University of New South Wales

Mechanical and Manufacturing Engineering Precinct Development J17 and J18

Environmentally Sustainable Design Report

DGR_ESD01

Issue | 12 November 2012

This report takes into account the particular instructions and requirements of our client.

It is not intended for and should not be relied upon by any third party and no responsibility is undertaken to any third party.

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1 Introduction

This report outlines the current Ecological Sustainable Development (ESD) initiatives as submitted to the Director General for development approval for the UNSW School of Mechanical and Manufacturing Engineering re-design and development.

This report further recognises the importance of the Director General Requirements (DGR), and where appropriate address the following items within the ESD strategy;

- Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design, construction and ongoing operation phases of the development.
- Include a description of the measures that would be implemented to minimise consumption of resources, water and energy, including an Integrated Water Management Plan which details any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design.

An ESD strategy has been developed to address the Director General's requirements and to ensure an appropriately high level of sustainability is achieved for the project. The ESD strategy for the site includes, but is not limited to, the following key areas:



Water Rain water capture and re-use Water efficiency



Energy Energy efficient design High performance envelope



Materials Responsibly sourced materials Dematerialisation Recycled content of materials

In conclusion this report recommends that ESD is considered at each of the key stages of the project from Design, though Construction and into Operation. The key Principles for inclusion are those identified within this report focusing on the sensitive use of Water, Energy and Materials.

2 Environmental Planning and Assessment Regulation 2000

The refurbishment and extension of the School of Mechanical and Manufacturing Engineering Buildings, J.17 and J.18 will be designed to showcase environmental and sustainability excellence.

As outlined in the DGR and where applicable this project will address the requirements of the Environmental Planning and Assessment Regulation 2000, particularly clause 7(4) of Schedule 2, which asks that the following are considered;

- careful evaluation will be undertaken, wherever practicable, to prevent serious or irreversible damage to the environment;
- where appropriate decisions will be guided with an assessment of the risk-weighted consequences for various options;
- ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations to come
- conservation of biological diversity and ecological integrity will be a fundamental consideration;
- individuals who generate pollution and waste will bear the cost of containment, avoidance or abatement;
- users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste
- Incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problem will be considered and implemented where appropriate.

3 Project Description

The design of the UNSW School of Mechanical and Manufacturing Engineering buildings will aim capture the essence of sustainable design for today's modern university buildings. Located at the heart the UNSW Kensington Campus, both existing Building J.17 and J.18 will provide sustainable and innovative solutions that continue to be at the forefront of today's built environment.

Building J17 is an existing six-storey building comprised of two wings, the main being an 'east to west' wing facing north onto International Square. Building J17 will be extended and refurbished with redevelopment of the 'south to east' wing inclusive of an additional floor.

Building J18, also known as the 'Willis Annexe' building, is an existing twostorey building. J18 will undergo a refurbishment and will continue to house the School's laboratory spaces, workshops and some academic and post-graduate accommodation.



Figure 1 Plan view of J17 and J18, Architectural rendering of the proposed façade and of building J.17 across J.18.

3.1 Environmentally Sustainable Approach

The Vision of UNSW is to create a sustainable development that not only provides a healthy and comfortable environment for its students and Staff but also contributes to the long term value and growth of the university campus at the Kensington location.

The proposed developments will provide education teaching spaces, auditoriums, labs and workshops that will be designed appropriately for its teaching functions, is operationally energy efficient and will minimises any adverse impacts on the environment.

The design philosophy proposed is simple and will be based on the following key strategies:

Sustainable Management – Best practice environmental management will be adopted throughout the life-cycle of the project from inception through to completion and final commissioning of both developments.

The Indoor Environmental Quality –Health and comfort of the students and staff are paramount in a teaching environment will be optimised with consummate levels of daylight, glare control, minimal internal noise, increased fresh air, and good thermal comfort; all working in concert to ensure a productive environment.

Energy Efficiency – Both buildings will be designed to achieve a significant reduction in greenhouse gas emissions through energy efficiency and the integration of a high performance building envelope with the mechanical services.

Transport – Energy efficient and less polluting forms of transport will be encouraged to and from the university campus, through both building designs providing cyclist facilities, lockers and showers for all students and staff alike.

Integrated Water Management – Potable water consumption and wastage in the development will be minimised though the implementation of an effective water strategy which integrates with the existing campus wide UNSW water management strategy.

Materials - Minimisation of material waste throughout the project life-cycle through the reuse and recycling of material that have a high a low impact on the environment

4 Sustainability Design Initiatives

The following initiatives will be considered in response to the requirements outlined for the DGR and the Environmental Planning and Assessment Regulation document, clause 7(4) of Schedule 2. As referenced in section 2 of this document.

The following sections outline the sustainable initiatives targeted for both building J17 and J18;

4.1 Management

- An independent commissioning agent will be appointed to assist with buildings commissioning and tuning.
- Waste management strategies will be implemented to help reduce the construction and operational waste throughout the life cycle of the project.
- A high level of environmental management will be implemented during the construction phase
- A building user and maintenance guide will be developed containing relevant information for all students and staff.
- The introduction of metering & real-time displays that will neatly be displayed in public areas will be considered providing students with a learning resource of the building operations.

4.2 Indoor Environmental Quality

- A mechanical Heating Ventilation and Air Conditioning (HVAC) design that will incorporate high volumes of outside air to promote a healthy indoor environment;
- Effective lighting levels provided for visual comfort achieved through ensuring that lighting levels are no greater than 400 Lux for 95% of the proposed office areas;
- Good levels of daylight received through the façade and building atrium;
- Maximised external views for all students, staff and visitors using the building;
- Promotion of a low toxicity indoor environment through the use of low VOC paints, carpets and adhesives;
- Ensuring the use of low emission formaldehyde wood products;
- Provision of a high level of air quality through the monitoring of carbon dioxide in auditorium and teaching spaces;
- Provisions for controls of the internal blinds system;
- High levels of thermal comfort for students and staff;
- A well designed acoustic environment for moderated and appropriate internal nose levels.

4.3 Energy

- A high performing façade to optimise energy efficiency of the mechanical HVAC system;
- Efficient mechanical HVAC systems that deliver the same or higher levels of thermal comfort to students and staff for less energy than a standard building use;
- Electrical sub metering to facilitate energy monitoring of building services, tenancies (including any retail), and other floors;
- Individually switched, zoned lighting control for lecture halls, common break out spaces and quiet study areas; to avoid wasting energy in electric light usage for areas which are not in use.
- Peak energy reduction consideration through the introduction of roof PV for both buildings.
- Monitoring the energy performance of the proposed building for a period of 12 months after occupancy.

4.4 Transport

• Provision of cyclist facilities which include secure storage, change room, shower and lockers. These facilities will be provided for all students staff and visitors to both building developments;

4.5 Integrated Water Management Plan

- Integration with the UNSW existing water management strategy which includes a campus wide stormwater management system where 70% of all stormwater is retained on site for re-use in a 'bore water' non-potable water supply which is reticulated across campus.
- 'Bore water' will be used in a dual reticulation arrangement to feed all nonpotable water uses in the buildings including; WC's, urinals, cooling towers, lab sinks.
- Water efficient fixtures and fittings provided throughout the building.
- Use of an efficient irrigation systems for site landscaping and other green elements such as green walls or west courtyard forming part of the site boundaries;
- Recycling of fire sprinkler and hydrant test water which is normally lost.

4.6 Materials

- Building J17 north wing and Building J18 will be retro fitted and re-used greatly reducing energy, waste generation, and resource depletion associated with a total re-build of all facilities. Additionally, the projects will target the recycling of waste associated with all strip-out works and the demolition and rebuild of Building J17 south wing.
- Provision of a dedicated recycling storage facility on site that will be accessible for recycling collectors.

- Use of low embodied energy materials (whenever possible) in the construction of the building giving preference to lightweight materials
- Maximize the use recycled material in the construction of the building including the use of concrete and steel with recycled content.
- Minimisation of traditional PVC use, and/or use of PVC which meets the 'Best Practice Guidelines for PVC in the Built Environment' as defined by the GBCA guidelines;
- Sustainable timber all timber or composite timber products used in the building and construction works shall be FSC or PEFC certified, or post-consumer reused timber;
- Design construction systems for disassembly making recycling and reuse of components more effective at the of building's life cycle;

4.7 Land Use and Ecology

- The proposed development is reusing existing building infrastructure and as a result will be located on a site that has previously been developed and built upon.
- Increased ecological value to the site through green landscaping, and the use of west courtyard forming part of the site boundaries;

4.8 Emissions

- Installation of a gross pollutant trap to prevent watercourse pollution or similar;
- Use of refrigerants with an ozone depleting potential of zero.

5 **Conclusions**

The initiatives outlined in section 4 of this report highlight the proposed sustainability measures within the development and how they will integrate with the existing University of New South Wales systems to achieve the intent of the Director Generals Requirements.

The sustainability principals will be consistent with the Universities sustainability aspirations, industry pest practice, and at all times will consider the objectives as set out in the Environmental Planning and Assessment Regulation 2000, particularly clause 7(4) of Schedule 2.