NORTHROP

SUSTAINABILITY REPORT

New Wright Block

Meredith Rd, Madgwick NSW 2350

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PREPARED FOR
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Sustainability Report

Revision Schedule

Date	Revision	Issue	Prepared By	Approved By
29.09.2019	1	Preliminary	I. Van Eerden	B.Fung
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EXECUTIVE SUMMARY

This Sustainability Report outlines how the proposed development of the New Wright Block residential student accommodation project meets expected sustainability outcomes of a state significant development.

The project is targeting the following sustainability objectives:

- The incorporation of ESD principles into the design and ongoing operational phases of the development;
- The inclusion of a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact.
- The inclusion of climate change adaption and mitigation measures within the building design.
- Alignment to the best practice ESD standards outlined within the Green Star Design & As Built v1.2 tool;

Specifically, the report details how the project addresses the following;

- A strong commitment to energy efficiency with the project design to demonstrate a 40% energy reduction over a standard construction building of its type;
- Low impact materials selections with the project maximising the reuse of onsite materials and the use of certified materials where applicable;
- The use of highly efficient water fixtures and fittings, alongside a waterless heat rejection system;
- Integration of educational signage, wayfinding and monitoring systems across the site; and
- An optimised air conditioning system to provide good provision of outside air while maintaining thermal comfort in the classroom areas.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses sustainability within the design and adequately equips the project for its long-term operation as required by the SEARs.

1. Introduction

Northrop has been engaged to provide input to the development of the New Wright Block in order to demonstrate the sustainability commitment expected of a state significant development.

The University of Armidale has prepared a State Significant Development Application (SSDA) to support a redevelopment of their campus to comprise a variety of new, replacement facilities and buildings to revitalise the educational mission of the University.

In summary, the proposal involves the demolition of the existing Wright Centre within the Bellevue Campus of UNE Armidale. Wright Centre will be replaced by the New Wright Block, which will include four (4) separate buildings, up to three (3) storeys in height. Three (3) of the buildings will contain a total of 114 individual rooms, accommodating a total 342 students studying at UNE. The remaining building will be two (2) storeys and act as a student hub.

A comprehensive range of ancillary items in support of the new student accommodation is also proposed. They include a net increase of 188 onsite car spaces, landscaped passive outdoor recreation areas, and a comprehensive pedestrian network linking the proposal with the rest of the campus.

1.1 Response to Secretaries Environmental Assessment Requirements (SEARs)

Item 7 of the SEARs lists four requirements which are outlined below, alongside is listed where the response to each can be found within this report;

Item	Action to Address the Requirement	Report Location
Detail how ESD principals (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 project.	This ESD report details how the project aims to address the Sustainability Principles and their incorporation into the design and ongoing operation of the project through focused design considering environmental impacts and through a gap analysis against Green Star as a holistic sustainability rating tool.	Section 2 & 3
Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future-proofing, use of sustainable and low carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy.	The project is incorporating a strong focus on sustainability and a gap analysis has been completed against the Green Building Council's holistic sustainability rating system to demonstrate how the project design can be assessed to an industry framework for ESD best practice.	Section 3

Include preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance.	By targeting the Adaptation and Resilience initiatives outlined within section 3.2.2 of this report the project commits to addressing all high and extreme risks posed to the project by Climate Change over the forecast building lifetime.	Section 3.2.2
Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change.	The project design includes consideration of future climate alterations into its design further development of this will occur throughout the detailed design process and within the development of a climate adaptation strategy.	Section 3.2.2

2. Sustainability Initiatives

The following section describes how ESD principals (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) are being incorporated in the design and ongoing operation phases of the project. These initiatives illustrate how the project addresses the following;

- The precautionary principle – through the implementation of environmental management and building maintainability, the project attempts to incorporate adaptability and resilience into the project design. The concepts behind the precautionary principle is to create spaces that can both; accommodate for changes, which may eventuate in the future, and avoid the risk of serious or irreversible damage to the environment.
- Inter-generational equity to ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations – through the inclusion of zero ozone depleting refrigerants, best practice PVC and low impact paints, sealants and adhesives, alongside a focus on providing greater vegetation and support for the buildings connection with nature, the project demonstrates a strong commitment to the preservation of environmental health, diversity and productivity of the local area.
- Conservation of biological diversity and ecological integrity – through the planting of native vegetation, improvement of stormwater runoff from the site and use of integrated landscaping, the project will act to improve, conserve and support the local biological diversity and integrity.
- Improved valuation, pricing and incentive mechanisms - the project has involved significant input from the Quantity Surveyor who will be involved throughout the entire design process to ensuring that the project both remains on budget and effectively considers environmental factors in the valuation of assets and services. Furthermore, the project will look at maintainability and the operational costs associated with individual design initiatives and the overall design.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses the ESD Principles as defined in clause 7(4) of schedule 2 of the Environmental Planning and Assessment Regulation 2000. Further details of the general sustainability initiatives are outlined below.

2.1 Energy Efficiency:

Energy efficiency will be considered throughout the design development process with the following improvements already considered as part of the design process;

2.1.1 Natural Ventilation of Circulation Spaces

The project incorporates new communal spaces. These areas will be able to operate as naturally ventilated spaces exploiting their central locations. Central circulation spaces and areas such as bathrooms and stairs will also look to incorporate natural and passive ventilation opportunities.

2.1.2 Improved building fabric and glazing performance

The building envelope comprises a number of different façade types, with the proposed scheme using a combination of building materiality and glazing to lower heat gains throughout summer while maintaining good views and daylighting throughout of the building.

The use of well-designed glazing and building materials will assist the projects targets for energy efficiency, acoustic separation and thermal comfort.

2.1.3 HVAC System Control

The proposed HVAC system will incorporate individual room control for thermal comfort conditions allowing building occupants to maintain comfort conditions suitable to the use and occupancy of spaces. This system assists in optimising the sites energy efficiency while maintaining comfortable conditions within the conditioned areas and ensures that vacant spaces are not conditioned.

2.1.4 Energy Metering and Monitoring

An energy metering and monitoring strategy is to be considered to effectively monitor the main energy uses within the project, alongside the lighting and small power use. This aims to provide fault detection and monitoring of the different areas of the project.

2.1.5 Improved outdoor air provision

The project will aim to improve the outdoor air provided to regularly occupied spaces. This will minimise CO2 build up and improve comfort for the building occupants.

In order to address energy use concerns the design will also look to incorporate on an outdoor air economy cycle, or openable windows, which will allow the building to exploit periods where the buildings external conditions can effectively provide thermal comfort in the space reducing the run times of the air-conditioning system.

2.1.6 Highly efficient lighting system

The installation of LED lighting will assist in the minimisation of lighting energy use. Improved lighting energy also reduces the heat loads within the spaces and therefore lowers the energy used to condition the building.

2.1.7 Passive Design Measures

A focus has been placed on good passive design within the building and shading systems for the project. Examples of this includes the following;

- Incorporation of shading on the facades of the buildings;
- Use of well-designed western glazed areas to exploit winter afternoon heating;
- Strong use of thermal mass to regulate temperatures;
- Integration of landscaping into the building designs to minimise heat islanding and promote passive cooling through transpiration; and
- Use of high performance thermal and acoustic insulation for the project facades.

2.2 Comfort Strategy

In order to ensure that the proposed buildings achieve this the project has proposed a mixed mode ventilation strategy that can provide conditioning when required and natural, or mechanically assisted, ventilation when external conditions are favorable. Additional to this the design of the buildings has focused on good passive design elements including the following;

2.2.1 Passive Solar Design & External Shading

The project design incorporates a strong focus on the use of optimised glazing and window shading to exploit the suns relative position in the sky. This allows solar heat gains through winter while blocking the majority of heat entering the building throughout the summer period.

2.2.2 Thermal Mass

Thermal mass is the ability of a material to absorb and store heat energy for use during cooler times. The project has included the use of a concrete structure to capture energy throughout the day and release this at night minimizing the internal temperature variation across the day.

2.2.3 Glazing Selection

The types of glass used within the project windows can lead to unwanted heat gain in summer and heat loss in winter or help retain heat in winter and limit unwanted heat gain in summer. The project is aiming to use double glazing throughout with a low-e spectrally selective coating to help to maximize daylight penetration into the spaces while effectively managing heat gains and losses across the year.

To add to this passive control of heat entry, blinds should also be provided to external windows

2.2.4 Natural Shading devices

The external landscaping incorporates the use of vegetation to help reduce the temperature of prevailing breezes and provided shaded areas to support the use of external areas across the year.

2.3 Indoor Environment Quality

Indoor environment quality is always an important consideration for student accommodation. The following considerations have been made as part of the building design:

2.3.1 Daylight Access

The design of the building addition aims to allow good daylight penetration into both internal and external spaces. This access to daylight throughout the building will both minimise energy used for lighting and will improve occupant connection to their external environment.

2.3.2 Interior noise level control

Internal noise levels will be actively considered with the building layout and systems design considering how noise will reverberate through the building. The use of acoustic insulation and sound isolation will ensure that interior noise levels to be maintained below acceptable limits.

2.3.3 Access to views

Access to external views allows the switch between short and long focal lengths reducing eye strain for students. There is significant evidence to support that eyestrain and related health problems can be significantly reduced in situations where the eyes can be refocussed periodically on a distant object. This is easier to achieve where there is a nearby window with a view.

The overall design of the project promotes the provision of views to all classrooms where students are expected to concentrate for extended periods of time.

2.3.4 Material selection

Materials selection for the project aims to improve the internal environment of the site with materials with low volatile organic compound and formaldehyde content preferred to help minimise respiratory issues for building occupants.

Maximum TVOC limits for paints, adhesives and sealants are detailed in the table below:

Table 1 Maximum TVOC Limits for Paints, Adhesives and Sealants

Product Category	Max TVOC content in grams per litre (g/L) of ready to use product
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes and wood stains	75
Primers, sealers and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

All engineered wood products used in the building will meet the relevant limits specified in the table below as per the specified test protocol or have product specific evidence that it contains no formaldehyde.

Table 2 Formaldehyde Emission Limit Values for Engineered Wood Products

Test Protocol	Emission Limit/Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L

JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m²hr
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m²hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m²hr (at 3 days)
ASTM D6007	≤0.12mg/m³
ASTM E1333	≤0.12mg/m³
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m³
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m²hr

2.4 Water Efficiency

A strong focus has been put on the effective management of water within the building with the following initiatives being included in the design in all areas throughout the project:

2.4.1 Water efficient fixtures and fittings

Water Efficient fixtures and fitting will reduce the water consumption of the site. As an indication, the following should be targeted:

- Wash hand basin taps 6 star WELS
- General taps 6 star WELS
- Toilets dual flush 4 star WELS
- Urinals 0.8 L per flush 6 star WELS
- Shower heads 7-9 L per minutes 3WELS

Figure 1 WELS Label

2.4.2 Use of low maintenance landscaping

The sites landscaping will endeavor to incorporate native and low maintenance vegetation where possible which will significantly reduce the potable water consumption of the site.

2.5 Improved Ecology

Through planting native vegetation and promoting improved interaction with the natural environment, the project will look to improve the site's ecology and minimise the ongoing environmental impact of the project. The project is currently implementing the following:

- Minimisation of light spill from the facility which impacts on migratory animals and insects;
- Reduced dissolved pollutants in stormwater discharged from the site; and
- Adaption and reuse of a previously developed site.

2.6 Sustainable Transport

The project design is currently well supported for students the use of active and sustainable transport. The site is relatively walkable, to the local bus route, and in close proximity to the university.

2.7 Waste Management

Effective waste management throughout demolition, construction and operation of the site will help to promote resource efficiency and minimise the adverse environmental impacts of the project. The following are being considered as part of the design process;

2.7.1 Separated Waste and Recycling Streams

The provision of separated waste and recycling streams allows for more effective recycling of the projects operation waste. Providing separate bins for cardboard/paper waste, glass, food wastes, comingled recycling and general waste will improve the buildings operational efficiency and result in significant environmental benefits. Some additional waste management measures are detailed below;

2.7.2 Construction and Demolition Waste Minimisation

The project will also look to limit the amount of construction and demolition waste sent to landfill with the aim of at least 90% of all waste produced by the project to be sent to recycling facilities or reused.

2.8 Materials

The construction and upgrading of buildings consume a large amount of resources, and measures will be taken within the design to maximize the expected lifespan of the installed fixtures and finishes. This will assist in project longevity and help to mimise waste going to landfill.

2.9 Education

Given the educational focus of the project, the following initiatives will help to promote an understanding of sustainability and building operation within the school population.

2.9.1 Energy, water, waste and indoor environment monitoring

The project is investigating the inclusion of displays with monitoring results from energy, water, waste and indoor environmental measurements will assist in understanding the operational performance of the facility. It could also promote the connection between utility services and outputs e.g. when the air conditioner is on the energy consumption increases.

2.9.2 The provision of WiFi Connectivity across the site

High speed WiFi will be installed throughout the entire site to provide support for next generation connectivity requirements.

3. Green Building Council of Australia Framework

3.1 Overview

The Green Building Council of Australia's provides an internationally recognised system to assess sustainable outcomes throughout the life cycle of the built environment. It was developed by the Australian Building Industry through the Green Building Council of Australia (GBCA), which is now the nation's leading authority on sustainable buildings and communities. Although the Project is incorporating a strong focus on sustainability there are a number of initiatives covered by the Green Star tool that are additional to the what is being considered. As such the project will look to implement additional elements drawn from this tool to more holistically address some elements of Ecologically Sustainable Design Principles.

If assessed against Green Star the project with the initiatives outlined in the preceding sections would likely achieve a rating of 4 Stars or Australian Best Practice Sustainability.

This section provides a brief summary of the additional elements drawn from the Green Star tool that will be investigated for the New Wright Block project.

3.2 Management

The Management category promote the adoption of environmental principles from project inception, design and construction phase, to commissioning, tuning and operation of the building and its systems. The following credits are currently being considered for incorporation;

3.2.1 Commissioning and Tuning

3.2.1.1 Services and Maintainability Review

The project team will perform a comprehensive services and maintainability review led by the head contractor or the owner's representative (or the ICA) during the design stage and prior to construction.

The services and maintainability review is to facilitate input from the design team, the facilities manager and operations staff, and any relevant suppliers and subcontractors. The review looks to address the following aspects of the project:

- Commissionability;
- Controllability;
- Maintainability;
- Operability, including 'Fitness for Purpose'; and
- Safety

3.2.2 Adaption and Resilience

3.2.2.1 Implementation of a Climate Action Plan

The project will consider the impacts of climate change through identifying and addressing all high and extreme risks posed over the expected lifecycle of the New Warnervale Primary School. This will be done through the creation of a Climate Adaption Plan

Climate Adaption Plan

The Climate Adaption Plan will contain as a minimum the following information:

- Summary of project's characteristics (site, location, climatic characteristics);

- Assessment of climate change scenarios and impacts on the project using at least two time scales, relevant to the project's anticipated lifespan. This must include a summary of potential direct and indirect (environmental, social and economic) climate change impacts on the project;
- Identification of the potential risks (likelihood and consequence) for the project and the potential risks to people. This risk assessment is to be based on a recognised standard;
- A list of actions and responsibilities for all high and extreme risks identified; and
- Stakeholder consultation undertaken during plan preparation and how these issues have been

3.3 Sustainable Transport

Sustainable transport criteria aim to provide design and operational measures that reduce the carbon emissions arising from occupant travel to and from the project, when compared to a benchmark building. In addition, it also promotes the health and fitness of commuters, and the increased accessibility of the location.

3.3.1 Access by Public Transport

The site is relatively well connected to public transport and will look to support these connections to the site and provide strong support for students and staff to mode switch utilize more sustainable transport options.

3.3.2 Bicycle Parking Provision

The project is looking to incorporate bike parking to support the residents within the proposed buildings.

3.4 Water

The aim of the category is to encourage building design that minimizes potable water consumption in operations. The potable water credit will be considered for implementation as follows;

3.4.1 Heat Rejection Water

A waterless heat rejection system is utilised on site minimizing water use for air-conditioning.

3.4.2 Landscape Irrigation

Rainwater supported drip irrigation with moisture sensor override is to be installed to minimise potable water used for the project irrigation.

3.5 Materials

The aim of the materials category is to reward projects that include building materials that are responsibly sourced or have a sustainable supply chain. Should these be targeted the project would need to consider

3.5.1 Responsible Materials

3.5.1.1 Permanent Formwork, Pipes, Flooring, Blinds and Cables

90% (by cost) of all cables, pipes, flooring and blinds in the project will either:

- Do not contain PVC and have an Environmental Product Declaration (EPD); or
- Meet Best Practice Guidelines for PVC.

3.5.2 Construction and Demolition Waste – Percentage Benchmark

This project should target 90% of the waste generated during construction and demolition being diverted from landfill. Compliance verification summaries should also be provided for the waste contractor and waste processing facilities.

3.6 Land Use and Ecology

The 'Land Use & Ecology' category aims to reduce the negative impacts on sites' ecological value as a result of urban development and reward projects that minimise harm and enhance the quality of local ecology.

3.6.1 Endangered, Threatened or Vulnerable Species

At the date of site purchase or date of option contract, the project site did not include old growth forest or wetland of ‘High National Importance’, or did not impact on ‘Matters of National Significance’.

3.7 Emissions

The 'Emissions' category aims to assess the environmental impacts of 'point source' pollution generated by projects. Negative impacts commonly associated with buildings include damage to the environment through refrigerant leaks or disturbances to native animals and their migratory patterns as a result of light pollution.

3.7.1 Reduced Peak Discharge

The project is aiming to achieve a post-development peak event discharge from the site which does not exceed the pre-development peak event discharge using the design Average Recurrence Interval (ARI) that corresponds to the associated flooding risk identified in the Climate Change and Adaption Assessment undertaken as part of the Adaption and Resilience credit.

3.7.2 Reduced Pollution Targets

Additionally the project aims to demonstrate that all stormwater discharged from the site meets the pollution reduction targets in Table 3 below.

Table 3 Minimum Pollution Reduction Targets

Pollutant	Reduction Target (% of the Typical Urban Annual Load)
Total Suspended Solids (TSS)	80%
Gross Pollutants	85%
Total Nitrogen (TN)	30%
Total Phosphorus (TP)	30%
Total Petroleum Hydrocarbons	60%
Free Oils	90%

3.7.3 Light Pollution to Neighbouring Bodies

The project design ensures that all outdoor lighting on the project complies with AS 4282:1997 at all inhabited boundaries, apart from boundaries with roads.

3.7.4 Light Pollution to Night Sky

Outdoor lighting has been designed to achieve the following;

- Control of upward light output ratio (ULOR) by demonstrating that no external luminaire on the project has a ULOR that exceeds 5%, relative to its actual mounted orientation.

3.7.5 Microbial Control

The project achieves will be no water-based heat rejection systems preventing the buildup of microbes in these systems.

3.8 Innovation

The 'Innovation' category aims to recognise the implementation of innovative practices, processes and strategies that promote sustainability in the built environment.

3.8.1 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. Through the targeting of world leading sustainability principles at project is contributing to a broader market transformation that repositions student health and well-being as a key indicator of sustainability.

3.8.2 Innovation Challenge – Financial Transparency

This Innovation Challenge aims to encourage owners, developers and operators to disclose the costs of sustainable building practices, and to agree to participate in a yearly report developed by GBCA that will inform the building industry on the true costs of sustainability.

3.8.3 Innovation Challenge – Microbial Control in Hot Water Systems

The projects hot water systems have been designed to manage the risk of microbial contamination.

4. Conclusion

This Sustainability Report outlines how the proposed development of New Wright Block meets the Secretary's Environmental Assessment Requirements (SEARs) as a state significant development.

The project is targeting the following sustainability objectives:

- The incorporation of ESD principles into the design and ongoing operational phases of the development;
- The inclusion of considered materiality and waste reduction measures, futureproofing and use of low carbon materials, energy and water efficiency, and technology such as renewable energy, to demonstrate alignment to industry best practice frameworks.
- The inclusion of climate change adaption and mitigation measures within the building design.

Specifically, the report details how the project addresses the following;

- A strong commitment to energy efficiency with the project design to demonstrate a 40% energy reduction over a standard construction building of its type;
- A highly efficient façade system designed to minimise heat gain into the building while promoting the entry of daylight into classroom spaces;
- Low impact materials selections with the project maximising the reuse of onsite materials and the use of certified materials where applicable;
- The use of highly efficient water fixtures and fittings, alongside a waterless heat rejection system;
- Integration of educational signage, wayfinding and monitoring systems across the site; and
- An optimised air conditioning system to provide good provision of outside air while maintaining thermal comfort in the classroom areas.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses sustainability within the design and adequately equips the project for its long-term operation thereby addressing the project SEARs.