Environmental Assessment

Tyree Energy Technologies Building

UNSW Kensington Campus

VOLUME 1

December 2009

CONICS

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Environmental Assessment

for

Tyree Energy Technologies Building
UNSW Kensington Campus

prepared for

The University of New South Wales

by

Conics (Sydney) Pty Ltd

December 2009

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prepared under Part 3A of the
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Environmental Assessment prepared by

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In respect of	UNSW Tyree Energy Technologies Building

Applicant & Land Details

Applicant name Applicant address	The University of New South Wales Anzac Parade Kensington NSW 2052
Land to be developed	Anzac Parade Kensington
lot no, DP/MPS, vol/fol etc	Lot 3 DP 1104617

Environmental Assessment

An environmental assessment is attached

Declaration

I certify that I have prepared the contents of this Environmental Assessment in accordance with the Director General's Requirements dated 3 November 2009 and the Environmental Planning and Assessment Act 1979 and Regulation, and that to the best of my knowledge, the information contained in this report in neither false nor misleading.

Signature	
Name	Silvija Smits
Date	9 December 2009

Executive Summary

The University of New South Wales is seeking to construct a new research and teaching building to be known as the Tyree Energy Technologies Building. The building will provide high quality space to accommodate leading edge research facilities in key energy areas, including photovoltaics, carbon capture and storage, oil and gas reservoir characterisation, carbon trading, nanomaterials and policy and market analysis.

The Tyree Energy Technologies Building will be the first stage of a redevelopment of the Kensington Campus for the Faculty of Engineering. Over the next 10-15 years, the faculty will be relocated from its existing 1960s buildings into new and refurbished accommodation in a major redevelopment of the lower campus. The works are intended to:

- establish new research facilities which provide flexible and operationally efficient space
- provide a gateway building to the campus and a landmark building for the Faculty of Engineering and UNSW generally
- establish a new built form connection to activate public use of urban spaces, and
- integrate and reinforce University Mall.

Proposed Development

The proposed development consists of the new four and a half (4.5) storey Tyree Energy Technologies Building of approximately 13,100m^2 of gross floor area and associated servicing, landscape and public domain works on the site of the existing tennis courts, Grounds Depot and cricket nets on the south-eastern corner of Anzac Parade and University Mall at UNSW's Kensington Campus.

- a standalone building of four and a half (4.5) floors plus a lower ground/semi-basement level
- learning and teaching spaces including tutorial rooms, computer laboratories, and lecture theatres
- laboratories and workshops
- administration, meetings rooms and offices
- lobby, exhibition spaces, circulation, amenities and cyclist facilities
- a café with associated kitchen and storeroom
- a central atrium space with access stairs and pedestrian bridges connecting floor levels through the full height of the building
- standard building services including air conditioning, ventilation, lighting, power, communications, security, hydraulic and fire detection systems, storage and plant spaces
- specialised dangerous goods storage and handling, and
- external works around the building including roadworks, pavements, retaining walls and landscape.

This application also includes the demolition of the existing Grounds Depot building, tennis courts, cricket nets and part of Spooner's Wall and the removal of hard stand surfacing and kerbing surrounding the Grounds Depot and some existing trees.

A number of other structures on the site are proposed for removal, including a brick bund, metal shed and bus shelter. Their demolition is to be carried out as exempt development pursuant to SEPP (Infrastructure) 2007 and does not form part of this proposal.

The proposed development excludes car parking. The Traffic and Parking Report concludes that the extra demand for car parking created by this proposal would be some 24 spaces. One of the key objectives of the Kensington Campus DCP is to reduce car dependence, so in line with the DCP it is not proposed to accommodate any parking but to continue with the established UNSW policy of travel demand management.

All required infrastructure and services will be provided as required.

Environmental Assessment

In accordance with Part 3A of the Environmental Planning and Assessment Act, the Director-General issued requirements for the project that must be addressed in the Environmental Assessment (EA). These requirements refer to the following issues:

- key issues which include addressing relevant planning policies and guidelines, built form/urban design, environmental amenity, transport and accessibility impacts (operational and constructional), ESD, utilities, drainage and stormwater, construction impacts, contributions and consultation
- a description of the proposal
- a draft Statement of Commitments, and
- environmental impacts of the proposal, the suitability of the site, and whether or not the project is in the public interest.

The proposal complies with all relevant environmental planning instruments, including the site specific UNSW Kensington Campus Development Control Plan.

The site is considered suitable for the development for the following reasons.

- The site is identified in the UNSW Kensington Campus Development Control Plan as a development site for an iconic campus building.
- Replacement tennis courts will be built at the University's sports field site at David Phillips Field, Daceyville. The potential for new cricket nets on the south-western side of Village Green is being investigated.
- Part of the land is currently underutilised.
- UNSW has excellent public transport services which are to be further enhanced with the implementation of the UNSW Kensington Campus Development Control Plan Transportation Strategy.
- The site is relatively flat and readily able to accommodate the type of development proposed.
- The development will assist in creating a new gateway to the campus and a landmark building for the Faculty of Engineering and UNSW generally.

Environmental impacts associated with the construction and operation of the proposed development will be minimal. Even though the facility will handle dangerous goods, UNSW has mechanisms in place, that will be applied to this development to ensure the ongoing safety and security of the campus and the surrounding area is maintained.

Although there will be an increase in population on the campus as a result of this proposal, the increase in private car travel is expected to be minimal as UNSW's Transportation Strategy, adopted as part of the DCP, is implemented over time.

There will be some loss of trees along Anzac Parade. However, as the proposal retains the trees along University Mall, which are identified as high priority in the DCP, and it includes new landscape works this loss will be ameliorated as far as possible.

The proposal is anticipated to achieve an equivalent 6 star rating for ecologically sustainable development, if implemented in accordance with ESD guidelines.

There will be no adverse noise or wind impacts.

Stormwater will be controlled as part of the UNSW Stormwater Strategy.

The social impacts of the proposal are only beneficial as the resultant teaching and research work is aimed at developing new energy technologies which will assist in climate change mitigation. There will be additional social benefits from the better use of existing infrastructure to create synergies between differing research streams within the one location.

The four common priority goals in the UNSW Strategic Plan 2005 include research, international, learning and teaching, and community. These goals form the guiding principles that underpin the UNSW Kensington Campus Development Control Plan. In relation to research, the proposed facility will be consistent with this goal in that it will allow flexible research space that has relationships with external bodies and disciplines within the University.

A proposal of this nature requires little justification or qualification that it is in the public interest. The benefits of research and development in energy technology are critical to climate change mitigation. Providing this facility will expand research in this area.

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1. Site Description

1.1 Location

The University of New South Wales (UNSW) Kensington Campus is located approximately six kilometres south-east of the Sydney CBD. The main campus is bounded by High Street to the north, Botany and Willis Streets to the east, Barker Street and Oval Lane to the south and Anzac Parade to the west. There is a western campus located on the opposite side of Anzac Parade which accommodates the Parade Theatre, NIDA and a small number of other facilities.

The main campus is divided into upper, middle and lower campus zones. The site of the proposed building is at UNSW coordinates H6 on the lower campus at the junction of University Mall, Anzac Parade and Day Avenue (see Figure 1). The site is located to the north of New College, west of Sam Cracknell Pavilion and Village Green and south of University Mall (see site photographs in Figure 2). It is identified in the Campus 2020 Master Plan, adopted by Randwick Council in 2005, as both an icon site, because of its landmark location, and a potential development site (refer Section 3.2.6).

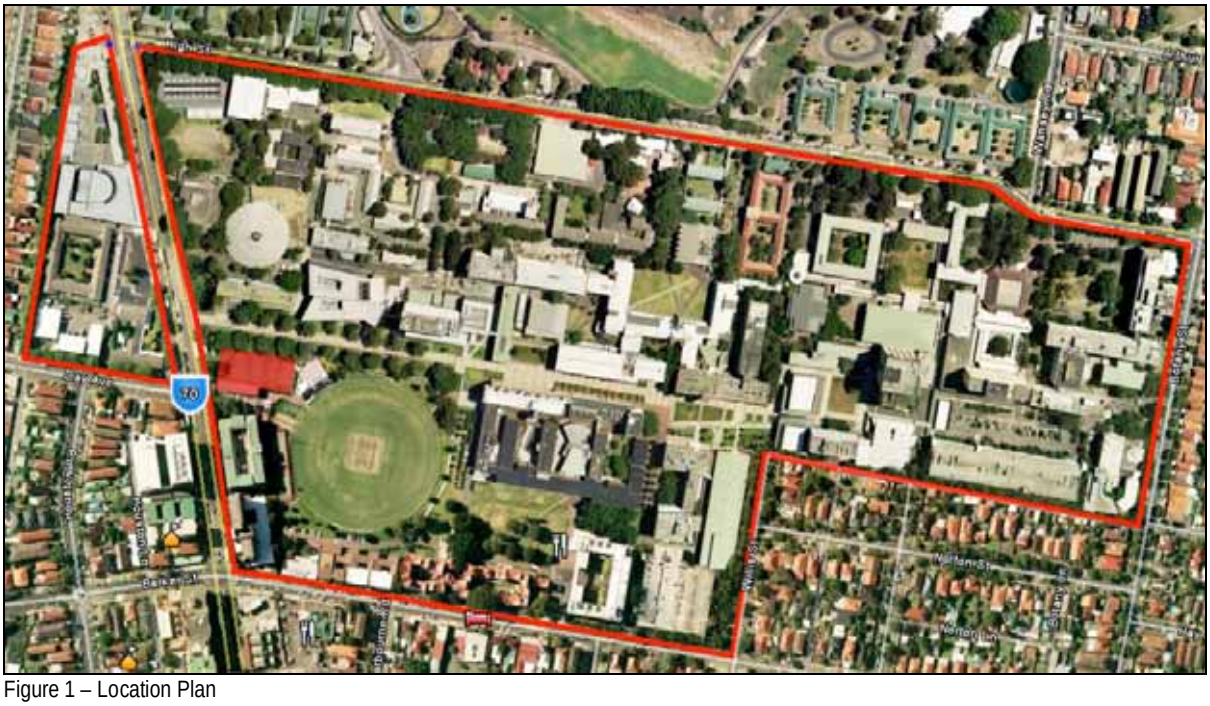

Figure 1 – Location Plan

Although the campus as a whole has a large change in topography falling some 34 metres from Botany Street in the east to Anzac Parade in the west, this lower section is level to the eastern edge of the Village Green. The major level difference occurs to either side of the Willis Street alignment in middle campus. The average ground level of the site is RL 27.0m relative to Australian Height Datum (AHD).

1.2 Ownership and Title Information

The whole of the Kensington Campus, including the development site, is owned by UNSW. The development site is located on a parcel of land identified as Lot 3 in DP 1104617.

1.3 Existing Improvements

The site is currently improved by tennis courts, a maintenance building and yard (the Grounds Depot), a number of cricket nets to the south-east, a shed, brick bund and a bus shelter on Anzac Parade (refer site photographs in Figure 2).

The boundary with University Mall is delineated by Spooner's Wall, a landscape element that extends from Anzac Parade to the eastern end of the Village Green. The portion of wall adjacent to the site will be removed as part of this proposal.

University Mall, a ceremonial entry point to the campus comprises a central paved pathway and with two rows on significant tree plantings to either side.

The development site also includes a number of existing trees along Anzac Parade. An analysis of the existing trees is at Appendix C. A small number of trees along Anzac Parade and the southern edge of the site adjoining New College will be lost as a consequence of this development proposal. Trees along University Mall will be protected and retained.

There is no existing car parking on site, however there are two loading bays within the maintenance yard.

Figure 2a – University Mall looking east (site to right)

Figure 2b – Development Site, south of University Mall

Figure 2c – Sam Cracknell Pavilion from University Mall

Figure 2d – Exsiting tennis courts with Spooner's Wall in foreground

Figure 2e – Existing cricket nets with Ground Depot beyond to right and New College to left

Figure 2f – Existing cricket nets, Grounds Depot and tennis courts, with Sam Cracknell Pavilion to right

Figure 2g – Internal roadway (Southern Drive) to rear of New College looking south

Figure 2h – Internal roadway to Grounds Depot looking north

Figure 2i –New College Postgraduate Village opposite site on western side of Anzac Parade

Figure 2j – Western Campus looking west, with New College Postgraduate Village to left

1.4 Existing Access

Pedestrian access to the site is available from University Mall to the north and Village Green to the east.

Vehicular access to the site is via an internal roadway known as Southern Drive, between New College and Village Green accessed from Gate 14 in Barker Street to the south.

As descibed in the Campus 2020 Master Plan, UNSW Kensington Campus is a major traffic generator that attracts people from the whole Sydney region. Use of private motor vehicles as a mode of travel to and from campus has been steadily decreasing over the last decade. This has been acheived by UNSW implementing restrictive measures that discourage the use of the private vehicles together with the positive measures to ensure a shift to sustainable travel modes such as pubic transport, cycling and walking (see also Section 2.5).

Histroically, parking has been distributed throughout the campus in surface car parks. However the proportion of the campus occupied by parking has decreased due to redevelopment initiatives and the construction of two multi-storey parking stations located on the campus perimeter with direct access off Botany and Barker Streets. Some surface parking remains.

1.5 Existing Services

The subject site, consistent with the whole of the UNSW campus, is serviced by all necessary utilities including power, gas, water, sewer, stormwater drainage and telecommunications.

1.6 Existing Ground Conditions

The contamination assessment undertaken by Urban Environmental Services attached to the geotechnical and environmental investigation report prepared by Pells Sullivan Meynink (PSM) for the proposed development (refer Appendix E) indicates the regional geology to be as follows.

> *Review of the Department of Land and Water Conservation Sydney Soil and Landscape Series Sheet 9130 (2004) indicate that site is within the Tuggerah Aeolian Landscape comprising gently undulating to rolling coastal dunefields. Soils are podzols on dunes and podsol/humus podzols intergrades on swales. The soils pose a wind erosion hazard, are non cohesive, highly permeable, and subject to localised flooding with a permanently high watertables.*
>
> *Review of the DLWC Acid Sulphate Soil Risk Map – Botany Bay, Edition 2, 1997 indicates the site is within a typical landform comprising bedrock slopes, elevated Pleistocene and Holocene dunes and elevated alluvial plains. Acid sulphate soils are not known or expected to occur in these environments. The environmental risk is indicated as land management activities not likely to be affected by acid sulphate soil materials.*
>
> *Geotechnical drilling undertaken by PSM indicated the site is underlain by fine to medium grained sands.*

In respect of contamination, Urban Environmental conclude that:

> *based on the historical evaluation of site usage, the subject site has had a history of education use since the 1950s. The site does not have a history of potential contaminating activities and is suitable for education redevelopment. No further investigations are warranted from a contamination perspective.*

The geotechnical report by PSM notes that *groundwater was encountered at levels of between RL 20.7m and RL 21.0m AHD*. It further notes that *groundwater levels fluctuate with rainfall and other factors*. As the proposed basement is to be at RL 23.7m AHD it is not anticipated that groundwater will be encountered during construction.

1.7 Local Context

UNSW Keningston Campus is surrounded by a variety of land uses ranging from recreational, institutional (hospital), local town centre and residential.

Adjoining the campus to the north is the Royal Randwick Racecourse. To the north east is part of the Randwick residential area, with the Randwick town centre further north-east. The Prince of Wales Hospital, incorporating the Sydney Children's Hospital and the Royal Hospital for Women, lies to the east, separated from the campus by a strip of Randwick residential development. South and south-west of the campus is the Kingsford residential area and Kingsford town centre. Beyond the western campus to the west lies the Kensington residential area with the Kensington town centre to the north-west.

All of the town centres are within a 500 metre radius of the campus. All are local centres offering services mainly to the surrounding residential areas and UNSW. The nearest major business and/or shopping centres are the Sydney CBD, Bondi Junction and Eastgardens/Maroubra Junction, which are within a 5 to 6 km radius.

The residential areas of Randwick, Kingsford and Kensington in the vincinity of the site, are all characterised by a mixture of low density single/two storey dwellings and low rise residential flat buildings. The exception is the medium rise development along Anzac Parade in the business centre of Kingsford and the recently approved mixed developments in Kensington town centre, that include a component of student housing.

Anzac Parade, which is the major arterial road in the locality, adjoins the western end of the main campus. Anzac Parade divides main campus from western campus. Together with High Street, Botany Street and Barker Street that adjoin the remainder of the campus, these roads form the local road network. With the exception of Barker Street, they are the major bus routes that link the campus with the rest of the Sydney metropolitan area.

2. Development Proposal

2.1 Objectives

The University of New South Wales is seeking to construct a new research and teaching building to be known as the Tyree Energy Technologies Building. The building will provide high quality space to accommodate leading edge research facilities in key energy areas, including photovoltaics, carbon capture and storage, oil and gas reservoir characterisation, carbon trading, nanomaterials and policy and market analysis.

The Tyree Energy Technologies Building will be the first stage of a redevelopment of the Kensington Campus for the Faculty of Engineering. Over the next 10-15 years, the faculty will be relocated from its existing 1960s buildings into new and refurbished accommodation in a major redevelopment of the lower campus. The works are intended to:

- establish new research facilities which provide flexible and operationally efficient space
- provide a gateway building to the campus and a landmark building for the Faculty of Engineering and UNSW generally
- establish a new built form connection to activate public use of urban spaces, and
- integrate and reinforce University Mall.

These works are described in detail below and are shown on the architectural drawings in Volume 2.

A key component of the design of the building is to ensure that it preserves and enhances the existing landscape character of University Mall.

2.2 Proposed Development

The proposed development consists of the new four and a half (4.5) storey Tyree Energy Technologies Building of approximately 13,100m^2 of gross floor area and associated servicing, landscape and public domain works on the site of the existing tennis courts, Grounds Depot and cricket nets on the south-eastern corner of Anzac Parade and University Mall at UNSW's Kensington Campus.

Specifically the proposed development comprises (refer architectural drawings and landscape concept design in Volume 2):

- a standalone building of four and a half (4.5) floors plus a lower ground/semi-basement level
- learning and teaching spaces including tutorial rooms, computer laboratories, and lecture theatres
- laboratories and workshops
- administration, meetings rooms and offices
- lobby, exhibition spaces, circulation, amenities and cyclist facilities
- a café with associated kitchen and storeroom
- a central atrium space with access stairs and pedestrian bridges connecting floor levels through the full height of the building
- standard building services including air conditioning, ventilation, lighting, power, communications, security, hydraulic and fire detection systems, storage and plant spaces
- specialised dangerous goods storage and handling, and

- external works around the building including roadworks, pavements, retaining walls and landscape.

This application also includes the demolition of the existing Grounds Depot building, tennis courts, cricket nets and part of Spooner's Wall and the removal of hard stand surfacing and kerbing surrounding the Grounds Depot and some existing trees.

To undertake the landscape works, a number of existing trees will be protected, notably those along University Mall and a number of trees will be removed. The trees to be removed are located in the south-western corner of the site, adjoining Anzac Parade and they are not identified as priority for retention under the DCP. The Arboriculture Assessment (refer Appendix C) identifies trees to be removed and those which are retained including guidelines on tree protection measures.

A number of other structures on the site are proposed for removal, including a brick bund, metal shed and bus shelter. Their demolition is to be carried out as exempt development pursuant to SEPP (Infrastructure) 2007 and does not form part of this proposal.

2.3 Built Form and Configuration

The built form and urban design of the project has been carefully conceived to address the particular features of the site and its attributes, as set out in the Architectural Design Statement at Appendix N prepared by Francis-Jones Morehen Thorp. The design statement also describes proposed external materials and finishes.

The proposed height and scale of the building is consistent with surrounding development with each façade designed to respond to its aspect.

The main building façade is along University Mall. The building responds to the varying heights of the existing trees along University Mall through horizontal elements of the northern façade. This is reinforced by the light canopy which is scaled to the roof of the building.

The general form of the building is rectangular in shape but from Levels 1 to 4 it has three angular fragments protruding from the western side and one rectangular fragment on the south-eastern corner.

The western angular building façade addresses Anzac Parade by creating an urban transition from the street aligned block forms to the south and the landscape to the north. This façade design also responds to the existing vegetation as it weaves with the existing Figs along Anzac Parade.

The design of the main façade at ground level addresses University Mall through a continuous raised platform with seating steps. This is to create an open and welcoming space to facilitate interaction between the building and the Mall.

The main access into the building is at ground level via the seating steps. Ramps are located on the west and east sides of the steps. Entrances are also located along the western, southern and eastern sides.

Access between the levels is provided via three sets of stairs, a single passenger lift and a goods lift. One set of stairs is associated with a central atrium space that also has pedestrian bridges connecting floor levels through the full height of the building. The goods lift is located at the south-eastern corner of the building connected to the loading dock at ground level.

The lower ground will contain three horseshoe-shaped theatres, two computer laboratories, three teaching laboratories and workshops. This level includes space for student learning facilities, amenities and quiet study areas. Back-of-house areas include switch rooms, plant space and pump rooms.

The ground floor is designed to activate the adjoining areas by providing an interactive environment for people to pass through or congregate. The seating steps along the entire northern façade lead up to an interior exhibition area, foyers, open learning areas and a café. Also on this level are tutorial rooms, quiet learning areas and back-of-house areas including a loading dock, storage and plant spaces. Amenities and cyclist facilities are also located at ground level.

Levels 1, 2 and 3 house wet and dry laboratories, offices, meeting rooms and open plan staff areas. Amenities and plant space are provided on these levels. Roof top laboratories are provided on Level 4 as well as internal laboratories. Level 5 is the roof level which consists of plant rooms.

2.4 Landscape and Public Domain

A landscape concept plan has been prepared as part of the proposal (see Volume 2). The Landscape Design Statement prepared by Francis-Jones Morehen Thorp is at Appendix O.

The landscape concept addresses impacts on University Mall, a significant and symbolic area of open space within the UNSW Kensington Campus. The retention of the existing landscape and mature trees is a key element of the project.

The development proposal will significantly improve the Anzac Parade streetscape environment and the University Mall gathering space, through major landscape works that will enhance pedestrian connectivity and safety by reinforcing pedestrian movement networks.

The design of the northern façade at ground level addresses the Mall through a continuous raised platform with seating steps. The entry is highlighted in the form of an oversized porch. This design in combination with the landscape of the site will emphasise the relationship between the building frontage and University Mall.

At ground level soft landscape is to be utilised to create a sense of place through definition of space and attractive landscape treatments. Landscaping at critical locations will play a role in signalling of entry points and providing a sense of direction. The proposed treatment for the footpath will be detailed to blend with the footpath along University Mall.

The distinctive planting of the existing Fig Trees and deciduous Cottonwood Trees give the landscape of the Mall a varying scale. The proposed building responds to this varying height through horizontal elements along the northern building façade.

2.5 Access and Parking

Pedestrian and Disabled Access

The main pedestrian access into the building is via the seating stairs which extend along the entire northern facade of the building. A ramp is located on the west and east sides of the stairs for disabled access. Access into the building is also via three entrances located on the western, southern and eastern sides. The building will assist in defining University Mall by creating a landmark and by providing an interactive environment for people to pass through or congregate.

The proposal has been designed in accordance with best practice for people with disabilities as set out in the Access Review at Appendix D. The report concludes as follows.

> *The development has been reviewed to ensure that ingress and egress, paths of travel, circulation areas and toilets comply with relevant statutory guidelines.*

In general, the development has accessible paths of travel that are continuous throughout. In line with the report's recommendations, the proposed development has demonstrated a reasonable degree of accessibility. The Project Application drawings indicate that compliance with statutory requirements, pertaining to site access, common area access, and accessible sanitary facilities, can be readily achieved.

Vehicular Access

Vehicular access to the building will be via a driveway (Southern Drive) from Gate 14 in Barker Street around the Village Green, past New College on the western side of the Green and to the southern side of the proposed Tyree Energy Technologies Building. A loading dock is located at the south-eastern corner of the building for servicing and deliveries.

The driveway is suitable for access by a medium rigid vehicles. Noise impacts from deliveries and traffic on New College are addressed in the Noise Report at Appendix G.

Parking

One of the key objectives of the Kensington Campus DCP (refer Section 3.2.6) is to reduce car dependence through a combination of:

- reduction of parking supply
- public transport upgrades
- location of university accommodation
- parking charges, and
- an interactive information system.

As set out in the Traffic and Parking Report at Appendix B these initiatives have been actively pursued by UNSW, such that the most recent travel survey has demonstrated a reduction in the use of private vehicles by staff from 53% to 44% over the last three years. Parking supply has been reduced with the construction of a number of new projects, public transport has been improved, 1,330 new student beds have been added to the campus, parking charges have been increased every year and travel information is freely available to all campus users. In addition carpooling has successfully been introduced during 2009.

Consequently the proposal does not include provision of car parking. In accordance with the Kensington Campus DCP, the extra demand for car parking created by this proposal would be some 24 spaces. However, for the reasons set out above it is not proposed to accommodate this requirement, but to continue with the established UNSW policy of travel demand management.

2.6 Description of Operations

Proposed Laboratory Teaching and Research

Proposed research at the Tyree Energy Technologies Building will include research facilities in key energy areas such as photovoltaics, carbon capture and storage, oil and gas reservoir characterisation, carbon trading, nanomaterials, and policy and market analysis.

The building will incorporate a number of teaching and research laboratory spaces. The teaching and research activities to be accommodated in these laboratory spaces include:

- world first degree courses in renewable energy engineering
- world leading research into photovoltaic cells and other renewable energy sources, including biomass

- teaching in petroleum engineering, including examination of all aspects of reservoir analysis, drilling and underground sensing equipment
- research into geothermal energy with a focus on the identification of underground resources
- research into nano particles and catalysis with a focus on application to catalytic processes, environmental treatment, clean energy production and the life sciences, and
- coordinated research encompassing the diverse research strengths and expertise of UNSW focussed on developing real world solutions to future energy challenges.

Population

At this stage the anticipated number of staff in the new building is set out in the following table.

Table 1: Anticipated Building Population

Floor Level	Activity	Population
Lower ground	teaching, learning and back of house	255
Ground	teaching, learning, café, study centre	361
Level 1	laboratories and offices	149
Level 2	laboratories and offices	149
Level 3	laboratories and offices	149
Level 4	laboratories and offices	48
	Total	1,111

As some 1,000 of these staff are already accommodated on the campus in existing facilities, the additional population is in the order of 100 staff.

Laboratory Design and Procedures

Policies and procedures

The following UNSW policies and procedures, consistent with Commonwealth and State legislation and Australian Standards apply to the operation of all UNSW laboratory facilities as appropriate:

- Biological Spills Management Guidelines
- Biological Safety Procedure
- Guidelines on Working with Carcinogens
- Guidance Notes for Certification of a Containment Facility
- Ionising Radiation Procedure
- Non-ionising Radiation Procedure
- Radiation spill procedures
- Guidelines for the Storage of Dangerous Goods at UNSW
- Hazardous Substances Procedure
- Disposal of Hazardous Waste Procedure, and
- Laboratory Safety Manual Guideline and Template.

The UNSW Environmental Management Plan (EMP) has established a “Green Lab” program to support Faculties in managing their environmental compliance obligations and achieve continual environmental improvement with respect to laboratory operations. In addition to the above policies and procedures, the following documentation has been developed through the Green Lab program to inform and facilitate laboratory operational environmental compliance:

- Laboratory Environmental Legislative Compliance Register
- Laboratory Environmental Audit Protocol, and
- Environmental Compliance Accountability Framework.

Design responses

As documented in the *Campus 2020 Master Plan* and the UNSW EMP, in 2005 UNSW adopted the objective that new buildings and major refurbishments will be designed and constructed to achieve 5 stars under the Green Building Council of Australia (GBCA) "Green Star" rating system. Design of the laboratories will exceed that objective (see also Appendix F).

In addition, the following UNSW requirements and Australian Standards will apply:

- UNSW Facilities Management Design and Construction Guidelines
- AS/NZS 2243 Safety in laboratory series Part 1 – 10 (where applicable), and
- AS/NZS 2982.1 laboratory construction and design.

Laboratory spaces will be designed to maximise opportunities for flexibility (multiple use of similar spaces) and adaptability (ease of conversion of layout and services), thus reducing the consumption of resources in accommodating future change.

Bore water from the Botany Sands Aquifer will be provided for non-potable uses to reduce demand on the mains potable water supply.

Separate electricity and water sub-metering will be provided throughout the building, including for each laboratory and associated support space, to enable monitoring to inform improved operational efficiencies. Electrical, mechanical and hydraulic services will be controlled through an electronic Building Management System (BMS).

Laboratory temperature set points will typically be set between 19^{O}C (winter) and 24^{O}C (summer) to save energy in heating and cooling. Laboratory mechanical ventilation systems will be designed to meet regulatory requirements and standards for protection of the public and the environment from airborne chemical, radioactive and biological hazards, and will incorporate high efficiency air handling units with economy cycles to reduce energy consumption. Variable air volume (VAV) flow control and make-up air will be provided to laboratory fume cupboards to reduce energy consumption.

Flammable goods storage cabinets will be provided within laboratories as required. Bunding will be provided to regulatory requirements to enable containment of spills and laboratory finishes will be impermeable to facilitate clean-up in the event of spills.

Dangerous Goods Handling and Storage

Policies and procedures

As an advanced research facility, the proposed development involves the use, storage and handling of a range of dangerous goods. Impacts to people and the environment may potentially arise from improper handling and storage practices.

UNSW has established University-wide policies and procedures for minimising the risk of environmental impacts arising from the handling and storage of these materials in compliance with the NSW Occupational Health and Safety (Dangerous Goods Amendment) Regulation (2005) [the Regulation], the UNSW Occupational Health and Safety Management System and the UNSW Environment Policy and Environmental Management Plan. The two key University policy and procedure instruments which will apply to the handling and storage of dangerous goods at the Tyree Energy Technologies Building are outlined below.

- *Guidelines for the Storage of Dangerous Goods at UNSW* (approved April 2002)
  Describes University requirements for safe handling and storage of dangerous goods from both a legislative and Australian Standards perspective, including reference to Environment Protection Authority regulations on transporting dangerous goods.
- *UNSW Hazardous Substances Policy* (approved December 2000)
  Establishes a framework to systematically identify and investigate potential chemical hazards to minimise the risk of adverse health and safety effects to personnel, property and the environment arising from exposure to hazardous substances in the workplace. Includes procedures for hazard identification, risk assessment and management, storage and disposal of hazardous substances, and emergency preparedness and response.

The storage and handling of all dangerous goods on site will comply with the requirements of the Regulation. Refer to Appendix H for further details. This will include the preparation of the following documentation required under the notification requirements of the Regulation (square brackets indicate the Clause applicable under the regulation):

- Site Plan – showing the location of all Dangerous Goods storage areas and emergency response equipment (i.e. spill kits, first aid kits, hydrants, fire extinguishers, etc.) [required under Clause 174ZN(1) & Schedule 7 Part 8]
- Notification to WorkCover NSW – prepared and submitted on the appropriate application forms [required under Clause 174ZS]
- Risk Assessment – the storage and handling facilities will be subjected to a risk assessment to ensure risks are appropriately managed [required under Clause 174Q & 174ZX]
- Manifest – a manifest of Dangerous Goods stored and handled will be prepared and held at the at the Tyree Energy Technologies Building in an emergency "box" located at the entrance to the building [required under Clause 174ZN]
- Dangerous Goods Register – a Dangerous Goods Register will be prepared and held at the at the Tyree Energy Technologies Building in an emergency "box" located at the entrance to the building [required under Clause 174ZW]
- Emergency Plan – a facility Emergency Response Pan will be prepared and held at the at the Tyree Energy Technologies Building in an emergency "box" located at the entrance to the building [required under Clause 174ZW], and
- Training – a training programme for staff handling Dangerous Goods will be conducted, including characteristics of Dangerous Goods, spill response and safety requirements [required under Clauses 13 and 174ZV].

All chemicals will be stored securely with associated Material Safety Data Sheets (MSDS) and clearly defined operating procedures for their use, and for the recovery and/or disposal of spilt chemicals and used chemical containers. Copies of MSDS for all chemicals on site will be stored at each specific chemical storage area as required under WorkCover regulations, and will also be kept centrally via the Chem-Alert electronic database.

Design responses

Centralised storage for dangerous goods will be provided within the loading dock area and in dedicated facilities, in close proximity to the goods lift, on lower ground level. This arrangement will minimise the risk of conflicts with vehicular and pedestrian traffic.

Internal circulation spaces (goods lift, corridors) will be designed to minimise the risk of conflicts between the movement of dangerous goods (eg from the receiving and storage area to laboratories) and other activities within

the building. The goods lift will be in isolation when transporting dangerous goods. Sensors and adequate ventilation will be provided to minimise the risk of oxygen depletion as required.

Waste management

Operation of the Tyree Energy Technologies Building will generate a variety of solid and liquid waste materials including municipal solid waste (MSW), paper and chemical wastes, recyclable containers, electronic waste, used laboratory equipment etc requiring a range of management strategies. An integrated waste management system is currently being implemented across UNSW consistent with the University's Environment Policy and EMP. This system is designed to combine a range of waste and recycling services to focus on highest resource value outcomes.

With respect to hazardous wastes, each UNSW School, Research Centre or Divisional Unit is responsible for establishing a safe and responsible method for the disposal of hazardous substances produced by normal activities, as well as those which may arise from accidental leaks and spillage. This requires adherence to associated UNSW policy and procedures, which in turn ensures compliance with regulatory requirements.

Disposal of hazardous wastes is managed to achieve the above criteria through the University's Disposal of Hazardous Wastes Procedure (approved September 2003).

Construction waste will be managed through Construction Site Environmental Management Plan (see guidelines in Appendix K), approved by the University and consistent with NSW regulatory requirements.

Operational waste minimisation programs will be delivered through the University's Environment Unit.

UNSW employs Plastech Operations Pty Ltd (DEC certified) for the removal of hazardous substances, dangerous goods and biological hazardous wastes.

Design responses

A dedicated waste handling area will be provided adjacent to the loading dock, including provision for segregation of waste streams, bin cleaning facilities with discharge to trade waste pit and adequate space for vehicular access.

As a minimum requirement, trade waste from laboratories will be treated to regulatory standards, including provision of dilution pits, pH dosing and arrestors. During design development consideration will be given to effluent pre-treatment to minimise discharge of total dissolved solids to sewer in line with the Victorian South East Water *Standards for Trade Waste Discharged to the Sewerage System*, which has been identified as Australian best practice by the Green Building Council of Australia.

Security

An integrated security management system will be installed in the building which will include:

- access control
- intruder alarms
- alarms management
- digital intercom
- closed circuit television
- remote digital camera imaging, and
- photo identification badging.

3. Environmental Assessment

3.1 Application of Part 3A

The provisions of Part 3A of the Environmental Planning and Assessment (EP&A) Act apply to this development. Clause 75B of the EP&A Act specifies criteria for projects to which this part applies, and invokes the provisions of the State Environmental Planning Policy (SEPP) (Major Development) 2005.

Under the Major Development SEPP, the Minister formed the opinion that the proposed development is of a kind described in Schedule 1, namely Group 7, Clause 20 "Educational Facilities" as it is both:

- for teaching and research at a university, and
- has a capital investment value of more that $30 million.

Subsequently the Director General's Requirements (DGRs) were issued on 3 November 2009, listing aspects to be addressed in this environmental assessment (EA), a copy of which are attached at Appendix A. The following is an assessment of the project in accordance with those requirements.

The table below provides a summary of the individual matters listed in the EA requirements and cross references them with the relevant sections in this report and the technical reports appended to this report.

Director General's Requirements	Report Reference
Key Issues	
• Relevant Planning Policies and Guidelines	Section 3.2
• Built Form/Urban Design	Section 3.3, Appendix N and drawings in Volume 2
• Environmental Amenity	Section 3.4 and Appendices D, E, G & J
• Transport and Accessibility Impacts	Section 3.5 and Appendix B
• Ecologically Sustainable Development	Section 3.6 and Appendix F
• Utilities	Sections 2.6 & 3.7 and Appendix H
• Drainage, Stormwater and Groundwater Management	Section 3.8, Appendix I and drawings in Volume 2
• Construction Impacts	Section 3.9 and Appendix K
• Contributions	Section 3.10
• Consultation	Section 3.11
General	
• executive summary	Page v
• site analysis including description of existing and surrounding environment	Section 1
• description of proposed development;	Section 2
• assessment of key issues specified above and table outlining how these key issues have been addressed	Section 3
• assessment of potential impacts of project and a draft Statement of Commitments	Sections 3 and 5
• plans and documents outlined below	Volume 2
• signed statement from author of Environmental Assessment certifying that information contained in report is neither false nor misleading	Page iv
• Quantity Surveyor's Certificate of Cost to verify capital investment value of project (in accordance with Major Development SEPP), and	Appendix M
• conclusion justifying project, taking into consideration environmental impacts, suitability of site, and whether or not project is in public interest.	Section 4

Director General's Requirements	Report Reference
Plans and Documents	
• existing site survey plan • site analysis plan • locality/context plan • architectural drawings Other plans: • Stormwater Concept Plan • Erosion and Sediment Control Plan • Geotechnical Report • View Analysis • Landscape Plan • Shadow Diagrams	Volume 2 Volume 2 Volume 2 Volume 2 Volume 2 Volume 2 Appendix E Volume 2 Appendix O and drawing in Volume 2 Volume 2

3.2 Relevant Planning Policies and Guidelines

3.2.1 Objects of the EP&A Act

This section addresses the object of the Environmental Planning and Assessment (EP&A) Act.

Objects of the EP&A Act (section 5)	Response
(a) to encourage: (i) the proper management, development and conservation of natural and artificial resources, including agricultural land, natural areas, forests, minerals, water, cities, towns and villages for the purpose of promoting the social and economic welfare of the community and a better environment, (ii) the promotion and co-ordination of the orderly and economic use and development of land, (iii) the protection, provision and co-ordination of communication and utility services, (iv) the provision of land for public purposes, (v) the provision and co-ordination of community services and facilities, and (vi) the protection of the environment, including the protection and conservation of native animals and plants, including threatened species, populations and ecological communities, and their habitats, and (vii) ecologically sustainable development, and (viii) the provision and maintenance of affordable housing, and	 Proposal for tertiary education building for teaching and research into new energy technologies within existing university campus within existing urban area. Proposal promotes orderly and economic use of land as is located within existing university campus within existing urban area. Not applicable. Proposal for public purpose. Proposal for community facility, albeit as part of existing university campus. Existing urban environment to be protected; no threatened species on site. Proposal aspires to 6 star rating (refer Appendix F). Not applicable.
(b) to promote the sharing of the responsibility for environmental planning between the different levels of government in the State, and	Noted. As Part 3A project both State and local government involved in process.
(c) to provide increased opportunity for public involvement and participation in environmental planning and assessment.	Public involvement provide through consultation processes, both in preparation of UNSW Kensington Campus DCP and this EA.

3.2.2 State Environmental Planning Policy (Major Development) 2005

As noted in Section 3.1, the Minister formed the opinion that the proposed development is of a kind described in the Schedule 1 of the Major Development SEPP, namely Group 7, Clause 20 "Educational facilities" as it is for teaching and research at a university and has a capital investment value of more that $30 million. Subsequently the Director General's Requirements were issued on 3 November 2009.

3.2.3 State Environmental Planning Policy No 55–Remediation of Land

This policy introduces state-wide planning controls for the remediation of contaminated land. It states that land must not be developed if it is unsuitable for a proposed use because it is contaminated. If the land is unsuitable, remediation must take place before the land is developed. The policy makes remediation permissible across the State, defines when consent is required, requires all remediation to comply with standards, ensures land is investigated if contamination is suspected, and requires councils to be notified of all remediation proposals.

As noted in Section 1.6, the contamination assessment carried out by Urban Environmental Services (refer Appendix E) indicates that the subject site does not have a history of potential contaminating activities and therefore no further contamination investigations are warranted.

3.2.4 Sydney Metropolitan Strategy and Draft East Subregional Strategy

Sydney Metropolitan Strategy

The Sydney Metropolitan Strategy is a broad framework to strengthen Sydney's place in the global economy by outlining a vision for growth and development over the next 25 years. The strategy has five key aims:

1. enhance liveability
2. strength economic competitiveness
3. ensure fairness
4. protect the environment
5. improve governance

The proposed Tyree Energy Technologies Building will support the development of the strategy's aims by creating leading edge research facilities in key energy areas including photovoltaics, carbon capture and storage, oil and gas reservoir characterisation, carbon trading, nanomaterials and policy and market analysis.

Draft East Subregional Strategy

The Draft East Subregional Strategy is currently on exhibition for public comment. When finalised, the strategy will guide land use planning until 2031 in the Botany Bay, Randwick, Waverley and Woollahra local government areas. Key directions of the strategy include:

- strengthening the Randwick medical and education precinct and Bondi Junction's role as jobs hubs
- protecting other key regional employment lands
- improving public transport access, especially for routes connecting to other Sydney subregions
- increasing housing choice
- protecting and promoting scenic quality and tourism, and
- supporting and strengthening the nation's economic gateways.

The strategy identifies UNSW as one of the nation's leading academic and research institutions and also the largest in terms of student numbers. The strategy does not identify any specific strategic provisions for UNSW but it identifies future growth and development of the university is to be managed by the UNSW Campus 2020 Master Plan.

The Tyree Energy Technologies Building is generally in accordance with the key directions of the strategy. It will strengthen UNSW position as a one of Australia's foremost institutions by making a major contribution to energy research.

3.2.5 Randwick Local Environmental Plan 1998

Zoning

Under the Randwick Local Environment Plan 1998 (LEP) the campus is zoned No 5 Special Uses which allows the University to operate and develop the campus as an *educational establishment* together with associated ancillary development, for which Randwick City Council (RCC) is normally the consent authority. As this development falls under the Major Development SEPP, the Minister for Planning is the consent authority.

The proposed Tyree Energy Technologies Building is both permissible in and consistent with the zoning of the land. The proposal complies fully with the LEP, consequently alternative locations or alternative proposals are neither required nor considered.

In terms of urban design controls such as height, scale, character and alignment of buildings, the LEP places no restrictions within the Special Uses Zone for the proposed redevelopment. These detailed controls are set out in the UNSW Kensington Campus Development Control Plan (DCP). Chapters 5 and 6 of the DCP, which contain the key controls, are addressed in Section 3.2.6.

Other LEP clauses

Services

Clause 22 requires that Council be satisfied that services such as water, removal of sewage and drainage are available to the land prior to consent being granted. Section 3.7 notes that satisfactory provision of infrastructure will be available to the proposed development.

Tree preservation orders

Clause 28 includes the procedures for making and applying tree preservation orders (TPO) to specific trees within the RCC area. These orders relate to:

- trees that are 6 or more metres tall
- trees with a canopy greater than 4 metres across
- trees with a trunk circumference of 1 metre (measured 1 metre above ground)
- any tree on public land, and
- any palm tree, cycad or tree fern of whatever size.

Consent must be obtained to ringbark, cut down, top, lop, remove, injure or destroy any tree covered by a TPO. A small number of trees along Anzac Parade and along the southern edge of the site adjoining New College will require removal to allow the development to proceed, as set out in the arboriculture assessment at Appendix C. Consent is sought to remove those trees nominated in that report.

Development in the Special Uses zone

Clause 37A states that Council may grant consent to the development of land within Zone No 5 only if it is satisfied that the proposed development is compatible with the character of the locality and will not adversely

affect the amenity of nearby and adjoining development. As detailed in Sections 3.2.6 and 4, the proposed development is compatible with the planning controls for the site and is an appropriate development for the site and surrounds.

Master plans

Clause 40A requires the preparation of a master plan for sites greater than 4,000m^2 and details the requirements to guide development on such sites. Any reference to a master plan is now to be read as a requirement for a site specific DCP. The UNSW Kensington DCP, which resulted from the *Campus 2020 Master Plan* prepared by UNSW in 2005, which is addressed below, satisfies this requirement.

Contaminated land

Clause 42B states that Council must be satisfied that the land after remediation be suitable for the proposed development and remediation will occur before the land is developed. As detailed in Section 1.6 and noted in Section 3.2.3, the land is not contaminated.

3.2.6 UNSW Kensington Campus Development Control Plan

The aims of the DCP are to provide planning and design objectives and provisions which will optimise:

a. the physical, social, educational and environmental quality of the UNSW Kensington Campus

b. the role and environmental 'fit' of the campus within its Randwick City context and its compatibility with the evolving character of adjoining lands, and

c. the Campus Experience.

The proposed development is consistent with these aims by achieving the relevant *Campus Design Principles* as outlined in the following table.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
5.1 Sustainability	
a. Existing and new campus buildings, landscapes and infrastructure are to be managed by UNSW to be consistent with the relevant sections of the EMP.	Design of building includes ESD initiatives as noted below and as set out in Section 3.6 and Appendix F.
b. Key energy management requirements are to: • *aggressively implement energy conservation* • *reduce greenhouse gas emissions through design and management, and* • *consider renewable energy technologies such as photovoltaic cells in the design of new buildings and refurbishment projects, to ensure that the University maintains a reputation as a leader in renewable energy design in the built environment.* *A report on energy efficiency is to accompany all DAs for new buildings or refurbishments.*	Energy initiatives included in design of project, eg energy efficient lighting, installation of PV, high performance glazing, shading, water efficient fixtures and fittings and reduction of potable water use. Transport has also been considered as part of design; bicycle storage and end of trip facilities included. This complements excellent existing public transport.
c. Key water management requirements are to: • *reduce potable water consumption* • *increase the use of bore water for non-potable water requirements*	Water conservation initiatives included in design of building and landscape. UNSW local bore water supply will be used for non-potable water requirements.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
• *maximise the on-site retention of stormwater via natural infiltration and aquifer recharge, and* • *ensure all water fittings and equipment are 4 star efficiency.* *Stormwater runoff from the UNSW Kensington Campus is to be managed in accordance with the Stormwater Strategy prepared for UNSW by ANA Technical Services Pty Ltd dated 28 November 2005, Drawing CMP 1000 (Rev 1) dated 28 November 2005 and Drawing DSP 1000 (Rev 1) dated 22 November 2005.* *Aquifer recharge and borewater reuse, licensed by the Department of Natural Resources, is to be implemented in all capital works projects where permissible.* *Where relevant, development is to extend UNSW's substitution of town water use by harvested stormwater via the Botany Sands Aquifer (subject to approval from the Department of Natural Resources). This initiative fulfils the objectives of Council's rainwater tank policy, and may be used to demonstrate compliance with the requirements of BASIX for water conservation (subject to approval by the Department of Planning).*	Stormwater drainage to be in accordance with UNSW Stormwater Strategy. Refer to civil design statement at Appendix I and stormwater concept plan in Volume 2. Water used for flushing of toilets and drip irrigation of landscape areas will come from UNSW local bore water supply.
d. Key materials management requirements are to: • *reduce solid waste to landfill and thermal treatment, &* • *increase solid waste recycling, especially in construction and demolition and organics.* *Waste management plans are to be prepared for all developments ensuring that suitable waste management processes and waste storage areas that support the principles of waste avoidance, reuse and recycling are incorporated into the design of buildings. Waste management plans are to include projected waste generation rates for the end use of the development and the development plans are to include facilities to support this waste generation, eg appropriately sized and accessible waste storage areas, integrated with waste collection systems.* *Waste management plans that maximise reuse and recycling of waste generated in the demolition and construction phase are to be prepared for all developments.* *All waste storage areas are to be graded and drained to the sewer to the requirements of Sydney Water.*	Construction and Operation Waste Management Plans will be implemented. Refer to ESD Report at Appendix F and guidelines at Appendix K.
e. Key planning, design and development requirements are to: • *ensure all new buildings and refurbishments target a 5 star rating under Green Star rating scheme* • *increase accessible green open space, and* • *achieve compliance with environmental planning, heritage and construction regulations.* *These issues are addressed further in the objectives and provisions for buildings and landscape in Sections 5.2 – 5.9. Details to be provided in DAs.*	Proposed building designed to incorporate range of Environmentally Sustainable Design (ESD) principles and anticipated to achieve an equivalent 6 star rating if implemented in accordance with ESD guidelines at Appendix F.
f. Key compliance and pollution prevention requirements are to: • *achieve compliance with environmental legislation and*	Complies. Refer design details in Section 2.6 and ESD report at Appendix F.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
regulations, and • *reduce quantity and toxicity of wastes and products on campus.*	
g. Key transport requirements are to: • *pursue a range of travel demand management strategies to reduce the number of vehicle trips to the campus, and* • *increase staff and student numbers travelling by foot, bicycle and/or public transport.* *These issues are addressed further in the objectives and provisions for transport in Section 5.10.*	Complies. Campus-wide transportation strategy to reduce private vehicle trips being implemented.
5.2 Sense of Place	
a. The key features which define sense of place to be protected and promoted in all future development of the campus are identified on Figure 5.1. These focus on: • *identification of the campus from afar, such as the building silhouettes and icon signage* • *perimeter tree planting* • *the sense of arrival, particularly along Anzac Parade, High Street and Botany Street* • *primary entrances from all streets* • *major existing and new gathering places, and* • *the network of connective spaces.*	Complies. Design principles include: • create a landmark building and create a sense of arrival • create a high quality built and landscape interface with Anzac Parade / University Mall, and • reinforce campus entrances and University Mall connection.
b. The achievement of sense of place is also based on the pursuit of the issues and provisions of other campus design principles, particularly Legibility (Section 5.3), the "public rooms" and specific characters of each Hub (Section 5.4), Landscape (Section 5.5), Buildings (Section 5.6), Retail (Section 5.7) and Recreation and Cultural Facilities (Section 5.9).	Complies, see relevant sections.
c. The interface of the campus with the surrounding community also determines its sense of place. The desired future character of these interfaces are to be as follows. The specific controls to achieve these characters are detailed in Sections 5.3, 5.5 and 5.6 and shown on Figures 5.2, 5.6b, 5.7, 5.8 and 5.9. • ***Anzac Parade*** - *Distinctly passing through the campus; differentiated from the "built to property line" development of the adjacent town centres of Kensington and Kingsford.* - *Buildings to be set back from the street within a pattern of buildings/open space, especially at the extended University Mall that is to unite the divided campus.* - *Existing major trees to be retained, as set out in Section 5.5.* - *Pedestrian crossing to be at grade and of a distinctive hard-wearing material that signifies the University.* - *Additional trees to be added to median opposite University Mall.* - *New small footprint towers, of quality architecture and appropriate form, sited to avoid adverse environmental effects, to mark the UNSW gateway at University Mall, including icon building.*	Complies: • high quality architecture and urban form to create an iconic building that marks UNSW gateway at University Mall • ground floor includes potential for public uses which can interact with University Mall through an open design, and • major trees retained.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
- *Mainly public/university uses at ground level; potential for university housing at upper levels, including for accommodation for visiting students, academics and staff of educational institutions and their families.*	
d. *Other physical elements important to be reinforced for sense of place are topography, significant buildings and spaces including the Old Tote Courtyard Heritage Conservation Area (HCA), views and prospect, and existing trees.*	Complies. Topography and connectivity to campus icons reinforced, important trees retained.
e. *The design of individual capital works projects are to detail how these characteristics and features will contribute to the desired sense of place.*	Complies. See architectural design statement at Appendix N.
5.3 Legibility	
a. *New projects are to maintain and enhance the views into the campus identified in Figure 5.2 to ensure the legibility of the campus in the street layout.*	Complies. Northern building edge maintains views into campus from University Mall. View from Day Avenue maintained over service yard.
b. *Major and minor entries to the campus, and the varying permeability of campus boundaries, are to be achieved as identified in Figures 5.1 – 5.3.*	Complies. Campus legibility and connections maintained. Existing campus spaces maintained and enhanced, notably University Mall. Adjoining campus entrances, being University Mall and Day Avenue redefined and enhanced.
c. *New development and refurbishment projects are to over time achieve the pattern of public domain identified on Figure 5.3 which comprises a network of well defined major gathering spaces and a grid of smaller connective spaces which link the gathering spaces and campus entrances.*	Complies. Pattern of public domain to be enhanced by façades of new building creating better definition of street edges and views. Ground level will create an interactive space.
d. *The boundaries of most existing spaces are well defined by building alignments or landscape elements, however those of new spaces are to be subject to refinement during further design studies. These aspects are further documented in Figures 5.6b, 5.7 and 5.8.*	New building will better define existing public spaces and connections.
f. *Gathering spaces are to be joined by a network of east-west links, the enhanced and extended University Mall and University Walk and north-south connections as shown in Figure 5.3.*	Complies. Connecting space adjoining site, University Mall, will be enhanced through ground floor uses that will activate this area.
g. *Significant places are to be achieved at the intersections of major pedestrian routes by the creation of:* • *a gathering space (see Figure 5.3), and/or* • *a public room (see Figure 5.4) and/or* • *a Hub (see Section 5.4 and Figure 5.5), and/or* • *memorable features such as landscape elements (see Figure 5.6b), building design, uses, and/or public art.*	Complies. Proposal includes public room at ground level in accordance with Figure 5.4. This public room, which fronts onto University Mall and Anzac Parade will enable public interaction through exhibitions, the café and use of theatres by both industry partnerships and wider community.
j. *Lighting of the public domain is to contribute to legibility and ensure safety, with particular emphasis on open spaces at Hubs, University Walk and its intersections with north-south connections, and all routes to campus entrances with public transport stops.*	Complies. All public domain areas will be appropriately lit.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
k. Paving selections for the connective spaces are to contribute to legibility, with particular emphasis on the routes between Hubs and to campus entrances with public transport stops.	Complies. Refer landscape design statement at Appendix O.
l. All new campus projects are to incorporate consistent high quality signage throughout the public domain in accordance with the adopted UNSW Signage Code. Icon signage is to contribute to identification of the campus from afar but not adversely impact on adjoining properties.	Can comply. Appropriate signage consistent with UNSW Signage Code will be provided.
m. Equal access to the public domain is to be achieved through implementation of the findings of the UNSW Disability Access Audit. This is to include a "shoreline" for the vision impaired through the campus.	Proposal complies, see Access Review at Appendix D.
5.5 Landscape	
a. All landscape works and management are to implement the sustainability principles and mechanisms of the EMP.	Complies. Refer Appendix O.
b. New buildings are not to impinge on or harm existing significant trees and areas of vegetation identified in Figures 5.6a and 5.6b, except as set out below. In these locations the existing vegetation is to form the basis of landscape designs.	Proposed structure will require removal of some trees along Anzac Parade, however development retains high/ highest priority trees listed in DCP, namely trees lining University Mall.
c. Prior to design work for adjoining new developments, the specific root and canopy zone requirements of the vegetation in Figure 5.6a is to be assessed and the needs of the vegetation may be a constraint on development. This vegetation can only be removed based on detailed arborist assessments if there is no other design option, and in conjunction with agreed replacement (including advanced trees) or compensation strategies only if the trees are non-viable (due to age or disease) and thus require replacement.	Arboriculture Assessment at Appendix C has assessed existing vegetation on site making a number of recommendations to ensure all trees that are to be retained are kept in good condition for duration of works.
e. The important landscape tradition areas of University Mall, Village Green, Library Lawn, Old Tote Courtyard and Michael Birt Gardens / Chancellery Forecourt are to be improved within clear guidelines that retain their design significance in the public domain having regard to contextual changes from surrounding development.	Proposed development will maintain design significance in public domain of adjoining University Mall and Village Green whilst improving these areas by providing high quality building that is activated at ground level.
g. Landscape development is to lead toward an optimal distribution of appropriate landscape types. Landscape design is to use successful existing spaces as models for new development.	Appropriate species selection and landscape design to enhance amenity and soften built form. Refer to landscape design statement at Appendix O and Landscape Concept Plan in Volume 2.
i. Landscape design is to be a key aspect of the creation of new entrances (see Figures 5.1 & 5.6b).	New entry point at Day Avenue axis leads to front of building. Access to Village Green precluded by fenced service yard/loading area for safety reasons. View to green space retained.
k. The campus boundaries are to provide openness and entries, or security and definitional fencing.	Boundary fence along Anzac Parade to be removed creating new openness.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
l. Landscape design and management is to: • *optimise safety and security by enhancing visibility and sight lines, and eliminating areas of darkness and places for entrapment* • *provide equal access throughout the public domain implementing the findings of the UNSW Disability Access Audit and service and emergency access to buildings* • *optimise plant growth, including large trees, by provision of permeable surfaces, deep soil areas and drainage to planted areas, promoting water infiltration and aeration (provision of hard surfaces and their drainage to relate to the UNSW Stormwater Strategy), and* • *incorporate where appropriate infill planting for increasing habitat diversity, and species and assemblages appropriate for academic research and teaching purposes.*	Landscape to incorporate Crime Prevention Through Environmental Design principles. Landscape to meet requirements for access for people with disabilities. Deep soil areas included. Complies. Refer to Landscape Design Statement at Appendix O and Landscape Concept Plan in Volume 2.
m. Species selection is to: • *be ecologically appropriate for the specific site conditions* • *reinforce the dominant fig tree character of the campus* • *incorporate other distinctive species, in particular Tallowwoods, Melaleuca quinquenervia and Poplars, and* • *develop areas of pre-1788 vegetation of the site (eg as Eastern Suburbs Banksia Scrub).*	Complies. Species selections detailed in Appendix O.
p. Expansive areas of pavement are to be permeable in nature wherever possible in order to reduce stormwater runoff, recharge groundwater supplies and to maintain infiltration rates to the root zones of established trees.	Paving designed in accordance with stormwater runoff requirements. Refer Appendix O and plan at Volume 2.
5.6 Buildings	
a. New buildings are to be located within the building location zones identified in Figure 5.8 subject to the additional provisions set out below.	Complies.
b. New buildings or extensions to existing buildings are to be located behind the key building alignments identified in Figure 5.7 and the existing alignments set for University Mall, Science Square, the Quadrangle, Library Lawn, Commerce Courtyard, Chancellery Forecourt, Union Road, Engineering Road, College Road and Chancellery Walk.	Complies with University Mall building alignment.
c. The precise position of other building alignments are to be subject to detailed design studies of both the proposed buildings and adjoining public domain including consideration of at least: • *tree root and canopy requirements* • *appropriate building footprint sizes to meet the requirements of proposed uses and energy performance of buildings* • *appropriate dimensions of new gathering and connective spaces* • *the design of new or upgraded entrances* • *solar access requirements of adjoining open spaces and buildings*	Complies. These criteria have been considered in siting and design of building: • refer to Arboriculture Assessment at Appendix C • building footprint sized to meet design and energy performance • adjoining gathering space maintained • fence to Anzac Parade to be removed • solar access generally maintained, refer diagrams in Volume 2.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
d. Campus boundary conditions are to be achieved as indicated in the building alignments in Figure 5.7 and the sections in Figure 5.9.	Complies. Building setback from Anzac Parade, although staggered edge responds to existing retained trees.
e. Maximum building heights are to be as specified in Figure 5.8. Heights are defined as wall heights allowing for appropriately articulated upper levels and roof forms. Areas above the wall height may include useable internal floor space and plant rooms that are not to occupy more that 50% of the building footprint and outdoor recreation spaces.	Complies. Proposal does not exceed 24m maximum building height. Plant room over 24m in height but occupies less than 50% of building footprint.
f. Floor levels of all new habitable and storage areas are to be a minimum of 300 mm above any adjoining 1 in 100 year ARI flow path/ponding depth.	Complies.
g. Design of campus buildings is to respond positively to the architectural relationships and elements in Section 6.1.	Complies, see below.
h. Campus building types are to conform to the details set out in Section 6.2.	Complies, see below.
i. Building design is to contribute to the creation of the special places indicated in Sense of Place (Section 5.1) and the creation of Hubs (Section 5.4).	Complies. Building relates to public domain with openness and landscape to create sense of place and add to site character.
k. Equal access to buildings is to be achieved through implementation of the findings of the UNSW Disability Access Audit, and compliance with the Building Code of Australia and Disability Discrimination Act.	Proposal complies. Refer Access Review at Appendix D.
l. Service access to buildings is to be appropriately located in relation to access needs and include required loading docks sited and designed to optimise the aesthetics of ground floor levels and safe and comfortable pedestrian movement.	Service access located at rear of building on southern side separated from main pedestrian access, which is via northern side of building.
m. Buildings and structures to house infrastructure, plant and campus services are to be in accordance with any Campus Infrastructure and Services Strategy and located adjacent to but not within gathering and connective spaces, be integrated with other buildings and comply with the design quality provisions of the DCP.	Gas storage for this proposal to be located to west of Applied Sciences building. Other services separated from pedestrian areas , by location at south-east corner.
n. DAs for buildings on western and lower campus greater than 20 metres in height above existing ground level are to be accompanied by an urban design analysis, which includes a view impact assessment demonstrating the proposal's relationship with the public domain of the surrounding streets in addition to any impacts on nearby residential development.	Refer Architectural Design Statement at Appendix N and view analysis photomontages in Volume 2.
p. All DAs for buildings greater than 15.24m Above Existing Ground Height (AEGH) are to be referred to Sydney Airports Corporation Ltd for approval, as required by the Civil Aviation (Buildings Control) Regulations.	Noted.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
s. Solar access to living areas and principal landscaped spaces of adjoining residential development is not to be reduced to less than 3 hours per day throughout the year. If 3 hours per day is not currently achieved, new development must not reduce this further.	Complies. Refer shadow diagrams in Volume 2. Some impact on north-east corner of New College in mid winter, but no change to courtyard.
5.7 Housing	
a. On campus housing is to be located as indicated in Figure 5.10.	Figure 5.10 indicates development site as proposed campus housing site, inconsistent with Figure 5.1 that identifies site for an iconic campus building. Considered that proposal more appropriate on this significant site than housing. Current UNSW approach to redevelop existing sites, eg Kensington Colleges on High Street to increase capacity. Further Figures 5.4 and 5.5 identify site for a public room, provided as part of proposal.
5.10 Transport and Parking	
a. The reduction in car dependence is to be achieved through a combination of: • *reduction in parking supply* • *public transport upgrades* • *location of university accommodation* • *parking charges, and* • *an interactive information system* *as set out in the Transportation Strategy in Figure 5.12.*	Complies. Car dependence is reduced by lack of parking provision, bike facilities and easy access to public transport.
b. The total number of parking spaces on campus is to be maintained until such time as it is demonstrated through the annual parking survey that the total number may be reduced without adversely impacting parking on the surrounding streets.	No additional parking is proposed, although 5 car spaces for UNSW electric cars proposed in service yard, consistent with DCP objectives which provide for reduction in parking on campus in association with a shift away from private car travel to and from campus. Anticipated that development will increase total number of staff by 100. This extra demand is considered to be met by public transport as proposed development has good access to public transport services in accordance with government policy to encourage travel by non-car modes.
c. Surface parking within the campus is to continue to be relocated to be under new buildings or within structured car parks (see Figure 5.13). • *New car parking areas are to be constructed under new buildings on western campus and on lower campus (possibly also under new buildings) to replace 300 existing permit and reserved parking as lost due to redevelopment.* • *100 short-term parking spaces are to be located in lower campus with access from High Street over time as new visitor parking for the campus.*	No existing surface parking on development site.
d. Maintain the provision of Disabled Parking and Loading Zones throughout the campus.	Proposal maintains existing loading zones. No existing disabled parking on development site.

Relevant Provisions of UNSW Kensington DCP Chapter 5 - Campus Design Principles and Provisions	Compliance
e. All new DAs (excluding university accommodation) are to include an assessment of whether the proposal involves an increase in staff, student or other visitations to the campus or only a relocation or up-grade of existing facilities in the context of the total campus population and parking trends, as set out in the Transportation Strategy in Figure 5.12. Where an increase is proposed, the DA is to be supported by a Traffic and Parking Report which addresses: *• the potential increase in parking demand* *• the potential impacts on campus parking supply and demand and on-street parking demand* *• achievements in reducing parking demand across the campus, and* *• any specific measures proposed to lower parking demand or avoid potential adverse impacts.* *Specific pedestrian, bicycle, public transport or parking initiatives/improvements may be required prior to occupation of specific proposal.*	Traffic & Parking Report at Appendix B has assessed increase in traffic and parking demands from proposal concluding that development is consistent with DCP objectives which provide for a reduction in parking on campus in association with a shift away from private car travel to and from campus.
f. The University is to contribute to the cost of external civil works that relate to specific DAs such as improving/ upgrading bikeways and pedestrian footpaths in the vicinity of UNSW.	No specific works off campus are required or proposed as part of this development.
g. All new/amended car parking areas, access roadways, internal circulation areas and ramps shall comply with the requirements of AS 2890.1 (2004) and AS 2890.2 (2002).	Complies. Refer Appendix B.
h. The location of vehicle access / egress points is to be determined subject to an assessment of the impacts on existing traffic flows.	Access from Gate 14 complies. Refer Appendix B.

Section 6 of the UNSW Kensington Campus DCP identifies of key architectural design elements and types to promote high quality architecture which is fit for purpose, responsive to future needs and embodies the principles of sustainability. These are addressed in the table below.

Relevant Provisions of UNSW Kensington DCP Section 6 - Design of Campus Projects	Compliance
6.1 Architectural relationships and elements *6.1.1 Supporting sustainability*	Building to employ ESD principles in design and construction (refer Appendix F & N) and encourage natural light penetration where appropriate, eg not in laboratory areas. Proposal considered a loose fit laboratory building which can permit subsequent refit. However building relies partly on artificial ventilation.
6.1.2 Supporting a sense of place *A. Relationship to the edge streets* *B. Building ensembles* *C. Multi-use* *D. Outward ground floor uses* *D. Engaging address*	Proposed building to activate Anzac Parade entry and to address University Mall, refer Appendix N. Building will not be multi-use as it will have a specific purpose and be secured, but would be able to be retrofitted in future. Building will have a highly visible façade and a café to engage with public ground level.

Relevant Provisions of UNSW Kensington DCP Section 6 - Design of Campus Projects	Compliance
6.1.3 Supporting legibility *A. Relationship to connective campus space* *B. Relationship to vistas* *C. Through building links* *D. Awnings and colonnades* *E. Linking elements*	Building designed to define and reinforce Anzac Parade entry, University frontage and University Mall. Proposal will assist in activation of area and reinforce campus pedestrian links.
6.2 Campus Building Types *6.2.3 Slabs* *6.2.4 Atria*	Proposed building to comprise post tensioned concrete frame. In accordance with DCP requirements building footprint generally orientated with broad side to north/south and narrow ends to east/west. New building façade will redefine surrounding campus links and spaces.
6.3 Landscape *6.3.1 Sustainable* *6.3.2 Useful* *6.3.3 Imagable* *6.3.4 Clear*	Design of landscape to ensure sustainability, useful open spaces that will add to legibility of campus while providing comfort, safety and convenience. Refer Appendix O.

3.3 Built Form and Urban Design

The built form and urban design of the project is the result of a nationwide search for expressions of interest followed by a limited architectural competition of which Francis-Jones Morehen Thorp were the obvious winners. Their design demonstrated the best response to the urban design and environmental constraints that the site posed (refer also Sections 2.2 and 2.3).

Francis-Jones Morehen Thorp's Architectural Design Statement at Appendix N summarises the vision as follows.

> *The core objective of the UNSW is to be a leading research-intensive university within the Asia-Pacific Region. It aspires to be the destination of choice for students and engage with the wider community. The importance of it's built environment and considered development cannot therefore be underestimated in facilitating a campus experience of excellence. The Tyree Energy Technologies Building (ETB) will accommodate and showcase state-of the-art leading edge research in clean energy including photovoltaics, carbon capture and storage. There is currently not a more important issue within contemporary society, and therefore the importance and primacy of the ETB and it's site will provide appropriate demonstration of UNSW's commitment to this fundamental issue.*
>
> *On the Kensington Campus, the ETB site is arguably the most important development since the completion of the Scientia. The proposed ETB site addressing both Anzac Parade and the University Mall is the most prominent remaining site on Campus, and accordingly requires an iconic building that will provide a gateway to the Faculty of Engineering, the Lower Campus, and the University as a whole. The new development seeks to address the University Mall through careful consideration of scale, height, setback and an understanding and respect for Spooner's landscape, the most significant landscape of the campus. The ETB should, above all, provide a welcoming embrace, encouraging public interaction and interest in the unique research that will be undertaken within the new complex.*

> *Our design concept seeks a balance and resolution of the various aspects of the brief combining functionality and flexibility in the creation of best practice environments for teaching and learning, research and workplace, with the iconic aspiration of the University's strategic vision and goals and the potential of the important gateway site.*
>
> *We have developed a proposal in direct response to the Masterplan/DCP Principles in order that a cohesive response will be achieved that accommodates the immediate needs of the ETB, and provides a strategic and flexible long-term vision that creates a memorable and distinctive address for the Campus. A sympathetic synthesis of architecture and landscape architecture is achieved that is both innovative and of unique character avoiding 'passing fashion' in order to strengthen the locale and create an appropriate and timeless long-term identity for UNSW.*

Their scheme addresses 14 principles (refer to diagrams in Appendix N).

The built form and urban design of the project has been carefully conceived to address the particular features of the site and its attributes:

- the new gateway entry
- each façade responsive to its aspect
- relationship to University Mall, and
- improved landscaping to Anzac Parade.

The proposal will significantly improve the Anzac Parade streetscape environment and the University Mall gathering space, through major landscape works that will enhance pedestrian connectivity and safety by reinforcing the pedestrian movement networks.

3.4 Environmental Amenity

The proposed Tyree Energy Technologies Building will significantly enhance existing environmental amenity. The site is currently underutilised and is identified in the UNSW Kensington Campus Development Control Plan as a development site for an iconic campus building.

The building will assist in upgrading the gateway entrance at University Mall by creating a landmark that will providing an interactive environment for people to pass through or congregate. As such it will generally have a positive effect on adjoining land uses. Furthermore although there will be a minor overshadowing impact on a small part of New College, acoustic and visual privacy to the area will be maintained, views will be enhanced and wind impacts able to addressed in detailed design.
The shadow diagrams in Volume 2 indicate that the low rise nature of the building will limit the impact on New College. However, the shadow diagrams show that there will be a small loss of solar access to the north-eastern corner of the building in mid-winter. Importantly the courtyard within New College will be unaffected.

The building addresses the key view corridors to the site through varying building elements and styles. Views to the site will be enhanced from Anzac Parade/University Mall, the Village Green and Day Avenue as shown on the photomontages in Volume 2. Although the building extends beyond the extended Day Avenue kerb line, a view into the site will be retained. However, access between the proposed development and New College will be precluded to ensure the safety of pedestrians by restricting access to the service yard in this area.

The design of the building ensures that the acoustic and visual privacy of the adjoining New College will be maintained. The rear or southern façade of the proposal has limited openings. The acoustic assessment at Appendix G by Arup concludes as follows.

Noise emitted from the proposed development has been assessed in accordance with appropriate noise legislation and guidelines to noise sensitive receivers in the vicinity of the subject site.

To ensure that noise levels comply with the project noise limits, the following roof top mechanical services equipment will require further investigation, and may require noise control treatment:

- *Emergency generator*
- *Cooling towers*
- *Smoke exhaust fans*

Suggested noise control treatments to be investigated during detail design include:

- *Vibration isolation for reciprocating plant, including the gas and emergency generators.*
- *Locating the emergency generator in a separate plantroom.*
- *Smoke exhaust fans to be located in a separate plantroom, with acoustic louvres in the ventilation openings.*
- *Noise control options for the cooling towers, such as attenuators, plantroom spaces to form a noise barrier around the cooling towers.*

By implementing the above recommendations, the noise impact of the proposed development on the community will be minimised, and noise levels at nearest noise sensitive receivers are expected to meet the applicable criteria.

The wind assessment at Appendix J confirms that the wind environment around the building can be addressed.

In summary, it is AECOM's view that the building will not significantly increase local existing pedestrian wind effects and that any local wind effects can be mitigated with a combination of foliage and other external features during the design development phase.

3.5 Transport and Access Impacts

The Traffic and Parking Report at Appendix B prepared by URaP/TTW concludes as follows.

The approach routes to the site are Anzac Parade and Barker Street. These roads will continue to have a similar level of service to the existing situation once the proposed facility is in operation.

Vehicular access to and from the site will remain as existing situation. The access layout is in accordance with the Roads and Traffic Authority's Guidelines, Australian Standard and Council's Code.

No adverse impact in terms of vehicular traffic generation or parking demand will be experienced as the result of the proposed development.

Bus routes provide numerous services to the development site which are situated within walking distance to the project site.

Pedestrian facilities and footpaths are available along streets in vicinity to the site. Pedestrian amenities such as ramps and access ways also are included as part of the proposal.

It is recommended, that bicycle parking facilities be provided as part of the project proposal.

The loading area and access arrangements are acceptable and should comply with Australian Standards. As well, the development should have no unacceptable traffic implications.

Service and delivery vehicles will gain access to the site from Gate 14, off Barker Street via Southern Drive. The loading area for the site is located on the south-east corner of the proposed building. It is envisaged that vehicular access to and from the site will be in forward directions.

Access to the site during the construction period will also be from Gate 14 off Barker Street. There is already a loading area available on south-eastern part of the site which also can be used during the construction period.

3.6 Ecologically Sustainable Development

The proposed Tyree Energy Technologies Building has been designed to incorporate a range of Ecologically Sustainable Design (ESD) principles while the facility itself will be responsible for significant improvements in energy technology and innovation.

The ESD (Green Star Strategies) Report at Appendix F prepared by AECOM outlines a number of initiatives that have been incorporated into the design. This includes management, indoor environment quality, energy efficiency/ greenhouse, transport, water efficiency, materials and emissions as noted below.

This environmental strategies report has been commissioned by the UNSW to identify and undertake an Ecologically Sustainable Development assessment of the proposed Tyree Building to be constructed within the UNSW campus.

Amongst the range of environmental rating tools commonly used in Australia, the Green Building Council of Australia's Green Star Education rating tool v1 is most applicable to the Tyree Building. Assessing the prototypes against the Green Star Education rating tool v.1 is useful to understand the environmental impact of the construction and operation and identify areas where potential environmental improvements can be made.

The report is structured around the environmental categories and credits outlined in the Green Star Education rating tool. Where other ESD strategies beyond Green Star may be appropriate, these have been included in each category following the Green Star compliance analysis.

The following outlines each of the identified sustainability categories for the project. The key suggested sustainability measures for each of these indicators are based on a combination of measures proposed for the Tyree Building, measures designed to achieve Green Star compliance and other sustainability measures worthy of consideration.

Management	• *Monitoring of utility bills* • *Regular environmental bulletins during building operation* • *Adequate services commissioning* • *Appropriate building tuning* • *Preparation and adherence to an Operational Waste Management Plan*
Indoor Environment Quality	• *CO2 sensors in each return duct in order to facilitate continuous monitoring and adjustment of outside air ventilation rates* • *Improved thermal comfort conditions* • *Building finishes selected for low toxicity*
Energy Efficiency/Greenhouse	• *Energy efficient lighting, use of T5 or T8 fluorescents* • *Building Management System that monitors energy and water usage for the building*

	• *High performance glazing, shading and building fabric* • *Installation of PV* • *High efficiency mechanical systems* • *Tri-generation system*
Transport	• *Green Travel Plan* • *Bicycle storage facilities to encourage alternate modes of transport* • *Excellent existing public transport*
Water Efficiency	• *Water efficient fixtures to all hydraulic fittings* • *Connection to a Building Management System which monitors usage* • *Provision of water sub-meters to monitor usage* • *Reduced use of potable mains water through use of rainwater and borewater*
Materials	• *Provision of appropriate recycling sorting and composting facilities in common accessible areas of the building* • *Source timber from sustainable sources, certified where possible* • *Specification of product manufacturers who take into consideration the life cycle of their product, including manufacture and design for disassembly at the end of the products life.*
Emissions	• *Thermal insulation to external walls which avoids the use of ozone-depleting substances in both its manufacture and composition*

3.7 Utilities

All essential services are either currently available on site or are capable of being provided efficiently to the site, as part of the existing UNSW network. Services will be augmented as required.

In addition to the typical campus base building services such as air conditioning, ventilation, light and power, hydraulic, stormwater and fire systems, a number of specialised services utilities will be provided to operate the Tyree Energy Technologies Building.

The proposal will also store a range of dangerous goods as noted in Section 2.6. Details and quantities are specified in the Dangerous Goods Report at Appendix H. Appendix H also includes confirmation that State Environmental Planning Policy No 33–Hazardous and Offensive Development does not apply to this proposal.

3.8 Drainage, Stormwater and Groundwater Management

Drainage and stormwater management on the site will be managed in accordance with the UNSW Stormwater Strategy as noted in the Civil Design Statement at Appendix I and on the Stormwater Concept Plans in Volume 2. This detailed strategy was prepared in consultation with Randwick Council engineers to address campus-wide drainage patterns. The design statement notes as follows in regard to the proposed stormwater system.

> *All proposed pipeworks which consist of pipes and access pits shall be designed in accordance with Australian Rainfall & Runoff (AR&R), Council and AS 3500.3 1998 and will be directed to Council's receiving stormwater network on Anzac Parade.*
>
> *Randwick Council requests that the volume of rainwater retention be determined in accordance with the UNSW 2020 Masterplan report. The development would then require retention tank storage be sized for the 20 year ARI storm to an equivalent volume to a percolation chamber sized for the same storm event. As we are still investigating options within the requirements of this report the size of the tank is still yet to be resolved. The tank will overflow into the council 1050 diameter pipe as described in the UNSW 2020 Masterplan Stormwater Strategy report. The tank is to discharge the 100year ARI storm above ground in an emergency.*

3.9 Construction Impacts

The construction impacts associated with the proposal are addressed in the Environmental Management Requirements guidelines at Appendix K. This report highlights those matters that will be addressed in the detailed Construction Management Plan (CMP) to be prepared by the head contractor. The key items are as follows.

- statutory compliance
- hazardous substances/dangerous goods management plan
- waste management plan
- stormwater and erosion management plan
- noise and vibration management plan
- air quality management plan
- tree protection plan
- community and stakeholders consultation/ participation management plan
- sustainability, and
- traffic aspects.

3.10 Contributions

UNSW advise that they have formally requested that Randwick City Council amend clause 11.2.1 of its Section 94A Development Contributions Plan to exempt UNSW from payment of a levy. The Plan currently requires UNSW to pay a fixed levy of 1% of the cost of development each time a Development Application is made. The reasons for the exemption are explained below.

> *UNSW is a not-for-profit public institution substantially funded by the Commonwealth Government. Its functions and operations are determined by the University of New South Wales Act and By-law. Its governing Council is made up of twenty two members including parliamentary and ex-officio members, members elected by staff, students and graduates, and members appointed by the Minister for Education.*
>
> *In contrast to the development industry, any surplus income that UNSW may generate is from educational commercial ventures, not capital works and is returned back to the university for re-investment in teaching, learning, research and other facilities for the public good.*
>
> *The Kensington campus, as the main home of UNSW, has been in a constant state of expansion and redevelopment since its inception in 1949. This will continue into the future as the university grows and expands its academic activities in response to newly defined national educational strategies and policies. UNSW is, and will remain a permanent feature of Randwick City and a key stakeholder in its future.*
>
> *A key purpose of Council's S94A Plan is to facilitate the realisation of outcomes identified in the Randwick City Plan. UNSW is of the view that UNSW already contributes significantly to these outcomes in a series of direct contributions, details of which can be supplied if required.*
>
> *UNSW also contributes substantially to the desired outcome in the Randwick City Plan of a strong local economy as highlighted in economic impact studies such as the 2008 'Randwick Economic Activity Study' by SGS Economics and Planning. These economic contributions include UNSW being Randwick City's largest employer by a significant margin with more than 6,000 staff including those at the Prince of Wales Hospitals, and 42,000 student enrolments including more than 9,000 international students with an annual direct spending injection into Randwick's local economy by UNSW staff, students and visitors in the order of $150m.*

It is considered inappropriate that projects funded as part of the Commonwealth Government's economic stimulus package will have a portion of their funding diverted to a series of predominantly minor works listed in the S94A Plan. These works neither meet the Commonwealth's funding criteria nor have a binding agreement for their commencement or completion as is required as a condition of funding from the stimulus.

In recognition of the strategic importance of the education, health and research functions of UNSW and the Prince of Wales Hospital complex, 'Randwick Education and Health' has been designated as a Specialised Centre in the Sydney Metropolitan Strategy and Draft East Subregional Strategy. UNSW wishes to continue to work together with Council and other key stakeholders to create the vision for this Centre. To this end UNSW has restructured its Facilities Management department to provide more resources for the preparation of a planning framework for the Centre as well as other planning activities for UNSW and Randwick City. It is therefore proposed that in lieu of paying a S94A levy UNSW contributes further to Council the university's expertise, experience, staff and resources.

UNSW is of the view that realisation of the Randwick Education and Health Specialised Centre will not be achieved by levying monetary contributions from the university intermittently (i.e. only when a Development Application is lodged) for the construction of a wide range of predominantly minor works scattered across the City that may take years to fully fund (if at all). More value and benefit can be gained by all stakeholders through Council working together with UNSW as the major generator of economic activity to strengthen the Randwick Education and Health Specialised Centre and achieve its desired outcomes and long term vision.

It is therefore requested that UNSW be granted an exemption from payment of a levy under Council's Section 94A Development Contributions Plan and that the reasons presented in this request and the alternative proposal suggested, be favourably considered.

3.11 Consultation

The Director General's Requirements state that consultation is required at an appropriate and justified level in accordance with the Department's *Major Project Community Consultation Guidelines October 2007*.

Consultation was undertaken with the officers of Randwick City Council on a number of occasions to discuss the project and seek guidance on the issues that needed to be addressed in the Part 3A application.

The UNSW Kensington Campus 2020 Master Plan was exhibited and consulted with the community during 2005. The document was adopted in 2007 as a DCP in a process that involved exhibition and consultation with the community. The Master Plan and the DCP both identify the site for redevelopment. Nothing in this proposal exceeds the indications in that Master Plan or the DCP and as demonstrated by this Environmental Assessment (EA). The proposed Tyree Energy Technologies Building is generally in accordance with the DCP.

Consequently at this stage, further community consultation was not undertaken. It is anticipated that this will occur when the project is exhibited following lodgement of this EA.

4. Conclusion

Taking into consideration the environmental impacts of the proposal, the suitability of the site, and public interest, this report concludes that the project is an appropriate development in its location and in regard to its purpose.

4.1 Suitability of the Site

The site which currently accommodates tennis courts, a Grounds Depot and cricket nets, is suitable for the development for a number of reasons.

- The site is identified in the UNSW Kensington Campus Development Control Plan as a development site for an iconic campus building.
- Replacement tennis courts will be built at the University's sports field site at David Phillips Field, Daceyville. The potential for new cricket nets on the south-western side of Village Green is being investigated.
- Part of the land is currently underutilised.
- UNSW has excellent public transport services which are to be further enhanced with the implementation of the UNSW Kensington Campus Development Control Plan Transportation Strategy.
- The site is relatively flat and readily able to accommodate the type of development proposed.
- The development will assist in creating a new gateway to the campus and a landmark building for the Faculty of Engineering and UNSW generally.

4.2 Likely Environmental Effects

Environmental impacts associated with the construction and operation of the proposed development will be minimal, as detailed in Sections 3.4, 3.5, 3.8 and 3.8. Even though the facility will handle dangerous goods, UNSW has mechanisms in place, that will be applied to this development to ensure the ongoing safety and security of the campus and the surrounding area is maintained (refer Section 2.6 and Appendix H).

Although there will be an increase in population on the campus as a result of this proposal, the increase in private car travel is expected to be minimal as UNSW's Transportation Strategy, adopted as part of the DCP, is implemented over time (refer Traffic and Parking Report at Appendix B).

There will be some loss of trees along Anzac Parade, as noted in the arboriculture assessment at Appendix C. However, as the proposal retains the trees along University Mall, which are identified as high priority in the DCP, and it includes new landscape works this loss will be ameliorated as far as possible.

The proposal is anticipated to achieve an equivalent 6 star rating for ecologically sustainable development, if implemented in accordance with ESD guidelines at Appendix F.

There will be no adverse noise or wind impacts as detailed in Section 3.4 and Appendix G and Appendix J, respectively.

Stormwater will be controlled as part of the UNSW Stormwater Strategy as noted in the report at Appendix I and on the Stormwater Concept Plan in Volume 2.

4.3 Likely Social Effects

The social impacts of the proposal are only beneficial as the resultant teaching and research work is aimed at developing new energy technologies which will assist in climate change mitigation.

There will be additional social benefits from the better use of existing infrastructure to create synergies between differing research streams within the one location.

4.4 Likely Economic Effects

The four common priority goals in the UNSW Strategic Plan 2005 include research, international, learning and teaching, and community. These goals form the guiding principles that underpin the UNSW Kensington Campus Development Control Plan. In relation to research, the proposed facility will be consistent with this goal in that it will allow flexible research space that has relationships with external bodies and disciplines within the University.

4.5 Justification of Project and Public Interest

A proposal of this nature requires little justification or qualification that it is in the public interest. The benefits of research and development in energy technology are critical to climate change mitigation. Providing this facility will expand research in this area.

5. Statement of Commitments

The following is the Statement of Commitments by UNSW on how the project will be managed to minimise its impacts both during construction and once the Tyree Energy Technologies Building is operational.

General

1. The development will be undertaken in accordance with this Environmental Assessment dated December 2009 prepared by Conics (Sydney) Pty Ltd (including accompanying appendices) and the drawings including the architectural drawings prepared by architects Francis-Jones Morehen Thorp, in Volume 2 to this report.

2. The applicant will obtain all necessary approvals required by State and Commonwealth legislation and relevant Randwick City Council policies.

Transport and Parking

3. Car parking will be limited in accordance with the Traffic Report by URaP/TTW (November 2009).

4. All deliveries and service vehicles to the site will enter via Gate 14. A manoeuvring area for medium rigid vehicles and loading dock will be provided to the south-east of the building.

5. Access, servicing and layout arrangements will be provided in accordance with AS 2890.1:2004 and AS 2890.2:2002.

ESD

6. The construction and operation of the Tyree Energy Technologies Building will be undertaken in accordance with the Green Star Strategies Report prepared by AECOM dated 21 October 2009 and the ESD guidelines prepared by UNSW Environment Unit (November 2006) to achieve identified ESD initiatives. The design of the project will be subject to continuing refinement during the detailed design phase in consultation with UNSW.

Tree Management

7. Prior to commencing any work on the site, the trees that are to be retained will be protected as set out in the Arboriculture Assessment prepared by The ENTS Tree Consultancy dated 26 November 2009 at Appendix C, by defining a Tree Protection Zone. Should the need arise to prune any branches to allow for installation of hoardings this will be done by a qualified arborist and in accordance with the Australian Standard AS 4373-1996 “Pruning of Amenity Trees”.

8. The Tree Protection Zone will remain until construction is completed. Should the need arise to access or reduce the Tree Protection Zone, the Site Arborist will prepare an amended Tree Protection Plan and specific Tree Protection Guidelines for approval prior to its implementation.

9. Natural ground level will be maintained under the canopy of trees to be retained. Trenching for services, stockpiling of materials, wash out of equipment and parking of vehicles will not take place under the canopy of the trees.

10. Tree protection will form a part of the site induction process. All inductees will be made aware of the trees that are to be retained and the prohibited activities.

11. Any removal of trees from within the site will be in accordance with Randwick City Council's Tree Preservation Order.

Landscape and Public Domain

12. Landscape works will be provided in accordance with the landscape design statement and landscape plan prepared by Francis-Jones Morehen Thorp as set out in Appendix O and Volume 2.

13. Any public domain infrastructure damaged due to building works will be repaired or replaced to the standard in which that infrastructure was found immediately prior to the commencement of the works. The repair or replacement will be done to the satisfaction of the Department of Planning prior to issue of the Occupation Certificate.

14. The Department of Planning will be provided with larger examples of the exterior materials within 120 days of issue of main Construction Certificate.

Infrastructure and Services

15. All services that will be disrupted as a result of construction of the Tyree Energy Technologies Building will be appropriately relocated. This relocation will be undertaken in consultation and after agreement with the relevant service provider and UNSW. Relocation of all services off-site will be completed prior to commencement of construction works.

16. All existing utility services will be augmented as required.

17. Stormwater runoff from the site will be managed in accordance with the Stormwater Strategy prepared for UNSW.

18. Aquifer recharge and bore water reuse, licensed by the Department of Environment, Climate Change and Water, will be implemented where permissible. The project will extend UNSW's substitution of town water use by harvested stormwater via the Botany Sands Aquifer (subject to approval).

Waste Management

19. A detailed waste management plan will be prepared to ensure that suitable waste management processes and waste storage areas that support the principles of waste avoidance, reuse and recycling are incorporated into the design of the building. The waste management plan will include projected waste generation rates for the end use of the project. The development plans will include facilities to support this waste generation, ie appropriately sized and accessible waste storage areas, integrated with waste collection systems.

20. Prior to commencement of work on site a waste management plan that maximises reuse and recycling of waste generated in the demolition and construction phase will be prepared.

21. All waste storage areas will be graded and drained to the sewer to the requirements of Sydney Water.

Construction

22. Site management during construction will be consistent with the outline of Environmental Management Requirements at Appendix K. The plan will include:

    - statutory compliance
    - hazardous substances/dangerous goods management plan

- waste management plan
- stormwater and erosion management plan
- noise and vibration management plan
- air quality management plan
- tree protection plan
- community and stakeholders consultation/ participation management plan, and
- sustainability, and
- traffic aspects.

23. General constructions hours will be as follows:

    - Monday to Friday 7:00 am to 6:00 pm, and
    - Saturday 7:00 am to 3:00 pm.

24. Where construction work is undertaken which generates significant noise or vibration impacts, construction hours will be as follows:

    - Monday to Friday 9:00 am to 12:00 pm and 2:00 pm to 5:00 pm, and
    - Saturday 9:00 am to 12:00 pm.

25. A traffic management plan detailing the temporary barriers, line marking and signage that will be set up to control traffic during the construction stage will be prepared and approved by UNSW prior to commencement of works.

26. All areas used for construction site activities will be reinstated prior to occupation of the premises. Services such as irrigation will be reinstated along with the replacement of any damaged paving.

Building Code of Australia

27. The architectural plans will be subject to review to ensure compliance with the deemed-to-satisfy provisions of the BCA, or compliance with the relevant provision through an alternate solution.

28. All works will comply with the provisions of the BCA, either in terms of the deemed-to-satisfy provisions or by way of an alternate solution.

Noise

29. The recommendations of the Noise Report prepared by Arup (December 2009) will be implemented.

30. A qualified acoustic consultant will be engaged during the detailed design development to ensure that the acoustic requirements for the project as outlined in the Noise Report are achieved.

Access for People with a Disability

31. The development will comply with the requirements of Australian Standard AS 1428.1 General requirements for Access as well as the Access Review at Appendix D.

Operation

32. The design and management of the building will comply with the laboratory design and procedures, dangerous goods handling and storage outlined in Section 2.6 of this report.