Wee Waa High School

Sustainable Development Plan

School Infrastructure NSW

Project Number: 520245

Application Number: SSD-21854025

Revision: 3

2021-10-29

Acknowledgement of Country



We acknowledge the Traditional Custodians of the land, the Kamilaroi, on which this project is located, as well as the lands of the Cammeraygal people on which we work and pay our respects to their Elders past and present.

Kamilaroi Aboriginal people lived in harmony with the environment for tens of thousands of years prior to colonisation, and we acknowledge that much can be learnt from Aboriginal people. We acknowledge their evolving, living relationship and the deep respect and understanding for Country, and sustainable and resilient land management practices, and pay respect to this cultural knowledge.

Document control record

Cover image: Concept design render (SHAC Architects)

Document prepared by:

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 5, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com

Document control						aurecon
Report title		Sustainable Development Plan				
Document code		REP-ESD-0001	**Project number**		520245	
File path		Https://aurecongroup.sharepoint.com/sites/P520245/5 Deliver Design/501 Engineering/Reports/WWHS SSD Sustainability Report Rev1.docx				
Client		School Infrastructure NSW				
Client contact		Matt Arnett	**Client reference**			
Rev	**Date**	**Revision details/status**	**Author**	**Reviewer**	**Verifier** (if required)	**Approver**
0	2021-10-06	DRAFT for information	Gaia Anjali RC	Maeve Molins	Quentin Jackson	Maeve Molins
1	2021-10-07	Rev 1 for comment	Gaia Anjali RC	Maeve Molins	Quentin Jackson	Maeve Molins
2	2021-10-15	FINAL	Gaia Anjali RC	Maeve Molins	Quentin Jackson	Maeve Molins
3	2021-10-29	FINAL - minor wording revision	Gaia Anjali RC	Maeve Molins	Quentin Jackson	Maeve Molins
Current revision		**3**				

Approval			
Author signature		Approver signature	
Name	Gaia Anjali RC	Name	Maeve Molins
Title	Engineer (Sustainability)	Title	Senior Sustainability Consultant

Executive Summary

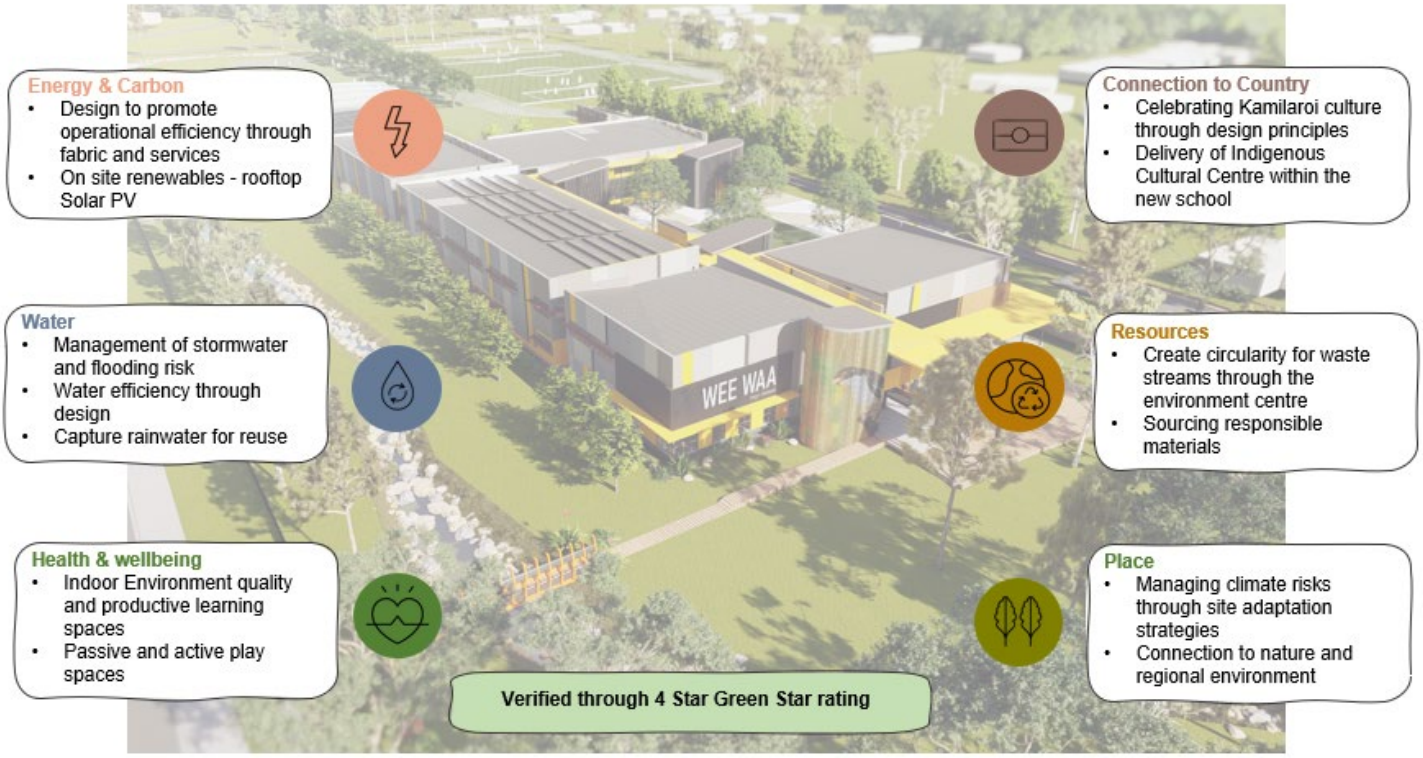
Sustainable Design plays an important role in how NSW Schools are designed and constructed and delivers ongoing benefits to students and the school operators.

Sustainability is a broad term that covers both the environmental performance of schools and the health and wellbeing of students and staff.

This report is written in support of a State Significant Development Application for a new building proposed for Wee Waa High School in the New England and North West region of New South Wales.

The chapters of this report address the sustainability strategy and practical initiatives adopted for the project and details how all Secretary's Environmental Assessment Requirements (SEARS) will be met by the project.

The key sustainability themes for Wee Waa High School are illustrated below:



Contents

Appendices

Figures

Tables

1 Introduction

1.1 Project Introduction

Aurecon have been engaged by School Infrastructure NSW (SINSW) to provide sustainable design services for a new High School development for Wee Waa High School.

Students and staff were evacuated from the current Wee Waa High School site due to ongoing health issues in late 2020. Students are currently collocated within the town's primary school in an overcrowded site. A Ministerial announcement made on 3 June 2021 committed to the construction of a new High School at Wee Waa on existing Department of Education owned land and adjacent Crown land as an urgent priority. The site is located on Mitchell Street/Kamilaroi Highway and is legally described as Lot 1 DP577294, Lot 2 DP550633 and Lots 124-125 DP757125.

This report accompanies a State Significant Development Application which seeks consent for the construction of a new high school to service 200 students with potential to grow to a total capacity of 300 students, subject to further funding and service need, and 61 staff. The site will consist of a two-storey building, and adjacent Indigenous Cultural Centre, Agricultural and Environment Centre, sporting fields and associated civil and utilities works. For a detailed project description refer to the EIS prepared by Ethos Urban.

Figure 1 Site perspective (source: SHAC)

The development will provide:

- 10 General Learning Spaces
- 5 Specialist Learning Spaces. Additional learning spaces include Special Education Learning Units, an Indigenous Cultural Centre, and Agriculture & Environment Centre.
- 1 Rugby Field with a Perimeter Running Track
- 1 Touch Football Field
- Sports Courts
- A large Central Courtyard
- New covered walkways and landscaping; and
- 2 Bike Store areas, Shuttle Bus Parking and Car Spaces

1.2 Site Introduction

Wee Waa is located within New England region in New South Wales, Australia, approximately 40km North east of the regional centre Narrabri. The town is within the Narrabri Shire local government area and is on the Namoi River.

The site for the new School is located centrally in the in Wee Waa town centre at 105-107 Mitchell Street/Kamilaroi Highway. The site fronts Mitchell Street/Kamilaroi Highway (South) just off the intersection with Church Street and fronts Charles Street (West) as shown in Figure 3.

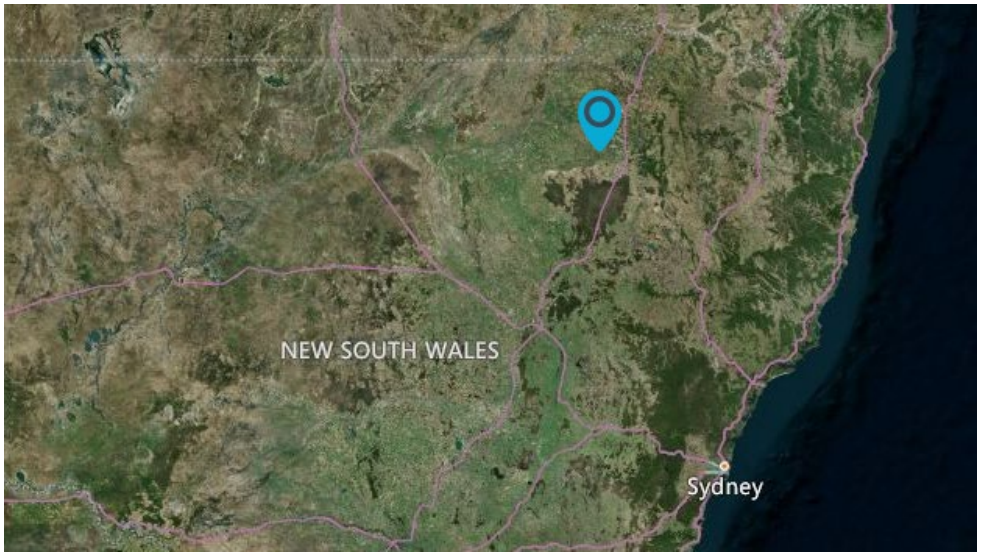


Figure 2 Wee Waa Regional Context (source: https://nationalmap.gov.au/)

Figure 3 Location for the new High School Site in the Wee Waa Town Centre (source: SHAC)

2 Secretary's Environmental Assessment Requirements (SEARS)

This report supports a State Significant development application, and as such responds to the SEARS issued for the site in July 2021

The SEARS covered in this report are those of Part 6. Ecologically Sustainable Development (ESD)

Refer to Table 1 for an overview of how this report addresses each ESD requirement,

Table 1 ESD SEARS

	SEARS requirement	Reference
A	how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation) would be incorporated in the design and ongoing operation phases of the development.	**Chapter 3: Sustainable Development Principles**
B	proposed measures to minimise consumption of resources, water (including water sensitive urban design) and energy.	**Energy: Chapter 6** **Water: Chapter 7** **Resources: Chapter 8**
C	how the future development would 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.	**National Best Practice: Chapter 5 Green Star** **Energy: Chapter 6** **Water: Chapter 7** **Resources: Chapter 8**
D	how environmental design will be achieved in accordance with the GANSW Environmental Design in Schools Manual (GANSW, 2018).	**Chapter 6 – Energy**
E	an assessment against an accredited ESD rating system or an equivalent program of ESD performance. This should include a minimum rating scheme target level.	**Chapter 5: Green Star** **Appendix A: Green Star Pathway**
F	a statement regarding how the design of the development is responsive to the NARCliM projected impacts of climate change	**Chapter 10: Resilience**
G	an Integrated Water Management Plan detailing any proposed alternative water supplies, proposed end uses of potable and non-potable water, and water sensitive urban design.	**Chapter 7: Water**
	Key Reference documents	
	NSW and ACT Government Regional Climate Modelling (NARCliM) climate change projections.	✓

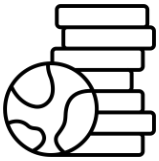
3 Sustainable Development Principles

3.1 Holistic principles for Sustainability

SINSW takes a holistic view of sustainable development and requires the conserving and enhancing of human societies to be considered, along with ecological conservation and enhancement. SINSW draws its core principles from federal and state legislation on Ecologically Sustainable Development (ESD) and draws from international literature regarding Sustainable Development (SD), such as the 1987 Brundtland Report *Our Common Future* and the UN Sustainable Development Goals.

The Precautionary Principle

Taking preventive action in the face of uncertainty



- From the early schematic design phase, the project has considered environmental and social impacts decision making processes. This includes a strategy to mitigate climate change through energy efficiency and renewable energy.
- The project has considered projected climate risks for the region and a Climate Change Adaptation strategy has been prepared (refer to Section 10 – Resilience)

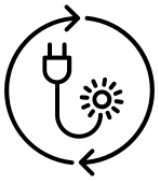
Inter-Generational Equity and Conservation of Biological and socio-cultural Diversity and Ecological and socio-cultural Integrity

Meeting the needs of the present without compromising the ability of future generations to meet their needs

- The school's design will seek to optimize environmental, social, and cultural performance.
- The school will create comfortable and productive learning spaces for the next generation of students and seek to showcase any sustainability initiatives to promote learning.

Improved valuation, pricing, and incentive mechanisms

Considering the whole of project benefits to determine the expected return on investment for investment in sustainability.



- The design acknowledges that expenditure in sustainability initiatives will provide return on investment over the life of the building. The expected payback will be factored into final sizing for PV system and rainwater tanks. Refer to Chapters 6 and 7.

3.2 Sustainability Benchmarking

Wee Waa HS will demonstrate alignment with 'National Best practice' measures for sustainability.

The design achieves this through:

✓ 4 Star Green Star – Design & As Built v1.3 Certified rating

This represents 'Australian Best Practice' and, through certification with the GBCA promotes transparency of sustainability targets as all claims must be independently assessed.

✓ Alignment with key State planning policies

Alignment with NSW Planning legislation and guidelines such as the NSW Government Resource Efficiency Policy and the NSW Climate Change Framework that provide regional context and promote a best practice approach to sustainability and climate change.

✓ Early integration of sustainability and ongoing involvement

Sustainability impact has been used to decision making in the school's design from the early stages, to take advantage of opportunities to make simple changes to promote sustainability.

✓ Educational Facilities Standards and Guidelines – Ecologically Sustainable Design Guidelines.

The EFSG has been developed specifically for NSW Public Schools and sets a standardised approach to sustainability that represents the best value for money and project environmental outcomes across a holistic range of areas. These guidelines promote the latest best practice in schools and are regularly updated as benchmarks shift.

.

4 Other Sustainability References

Educational Facilities Standards and Guidelines

NSW Department of Education - Educational Facilities Standards and Guidelines (EFSG) DG02 includes requirements for Ecologically Sustainable Development. These Guidelines apply specific design/construction criteria to embed minimum sustainability outcomes for new schools in NSW. They also ensure alignment of new schools with other NSW Government policies described below

NSW Government Resource Efficiency Policy (GREP)

This is a key policy for NSW Government agencies to implement the Whole of government targets for energy efficiency, renewable energy and efficient management of water and waste.

NSW Climate Change Policy Framework

This Policy sets in place the NSW Government's objective is for NSW to be more resilient to a changing climate. This includes a specific direction to Reduce risks and damage to public and private assets in NSW arising from climate change

National Construction Code Section J 2019

Section J includes mandatory energy efficiency requirements for new and refurbished buildings. This report covers concept stage considerations for the deemed to satisfy (DtS) for Parts 1-3 of Section J. Under DG 2.0 New schools must not only meet but exceed Section J by 10%.

Narrabri Shire Council

While no specific sustainability controls are in place for educational buildings within the Narrabri DCP, Narrabri Shire Council identifies Environmental Sustainability as a key strategic direction within its Operational Plan 2021-2022. This includes a focus on conservation of natural environments and providing appropriate infrastructure for active transport.

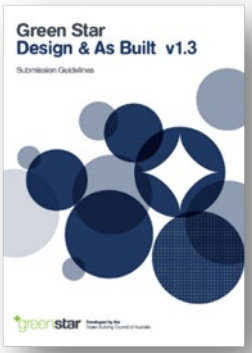
4.1 Other Reference Documents

- Preliminary Schematic Design Plans by SHAC Architects
- Landscape Design package by Moir Landscape Architects
- Marline Engineering Concept Design Report

5 Green Star

Key points:

- Wee Waa High School is targeting a 4 Star- Green Star rating, through formal certification with the GBCA.
- The 4 Star commitment will see the school implement sustainable design and construction throughout the delivery process, which must be validate through a third-party assessment post practical completion
- A pathway has been developed for the project and a number of initiatives have been implemented within the preliminary design



Wee Waa High School is targeting a 4 **Star- Green Star Design & As Built v1.3 rating**, through formal certification with the Green Building Council of Australia (GBCA).

A Green Star pathway has been developed for the school, which aligns to SINSW's preferred approach for Gren Star in schools.

This has been workshopped with the Design team for coordination and input from a range of disciplines.

The workshop was held 17 September 2021, and included the project architect, landscape architect and civil engineer.

As detailed in the pathway, the school's design includes sustainable design initiatives that are recognised in Green Star including:

- **Management**: Climate Change Adaptation, Energy Metering and Monitoring, Operational waste
- **Indoor Environment Quality**: High quality daylit spaces, with window shading to promote visual comfort Mixed mode ventilation
- **Energy**: Solar PV array on roof, 10% improvement on Section J requirements for overall energy consumption of the building, LED lighting
- **Transport**: Provision of Bike parking spaces for students and showers and lockers to encourage staff to walk or cycle
- **Water**: Rainwater used for toilet flushing and irrigation
- **Emissions:** Post development peak Stormwater discharge not to exceed the pre-development peak discharge for flows up to the 2-year ARI and Stormwater pollution reduction initiatives – including Gross Pollutant Trap and tertiary treatment (storm filter system).
- **Ecology:** Increased vegetation/landscaped elements – improved 'ecological value' and heat island effect mitigation
- **Innovation:** Modern Methods of Construction/'kit of parts', Stakeholder Engagement, Indigenous design, Healthy Canteen Policy, Access for People with Disabilities

Refer to **Appendix A – Green Star Pathway**

6 Energy and Carbon

Key points:

- The school will be designed to align with Stage 1 of the NSW Government Net Zero Plan
- Energy performance will exceed minimum section J requirements and, in line with Green Star, seek to reduce demand for operational energy through design strategies for building fabric and services
- Passive design of glazing and shading and allowance for natural ventilation mode improves the buildings ability to be operated efficiently
- The current scheme allows for approximately 90kW Solar PV on the roof of Building B and Building F
- In line with a transition away from fossil fuels the school will largely operate as all electric, with the exception of gas for specialist uses e.g. science labs.

6.1 Towards Net Zero

In March 2020, the NSW Government announced its Net Zero Plan Stage 1: 2020–2030, which establishes key steps to NSW's action on climate change and addresses strategies to achieve the goal of net zero emissions by 2050.

Recognising the contribution of the built environment to carbon emissions, and the role that government agencies must play in showing leadership, SINSW promotes several key sustainability initiatives in line with this goal, which are being implemented on WWHS.

These are summarised below:

1. **Designing the school to minimise operational energy usage**

   → Refer to chapters 6.2, 6.3 and 6.4

2. **Eliminating on site fossil fuels for heating and hot water**

   → WWHS Services are to be all electric except for small uses where required for functional purposes (i.e. science labs and cooking)

3. **On Site and Off-site renewable energy supplied to the school**

   → Refer to Section 6.5 regarding rooftop PV
   → Through their energy contract NSW Government agencies are required to purchase a minimum 6% GreenPower

4. **Commitment to other sustainability opportunities to minimise embodied carbon**

   → Refer to chapters on waste, water and
   → Refer to chapter 5 for commitment to target 4 Star Green Star for sustainability verification

Implementing these strategies now will enable SINSW to achieve net zero for WWHS in the future through offsets and electricity procurement.

Figure 4 Indicates a possible transition plan to net zero, including existing measures that promote emissions reductions in line with Stage 1 of the NSW Net Zero Plan as well as a possible strategy to meet the goal of net zero by 2050.

Note chart is illustrative only and not to scale.

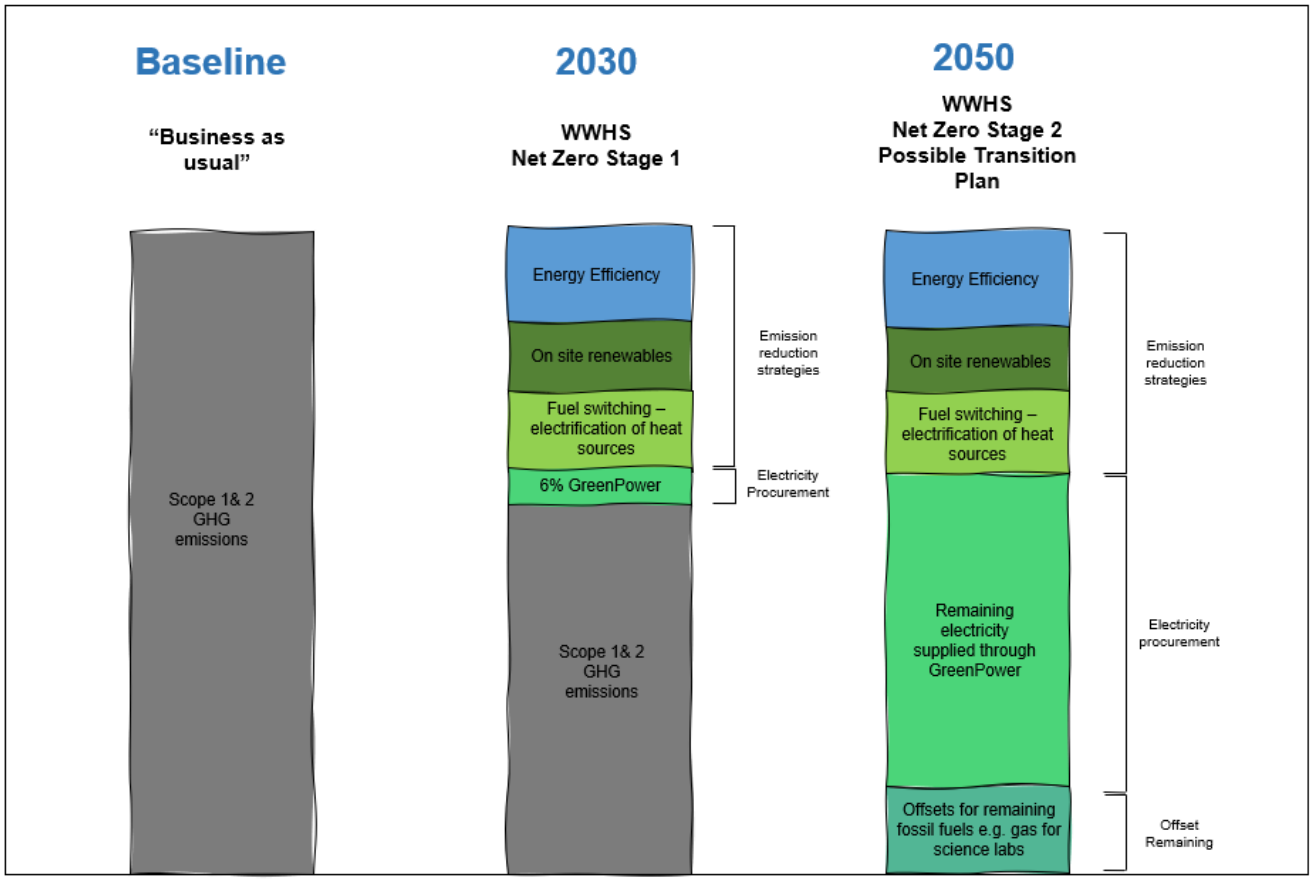


Figure 4 Indicative Pathway to Net Zero Emissions

6.2 Building Fabric and Passive design

Building Fabric plays a significant role in responding to the operational energy that will be used by a building.

This has informed the design of the school and considerations have been made to passive strategies that will a promote comfortable conditions whilst limiting reliance on mechanical systems for heating and cooling where possible (Refer to 6.2)

Passive design concepts outlined in the GA NSW's 'Environmental Design in Schools' Guidelines have been considered and applied to the building's design.

Passive design strategies that will be implemented on Wee Waa High School include:

- Limiting window to wall ratio on each orientation
- **Shading design** to promote passive heating in winter and restrict heat in summer (ie. depicted in Figure 5). This has been determined using sun path diagrams to optimise the shading angle for each orientation.
- Total System **SHGC** of 0.4-0.5 to limit solar heat gain

- **U value** will be determined at the next stage of the design following development of window sizes however it is recommended to allow for a high performance single glazed option that can allow for operable windows in line with the mixed mode strategy.

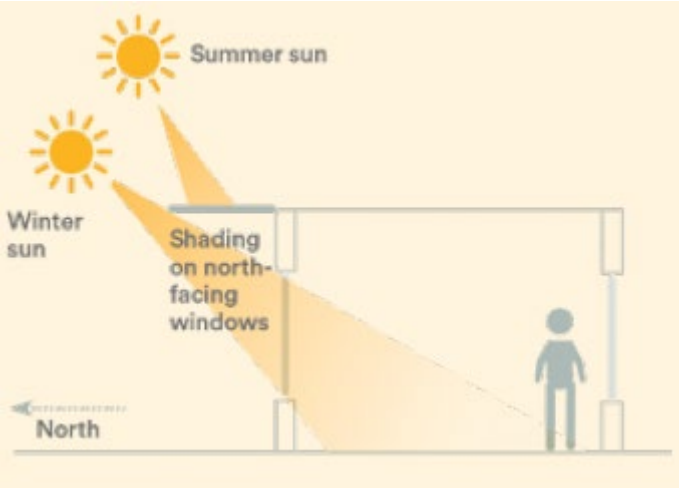


Figure 5 Examples of passive design strategies promoted in the GA NSW Guidelines

6.3 HVAC Strategy & Mixed Mode Ventilation

A mixed-mode strategy is proposed for the school to balance both comfort and efficiency and take advantage of suitable outside temperatures to reduce reliance on air conditioning.

6.3.1 Mechanical heating/cooling mode

The air conditioning system will operate during periods where the outside temperature is too hot or too cold.

Air cooled reverse cycle heat pump or heat recovery systems shall provide heating and cooling to each space to suit the load demand.

It is proposed to install an energy recovery unit which serves to temper the outside air and reduce the outside air heating and cooling loads.

Each room will be zoned to suit the exterior and internal load influences to ensure an even temperature can be maintained throughout the various areas.

A control system will prevent unnecessary use of air-conditioning by:

- Provide pre-programmed operational timer functions via weekly scheduled timers
- Auto shut off set points to enable the system to be automatically shut down after a set period of time after being switched on

6.3.2 Natural ventilation mode

Fresh and free-flowing air in our learning environments can impact student concentration levels (GA NSW 2018)

The proposed mixed mode ventilation strategy is to prefer operable glazing to enable the use of natural ventilation where the temperature allows this.

Each indoor unit will be controlled by a local wall mounted LCD controller which will provide the user with the ability to turn the system on or off and be able to adjust the indoor temperature set points.

A coloured light system is proposed (Figure 6) in line with the EFSG Control requirements which is connected to a sensor and is capable of changing colour based on outside temperature, informing building users of the suitability of the conditions to operate natural ventilation mode.

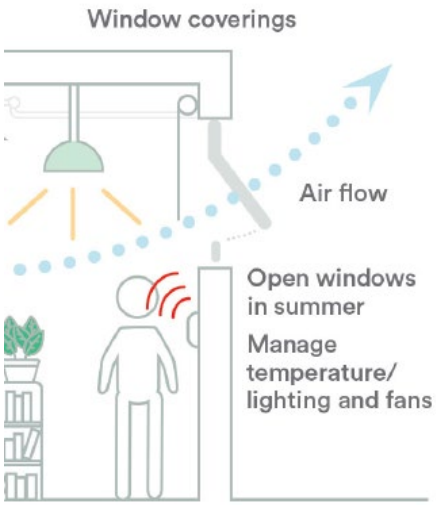


Figure 6 Indicative light system proposed and natural ventilation illustration (SI NSW, GA NSW)

6.4 Efficient Lighting

It is proposed that new lighting provided will be LED type luminaire fittings, generally 4000K colour temperature. This offers efficient lighting that will meet or exceed Section J efficiency requirements.

To further limit lighting electricity consumption, motion sensor control is proposed to limit lighting in occupied spaces, which will also be accompanied by manual local switches for user control.

The lighting system shall use DALI communication protocol to control each luminaire. This allows each luminaire to be addressed individually switched and dimmed to provide the highest level of control to the building occupants.

6.5 Renewable Energy

On site generation through PV will be installed on the Building B/Building F roof, as required by the EFSG, and recognised in Green Star credit 15E.

This represents a good opportunity to supply the school through clean energy, which is expected to be cost effective given the school will use most of its energy in daylight hours.

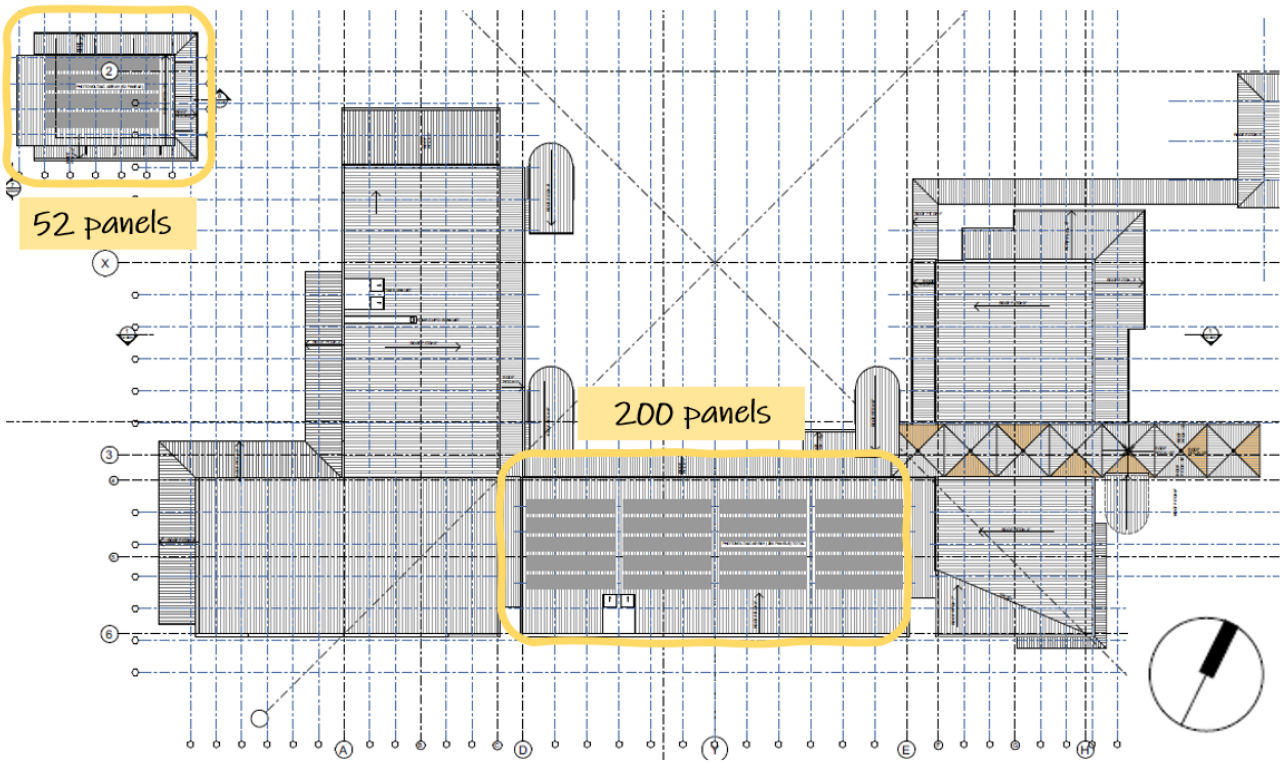


Figure 7 Indicative Rooftop PV Layout and number of panels (source: SHAC)

7 Integrated Water Management

Key points:

- Three rainwater tanks are proposed to capture water from the impervious roof areas and supply flushing and landscaping, aligning to EFSG requirements for alternative water sources
- Fixture selection in future design stages must adhere to GREP and Green Star requirements for flow efficiency

Water is a finite resource in Wee Waa and the design of the school will prioritise strategies that allow the responsible consumption of water, noting this is aligned with the NSW GREP and Schools Infrastructure Sustainability Strategy to which include controls to manage reliance on potable water. This will be achieved through design strategies that promote efficiency and substitution of potable water with alternate water sources such as reused rainwater.

7.1 Water Sources

Water consumption for the refurbished school will include:

Potable Sources: Taps/Showers, drinking water and water for use in cooking/classrooms and kitchenettes

Non-potable sources: Flush fixtures (toilets/urinals)

7.2 Fixture Efficiency

Selection of fixtures and fittings for new amenities must implement water efficiency targets which are nominated in the WELS rating for products.

The following targets will be achieved in line with Green Star credit 18 level of achievement, noting that this is also required as per DG2.4.1and Part W3 of the NSW Government Resource Efficiency Policy.

Table 2 WELS requirements for fixtures

Fixture type	Minimum rating
Taps	5 Star
Toilets	4 Star
Urinals	5 Star
Dishwashers	5 Stars
Showers	3 or 4 Star but less than 7.5L/s

7.3 Landscape Irrigation

Plant species in landscape areas will be selected for drought and heat tolerance and be suited for the Wee Waa climate. As such it is anticipated that landscaping will not require irrigation.

7.4 Rainwater Reuse

Roof water harvesting and tank storage in the school will be provided in line with DG 2.4.2 and DG 53.

The design allows for three water tanks as shown in the plan below. The final size of these is to be developed during the detailed design phase, it is anticipated that they will each be sized between 5-10kL.

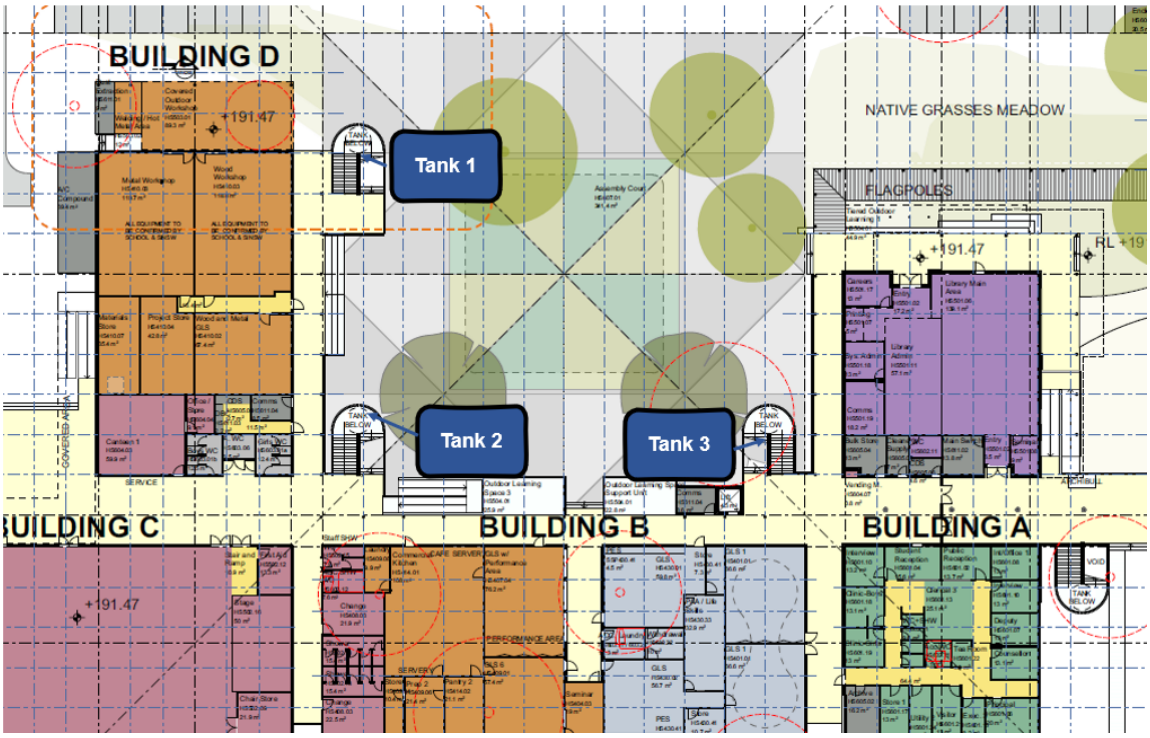


Figure 8 Rainwater tank location

The harvested rainwater will be pumped to toilets and urinals to avoid reliance on potable water for flushing.

7.5 Water Sensitive Urban Design

Given the site constraints careful consideration has been given to how to manage water within the site to promote the impact to surrounding areas and waterways. The following WSUD strategies have been included within the civil/landscaping design for the site

- **Maintenance of significant existing swales** - water is then captured, where it can slowly filter down into the subsoil, passively removing pollutants
- **Roof water capture** – capturing water from the room, reducing stormwater runoff and supplementing potable water

For further details refer to Stormwater Management Plan.

8 Resources

Key points:

- SI NSW promotes resource efficiency through planning, design and material procurement in schools.
- At the point of material selection, sustainability objectives from Green Star and SI NSW's EFSG will form part of the selection criteria.
- The new building will provide a spatial allowance to effectively manage waste streams expected to be generated throughout the operation.

8.1 Sustainable Materials

Sustainability will be considered during material selection in the detailed design phase to limit the project's consumption of natural resources, and promote healthy indoor environments

The EFSG encourages materials that adequately and economically perform their intended functions and have lower adverse environmental impacts throughout their life cycle whilst maintaining good health qualities and avoiding exposure to toxins such as Volatile Organic Compounds.

The EFSG Sustainable Material requirements align to what is required in Green Star, however some additional considerations will be required by the tool.

Accordingly, key sustainability factors for material selection are summarised in Figure 9.

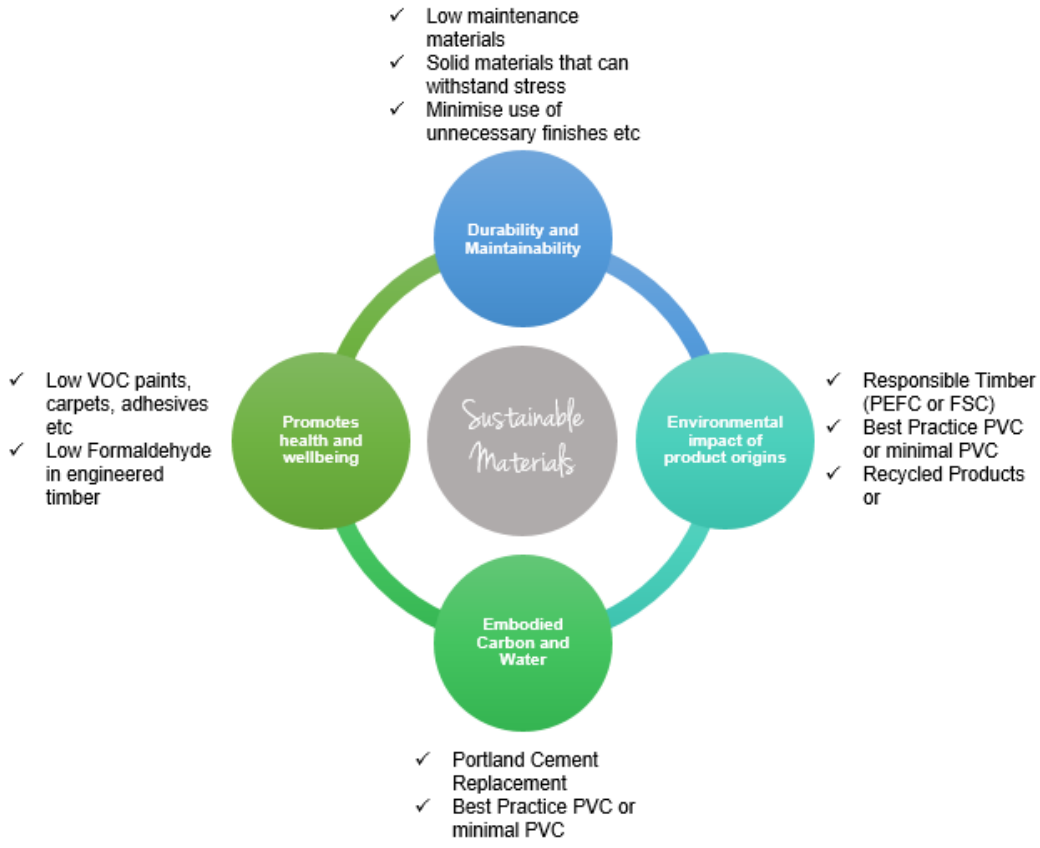


Figure 9 Key material selection principles that should inform the materials used in the school.

8.2 Operational Waste Management

Waste planning for the school will promote operational waste efficiency and the reduction of waste sent to landfill.

A waste specialist has been engaged to provide input as to how systems within the school will support waste diversion targets, refer to the Operational Waste Management Plan.

Sustainable waste management will be promoted through the design through:

- Provision of the Environment Centre, an interactive learning space where students can directly engage with waste streams and monitor waste contamination and generation within the school
- Providing a waste storage area in an external, accessible area and will include sufficient space to store waste and recyclables for a weekly collection.
- Supporting predominantly digital learning and operations which reduce paper waste generation, which traditionally generates large portions of a school's waste
- Separating organic waste which can be diverted into compost for the school's agricultural program or other needs
- Seeking opportunities for a circular economy within the school, for example repurposing of used plastic/cardboard etc for visual arts

8.3 Construction Waste

The design for the school buildings will support the use of prefabricated parts in line with the SINSW strategy to streamline on site construction processes, through employing Modern methods of construction.

This means that for some components of the building, volumetric modules, assembled in a factory, can be transported to site, and craned into position.

These techniques reduce construction materials needed, streamline manufacturing, and create less construction waste on site.

Overall, the project will target at least 90% of construction waste diverted from landfill.

9 Transport

Key points:

- SINSW has an interest in reducing transport related emissions through sustainable transport initiatives in schools
- Given the regional location of the school driving is a frequent mode of transport for staff and students
- The development of the new school will create opportunities to increase the mode share of more sustainable options such as walking and cycling

9.1 Walking to school

A transport survey conducted found that approximately 63% of students live within a 15-minute walk of the site.

However, there are concerns regarding a safe crossing of Mitchell St, therefore it is proposed to create a safe pedestrian crossing as well as overall improvement of facilities adjacent to the school to increase mode share and safety for walkers.

9.2 Cycling Facilities

A bike parking enclosure if provided with easy access to the George St entrance, to cater to staff and students who cycle to the school. The location of the bike enclosure is depicted in Figure 10.

Figure 10 Location of Bike enclosure to the North East of the site

9.3 Green Star Transport

The project will be recognised in Green Star for sustainable transport initiatives the promote the use of public transport and active transport and limit the need for private vehicles to

A school specific approach has been developed by the GBCA to recognise the planning process and transport initiatives within schools that are aligned with the sustainability approach.

This approach rewards Green Star points for the implementation of the SINSW Schools Transport Assessment process detailed below

The assessment process is guided by 8 principles:

1) Students achieve daily physical activity requirements through active travel to school
2) Multi-modal transport planning and infrastructure provision to school is prioritised
3) Transport stakeholders are consulted with early and regularly
4) Supporting infrastructure is installed to the school and on-site
5) Traffic disruption to the school and community during construction is minimised
6) A commitment is made to a visible, funded, feasible Travel Plan
7) School Transport Plan is monitored and evaluated regularly
8) Consistency and quality of deliverables is increased.

10 Resilience

10.1 Climate Risks for the site

An increasing focus has been placed by SINSW on the resilience of schools to site-specific climate change effects which are evident based on Climate Change projections for NSW.

Wee Waa High School must adress high and extreme risks, as required by SEARS, as well as Green Star credit 3 and EFSG DG08.

Aurecon have reviewed climate data available for the New England North West (NENW) sub-cluster available from AdaptNSW. This data is (CMIP3 data) has been made available through the NSW and ACT Regional Climate Modelling (NARCliM).

Climate Change will have considerable impacts to the conditions that today's buildings will be subject to in the future. Resilience to the projected climate change scenarios will play a role in the design of Wee Waa at each stage, and strategies have been developed to position the project to respond to future risks, both in the short term (2030) and long term (2070)

Climate Change risks that will affect the development are detailed in Table 4.

Table 3 Project Impacts of Climate Change for Wee Waa based on projections for the New England North West Region (source: AdaptNSW)

Impact of Climate Change on New England North West Region	
TEMPERATURE 	**Increase in Average Temperature:** The annually averaged warming is projected to be +0.7-2.2°C by 2030. **Higher Frequency of Extreme Temperatures:** Frequency of hot days (temperature >35°C) are set to increase by 10-20 days more in by 2030, and >30 days by 2070. Cold nights (temperature <2°C) are projected to decrease by 5-20 days.
PRECIPITATION 	**Precipitation:** Decreases in winter rainfall are projected, but increased rainfall in autumn. The variability of rainfall increases by 2070. **Extreme Rainfall:** Increased Intensity of extreme rainfall events **Drought:** Time spent in drought is projected to increase.
BUSHFIRE 	**Bushfires:** Harsher fire-weather climate is projected for the near- and far-future, especially during spring and summer.

10.1.1 Data Acknowledgement

We acknowledge the NSW government, ACT government, SA government, and the Climate Change Research Centre of University of NSW on the NARCliM, which is responsible for CMIP, and we thank the climate modelling groups for producing and making available their model output. For CMIP the U.S. Department of Energy's Program for Climate Model Diagnosis and Intercomparison provides coordinating support and led development of software infrastructure in partnership with the Global Organization for Earth System Science Portals.

10.2 Interdisciplinary Climate risk workshop

A Climate Change Adaptation workshop on 29th September 2021 was attended by the Architect, Landscape Architect, Civil Engineer, SINSW, Project Manager and lead by the Sustainability consultants.

The workshop introduced the current conditions and future projections of Wee Waa.

The discussion centred around existing and proposed design strategies that improved the school's ability to withstand projected impacts of climate change across the two timescales assessed.

10.3 Risks to Wee Waa High School

Based on the future projections, and the proposed features of the school site, the site-specific risks based on climate change projections are outlined in Table 4.

Table 4 Risks to the school identified based on Climate projections for NENW

Projected Climate Risks for New England North West NSW	
TEMPERATURE 	**Increase in Average Temperature:** ▪ Damage or compromised reliability and durability of building components and materials ▪ Decreased outdoor comfort for staff and students, and possible health and safety concerns when they engage in activities outdoors ▪ Increased reliance on air conditioning, thus higher energy consumption and maintenance requirements **Higher Frequency of Extreme Temperatures:** ▪ Increase in electricity demand, resulting in possible brown or black outs ▪ Decrease in indoor thermal comfort
PRECIPITATION 	**Precipitation and drought – increase in the number of dry days:** ▪ Decrease in water supply and potential water restrictions imposed by the local council ▪ Lower water availability and increased demand for landscaping **Extreme Rainfall – Increase in Rainfall Variability:** ▪ Increased erosion and siltation due to storms/flooding ▪ Extreme storm events with high winds causes damage to buildings and injury to people
BUSHFIRE 	**Bushfires:** Harsher fire-weather climate is projected for the near- and far-future, especially during spring and summer.

10.4 Project Adaptation

As discussed with the design team during the climate risk workshop, potential adaptation strategies have been identified. A high-level summary of the risks and adaptation strategies applicable to the school are shown in Figure 11.

As the design develops, input into how the design responds to and mitigates these risks is recommended to ensure a robust approach to building the school resilience. At the next stage of the project it is recommended to complete a detailed climate adaption risk assessment and adaptation report.

Figure 11 Wee Waa High School Adaptation Strategies

Appendix A

Green Star Pathway

PROJECT TITLE:	**Wee Waa High School**
DOCUMENT:	**Green Star - Design & As Built v1.3 Credit Summary**
REVISION:	**Rev 1**
AUTHOR:	Maeve Molins
DATE:	7/10/2021

Credit No.	Credit	#	Criteria	Requirement	Available points	High Achievability	Low-Medium Achievability	Not recommended	Responsibility	General discussion
						Recommended outcome for the project and acheievable within reasonable cost/effort	May require further investigation/significant cost or imposes certain design limitations	Not recommended/ achievable for this project		
MANAGEMENT	1 Green Star Accredited Professional	1.0	Accredited Professional	1 point is available where a Green Star Accredited Professional – Design & As Built (GSAP) has been 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.	1	1			SINSW	
	2 Commissioning and Tuning	2.0	**Minimum Credit Requirement:** Environmental Performance Targets	In order for the minimum requirement to be met, documented targets for the environmental performance of the project must be set.	Conditional for credit	Anticipated			MEP/ESD/SINSW	Requires the development of a 'Design Intent Report' or "Owner's project Requirements'
		2.1	Services and Maintainability Review	1 point is available where a comprehensive services and maintainability review of the project is performed.	1	1			SINSW	Achieve through diverse stakeholders - AMU and Commissioning Team consulted in TSG process
		2.2	Building Commissioning	1 point is available where comprehensive pre-commissioning and commissioning activities are performed for all nominated building systems.	1			1	Head Contractor	Air tightness testing is required for this credit, not typically pursued by schools due to additional cost
		2.3	Building Tuning Systems	1 point is available where a tuning process is in place that addresses all nominated building systems.	1		1		Head Contractor	Include in Contractor Specification
		2.4	Independent Commissioning Agent	1 additional point is available for utilisation of an Independent Commissioning Agent (ICA) to advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning and tuning phases.	1	1			SINSW	GBCA approved Schools to target credit using the Commissioning and Temporary Schools Program Team in lieu of engaging a dedicated independent commissioning agent for each project on the following condition; Refer **GBCA Response R-14422**
	3 Adaption and Resilience	3.1	Implementation of a Climate Adaptation Plan	2 points are available where: • A project specific Climate Adaptation Plan has been developed in accordance with a recognised standard; and • Solutions have been included into the building design and construction that specifically addresses the risk assessment component of the adaptation plan.	2	2			SINSW/ESD	Must develop a Climate Change Adaptation Plan in accordance with Australian Standard and implement specific responses to all 'high' risks.
	4 Building Information	4.2	Building Information	1 point is available where: - Comprehensive operations and maintenance information is developed and made available to the facilities management team; and - Relevant and current building user information is developed and made available to all relevant stakeholders.	1	1			Head Contractor	Typically common practice - Contractor must develop comprehensive O + M information. School User Guide template made available from SINSW
	5 Commitment to Performance	5.1	Environmental Building Performance	1 point is available where there is a commitment to set targets and measure results for the construction waste from end-of-life of interior fitout or other building attributes.	1			1	SINSW	SI obligation - must develop building performance reporting strategy. To be discussed if currently in place.
		5.2	End of Life Waste Performance	1 point is available where there is a commitment to set targets and measure results for the construction waste from end-of-life of interior fitout or other building attributes.	1	1			SINSW	SI NSW to commit to extending the life of internal fitout for 10 years (excluding general wear and tear)
	6 Metering and Monitoring	6.0	**Minimum Credit Requirement:** Metering Strategy	1 point is available where there is a commitment to set targets and measure results for the environmental performance of the building.	Conditional for credit				Electrical	Generally standard practice for metering strategy
		6.1	Monitoring Strategy	1 point is available where there is a commitment to set targets and measure results for the environmental performance of the building.	1			1	Electrical	Requires monitoring system to capture and process data produced by the installed energy and water meters - provide real time data to management and report on consumption trends etc.
	7 Responsible Construction Practices	7.0	**Minimum Credit Requirement:** Environmental Management Plan	To qualify for this credit, it is a minimum requirement that environmental impacts are managed during construction by implementing a best practice environmental management plan.	Conditional for credit	Anticipated			Head Contractor	Contractor Requirement
		7.1	Environmental Management System	1 point is available where the responsible party for the site has a formalised approach to planning, implementing and auditing is in place during construction, to ensure conformance with the EMP.	1	1			Head Contractor	Contractor Requirement
		7.2	High Quality Staff Support	1 point is available where high quality staff support practices are in place that: - Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site; and - Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs.	1		1		Head Contractor	Contractor Requirement
	8 Operational Waste	8.B	Prescriptive Pathway - Facilities	1 point is available where facilities are in place to collect and separate distinct waste streams, and where these facilities meet best practice access requirements for collection by the relevant waste contractor.	1	1			Architect/Waste Consultant	Best Practice Waste Management facilities - storage of recyclables sized for expected waste generation, adequate access for removal etc
Management Total (unweighted)					**14**	**9**	**2**	**3**		
INDOOR ENVIRONMENTAL QUALITY	9 Indoor Air Quality	9.1	Ventilation System Attributes	1 point is available where: • The entry of outdoor pollutants is mitigated; • The system is designed for ease of maintenance and cleaning; and • The system has been cleaned prior to occupation and use.	1	1			Mechanical	Minimum separation distances between pollution sources and outdoor air intakes required as per ASHRAE design standards - typically not challenging - Leigh to review. Must provide access to both side of heating coils, cooling coils, filters etc for cleaning and maintenance. - the proposed VRF only has filters - access to be provided in mech design.
		9.2	Provision of Outdoor Air	2 points are available where the nominated area is provided with sufficient outdoor air to ensure levels of indoor pollutants are maintained at acceptable levels. Options are available for mechanically and naturally ventilated buildings and for outdoor air provision or contaminant monitoring.	2			1	Mechanical	Two points targeted as natural ventilation via louvres provided for outside air.
		9.3	Exhaust or Elimination of Pollutants	1 point is available where nominated pollutants, such as those arising from printing equipment, cooking processes and equipment, and vehicle exhaust, are limited by either removing the source of pollutants from the nominated area, or exhausting the pollutants directly to the outside while limiting their entry into other areas of the project.	1	1			Mechanical	Pollutants from printing, photocopying shall be eliminated through printer/photocopier selection. Pollutants from cooking n/a - canteen only has basic heating facilities - no stove or oven. Pollutants from vehicles n/a - no car parks.
	10 Acoustic Comfort	10.1	Internal Noise Levels	1 point is available where internal ambient noise levels in the nominated area are suitable and relevant to the activity type in the room. This includes all sound generated by the building systems and any external noise ingress.	1	1			Acoustics & MEP	Minimise noise intrusion from constant external sources (e.g. road) and services - requires acoustic consultant review to confirm achievability
		10.2	Reverberation	1 point is available where the nominated area has been built to reduce the persistence of sound to a level suitable to the activities in the space.	1	1			Acoustics	Reverberation times in the lower band of times specified in the Australian Standard AS2107:2016 - requires acoustic consultant review to confirm achievability
		10.3	Acoustic Separation	1 point is available where the nominated enclosed spaces have been built to minimise crosstalk between rooms and between rooms and open areas.	1	1			Acoustics	Wall Construction to minimise sound travelling between private rooms. Rw 45 for partitions R2 35 for partitions with door (Rw) from 30 to 35 for glazed operable walls between enclosed spaces only. (**Refer GBCA TQ R-14412)** Requires acoustic consultant review to confirm achievability.
	11 Lighting Comfort	11.0	**Minimum Credit Requirement:** Lighting Comfort	The minimum requirement is met where lights are flicker-free and accurately address the perception of colour in the space.	Conditional for credit	Anticipated			Electrical/Lighting	Typically standard practice. Compliance anticipated, to be reviewed against area definition
		11.1	General Illuminance and Glare Reduction	1 point is available where, in the nominated area: • Lighting levels and quality comply with best practice guidelines; and • Glare is eliminated.	1	1			Electrical/Lighting	Typically standard practice. - in line with EFSG lighting
		11.2	Surface Illuminance	1 point is available where, in the nominated area, a combination of lighting and surfaces improve uniformity of lighting to give visual interest.	1				Electrical/Lighting/Architect	Can be challenging to achieve surface reflectance for ceilings of at least 0.75 - pending architectural intent
		11.3	Localised Lighting Control	1 point is available where, in the nominated area, occupants have the ability to control the lighting in their immediate environment.	1	1			Electrical/Lighting	Localised control is generally good practice for school environment
	12 Visual Comfort	12.0	**Minimum Credit Requirement:** Glare Reduction	The minimum requirement is met where the glare in the nominated area from sunlight through all viewing façades is reduced through a combination of blinds, screens, fixed devices, or other means.	Conditional for credit	Anticipated			Architect	Internal Blinds to be included
		12.1	Daylight	Up to 2 points are available where a percentage of the nominated area receives high levels of daylight: • For 40% of the nominated area – 1 point; • For 60% of the nominated area – 2 points.	2	1	1		Architect	Recommended outcome, however may not be achieved due to depth of space. daylight calcs required to confirm.
		12.2	Views	1 point is available where 60% of the nominated area has a clear line-of-sight to a high quality internal or external view.	1	1			Architect	Recommended outcome - views calculations required to confirm
	13 Indoor Pollutants	13.1	Paints, Adhesives, Sealants and Carpets	1 point is available where at least 95% of all internally applied paints, adhesives, sealants and carpets meet stipulated 'Total VOC Limits', or, where no paints, adhesives, sealants or carpets are used in the building.	1	1			Head Contractor	Alignment with EFSG selection requirements
		13.2	Engineered Wood Products	1 point is available where at least 95% of all engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building.	1	1			Head Contractor	Alignment with EFSG selection requirements

PROJECT TITLE:	**Wee Waa High School**
DOCUMENT:	**Green Star - Design & As Built v1.3 Credit Summary**
REVISION:	**Rev 1**
AUTHOR:	Maeve Molins
DATE:	7/10/2021

Credit No.	Credit	#	Criteria	Requirement	Available points	High Achievability	Low-Medium Achievability	Not recommended	Responsibility	General discussion
ENERGY	14 Thermal Comfort	14.1	Thermal Comfort	1 point is available where a high degree of thermal comfort is provided to occupants in the space, equivalent to 80% of all occupants being satisfied in the space.	1	1			Architect/ESD/Mechanical	Should be achievable with attention to WWR, shading and glazing - thermal comfort modelling required to confirm.
		14.2	Advanced Thermal Comfort	1 additional point is available where a high degree of thermal comfort is provided to occupants in the space, equivalent to 90% of all occupants being satisfied in the space.	1	1			Architect/ESD/Mechanical	
	Indoor Environment Quality Total				**17**	**13**	**1**	**3**		
		15.0	Conditional Requirement	The minimum Deemed-to-Satisfy performance requirements stipulated within Part J1 of the NCC have been exceeded by at least 5%, and compliance with other applicable DTS requirements of Section J of the NCC must be achieved by the project .	**Conditional Requirement, must be achieved in order to be awarded a Green Star rating**					Achievable through good mechanical design and good practice envelope.
		15.0.1	Building Fabric							10% improvement on Section J DTS.
		15.0.2	Glazing							10% improvement on Section J DTS
		15.0.3	Minimum Point Threshold							N/A - 4 Star rating.
		15.A	**GHG Emissions Reduction - Prescriptive Pathway**	Up to 10 points are available where the project's GHG emissions have been reduced by employing 'best practice' building attributes.						
	15 Greenhouse Gas Emissions	15A.1	Building Envelope	1 point is awarded where the installed roofs and ceilings, floors and roof lights comply with all the following conditions: □ 10% increase on the minimum required total R-values specified for roofsand ceilings in Part J1.3, and floors in Part J1.6, including compliancewith J0.4 where applicable; and -For roofs, have an upper surface solar absorptance of at least 0.05 lessthan the maximum allowable value in Part J1.3; and -For roof lights, achieve a total system U-value of less than or equal to3.3 W/m².K; and -For roof lights, achieve a total system SHGC of less than or equal to85% of the maximum allowable value in Part J1.4.	1	1			Architect	10% improvement on Section J DTS - already EFSG requirement
		15A.2	Wall-Glazing Construction and Retail Display Glazing	Glazingcomplies with a set of prescriptive requirements that exceed minimum performance of the NCC Section J	1	1			Architect	10% improvement on Section J DTS - already EFSG requirement
		15A.3	Lighting	1 point is awarded where the internal artificial lighting complies with the following conditions: '-The actual installed aggregate illumination power is not more than90% of the maximum illumination power based on the maximumallowable lighting power densities defined in Table J6.2a; and -Automated lighting control systems, such as occupant detection anddaylight adjustment, are provided to 95% of the nominated area	1	1			Electrical	Illumination power max 90% on allowed power in Section J Automated lighting control system
		15A.4	Ventilation and Air Conditioning	All installed HVAC equipment complies with a set of prescriptive requirements that exceed minimum efficiency of the NCC Section J	1		1		Mechanical	Improve on Section J DTS efficiency for fans, pumps etc
		15A.5	Domestic Hot Water	1 point is awarded where domestic hot water systems are powered by one of the following heat sources: □ Renewable Energy; □ Electric heat pump (minimum COP 3.5 under design conditions); or □ Waste heat or heat recovered from another process.	1	1			Hydraulics	Aligns with EFSG - Gas not desired for DHW
		15A.6	Transition Plan	A transition plan has been developed showing how the building willtransition away from the use of fossil fuels by 2030;	1			1	SINSW	Must develop plan to phase out fossil fuels by 2030
		15A.7	Fuel Switching	1 point is awarded where no fossil fuels are burned on site to generate electricity, heating, or cooling; and either: -at least 15% of energy required by the building annually is generated byon site renewable solutions; or -two points have been achieved from 15A.1 – 15A.5	1		1		MEP	15% annual energy sourced from on site renewables
		15A.8	On-Site Storage	renewable energy storage procurement and use strategy has beendeveloped and demonstrates that the storage is sized to match therequirements of the building and that value will be provided to theproject;	1			1	SINSW	Could be achieved with battery
		15A.9	Vertical Transportation	1 point is awarded where the energy associated with lift machinery or other vertical transportation complies with the following conditions: □ The minimum lift energy efficiency is class A or B in accordance withISO 25745-2; and □ The lift idle and standby energy performance level is 1 in accordancewith ISO 25745-2.	1		1		Vertical Transport	N/A
		15A.10	Off-Site Renewables	Supply contract is in place to procure at least 50%of the building's electricity consumption through Off-site Renewableelectricity solutions.	2			2	SINSW	Commitment to procure Off site Renewable energy
	16 Peak Electricity Demand Reduction	16.A	Prescriptive Pathway - On-site Energy Generation	1 out of 2 points are available where it is demonstrated that the use of on-site electricity generation systems reduces the total peak electricity demand by at least 15%	2		1	1	Electrical	
	Energy Total				**22**	**4**	**4**	**14**		
TRANSPORT	17 Sustainable Transport	**17.A**	**Performance Pathway**	Up to 7 out of 10 points are available where projects provide access to sustainable transport infrastructure as demonstrated using specified prescriptive criteria						
					3	10			Transport Planner	GBCA approved that schools projects may target credit 17 Sustainable Transport-Performance Pathway using the SINSW Schools Transport Assessment process detailed in GBCA response **R-14426**
		17.B1	Access By Public Transport		3					
		17.B2	Reduced Car Parking		1				Transport	
		17.B3	Low Emission Vehicle Infrastructure		1				Transport	
		17.B4	Active Transport Facilities		1				Transport	
		17.B5	Walkable Neighbourhood		1					
	Transport Total				**10**	**10**	**0**	**0**		
WATER	18 Potable Water	**18.B**	**Prescriptive Pathway**	Up to 6 out of 12 points are available where it is demonstrated that the building's potable water consumption has been reduced through best practice water saving design features.						
		18.B1	Sanitary Fixture Efficiency		1	1			ESD/Architect	Must meet WELS rating for taps, showers, toilets, urinals, washing machines and dishwashers. Aligns with EFSG.
		18.B2	Rainwater Reuse		1	1			Hydraulics	Would require increase in current rainwater tank capacity - current proposed 10kL
		18.B3	Heat Rejection		2	2			Mechanical	no water based heat rejection
		18.B4	Landscape Irrigation		1	1			Landscape Consultant	No potable water used for landscape irrigation
		18.B5	Fire System Test Water		1				Fire Protection	Store or recirculate 80% of test water for use on site. - This credit is Not Applicable as the project does not use sprinklers.
	Water Total				**12**	**5**	**0**	**7**		
MATERIALS	19 Life Cycle Impacts	**19.B**	**Prescriptive Pathway - Life Cycle Impacts**	Up to 5 points are available where the project reduces the amount of building materials used. The following options are included in this pathway: Concrete; Steel; Building Reuse; and Structural Timber.						
		19B.1	Concrete	There are 8 points available between the options in this pathway. However, only a maximum of 5 points can be awarded depending on the project's specific conditions.	3			2	Head Contractor/Structural	Reduce Portland Cement content and use recycled water and aggregates in concrete mix
		19B.2	Steel		1			1	Head Contractor/Structural	Reduce steel mass (compared to a reference case)
		19B.3	Building Reuse		4			4		NA - new building
		19B.4	Structural Timber		3	1			Structural Engineer	Up to 3 points are available where the building is constructed from the following proportion of structural timber: □ 1 point for 30% of the building's GFA; □ 2 points for 70% of the building's GFA; and □ 3 points for 90% of the building's GFA.
	20 Responsible Building Materials	20.1	Steel	1 point is available where 95% of the building's steel (by mass) is sourced from a Responsible Steel Maker; and A. 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); OR B. For concrete framed buildings, at least 60% (by mass) of all reinforcing bar and mesh is produced using energy-reducing processed in its manufacture (measured by average mass by steel maker annually).	1	1			Head Contractor	Include in Contractor Specification
		20.2	Timber	1 point is available where at least 95% (by cost) of all timber used in the building and construction works is either: A. Certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification; OR B. Is from a reused source.	1	1			Head Contractor	Included in GC211 and EFSG
		20.3	Cables, Pipes, Floors and Blinds	1 point is available where 90% (by cost) of all permanent formwork, pipes, flooring, blinds and cables in a project either: A. Do not contain PVC and have an Environmental Product Declaration (EPD); OR B. Meet Best Practice Guidelines for PVC.	1	1			Head Contractor	Include in Contractor Specification
	21 Sustainable Products	21.1	Product Transparency and Sustainability	Up to 3 points are available when a proportion of all materials used in the project meet transparency and sustainability requirements under one of the following initiatives: A. Reused Products; B. Recycled Content Products; C. Environmental Product Declarations; D. Third-Party Certification; or E. Stewardship Programs. Points are calculated based on specified benchmarks for the percentage of compliant products used in the project.	3			3	Head Contractor	Not recommended for 4 Star - can be challenging to procure materials at high enough value whilst also aligning with EFSG material selection

PROJECT TITLE:	**Wee Waa High School**
DOCUMENT:	**Green Star - Design & As Built v1.3 Credit Summary**
REVISION:	**Rev 1**
AUTHOR:	Maeve Molins
DATE:	7/10/2021

Credit No.	Credit	#	Criteria	Requirement	Available points	High Achievability	Low-Medium Achievability	Not recommended	Responsibility	General discussion
LAND USE & ECOLOGY	22 Construction and Demolition Waste	22.B	Percentage Benchmark	1 point is available where the construction waste going to landfill is reduced by either: A. Minimising the total amount of waste sent to landfill when compared against a typical building; OR B. Diverting a significant amount of waste from going to landfill as a proportion of waste generated.	1	1			Head Contractor	Include in Contractor Specification - Best Practice Construction Waste Management. Required under EFSG Require consideration to waste processing facilities - will need to fill in disclosure statement.
	Materials Total				**14**	**5**	**0**	**9**		
	23 Ecological Value	23.0	**Minimum Credit Requirement:** Endangered, Threatened or Vulnerable Species	To meet the minimum requirement for this credit, the project must demonstrate that no critically endangered, endangered, or vulnerable species, or ecological communities were present on the site at time of purchase.	Conditional for credit	Anticipated				
		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 Ecological Value Calculator based on a comparison of the condition of the site before and after design/construction.	3		1	3		Challenging due to Greenfield Site
	24 Sustainable Sites	24.0	Conditional Requirement	The Conditional Requirement is met where, 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'.	**Conditional Requirement, must be achieved in order to be awarded a Green Star rating**					
		24.1	Reuse of Land	1 point is available where 75% of the site was Previously Developed Land at the date of site purchase or (for previously owned land) at the project's Green Star registration date.	1			1		Challenging due to Greenfield Site
		24.2	Contamination and Hazardous Materials	1 point is available where the site, or an existing building, was previously contaminated and the site has been remediated in accordance with a best practice remediation strategy.	1			1		It is understood there is no contamination on the site
	25 Heat Island Effect	25.0	Heat Island Effect Reduction	1 point is available where at least 75% of the total project site area comprises building or landscaping elements that reduce the impact of the heat island effect.	1	1			Architect/Landscape	Will require light coloured roof, shading, vegetation and external material selection (light/reflective materials)
	Land Use & Ecology Total				**6**	**1**	**1**	**4**		
EMISSIONS	26 Stormwater	26.1	Reduced Peak Discharge	1 point is available where the post-development peak event discharge from the site does not exceed the pre-development peak event discharge.	1			1	Civil	Risk due to flooding concerns on the site
		26.2	Reduced Pollution Targets	1 additional point is available, where the first point has been achieved and all stormwater discharged from site meets specified Pollution Reduction Targets.	1	1			Civil	
	27 Light Pollution	27.0	**Minimum Credit Requirement:** Light Pollution to Neighbouring Bodies	For the project to be awarded a point for this credit, the project must comply with AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting.	Conditional for credit	Anticipated			Electrical/Lighting	The project will comply with AS4282 'Control of the Obtrusive Effects of Outdoor Lighting.'
		27.1	Light Pollution to Night Sky	1 point is available where it can be demonstrated that a specified reduction in light pollution has been achieved by the project. Two options are available for demonstrating a reduction in light pollution.	1	1			Electrical/Lighting	
	28 Microbial Control	28.B	Legionella Impacts from Cooling Systems	1 point is available where: - The building is naturally ventilated; or - The building has waterless heat-rejection systems; or - The building has water-based heat rejection systems that includes measures for Legionella control and Risk Management.	1	1			Mechanical	No water based heat rejection
	29 Refrigerant Impacts	29.0	Refrigerant Impacts	1 point is awarded where one of the following criteria is achieved: - The combined Total System Direct Environmental Impact (TSDEI) of the refrigerant systems in the building is less than 15; or - The combined TSDEI of the refrigerant systems is between 15 and 35, AND a leak detection system with automated refrigerant recovery is in place - All refrigerants in the project have an ozone depletion potential of zero, and a global warming potential of 10 or less; or - Where there are no refrigerants employed by nominated building systems, this point is awarded.	1			1	Mechanical	Can be cost prohibitive with VRF system - multiple indoor units - each one would require leak detection system - typically this is not commercially viable.
	Emissions Total				**5**	**3**	**0**	**2**		
INNOVATION	30 Innovation	30 A	**Innovative Technology or Process**		10	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.				**note: GBCA approval should be sought for all innovation claims other than 30D 'Innovation Challenge'**
		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 the world.				
			DfMA	Innovation Opportunity to reward design strategies that minimise the need for internal refurbishment. Subject to GBCA approval.		1				
		30 C	**Improving on GS Benchmarks**			The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points. For credits where this Innovation criterion is applicable, improved benchmarks are included in the 'Innovation' section of the individual credit.				
			Stormwater				1		Civil	Possibility to target based on significant green space and length of swales which will remove pollutants. To be confirmed following MUSIC model.
		30 D	**Innovation Challenge**			The project can target any of the current Innovation Challenges that are published on the GBCA website. Alternatively, where the project addresses a sustainability issue not included within any of the credits in the existing Green Star rating tools, projects may propose a new Innovation Challenge.				
			Community Benefits			1			Architect	i.e. Use of facilities by community groups GBCA approved schools to target using the Schools Infrastructure policy 'Community Use of School Facilities' and the 'Share Our Spaces' program guide in lieu of a Needs Analysis Report. **Refer GBCA TQ R14478**
			Local Procurement			1			Architect/ Contractor	Employment of construction staff from local area and/or use of high number of products and materials from the local area. Benchmark to be set by project team.
			Design for Inclusivity			1			Architect/ Access Consultant	Exceed NCC and minimum requirements for Accessibility - look beyond Accessibility to provide Inclusive spaces for a diverse group of people and abilities- noting this school services a wide geographical area and must ensure the needs of all students can be promoted through design. Note: GBCA approves schools to target Universal Design, providing the Education Facilities Sustainable Guidelines (EFSG) in lieu of a needs analysis report.
			Indigenous Inclusion/ RAP			1			Architect	Project has engaged with and included meaningful strategies that acknowledge the traditional owners of the land. Project includes Indigenous education centre and celebrates and preserves traditions of Kamilaroi nation. DoE have a RAP - concepts should be embedded in the design & construction of the school - Refer GBCA FAQ 00101 can use an organisation Reconciliation Action Plan (RAP) to demonstrate compliance with the Innovation Challenge - Compliance requirements. The registered Green Star project must demonstrate a relationship to, and a role in delivering, the action items within the organisational RAP.
			Healthy Environments - Healthy Canteen			1			School Principal	**Refer GBCA R-14476**
		30E	**Global Sustainability**			Project teams may adopt an approved credit from a Global Green Building rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star rating tool.				
			Contribution to Place	(From Green Star for Buildings)		1			Architect	The project must comply with one of the following criteria: • Urban Context Report • Independent Design Review
			Stakeholder Engagement	(From Green Star Communities)		1			SINSW	Project has conducted extensive stakeholder engagement given the significance of the project
			Procurement and Workforce Inclusion	(From Green Star for Buildings)			1		Head Contractor	Contractor Requirement based on employment targets - '-The project implements a social procurement plan. - At least 2% of the building's total contract value has been directed to generate employment opportunities for disadvantaged and under-represented groups.
			Quality of Amenities	(From Green Star Interiors)		1			Architect	The project can target Green Star - Interiors v1.1 credit 14A Quality of Amenities for one (1) innovation point by replacing the needs analysis with the requirements set out in the Education Facilities Sustainable Guidelines (EFSG) Accommodation - Staff Room and Annex. The project team still need to demonstrate how the staff room provides quality and universally accessible spaces for teachers to enjoy. **GBCA TQ R-09652**
	Innovation Points Targeted				**10**	**9**	**1**			
	Innovation Award Total				**10**	**9**	**0**	**1**		
				Total Credits	**100**	**50**	**8**	**42**	**58**	
				Total Credits with Innovation	**110**	**59**	**8**	**43**	**67**	

Appendix B

Climate Risk Register & Adaptation Strategies

Climate Risks and Adaptation for Wee Waa High School				
Risk Category	**Climate-related risk to Wee Waa High School**	**Risk rating for near future (2030 projections)**	**Risk rating for far future (2070 projections)**	**Adaptation Strategies**
TEMPERATURE 	**Increase in Average Temperature:** ■ Damage or compromised reliability and durability of building components and materials ■ Decreased outdoor comfort for staff and students, and possible health and safety concerns when they engage in activities outdoors ■ Increased reliance on air conditioning, thus higher energy consumption and maintenance requirements	**Medium**	**Medium**	■ Mixed mode ventilation (HVAC system) for better indoor air temperature control ■ Effective building sealing and airtightness ■ Optimise passive design to promote passive cooling of the building and reduce demand on HVAC
	Higher Frequency of Extreme Temperatures: ■ Increase in electricity demand, resulting in possible brown or black outs ■ Decrease in indoor thermal comfort			■ Onsite generation to mitigate possible brown or blackouts ■ Selecting building materials that are durable to heat stress.
PRECIPITATION 	**Precipitation and drought – increase in the number of dry days:** ■ Decrease in water supply and potential water restrictions imposed by the local council ■ Lower water availability and increased demand for landscaping	**High**	**High**	■ Selecting water efficient appliance and equipment ■ Onsite rainwater storage to increase resilience against drought ■ Drought resilient landscaping

	Extreme Rainfall – Increase in Rainfall Variability: ■ Increased erosion and siltation due to storms/flooding ■ Extreme storm events with high winds causes damage to buildings and injury to people ■ Extreme storm events with high winds causes flying objects to injure people ■ Extreme rainfall overwhelms stormwater systems and causes flooding on site (inundation of stormwater channels)			■ Building design to consider high winds e.g. eliminate loose objects that could be a flying hazard ■ Landscaping to establish plants to reduce erosion and siltation ■ Landscaping to establish good root zones against strong winds
BUSHFIRE 	**Bushfires:** ■ Distant bushfire damages power infrastructure, resulting in power outage to the site ■ Distant bushfire smoke blows into the site, causing poor health outcomes to the occupants ■ Bushfire in the immediate site damages or destroys buildings and infrastructure	**Medium**	**Medium**	■ Install air quality sensors, air filters, and fire protection systems in buildings ■ Effective building sealing and airtightness to reduce poor air quality ■ HVAC system (mixed mode ventilation) can be toggled to active conditioning when there is poor air quality ■ Building arrangement allows for cross-site ventilation to reduce smoke build-up

Document prepared by

Aurecon Australasia Pty Ltd
ABN 54 005 139 873
Level 5, 116 Military Road
Neutral Bay NSW 2089
PO Box 538
Neutral Bay NSW 2089
Australia

T +61 2 9465 5599
F +61 2 9465 5598
E sydney@aurecongroup.com
W aurecongroup.com