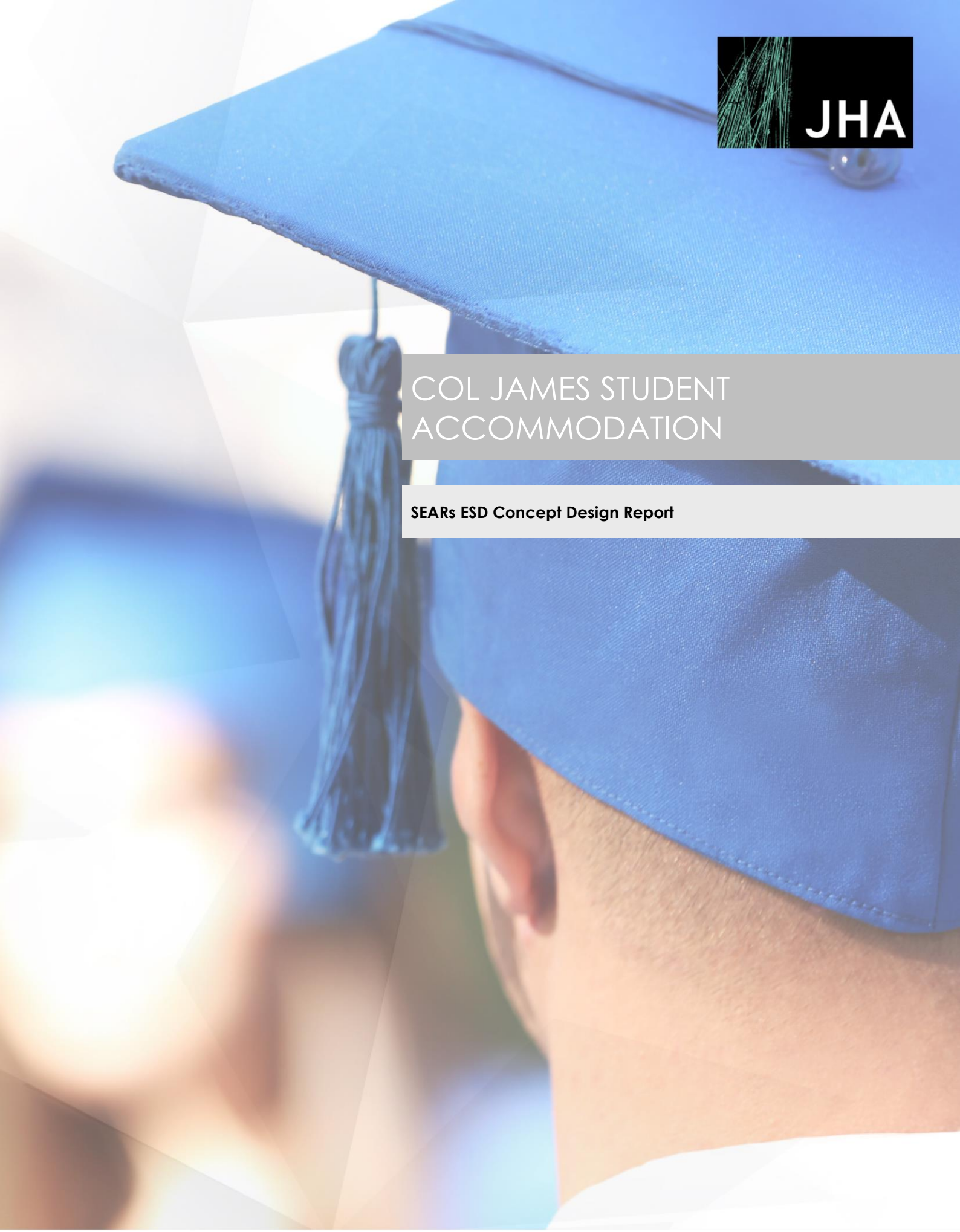

COL JAMES STUDENT ACCOMMODATION

SEARs ESD Concept Design Report

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Project	Col James Student Accommodation Building
Description	SEARs ESD Concept Design Report
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CONTENTS

1. EXECUTIVE SUMMARY

This report has been prepared by JHA to identify and summarise the Ecologically Sustainable Design (ESD) initiatives which have been considered in the design of the proposed Col James Student Accommodation Building located in Redfern New South Wales.

This report demonstrates compliance with the Secretary's Environmental Assessment Requirements (SEARs) which apply to the project and has been prepared to accompany a State Significant Development Application to the NSW Department of Planning and Environment. This report should be read in conjunction with the Architectural design drawings and other consultant design reports submitted as part of the application.

The report identifies how the principles of Ecologically Sustainable Design (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and on-going operation phases of the development.

2. INTRODUCTION

2.1 Project Description

The project is part of the overall mixed-use redevelopment master plan of the land known as “the Block” located in Redfern. The land is owned by the Aboriginal Housing Corporation (AHC). Precinct 3 of the master plan will include a 23 storey (plus plant room) student accommodation building—the focus of this report. The site is in close proximity to a number of universities and colleges. As such, there is a strong demand for student housing. Existing AHC research indicates that provision of student housing would be a viable commercial enterprise. This endeavour will yield profits which will be used to subsidise 62 affordable housing dwellings for Aboriginal and Torres Strait Islanders which will be constructed within Precinct 1.

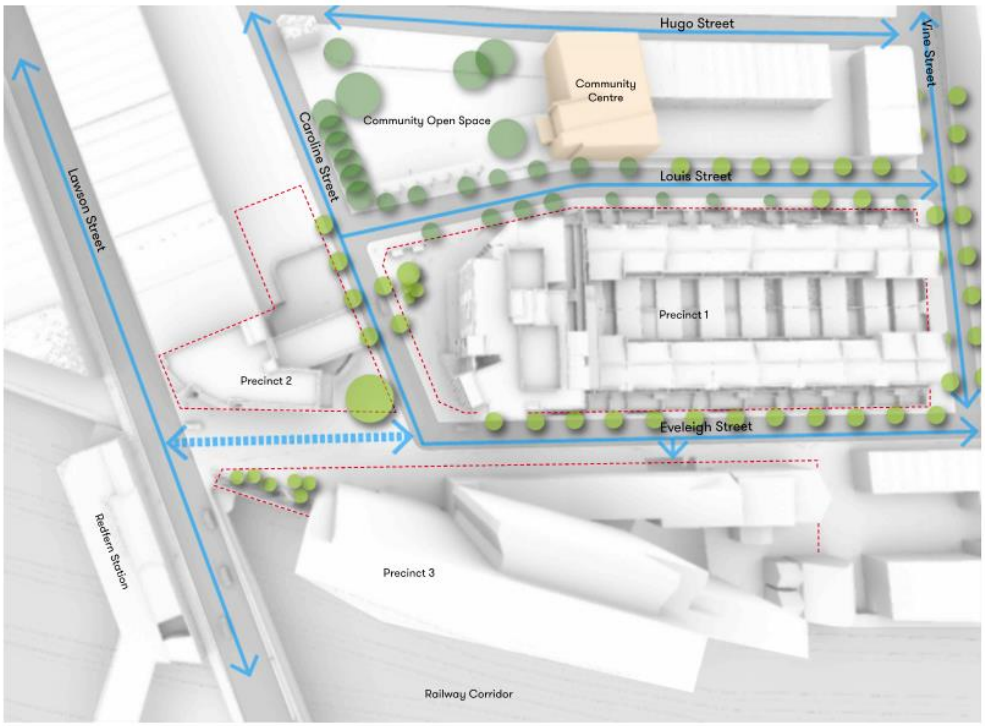


Figure 1 – Precincts 1, 2 & 3 proposed buildings

As indicated above, the building form of the proposed student accommodation building is shown in Precinct 3. Precinct 2 will be dedicated to commercial, retail and child care, while Precinct 1 will be the site of a residential zone, including 62 affordable housing units for Aboriginal and Torres Strait Islanders.

The student housing building will include beds for a total of 596 students across 522 different dwelling units, including studios, twin units (two beds), as well as several 5 bed cluster units. The development yield summary is as follows:

Unit Type	Number of Units	Beds
Studio	233	233
Twin (2 Beds)	74	148
5 Bed Cluster	43	215
Total	**522**	**596**

Figure 2 – Proposed Room Typologies

As shown above, studios will feature kitchenettes as well as en-suite bathrooms. Twin rooms feature a kitchenette and a shared en-suite bathroom. The 5 bedroom cluster units will feature individual en-suite bathrooms and a shared kitchen and living/dining area.

In addition to student dwellings, the building will also feature the following amenities:

- Communal laundry

- Communal kitchen and dining area
- Cinema
- TV/Gaming room
- Communal lounge room
- Landscaped Courtyard (340 m²)
- Landscaped Rooftop Terrace (195 m²)
- Green Roof (non-accessible)(250 m²)
- Bicycle Storage (240 m²)
- Gym
- Meeting rooms

2.2 Site Location

Figure 3 – Precincts 1, 2 & 3 and surrounding area

As indicated in Figure 1, the site is located directly north of the Redfern Railway Station. It is roughly 2 kilometres southwest of the heart of Sydney's Central Business District. The University of Sydney is situated to the West of the site.

3. ECOLOGICALLY SUSTAINABLE DESIGN (ESD) INITIATIVES

3.1 Introduction

This report acknowledges the SEARs prepared by the Secretary which notes the following in Section 5 of the document:

5. Ecologically Sustainable Development (ESD)

The EA/EIS shall identify how best practice ESD principles will be incorporated in the design of the development, and include innovative and best practice proposals for environmental building performance.

This development is being designed in accordance with a wide range of ESD goals that pertain to the design, construction and operational stages. The development team will ensure that the building minimises the impact on the environment in the areas of energy, water and materials. A strong focus on electrical and mechanical requirements, including the potential use of renewable energy contributes to significant strides toward minimising climate change impacts.

The aim of the ESD objectives is to encourage a balanced approach to designing a new student housing project; to be resource efficient, cost-effective in construction and operation; and to deliver enhanced sustainability benefits with respect to impacts on the environment and on the health and well-being of students, staff and visitors whilst providing the best possible facilities for a constructive student living experience.

Initiatives are arranged into the following categories:

- Management
- Envelope
- Electrical Installations
- Mechanical (HVAC) Installations
- Lighting
- Water
- Materials
- Waste
- Sustainable Transport
- Landscaping

In accordance with the above variety of categories, the development will implement a holistic and integrated approach to Ecologically Sustainable Design (ESD), maximising passive opportunities with the selective application of modern technology where appropriate. Initiatives will be chosen with due regard to whole of lifecycle cost benefits to the AHC.

The ESD initiatives and targets outlined within this document have been compiled based on the following:

- Best practice design principles
- BCA/NCC Section J – Energy Efficiency Targets (i.e.: exceeding targets)
- Principle's Project Requirements (PPR)
- Implementing credit strategies from the Australian Green Building Council's Green Star rating system(s) where appropriate

3.2 Management

The project team is committed to achieving management-related sustainability goals in the design and construction phases, as well as in operation.

3.2.1 Green Star Accredited Professional

All members of the design team are experienced in delivering sustainable outcomes for engineering services packages and the design process shall be overseen by a Green Star Accredited Professional to provide advice on achieving the sustainability targets of the project.

3.2.2 Comprehensive Commissioning

Comprehensive commissioning procedures shall ensure the building is operating efficiently in accordance with the design intent and carried out in line with the Green Star commissioning requirements.

3.2.3 Building User's Guide

All relevant information about the design and correct operation of the building's environmental features will be transferred to the occupants via a Building Users' Guide.

3.3 Envelope

3.3.1 Building Fabric Performance

The building fabric will be designed to meet or exceed the thermal and sealing performance requirements of the BCA Section J by utilising appropriate glazing and insulation, as well as vertical and horizontal shading.

3.3.2 Shading and Daylighting

The building orientation is such that there is a significant amount of south facing glazing, allowing for increased natural daylight whilst minimising unwanted passive solar heat gain. The shading scheme for the building facilitates the application of glazing while mitigating extra heat loads and glare and cutting tinting treatment requirements that reduce natural light transmission. These passive design features allow for enriched daylighting and greater access to external views for occupants. Additional daylighting reduces the reliance on artificial light and benefits alertness, mood and productivity. External views provide a connection to nature and the surrounding environment and also help to create an environment encouraging healthy living.

3.4 Electrical

3.4.1 Metering

Electricity metering and sub-metering will be specified to monitor and manage electricity consumption in the building.

3.5 HVAC

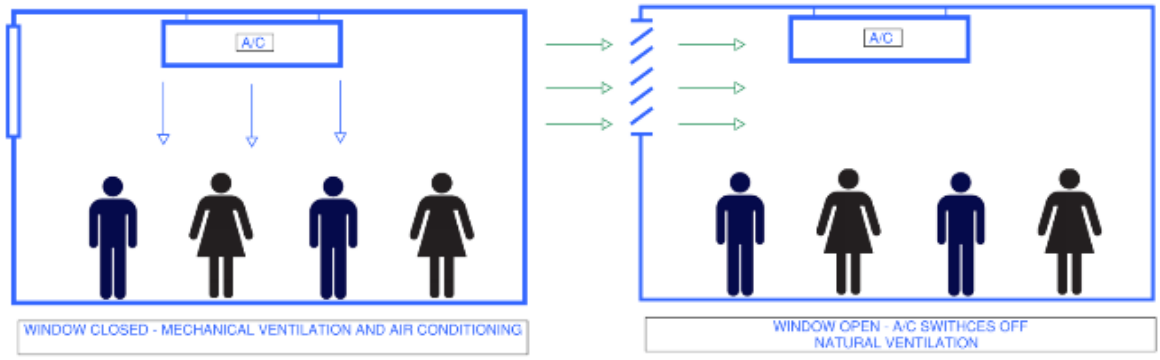
The mechanical systems within the building maintain internal space conditions for a range of variables including temperature, air velocity and noise level to deliver a comfortable indoor environment for occupants. This reduces temperature fluctuations, draft, and plant noise and allows participants to focus on learning. Due to the climate zone of the site as well as the market profile for the demand of mid-priced student housing, student rooms will feature heat and air conditioning via the provision of an efficient variable refrigerant volume (VRV) system.

3.5.1 Wide Setpoint Control Deadband

Seasonal setpoints are typically set as Cooling 24^{o} +1 and Heating 21^{o}-1 which translates to a 22.5^{o}C control setpoint with a 3^{o} deadband (21-24^{o}C) and a 1^{o} proportional control band above and below. This allows a reasonably wide range for the building to operate in free-running mode with no artificial heating or cooling necessary.

3.5.2 Mixed Mode AC

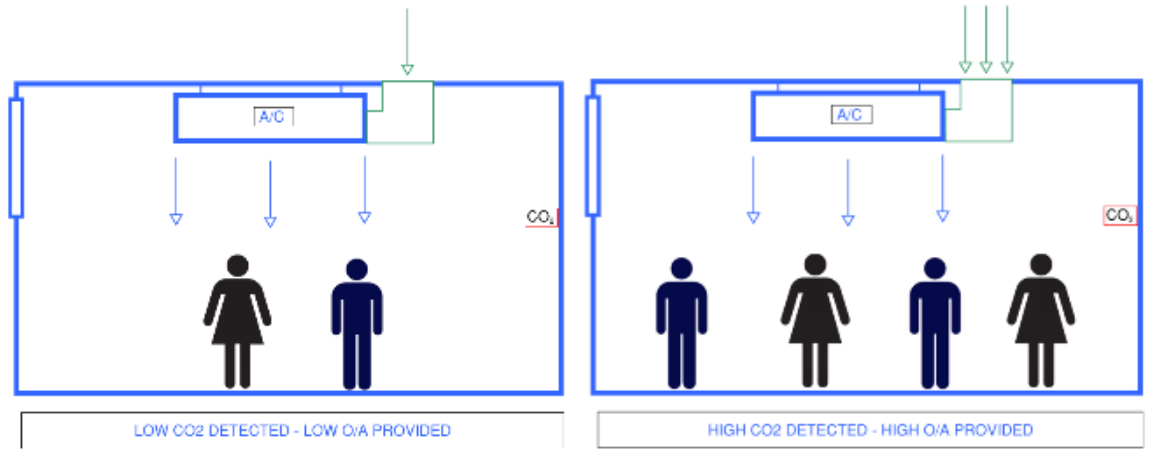
The air conditioning in each dwelling unit will function in a mixed mode ventilation arrangement. Reed switches will detect when the windows are open and deactivate the air conditioning serving that space. In this mode the space will be naturally ventilated reducing the air conditioning energy consumption.



Typical Window Interlock Operation

3.5.3 CO2 Monitoring

CO_2 monitoring and ventilation controls will be incorporated in densely occupied rooms such as the cinema, gym and communal kitchen and dining areas to modulate the ventilation rates of internal spaces to match the occupancy, therefore supplying the optimum quantity of fresh air to maintain air quality and avoid unnecessary loads on air conditioning plant. Low speed, large diameter fans have been specified in the naturally ventilated foyers as an energy efficient solution to stimulate air circulation and provide effective of cooling.



Typical CO2 Monitoring Strategy

3.5.4 Dedicated HVAC Plant for 24/7 Spaces

Spaces that require 24/7 operation of the HVAC systems will be considered for dedicated plant to enable out-of-hours shutdown of the main plant, e.g. server rooms.

3.5.5 Energy Efficiency

Lighting is to achieve an approximate 15% improvement over BCA Section J6 lighting power density allowances (W/m^2) through the use of LEDs.

3.6 Water

3.6.1 No Hot Water to Restrooms

To further reduce the energy consumption associated with hot water, limited hot water will be provided to public restroom wash basins, such as those located on the lower ground level.

3.6.2 High Efficiency Fixtures

Water consumption shall be reduced by incorporating water efficient fixtures and fittings in accordance with the Australian Government's Water Efficiency Labelling Scheme (WELS).

3.7 Energy

3.7.1 Keyless Access Security

KAS access card controlled energy saver devices will be installed at the entry of each student room. If the card is not inserted, this will deactivate:

- Air conditioning
- Lighting
- Cooking facilities
- GPOs above the kitchen bench and at the television

3.8 Materials

3.8.1 Low VOC / Low Formaldehyde Materials

Adhesives, sealants, flooring and paint products will be selected to contain low or no Volatile Organic Compounds (VOCs) and all engineered wood products used in exposed or concealed applications are specified to contain low or no formaldehyde to avoid harmful emissions that can cause illness and discomfort for occupants.

3.8.2 Recycled Content

Loose furnishings within the building shall be selected based on their recycled content, end-of-life recyclability and product stewardship agreements. By selecting loose furnishings which comply with independent environmental certification, for example Ecospecifier or Good Environmental Choice Australia, the project will confidently reduce environmental impacts and waste from furnishings over the life of the building.

60% by mass of all steel shall have a post-consumer recycled content greater than 50% or be reused steel. Sustainable timber shall be specified for at least half of the timber products used on the project. Recycled concrete shall be specified using recycled aggregate or manufactured sand and reduced quantities of portland cement to reduce environmental impacts of concrete production and embodied energy.

3.9 Waste

During the construction phase of the project at least 80% of building demolition and construction waste shall be recycled.

Centralised waste and recycling bin systems shall be provided for the building during operation as well as a dedicated storage area for the separation and collection of recyclable waste.

3.10 Sustainable Transport

3.10.1 Encourage Alternative Transport

The project promotes and caters for sustainable and alternative transport options. Bicycle parking residents and staff in accordance with Green Star bicycle storage guidelines in the amount of roughly

1 bicycle storage unit per 2 occupants. Currently, the design allows for storage of 172 bicycles in the resident bicycle storage area and 8 bicycles in the public domain for visitors.

No parking for vehicles is provided and the building and entrance positioning has maintained access to the adjacent Redfern railway station.

3.10.2 Vertical Transport

Lifts will be assessed to determine the economic viability of energy recovery.

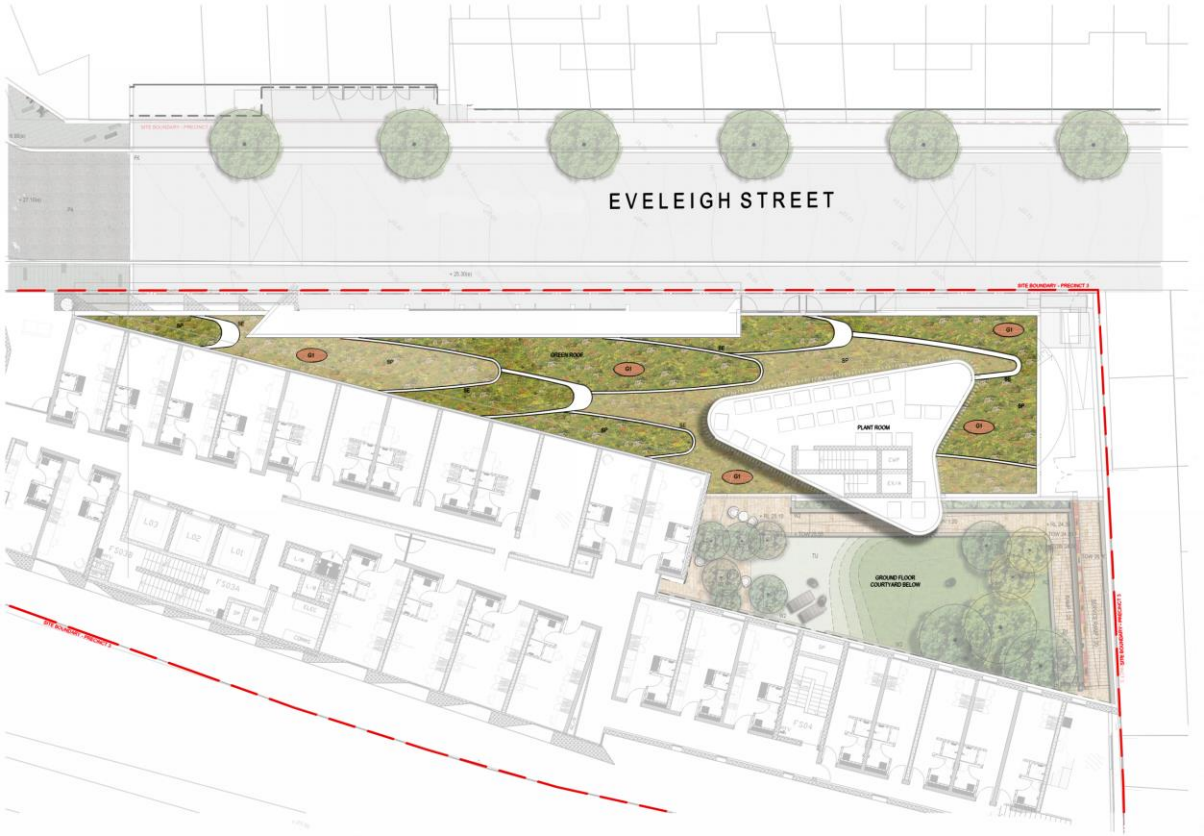
3.11 Landscaping

3.11.1 Green Roof

As rendered below, the project will feature a non-accessible sedum eco roof sized at approximately 250 m² and an accessible landscaped roof sized at approximately 195 m².

The eco roof will assist in thermal insulation of the building envelope. It will also contribute to minimising stormater runoff rates and total suspended solids. The vegetation will assist in mitigating the urban heat island effect through increased evapotranspiration. The use of a low maintenance sedum layer does not require irrigation, pesticides or fertiliser and its carbon sequestering abilities will mitigate climate change impacts. It will also promote biodiversity and provide refuge for local birds and insects.

The accessible landscaped roof portion will promote indoor-outdoor living for increased occupant well-being and will utilise native or adapted plants. Decking material will have a low solar reflectance index, minimising contributions to the urban heat island effect.



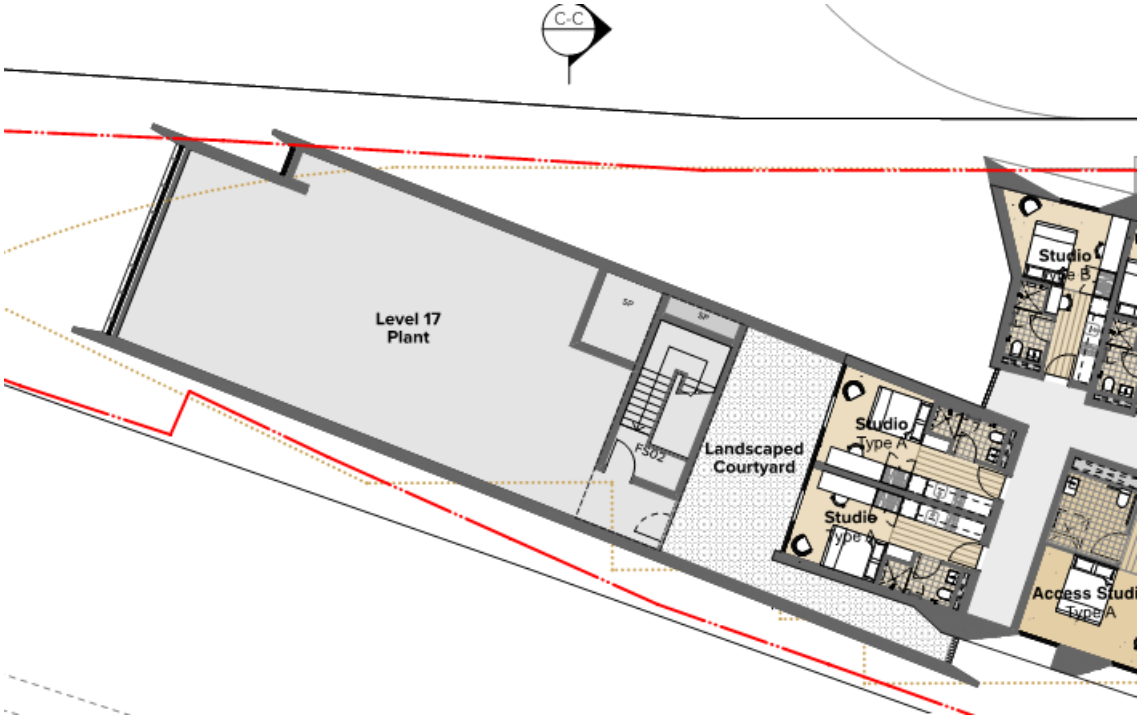
Roof diagram showing non-accessible eco roof

Accessible landscaped roof

3.11.2 Ground Floor and Level 17 Courtyards

The building will feature ground floor and level 17 courtyards for enhanced site user well-being and increased evapotranspiration to combat the urban heat island effect. The increased perviousness that these features contribute to the site will also decrease stormwater runoff. The carbon sequestering abilities of the plants will assist in mitigating climate change contributions. Plants will be selected on the basis that they are indigenous or well adapted, requiring minimal maintenance in terms of pesticides, fertiliser and irrigation.

Location of landscaped ground level courtyard



Location of landscaped level 17 courtyard

4. COMPARISON AGAINST INDUSTRY BENCHMARK RATING SCHEME

4.1 Green Star Design and As-Built V1.1

This project is not pursuing an accredited Green Star rating, however many of the initiatives proposed are based on or share similarities with credits in the Green Star Design and As-Built rating tool.
For the purposes of comparison the following table has been prepared which outlines where the sustainability initiatives which have been incorporated into this project are recognised by the Green Star Design and As-Built V1.1 tool.

No.	Initiative	Green Star Design and As-Built V1.1	
		Recognised	Credit Reference
10.2.1	ESD Professional	✓	1
10.2.2	Environmental Management Plan	✓	7
10.2.3	Commissioning and Building Tuning	✓	2
10.2.4	Building Users Guide	✓	4
10.2.5	Public Information Display		
10.3.1	Building Performance Improvement (BCA Section J)	✓	15
10.3.2	Infiltration		
10.3.3	Shading and Daylighting		
10.4.1	Demand Management	✓	16
10.4.2	Metering	✓	6
10.5.1	Wide Setpoint Control Deadband		
10.5.2	Mixed Mode AC		
10.5.3	CO2 Monitoring	✓	9.2
10.5.4	Dedicated AC for 24/7 Areas		
10.6.1	Lighting Control	✓	27
10.6.2	Lighting to achieve 15% improvement over BCA J6	✓	11.1
10.6.3	Obtrusive Lighting	✓	27
10.7.1	Hot Water Systems		
10.7.2	No Hot Water in Public Restrooms		
10.8.1	Solar Photovoltaics		
10.9.1	High Efficiency Fixtures	✓	18
10.9.2	Rainwater Harvesting	✓	18
10.10.1	Low VOC & Formaldehyde Materials	✓	13.1 & 13.2
10.10.2	Recycled Content	✓	21, 20.1
10.11.1	Construction & Demolition Waste		
10.11.2	Waste Storage and Sorting	✓	8B.1 & 8B.2
10.12.1	Alternative Transport	✓	17B.2 & 17B.4
10.12.2	Vertical Transport		

5. ESD INITIATIVES SUMMARY TABLE

The proposed initiatives are listed below in summary:

Category	Initiative	Component Affected	Benefit
Management	GSAP	Design	Accredited professional ESD consultant to aid design team
	Comprehensive Commissioning	Commissioning of services	Services more likely to be commissioned properly and run as per the design intent
	Building Users Guide	Facility Management	Greater understanding of the building's environmental features will be transferred to the building FM team
	Public Displays	Occupants	ESD initiatives within the building will be displayed at appropriate points to assist the occupants in maximising their benefit
Envelope	Building Fabric Performance exceed Section J	HVAC Energy Thermal Comfort	Exceeding section J minimum thermal performance requirements will provide a more comfortable and energy efficient building envelope
	External shading	HVAC Energy & Thermal Comfort	External shading will be optimised using computer simulation to improve the passive solar performance of the building envelope
	Daylight Harvesting	Lighting Energy	Strategic use of vision glazing combined with light internal colours, light shelves and appropriate floor ratios will be used to maximise the availability of natural light inside the space
Electrical	Demand Management	Maximum Electrical Demand	BMS controls will enable the services to be manipulated during periods where the building is likely to reach or exceed the maximum demand. This will include load shedding and preconditioning of air conditioned spaces during periods of low demand. Reduced maximum demand can substantially reduce energy bills.
	Metering	Electrical and water consumption	Sub metering in accordance with the Green Star Performance standards will allow consumption to be monitored and reported on, and identify trends which require rectification.
HVAC	Wide setpoint deadband	HVAC energy consumption	Use of wide setpoint control deadbands enables the HVAC systems to operate without artificial cooling or heating for longer periods of time but without substantially affecting thermal comfort.
	Mixed mode AC	HVAC energy consumption	Mixed mode AC allows spaces to operate under natural ventilation when conditions are suitable, but then make use of AC during extremes of temperature.
	CO2 Demand Controlled Ventilation	HVAC energy consumption	CO2 demand controlled ventilation will enable reduced outside air quantities to be delivered to spaces with reduced occupant numbers to avoid unnecessary heat loads associated with ventilation.
	Dedicated plant for 24/7 spaces	HVAC energy consumption	Using dedicated plant for continuously operating spaces such as comms rooms allows them to be sized more appropriately and avoid the main plant operating at a vastly reduced load outside of normal operating hours

Lighting	Automated lighting control	Lighting energy	Presence Detection (PD) and Photo Electric (PE) sensors enable lighting to be turned on only when necessary and avoid unnecessarily lit spaces.
	Lighting energy efficiency improved over BCA Section J by 15%	Lighting energy	Improved lighting efficiency will reduce the energy consumption of the lighting and also reduce internal heat loads leading to reduced HVAC energy consumption.
Hot Water	No HW to restrooms	Hot water energy	Providing hot water to restrooms is often pointless as the basins are rarely used long enough to heat up the water sitting in the dead legs, leading to hot water being heated that does not reach the user.
Renewables	Solar PV	Electrical energy	Solar PV to be provided with a target of reducing the overall energy consumption of the site by 5-10%
Water	High efficiency fixtures	Potable water use	High WELS rated fixtures will reduce potable water use.
Materials	Low VOC and formaldehyde materials	Indoor Environment Quality	Specifying low or no VOC and formaldehyde content in materials prevents these toxic substances which are commonly found in construction materials from being present within the building and causing harm to the occupants.
	Recycled content in construction materials	Embodied energy and Landfill volumes	Using construction materials and furnishings which have a post-consumer recycled content to them reduces waste going to landfill and embodied energy of the construction materials.
	Recycling of construction waste	Landfill volumes	Recycling construction waste reduces the burden on virgin materials and reduces the amount of waste going to landfill.
Sustainable Transport	Bicycle parking and end of trip facilities	Fossil fuel use in transport	Encouraging cycling by providing secure storage and a shower facility reduces reliance on fossil fuel burning transport methods and reduces traffic congestion.
Vertical Transportation	Regenerative Lifts	Lift energy	By providing lifts that feature idle/standby mode and regenerative capability, a significant decrease in energy used for vertical transportation can be obtained.