



Umow Lai

Sustainable Design Statement

Bankstown City Campus Development
Western Sydney University

REPORT AUTHORISATION

**PROJECT: SUSTAINABLE DESIGN STATEMENT
BANKSTOWN CITY CAMPUS DEVELOPMENT**

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EXECUTIVE SUMMARY

This report provides an overview of the proposed Bankstown City Campus development at the Western Sydney University Bankstown City Campus. It examines the potential for sustainability measures to be incorporated in to the project to achieve the planning scheme objectives.

As a result of the ESD initiatives discussed within this report, the Bankstown City Campus development is expected to achieve a level of environmental sustainability consistent with the criteria required by the Secretary's Environmental Assessment Requirements (SEARs) for State Significant Development (SSD).

The sustainability measures implemented in the design aim to ensure that the development has enhanced energy efficiency, therefore minimising the associated greenhouse gas emissions. The design targets a reduction in potable water use and investigates the use of alternative water sources. The minimisation of waste going to landfill, and an increase in the rate of material reuse and recycling is also incorporated.

As detailed in this report, the building has demonstrated its ability to achieve the sustainability objectives regarding energy, water and waste efficiency to meet the SEARs requirements. The SEARs requirements for the project with respect to this report are detailed as follows:

- Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the development.
- Demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice.
- Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.

Compliance with the second point above is demonstrated through the achievement of a 5 Star Green Star Design and As Built version 1.3 certified rating. This report details the sustainability measures proposed to be implemented into the Bankstown City Campus and which satisfy all SEARs requirements.



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1 INTRODUCTION

This report has been prepared to provide an overview of the proposed Ecologically Sustainable Development (ESD) design features incorporated into the design of the proposed Bankstown City Campus at the Western Sydney University. The report identifies how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) are incorporated into the project and to demonstrate compliance with the SEARs requirements.

The sustainability measures implemented in the design aim to ensure that the development has enhanced energy efficiency, a resultant reduction in greenhouse gas emissions, reduced potable water use as well as waste going to landfill, and an increase in the rate of material reuse and recycling.

Incorporated in the design and ongoing operation phases of the development. As detailed in this report, the building has the preliminary design potential to achieve the sustainability objectives regarding energy, water and waste efficiency as set out in the SEARs requirements.

The report includes discussion on the passive design features, energy efficiency, indoor environment quality, water conservation, sustainable materials, transport, waste management and appropriate WSUD initiatives which are proposed to be incorporated into the development.

The various ESD design measures noted in this document will be further explored as the project design and construction progress.

1.1 THE DEVELOPMENT

The development site for the Bankstown City Campus is located at 74 Rickard Road Bankstown. The site is bordered by the Bankstown City Council Offices to the East, the and Library to the West, Rickard Rd to the North and Paul Keating Park to the South.

The image below shows the existing site and environs:



Figure 1: **Bankstown City Campus** (image from Google Maps)

The development site lies within the jurisdiction of the City of Canterbury Bankstown. The teaching spaces are deemed to be Class 9b under the National Construction Code (NCC) 2019, staff office spaces are Class 5, with the car park area falling under Class 7a.



1.2 ECOLOGICALLY SUSTAINABLE DESIGN

The Intergovernmental Panel on Climate Change quotes that buildings are responsible for consuming 32% of the world's resources, including 12% of its fresh water and up to 40% of its energy, whilst generating 40% of the waste going to landfill and 40% of air emissions. Such figures confirm that buildings are the biggest source of emissions and energy consumption around the globe, and current design and construction practices in the built environment fuel the global slide towards irreversible climate change.

The property industry in Australia is well positioned to deliver significant long-term environmental and social improvements using a broad range of measures. This is realised with a focus on sustainability from an early stage of the design process.

Ecologically sustainable design of buildings seeks to minimise the ongoing operational consumption of scarce resources such as energy and water and to use resources in such a way as to minimise the impact on the environment. Within the building consideration is given to the amenity and comfort of the building occupants by appropriate selection of materials, fabric and energy systems.



2 REGULATORY COMPLIANCE

The following section details regulatory compliance requirements identified for the development related to sustainability.

2.1 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS - SEARs

The SEARs requirements for the project with respect to this report are detailed as follows:

- Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the development.
- Demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice.
- Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.

2.2 NCC SECTION J ENERGY EFFICIENCY

Section J of the National Construction Code (NCC) stipulates the minimum energy efficiency requirements for residential (Class 1, 2, 3 & 4) and non-residential buildings (Class 5 to 9) within all states and territories of Australia where Section J has been mandated. The project is currently targeting compliance under the NCC2019 Part J requirements as confirmed by the relevant Building Surveyor for the project. The previous iteration of the building design targeted NCC 2016 compliance. However with the current redesign the project is now targeting NCC 2019 and as such is required to achieve a higher level of greenhouse gas emissions reduction than applied previously.

Section J is comprised of eight parts, each specifically outlining minimum deemed-to-satisfy criteria. Those sections that are applicable within New South Wales cover the performance of the building fabric, glazing, building sealing, HVAC systems, artificial lighting and power and access for maintenance.

Compliance with these requirements is ensured by the design team, and must be demonstrated before being approved for a building permit.

For Class 9b and Class 5 areas, compliance is demonstrated via the Deemed-to-Satisfy requirements of Part J1 to J3 (where applicable) or performance verification (JV3 modelling).

The Bankstown City Campus project is proposing to exceed the minimum NCC2019 Part J energy requirements. Not that the requirements for NCC 2019 represents a significant increase in energy efficiency from NCC 2016.



3 GREEN STAR

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.

The GBCA has historically managed a suite of Green Star rating tools for different building types (e.g. Office, Education, Healthcare etc.). These tools have had significant penetration into the property and construction sector, becoming the default “yard-stick” for environmental performance of property development.

The use of the Green Star Education tool has also been popular within the tertiary education sector with numerous projects of significance defining Green Star objectives.

With a recent overhaul and change of strategic direction, these sector specific rating tools are now referred to as “legacy” rating tools. Since late 2014, the GBCA has released a Design and As Built tool to replace all previous legacy rating tools.

3.1 GREEN STAR DESIGN & AS-BUILT (GREEN STAR DAB)

The Green Star DAB is a single rating tool which can be applied to any eligible building type. Therefore educational developments such as the Bankstown city campus development, a single tool can be used for the whole project. The fitout component is not currently proposed to be rated (Green Star Interiors) but would need to align with any Design and As Built requirements for integrated fitout elements.

Previously with legacy rating tools, each different space type would need to use the specific tool for that space type (i.e. Green Star Office v3 and Green Star Education v1):

Umow Lai notes the significant changes within the Green Star DAB rating tool compared to legacy tools:

- The number of credits have been rationalised with the number of points available limited to approximately 100, plus an additional 10 innovation points.
- The rating system no longer uses “weighting factors” to allocate different emphasis on environmental issues.
- The rating achieved is an As-Built rating only, although an option exists to have the GBCA undertake a ‘Design Review’ rating achieved as the design develops.
- Significant changes and improvements have been made to credit criteria.
- A significant emphasis is placed on Life Cycle Assessment within the materials category.
- The Innovation category has been completely revised with the integration of Innovation Challenges.



Green Star DAB has undergone 3 major reviews since its release with the current version of the tool being version 1.3. Version 1.3 is a new version that was specifically created to deal with greenhouse gas emissions credits due to the introduction of NCC 2019. Current projects that are using NCC 2016 are to use Green Star DAB v1.2 while projects that are applying NCC 2019 must use Green Star DAB v1.3. The only changes between Green Star DAB v1.2 and v1.3 relate to the Energy and Greenhouse Gas Emissions credits that utilise NCC Part J as a benchmark.

3.2 TARGETED GREEN STAR POINTS

The project requires 60 points out of 100 available to achieve the target 5 Star 'Australian Excellence' rating. Currently the project is sitting at 65.0 points, which includes a point 'buffer'.

The project is targeting 9 out of 10 available innovation points.

Table 1 Green Star Status

Category	Available Points	Targeted Points	'Potential/Alternative' Points
Management	14	13	1
Indoor Environment Quality	17	11	4
Energy	22	7.0	1.4
Transport	10	10.0	0
Water	12	5	1
Materials	14	5	7.5
Ecology	6	2	1
Emissions	5	3	0
Innovation	10	9	0
TOTAL	110	65.0	15.9

The proposed 5 Star pathway has been reviewed and commented on by the design team to ensure targeted credits are incorporated into the design and cost plan.

A detailed summary of Green Star Design and As Built version 1.3 credits targeted by BCCD is contained in the appendix.



4 ESD PRINCIPLES

The Environmental Planning and Assessment Regulation 2000 (clause 7(4) of Schedule 2) defines the Principles of Ecologically Sustainable Development as follows:

- 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,
- 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,
- c) **conservation of biological diversity and ecological integrity**, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
- 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 following sections detail how the proposed design specifically responds to each of these principals.

4.1 PRECAUTIONARY PRINCIPLE

The design for the Bankstown City Campus development follows the precautionary principal by applying best practice environmental sustainable design throughout the project. Much of this design has been undertaken to prevent irreversible damage to the environment. For example the large solar photovoltaics array covering all available areas of the roof of the building will ensure that a significant proportion of electricity comes from renewable sources. This reduces the harm to the environment that occurs through fossil fuel based power generation.

A risk weighted assessment basis is also followed to assess the merits of various sustainable design options. A primary example of this is the Climate Adaptation Plan that is being developed to allow the project team to identify key risks associated with climate change over the expected lifetime of the project. The Plan includes a risk assessment to analyse varying degrees of climate change severity over future time scales based on scientific research. The risk assessment process identifies design initiatives that can be implemented to ensure that risks are lowered to an acceptable level. The significant planting of vegetation across the building is driven by a desire to improve the local thermal environment while adding to local ecology.



4.2 INTER-GENERATIONAL EQUITY

The project sustainable design initiatives are intended to maintain or enhance the health, diversity and productivity of the environment for the benefit of future generations. Key among these issues is climate change, which represents the single greatest threat to the health, diversity and productivity of the environment for the benefit of future generations. The project combats climate change through the design of the building being very energy efficient and also through the use of renewable electricity sources for part of the power consumed by the building.

Other areas of intergenerational equity are also addressed in the sourcing and supply of raw materials used for the construction of the building. Key materials for use in the building such as timber, steel and PVC are responsibly sourced to limit their impact on future generations. The project is also in close consultation with members of local indigenous communities to ensure that the wishes of the traditional custodians of the land are respected.

4.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

Conservation of biological diversity and ecological integrity is a fundamental consideration for the project sustainable design. The Bankstown City Campus development occupies a relatively minor area of limited ecological value (a former car park) and so therefore has minimal existing biological diversity and ecological integrity. The project is seeking to significantly improve its ecological integrity through the planting of various forms of vegetation. This includes large areas of planting including trees on the terraces that step up[the building and also green wall elements.

The project will also benefit biological diversity and ecological integrity through the sourcing of materials and resources required for the construction and operation of the facility. Construction materials such as timber will be supplied using sustainable forest certification schemes that ensure that biological diversity and ecological integrity is protected and maintained. Similarly various other materials used in the project will be sourced with Environmental Product Declarations that are designed to protect biological diversity and ecological integrity.

The conservation of water resources is also a fundamental consideration in the design. Low water consuming fittings are to be specified throughout the project. In addition the roof area is used to capture a substantial volume of rainwater that reduces potable water consumption and therefore reduces pressure on ecological systems caused by water scarcity.

4.4 IMPROVED VALUATION, PRICING AND INCENTIVE MECHANISMS

The University of Western Sydney is developing the Bankstown City Campus development for its own use and will be the long term occupant and operator of the facility. The University is also responsible for the provision of all resources needed for the building and the management of all waste produced. This closed cycle from production to disposal ensures that the University bears the cost of containment, avoidance or abatement of any pollution associated with the development.

Sustainability is fully integrated through the design and construction of the Bankstown City Campus development to ensure that the strong environmental goals set for the facility are achieved in the most cost effective way. Detailed energy, water and environmental impact modelling is used throughout the design process to optimise the performance and effectiveness of the project.



5 SUSTAINABILITY INITIATIVES

The subsequent sections set out the important ESD design features of the new development, that contribute to it meeting the SEARs requirements.

5.1 ESD DESIGN APPROACH

The ESD design approach for the project seeks to deliver a very low energy and highly sustainable building without complicating the design and ongoing operation. The ESD and Green Star solutions proposed have been targeted towards a commercially acceptable outcome on the expectation that a developer-led delivery approach may be undertaken.

The use of complex technology will be avoided in favour of holistic design approaches and sound engineering principles. The ESD design will seek to deliver an integrated design approach where all members of the project team work together to achieve market leading sustainable performance.

Key design aspects are discussed in the following sections.

5.2 BUILDING FABRIC AND MASSING

The fundamental approach to be taken in designing a sustainable building is to design the orientation and massing of the building to limit unwanted solar exposure while providing good indoor environment quality. The orientation and massing of Bankstown City Campus development is largely defined by the site footprint and orientation, and the requirement to minimise overshadowing of the Paul Keating Park. The core of the building is located to the east of the floor plate.

The project has an extensive external shading system provided on all façade excepts the terrace areas, ground floor retail facades and to a lesser extent the south facade. Based on collaborative design evaluation between Umow Lai, Inhabit and Lyons, the shading system has been optimised so that solar loads are minimised across the façade. The external shading scheme consists of horizontal banded shading blades across the north façade, vertical shades blades to the east and diagonal sloped shading fins to the west. The south facing façade features minimal shading protrusion due to limited direct solar gains on this façade. Glazing will be high performance low-E double glazing with excellent solar control and daylight transmission properties.

Massing of the building has been designed to daylight access deep into the floor plate with terraces providing important occupant amenity access.

The overall arrangement provides the building with low façade loads allowing highly efficient energy systems to be used to maintain occupant comfort.

5.2.1 Building Fabric

In order to reduce the energy consumption associated with active heating and cooling systems, the development will incorporate sufficient levels of insulation to provide a high performing building fabric.

A high performing building fabric is relevant for a University development in Sydney's climate. Space conditioning will occur for extended hours through the day (to varying extent throughout the building). A building fabric which meets and/or exceeds minimum NCC requirements can significantly decrease the heating and cooling energy consumption associated with the facility.



The levels of insulation to be incorporated within the building fabric should be selected to meet or exceed the requirements of the NCC Section J. Typically, these are recommended to be as follows:

Table 2 Building Fabric Insulation Performance

Building Fabric Component	Recommended Insulation Level (Total System R-value)
Exposed Ceilings/Roof	R4.2
Exposed Exterior Walls	R2.8
Exposed Suspended Floors	R2.0
Walls between conditioned and unconditioned spaces	R1.8
Floors between conditioned and unconditioned spaces	R1.0

5.2.2 Preliminary Glazing Performance

The current architectural proposal includes large areas of vision glazing, which will require high performance façade systems to meet the overall project requirements.

In order to optimize the building façade performance Umow Lai have proposed different options with different glazing configurations, external shade design options and electrochromic glazing. The results of all such options were presented in the separate Façade ESD Options Report.

The preliminary minimum glazing performance properties proposed are as follows:

Table 3 Proposed Glazing Performance

Parameter	Retail Facades	Main Tower Facade
Total System U-value	4.5 W/m ² K (SGU) 5.5 W/m ² K (SGU Louvres)	3.0 W/m ² K (shading) 3.5 W/m ² K (no shading)
Total System SHGC	0.62	0.23
Glass Only U-value	3.5 W/m ² K	1.6 W/m ² K
Visual Light Transmission	42%	42%

5.2.3 Air-tightness

Air-tightness of the building envelope contributes significantly towards overall energy efficiency. The building will be pressure tested during construction as part of the Green Star DAB v1.2 building commissioning requirement (see Section 5.3.1).

Umow Lai have set a target air leakage rate of 5m³/hr.@50Pa, which is considered 'normal' practice for an air conditioned office type building in the UK (refer ATTMA TSL2 Issue 1). The required methodology for whole of building air pressure testing and this performance requirement be written into the construction contract.



5.3 MANAGEMENT STRATEGIES

It is expected that the majority of the Green Star Management credits will be targeted by the project. Significant emphasis will be placed on commissioning activities, building tuning and the management of the site during construction. Comprehensive metering will be investigated to provide facility management with sufficient information to operate BCCD efficiently.

5.3.1 Commissioning

Comprehensive building pre-commissioning, commissioning and quality monitoring will be required by the appropriate contractors and trades on site.

Note that it is now a requirement of Green Star Design and As Built v1.2 that whole building air pressure testing must be conducted as part of the commissioning process. This will require the engagement of a specialist air pressure testing contractor to advise the head contractor on air leakage minimisation during construction and to conduct the final air pressure testing. Architectural detailing will also need to take account of the requirement for the building to deliver a high degree of air tightness.

Transfer of all documentation regarding design intent, as-installed details, commissioning report and training of building management staff to the Building Owner/Manager.

To ensure the optimum energy performance of the building, an Independent Commissioning Agent (ICA) should be engaged to provide advice to the client and to the design team to monitor and verify the commissioning of the HVAC and building control systems. Umow Lai have provided an ICA scope to assist with engagement.

The installing Contractors will be committed to a 12 month building tuning period after handover, including minimum quarterly reviews and final recommissioning after 12 months. This will require the installation of a comprehensive energy monitoring system in the BMS.

In addition to the requirements of the Green Star manual we would propose that the Contractor undertakes an intense initial fine tuning commissioning phase during the first quarter with formal monthly reporting of energy performance across the defects liability period.

5.3.2 Building Users Guide

To enable the building users to achieve the environmental performance envisaged by the design team, a comprehensive Building Users Guide will be prepared for use by the tenants and building management.

5.3.3 Construction Management

In order to minimise environmental impact during construction, the Contractor will be required to provide and implement a comprehensive, site-specific Environmental Management Plan (EMP) during the construction works.

In addition, the Contractor will be required to have ISO14001 Environmental Management System accreditation applicable to the construction of the building.

5.3.4 Metering

Metering and sub-metering shall be provided in accordance with Green Star and tenancy requirements, where applicable. Should a future NABERS Energy rating be required for part of the building, then additional electrical and thermal metering would be required to differentiate those areas covered by the rating.



A comprehensive energy monitoring system will be required to fulfil the requirements for Green Star commissioning and building tuning credits.

5.4 INDOOR ENVIRONMENT QUALITY

The design response will provide for high levels of indoor environment quality through the provision of daylight and views, well-designed artificial lighting systems and consideration of thermal comfort.

Emissions of pollutants from internal finishes and furniture will be reduced through the broad application of low VOC and low formaldehyde products.

5.4.1 Indoor Air Quality

The indoor air quality (IAQ) in BCCD will be continuously monitored by a carbon dioxide (CO₂) monitoring system which will be used to adjust the outside air ventilation rates being provided to the space to ensure a high level of IAQ.

A fan coil system with high induction air diffusion will be designed to achieve a high air change effectiveness for improved IAQ.

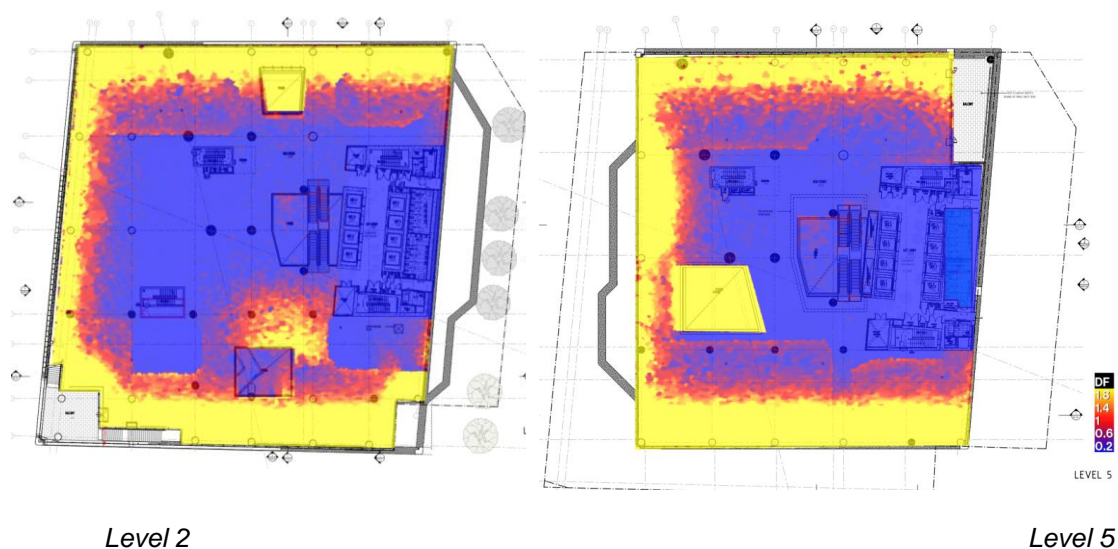
High efficiency air filtration shall be provided to all air handling units to further enhance IAQ

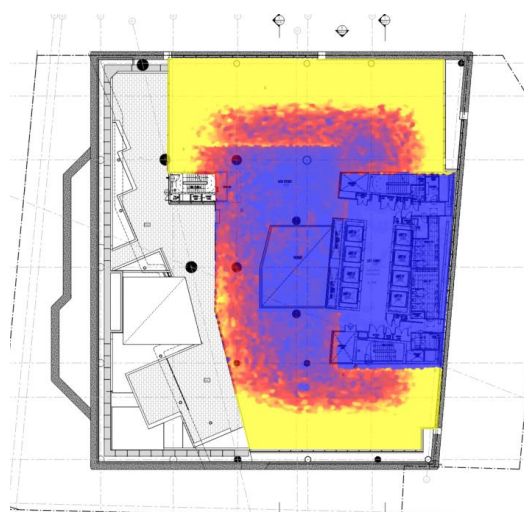
5.4.2 Daylight

The external glazed façade has been designed to provide excellent daylight levels across the floor plate while also providing good energy efficiency. Advanced glazing technology with spectrally selective coatings allows reasonably high levels of visible daylight to transmit through the windows while rejecting a high proportion of solar radiation. This combined with external shading provides an excellent balance between daylight, views, glare control and energy efficiency.

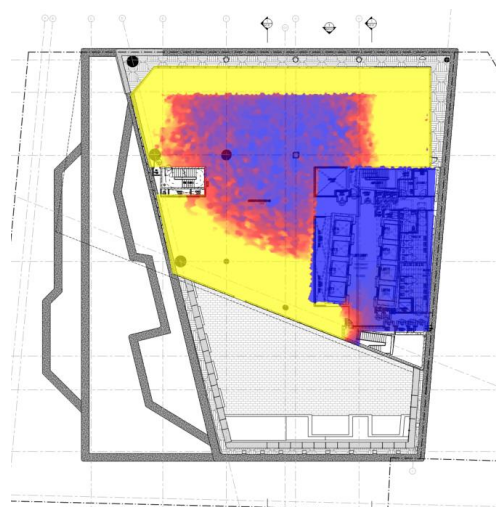
The following image shows preliminary daylight modelling conducted for 'typical' levels 2, 5, 7, and 14. The areas shown in green are where the Daylight Factor is equal or greater than 2%

Figure 1 Typical Floors Daylight Factor $\geq 2\%$





Level 8



Level 14

Table 1 Sample Floor Daylight Modelling Results

Level	L2	L5	L8	L14
Floor Area (m ²)	2506.3	1679.4	921.3	770.8
Area DF>2.0% (m ²)	750.1	579.52	485.2	419.2
% Compliant	30%	35%	53%	54%

When area-weighted across the whole building, these results show that greater than 40% of the total floor area receives a Daylight Factor equal or greater than 2%, which achieves 1 point for the relevant Green Star credit.

5.4.3 Lighting

The building interior lighting will be carefully designed to optimise occupant comfort. High quality LED light fixtures will be specified for their energy efficiency, high colour rendering index (CRI) and long life span when compared to alternative technologies.

The use of indirect/direct lighting for the office areas will be considered, with the base building office lighting designed for a maintained illuminance level of no more than an average of 320 lux as measured at the working plane.

Perimeter daylight dimming and occupancy sensor control will assist in maintaining lighting levels efficiently.

5.4.4 Thermal Comfort

The high performance façade system in conjunction with the air conditioning systems will be designed to ensure high thermal comfort conditions leading to greater occupant satisfaction and improved productivity.



Predicted Mean Vote calculations will be carried out to ensure radiant and convective climate effects are properly considered for all occupants over the entire floor plate to ensure perimeter and core zone comfort is maintained through correct shading and air conditioning zoning.

During the next design phase, more detailed thermal modelling of the building will be undertaken to calculate the comfort performance of the building in accordance with ISO7730.

5.4.5 Noise

Detailed design will be performed to ensure that the building services achieves ambient internal noise levels in accordance with AS/NZS 2107:2000, to ensure comfort of the building occupants. Compliance with the Green Star acoustic credits will require acoustic testing by registered professionals. This acoustic testing will be undertaken by a specialist sub-contractor to be appointed by the Contractor.

5.4.6 Minimisation of Internal Air Pollutants

The materials used in the construction of the building will be specifically selected to minimise off-gassing of Volatile Organic Compounds (VOC) and Formaldehyde, which can negatively impact IAQ.

- All paints used in the construction will be zero-VOC paints
- Carpets will be specially selected to be low-VOC
- It is proposed that only low formaldehyde composite wood products will be utilised
- A dedicated tenants' exhaust riser will be installed as part of the base building in accordance with AS1668 Part 2. Reticulation from this riser to tenants photocopying/printing areas will be undertaken as part of the fitout for extraction of contaminants from the building. Note that this exhaust extraction will not be required where complying low emissions photocopying/printing equipment is installed in the tenancy.

5.5 ENERGY EFFICIENCY

Energy efficiency design approach begins with a high performance façade to reduce the overall energy requirements of the building. This allows simpler services systems to be used utilising well understood systems and design approaches.

The demands minimised through a high-performance façade will be met with mechanical services designed for energy efficient performance. Conventional and well understood air delivery systems will be applied, with highly efficient fans and equipment (e.g. chillers & boilers).

Energy consumption associated with artificial lighting systems will be minimised through high performance (e.g. LED) fittings and effective lighting controls including daylight dimming and localised presence detection.

Improvement in energy efficiency will form a primary strategy to assist in achieving the 5-Star Green Star DAB v1.3 Energy performance.

5.5.1 Building Fabric

The building façade has been designed for energy efficiency as described in Section 5.2 of this report.



5.5.2 Energy Efficient Air Conditioning Design

The initial concept design included a low temperature variable air volume (VAV) system. In order to reduce plant space throughout the building, this has been changed to an in-ceiling fan coil solution.

Traditionally VAV systems are more energy efficient than in-ceiling fan coils due to their ability to reduce fan speed when peak air supply is not required (the majority of the time).

NDY have included a number of energy efficiency measures into the fan coil system design following consultation with Umow Lai:

- Variable speed EC fans controlled by space load demand and occupancy.
- Demand control ventilation controlled by carbon dioxide (CO₂) monitoring system.

In addition, the air conditioning system will include the following features:

- Electric motors will be high efficiency.
- High efficiency water-cooled chillers will be selected.
- High efficiency condensing gas boilers will be selected.
- High efficiency variable speed pumping systems for the chilled water and heating hot water systems.
- Plant energy use will be monitored and optimised using the Building Management System.

5.5.3 Electrical Design Initiatives

LED lighting will be specified for energy efficiency performance. Dimmable control will also be provided to light fittings with daylight sensors along perimeter areas to allow for daylight compensation control. Initial daylight simulations indicate that these daylight areas will extend well into the floor plate – see Section 5.4.2.

All substantive energy uses within the building will be sub-metered and in addition, sub metering will be provided for each floor and tenancy. This will be linked through an energy monitoring system to allow trending of energy uses daily, weekly and annually. The data collected will be provided in the correct format as required for the Green Star DAB v1.3 rating.

The base building lighting system design will be configured with controls to minimise the extent of lighting of unoccupied areas. Design measures include:

- All individual or enclosed spaces to have individual switches and motion sensors.
- The size of individually switched lighting zones will not exceed 100m² for 95% of NLA.
- Switching will be clearly labelled and easily accessible by building occupants.
- Car parks, toilets and escape stairs to allow the provision of high sensitivity ultrasonic occupancy sensors to ensure that switching off of lights can be employed.



5.5.4 Renewable Energy – Solar PV

The cost of renewable energy systems such as Solar PV have fallen dramatically in recent years while the costs for grid electricity has risen significantly. While trends such as off-site renewable energy Power Purchase Agreements (PPA's) become popular in tertiary education, this does not avoid the cost of network charges or renewable firming capacity. Therefore on-site renewable energy remains a very attractive proposition and is also strongly rewarded within the Green Star rating. (Green Star benefits of PPAs are lower than those for site-installed PV).

The use of on-site Solar PV arrays to generate energy is an effective and cost competitive solution to hedge institutions against long term energy costs and fluctuations. It is therefore proposed that most of the roof area will contain Solar Photovoltaic panels to provide renewable energy supply into the building.

Preliminary analysis has been undertaken to determine the maximum solar coverage that can be achieved on the available roof area. This will be reduced due to the requirement for some roof mounted mechanical plant an associated access, and the precise system capacity is still under development by the design team.

At this stage of the design we anticipate that an array size of up to 40 kW will be achievable on the reduced roof area, with an annual energy yield of approximately 54,000 kWh.

5.5.5 Preliminary Energy Modelling

Preliminary energy modelling has been undertaken incorporating the energy efficiency measures of the NCC 2019 building envelope, building systems, and solar PV as described in this report.

Figure 2 Whole Building Energy Model

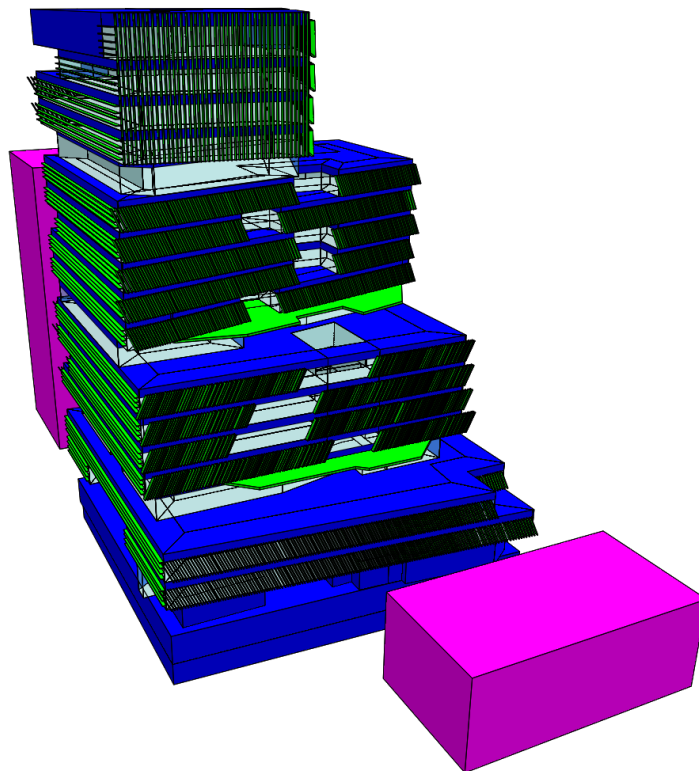


Table 2 Green Star Energy Modelling Assumptions

Parameter	Preliminary Assumption
Building Envelope	As per section 3.2 High performance glazing and air-tight
Heating, Ventilation, Air-conditioning	Condensing gas boilers (95% eff.) Water-cooled chiller (IPLV 7.5) FCU's including variable speed and CO2 demand control ventilation Ventilation fan energy 90% of Section J 2019 max. Carpark fan energy 70% of Section J 2019 max.
Lighting	Lighting energy 65% of Section J 2019 max.
Domestic Hot Water	Proposed usage 60% of reference case
Vertical Transport	8 kWh/m2
Solar PV	40kW = 54,000kWh/year

This results in the following preliminary and target Green Star Energy points scores that will be further refined as the project progresses.

Table 3 Preliminary Green Star Energy Results

Category	Minimum Points	Maximum Points
Façade Reduction	3.0	3.1
GHG Emission Reduction	2.7	3.0
Renewable Energy	0.0	0.0
Peak Energy Demand	1.3	1.7

Note that the renewable energy component in Green Star DAB v1.3 has changed so that the Solar PV must contribute at least 15% of the total energy consumption before a point can be awarded. Previously the extent of Solar PV proposed was able to achieve more than 1 point in Green Star DAB v1.2.

5.6 TRANSPORT

The site's location provides significant benefit for public transport access. Cyclist facilities will also need to be provided to meet Green Star and planning requirements, including comprehensive End-of-Trip facilities for staff. The provision of more sustainable forms of transport will reduce the usage rates of car parking on site.

The performance based approach in Green Star is proposed for the Green Star transport category. Detailed analysis of sustainable transport performance will be required to be undertaken by the project Transport Consultant to compare the building to a reference project.

5.6.1 Car Parking

A comprehensive performance based transport study has been undertaken to assess sustainable modes of transport for the project. This has influenced car parking numbers and types while also exploring alternatives to traditional car based transport for building occupants.



The infrastructure serving the car park areas also makes provision for the anticipated dramatic transformation vehicle fleets over the coming decade through the wider adoption of Electric Vehicle (EV). In particular, the electrical infrastructure within the building has been designed to support the charging of electric vehicles. Specific destination charging locations will be able to be rolled out as the proportion of electric vehicles increases, without any negative impacts on the building infrastructure.

5.6.2 Cyclist Facilities

A substantial cyclist facility will be provided to encourage occupants to cycle to work located for easy access into the building.

Facilities will include secure tenant bicycle storage, showers, secure lockers, changing and drying facilities.

The sustainable transport study has incorporated provisions in the design for cycle racks and end of trip facilities as follows:

Table 4 Green Star Cyclist and End of Trip Facilities

Facilities	Benchmark Requirement
WSU Staff Secure Bike Racks	54 Cycle racks ~7.5% of Staff Occupants for 750 Total Persons
WSU Students Secure Bike Racks	98 Cycle Racks within the Public Realm
Visitor Secure Bike Racks	6 Visitor Racks in the Basement
Showers for staff only	10 Showers
Lockers for Staff	68 Lockers (>1.2 locker/staff bike rack)

As the project is pursuing a performance based approach, it is understood that cyclist facilities for the building will meet the Green Star requirements.

5.7 WATER EFFICIENCY

Water efficiency will be given a high-priority given the significant demands likely of a large building of this nature.

Water efficiency will be assisted through the use of rainwater harvesting to the extent available from the building footprint. This non-potable water resource is a potential source to be used for toilet flushing, irrigation and to potentially supplement heat rejection demands. However given the ratio of building footprint to area, rainwater may be limited in its impact.

Measures employed include:

- The use of water efficient (generally 5 Star rated where possible) fittings for basin, pans, sinks, urinals and showers.
- 45kL rainwater collection tank with harvested water used for toilet flushing throughout the building, irrigation and potentially heat rejection (cooling towers).
- Any landscaping will be designed to be water sensitive.
- Water meters will be installed for all major water uses. These will be linked to the Building Management System to provide a leak detection system.



- Collection or recirculation of all fire protection system test water and maintenance drain-downs for reuse on-site.

5.8 MATERIALS

Responsibly sourced materials including steel, timber and PVC, will be applied extensively. Life Cycle Analysis can be applied to assist in materials selection but is not proposed at this stage. Some areas of sustainable materials use such as Portland cement replacement in concrete are not recommended at this stage due to the potential impact on project cost and program.

5.8.1 Recycling Waste Storage

A dedicated storage area will be provided for the separation, collection, and recycling of consumables with access for all building occupants and for collection by recycling companies. The storage area shall be adequately sized to allow for recycling of, as a minimum, paper, glass, plastics, metals, and organic (compost) materials. The current size of the recycling facility has been determined by a waste consultant engaged as part of the consultant team.

5.8.2 Waste Reduction

In order to reduce waste, consideration will be given to selecting materials to be used in the building construction and refurbishment to have a significant recycled content and that utilise Environmental Management Systems in the manufacture.

5.8.3 Steel

The responsible sourcing of steel for use in reinforcement is proposed in accordance with Green Star requirements.

5.9 LAND USE ECOLOGY AND EMISSIONS

5.9.1 Sustainable Sites

Roof treatments (other than PV) will be carefully considered to minimise impacts of the heat island effect. Roofing materials with high albedo will be investigated.

Stormwater runoff will be mitigated in terms of run-off volumes and quality of the water discharged to the municipal stormwater system.

5.9.2 Stormwater Management

The quality and quantity of stormwater released from this site post development is a significant factor for consideration both within the town planning and sustainability contexts.

The following performance objectives should be demonstrated within the new development:

- Reduction in the impact of stormwater run-off.
 - Improvement in water quality of stormwater run-off.
 - Achievement of best practice stormwater quality outcomes.
 - Incorporating water sensitive urban design principles where possible.
- The project design will include measures to mitigate the impact of litter, sediments and pollution entering stormwater systems and downstream waterways. Detailed information on proposed maintenance and site management plans will need to be provided as the design progresses.



5.10 EMISSIONS

5.10.1 Refrigerants

The design will include the use of refrigerants in HVAC systems which have an Ozone Depletion Potential (ODP) of zero.

5.10.2 Light Pollution

The design will endeavour to minimise light pollution in that no direct beam light will be directed beyond the site boundaries or upwards to the night sky.

5.10.3 Watercourse Pollution and Reduced Flow to Sewer

Rainwater harvesting systems will be designed to provide on-site detention and filtration of stormwater leaving site, and the potable water conservation strategies will also have a secondary benefit of reducing waste water produced by the building.

5.10.4 Insulant ODP

The design will specify thermal insulation which avoids the use of ozone depleting substances in either manufacture or composition.

5.11 INNOVATION

The expansion of the Innovation category within the Green Star DAB tool will be exploited to achieve a the maximum number of innovation points. Innovation initiatives will be further investigated, such as exceeding Green Star benchmarks, local procurement, financial transparency, market transformation, contractor education and the undertaking of a pre and post occupancy survey.



6 CONCLUSION

This report has demonstrates meets the Bankstown City Campus development meets the SSDA submission SEARS requirements. These are in addition to the minimum compliance requirements of the NCC 2019 (i.e. Section J).

As a result of the ESD initiatives discussed within this report, the Bankstown City Campus development is expected to achieve a level of environmental sustainability consistent with the SEARs requirements.

The sustainability measures implemented in the design aim to ensure that the development has enhanced energy efficiency, thus minimising the associated greenhouse gas emissions. Potable water use will be minimised through water conservation measures, including Water Sensitive Urban Design initiatives. The project also includes measures to minimises waste going to landfill through the construction and operational stages, while increasing the rate of material reuse and recycling.

As detailed in this ESD Statement, the Bankstown City Campus development has demonstrated the design potential to achieve the SSDA submission SEARS requirements.



APPENDIX A - PRELIMINARY GREEN STAR ANALYSIS

The tables across the following pages shows the preliminary Green Star Office Design and As Built Version 1.3 assessment for the Bankstown City Campus Development Project. The individual credits shown are indicative and may change in the final design, however the overall rating target of 5 stars would still be achieved.

The preliminary credit scores are provided in the two far right columns the first being the current points targeted and the second being potential additional points possible with the project design.

This analysis shows that the proposed design would comfortably be able to achieve the

required 5 Star Green Star ratings (minimum 60 points required) with numerous additional points also available.

The Green Star Design and As Built Version 1.3 rating is a combined design and as built rating with formal certification only being awarded at the conclusion of the as-built stage.



Green Star - Design & As Built Pathway v1.3

Rev K

13/08/2020

Project: WSU Bankstown City Campus GS4415DA												Previous Points Targeted	Current Points Targeted	Stretch Points TBC
Targeted Rating: 5 Star - Australian Excellence												67.7	65	Extra 16.9 Total 81.9
Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC		
MANAGEMENT														
Green Star Accredited Professional (GSAP)	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	Man-1.1	Accredited Professional	GSAP contractually engaged to provide advice, support and information related to Green Star principles, structure, timing and processes at all stages of the project leading to certification. GSAP is required to undertake at least one Green Star workshop with the project team and meeting minutes must sufficiently demonstrate GSAP involvement.	Umwow Lai proposed to provide the GSAP role.	Contract	Umwow Lai	WSU/AP	1	1	1	0		
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	Man-2.0	Environmental Modelled Targets	Environmental performance targets must be set and documented for the project through the development of a Design Intent Report or an Owner's Project Requirements report. These documents must outline; a) Description of the basic functions/operations/maintenance of the nominated building systems; b) Targets for the project energy & water consumption, and budgets for all nominated systems; c) Description of how energy, water and aspects of indoor environment quality are metered and monitored.	Design Intent Report will be prepared to document the design intent and the energy/water/IEQ targets for the project.	Other Documents	Umwow Lai / ICA	WSU/AP	-	Complies	Complies	-		
		Man-2.1	Services and Maintainability Review	A comprehensive 'Services and Maintainability Review' must be conducted during design stage and prior to construction. This can be conducted by the Head Contractor (where applicable), an Owner's Representative (e.g. FM sub-contractor) or the ICA (where applicable). The design review must address the following for all nominated building systems; commissionability, controllability, maintainability, operability (fitness for purpose) and safety.	Services & maintainability Review to be completed by the project's ICA. Umwow Lai and WSU/JS to suggest ICA's to be engaged before SD.	Other Documents	WSU/AP	Umwow Lai	1	1	1	0		
		Man-2.2	Building Commissioning	Pre-commissioning & commissioning must be undertaken to CIBSE, ASHRAE and/or AIRAH standards/guidelines. The commissioning process must generate key documents a) Commissioning Specification, b) Commissioning Plan and c) Commissioning Report. The Commissioning Specification must list the commissioning requirements for each system, not simply reference compliance "to the relevant standard". The Commissioning Report is a summary of the commissioning undertaken and that all documents were adhered to and the nominated systems have been commissioned. AIR TIGHTNESS (PERMEABILITY) IS NOW A REQUIREMENT OF THIS CREDIT	This represents standard practice on Green Star projects. Services specifications will include compliant specification sections which satisfy the Green Star requirements. Note that this credit will require façade air leakage tests, but this will probably be required for spaces in any case.	Specification	Umwow Lai	WSU/AP	1	1	1	0		
		Man-2.3	Building Systems Tuning	A 12 month building tuning period is required to be implemented with a minimum of quarterly reviews and tuning, inclusive of analysis of data from the monitoring systems and assessment of feedback from occupants. Specific documentation/actions required are; a) O&M Manuals developed and provided to building owner; b) a Building Tuning Plan is developed; c) a Building Tuning Team is formed.	This is a readily achievable credit which provides measurable benefit to building owner	Specification	Umwow Lai	WSU/AP	1	1	1	0		
		Man-2.4	Independent Commissioning Agent	An ICA must be appointed from design stage and one of the above points targeted. The ICA must advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning and tuning phases. ICA must satisfy Green Star qualifications & experience requirements.	WSU have engaged an ICA	Contract	WSU/AP	Umwow Lai	1	1	1	0		
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	Man-3.1	Implementation of a Climate Adaptation Plan	Undertake the development of a Climate Adaptation Plan in accordance with recognised standards. A minimum of two risk items identified within the CAP are addressed by specific design responses.	A draft Climate Adaptation Plan has been issued by Umwow Lai and a Climate Adaptation workshop held. Project team members to comment on proposed mitigation measures included in the conclusion that need to be incorporated into the design.	Report	Umwow Lai	WSU/AP	2	2	2	0		
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	Man-4.1	Building Operations and Maintenance Information	Two key documents must be generated; a) Best-practice 'Operations and Maintenance Information' package must be developed. This must extend beyond the standard O&M Manual provisions and must satisfy Green Star content requirements, inclusive of sustainability and performance metrics; b) A 'Building Log Book' must be developed in accordance with CIBSE TM31. Intent is to provide a central point of information for those managing the facility, to be used for training and an induction document for staff/contractors.	This is considered a highly attainable credit with minimal cost impact to the project. This leverages from documents that the industry is familiar with.	Specification Log Book O&M	Umwow Lai	WSU/AP	1	1	1	0		
		Man-4.2	Building User Information	A Building User Information package must be developed for the building and its content must be appropriate for the occupants ("day to day users"). Specific Green Star content requirements must be satisfied. A key requirement is that the BUI is communicated digitally such as digital signage, interactive information kiosks, websites, apps or mobile devices etc written for the building tenants. ONLY ONE POINT FOR THIS CREDIT IN THIS VERSION	This is considered a highly attainable credit with minimal cost impact to the project. It is likely the digital communication systems for both main users will exist regardless of this credit. Credit will just require the development of the content. Umwow Lai propose to be integrated into Sustainability Information Display or WSU/JS Website.	Report	Umwow Lai	WSU/AP	-					
Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	Man-5.1	Environmental Building Reporting	80% of the GFA must be covered by a performance agreement with at least 2 environmental metrics (emissions, energy, water, waste or IEQ).	This is very attainable where there is an internal management plan for reviewing energy & water performance.	Performance Agreement	WSU/AP	Umwow Lai	1	1	1	0		
		Man-5.2	End of Life Waste Management	80% of the GFA must be covered by a formal commitment to by the owner to extend the life of finishes to all common areas to at least 10 years (barring minor wear & tear).	To be discussed with Lyons and Client regarding longevity of proposed development	-	-	-	1	0	0	1		
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	Man-6.0	Metering Strategy	MANDATORY CREDIT REQUIREMENT: Accessible metering to be provided to monitor building energy & water consumption, including all common & major uses (Base Building). Metering shall be provided to allow for monitoring of relevant areas or functional space types. In most cases, floor-by-floor metering will suffice, however if a floor comprises separate space types, each shall be metered separately. Each tenancy shall be provided with sub-metering (NB - Authority Meters will meet this as they are required per tenancy). All sub-meters shall meet NABERS requirements pertaining to accuracy and be located in areas that allow regular monitoring & maintenance.	This is a highly attainable credit and is standard practice on Green Star projects.	Design	Electrical / NDY Mech	WSU/AP	-	Complies	Complies	-		



Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC
		Man-6.1	Monitoring Strategy	Two key requirements must be met: a) A sub-meter monitoring strategy must be developed in accordance with a recognised standard (CIBSE TM 39), and shall provide a metering schedule which identifies location, type of meter & resource, end-use demand, and estimated energy consumption. b) Sub-meters must be connected to an automated system capable of capturing and processing sub-meter data, and shall have the functionality to produce reports, alter owner/FM to missing data or meter failures, alarms when use increases beyond defined thresholds, and other functionality to provide a useful monitoring system. c) MUST MEET THE METERING INTEGRITY REQUIREMENTS OF GREEN STAR d) PROVIDE A DETAILED PROCESS ON HOW TO DEAL WITH FAULTS LOCATED IN AN ACCESSIBLE LOCATION	This is a highly attainable credit and is standard practice on Green Star projects.	Design	Electrical / NDY Mech	WSU/AP	1	1	1	0
Responsible Construction Practices	To reward projects that use best practice formal environmental management procedures during construction.	Man-7.0	Environmental Management Plan	MANDATORY CREDIT REQUIREMENT: A project specific Environmental Management Plan (EMP) is required to be prepared and must be compliant with best practice guidelines such as the NSW Environmental Management System Guidelines. All sub-contractors are required to adhere to the requirements of the EMP. Scope of EMP shall meet Green Star minimum requirements.	This is a highly attainable credit and is standard practice on Green Star projects. A reputable Head Contractor should have this locked away from past projects.	Specification	WSU/AP	Umow Lai	-	Complies	Complies	-
		Man-7.1	Formalised Environmental Management System	Formalised Environmental Management System must be implemented on site and must have been certified by a third-party organisation which provides independent verification of system compliance. EMS must be certified to ISO14001, BS 7750 or European Community EMAS. Certification to these standards must be valid before and throughout construction and all sub-contractors are required to adhere to the requirements of the EMP.	This is a highly attainable credit and is standard practice on Green Star projects.	Specification	WSU/AP	Umow Lai	1	1	1	0
		Man-7.2	High Quality Staff Support	1 point is available where high quality staff support practices are in place that: <input type="checkbox"/> Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site. To comply with this requirement programs and policies beyond OH&S to promote health and Wellbeing on-site for both physical and mental health outcomes; and <input type="checkbox"/> Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs. Training for at least three days on site provide through one or more of: On-site training, such as by including the items above as part of site induction practices. <input type="checkbox"/> Off-site training, such as by providing sustainability training to site workers via a TAFE or similar program within the last 3 years . <input type="checkbox"/> Online training, such as by a third party service that can provide training on sustainability topics and track personnel who have taken the relevant materials within the last three years.	At least three distinct issues, with one of those specifically addressing mental health impacts, must be addressed. Issues that may be considered include: <input type="checkbox"/> healthier eating and active living <input type="checkbox"/> reduced harmful alcohol and drug and tobacco-free living <input type="checkbox"/> increase social cohesion, community, and cultural participation <input type="checkbox"/> understanding depression <input type="checkbox"/> preventing violence and injury <input type="checkbox"/> suicide prevention <input type="checkbox"/> decrease psychological distress	Specification Contractor Training	WSU/AP	Umow Lai	1	1	1	0
Operational Waste	To recognise projects that implement waste management plans that facilitate the re-use, upcycling, or conversion of waste into energy and stewardship of items to reduce the quantity of outgoing waste.	Man-8.1	Waste in Operations	An Operational Waste Management Plan (WMP) shall be developed by a qualified professional, in accordance with best practice guidelines (e.g. City of Sydney Policy for Waste Minimisation in New Developments). The WMP scope must meet minimum Green Star requirements. Waste Auditor professional shall meet Green Star minimum qualifications & experience requirements. RECYCLING TO BE COLLECTED BY BUILDING'S WASTE SERVICE. COMINGLED RECYCLING IS PERMISSIBLE TO THE EXTENT THAT IT IS ACCPETED BY THE WASTE COLLECTION SERVICE	This is a highly attainable credit and is standard practice on Green Star projects. It requires 10L/100sqm/day of storage for general waste and the same for recycling. Base on the envisaged collection interval for waste this drive the recycling and waste storage area sizes.	Design	Elephants Foot	WSU/AP	1	1	1	0
									14	13	13	1

INDOOR ENVIRONMENT QUALITY

Quality of Indoor Air	To recognise projects that provide high air quality to occupants.	IEQ-9.1	Ventilation System Attributes	Three requirements are to be met: a) Mechanical services to be designed in accordance with ASHRAE Standard 62.1:2013 with regards to separation distances between OA intakes and pollution sources) such that the entry of outdoor pollutants is mitigated; b) Mechanical services shall be designed for ease of maintenance and cleaning with adequate access provided to both sides of moisture or debris generating (i.e. coils & filters) components within the air distribution system; c) Prior to occupation, all new and existing ductwork is cleaned in accordance with recognised standards.	ASHRAE 62.1:2013 has been reviewed by Umow Lai and confirmed that requirements should be able to be met. Problematic areas may be lower level retail/café spaces. To be resolved further in Detailed Design.	Design	NDY Mech	Umow Lai	1	1	1	0
		IEQ-9.2	Provision of Outside Air	1 point awarded for 50% above AS1668.2 For mechanically ventilated spaces, 2 point is awarded where; a) Outdoor air is provided at a rate 100% greater than the minimum required by AS1668.2:2012 or ASHRAE 62.1:2003 OR b) CO2 concentrations are maintained below 700ppm with CO2 sensors located within each enclosed space or as regularly as temperature sensors, or monitor an area no greater than 500m2.	The class of building may make this difficult to achieve as occupancy levels are high.	Design	NDY Mech	Umow Lai	2	0	0	2
		IEQ-9.3	Exhaust or Elimination of Pollutants	Credit criteria is achieved where one or any combination of the following are achieved; a) Removing the source of the pollutants - Print/photocopy/ cooking equipment/vehicle exhausts are compliant with ECMA-328, RAL-UZ 171 or GGPS.003 emissions standards or are not present within the Nominated Area; b) Exhausting pollutants directly to outside where they exist in accordance with a recognised standards; c) Printing and photocopy equipment is enclosed in a dedicated area and exhausted directly to outside or to a dedicated exhaust riser. d) Cooking process and equipment - All kitchens are ventilated in accordance with AS1668.2-2012 and are separated from other areas. Kitchenettes with only simple reheat equipment are excluded from the scope. e) Vehicle exhausts - Spaces with vehicle exhausts are compliant with AS1668.2-2012.	Umow Lai considers this credit attainable. EMISSIONS STANDARD FOR REMOVAL OF POLLUTANTS AT SOURCE HAVE BEEN UPDATED IN THIS VERSION. Any print/copy centres WITH NON COMPLIANT EMISSIONS EQUIPMENT provided to common areas will need to be provided with dedicated exhaust system. For cafes/kitchens kitchen exhaust needs to be provided compliant with minimum AS1668. Cold-shell retail spaces to be provided with standard intake & exhaust louvres. Fit out of this spaces not included in scope of Green Star.	Design	NDY Mech	Umow Lai	1	1	1	0
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	IEQ-10.1	Internal Noise Levels	Internal ambient noise levels within the nominated area are no more than 5dB(A) above the satisfactory sound levels provided in Table 1 AS/NZS 2107:2016. Noise measurement must account for all internal and external noise sources . Noise measurement and documentation must be provided by a qualified acoustic consultant. Compliance demonstrated through measurement at commissioning/practical completion sampling 10% of spaces representative of the nominated area and space diversity. GFA<500sqm require 95% of spaces to be measured. Mixed mode building to be calculated as if Mechanical.	This credit has potential implications on the project, particularly the façade performance, the internal noise level credit will need to be evaluated by Acoustic.	Design	NDY Acoustic	Lyons/Inhabit	1	1	1	0
		IEQ-10.2	Reverberation	Reverberation time within dedicated teaching spaces must be in the lower range of 'Recommended Reverberation Time' provided in Table 1 of AS/NZ 2107:2016. 2016 VERSION OF STANDARD NOW REFERENCED	Suspended acoustic ceiling, acoustic plasterboard of coverings to provide reverberation times.	Design	NDY Acoustic /HDR	WSU/AP	1	1	1	0



Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC
		IEQ-10.3	Enclosed Spaces / Acoustic Separation	Noise transmission within enclosed spaces is addressed through the achievement of a weighted sound reduction index of at least Rw 45 fixed partitions without door or glazed without door and at least Rw 35 for all partitions containing a door, or suitable performance is achieved though measurement. Acoustic consultant can use their discretion on glazed partitions on whether 35 or 45 is used.	Acoustic will need to review this credit for implications but we expect it can be achieved.	Design	NDY Acoustic /HDR	WSU/AP	1	1	1	0
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	IEQ-11.0	Minimum Lighting Comfort	MANDATORY CREDIT REQUIREMENT: All lights within the nominated area are; a) Flicker-free through the application of Class A1 and/or A2 ballasts, high-frequency ballasts for fluorescent lamps or electronic ballasts in HID lamps; AND b) Accurately address the perception of colour in the space with a minimum CRI of 80.	Umwow Lai considers these requirements consistent with good practice and are achievable for the project.	Design	Specialist Lighting / NDY Elec	Lyons/HDR	-	Complies	Complies	-
		IEQ-11.1	General Illuminance and Glare Reduction	a) Maintained illuminance levels comply with best practice guidelines and glare is eliminated as demonstrated in accordance with three options 11.1.2A, 11.1.2B & 11.1.2C.	Umwow Lai considers these requirements consistent with good practice and are achievable for the project.	Design	NDY Elec	Lyons/HDR	1	1	1	0
		IEQ-11.3	Localised control	Occupants have the ability to control the lighting in their immediate environment. This includes turning the lights on and off and adjusting their light levels.	Umwow Lai considers these requirements consistent with good practice and are achievable for the project if Organic Response is adopted.	Design	NDY Elec	Lyons/HDR	1	0	0	1
		IEQ-11.2	Surface Illuminance	Within the nominated area, a combination of lighting and surfaces improve uniformity of lighting to give visual interest. Demonstration is via two compliance methods 11.2.A and 11.2.B.	<input type="checkbox"/> An average surface reflectance for ceilings of at least 0.75; and <input type="checkbox"/> A direct/indirect lighting system is present such that the ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane.	Design	Umwow Lai/ NDY Elec	Lyons	1	0	0	1
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	IEQ-12.0	Glare Reduction	MANDATORY CREDIT REQUIREMENT: Within the nominated area glare from sunlight is reduced through a combination of blinds, screens, fixed devices or other means. Glare reduction is to be demonstrated through methods 12.0A Fixed Shading Devices, 12.0B Blinds or Screens and/or 12.0C Daylight Glare Model.	This must be considered to be able to target other credits - on the basis of compliant blinds (VLT <5%) to be provided to all windows	Design	Lyons/HDR	Umwow Lai	-	Complies	Complies	-
		IEQ-12.1	Daylight	Up to 2 points are available where a percentage of the nominated area receives compliant levels of daylight during 80% of the nominated hours. Compliant daylight levels are considered a Daylight Factor (DF) of no less than 2.0% at Finished Floor Level under either a CIE overcast or CIE uniform sky; 1 point - 40% of nominated area 2 points - 60% of nominated area	Given the potential façade design, general depth and arrangement of floors and exclusion of corridors from nominated area, it is possible that 1 points can be achieved. Dependant on blinds credit	Design	Lyons/HDR	Umwow Lai	2	1	1	0
		IEQ-12.2	Views	60% of the nominated area has a clear line of sight to a high-quality internal view or an external view. All floor areas within 8m from a compliant window, atrium or view can be considered to meet this criterion.	Given the proposed façade design, general depth and arrangement of floors, it is highly likely that the 1 point can be achieved for external views.	Design	Lyons/HDR	Umwow Lai	1	1	0	0
		IEQ-13.1	Paints, adhesives, sealants and carpets	95% of all internally applied paints, adhesives, sealants and carpets meet stipulated VOC limits. http://new.gbca.org.au/product-certificationschemes/ .	This is a highly attainable credit and is standard practice on Green Star projects. NEW CERTIFICATION SCHEMES ADDED	Specification	Lyons/HDR	Umwow Lai	1	1	1	0
		IEQ-13.2	Engineered wood products	95% of all engineered wood products meet stipulated formaldehyde limits. http://new.gbca.org.au/product-certificationschemes/	This is a highly attainable credit and is standard practice on Green Star projects.	Specification	HDR	Umwow Lai	1	1	1	0
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	IEQ-14.1	Thermal Comfort	For 95% of the nominated area and 98% of occupied hours a high degree of thermal comfort is achieved: b) Prescriptive DTS thermal comfort criteria are satisfied (DB 20-24DegC, RH 40-60%, terminal velocity < 0.2m/s, turndown ability, zone size limitations, SHGC <0.3 and U-Total <3.0W/m2K) - 1 POINT ONLY. Residential Spaces (Class 2 NOT Class 3) An average NatHERS rating of 7 Stars (1 point) OR 8 Stars (2 points) or greater is achieved.	This needs to be reviewed against thermal comfort strategy to confirm if 1 or 2 points can be achieved. Previous modelling indicates 2 points is likely.	Design	Umwow Lai	NDY Mech	2	2	2	0
		IEQ-14.2	Advanced Thermal Comfort									
									17	12	11	4

ENERGY

Performance Pathway	15-E	Ene-15.0	Conditional Requirement: Performance Pathway	GREEN STAR CONDITIONAL REQUIREMENT: Minimum energy efficiency improvement required. Proposed Building performance is equal or better than the Benchmark Building which represents a 10% improvement upon the Reference Building (DTS Compliant). A minimum energy points score of 3 or 6 points, for 5 Star or 6 Star projects (respectively) is required.	Umwow Lai confirms the Conditional Requirement will be met - minimum 10% improvement from NCC DTS.	Design	Umwow Lai Lyons	NDY Mech	Base + 3 Points	Complies	Complies	-
		15-E	Greenhouse Gas Emissions	20 points in total are available through the Ene-15.D Modelled Performance Pathway; - Up to 4 points are awarded on a continuous sliding scale based on the improvement of the Proposed Building façade compared to a DTS compliant façade. 0% improvement (0 points) to 20% improvement (4 points maximum); - Up to 16 points are awarded based on the reduction of greenhouse gas emissions of the Proposed Building compared to the Benchmark Building. 0% emissions reduction (0 points) to 100% emissions reduction (16 points maximum)	Points targeted based on revised concept facade and services modelling undertaken. This assumes some improvements such as air tightness of at least 5 m3/hr@50Pa and VSD and CO2 control of fan coil units. A solar PV installation of approx 40kWp has also been agreed with NDY but tbc. The project has been registered to GS DAB v1.3 and it is assumed NCC2019 benchmarks will apply.	Design	Umwow Lai Lyons	NDY Mech	20	6.1	5.7	1
Peak Electricity Demand Reduction		Ene-16.1-B	Modelled Performance Pathway: Reference Building Pathway	Up to 2 points are available where it is demonstrated that the project's predicted peak electricity demand has been reduced below that of a Reference Building: <input type="checkbox"/> 20% : 1 point <input type="checkbox"/> 30%: 2 points	Umwow Lai note that points to be confirmed after modelling, but appears reachable based on proposed Solar PV.	Design	Umwow Lai Lyons	NDY Elec	2	1.6	1.3	0.4
									22	7.7	7	1.4

TRANSPORT

Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC
Sustainable Transport	Modelled Performance Pathway	Tra-17-A.1	Performance Modelled Pathway	Up to 10 points are available where the proposed transport solutions on the site decrease emissions from transport, decreases mental and social impacts of commuting and encourages healthier uptake of active transport options. Points are based on a holistic approach to reducing the impacts from transport where the Proposed Building performance is compared to Reference Building performance across the following indicators: - Emissions reduction; - Active mode encouragement; - Vehicle kilometres travelled reduction; - Walkable location Points are awarded by completing the Sustainability Impacts from Transport Calculator and required the development of a detailed Travel Plan. Any change between the Proposed and Reference scenarios must be supported with significant evidence base on building occupant surveys, evidence of staff living locations, evidence of staff commuter times, incentive programs related to use of public transport and working from home. REQUIREMENT TO BE COMPLETED BY TRAFFIC CONSULTANT .	Umwow Lai's preliminary assessment of the Sustainable Transport credit indicates that a higher number of points are available using the Performance Pathway. The Transport Consultant Arup have conducted a preliminary assessment that indicates that at least 6 points is achievable. Arup to confirm if higher points are achievable.	Consultant		Arup Traffic	10	10	10	0
									10	10	10	0

WATER

Potable Water	Modelled Performance Pathway	Wat-18-A	Potable Water - Modelled Pathway	Up to 12 points are available based the reduction in potable water consumption of the Proposed Building when compared to a Reference Building. This credit addresses potable water consumption from the use of sanitary fixtures, appliances, HVAC, irrigation systems and swimming pools. Compliance requirements and guidance for the modelled performance pathway is detailed in the Green Star Potable Water Calculator. WELS HAS BEEN ADJUSTED 4 STAR SHOWERS AND 6 STAR WC's (VACUUM) ARE NOW AVAILABLE	The major water consumption on the site will be associated with showers and toilets, irrigation and cooling. Preliminary water balance work indicates that the maximum number of points available to the project without any form of water recycling is 4 points. Current proposed hydraulic fittings, landscape areas and rainwater tank have been included in the Potable Water Calculator to achieve 5 points.	Design	NDY Hyd	Lyons	12	5	5	1
									12	5	5	1

MATERIALS

Life Cycle Impacts	Mat-19.A.1	Comparative Life Cycle Assessment	Up to 6 points are available where Whole-of-Building (WoB) and Whole-of-Life (cradle to grave) Life Cycle Assessment (LCA) is conducted for the Proposed Building and a Reference Building. Points are awarded based on the extent of environmental impact reduction achieved against six environmental impact categories when compared to the Reference Building. ENERGY CONTRIBUTION IS CAPPED AT 3 POINTS OUT OF POSSIBLE 6	Umwow Lai can conduct a compliant LCA review if required.	Cost Specification	ESD Consultant	Lyons / Bonacci	6	0	0	4
	Mat-19.A.2	Additional Life Cycle Impact Reporting	Up to 4 additional points are available where the LCA is used to inform the building's design process or as built outcome. Any combination of the below four initiatives may be targeted: <input type="checkbox"/> Additional life cycle impact reporting (Human Toxicity, Land Use, Resource Depletion - Water, Ionising Radiation, Particulate matter); <input type="checkbox"/> Material selection improvement; <input type="checkbox"/> Construction process improvement; or <input type="checkbox"/> LCA Design Review - Continuous design review: First Consideration CD, First Iteration, Subsequent iterations changes made reported to the design team, Minutes of design review meetings reflecting the intent of incorporation of LCA considerations..	Umwow Lai can conduct a compliant LCA review. ETool enables the output of additional impact categories such that the additional point is attainable.	Cost Specification	ESD Consultant	Lyons / Bonacci	4	0	0	1
	19.B.1.1	Portland Cement Reduction	Reduced use of Portland cement (1 point for 30%, 2 points for 40%) by mass.	Suggest target	Cost Specification	Bonacci	Lyons	2	0	0	1
	19.B.1.2	Water Reduction	0.5 point is available where the mix water for all concrete used in the project contains at least 50% captured or reclaimed water (measured across all concrete mixes in the project).	Suggest target	Cost Specification	Bonacci	Lyons	0.5	0	0	0.5
	19B.1.3	Aggregate Reduction	0.5 point is available where either: At least 40% of coarse aggregate in the concrete is crushed slag aggregate or another alternative materials (measured by mass across all concrete mixes in the project), provided that use of such materials does not increase the use of Portland cement by over five kilograms per cubic meter of concrete; OR At least 25% of fine aggregate (sand) inputs in the concrete are manufactured sand or other alternative materials (measured by mass across all concrete mixes in the project), provided that use of such materials does not increase the use of Portland cement by over five kilograms per cubic meter of concrete.	Highly challenging credit - not considered for 5-Star.	Cost Specification	Bonacci	Lyons	0.5	0	0	0
	19.B.2A/B	Steel	For steel framed buildings, 1 point is available for reducing the mass of steel framing compared to standard practice. For concrete framed buildings, 1 point is available when there is a reduction in the mass of steel reinforcement used when compared to standard practice.	Request Bonacci Advice	Cost Specification	Bonacci	Lyons	1	0	0	1
	19.B.3.1	Building Reuse - Façade Reuse	Reuse of the building façade (1 point for 50% by area, 2 points for 80%)	Highly challenging credit - not considered for 5-Star.	Cost Specification	Bonacci	Lyons	2	0	0	0
	19.B.3.2	Building Reuse - Structure Reuse	Retaining of the Structure (1 point for 30% by mass, 2 points for 60%).	Highly challenging credit - not considered for 5-Star.	Cost Specification	Bonacci	Lyons	2	0	0	0
Responsible Building Materials	19.B.4	Structural Timber	The minimum requirement is met where all structural timber used in the building is responsibly sourced. If the structural timber used represents less than 30% of the building's GFA, then the 'Life Cycle Impacts – Structural Timber' pathway (19B.4) cannot be targeted. FSC or PEFC certified. Up to 3 points are available where the building is constructed from the following proportion of structural timber: <input type="checkbox"/> 1 point for 30% of the building's GFA; <input type="checkbox"/> 2 points for 70% of the building's GFA; and <input type="checkbox"/> 3 points for 90% of the building's GFA.	Highly challenging credit - not considered for 5-Star.	Cost Specification	Bonacci	Lyons	3	0	0	0
	Mat-20.1	Responsible Steel Maker and Fabricator	1 point is awarded where; a) 95% of the building's steel is sourced from a Responsible Steel Maker (ISO14001 certified EMS for manufacturing facility AND the steelmaker is a member of the World Steel Association's Climate Action Programme); AND b1) For concrete framed building, at least 60% (by mass) of all reinforcing bar and mesh is produced using energy-reducing processes in its manufacture (measured by average mass by steel maker annually); OR b2) For steel-framed buildings, at least 60% of the fabricated structural steelwork is supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute (ASI).	Umwow Lai notes that the credit criteria utilise industry developed programs so should be attainable. It is likely that the credit criteria can be satisfied, however further clarification with the Bonaccineer.	Specification	WSU/AP Bonacci	Umwow Lai	1	1	1	0



Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC
		Mat-20.2	Timber	1 point is awarded where at least 95% (by cost) of all timber used in the building and construction works are certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification or is from a reused source.	Umow Lai notes that the criteria permits both FSC and PEFC certified timber products.	Specification	Bonacci Lyons	Umow Lai	1	1	1	0
		Mat-20.3	Cables, pipes, floors and blinds	1 point is awarded where 90% by cost of all cables, pipes, flooring and blinds in the project either; a) Do not contain PVC and have an Environmental Product Disclosure (EPD); OR b) Meet Best Practice Guidelines for PVC as per GBCA requirements.	The GBCA 'Best Practice PVC in the Built Environment' guidelines and response from industry has made this credit more attainable. Problematic areas may be blinds. Cables, conduits, pipes and flooring should be attainable.	Specification	Umow Lai Lyons	NDY Mech	1	1	1	0
Sustainable Products	To encourage sustainability and transparency in product specification.	Mat-21.1	Sustainable Products	Up to 3 points are awarded when products meet transparency and sustainability requirements under any combination of the following categories; Reused Products, Recycled Content, Environmental Product Declarations, 3rd Party Certifications, or Stewardship Programs. Points are awarded on the basis of the Total Contract Value which is represented by product cost that satisfies the requirements. Awarded as follows; 1 point - 3.0% of contract value 2 points - 6.0% of contract value 3 points - 9.0% of contract value	Will need to be followed up with Lyons to determine likelihood of meeting this requirement	Specification	Lyons/ HDR	WSU/AP	3	1	1	0
Construction and Demolition Waste	To reward projects that reduce construction waste going to landfill by reusing or recycling building materials	Mat-22.1	Reduction of Construction and Demolition Waste	The minimum requirement is met where the waste contractors and waste processing facilities servicing the project demonstrate compliance with the Green Star Construction and Demolition Waste Reporting Criteria. 1 point is available where the construction waste going to landfill is reduced by: <input type="checkbox"/> Minimizing the total amount of waste sent to landfill when compared against a typical building (>15kg/sqm 0 points, 12.5-15kg/sqm 0.5 points, <10kg/sqm 1 point); OR <input type="checkbox"/> Diverting a significant proportion of waste (>90% of total) from going to landfill (1 point).	Umow Lai notes that this is attainable for the project. Reference to 90% by weight and other conditions needs to be clearly stipulated within contract documentation.	Specification	Lyons	Umow Lai	1	1	1	0
									14	5	5	7.5

LAND USE AND ECOLOGY												
Ecological Value	To reward projects that improve the ecological value of their site.	Eco-23	Endangered, Threatened or Vulnerable Species	MANDATORY REQUIREMENT: It must be demonstrated that no critically endangered, endangered or vulnerable species, or ecological communities were present on the site at the time of purchase.	Need surveys of the proposed site to determine	Other Documents	Lyons	WSU/AP	-	Complies	Complies	-
		Eco-23.1	Ecological Value	Up to 3 points are awarded where the ecological value of the site is improved by the project. The number of points awarded is determined by the Green Star - Change of Ecological Value Calculator based on a comparison of the condition of the site before and after the project. (POINTS CHANGED IN V1.2) Improvement in Ecological Value Points Achieved 0.01								

EMISSIONS												
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	Emi-26.1	Peak Discharge To Stormwater	1 point is available where the post-development peak event discharge volume from the site does not exceed the pre-development peak event stormwater discharge using the Average Recurrence Interval (ARI) as defined by Green Star. NOTE - If Man-3.1 Climate Adaptation & Resilience credit is targeted, the risk assessment will impact the ARI used for this credit(1 ARI for low risk and 5 ARI for medium-high risk). If this credit is not targeted, the ARI to be used should be consistent with local requirements/guidelines.	Umow Lai notes that as the site is currently fully covered with impermeable surfaces, the post-development peak event discharge volume will be achievable.	Design	Civil Engineer	NDY Hyd	1	1	1	0
		Emi-26.2	Pollution Targets	PRE-REQUISITE CREDIT (PEAK DISCHARGE REQUIREMENT MUST BE MET): 1 point is awarded where it is demonstrated that all stormwater discharged from the site meets the Green Star stormwater "Pollution Reduction Targets A" or meet statutory requirements whichever is the higher level of filtration. INNOVATION points available for Table B/C adherence.	Umow Lai notes that Pollution Reduction Targets A can generally be achieved cost effectively. This is in line with City of Melbourne planning requirements.	Design	Umow Lai Bonacci	NDY Hyd	1	1	1	0
Light Pollution	To reward projects that minimise light pollution.	Emi-27	Light Pollution to Neighbouring Properties	MANDATORY CREDIT REQUIREMENT: It must be demonstrated that the project complies with AS 4282 'Control of the Obtrusive Effects of Outdoor Lighting'.	Umow Lai confirms that this requirement is attainable for the project, however is subject to further design in DD.	Design	NDY Specialist Lighting	Lyons	-	Complies	Complies	-
		Emi-27.1	Light Pollution to Night Sky	1 point is awarded where it is demonstrated that a specified reduction in light pollution has been achieved by the project, where either; a) the Upward Light Output Ratio (ULOR) is controlled OR b) Direct luminance is controlled.	Umow Lai confirms that this requirement is normally highly attainable for projects, but further detail of specialist lighting is required.	Design	NDY Specialist Lighting	Lyons	1	1	1	0



Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	Emi-28.1	Microbial Control	1 point is awarded where one of the following is demonstrated; a) The project is naturally ventilated; b) The project is provided with waterless heat rejection; c) The project is provided with water-based heat rejection that is design and built in accordance with AS/NZS 3666.1:2011 and includes measures for Legionella control and Risk Management in accordance with Victorian Public Health & Wellbeing Act 2008.	The credit criteria does permit water-based heat rejection systems, air cooled or evaporative coolers will comply. Depends on locating adequate plant space	-	NDY Mech	Umwow Lai	1	0	0	0
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	Emi-29.1	Refrigerant Impacts	1 point is awarded where one of the following requirements is satisfied: a) The combined Total System Direct Environmental Impact of systems containing refrigerants is less than 15; b) The Total System Direct Environmental Impact of systems containing refrigerants is between 15 and 35 AND a leak detection system is in place including an automated refrigerant recovery system capable of recovering over 95% (by weight) of refrigerant; c) All refrigerants in the project have an ODP of 0 AND GWP of 10 or less; d) No refrigerants are used within the project The Total System Direct Environmental Impact is calculated using the Impacts from Refrigerants Calculator'. Specific information is required on each piece of equipment which contains refrigerant including refrigerant ODP, refrigerant GWP, mass of refrigerant, leakage risks, charge efficiency (kg/kW) and equipment life.	To be evaluated against comfort requirements and type of AC systems installed.	Design	NDY Mech	Umwow Lai	1	0	0	0
									5	3	3	0

INNOVATION												
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	Inn-15	INNOVATION: Innovative Technology or Process - Onsite Renewable Energy	Additional points are available on a continuous sliding scale for the installation of significant renewable energy generation systems which contribute 15% (1 points) to 30% (2 points maximum) of the Base Building energy demand.	A sufficient renewable energy system (PV) is recommended to be incorporated into the project.	Specification	Lyons	NDY Elec	2	1.4	0	0
		Inn-30.A	Greenhouse Gas Emissions	One (1) point is available where Building Integrated Photovoltaic (BIPV) systems contribute to the reduction of greenhouse gas emissions by at least 15%. This point can be awarded in addition to the 'Onsite Renewable Energy' points highlighted above		Specification	Lyons	NDY Elec	1	0	0	0
		Inn-28a	INNOVATION: Innovation Challenge - Microbial Control in DHW	1 point is awarded where it is demonstrated that DHW systems have been designed to manage the risk of microbial contamination. Operational practices may be used, however the design of the system must also include features that facilitate the achievement of the credit.	Umwow Lai considers this an attainable point for the project. Generally DHW systems will be design such that circulation temperatures are sufficiently high to kill bacteria.	Design	NDY Hyd	Umwow Lai/WSU	1	1	1	0
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.	Inn-30.B	Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world. The GBCA is more likely to award innovation points for projects that: - Increase the knowledge and capacity of the building industry; - Increase the knowledge of sustainable building practices in regional areas; - Change the regulatory environment; - Use technologies or strategies which, if adopted widely, would likely result in a significant reduction of impacts in the built environment. The following Innovation credits are specifically referenced in the Green Star DAB Submission Guideline document;		-	NDY Mech	Umwow Lai		0	0	1
		Inn-2.b	INNOVATION: Market Transformation	Soft Landings Framework. An additional 1 point is available where commissioning & tuning is undertaken in accordance with the BSRIA "Soft Landings Framework". This framework provides the structure "for project teams to stay engaged after practical completion, hand-holding the client during the first months of operation to fine-tune and de-bug systems and ensure the occupiers understand how to control and best use their new work environment. The Soft Landings process is designed to extend up to three years post-completion. The Soft Landings Framework includes procedures and example checklists which act as signposts for design teams to help end-users get to grips with their often unfamiliar and complex buildings. It allows for a full programme of post-occupancy evaluation that the project team can use to improve a building's performance and make it sustainable over the long term."	The 'Soft Landings' methodology could be explored on the project as an augmentation to the standard building tuning.	Design Process	-	-	1	0	0	1
Improving on Green Star Benchmarks (2 Point Maximum per item - see new guidelines for point allocation)	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	Inn-2.a	INNOVATION: Improving on Green Star Benchmarks - Commissioning and Tuning	Supplementary or Tenancy Fit out Systems Review. An additional 1 point is available where a 'Services & Maintainability Review' (as per Man-2.1) is completed on the tenancy fit out systems. Criteria & documentation as per Man-2.1 above.	Extend 2.1 Maintainability review to cover the fit out.	Other Documents	WSU/AP	Umwow Lai	1	1	1	0
		Inn-13.a	INNOVATION: Improving on Green Star Benchmarks - Zero VOC Paints	One additional point is awarded where over 50% of paints (by cost) specified in the building have a maximum TVOC content of 5g/L, verified by one of the approved test methods.	It is likely that this requirement can be met for the project. General application wall & ceiling paints have a TVOC content of 2-5g/L on the basis of a review of the Dulux range.	Specification	Lyons/HDR	Umwow Lai	1	1	1	0
		Inn-22	INNOVATION: Improving on Green Star Benchmarks - Reduction of Construction Waste	1 additional point is available where the construction and demolition waste which is not recycled and directed to landfill is no greater than 5kg/m2 GFA.	Contractor to provide confirmation on the attainability of this credit point.	Specification	Lyons	Umwow Lai	1	1	1	0
		Inn-26a	INNOVATION: Improving on Green Star Benchmarks - Stormwater Pollution Targets	Up to 2 points are awarded where it is demonstrated that Pollution Reduction Targets 'B' or 'C' are achieved for the site.	Confirm with Civil. It is possible. Additional innovation point to use landscape as part of WSUD is also being investigated.	Design	Umwow Lai Bonacci	NDY Hyd	2	1	1	0
Innovation Challenge		Inn-30.D6	Local Procurement 1	A percentage of the products/materials were from/made in Australia	Assessment would need to be made as to what % TCC the materials and labour are local This innovation challenge is based on the project team demonstrating that the local sourcing in the project is significant to the satisfaction of the GBCA.	Specification	WSU/AP	Umwow Lai		1	1	0
		Inn-30.D7	Local Procurement 2	A percentage of the labour and services by the building or fit out come from the local area.		Specification	WSU/AP	Umwow Lai		1	1	0
		Inn-30.D12	Market Intelligence	Pre and post occupancy survey of building users - BOSSA or other is suitable.	This has been done before on previous projects.	Survey	WSU/AP	Umwow Lai		1	1	0
		Inn-30.D15	Financial Transparency	Disclose anonymous design, construction and documentation costs to GBCA.	Specific costs associated with sustainability initiatives will be shared with the GBCA pending review by EPC This is considered a low risk innovation point.	Other Documents	WSU/AP	Umwow Lai		1	1	0

Credit Name	Aim of Credit	Code	Sub-Criteria	Teaching/Commercial Tower - Criteria Requirements	Comments	Credit Implications	Design Stage Primary Custodian	Design Stage Secondary Custodian	Points Available	Previous Points Targeted	Current Points Targeted	TBC
		Inn-13.b	INNOVATION: Innovation Challenge - Plants	One additional point is awarded where indoor plants are evenly distributed across the nominated area and are regularly maintained. One or more plants with a soil area of at least 500cm2 is required per 10m2 of nominated area. Small enclosed rooms of less than 10m2 must contain one plant.	Not targeted	-	Aspect/HDR	-	1	0	0	1
									10	10	9	1
									Points Available	Points Targeted	Points Targeted	TBC
									110	67.7	65	Extra 16.9 Total 81.9