



MACQUARIE
University

Sustainable Financing Framework

2019 Annual Report



Macquarie University Sustainable Financing Framework: 2019 Annual Report

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1.0 Introduction

The Macquarie University Sustainability Financing Framework (the “Framework”) was developed in August 2018 to demonstrate how Macquarie University intends to enter into Sustainability Financing Transactions (“SFTs”) with proceeds earmarked to finance, or refinance, projects and expenditures that will deliver positive environmental and social outcomes and which support Macquarie University’s strategy and vision.

In accordance with Section 2.4 of the Framework, the following Annual Report relates to the reporting period of 1st September 2018 – 31st August 2019.

1.1 Summary of SFTs

The following is a summary of the SFTs as per the below Macquarie University Sustainability Bonds Register.

Macquarie University Green / Sustainable Bonds - Register

(AUD \$m)

Date	Identifier / ISIN	Issuer	Currency	Coupon	Maturity	Principal Amt
7-Sep-18	AU3CB0256279	Macquarie University	AUD	3.5%	7-Sep-28	200.0
7-Sep-18	AU3CB0256295	Macquarie University	AUD	4.5%	7-Sep-43	50.0

1.2 Allocation Reporting

In accordance with Section 2.2 of the Macquarie University Sustainability Financing Framework (the 'Framework'), the Macquarie University Finance & Facilities Committee (F&FC), under delegation from the University Council, approved at the meeting on 27th May 2019 the nomination of the Macquarie University Central Courtyard Project to receive 100% of the proceeds totalling \$250m of the Bonds raised under the Macquarie University Sustainability Financing Framework.

Project Overview: Macquarie University Central Courtyard Precinct ("MUCCP")



Image 1: 1 Central Courtyard

This rejuvenation and renewal of the Macquarie University Central Courtyard & the Buildings that surround it is be a critical part of the reinforcement of the Central Courtyard Precinct as the “heart of the campus”.

The guiding vision for the design of the Central Courtyard Precinct is to create a vibrant dynamic precinct that:

1. Creates a focus for the entire University community – students, staff and visitors;
2. Manifests the vision and aspirations of the University;
3. Creates a memorable and meaningful place;
4. Respects and celebrates the architectural, cultural and landscape heritage of the project;
5. Engages and enhances the campus through sustainability, functionality and design;
6. Accommodates a wide variety of functions and activities, both permanent and temporary;
7. Is sustainable, functional, flexible and capable of evolving over time.

This is being delivered as a program of 'Project Parts', which when realised will serve a variety of functions, delivering new social and educational infrastructure at the very heart of the campus, incorporating approximately 68,000m² of GFA across both new and refurbished buildings and associated public realm.

The nominated Project Parts (as listed below), being funded under the Framework, are being delivered under a single Construction Contract to FDC Constructions (NSW) Pty Ltd.

Project Parts:

- Stage 2 Central Courtyard Redevelopment (Landscape & Public Realm);
- Stage 4 C8A Lincoln Building;
- Stage 5a 1 Central Courtyard;
- Stage 5b Residential Student Accommodation Buildings R1 & R2;
- Stage 7 Mars Creek Rehabilitation Works.

Nominated Framework Category		Comment
Green:	Green Buildings	Targeted 5.0 Star Green Star, utilising the Green Building Council of Australia’s Green Star ‘Design and As-Built’ benchmarking system.
	Environmentally Sustainable Management of Living Natural Resources and Land Use	Reinstatement of Mars Creek- Reach 3.

Notes:

1. Other Green Sub-Categories relating to Energy, Pollution and Water are incorporated into the Green Buildings Category via the Green Star benchmarking system, and therefore cannot be allocated twice;
2. Stage 2 Central Courtyard Redevelopment, which comprises the landscape treatment of the public realm, is captured within the Green Star assessment of the adjacent building.

Specific detail can be found in the Project Impact Report in Section 2.

1.3 Use of Proceeds

Macquarie University Green / Sustainable Bonds - Use of Proceeds

(AUD \$m)

#	Name of Project	Project Description	Total Project Amt	Cost Incurred (up to 30 th June 2019)	by Sustainability Bonds
A	MUCCP – Stage 4: Lincoln Building (C8A) Refurbishment	Refurbishment of office space and provision of 6 new retail spaces.	24.7	2.2	2.2
B	MUCCP – Stage 5: 1 Central Courtyard & Residential Student Accommodation Buildings R1 & R2 *	New learning and teaching building, retail spaces and graduation hall; 342 bed student accommodation.	261.3	24.5	24.5
C	MUCCP – Stage 7: Mars Creek Rehab works	Rehabilitation of Mars Creek. Environmentally Sustainable Management of Living Natural Resources and Land Use.	9.3	0.4	0.4

Notes:

* Includes c.A\$14.1m (in total forecasted project spend) of MUCCP – Stage 2: Central Courtyard Upgrade, as it supports and is ancillary to the adjacent buildings in Stage 5

(AUD \$m)

Year Raised	Identifier / ISIN	Principal Amt	Allocation in Projects		
			A	B	C
2018	AU3CB0256279	200.0	-	-	-
2018	AU3CB0256295	50.0	2.2	24.5	0.4



MACQUARIE
University

Sustainable Financing Framework

2019 Project Impact Report - MUCCP



Macquarie University Sustainable Financing Framework: Project Impact Report

Purpose

In accordance with Section 2.4(c) of the Macquarie University Sustainability Financing Framework (the 'Framework', this Impact Report relates to the Project as nominated in accordance with Section 2.2 of the Framework as an Eligible Project.

Project: Macquarie University Central Courtyard Project (MUCCP), comprising:

- Stage 2 Central Courtyard Redevelopment;
- Stage 4 C8A Lincoln Building;
- Stage 5a 1 Central Courtyard;
- Stage 5b Residential Student Accommodation Buildings R1 & R2;
- Stage 7 Mars Creek Rehabilitation Works.

The following stages of the Central Courtyard Project do not form part of the current project:

- Stage 1 – Campus Common;
- Stage 3 – Temporary Decant of 18 Wally's Walk 3;
- Stages 6a and 6b – The redevelopment of the Old Library (18 Wally's Walk) and residential buildings (R3,R4 and R5).

Allocation of Proceeds: 100 per cent.

Image 1: 1 Central Courtyard



Project Overview

This rejuvenation and renewal of the Central Courtyard and the buildings that surround it, is a critical part of the reinforcement of the Central Courtyard Precinct as the “heart of the campus”.

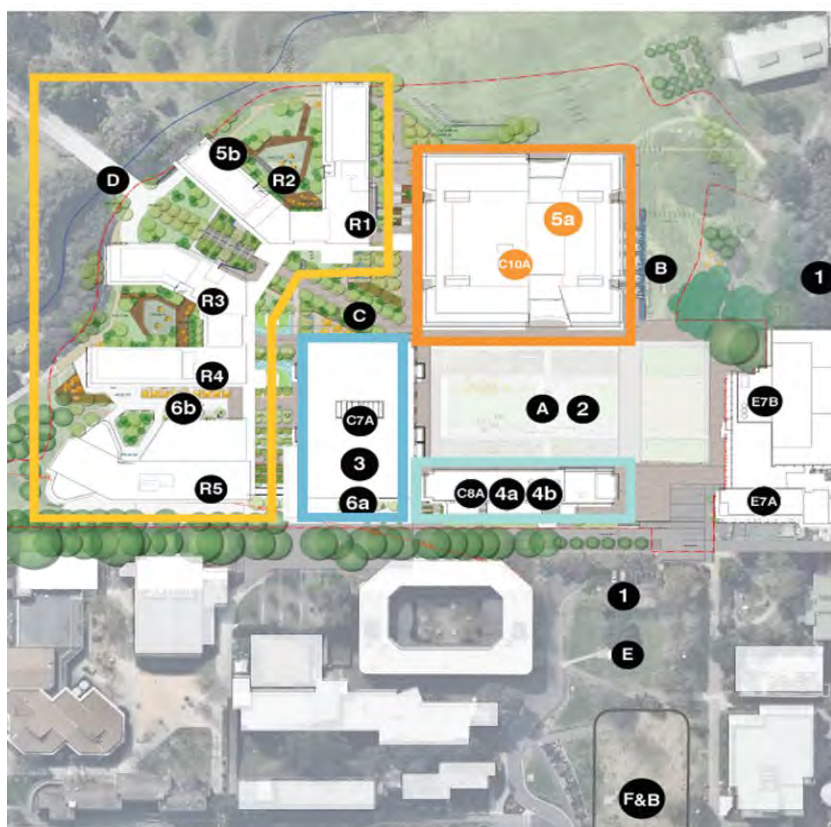
The guiding vision for the design for the Central Courtyard Precinct is to create a vibrant dynamic precinct that:

- Creates a focus for the entire University community – students, staff and visitors;
- Manifests the vision for and aspirations of the University;
- Creates a memorable and meaningful place;
- Respects and celebrates the architectural, cultural and landscape heritage of the project;
- Engages and enhances the campus through sustainability, functionality and design;
- Accommodates a wide variety of functions and activities, both permanent and temporary;
- Is sustainable, functional, flexible and capable of evolving over time.

This is to be delivered as a program of ‘Project Parts’, which when realised will serve a variety of functions, delivering new social and educational infrastructure at the very heart of the campus, incorporating approximately 68,000m² of gross floor area (GFA) across both new and refurbished buildings and associated public realm.

The nominated Project Parts (as listed above), being funded under the Framework, are being delivered under a single Construction Contract to FDC Constructions (NSW) Pty Ltd.

Image 2: The Central Courtyard Precinct



PROJECT PARTS

PROJECTS KEY

- 1 - Temporary Overlay
- 2 - Central Courtyard
- 3 - Temporary Fitout of C7A
- 4a - Food & Beverage C8A
- 4b - C8A Overall Refurbishment
- 5a - New C10a
- 5b - Student Accommodation R1 & R2
- 6a - Adaptive Re-use of C7A
- 6b - Student Accommodation R3, R4 & R5

BUILDINGS KEY

- C7A - Old Library Building**
Adaptive re-use and conversion to MUSE, Learning and Teaching and vice.
- C8A - Lincoln Building**
Refurbishment and conversion of Ground floor to Food & Beverage, c above.
- C10A - Student Hub**
An exciting new building with Food & Beverage, MUSE and Teaching Spaces.
- R1 - R5 - Student Accommodation**
New student residential accommodation bringing life to the heart of th
- E7A + E7B**
Undergoing renewal as a separate project.

PUBLIC DOMAIN KEY

- A - Central Courtyard**
Upgrade the Central Courtyard to be an attractive and dynamic social
- B - New Graduation Stairs**
- C - New Residential Courtyard**
- D - Mars Creek enabling works & Flood mitigation**
- E - Campus Common (Temporary Overlay)**

Macquarie University Sustainable Financing Framework:

Impact Measure 01 – Green Buildings

IMPACT MEASURE 01

Eligible Category: 2.1.1 Green: Green Buildings

Eligibility Projects: New construction and/or renovation of existing buildings that have or will receive any one of the following certifications/ratings or demonstrate equivalent performance as listed below.

- Green Building Council of Australia (GBCA) Green Star (minimum 5 Star or above).

Impact Indicators: Green or equivalent certifications obtained.

Project Alignment: Given the diversity of functional building types included in the Project, three separate applications have been made to the GBCA as noted in the table below.

Table 1: Applications to the Green Building Council of Australia

Project	Stage 4 – Lincoln Building	Stage 5a 1 Central Courtyard	Stage 5b Residential Student Accommodation Buildings R1 & R2
Project Description	Refurbishment of office space and provision of 6 new retail spaces.	New learning and teaching building, retail spaces and graduation hall.	342 bed student accommodation across two buildings with common podium.
Rating Tool	Green Star – Design and As Built v1.2		
Project Size (GFA)	2,568m ²	15,400m ²	11,950m ²
Desired rating	5.0 Star Green Star		
Rating Type	Major Refurbishment	New Construction	New Construction
Space Use	Class 5/6	Class 5/6/9b	Class 3/7a/9b
GBCA Project Registration Number	GS-4589DA	GS-4588DA	GS-4587DA

Note: Stage 2 of the Central Courtyard Redevelopment, which comprises the landscape treatment of the public realm, is captured within Green Star assessment of the adjacent building. Further detail on the Precinct Ecological Sustainable Development (ESD) Strategy, as well as the building specific Green Star Strategy, can be found in **Appendix A – Macquarie University Central Courtyard Project Impact Report, Green Buildings** (prepared by Arup).

Green Buildings

Appendix A:

Macquarie University Central Courtyard Project Impact Report, Green Buildings (prepared by Arup)

Macquarie University Sustainability Financing Framework

Impact Measure 01

Appendix A – Macquarie University Central Courtyard Project Impact Report, Green Buildings

Issue | 17 July 2019

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.

Job number 251278-00

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ARUP

Document Verification

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		Name	Enrico Zara		
		Signature			
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			Prepared by	Checked by	Approved by
		Name	Enrico Zara		
		Signature			
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		Description	Initial issue for approval		
			Prepared by	Checked by	Approved by
		Name	Enrico Zara	Enrico Zara	Haico Schepers
		Signature			
Issue	17 Jul 2019	Filename	20190712 MUCCP - ESD - Impact report - low res AC mark-up.docx		
		Description	include MU comments		
			Prepared by	Checked by	Approved by
		Name	EZ	AC (MU)	HS
		Signature			

Issue Document Verification with Document



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1 Introduction



This report has been prepared in the context of the MQ Sustainable Financing Framework to summarise the strategies included in the building design as part of the Green Buildings Framework Category for the following component:

- Stage 4: C8A Lincoln Building
- Stage 5a: 1CC
- Stage 5b: Residential Student Accommodation Buildings R1 & R2.

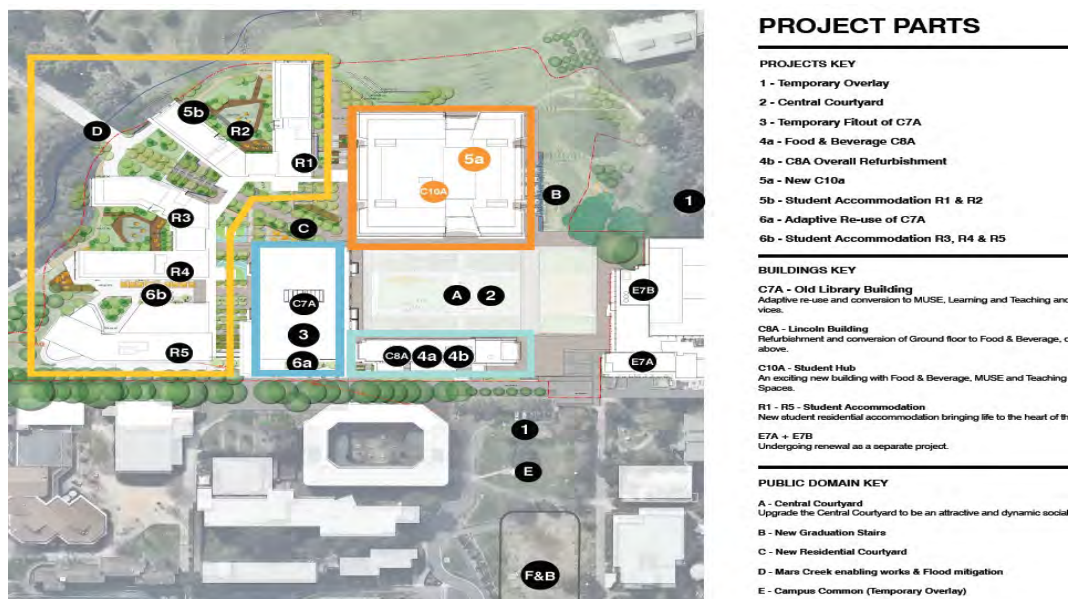





Figure 1: the MU Central Courtyard Project masterplan

1.1 Project Context

From the outset, the Macquarie University Central Courtyard Precinct (MUCCP) Masterplan design developed by Architectus, Arup and Aspect defined the approach to sustainability in the context of the broader Macquarie University campus, establishing a framework and highlighting the key principles

The core principles and key objectives of the sustainable design approach are summarised in the following table:

	User Comfort (Microclimate)	Encouraging active, sociable, meaningful lives to promote good health and wellbeing through built form, information, education and initiatives
	Energy and Carbon	Making buildings more energy efficient and delivering all energy with renewable technologies
	Waste	Reducing waste, reusing and recycling where possible, and moving towards zero waste to landfill
	Sustainable Transport	Encouraging low or zero carbon modes of transport to reduce emission, and reducing the need to travel
	Sustainable Material	Using sustainable healthy products with low embodied energy which are sourced locally and made from renewable or waste products
	Sustainable Water	Using water more efficiently in buildings and in the products we buy: tackling local flooding and watercourse pollution
	Social, Community and Culture	Reviving local identity, supporting and participating in the arts, and retaining a sense of cultural and community

These principles were then explored and tested during the masterplan & concept design phases, with a focus on siting, massing and building design through microclimate modelling, which informed the arrangement and design of the buildings and the courtyard spaces that connect them

Exterior environments have been designed to offer welcome respite for the University Community throughout the operating hours of the Macquarie University Central Courtyard Precinct. Providing comfortable external spaces in which students, staff and visitors can gather and linger together will increase the sense of community.

Providing suitable microclimates for reading, studying and socializing maximizes the outdoor use of the campus and offers a choice between indoor and outdoor activities. Using natural heat, light and wind to control conditions can minimize

energy consumption.

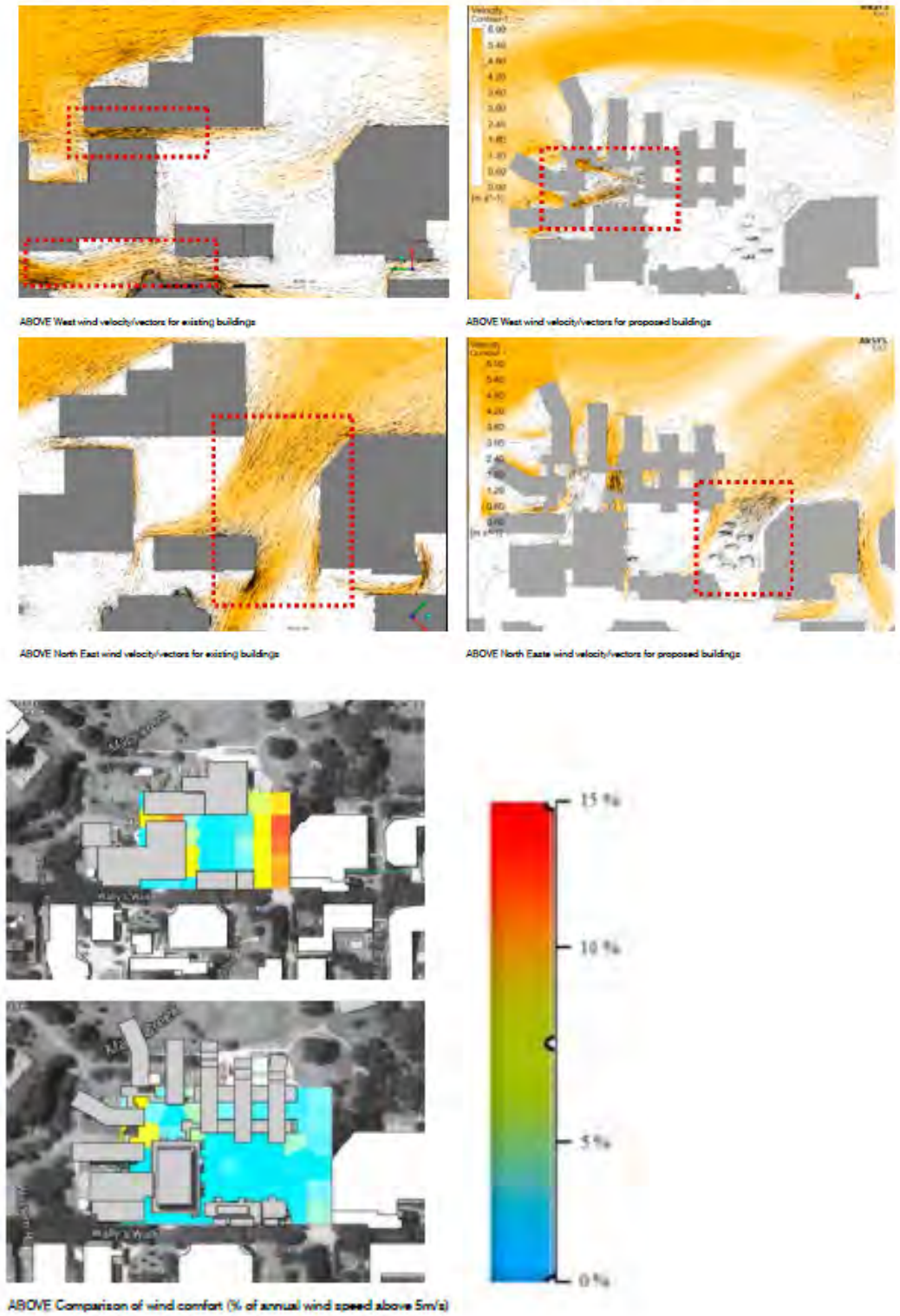


Figure 2: The massing of the new buildings has been developed with the support of wind studies, prepared during the master planning phase, to reduce wind issues compared to the previous conditions.

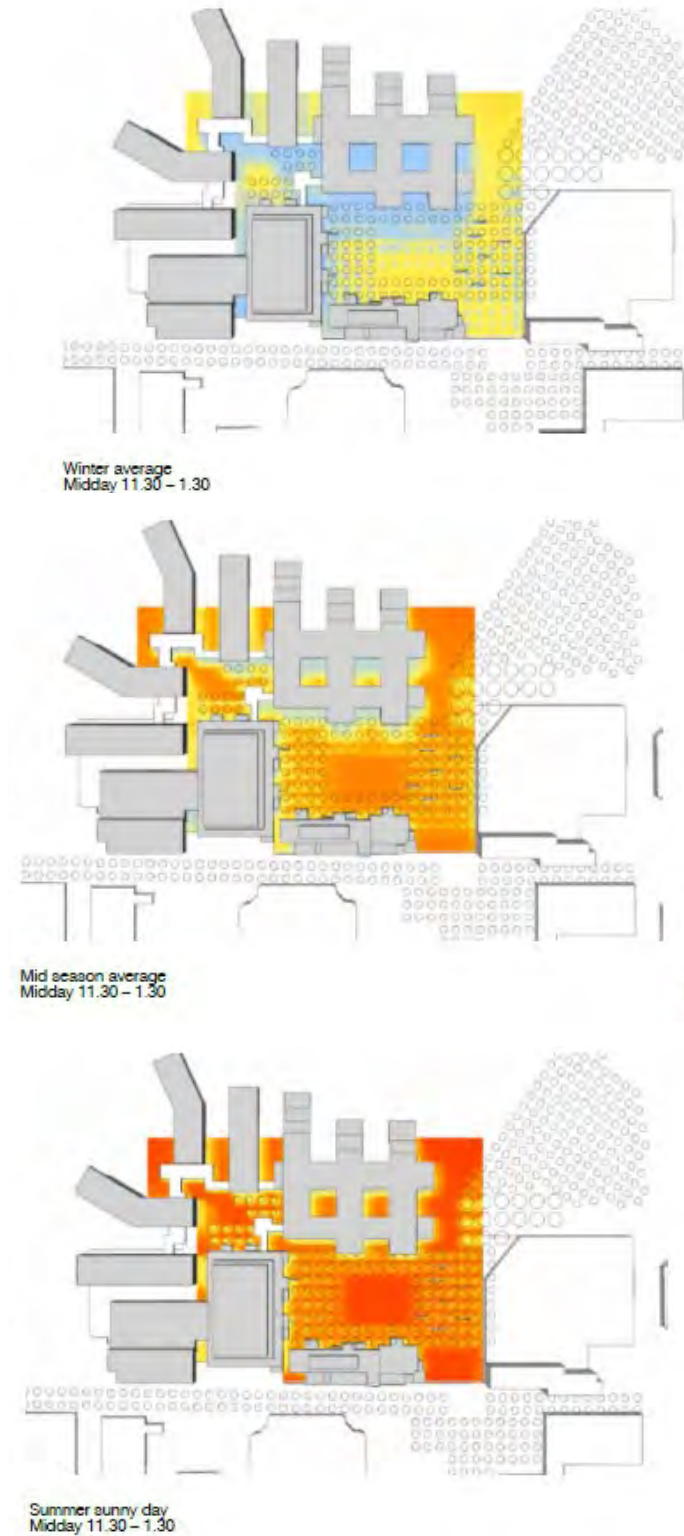


Figure 3: Mean Radiant Temperature studies have been used to identify the areas which courtyard areas are more suitable for outdoor activities. The retail spaces have been located in areas which can cater for different climate conditions. In addition, the design has introduced passive measures, such as solar canopies in front of the Lincoln Building, to protect from the summer solar radiation and winter rain.

To support the primary functions of the buildings, the design strategy also focused on a precinct based approach to supporting infrastructure, leveraging off diversity and functional performance. Key outcomes being:

- Highly efficient precinct thermal energy plant.
- Precinct energy supply and distribution incorporating behind the meter photovoltaic arrays on the building rooftops;
- Precinct wide rain water harvesting to be utilised for cooling tower make up water.
- The siting of individual buildings and the respective massing and envelope design responds to both the functional and operational requirements of the uses contained within, but also the microclimates created by other adjacent buildings and landscape elements;
- Integration of landscape with both the building design and the catchment, treatment and discharge of stormwater runoff.

2 The Buildings

The MUCCP has been designed to be built and operated according to best practice of sustainable design.



The following paragraphs provide a high level summary of the key strategies which have introduced to achieve **5 Star - Australian Excellence** with the Green Star – Design & As Built v1.2 rating tool.

2.1 Stage 5A: One Central Courtyard

The 1 Central Courtyard (1CC) development is the first key building to be constructed as part of the Macquarie University Central Courtyard Precinct. 1CC is centrally located and facing north towards the lake, with active edges to the central courtyard and residential towers.



Figure 4: 1CC seen from the park lands.

The new building comprises of several key spaces including Graduation Hall, bar, retail, food and beverage outlets, informal teaching spaces and formal teaching spaces. The central 4 level building allows for visual connection that encourages social interaction and user engagement in a sustainable environment.

The fundamental aims of the project are: to create a modern indoor environment that is functional, flexible and provides a variety of learning and teaching modes in a building that is efficient both operationally and from an energy perspective.; to

In addition to the precinct wide strategies, following key principles are applied across the project:

- Passive design strategies developed across all spaces by using natural ventilation and spill air to condition transient spaces.
- Three storey central voids will be used to support relief air and natural ventilation strategies. Integration of daylight to enhance the wellbeing and comfort in the common areas.
- A high performing building envelope that responds to the internal functions whilst ensuring energy consumption is minimised and to meet intent of the university's ecological targets.
- Infrastructure that allows for a high degree of flexibility, both functionally and operationally – with the ability to run parts of the building in isolation.
- Shading to reduce solar gains into the interior space.

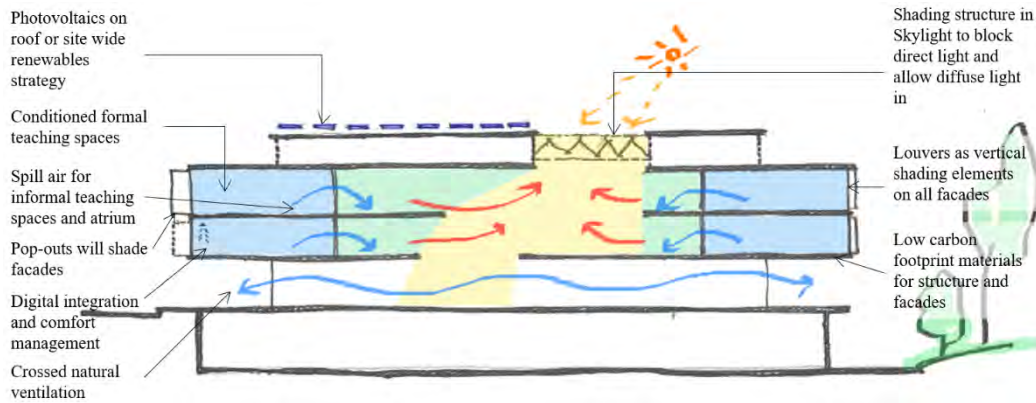


Figure 5: The mixed mode and daylight strategies have shaped the building design. The central atrium will provide both daylight access and a path for the natural ventilation relief.

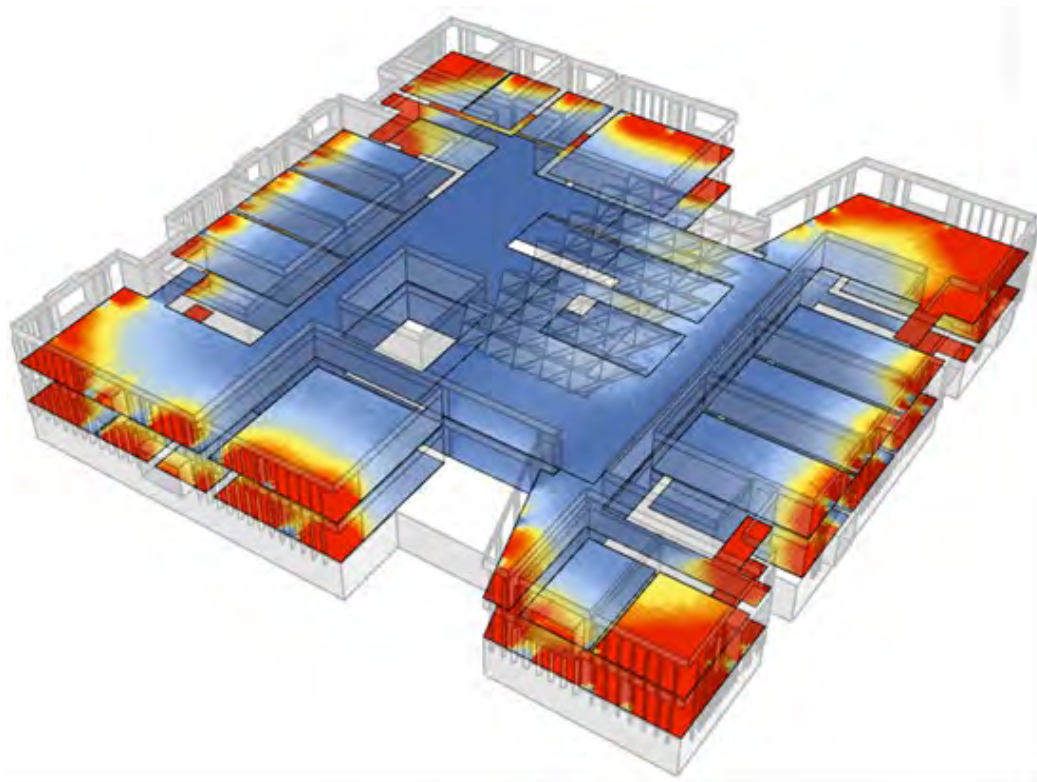


Figure 6: daylight and solar control strategies have been integrated in the building envelope which has been developed to include solar shadings and high-performance glass.

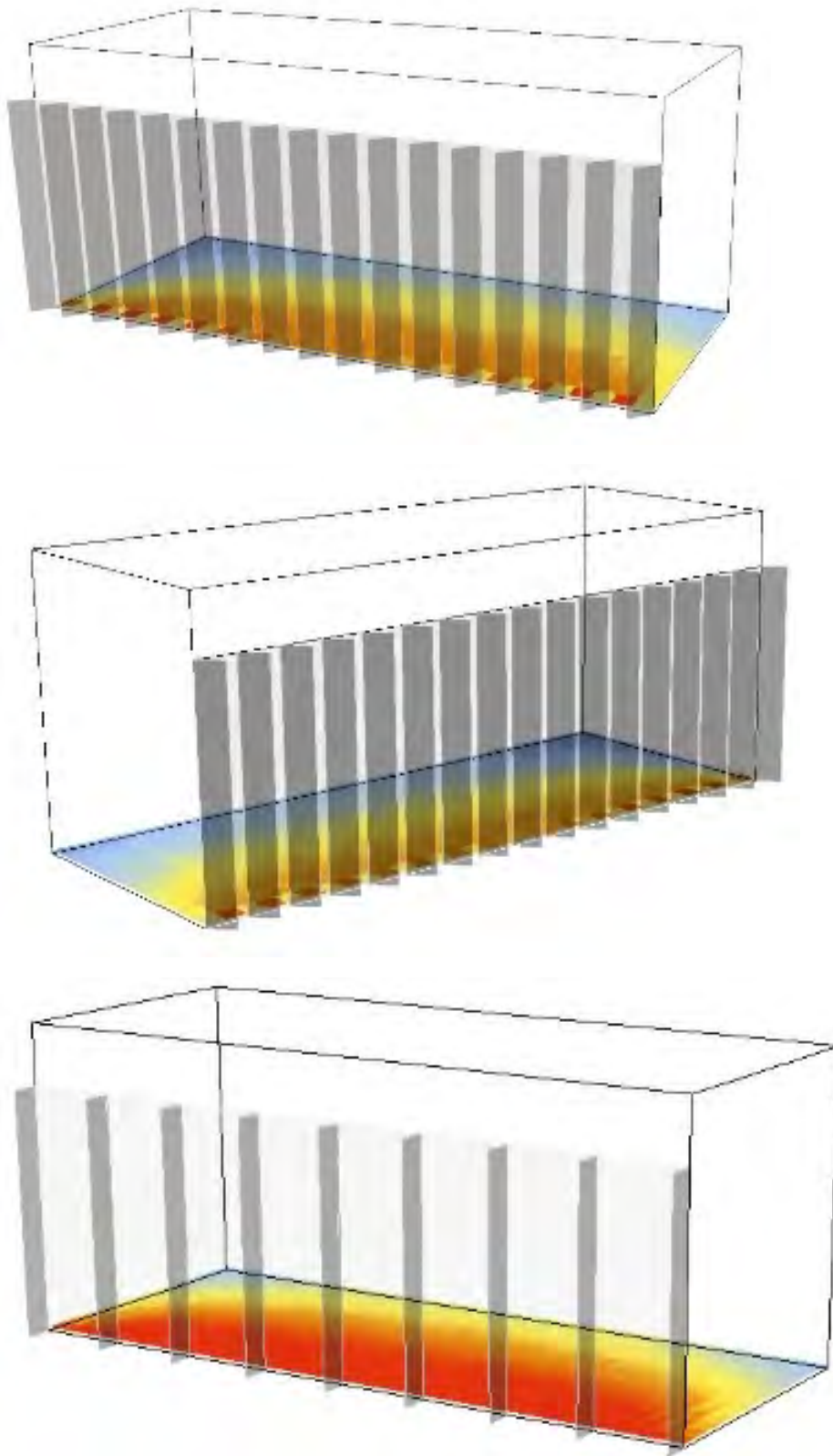


Figure 7: the solar shading devices number, shape and orientation have been optimised to achieve high levels of daylight and reduce solar gains.

- Provision of PV panels to minimise operational greenhouse gas emissions and peak load reduction.
- Reduce carbon footprint of the structure and the façade by using effective technical solution or alternative materials. Where possible reused or recycled materials ought to be considered.
- Formal and graduation ventilations systems will be designed to provide flexible room usage and efficiently respond to extremely variable occupancies.
- Outside air rates will vary to ensure CO2 levels don't exceed 800ppm within formal areas to maintain high indoor environment quality and to reduce energy demand.
- Systems to be designed for flexibility and allowing for future changes of use throughout the life of the building. For example, chilled water loops on levels 1 and 2 will allow the future installation of local fan coil units to satisfy potential future high equipment loads or occupancies.
- Provide a safe and comfortable environment for the occupants, while meeting the functional requirements of the spaces. Wherever possible, the design will seek to minimize energy use and carbon emissions in a cost effective manner.
- Flexibility for future layout and usage modifications will be provided through an appropriate provision of spare capacity.
- Long life, low energy lighting (LED) to the building. Lighting control for 'absence detection' and 'presence detection' to deactivate lights when spaces are not in use. Energy management, light and power monitoring at the distribution boards.
- Lighting design to consider circadian rhythms and how natural and electrical lighting can be utilised to support learning. Luminaires will provide low glare and be comfortable, and support wayfinding elements. Variable lighting typography and lux levels to suit different modes of working while providing some user controllability of lighting with intelligent sensors located within luminaires.
- Formal spaces to utilise tuneable white light. Cooler light in the room will make the materials appear colder, this can contribute to enhance user comfort, reduce complaints and dependency on mechanical on the more extreme days.
- To connect the ICC exterior, interior and courtyard landscape and areas there will be consideration on selecting a lighting form and element that is constant throughout but varying in size and quantity to enhance a holistic approach to the projects.
- Localised lighting control to task lighting within the informal spaces.
- Hydraulic services have been designed to maximise water and energy efficiency. The proposed hydraulics system is designed to be robust and offer a long service life and high levels of reliability. Seamless design integration and operation has driven the design.
- Sound insulation requirements for the roof section provide limits to noise break-in from the cooling towers.

- A digital platform will be established as part of the building design. This will enable the opportunity to implement a wide range of operational initiatives within the building. As the next step, we will facilitate a series of user workshops to identify the most appropriate digital initiatives for the building / precinct.

2.2 Stage 5B: Student Accommodation

The Student Accommodation is a new key component of the new Central Courtyard Precinct Project for Macquarie University and the future of the wider campus.

The ambition to create a new vibrant community of students living on campus. Activating student social life common areas of the university is a main driver for the development.



Figure 8: the student accommodation buildings seen from Gymnasium road

The Student Accommodation Part5b project will include the buildings R1 and R2. The aim is to create affordable and vibrant accommodation which sets Macquarie University apart from competing universities and attracts students to Macquarie University.

In addition to the precinct wide strategies, the key principles and approaches across all design disciplines are summarised below:

- Passive design principles have been developed in the design of the accommodation units to achieve comfort and minimise energy consumptions.
- In fact, a combination of passive strategies (such as natural ventilation, high performance building envelope optimised to reduce solar gain into the space whilst maintaining good daylight levels) and solar photovoltaic panels will allow the residential component to be operated close to a carbon neutral approach.

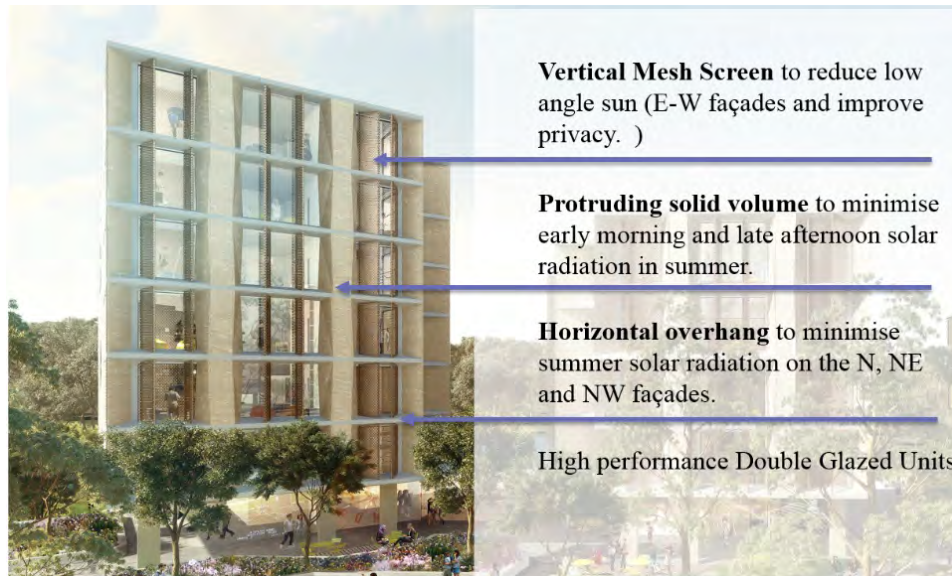


Figure 9: The building envelope has been designed to provide high level of comforts for in the guestrooms and to maintain the view towards the park lands.

- The buildings have been designed to take into account future needs or climate change risks. The mechanical system includes cooling or heating in the bedrooms, however the bedrooms can be ventilated passively with operable windows and ceiling fans.
- Common areas will feature a mixed mode comfort strategy, with air conditioning system and high level motorised windows driven by temperature and CO2 sensors. Smart comfort management and digital integration will be developed to enhance user experience of the spaces.
- Centralised exhaust systems for the toilets and the kitchen hoods controlled by the BMS will provide air quality and ventilation, to avoid risk of condensation and poor ventilation in the apartments.
- Long life, low energy lighting to the building (LED). Lighting control ‘absence detection’ and ‘presence detection’ to deactivate lights when spaces are not in use. Variation of lux levels that provides diversity of activities and functions. Smart lighting infrastructure with easy user interfaces to monitor and amend luminaires.
- Automation controls, energy management, light and power will be centrally monitored to optimise efficiency,
- Hydraulic services have been designed to maximise water and energy efficiency. The proposed hydraulics system is designed to be robust and offer a long service life and high levels of reliability. Hot water will be prepared with gas fired boilers located on the roof with easy access for maintenance.
- Appropriate acoustic separation between adjacent spaces in the common areas is important.
- Bike Hub located in the podium (# number of bikes) + end of trip facilities.

2.3 Stage 4: Lincoln Building

The environmental approach for C8A Lincoln Building refurbishment focuses on creating a comfortable and flexible space to house office functions and retail areas.

The design of the Lincoln Building presents the opportunity to position the facility for the future, while acknowledging and preserving the legacy of the university.



Figure 10: Lincoln Building seen from the courtyard

The adaptation and reuse of an existing building has intrinsic environmental benefits in the avoidance of using new construction materials and resources.

Reuse of the existing building is a key aspect of the overarching environmental strategy of this building and the overall environmental assessment of the MUCCP development.

The adaptation and reuse of the building is intended to enhance the heritage value and the intent is to retain the building aesthetic as close to original as possible.

The environmental approach of the C8A Lincoln Building design is centred upon the core principles described in the MUCCP ESD Masterplan and has been based on the Macquarie University sustainability vision to target 5 Star Green Star and key focus items including:

- high levels of energy performance
- Integrated approach to Waste Management and Minimisation
- environmentally low-impact materials, and
- efficient water management.

These targets are directed at reducing environmental impacts for the whole life cycle of the building.

In addition to the precinct wide strategies, some key approaches to improving the performance of the Lincoln Building which will be considered are:

- PV panels to offset carbon emissions
- Introduction of new double glazed units to improve energy performance and thermal comfort
- Selection of sustainable construction materials
- Central plant connections, maximising load diversity and minimising material use
- Control strategy and automation to enhance comfort and energy performance
- Insulation to existing envelope to provide energy benefit and limit peak loads

3 Green Star Strategy

The buildings are targeting a **5 Star - Australian Excellence** rating with the Green Star – Design & As Built v1.2 tool.

The following list summarises the overall key masterplan and building strategies introduced in the project, which have been rationalised for each individual building.

Management

- Pre-commissioning and commissioning of systems and tuning will be carried out to achieve the environmental performance targets.
- Comprehensive services and maintenance review
- Relevant and up-to-date building user information will be available to engage and educate all building users
- Environmental performance targets such as GHG emissions, water usage, energy usage, operational waste, and IEQ aspects will be measured, monitored, and reported.
- Waste will be properly separated, stored and managed –diverted, recycled, land filled according to the precinct’s Waste Management Plan.

Indoor Environmental Quality

- The entry of outdoor pollutants through the ventilation system will be mitigated and systems will be designed for ease of maintenance and cleaning.
- Outside air will be provided at 50% greater than Australian Standard.
- Sources of pollutants such as printers and kitchens will be separated from the rest of the areas or have a dedicated exhaust to the outside.
- Materials will be selected to minimise levels of indoor pollutants such as VOCs and formaldehyde.
- Noise levels will be kept within allowed limits and controlled by the material selection of the partitions and finishes.
- Lighting comfort will be achieved with the selection of glare-free lights and individual controls in working areas.
- Solar glare will be addressed with the use of internal blinds or other appropriate strategies.

Energy

- The carbon emission will be reduced by at least 20-40% compared to a DTS Benchmark Building.
- Peak electricity demand will be reduced by at least 15-30% when compared to a benchmark building.

Sustainable Transport

- Bicycle parking & end of trip facilities will be provided.
- Car parking provisions will be limited to service vehicle only.

Water

- All sanitary fixtures and whitegoods to be water efficient in accordance to the WELS Rating system, as specified in the Green star- Design and As Built Guide.
- Landscape will be low or no water demanding and with efficient irrigation systems for formal landscape area only.
- Rain water will be collected and reused in the cooling towers.

Materials

- Timber used for the project (structural, finishes, furniture, etc) will have an eligible forest certification or be from a reused source.
- The mass of reinforcing steel used in the project will be reduced compared to a benchmark building
- No materials containing PVC will be installed inside the building.
- At least 6% of all products will meet transparency and sustainability requirements such as: Reused products, Environmental Product Declaration, Stewardship programs, manufacturers ISO 14001 certification.
- At least 90% of the waste generated during construction will be diverted from landfill.

Land Use & Ecology

- Asbestos, lead, PCBs or any other hazardous materials have been identified and stabilised or removed from the building.
- The project will address Heat Island Effect reduction by using high albedo (high reflectance) materials for the roof and hardscape, as well as the use of green roofs and landscape elements.

Emissions

- Peak stormwater discharge will be no greater than the pre-development peak and all stormwater discharged from the site will meet the pollution Reduction Targets specified in the Green star- Design and As Built Guide.
- Outdoor lighting will be designed to control the obtrusive effects to neighbouring properties as well as to reduce night pollution to night sky (control of upward light output ratio, control direct luminance).

Innovation

- On-site renewable energy generation will contribute to at least 10% of the total energy demand of the building.
- The majority of paints specified in the building will have ultra-low VOC contents (max 5g/L).
- Project-specific training on concepts of global warming, climate change, health impacts, sustainable solutions and practices, and certifications will be delivered to contractors and subcontractors involved in the project.

Macquarie University Sustainable Financing Framework:

Impact Measure 02

Green: Environmentally Sustainable Management of Living Natural Resources and Land Use

IMPACT MEASURE 02

Eligible Category: 2.1.1 Green: Environmentally Sustainable Management of Living Natural Resources and Land Use.

Eligibility Projects: Preservation or restoration of natural landscapes including biodiversity conservation and wetland projects such as the Mars Creek and Bushcare programs.

- Impact Indicators – the amount of land covered by open space (ha and %);
- Amount of land covered by trees, plants, shrubs etc. (ha and %);
- Number of trees planted;
- Avoidance or reduction of biodiversity loss (# of species);
- Quality enhancement of soil and/or land and/or water through management practices associated with land use specific projects.

Project Alignment:

Macquarie University has two creeks traversing campus:

- University Creek catchment is 94.4 ha – 30 per cent within Macquarie University land;
- Mars Creek catchment is 118.3 ha – 70 per cent within Macquarie University land.

Image 3: Mars Creek Catchment (red outline) and the University Boundary (yellow outline)



Discharge of run-off

Upstream (off campus) flows are contained within subterranean stormwater systems collecting runoff from the local district (roads, roofs, parkland etc). Once on campus, these subterranean systems are discharged into two creeks, which discharge downstream into the Lane Cove River (via the Lane Cove National Park) which is an upper tributary of Sydney Harbour.

Since 2010, Macquarie University has progressively reinstated the creeks and associated riparian zones to their natural state, and in doing so, installed intervention devices that include some form of detention, retention (e.g. water reuse or infiltration system), water quality infrastructure and biodiversity zones to protect the in-stream environment.

The above interventions, together with large areas of the catchment that allow storm water runoff to be intercepted by our landscape, create significant amelioration of 'Urban Stream Syndrome' impacts of extreme/erosive storm flows and suppressed dry-weather flows.

Typical performance criteria resulting from this water quality infrastructure includes the reduction in the mean annual load of:

- Gross pollutants – 90 per cent;
- Total suspended solids – 80 per cent;
- Total Phosphorus – 65 per cent;
- Total Nitrogen – 45 per cent.

To date, the progressive reinstatement of the creek lines and rehabilitation of associated vegetated riparian zones, across 50 per cent of the University's creek landscape, has added 60,000 native plants along 800 metres of creek edge.

The benefits to this combined water catchment and Creek Rehabilitation Strategy are:

- Improved amenity for the Macquarie University community;
- Flood mitigation, both on campus, and to the downstream flows in the Lane Cove River (Sydney Harbour);
- Water purification and pollution control.

Mars Creek

The component of Mars Creek which transverses Macquarie University is approximately 1,220 metres in length and is broken down into six reaches. The Macquarie University Central Courtyard Project (MUCCP) Stage 7 Mars Creek Rehabilitation Works, is the rehabilitation of the 130m section of Mars Creek known as Reach 3 which makes up 11 per cent of the 1,220 metres of the total length that transverses campus.

Table 2: Mars Creek Rehabilitation Status

Reach Identity	Length (m)	% of total within campus	Riparian Corridor width	Period of Re-vegetation
Mars Creek Reach 1	240	20%	25 m	2012-2013
Mars Creek Reach 2	405	33%	15-30m	2008-2011
Mars Creek Reach 3	130	11%	20 m	Stage 7 Mars Creek Rehabilitation Works
Mars Creek Reach 4 (Campus Lake)	225	18%	n/a	n/a
Mars Creek Reach 5	115	9%	n/a	n/a
Mars Creek Reach 6 (bushland reach)	105	9%	30 m	2008-present
	1,220	100%		

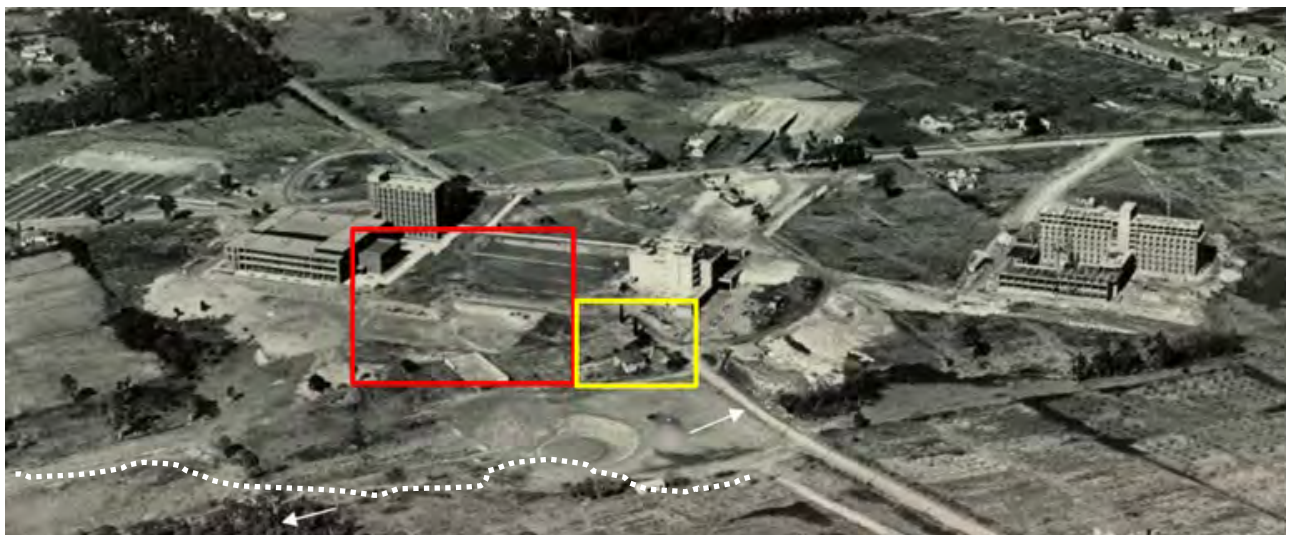
Macquarie University Central Courtyard Project – Stage 7 Mars Creek Reach 3 Rehabilitation Works

The following Images 4 - 7 indicate the reaches of Mars Creek, the existing condition and site context

Image 4: The reaches of Mars Creek



Image 5: The University under construction in 1967, looking south east towards the Central Courtyard Precinct (Stage 5a is indicated in red, 5b in yellow)

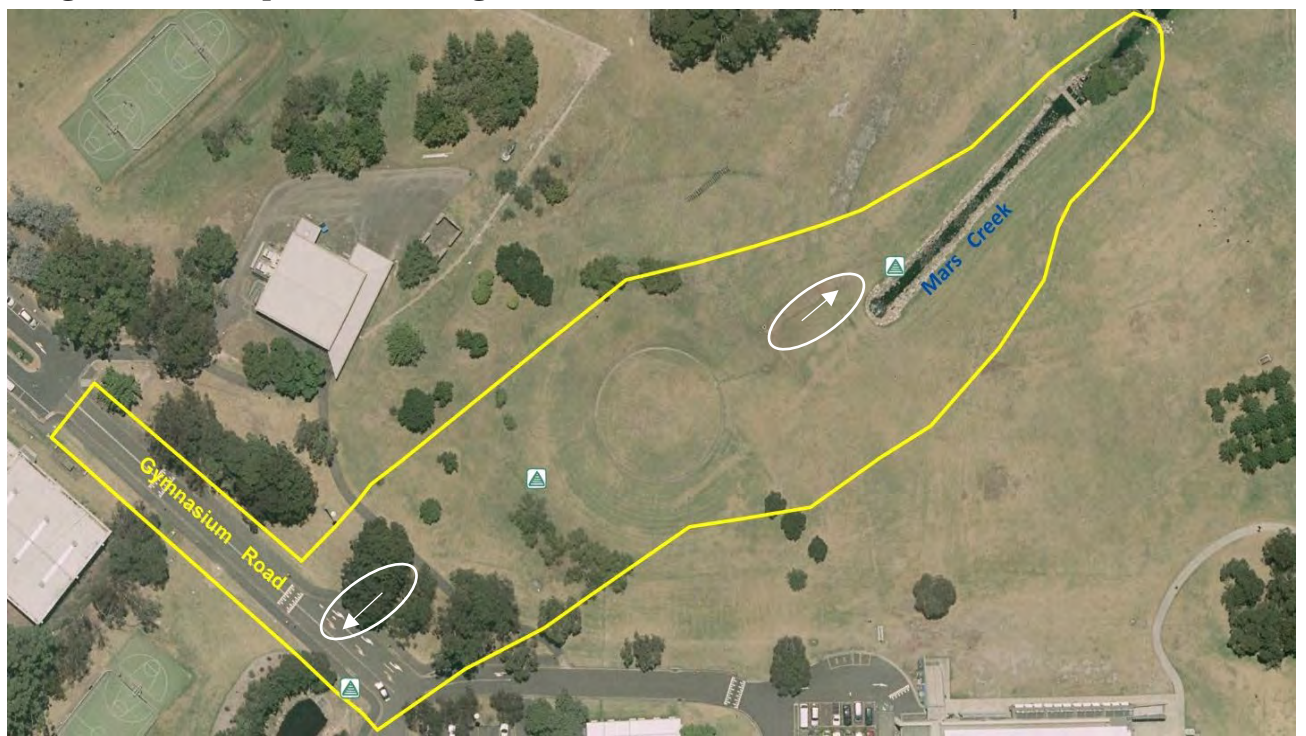


Note – The dotted lines indicate the former path of Mars creek directly before it was piped underground.

Image 6: Mars Creek - Reach 3 Site Context



Image 7: An aerial photo indicating the 'ends' of Mars Creek Reach 3 in 2018



The Rehabilitation of Mars Creek Reach 3

The rehabilitation of Mars Creek Reach 3, focuses on ameliorating the habitat 'truncations' from previous hard engineering works originating in the 1960s. This includes 'daylighting' or opening up a section of creek that was piped in a subterranean stormwater system for more than 50 years ago.

The works will create a new naturalised surface channel through a section of the original creek bed, and in doing so, reinstate the riparian zone of approximately 20 metres in width. Additional habitat features will include a re-made culvert inlet that will offer native freshwater eels a new migration route from their existing habitat in the university's lake, to the rehabilitated upper reaches of Mars Creek.

Key Landscape Design Principles

The proposed Mars Creek works within the Reach 3 zone described above adhere to the general design principles listed below:

- The implementation of environmentally sustainable design principles;
- Storm water management including water sensitive urban design initiatives (WSUD) such as bio swales;
- New tree planting to offset existing tree removal in the vicinity of the proposed works;
- High quality, low maintenance materials and planting;
- Ensure that the public domain has been designed with regard to crime prevention through environmental design (CPTED) principles;
- Provide bed and bank stability and reducing bank and channel erosion;
- Provide an interface or buffer between developments and waterways
- Provide passive recreational uses.

Image 8: Landscape Plan

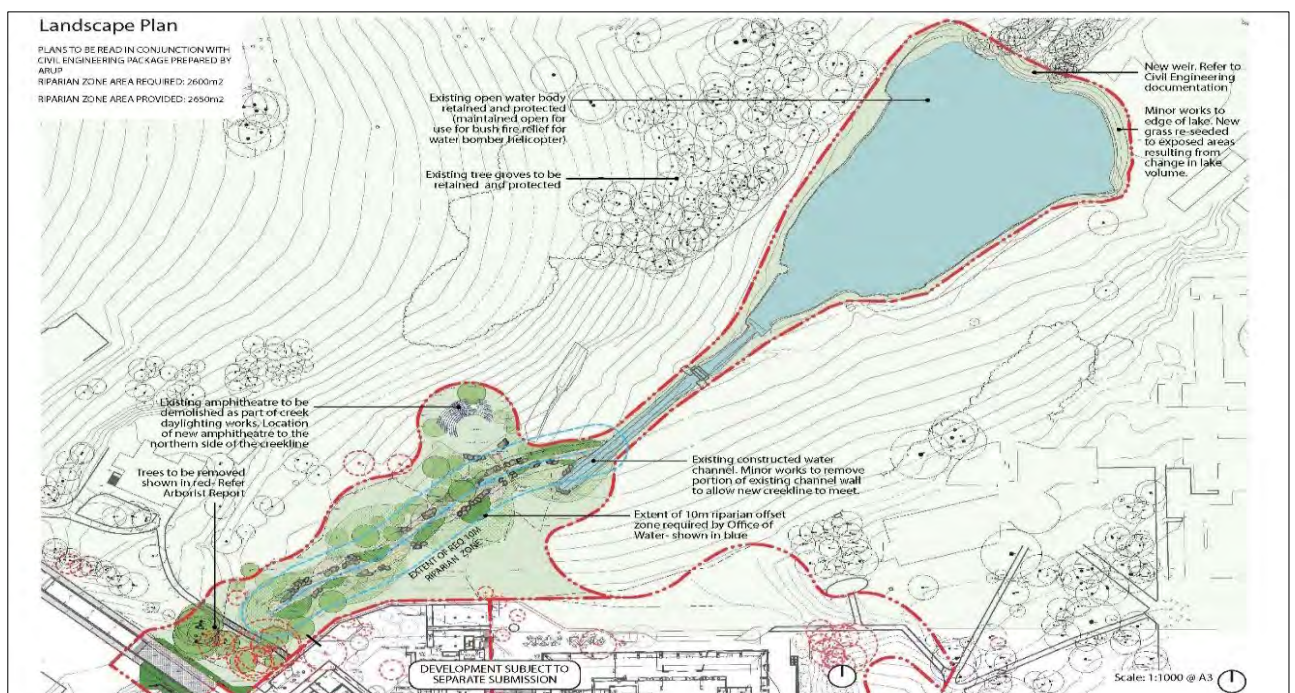


Image 9: Landscape Detail Plan



Image 10: Landscape Sections

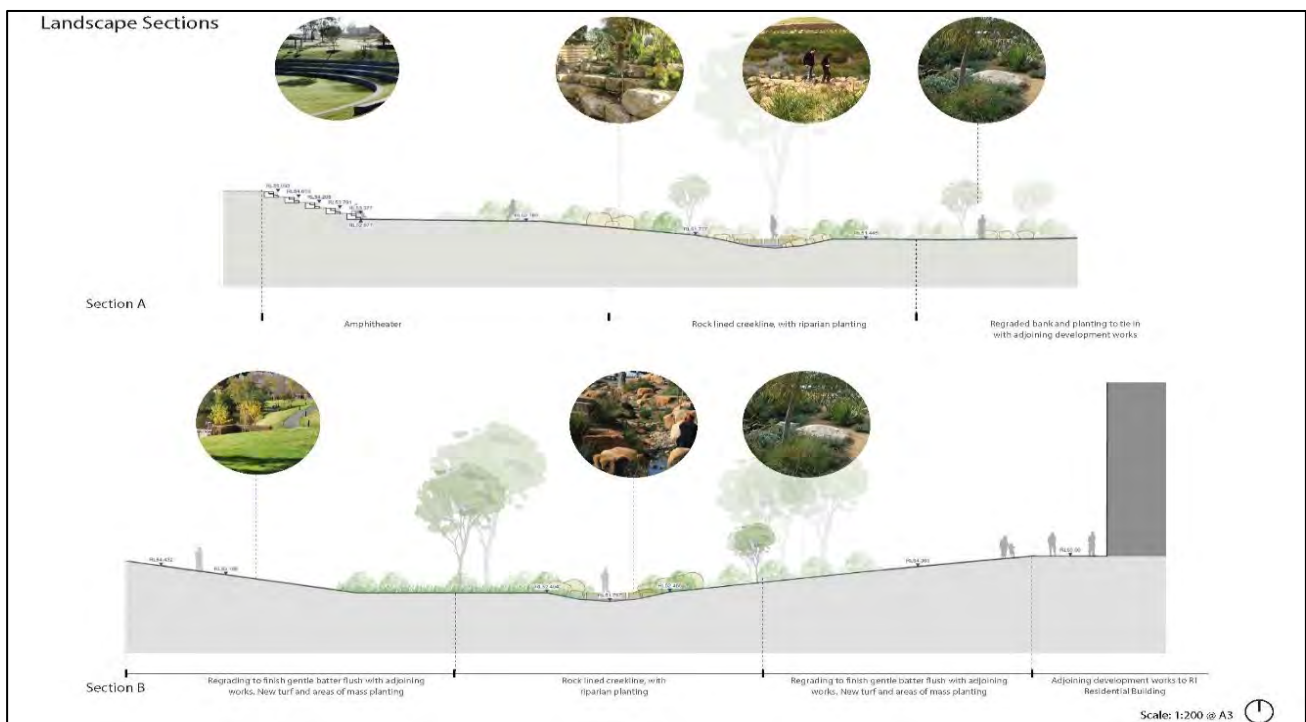
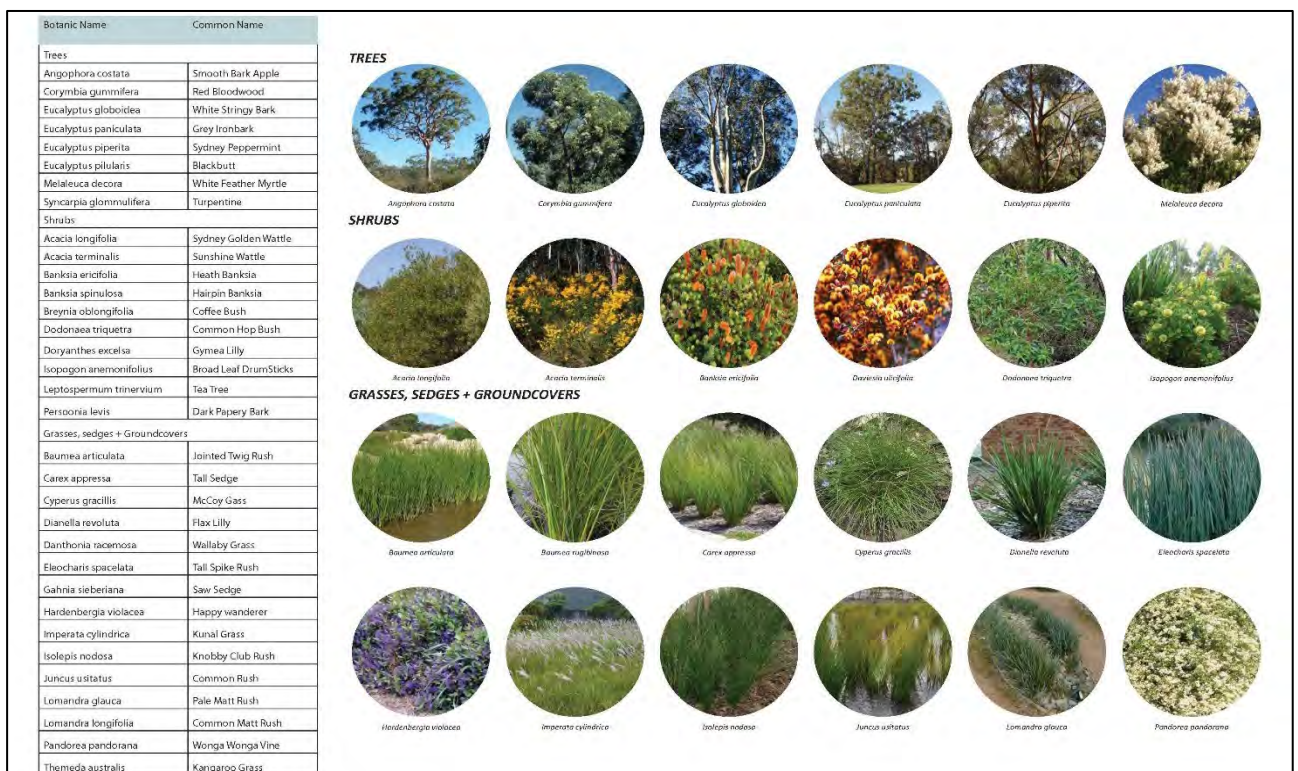


Image 11: Tree Removal / Retention Plan



Image 12: Indicative Planting Palette





MACQUARIE
University

Sustainable Financing Framework

2019 2nd Party Opinion - Sustainalytics Annual Review



Macquarie University

Type of Engagement: Annual Review

Date: October 4, 2019

Engagement Leader: Amanda Ackerman, amanda.ackerman@sustainalytics.com, (+31) 20 205 00 88; Evan Bruner, evan.bruner@sustainalytics.com, (+31) 20 205 00 27; De Entree 35-37, 1101 BH Amsterdam

Introduction

In 2018, Macquarie University (MQU) issued a sustainability bond aimed at financing green and social projects. Financing may include instruments such as bonds and loans that contribute towards sustainable development by earmarking the proceeds to projects/expenditures that fall within the eligible categories defined in its framework. In September 2019, MQU engaged Sustainalytics to review the projects funded through the issued sustainability bond and provide an assessment as to whether the projects met the Use of Proceeds criteria and the Reporting commitments outlined in the Macquarie University Sustainable Financing Framework.

Evaluation Criteria

Sustainalytics evaluated the projects and assets funded during the reporting period 1st September 2018 – 31st August 2019 based on whether the projects and programmes:

1. Met the Use of Proceeds and Eligibility Criteria outlined in the Sustainability Financing Framework; and
2. Reported on at least one of the Key Performance Indicators (KPIs) for each Use of Proceeds criteria outlined in the Sustainability Financing Framework.

Table 1 lists the Use of Proceeds, Eligibility Criteria and associated KPIs. The MQU Sustainable Financing Framework includes seven Use of Proceeds. This SPO covers impacts under two Use of Proceeds.

Table 1: Use of Proceeds, Eligibility Criteria and Key Performance Indicators

Use of Proceeds	Eligibility Criteria	Key Performance Indicators
Green Buildings	<ul style="list-style-type: none"> • New construction and/or renovation of existing buildings that follow strong Ecologically Sustainable Design (ESD) Principles* • New construction and/or renovation of existing buildings that have or will receive any one of the following certifications/ratings or demonstrate equivalent performance: <ul style="list-style-type: none"> ○ National Australian Built Environment Rating System (NABERS) – minimum 4.5 Star or above; or ○ Green Building Council of Australia (GBCA) Green Star – minimum 5 Star or above; or ○ For renovations or upgrades of existing buildings, deliver a minimum [30%] reduction in carbon emissions intensity ○ Any other good green design label, that can be demonstrated to be equal or better than above • Procurement of sustainably sourced building materials - including certified products (such 	<ul style="list-style-type: none"> • Green or equivalent certifications obtained • ESD principles scorecard¹ • Materials sourced sustainably (including certified products, recycled content) (%)

¹ The ESD Principles Scorecard ensures design initiatives have been included to provide performance equivalent to that of a 5 Star rated project under the nominated Green Star tool. This performance is to be achieved in the construction of the building in order to provide equivalence to an As Built rating

	as FSC timber), or products containing recycled content (such as concrete, glass)	
Environmentally Sustainable Management of Living Natural Resources and Land Use	<ul style="list-style-type: none"> • Preservation or restoration of natural landscapes including biodiversity conservation and wetland projects such as the Mars Creek and Bushcare programs 	<ul style="list-style-type: none"> • Amount of land covered by open space (ha and %) • Amount of land covered by trees, plants, shrubs etc. (ha and %) • Number of trees planted • Avoidance or reduction of biodiversity loss (# of species) • Quality enhancement of soil and/or land and/or water through management practices associated with land use specific projects

Issuing Entity’s Responsibility

MQU is responsible for providing accurate information and documentation relating to the details of the projects that have been funded, including description of projects, estimated and realized costs of projects, and project impact.

Independence and Quality Control

Sustainalytics, a leading provider of ESG and corporate governance research and ratings to investors, conducted the verification of MQU’s Sustainability Bond Use of Proceeds. The work undertaken as part of this engagement included collection of documentation from MQU employees and review of documentation to confirm the conformance with the Sustainability Financing Framework.

Sustainalytics has relied on the information and the facts presented by MQU with respect to the Nominated Projects. Sustainalytics is not responsible nor shall it be held liable if any of the opinions, findings, or conclusions it has set forth herein are not correct due to incorrect or incomplete data provided by MQU.

Sustainalytics made all efforts to ensure the highest quality and rigor during its assessment process and enlisted its Sustainability Bonds Review Committee to provide oversight over the assessment of the review.

Conclusion

Based on the limited assurance procedures conducted,² nothing has come to Sustainalytics’ attention that causes us to believe that, in all material respects, the reviewed bond projects, funded through proceeds of MQU, are not in conformance with the Use of Proceeds and Reporting Criteria outlined in the Sustainable Financing Framework.

² Sustainalytics limited assurance process includes reviewing the documentation relating to the details of the projects that have been funded, including description of projects, estimated and realized costs of projects, and project impact, which were provided by the Issuer. The Issuer is responsible for providing accurate information. Sustainalytics has not conducted on-site visits to projects.

Detailed Findings

Table 3: Detailed Findings

Eligibility Criteria	Procedure Performed	Factual Findings	Error or Exceptions Identified
Use of Proceeds Criteria	Verification of the projects funded by the sustainable bond during the reporting period 1 st September – 31 st August 2019 to determine if projects aligned with the Use of Proceeds Criteria outlined in the Sustainability Financing Framework and above in Table 1.	All projects reviewed complied with the Use of Proceeds criteria.	None
Reporting Criteria	Verification of the projects funded by the Sustainable bond during the reporting period 1 st September 2018 – 31 st August 2019 to determine if impact of projects was reported in line with the KPIs outlined in the Sustainability Financing Framework and above in Table 2. For a list of KPIs reported please refer to Appendix 1.	All projects reviewed reported on at least one KPI per Use of Proceeds criteria.	None

Appendix 1: Impact Reporting by Eligibility Criteria

Use of Proceeds and Eligibility Criteria Category	Environmental Impact Reported by Eligibility Criteria
Green Buildings	<p>Lincoln Building: 5 Star Green Star – Design & As Built v1.2 rating tool (Australian Excellence) Status: Construction Commenced May 2019</p> <p>Student Accommodation in buildings R1 and R2: 5 Star Green Star – Design & As Built v1.2 rating tool (Australian Excellence) Status: Construction Commenced May 2019</p> <p>One central Courtyard Building: 5 Star Green Star – Design & As Built v1.2 rating tool (Australian Excellence) Status: Construction Commenced May 2019</p>
Environmentally Sustainable Management of Living Natural Resources and Land Use	<p>Mars Creek Rehabilitation: The rehabilitation of Mars Creek Reach 3 focuses on ameliorating the habitat 'truncations' from previous hard engineering works originating in the 1960s. This includes 'daylighting' or opening up a section of creek that was piped in a subterranean stormwater system for more than 50 years ago.</p>

	<p>The works will create a new naturalised surface channel through a section of the original creek bed, and in doing so, reinstate the riparian zone of approximately 20 metres in width. Additional habitat features will include a re-made culvert inlet that will offer native freshwater eels a new migration route from their existing habitat in the university's lake, to the rehabilitated upper reaches of Mars Creek.</p>
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Sustainalytics

Sustainalytics is a leading independent ESG and corporate governance research, ratings and analytics firm that supports investors around the world with the development and implementation of responsible investment strategies. With 13 offices globally, the firm partners with institutional investors who integrate ESG information and assessments into their investment processes. Spanning 30 countries, the world's leading issuers, from multinational corporations to financial institutions to governments, turn to Sustainalytics for second-party opinions on green and sustainable bond frameworks. Sustainalytics has been certified by the Climate Bonds Standard Board as a verifier organization, and supports various stakeholders in the development and verification of their frameworks. In 2015, Global Capital awarded Sustainalytics "Best SRI or Green Bond Research or Ratings Firm" and in 2018 and 2019, named Sustainalytics the "Most Impressive Second Party Opinion Provider. The firm was recognized as the "Largest External Reviewer" by the Climate Bonds Initiative as well as Environmental Finance in 2018, and in 2019 was named the "Largest Approved Verifier for Certified Climate Bonds" by the Climate Bonds Initiative. In addition, Sustainalytics received a Special Mention Sustainable Finance Award in 2018 from The Research Institute for Environmental Finance Japan and the Minister of the Environment Award in the Japan Green Contributor category of the Japan Green Bond Awards in 2019.

For more information, visit www.sustainalytics.com

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