Appendix T

Sustainability Report

November 2011

157 Cleveland Street, Redfern
Sustainability Report for Development Application

Prepared for

Urbanest, Student Accommodation

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The success and realisation of the proposed initiatives will be dependent upon the commitment of the design team, the development of the initiatives through the life of the design and also the implementation into the operation of the building. Without this undertaking the proposed targets may not be achieved.

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1 Executive Summary

This Design Report has been prepared by Bates Smart Pty Ltd for Urbanest and is for the purpose of submission to the Department of Planning for Development Application. It describes a proposed student accommodation building for the site located at 157 Cleveland Street, Redfern.

The proposal is for a 5-storey, 404 bed student accommodation facility with ground floor communal recreation spaces organised around a large landscaped courtyard. The building is entered off the corner of Cleveland and Abercrombie Street with student lounge, meeting and communal laundry located along Cleveland Street and accessed directly of the courtyard. To the south are five-bed apartments fronting tree-lined Hudson St, while plant rooms and bike stores front Hart St.

The development is subject to the National Construction Code (NCC) Section J for Energy Efficiency minimum compliance for energy. The non-residential sections of the development will also be subject to the NCC Section J1 & J2.

This report has been written in response to Section 1 Environmental Planning Instruments and Section 4 ESD of the Director Generals Requirements and highlights the all the sustainability initiatives that will be investigated under for the development.

This report reviews the principles which can be incorporated into the proposed design of the development with respect to environmental performance in the following categories:

- Building Form & Fabric
- Indoor Environmental Quality
- Sustainable Building Materials
- Water Consumption
- Waste Management
- Energy Consumption & Renewable Energy
- Environmental Site Management
- Groundwater & Stormwater Management
- Air & Noise Pollution

Initiatives to be included or investigated in further detail are as below:

Director General Requirements (DGR)

- Utilise the Green Building Council Australia, Green Star – Education v1 rating tool as a minimum in the planning of the development.
- Take into consideration Council's Sustainable Sydney 2030 plan.

Minimum Compliance

The minimum regulatory ESD requirements applying to this site include the following:

- NCC Section J for Energy Efficiency

The development is considered to be Class 3: (a) a boarding house, guest house, hostel, lodging house or backpacker's accommodation. The development is not considered to be Class 2 as the units are not sole occupancy units with each being a separate dwelling. The development therefore must comply with Volume One of the National Construction Codes. A Class 3 development must meet the requirements of Section J1 to J8 dealing with energy efficiency. This report will focus on Section J1 and J2 only, other sections will be covered in the respective consultants documentation.

Sustainability Strategies

The following outlines the sustainability strategies which are being investigated to address the requirements of NCC Section J and the DGR:

- Facade design to minimise heating and cooling energy requirements, provide high levels of natural daylight, reduce glare and maintain occupant comfort.
- Ensure that all electrical appliances are best practice rated, including:
    - Clothes dryers - 5 stars or better
    - Clothes washers - 4.5 stars or better
    - Refrigerators/freezers - 3.5 stars or better
    - Televisions - 7 stars or better
- Install daylight sensors to control lighting adjacent to glazed areas.
- Install daylight sensors to all external lighting.
- Install motion sensors to control lighting to all back of house areas.
- Utilise the high efficiency lighting solutions with compact fluorescent lighting in bedrooms and LED options in common areas.
- Install air conditioning systems with the highest efficiency available for the type of system selected, leading to an up to 25% energy saving for the system.
- Utilise time clock controllers, occupancy sensors, automatic cut-off switches and room lock keys to minimise air conditioning unoccupied spaces.
- Provide individually ducted ventilation to allow ventilation fans to be switched off when not required.
- Installation of a hot water system to reduce the hot water energy consumption.
- Install an energy monitoring system to allow energy consumption to be determined and reported. Meters will be installed to each room and large equipment in the building. The energy consumption will be reported to help educate and inform the residents.
- Utilise lift controls to minimise the energy consumption of the lifts, particularly in standby mode.
- Install water consuming fixtures and fitting within one star of the highest star ratings available through the Water Rating labelling program.
- Ensure that all water consuming fixtures and fittings are best practice water rated, including:
    - Hand wash basins - 4 star or better;
    - Kitchen taps - 4 star or better;
    - Shower heads - 3 star or better;
    - WCs - 3 star or better;
    - Urinals - less than 1lt/flush;
    - Dishwashers - 4.5 star water rated;
    - Washing machines - 4.5 star water rated.
- Install a sub-soil drip irrigation system to all landscaped areas.
- Capture rainwater to be utilised in landscape irrigation and in washing machines.

- Install a water monitoring system to allow water consumption to be determine and reported. Meters will be to all large water consuming functions in the building. The energy consumption will be reported to help educate and inform the residents.
- Minimise indoor air pollutants by selecting or specifying:
    - low-VOC carpets;
    - low-VOC paints and sealants;
    - low-VOC adhesives;
    - low-VOC furnishings;
    - low formaldehyde joinery and composite timber products;
- Ensure services and architectural features provide desirable acoustic quality to rooms, as per AS2107:2000
- Provide bicycle parking facilities as close to the following rates and possible:
    - 1 occupant space per 5 dwellings;
    - Visitor cyclist facilities;
- Select materials with consideration to the following properties:
    - reused materials content;
    - disassembly to allow all components to be recycled;
    - long warranty periods >8 years for long life spans;
    - ISO14001 certification for the manufacture;
    - Origin on manufacture and components, minimise transport impacts
- Steel components are to include for reused or recycled content.
- Concrete is to consider the replacement of cement with industrial waste products and recycled aggregate.
- All refrigerants are to have an ozone depletion potential of zero.
- All thermal insulation is to have an ozone depletion potential of zero.
- Provide a dedicated storage area for the separation and storage of recyclables, including:
    - glass;
    - paper;
    - plastics;
    - cardboard;
    - organics;
    - metals.
- The construction contract will include commitments for the following:
- Establishment of a waste management area on site for the sorting and segregation of waste.
- Identification of appropriate waste sub-contractors for recycling, costs of collection and timing of collection service;
- Participation in waste minimisation training for contractors and sub-contractors;

- Published waste minimisation plan to reduce site waste to landfill;
- Provision of separate waste skips for cardboard, timber, metal, soft plastic, polystyrene, insulation, concrete, glass and bricks.
- Environmental Management Plan (EMP) will be developed to regulate the environmental impacts of the development during construction. This will identify potential environmental impacts and strategies to mitigate these impacts, as well as outlining methods for auditing and tracking the impacts and responsible parties.
- In recognition of effective handover being critical to the success of a building in achieving its environmental aspirations, a simple and concise building users' guide will be developed to inform and educate building users, residents and tenants on how to capture and promote strong on-going environmental performance.

2 Introduction

This Design Report has been prepared by Bates Smart Pty Ltd for Urbanest and is for the purpose of submission to the Department of Planning for Development Application. It describes a proposed student accommodation building for the site located at 157 Cleveland Street, Redfern.

The proposal is for a 5-storey, 404 bed student accommodation facility with ground floor communal recreation spaces organised around a large landscaped courtyard. The building is entered off the corner of Cleveland and Abercrombie Street with student lounge, meeting and communal laundry located along Cleveland Street and accessed directly of the courtyard. To the south are five-bed apartments fronting tree-lined Hudson St, while plant rooms and bike stores front Hart St.

Proposed Development Summary:

- Site location: 157 Cleveland Street Redfern
- Total Gross Floor Area: 10,074m²
- Site Area: 3,360m²
- Floor space ratio: 3:1
- Students: 404 students
- Mix: 45 students in five-bed apartments
  294 students in six-bed apartments
  4 students in a four-bed apartment
  118 students in studio-apartments
- Car parking: The development has no parking spaces
- Bike storage: 135 bicycle storage spaces

3 Director General Requirements

The Director General Requirements requests that the following key issues are addressed:

- Details of the minimum compliance with respect to sustainability for the project.
- Statements as to the suitability of NCC Section J and BASIX for the project.
- Statements as to the appropriateness of the Green Building Council of Australia's Green Star rating tools.
- A summary of the ESD principles to be included into the design, construction and ongoing operation of the development, as defined in clause 7(4) of Schedule 2 of the 'Environmental Planning and Assessment Regulation 2000'.
- Relate the buildings ESD initiatives to the State of the City 2011 Sustainable Sydney 2030 report, with particular note to:
    - The roll-out of energy efficient LED lighting;
    - Solar photovoltaic panels;
    - Solar water heating
    - Tri-generation to supply local power, heating and cooling to city buildings;
    - Minimised heat island effect;
    - Decentralise water master plan;

4 Regulatory and Voluntary Frameworks

The minimum regulatory ESD requirements applying to this site is the National Construction Code Section J.

The Green Star rating tool developed by the Green Building Council of Australia is the most applicable voluntary rating tool. A number of building types can be assessed against the tool and it covers a range of sustainability impact areas.

4.1 NCC Section J

The National Construction Code (NCC) Section J sets minimum energy performance requirements for all new developments. The minimum requirements cover air-conditioning, ventilation, lighting, power and hot water, as well as building fabric considerations including thermal construction and insulation, building sealing, glazing and shading.

The development is considered to be Class 3: (a) a boarding house, guest house, hostel, lodging house or backpacker's accommodation. The development is not considered to be Class 2 as the units are not sole occupancy units with each being a separate dwelling. The development therefore must comply with Volume One of the National Construction Codes. A Class 3 development must meet the requirements of Section J1 to J8 dealing with energy efficiency. This report will focus on Section J1 and J2 only, other sections will be covered in the respective consultant's documentation.

The Deemed-to-Satisfy Provisions in Section J of the NCC 2011 are defined in eight parts:

- Part J1 – Building Fabric
- Part J2 – External Glazing
- Part J3 – Building Sealing
- Part J4 – Air Movement
- Part J5 – HVAC Systems
- Part J6 – Artificial Light & Power
- Part J7 – Hot Water Supply
- Part J8 – Access for Maintenance

The development will respond to and meet all requirements of the NCC Section J.

4.2 BASIX and Accurate

The National Construction Code (NCC) Section J deems that developments with a building class of 1 or 2 should be assessed against the BASIX rating scheme. The BASIX rating scheme investigates the thermal comfort of the building (by utilising the Accurate thermal modelling program), energy consumption and water consumption. The BASIX scheme aims to achieve 30% energy consumption reductions and 40% water consumption reductions for buildings of this size.

As the 157 Cleveland Street development is a class 3a development BASIX is not applicable. The building will be designed and constructed to meet the NCC Section J requirements.

4.3 Green Star Ratings

Green Star is an environmental rating system for buildings. The Green Star rating system can be applied to many different types of buildings. The Green Star rating tools are as follows:

- Office Design and As-Built
- Office Interiors
- Education
- Health Care
- Retail Centres
- Multi-unit Residential
- Industrial
- Custom buildings

Typically the Multi-unit Residential tool is the most applicable tools to a development of this nature.

The purpose of Green Star is to recognise and reward environmental leadership in the top 25% of the building development market. Green Star aims to assist the building industry in its transition to sustainable development.

The Green Star environmental rating system for buildings was created for the property industry in order to:

- Establish a common language
- Set a standard of measurement for green buildings
- Promote integrated, whole-building design
- Recognise environmental leadership
- Identify building life-cycle impacts
- Raise awareness of green building benefits.

Building developments and/or fit-outs are evaluated against eight environmental impact categories:

- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land Use and Ecology
- Emissions

There are also sections within the rating tool to address any environmentally innovative features to be included into the building.

Within each category, points are awarded for initiatives that demonstrate that a project has met the overall objectives of Green Star and the specific criteria of the relevant rating tool credits. Points are then weighted and an overall score is calculated, determining the project's Green Star rating.

Green Star rating tools use Stars to rate performance:

- Star Green Star Certified Rating (score 45-59) signifies 'Best Practice'
- Star Green Star Certified Rating (score 60-74) signifies 'Australian Excellence'
- Star Green Star Certified Rating (score 75-100) signifies 'World Leadership'

The use of the Multi-Unit Residential rating tools cannot be directly applied to this development without significant changes to the rating tool. The Multi-Unit Residential rating tool calculates point based on the number of units and has provisions for areas such as kitchens, lounge rooms and other spaces to meet particular requirements. As the development relates to student housing the calculation methodologies will not be applicable.

The Green Star – Education tool is also not applicable to the development as this tool is associated with teaching spaces, not residential developments.

The Green Star rating tools have been referenced when developing the ESD initiatives for the project. However a formal Green Star rating will not be targeted for the project.

5 Sustainability Principles

The following section details how the sustainability 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.

The principles of ecologically sustainable development are as follows with the project approach to the principle highlighted in following each section:

a) The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:

   i. Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

   ii. An assessment of the risk-weighted consequences of various options,

   The development has embraced this principle with the aim of reducing all environmental impacts through design, construction and operation. The development aims to reduce resource consumption associated with energy consumption, water consumption, waste disposal and materials usage.

b) Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

   By situating the development on a currently developed site the diversity and productivity of the development has been maintained. With the inclusion of green roofs and internal landscaped courtyard, the diversity and productivity of the environment may be increased as a result of the development. The health of the environment is being maintained by minimising the environmental impact of the development through reduced energy consumption, water consumption, waste disposal and materials usage.

c) Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,

   As previously noted a, the currently developed site is being transformed and renewed. The current site offers little to the biological diversity and ecological integrity of the area. The development will enhance the biological diversity and ecological integrity by the inclusion of a green roofs, internal landscaped courtyard and rejuvenation of the site.

d) Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:

   i. Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

   ii. The 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,

   iii. Environmental goals, having been established, should be pursued in the most cost effective way, by establishing 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 problems.

   The development has considered a large range of sustainability initiatives to be included in the design, construction and operation of the building. These factors have been priced into the development and considered against the financial, operation, occupancy and environmental benefits of the initiatives.

   The development has included for monitoring and reporting of energy and water consumption to provide information as to who or what is consuming resources. Target consumption figures will be set and tracked in the reporting process.

To meet these sustainability principles the following detailed initiatives have been included in the development.

Design

During the design phase the following sustainability items have been included:

- Enhance the facade to ensure heat gains and losses are minimised whilst providing abundant natural light and reducing glare.
- Design of a high efficiency air conditioning and ventilation system to provide comfort whilst minimising the environmental impact.
- Design of a highly efficient lighting system which will only provide lighting when required and will provide the lighting in an efficient manner.
- Design of a solar hot water system with a gas boost control to minimise the greenhouse gas emissions related to the generation of the hot water.
- Design and specification of low energy fixtures and fittings.
- Design and specification of low water fixtures and fittings.
- Design of rain water capture and reuse system to reduce the potable water requirements of the landscaping and washing machines.
- Design of cyclist facilities to encourage occupants to cycle.

These design initiatives will ensure that the building has the capability of providing efficient services to the building occupants.

Construction

During the construction process the following sustainability initiatives will be considered:

- Detailed commissioning of building services to ensure efficient operation in operation.
- The use of low toxicity materials to maximise occupant indoor environment quality.
- The selection of low impact fitting with high life expectancies and minimised embodied carbon.
- Development of an environmental management plan to minimise the impact of the construction process.
- Development of a construction waste monitoring and reduction strategy to ensure that 80% of construction waste is recycled.

Operational

- During the construction process the following sustainability initiatives will be considered:
- Monitoring and reporting of energy consumption for major uses to help to educate the occupants and drive further operational efficiencies.
- Monitoring and reporting of water consumption for major uses to help to educate the occupants and drive further operational efficiencies.
- Provision of dedicated waste recycling streams to maximise the recycling rates of the development.
- Provision of public transport information to encourage alternative forms of transport.
- Provision of a sustainability building users guide to educate the occupants on how best to operate the building.

Further information on each of the initiatives is available in the following detailed sections.

6 Sustainability Initiatives

6.1 Energy & Emissions

Greenhouse reductions are achieved in a staged approach:

- Reduction in overall energy consumption through demand reduction and energy efficiency.
- Reduction in electricity and gas utility consumption by utilising waste products and renewable energy technologies.

The integrated energy strategies being considered for the development include:

Load Reduction	• Passive design • Mixed-mode AC systems • Daylighting to reduce reliance on artificial lighting; • Selection of energy efficient lighting and equipment • Water efficiency in hot water systems
System Efficiency	• Efficient air-conditioning services; • Fluorescent or LED lighting where possible with lighting control systems • Selection of efficient equipment and appliances
Renewable Sources	• Solar hot water • Consider alternative energy sources, including Photovoltaics

6.2 Passive Design

The development will utilise passive design to minimise the amount of air-conditioning required and therefore significantly reduce the building's energy consumption and greenhouse performance. A building's form, fabric and orientation will have the biggest influence on its thermal comfort and environmental performance. The following factors will be considered in the detailed stages of the design:

- Orientation
- Shading
- Structure
- Insulation
- Glazing

An efficient building fabric reduces heat losses and gains inside the building. This not only affects sizing of the mechanical plant but also the thermal comfort of occupants.

Choice of glazing will be vital in reducing heating and cooling energy consumption and maintaining occupant comfort. The selected glazing will help to avoid heat gains in the summer and aim to reduce losses in the winter. Consideration will be given to incorporating effective shading features into the design to avoid the necessity for low shading coefficients in the glass, which usually also decrease the visible light transmission (VLT) of the glass. To maximise the natural daylight within the buildings, VLT should be as high as possible.

6.3 Energy Efficient Systems and Services

Energy consumption can be reduced through the efficient design of lighting, air-conditioning, hot water and ventilation systems. The following strategies will be investigated for improved energy efficiency in design and operation:

		Energy Conservation Strategies
Strategies Common Areas		• LED or Fluorescent lighting to the common areas, hallways and plants rooms • Efficiency controls including timers and motions sensors to common areas and back of house • Localised light switching, daylight sensors and motion sensors, with small lighting zones to be designed, including plant rooms • Ventilation systems will have supply & extract ventilation with efficiency controls
Strategies Individual dwellings	**Services**	• Solar hot water and insulated pipework • Bathroom, kitchen and laundry exhaust individually ducted to facade or roof (with on/off switch linked to lighting switch); • High COP Air-Conditioning in bedrooms and living areas • Fluorescent or LED Lighting for bedrooms, bathrooms, laundries, toilets and hallways.
	Appliances	• Clothes dryers - 5 stars or better • Clothes washers - 4.5 stars or better • Refrigerators/freezers - 3.5 stars or better • Televisions - 7 stars or better

Lighting

An efficient lighting design and control strategy will be considered to reduce artificial lighting energy consumption and allow maximum advantage to be taken of daylight. Lighting power density will be required to meet NCC requirements. Initiatives include:

- Efficient light fittings such as compact fluorescent lamps and LEDs.
- Daylight dimming of external and streetscape perimeter lighting, as well as internal lighting adjacent to windows.
- Efficiency controls including timers and motions sensors in back of house and common areas .
- Localised light switching.
- Key switch lighting controls to all bedrooms.

Heating, Ventilation & Cooling (HVAC)

The following energy initiatives will be considered to help reduce air-conditioning and ventilation energy:

- Residential bathrooms, kitchens and laundries will be individually ducted and controlled.
- When air conditioning is provided it will be zoned so that only occupied areas are cooled, and spaces with different occupancy patterns or different cooling loads are zoned separately.
- Supply & extract ventilation with efficiency controls to common spaces.

Hot Water

A central solar hot water system with gas fired boosting will provide hot water for the domestic needs of the residential dwellings to assist with energy reduction.

6.4 Tracking & Monitoring

To enable the effective monitoring and tracking of energy and water consumption, sub-metering will be considered for systems with major energy use, to help identify areas of inefficiency with potential for improvement. This will be achieved either via the Building Management System (BMS) where applicable or via a simple metering system as appropriate.

6.5 Indoor Environment Quality

Indoor Environmental Quality (IEQ) affects occupant amenity and incorporates thermal comfort, indoor air quality, daylight and acoustic quality. These are outlined below and will be developed further during detailed design.

Thermal Comfort

Passive heating and cooling strategies will be considered for incorporation into the design, which will improve occupant thermal comfort. These will include:

- Wall and roof insulation to reduce heat gain and loss and moderate radiant temperatures from the walls, floor and ceiling
- Building facades with large areas of glazing will have a combination of external shading and blinds to reduce heat transfer and radiant temperatures in proximity to the windows

Daylight, Glare and External Views

The level of natural light in buildings is primarily determined by the extent and type of glazing, and the depth of the building floor plate. Extent of glazing must be optimised to allow maximum daylight, views, and winter sun, while minimising uncomfortable glare and excessive solar heat gains in summer. Glazing should be selected with a high Visual Light Transmission to maximise daylight penetration.

The glazed areas have been optimised to provide an effective study environment to the students living in the dwelling.

6.6 Water Conservation & Management

Water conservation strategies proposed for this project include:

- Reducing the mains or potable water consumed within the development through demand management.
- Substituting mains water required to meet this demand by utilising alternative sources such as rainwate.

Demand Management

Strategies to minimise consumption include water-efficient fittings and fixtures, water-efficient appliances and low-water use air-conditioning and irrigation systems. In order to reduce the overall water consumption for this development, the following initiatives will be considered:

	Water Conservation Strategies
Fixtures	• Hand wash basins - 4 star or better; • Kitchen taps - 4 star or better; • Shower heads - 3 star or better; • WCs - 3 star or better; • Urinals - less than 1lt/flush;
Appliances	• Dishwashers - 4.5 star water rated; • Washing machines - 4.5 star water rated.
Air-Conditioning	• Limited use of water cooled systems
Landscape Irrigation	• Water-efficient native species • Consider subsurface irrigation systems for non-native or drought resistant species • Rain water usage for landscape

Rainwater Harvesting & Reuse

Harvested rainwater will be considered to supplement the following non-potable water uses:

- Common area landscape irrigation.
- Clothes washing machines.

Landscape Selection

The use of native, drought-resistant planting will be considered to reduce water consumption used in irrigation. Sub-soil irrigation systems should be considered where non-native species are selected.

Tracking and Monitoring

Sub-metering via building management systems on major water usage can identify abnormal usage patterns usually associated with leaks, helping to reduce the considerable water lost in this way.

Groundwater & Stormwater management

In order to reduce the impacts of stormwater runoff from the site, the following stormwater management strategies will be considered:

- Rainwater capture from rooftops for reuse in buildings reducing stormwater runoff as well as mains potable water use.
- The use of permeable surfaces to be considered where suitable, allowing stormwater to seep directly into the earth and reducing stormwater flows off-site.

6.7 Transport

To encourage residents to cycle, secure and accessible bicycle storage will be included for building residents and visitors. Information on public transport will also be available to the residents. The building contains no car parking and due to the city location will minimise the number of car trips associated with the development.

6.8 Emissions

In addition to the reduction in greenhouse emissions as a result of lower on-site energy usage, a further reduction in emissions to land, air and water will be considered in the following ways:

- Where available, thermal insulation products will be selected which have a low Ozone Depletion Potential in their manufacture and composition, reducing the impacts of insulation on the atmosphere.

- 100% of refrigerants by volume will have an Ozone Depletion Potential of zero.
- Estimated wastewater discharge to sewer will be reduced relative to a standard building through the implementation of water efficiency measures.

6.9 Materials Selection

Consideration will be given to sourcing environmentally responsible materials, strategies include:

- Avoidance of ecologically sensitive products
- Selection of materials with a low embodied energy & high recycled content;
- Low toxicity material selection;
- Low impact on the indoor environment;
- Durability, flexibility and recyclable;
- Waste reduction