corner of Broadway and Wattle Street, the plant and other roof mounted equipment (including the wind turbine) remain screened from view.

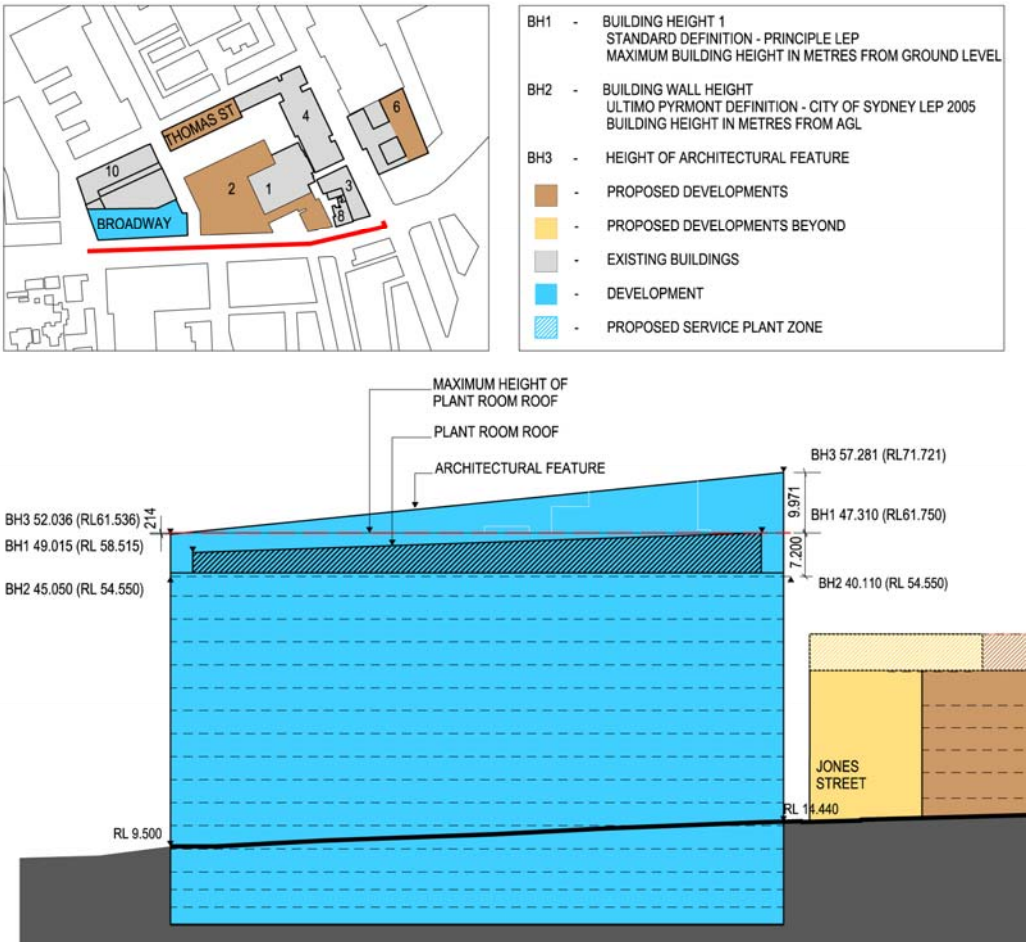

Figure 12 – Screening of roof plant (Broadway elevation) (Source: DCM)

5.2.4 Roof Plant Setback

To minimise the visual impact, the Conditions of Approval for the Concept Plan requires that the building plant to be set back at least 6 metres from any façade of the building facing a public street or incorporated into the design of the building.

As shown in the Plant Room Roof plan at **Appendix E,** the plant is set back both from the façade of the building and the binary screen at distances less than 6 metres. The plant is, however, incorporated into the design of the building in that it is effectively screened by the architectural feature. As demonstrated above and in the photomontages in the Design Report (**Appendix F),** at no point is the plant room roof above the height of the screen. Given the innovative nature of the architectural feature and the fact that the roof plant is effectively screened, this non-compliance with the Conditions of Approval is considered acceptable.

In keeping with the teaching/research function of the building and as part of EIF funding, a 7.89 metre wind turbine is mounted on the roof of the plant room more than 13 metres from the Broadway and Wattle Street façades. Also on the roof is a 4.99 metre high solar collector, set back over 19 metres from the Broadway façade, as well the photovoltaic array. All are hidden behind the architectural feature and none are visible from the corner of Wattle Street and Broadway opposite the building - see p.16 of Design Report at **Appendix F**.

If the wind turbine were to be visible from the west from more distant vantage points, this is considered acceptable as it announces and displays the environmental and teaching credentials of the Broadway Building.

5.2.5 Visual Impact

As part of the approved Concept Plan, UTS committed to limiting the built form of the Broadway Building to maintain distant views of the Building 10 Radio Tower from the south and west. Accordingly, DCM have assessed the visual impact of the Broadway Building with particular reference to impacts on views of the Radio Tower.

As described and illustrated in the Design Report (pp.9-12)(see **Appendix F**) three critical views of the Broadway Building were modelled from vantage points to the west and south west of the building. The model shows that the Broadway Building will have no impact on the visibility of the Radio Tower from a distance (Critical View 3). The tower will be partially screened by the architectural feature closer to UTS (Critical Views 1 and 2), but due to the perforated nature of the screen the impact is reduced and the tower is visible through the perforations.

The visual impact of roof plant has also been considered. As discussed above, the architectural feature is deliberately designed to hide the lift overrun and roof plant with the profile of the plant roof sloping to the west behind the lowest point of the screen (at Wattle Street and the Laneway). Moreover, as the design is envisaged as a series of angled plates, with the roof being the fifth elevation, the placement of roof top plant has been carefully considered so that the visual appearance and sculptural form of the building is maintained.

There will be little or no impact on surrounding streets from the wind turbine and solar collector and views will be limited to neighbouring tall buildings and possibly distant vantage points to the west along Broadway. If the turbine were to be glimpsed from afar this is considered appropriate as it displays and announces the research, teaching and environmental credentials of the Broadway Building.

5.3 Solar Access

Impacts on the Locality

The only structures shadowed by the Broadway Building are the proposed buildings at Frasers Broadway on the south side of Broadway (Blocks 1 and 4). Shading of Frasers Broadway will be no greater than that detailed in the approved Concept Plan as described in the shadow impact assessment undertaken by DCM (see Design Report p.23 and following pages at **Appendix F).**

At 12pm at the Winter Solstice, the Broadway Building will cast a shadow over Frasers Broadway of approximately 23m in height. Beyond this, the architectural feature will cast a further shadow of between 5m and 12m. This shadow will be dappled and have less of an impact due to the 45% free-air opacity of the perforated screen.

There is no loss of solar access to any area of public open space such as parks, squares and the like, although the public thoroughfare off Broadway between Blocks 1 and 4 of Frasers Broadway will be shaded. It is noted, however, that as the thoroughfare is bridged at around Level 7 for about 60% of its length, it will in itself cast shadows and reduce light to the thoroughfare.

Internal amenity

The three primary facades have full height glazing and the binary screen has 45% open area opacity. Combined they maintain a high level of transparency and enable reasonable solar access into the Broadway Building. Internally, glazed partitions are proposed to all main circulation paths, including at full height to the south side of the crevasse, allowing solar penetration and promoting a transparent and active interior.

5.4 Transport and Parking

An assessment of the impacts of the proposed traffic and parking is detailed in the Transport and Parking Report prepared by Halcrow located at **Appendix G**.

As elaborated below, the assessment concluded that the proposed development generally complies with the proposals put forward in the approved Concept Plan, that the impacts are equivalent to those identified in the Concept Plan, and that there will be no adverse effects on road users or transport as result of the development.

5.4.1 Traffic

Assessment

A detailed assessment of the impacts of the Concept Plan on the existing road and public transport network was undertaken by Halcrow MWT in May 2009 including the cumulative impacts of the proposal and the Frasers Broadway development. The assessment found that the performance of nearby intersections will be only marginally impacted by the overall development contemplated by the Concept Plan, and concluded that the local road and public transport network will be able to accommodate the additional demand generated by both the proposal and the Frasers development.

The original traffic estimates and proposed parking included the Broadway Building floor space and estimate of full time enrolments. These remain unchanged. On this basis, the proposal for the Broadway Building is in line with the estimated projections and it is assumed that these values can be relied upon for the assessment of traffic impacts of this project application. As such, the traffic generated by the Broadway Building development is unlikely to have any real traffic efficiency impacts on the surrounding streets, and no traffic and access issues are expected to arise.

Management

No management or mitigation measures are necessary. Notwithstanding this, the Broadway Building will be incorporated into the University's Sustainable Transport Strategy and Transport and Access Guide (which were included in the TMAP for the Concept Plan).

5.4.2 Parking

Assessment

As the number of parking spaces for the Broadway Building is the same as the number in the approved Concept Plan, there will be no impacts.

There will be increased use of the access into the Building 10 car park from Thomas Street.

Management

The increased use of the Building 10 car park is to be managed by way of two access lanes each with its own card reader. This will ensure that any additional queuing can be accommodated within the car park rather than extending across the footpath and onto Thomas Street.

5.4.3 Loading and Deliveries

Assessment

There will be an increase in the number of service vehicles /garbage trucks visiting the combined car park. Trucks will use the existing service entrance from Thomas Street which has adequate capacity to serve the requirements of both buildings.

The proposed pedestrianramp between the Building 10 car park and the Broadway Building (which is located close to the Broadway Building lifts) will allow goods to be dropped off and transferred easily to the new building. No management or mitigation measures are considered necessary.

The Building 10 waste collection area is likely to handle an increased amount of waste. The size of the service area is considered adequate to handle the increase in vehicles.

Management

Due to the increase in waste, it may be necessary to increase the number of waste collections during the week.

5.5 Wind Effects

The DGRs require an assessment of the wind conditions on pedestrians within the site and the public domain. The assessment was carried out by Cermak Peterka Peterson Pty Ltd (CPP) using wind tunnel test procedures - see **Appendix J** for the details of the assessment and wind tunnel test methodology.

Assessment

The model developed for the wind tunnel test considered the design of the Broadway Building, existing surrounding development and the buildings proposed on the Frasers Broadway site. The study examined wind conditions on people standing and seated both at locations remote from the site and immediately around the proposed building.

Overall the study concluded that the wind environment around the proposed development is generally satisfactory for the intended use of the space and all areas are acceptable for pedestrian walking with no distress criteria exceeded. The general wind amenity of the site is typically comparable to wind conditions remote from the site with these surrounding locations giving, for comparison, a general indication of the likely wind climate around the development. More specifically:

- Wind conditions are reasonably uniform across the site and no uncomfortable locations were recorded.
- The wind conditions will be dominated by the proposed Frasers Broadway development with the large massing of the development creating sheltered conditions for some wind directions, but accelerated channelled flow conditions from other directions resulting in a similar level of wind climate when integrated around all wind directions.
- All wind conditions at ground level are acceptable for use as a main public access way, however, if the Laneway at the north of the building is to be used for outdoor café style activities local temporary vertical screening would be recommended.
- Wind conditions in the walkway behind the screen on Broadway are expected to be calmer than along Broadway.

Given that wind conditions at ground level met the comfort criterion for use as a main public access way and all locations passed the distress criterion, no mitigation measures are considered necessary or are proposed.

5.6 Energy Efficiency and ESD

The environmental assessment is required to report on how energy efficiency and ESD is to be addressed in the design of the Broadway Building. As detailed in the report prepared by Aurecon (see **Appendix I)** - the project has the following Sustainable Design objectives:

- Achievement of 5 star Green Star Education v1 design rating certified by the Green Building Council of Australia;
- Energy efficiency with reference to industry benchmarks for educational facilities;
- Appropriate management of wastes on site during operations and construction; and
- Water efficiency with reference to industry benchmarks for educational facilities

The following sections describe the proposed initiatives to be incorporated into the building to achieve the above objectives as well as the intended Green Star rating.

5.6.1 Energy Efficiency

The proposed energy efficiency measures are intended to conserve energy and reduce greenhouse gas emissions through design and management. The following measures are proposed to reduce overall electricity demand and energy consumption.

- Incorporation of an outdoor air economy cycle to provide the majority of cooling requirements through the use of outside air when ambient conditions are mild. As outdoor air is utilised in lieu of return air during mild ambient conditions, this initiative can reduce cooling energy consumption by some 20% to 30%.
- Mechanical cooling and heating systems are to be designed to suit the demand of occupants and spaces, and will be limited to permanently occupied zones only, with limited spot cooling and heating provided to office areas and informal meeting areas within the crevasse.
- The building's chilled water needs will be served by high efficiency water cooled electric chiller and absorption chillers fed by waste heat from gas generators.

- The building HVAC system is to be a mixture of Air Handling Units (AHUs), Fan Coil Units (FCUs), overhead and underfloor supply for the basement levels and Level 1 and a floor displacement system on Levels 2 – 12. There will be a combination of floor by floor and central AHUs to serve the air conditioned spaces within the building. Lecture theatres, laboratories and the like will be separately zoned and automatically isolated when not in use to minimise energy waste.
- A gas fired trigeneration system will provide electricity to the building. The waste heat will be used to provide heating and to drive absorption chillers to cool the building. The inclusion of the trigeneration system will significantly reduce the energy consumption and carbon emissions of the building and also serve as an excellent opportunity for demonstrating this type of system to engineering students .
- The crevasse in the centre of the building (atrium) will provide natural day light to this space so reducing artificial lighting during daylight hours.
- As lighting for a facility such as the Broadway Building could account for between 25-40% of the estimated energy use of the building, all teaching spaces, offices and speciality areas are to be fitted with efficient fixtures, and reduced lighting densities are to be targeted where appropriate.
- An automated lighting control system will allow lights to be turned off when areas are unoccupied or when natural day lighting provides sufficient light to the space.
- The location of the internal stair system within the crevasse space will promote walking between floors and reduce reliance on energy consuming vertical transportation systems.
- Sub-metering to record and measure the electricity consumption of different energy uses is to be integrated into the Building Management System. This will separately monitor light and power consumptions for primary functional areas per floor. Ongoing reporting will allow the University to set goals for energy consumption reductions and attribute energy costs to particular uses. In addition, the building will incorporate a digital display within the main foyer that will display to students, staff and visitors the energy consumption of the facility in real time.

5.6.2 Water Efficiency

The proposed water efficiency measures to conserve water and reduce stormwater runoff /output from the site are summarised below.

- Rainwater is to be recovered and reused on site. Rainwater harvested from the main roof structure of the building and the covered Laneway between Building 10 and the Broadway Building will be used for WCs, urinals, cooling towers and irrigation of landscaping. A 50kL – 100kL rainwater tank (or similar capacity sized on expected roof capture area) will be located in the roof plant system.
- Water efficiency fixtures will generally be installed across the building (specified to achieve a minimum 6 WELS rating where feasible), while the specifications for laboratory fixtures are to meet minimum code requirements. To reduce the potable water consumption from the laboratories, at least 95% of the water requirement for all once-through water is to be sourced from non-potable water sources.
- Water meters are to be installed to all major water uses within the building and linked to the building management system which in turn would be linked to the site-wide University management systems.

5.6.3 Waste Management

The project will be targeting a minimum 80% diversion of construction waste from landfill through re-use and recycling. This will be covered in the Construction Management Plan (refer to Section 5.12 of this EAR).

Operational waste will be in accordance with the University's usual policies for waste reduction and minimisation as described in Section 3.11 of this report.

5.6.4 Transport Initiatives

The following sustainable transport initiatives are incorporated into the design of the Broadway Building:

- 25% of total car parking spaces are allocated for small cars - to encourage staff to use small cars so reducing greenhouse gas emissions.
- 10% of total car spaces are designated for carpooling vehicles - to promote car sharing and reduced personal vehicle movements to and from the site.
- Provision has been made for installation of recharge points for hybrid/ electric vehicles.
- 250 bicycle racks are provided in the Building 10 car park - 102 for staff and 148 for students.
- Provision of the appropriate number of cyclist facilities such as showers, lockers and change rooms.

5.6.5 Building Operations and Management

To ensure that ongoing sustainable and efficient operation of the Broadway Building, prior to occupation of the building the proponent will prepare the following guides:

- Building Users Guide that outlines ideal operational and maintenance procedures in relation to, amongst other things, the Energy and Environmental Strategy; monitoring and targeting; transport facilities; waste management, etc.
- Building Maintenance Guide that describes the measures to be undertaken to maintain and ensure that the building operates as designed and in the most efficient manner.

5.6.6 Green Star Rating

Green Star is an environmental design rating tool that has been tailored for the Australian climate and environmental issues. It focuses on a range of elements that encompass leading design in energy and water efficiency, materials, emissions, transport systems, management and indoor environment. The Green Star Education tool has been developed for new and refurbished university buildings.

The project is targeting a Green Star 5 star rating and has to score a minimum of 60 weighted points to achieve this. Based on the sustainable design initiatives described in this report, the proponent has set the following Green Star Education v1 target across the relevant categories to achieve the 5 star rating.

Table 7 – Green Star Education v1 target

Category	Points available	Points targeted
Management	14	14
IEQ	25	18
Energy	29	13
Transport	13	11
Water	16	11
Materials	27	15
Ecology	5	4
Emissions	14	8
Total	**148**	**94**
Weighted points	**199**	**66**
Equivalent Green Star Rating		**5 stars**

Source: Aurecon

5.6.7 Sustainability Measures and Performance

The proponent will measure the sustainability performance of the development through the following measures and environmental savings compared to relative industry benchmarks.

Table 8 – Sustainability Measures

Resource	Measure	Method for tracking usage	Measures to minimise /mitigate
Energy	$kgCO_2$-e per annum (GHG) kWh per annum	Electrical meters & sub-meters for different plant, equipment & spaces	Natural ventilated spaces High performance façade systems Efficient plant & equipment Efficient fixtures
Water	ML per annum L per person per day	Water meters for all major water uses	Rainwater harvesting & reuse Stormwater management on site Reduced flow ratings on fittings
Materials	Embodied energies Embodied water	Lifecycle assessments on material quantities consumed in construction	Materials supplements with waste materials Recycling and reuse of materials
Building / Site Wastes	T Wastes per week ML per annum	Waste receipts Stormwater capture	Recycling facilities on site Stormwater reuse within the building
People Movements	$kgCO_2$-e per annum (GHG)	Surveys of staff and usage rates of alternative modes of transport	Cyclist facilities Public transport access

Source: Aurecon

Achievement of a 5 Star Green Star rating and measurement of the sustainability performance of the building form part of the draft Statements of Commitments

5.7 Noise

Noise during construction has the potential to impact on neighbouring education buildings - primarily Building 10 - and the buildings on the western side of Wattle Street. Traffic noise from surrounding roads - Broadway and Wattle Street - as well as from internal plant and services could impact on the internal amenity of the building. Accordingly Renzo Tonin Associates was commissioned to assess the noise and impacts associated with the development (see **Appendix K).**

5.7.1 Construction Noise

Assessment

A quantitative noise assessment was undertaken consistent with the requirements in the Department of Environment, Climate Change and Water (DECCW) and recently released NSW Interim Construction Noise Guideline (ICNG) requirements. Sensitive noise receivers were identified as a residential building on Wattle Street, a commercial building on the corner of Wattle Street and Broadway, and all floors of UTS Building 10.

The assessment showed that noise emissions will generally exceed the set noise criteria and that noise mitigation measures will be required.

Management

To mitigate the impacts of noise the proponent will implement a combination of management measures. to be implemented as part of the Construction Management Plan for the site, detailed at **Appendix M** of this report . These include:

- General engineering controls.
- Specific noise mitigation measures to reduce airborne noise through the existing windows on the southern side of Building 10.
- Management measures where noise level exceedances cannot be avoided such as timing of works and relocation of affected classes elsewhere.

5.7.2 Operational Noise

Assessment

Noise from mechanical plant necessary for the building (cooling tower, condensing units, exhaust and intake fans; diesel generators, the trigeneration plant etc) could impact on neighbouring buildings. Similarly, noise from mechanical plant and equipment (including laboratory equipment) could potentially impact on the acoustic environment of the building itself, as could external noise from traffic on Broadway and Wattle Street and from aircraft.

In order to establish an understanding of the existing noise level on the site, measurement of noise levels in the vicinity of the site were measured to establish background and ambient noise levels. As described in the Renzo Tonin report, these will serve as the basis for the acoustic treatments to control noise impacting on the neighbouring buildings and noise intrusion into the Broadway Building.

Management

The mechanical plant items for the building are not yet finalised. Once selected, their noise specifications and their proposed locations will be checked prior to their installation on site to ensure that either singularly or in total they will not emit noise levels which exceed the noise limits specified as a result of the above measurement.

If noise emissions from the specified plant items are calculated to be in excess of the set criteria during the detailed design stage, then further acoustic treatments will be implemented to ensure compliance with the relevant noise criteria. In general, noise controls for mechanical plant are standard and commercially available, and can be readily added to silence any potentially noisy plant.

The study of external noise intrusion into the building found that appropriate controls can be incorporated into the building design to achieve a satisfactory environment consistent with the intended quality of the building and relevant standards. The design of the building envelope will be detailed to achieve the limits stipulated in Australian Standard AS2107:2000 "Recommended Design Sound Levels and Reverberation Times for Building Interiors"

In summary, the proposed development will be capable of complying with the applicable noise criteria outlined in the Renzo Tonin report by incorporating the appropriate noise control measures.

5.8 Reflectivity

The proposed design of the Broadway Building has the potential to create road traffic disability discomfort glare - specifically the proposed anodised aluminium screen and window glazing. Accordingly, UTS commissioned VIPAC Engineers & Scientists to assess the interaction of the building with the local environment in terms of reflectivity (see **Appendix L** for the VIPAC report).

The study used the results of a simulation that models the solar movements in relation to the building and examined reflection conditions for all daylight hours throughout the year and effects on motorists, pedestrians and surrounding buildings.

Assessment

The analysis assumed that the external glazing on all facades have a visible light reflectivity coefficient of 10% and that the facade areas covered by the aluminium screen have diffuse and less specular reflection properties compared with that of glazing. The analysis was based on the following facade features:

- North facade
  - 70% perforated anodised aluminium screen
  - 30% glazing
- East facade
  - 90% perforated anodised aluminium screen
  - 10% glazing
- South facade
  - 90% perforated anodised aluminium screen
  - 10% glazing;
- West facade
  - 90% perforated anodised aluminium screen.

The assessment identified no instances in which reflections from the proposed building would cause a persistent disability glare to motorists or unacceptable discomfort glare to pedestrians. The analysis further indicated that there would be no glare discomfort to people in the residential buildings to the west of the Broadway Building due to large trees and buildings blocking all reflections that exceed the predicted criteria for unacceptable discomfort glare.

Management

Notwithstanding the above findings, in accordance with VIPAC's recommendations the proponent has incorporated the following into the design of, specifications for, the building to decrease the likelihood of glare:

- exposed glazing - that is, not located behind a screen, will have a visible light reflectivity of 10% or less; and
- the anodised aluminium screen will have a matte finish and not be buffed or polished.

5.9 Contamination

The management and remediation of site contamination was dealt with as part of the Modification to the Concept Plan. No construction works the subject of this application will be commenced until the completion of remediation works outlined in the Remediation Action Plan and the subsequent validation assessment.

5.10 Archaeology

There will be no direct impacts on the archaeological values of the site as a result of the proposed construction of the Broadway Building. The impacts of the excavation of the site were covered and resolved as part of the section 75W Modification to the Concept Plan.

In summary, the Interim Excavation Report and Archaeological Assessment Review of the site, undertaken for UTS by Archaeological & Heritage Management Solutions Pty Ltd (AHMS), found that the site's potential archaeological research value and heritage significance lay in its association with the former occupation and use of the land by the Fowler pottery works (Fowler Ware). Based on this, prior to the commencement of the bulk earthworks UTS undertook a number of measures to manage the site's archaeological values including archaeological salvage excavation.

The excavations concluded that the site has low archaeological research potential associated with the in situ remains of former structures on the site and that it is unlikely that significant artefact deposits are extant on site except as deeper subsurface features.

In light of the conclusions from the archaeological work and the low research potential of the site, the proponent reconsidered the requirement for an Archaeological Management Plan contained in the Modification to the Concept Plan. However, should significant archaeological remains be exposed during the bulk excavation works, an archaeologist will be consulted to advise on their significance and the need for any further action.

5.11 Sydney Metro

The DGRs and the approval of the Concept Plan required that the proponent consult with Sydney Metro in relation to the potential impact of the Broadway Building on the proposed Metro West corridor. Any potential impacts of the Broadway Building on the corridor would largely be in relation to the excavation for, and the underground alignment of, the building. Accordingly, as part of the preparation of the Modification to the Concept Plan UTS duly consulted the Transport NSW - the government agency with responsibility for Sydney Metro.

The outcomes of the consultation and the resultant geotechnical advice are incorporated in the conditions of approval for the Modification to the Concept Plan.

5.12 Construction Management

The excavation of the Broadway Building is not part of this project application and was dealt with as part of the Modification to the Concept Plan. The following matters in the DGRs in relation to the management of construction impacts are not relevant to this EAR and were covered by the Modification to the Concept Plan:

- demolition;
- excavation work methods;
- geotechnical matters including Sydney Metro and RailCorp matters;
- groundwater and water extraction;
- noise and vibration associated with excavation.

In relation to the management of issues relevant to the construction of the building, prior to the commencement of works the proponent will prepare a Construction Management Plan (CMP) based on the framework plan at **Appendix M.** The CMP will address as a minimum:

- Construction hours;
- Construction traffic management (see below);
- Pedestrian management;
- Noise management;
- Waste management;
- Erosion and sediment control;

- Air and dust management; and
- Protection of existing street trees.

This matter is included in the draft Statement of Commitments in Section 6 of this EAR.

Construction Traffic Management

The impacts of construction traffic will be controlled through the Construction Traffic Management Plan (CTMP) prepared by Halcrow (see **Appendix N**). The CTMP covers:

- construction vehicle routes;
- access to the site;
- loading and deliveries to, and waste removal from, the site;
- the closure of Jones Street;
- management of pedestrian access/movements;
- emergency vehicle access; and
- driver protocols.

5.13 Utilities and Infrastructure

As discussed in this section, the site is able to be serviced for water, drainage, sewer, gas and electricity. UTS will use its existing communications infrastructure. Details are provided below.

Water, Wastewater and Gas

Arup were commissioned to investigate and report on the capacity of existing services and infrastructure to meet the hydraulic and gas servicing needs of the building (see report at **Appendix O).** Following analysis of the Broadway Building's hydraulic services requirements Arup concluded that there is sufficient capacity in sewer, stormwater and water mains and gas services for the proposed development. Specifically:

- There are adequate potable cold water supplies. Jones Street has a 600mm CICL water main and 2 x 150mm CICL and Broadway has a 200 CICL water main - all with sufficient hydraulic and fire flows for the new development.
- There is adequate capacity in the sewer lines and Sydney Water has confirmed that the existing 300mm VC sewer main within the property will serve the building. The design proposes several strategies to reduce wastewater output, such as low-flow tap ware, waterless urinals, and dual toilet supply.
- There is adequate capacity in the existing stormwater system and the existing drain in Wattle Street will be used. The design incorporates water sensitive urban design principles such as rainwater harvesting to minimise flows and prevent stormwater runoff together with onsite detention.
- There is adequate natural gas capacity in Jones Street for the proposed loads including the trigeneration plant (Jemena is the supplier). As part of the campus gas supply strategy UTS is investigating an alternative source of gas supply for the Broadway Building from the existing internal gas network infrastructure within the campus instead of using the Jemena Gas Network.

Electricity

Waterman AHW has consulted with Energy Australia and received in principle agreement to the supply of electricity to the site taking into account the proposed trigeneration plant.

5.14 Drainage and Stormwater

The DGRs require information on the development's drainage and stormwater regimes. This is addressed in a report prepared by Arup (see **Appendix P).** The report addresses the relocation, realignment or augmentation of the affected stormwater services, and potential impacts on the storm water systems in the area and overland flow management.

Arup concluded that there is sufficient capacity in the surrounding stormwater systems to meet the building's hydraulic services requirements. As detailed elsewhere in this report, the proposal incorporates water sensitive urban design to minimise flows and reduce stormwater runoff as well as onsite detention.

Final calculations and plans showing on the size and volume of on-site storage will be submitted to Sydney Water and the City of Sydney.

5.15 Building Code of Australia

The compliance of the proposal with the requirements of the Building Code of Australia (BCA) is under review. A strategy will be adopted to address any compliance issues that cannot meet the deemed-to-satisfy provisions of the BCA. A number of fire and hazard matters are to be the subject of a performance based alternative solution to be developed by the fire safety engineer.

In relation to energy efficiency, it is intended that the design meets or exceeds the requirements of Parts J1 to J8. Nevertheless, Design Certification will demonstrate that compliance is achieved.

A full BCA assessment and report will be completed prior to the issue of a construction certificate including the matters below.

5.15.1 Access for People with Disabilities

Morris-Goding Accessibility Consulting has prepared an Access Report to provide advice and strategies to maximise reasonable provisions of access for people with disabilities (see **Appendix Q**). The access review responded to the requirements of the AS1428 series, the BCA, City of Sydney Access DCP, and the Commonwealth Disability Discrimination Act (DDA).

Assessment

The design was reviewed to ensure that ingress and egress, paths of travel, circulation areas, and toilets comply with relevant statutory guidelines. In general, the proposed development has accessible paths of travel that are continuous throughout and has demonstrated an appropriate degree of accessibility. Compliance with statutory requirements, pertaining to site access, common area access, accessible parking and accessible sanitary facilities, can be readily achieved.

Management

The proponent will adopt the recommendations in the Access Report prior to construction certificate. The recommendations are in accordance with the DDA Access Code 2010 which is to be inserted into the BCA from 1 May 2011. Accordingly, these provisions will be assessed as part of BCA compliance. In addition, the requirements of UTS's Accessible Environments Policy will be addressed through detailed design.

6.0 Draft Statement of Commitments

In accordance with the Director-General's Environmental Assessment Requirements, the proponent is required to include a Draft Statement of Commitments in respect of environmental management and mitigation measures for the site. The following are the commitments made by UTS to manage and minimise potential impacts arising from the project.

6.1 Ecologically Sustainable Development

In relation to the sustainability of the Broadway Building, the proponent will:

- Achieve a 5 star Green Star Education v1 design rating certified by Green Building Council of Australia;
- Implement the sustainability measures detailed in this report in relation to energy, water, waste and transport;
- Monitor and report on the performance of the building in accordance with the measures set out in Section 5.6.7 of this report.

6.2 Construction Management

Prior to the commencement of construction, UTS will prepare a detailed Construction Management Plan based on the framework plan at **Appendix M** of the report. As a minimum the plan will cover:

- Construction traffic management;
- Noise management;
- Waste management;
- Erosion and sediment control;
- Air and dust management;
- Pedestrian management; and
- Protection of existing street trees.

7.0 Conclusion

The Broadway Building at UTS's City Campus not only provides a significant development at the southern gateway to the Sydney CBD, but importantly, presents through its unique design, a modern, cutting edge image of the university. The building is the cornerstone of UTS's growth strategy and enables a significant quantum of education floor space to be provided in one location in a purpose built building appropriate for, and expressive of, the technology-based teaching and research to take place within it.

The design of the building, selected through a two-stage design excellence competition, is consistent with the UTS Broadway Precinct Concept Plan approved by the Minister for Planning in December 2009. The development of the Broadway Building site maximises the social and economic potential of an existing underutilised university asset and significantly enhances the general locality and the university's Broadway frontage.

The assessment of the proposal has demonstrated that the development is consistent with the approved Concept Plan and that it will not generate any adverse environmental impacts. The design of the building and the range of sustainability measures included as part of the development enable UTS to demonstrate its commitment to reducing its environmental footprint and to achieving a targeted 5 Star Green Star rating using the Green Star Education tool for new buildings. Generous through-site links are provided at the lower levels and the whole building benefits from natural light from a full height atrium.

The site is suitable for the proposed development for the following reasons:

- The land is owned by the university and is currently utilised for non-educational purposes.
- It was subject to extensive analysis through the development of the Broadway Precinct Concept Plan.
- It is in the immediate vicinity of significant and multiple public transport modes, and will have negligible impacts on the local road network.
- It adjoins other education uses and buildings to its north and east and is entirely in keeping with the quality and size of development occurring on the Frasers Broadway site immediately opposite to the south.
- It makes economic use of existing infrastructure and space in Building 10 for cyclists' facilities and to access the new building's carpark.

Approval of the proposed development is sought on the following grounds:

- It is consistent with the approved building envelope for the site and the Concept Plan for the Precinct.
- By providing around 40% of the floor space envisaged in the Concept Plan, it enables the University to upgrade its teaching facilities to meet current industry standards and increase its overall student capacity.
- It is highly sustainable in that it targeted to achieve a 5 Star Green Star rating.
- It does not generate any unacceptable environmental impacts.
- It activates a neglected part of Broadway and showcases at the ground levels the research and educational activities within it.
- It encapsulates design excellence and provides a distinctive landmark at the southern gateway to the Sydney CBD.

The proposed development is considered to be in the public interest as State, regional and local needs will be met by effectively boosting the capacity of an existing, high quality tertiary institution. We therefore recommend that the Minister approves this Project Application.