



Sustainable Development Plan

Blakebrook Public School – Northern Rivers Schools Cluster
417 Rosehill Road, Blakebrook, NSW 2480

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E-LAB Consulting

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1 EXECUTIVE SUMMARY

This Sustainable Development Plan has been prepared on behalf ADCO for the proposed Blakebrook Public School development, located at 417 Rosehill Road, Blakebrook, NSW 2480.

This report provides an overview of the proposed sustainability targets for the project and the sustainability initiatives to be included. Information contained within this report has been prepared in consideration of:

- Educational Facilities Standards and Guidelines (EFSG) Sustainability Requirements.
- NCC 2019 Section J Amendment 1 Compliance
- 4 Star Green Star Design & As Built v1.3 equivalency
- Schools Infrastructure NSW Sustainability Initiatives

The project will implement several sustainable design initiatives designed to mitigate the environmental impacts of the following areas:

- Resilience – including a site-specific climate change risk assessment and adaptation plan.
- Energy & Carbon – energy efficiency across the buildings and use of on-site renewable energy
- Water Management – water efficient fixtures and fittings, collection and reuse of water and improved stormwater quality
- Health & Wellbeing - maximising daylight and improving indoor air quality through the use of low emissions materials
- Materials – consideration of the whole of life impact of materials and selection to minimise harm to the environment and efficient construction methods.

The following sections detail the development's specific sustainable design response in more detail.



2 INTRODUCTION

The existing buildings at Blakebrook Public School, 417 Rosehill Road, Blakebrook (Lot 2 Deposited Plan (DP) 859866) were significantly inundated during the February / March 2022 floods and most of the structures are no longer habitable due to the damages caused by the flood waters. As a result, the NSW Department of Education is proposing to demolish most of the existing school buildings and construct a new elevated school building to replace it. The floor level of the new building will be located above the design flood level to increase flood resistance and create useable undercroft spaces.

The works are being undertaken as a Development Application (DA) to Lismore City Council (Council)

The proposed development is to be undertaken in two (2) stages as follows:

- Stage 1: Demolition of the existing buildings and tree removal (separate Early Works DA)
- Stage 2: Construction of a new elevated school building and landscaping and ancillary works and structures (this Main works DA).

The Main Works development comprises:

- Construction of a new elevated school building, with at-grade (undercroft) amenities and storage, including:
 - Ground Level:
 - Open undercroft space for covered outdoor learning and play.
 - Male and female amenities and accessible toilet / change room facility.
 - Cleaners' store.
 - Equipment store.
 - Sport equipment store.
 - Elevated Level:
 - New administration comprising interview room, clerical spaces, Principal's office, staff room, sick bay and male, female and accessible amenities.
 - School library with computer room, store, main communications room and library office.
 - Four (4) General Learning Spaces (GLS) with learning commons and multi-purpose space.
 - Canteen with open servery space.
 - Store.
 - Male, female and accessible amenities.
 - Mechanical plant.
- New and hard soft landscaping including replacement play equipment, vegetable garden, fernery and yarning circle.
- New hydrant pump house with fire tanks.
- Relocation and replacement of existing septic tanks and water tanks.

It is not proposed to increase staff or student numbers as a result of these works.



2.1 SITE AND LOCATION

The site is located at 417 Rosehill Road, Blakebrook, NSW, within the City of Lismore LGA.

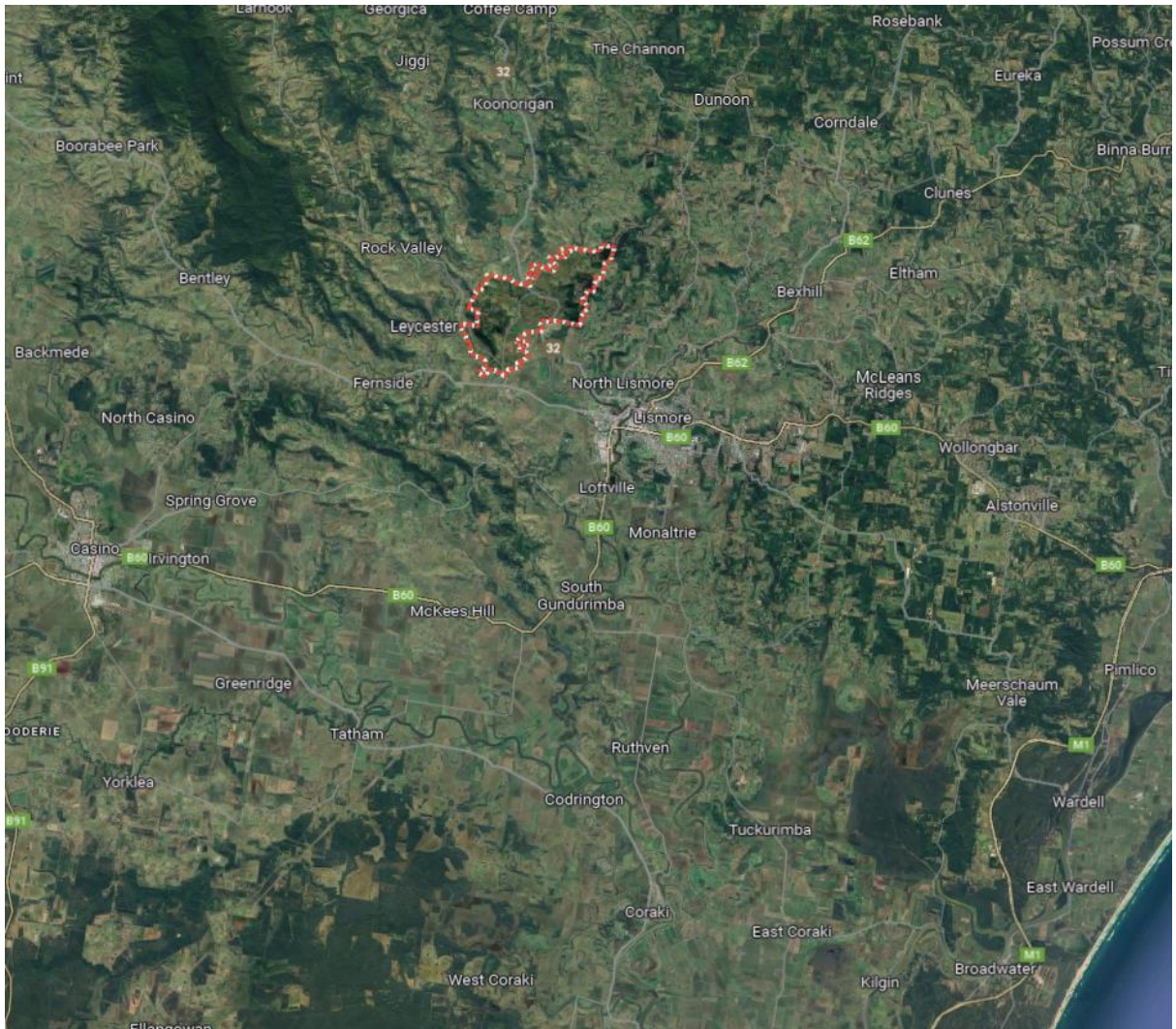


Figure 1: Site and Local Context (Source: Google Maps)

3 SUSTAINABILITY DRIVERS

3.1 OBJECTIVES

To demonstrate excellence in sustainability, the Blakebrook Public School development is targeting the following sustainability outcomes:

- Aligning the overall vision of the project with the ESD principles outlined in the Environmental Planning and Assessment Regulation
- Compliance with the Educational Facilities Standards and Guidelines (EFSG) – Technical Standards by the Department of Education
- Exceeding the requirements of Section J of the National Construction Code 2019
- 4 Star Green Star Design & As Built v1.3 equivalency
- Inclusion of initiatives to minimise energy and water demand and minimising overall environmental impacts.

3.2 EDUCATIONAL FACILITIES STANDARDS AND GUIDELINES (EFSG)

The Educational Facilities Standards and Guidelines outline a number of ESD principles in 001c Design Checklist – Sustainability including:

- NSW Government Resource Efficiency Policy
 - This outlines that projects will achieve a 4 Star Green Star rating
- Planning for sustainable development
- Climate Change Adaptation
 - Comprehensive climate change risk assessment
- Energy Conservation
 - Passive Design
 - Lighting and daylight
 - Views
 - Glare control and shading
 - Lighting and HVAC Controls
 - Energy efficient Appliances and equipment
 - Renewable Energy Generation
- Water Conservation
 - Water efficient appliances
 - Roof water harvesting and tank storage
 - Stormwater Management
- Sustainable Materials
 - Timber and low formaldehyde-emitting engineered wood products
 - Low VOC materials
 - Pesticides
- Ecological Conservation



- Waste Management
 - Construction and demolition waste
 - Operational Waste
 - Operational waste management plan
 - Waste management service contract
 - Waste avoidance
 - Waste minimisation
 - Waste disposal

The initiative of the design checklist have been incorporated into the design of the school, the connection between the design checklist and the Green Star pathway is outlines in Appendix A



4 PROJECT SUSTAINABILITY DESIGN RESPONSE

4.1 ENERGY EFFICIENCY

Energy consumption on the site will be minimised through excellent design and performance. In order to maximise the overall energy efficiency of the site, demand must first be reduced, then systems must be designed in the most efficient manner. On-site renewable energy should be maximised to the full potential on the site. It is only then that projects should look to offset using purchased carbon offsets.

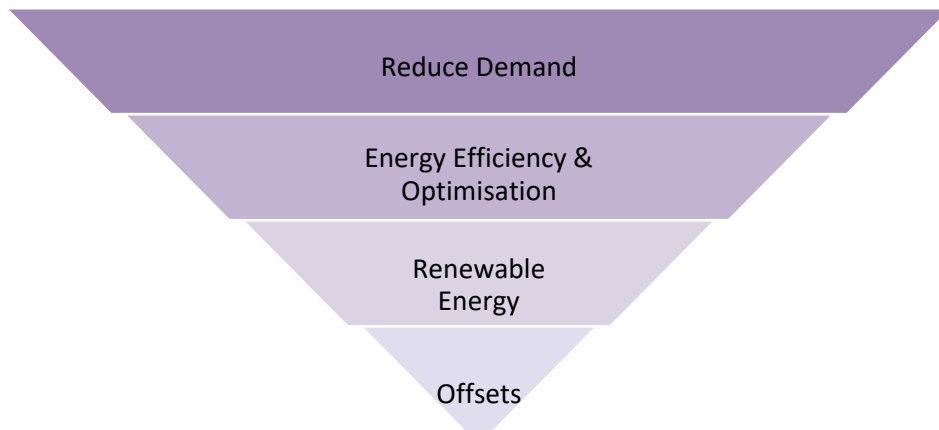


Figure 2 Hierarchy of Design - Energy Efficiency

4.1.1 High Performance Building Fabric

The building fabric has been carefully designed using a combination of solid elements and glazing. Fixed shading devices, overhangs and screens all serve to control heat gains through the façade in summer whilst maintaining good daylight and views.

The glazing performance will be a low-e system. This system is designed to reduce heating and cooling loads and complies with NCC 2019 Section J requirements for building fabric. It will also deliver greater comfort in the space to users, reduce energy consumption and improve indoor quality.

4.1.2 Design for Manufacture and Assembly (DfMA)

A key component of this development is a design for manufacture and assembly system. This system allows elements like insulation and thermal bridging to be addressed upfront and incorporated directly into the offsite manufacture of components. This improves the overall thermal performance of the facade system. The depth of the grid system uses also serves to maximise cross flow ventilation.

4.1.3 Natural & Mixed Mode Ventilation

Circulation and communal spaces will be designed to operate as naturally ventilated spaces. The buildings have been designed to allow air to flow between buildings and through covered walkway areas. This reduces the overall energy consumption of the development.

4.1.4 Renewable Energy

In line with Design Checklist 0.06 Energy, the project has been designed to incorporate photovoltaic systems on the roof. This will produce onsite renewable energy to reduce energy costs and provide an educational piece for students and staff. The size of the system will be determined through the detailed design phase.

4.1.5 Lighting

High efficiency LED lighting systems are to be provided as per the requirements of the design checklist for sustainability and lighting (0951) within the EFSG. This along with lighting control measures such as occupancy sensors and daylight sensors will aid in reducing the overall lighting energy demand.

4.2 WATER EFFICIENCY

Several considerations have been made to use and discharge water responsibly to improve the development's impact on the water cycle. The EFSG nominates several features in 0811 Sanitary fixtures and 0812 Tapware which will be incorporated, including:

- The following **water efficient fixtures** will be targeted:
 - 6 Star WELS rated taps
 - 4 Star WELS dual flush toilets
 - Showers <6L/min
 - Urinals will be maximum 0.8L/flush (6 Star WELS)
- **Rainwater harvesting and use** will be incorporated to maximise non-potable water usage on site
- **Landscaping** will be designed to be low water use, with the following to be implemented:
 - Incorporation of native and low maintenance vegetation
 - Irrigation supply from non-potable water sources
 - Sub soil drip irrigation systems to minimise evaporation
- **Water Sensitive Urban Design** is a strong focus for the development, especially due to the proximity to the overland flow paths. Several strategies have been put in place to ensure water is intercepted and filtered before it reaches waterways and reduces overall stormwater discharge. The use of onsite water detention and filtration systems will be used to minimise the impacts on council stormwater systems

4.3 DFMA & RESOURCE EFFICIENCY

Construction materials are a highly carbon intensive component of any development. They often involve very energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development. The use of the design for manufacture and assembly system for this project brings about significant sustainability benefits. The DfMA system is a process which combines the manufacture of building components, such as walls and facades, in a factory environment. These components are brought onto site and assembled, resulting in a more efficient construction methodology. Several sustainability benefits arise out of this process:

- Reduced material waste – the modularity of the system allows materials to be precisely manufactured and ordered. There are fewer off cuts of materials such as plasterboard, insulation, piping and joinery as grids are standardised and due to precision manufacturing.
- Less impacts of site activities – reduced construction time in turn means less impacts on the site environment. Fuel emissions, noise disturbance is drastically reduced.
- Construction precision – the modular and pre-fabricated nature of the system allows for more efficient thermal construction minimising thermal bridging and reducing overall operational energy demand.

4.4 INDOOR ENVIRONMENT QUALITY

Improved indoor environment quality is a significant by-product of sustainable building design. The architectural design provides significant consideration to the incorporation of elements to improve indoor environment quality:



- **Covered walkways** have been designed to allow students to around the building while being protected from the elements, while providing a connection to nature that indoor corridors are unable to provide.
- **Views** have been considered for each of the buildings to optimise access to the outdoor environment while balancing that with thermal control
- **Daylight glare** is minimised through the use of screens and overhangs on each façade
- **Artificial lighting** will be designed appropriately to minimise glare reduction and providing adequate illuminance levels. This will be done through careful luminaire selection and placement.
- **Acoustic comfort** will be optimised to ensure internal noise levels, reverberation levels and separation levels are achieved in line with best practice standards.
- **Materials and finishes** will be selected to be low-VOC and low formaldehyde to minimise off-gassing and provide a better quality environment for staff and students.



5 GREEN STAR

The development will be targeting a **4 Star Green Star Design & As Built v1.3 equivalency rating**. This reflects 'national best practice sustainable building principles' as a minimum performance requirement.

Widely considered as the benchmark environmental assessment tool within the Australian Property Industry, Green Star is an independent accreditation framework which delivers sustainable built outcomes throughout the project lifecycle. Green Star is a credits-based star rating system ranging from one through to six stars.

Green Star assesses the environmental performance of projects in design, construction and operation via the following category frameworks:

- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land use & Ecology
- Emissions; and
- Innovation

The project has been assessed against the Green Star framework and the following table outlines the preliminary scorecard for the development:

CATEGORY	POINTS AVAILABLE	POINTS TARGETED
Management	14	10
Indoor Environment Quality	17	12
Energy	22	5
Transport	10	10
Water	12	5
Materials	12	1
Land Use & Ecology	6	1
Emissions	5	2
Innovation	10	5
Total	110	51

Refer to Appendix A for the full Green Star Pathway.



6 SUSTAINABLE BUILDING SEPP

Currently, in NSW there are currently no consistent sustainability provisions for that consent authorities can refer to when assessing non-residential buildings. To address this, the new Sustainable Buildings SEPP asks consent authorities to consider how the building will:

- minimise waste from associated demolition and construction, including choice and reuse of building materials,
- reduce in peak demand for electricity, including through the use of energy efficient technology,
- generate and store renewable energy,
- reduce reliance on artificial lighting and mechanical heating and cooling through passive design
- meter and monitor energy consumption,
- minimise consumption of potable water

This is a requirement for all new non-residential developments with a capital investment value over \$5 million.

For this development the following requirements need to be met under the Sustainable Building SEPP:

- General sustainability reporting
- Embodied emissions reporting
- Net Zero Statement

There are more stringent requirements for offices over 1,000m² and hotel and motels rooms or services apartments with more than 100 room/services apartments. However, these requirements do not relate to the Blakebrook development.

As the project is targeting a 4 Star Green Star Design & As Built v1.3 equivalency rating the requirements within the new sustainable building SEPP have been met through the credits that are being targeted under the equivalency rating. See table below,

MEASURE	SUSTAINABLE BUILDING SEPP REQUIREMENT	PROJECT APPLICATION
General sustainability reporting	Reporting on general performance, including water conservation, waste minimization and use of renewable energy.	Credit 2 of the Green Star equivalency rating achieves this as it requires the development to report on the predicted energy and water use in the development
Embodied emissions reporting	Disclose at development application and construction certificate the quantities of materials and associated emissions. Describe how embodied emissions are minimised (by re-used or recycled content and low emissions construction technologies). Use NABERS embodied emissions materials form until NABERS framework is ready.	Embodied carbon calculations are being carried out by the QS
Net Zero Statement	Demonstrate at development application that the development is designed with sufficient space and infrastructure so all energy needs can be sourced from renewables by 2035	Energy modelling and peak energy reductions calculation have been undertaken as part of credit 15 and 16. The modelling will outline the amount of renewables required to ensure sufficient space for infrastructure.



7 NCC 2019 SECTION J

Section J of the National Construction Code 2019 relates to the energy efficiency of buildings. Section J is a minimum performance target for standard buildings and specifies minimum deemed-to-satisfy (DTS) requirements, for building fabric and services.

The proposed development aims to demonstrate compliance with the requirements using the Part J4 compliance methodology to allow for the intricacies of the project design.

The development is located within the NCC Climate Zone 2, which is considered the 'hot dry summer, cool winter' climate.

The table below outlines the thermal performance requirements for the development.

ELEMENT	MINIMUM PERFORMANCE
Roof/ceiling	R3.7 m ² /K/W (downward heat flow) with solar absorptance <0.45
External walls	R2.0 m ² /K/W (including the impacts of thermal bridging)
Internal walls	R2.0 m ² /K/W (including the impacts of thermal bridging)
Suspended floor slabs	R2.0 m ² /K/W (upwards and downwards heat flow)
Slab on ground	None
Glazing (External Fixed windows)	U Value 4.4 SHGC 0.65
Glazing (External louvres)	U Value 5.4 SHGC 0.4
Glazing (Internal windows)	U Value 5.9 SHGC 0.77



8 CLIMATE CHANGE RESILIENCE STATEMENT

As part of the Green Star response for the development and in line with EFSG requirements, the project will be evaluated using a full climate adaptation and risk assessment as per AS 5334-2013 and Green Star Design & As Built v1.3 to determine the design responses to be incorporated in the development.

As part of the initial design response for the project, an assessment of project risks associated with the predicted impacts of Climate Change has been undertaken for the proposed development. The assessment has been undertaken to ensure the project design allows for suitable provisions for the predicted impact of climate change scenarios. The NSW Government's NSW and ACT Regional Climate Modelling (NARCLiM) projections for the North Coast were used.

The NARCLiM modelling is on a regional basis, therefore Blakebrook Public School falls within the North Coast Region. The data from this region has been analysed.

8.1 CLIMATE ADAPTATION WORKSHOP

A Climate Change Adaptation Workshop will be carried out by the project team through the early design phase.

8.2 PROJECTED CLIMATE RISKS

Based on the NARCLiM data, the initial site-specific risks are as follows (these will be further explored in the climate adaption workshop):

- 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
- 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 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
- Bushfires: Harsher fire-weather climate is projected for the near- and far-future, especially during spring and summer.



8.3 PROJECT DESIGN RESPONSE

Potential adaptation strategies to the climate risks outlined above may be:

1. Flooding impact assessment has considered impacts of climate change in modelling
2. Mechanical systems designed to comply with the Bushfire Assessment requirements
3. Passive design and outdoor shading to promote comfort in extreme heat
4. Onsite rainwater storage and energy generation
5. Material selection focus on durability to climate stress such as extreme heat and wind loads
6. Landscape design to suit climactic conditions and tolerate dry periods

8.4 CLIMATE ADAPTATION PLAN

A detailed climate risk assessment and plan will be completed to ensure the climate risks and design response are captured and incorporated into the design of the development.



9 SUMMARY

Ecologically Sustainable Design is a driving consideration in the development of the proposed Blakebrook Public School. The project will incorporate several ESD initiatives in both design and operation. This will be benchmarked through formal certification to an independent third-party certification scheme, Green Star.

The development's commitment to reducing the overall environmental impact by incorporating initiatives covering:

- Educational Facilities Standards and Guidelines (EFSG) – Technical Standards Sustainability Requirements.
- NCC 2019 Section J Amendment 1 Compliance
- 4 Star Green Star Design & As Built v1.3 equivalency
- Schools Infrastructure NSW Sustainability Initiatives

Additional supporting information is provided within the Appendices of this report:

- Appendix A – Green Star Pathway
- Appendix B – EFSG ESD – Technical Standards

We trust this Sustainable Development Plan report provides sufficient overview of the project sustainability vision for the proposed Blakebrook Public School development.



Appendix A **GREEN STAR PATHWAY**



Green Star - Design & As Built Scorecard

Project:	Northern Rivers School
Targeted Rating:	4 Star - Best Practice

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Core Points Available	Total 4 Star Score Targeted
100	51



Category / Credit	Aim of the Credit / Selection	Code	Credit Criteria	Points Available	Points Targeted 4 Star	Responsible Party	Risk	EFSG Technical Standard	Relevant EFSG section/ information	Comments
Management				14						
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.1	Accredited Professional	1	1	ADCO	Low			ESD Consultant to be engaged throughout the project as project GSAP, including workshops, providing assistance and preparing Green Star submission. Requirement for EFSG. E-LAB have been engaged.
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies	E-LAB	Low	-SINSW Environmental Performance Plan		A project specific Design Intent Report must be developed. Services to provide input with description of systems in specifications. To be completed by E-LAB.
		2.1	Services and Maintainability Review	1	1	ADCO	Low	0001c Design Checklist - Sustainability	0.06 Energy conservation - Building air tightness testing	SINSW have a pre-approved TQ with GBCA to achieve this credit by demonstrating that the project has been delivered as per the EFSG and any issues have been rectified. Evidence to be provided in the form of a report. TBC with SINSW if there is a template Services & Maintainability Review Report specific to EFSG.
		2.2	Building Commissioning	1		C&TS	Low			Comprehensive commissioning activities to be carried out in line with CIBSE and AIRAH Guides. To be led by C&TS team from SINSW.
						ADCO	Med	0001c Design Checklist - Sustainability	0.06 Energy conservation - Passive Design	Requires air tightness testing to be completed and meet standards for high performance façade. EFSG requires tightness to be considered during the design development stage
		2.3	Building Systems Tuning	1		SINSW ADCO	Low			Can be targeted - SINSW needs to commit for the 12 month tuning period.
		2.4	Independent Commissioning Agent	1		SINSW C&TS	Low			SINSW have a pre-approved TQ with GBCA to achieve this credit by using the Commissioning and Temporary Schools Team (C&TS) team in lieu of engaging a dedicated ICA.
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	2	ADCO	Low	0001c Design Checklist - Sustainability	0.05 Climate Change Adaption	Climate Adaptation Plan can be developed. This should be targeted and will be easy to complete due to the high risk of floods.
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	1	ADCO	Low			All subcontractors to provide O&M manuals and Building Log Book(s) in line with CIBSE TM31. Building Users Guide to be developed & provided to building users.
Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1	SINSW	Low			SINSW to report internally on building performance, including energy and water as a minimum. SINSW has a letter template for this credit.
		5.2	End of Life Waste Performance	1	1	SINSW	Med			SINSW to commit to extending the life of internal fitout for 10 years (excluding general wear and tear). SINSW has a End of Life Waste Performance letter template for schools.
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-		ADCO	N/A			Not targeted. Would require accessible metering for all uses plus all loads >5% of annual energy use or > 100kVA plus metering of all demands >10% of water use. Floor by floor metering of electricity & separate uses (e.g. hall). Metering to be commissioned and validated in accordance with NABERS protocols. System must be capable of producing alerts for misuse.
		6.1	Monitoring Systems	1		ADCO	N/A			Not targeted. Requires Metering Schedule including type, location and consumption estimates. Monitoring Strategy to CIBSE TM39. 15min interval reporting capability, plus hourly, daily, monthly and annual interval (user-adjustable) energy reporting including power factor monitoring. Quarterly report generation automatic and alarms for out of range data.
Responsible Construction Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies	ADCO	Low			ADCO to develop best practice Environmental Management Plan for the project. Business as Usual for ADCO.
		7.1	Environmental Management System	1	1	ADCO	Low			ADCO is ISO14001 certified.
		7.2	High Quality Staff Support	1	1	ADCO	Low			Programs and policies in place going beyond legal OHS requirements promoting physical well-being and mental health.
Operational Waste	A. Performance Pathway	8A	Performance Pathway: Specialist Plan	1	1	WASTE CONSULTANT ARCHITECT	Low	0001c Design Checklist - Sustainability	0.10 Waste Management - Operational Waste	Separate bin storage required for general waste, paper & cardboard, glass, plastic AND at least 1 other waste stream. OWMP to be developed
Total				14	10					

Green Star - Design & As Built Scorecard

Project:	Northern Rivers School
Targeted Rating:	4 Star - Best Practice

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Core Points Available	Total 4 Star Score Targeted
100	51



CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED 4 STAR	RESPONSIBLE PARTY	RISK	EFSG Technical Standard	Relevant EFSG section/ information	COMMENTS
Indoor Environment Quality				17						
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	1	MECHANICAL	Med			Ventilation systems intakes and exhausts designed to ASHRAE 62.1, have adequate access to both sides of heating & cooling coils, humidifiers & filters. Ductwork to be blue bagged on site prior to installation.
		9.2	Provision of Outdoor Air	2		MECHANICAL	N/A			Not targeted.
		9.3	Exhaust or Elimination of Pollutants	1	1	MECHANICAL, SINSW	Low	0001c Design Checklist - Mechanical	0.06 Ducted dust extraction - Dust extraction Space 0.07 Duplication/printing room ventilations 0.08 Fume cupboards	Any print/photocopy equipment to comply with emissions guidelines or located in enclosed room. Mechanical consultant to ensure cooking processes and vehicle exhausts comply with credit requirements
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1	ACOUSTIC	Low	0001c Design Checklist - Acoustic	0.03 Internal Noise levels	Acoustic Consultant to ensure compliance with this credit. Internal noise levels no more than 5dB(A) above lower figure in AS/NZ 2107:2016. Testing required at completion.
		10.2	Reverberation	1	1	ACOUSTIC	Med	0001c Design Checklist - Acoustic	0.04 Room Acoustics 0.07 Acoustic Performance Standards	Acoustic Consultant to ensure compliance with this credit. Spaces to meet reverberation times outlined in AS/NZ 2017:2016. Typically achievable for school projects.
		10.3	Acoustic Separation	1		ACOUSTIC	Med			Targeted using approved TQ 14412 showing glazed operable walls meet RW30
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies	ELECTRICAL	Low	0001c Design Checklist - Sustainability	0.06 Energy Conservation - Lighting and daylight	CRI >80% and 12-bit or greater resolution for LED drivers or flicker free luminaires
		11.1 General Illuminance and Glare Reduction	11.1.1 General Illuminance	1	1	ELECTRICAL	Low	09 Electrical - 0951 Lighting	0.03 Lighting Design - Design Considerations	Best practice lighting levels in line with AS/NZS 1680.2 to be achieved. Isolux plots to be provided.
			11.1.2 Glare Reduction							All luminaires to have diffusers or meet UGR values of AS 1680.1. Isolux calculations to be provided.
		11.2	Surface Illuminance	1	1	ELECTRICAL	Low	09 Electrical - 0951 Lighting	0.03 Lighting Design - Illuminance	Requirement of 0951 Lighting
		11.3	Localised Lighting Control	1	1	ELECTRICAL	Med	09 Electrical - 0951 Lighting	0.07 Local Switching	Local Switching is referred to in the EFSG
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies	ARCHITECT	Low	0001c Design Checklist - Sustainability	0.06 Energy Conservation - Glare control and shading	Requires blinds with VLT <10% to all teaching and learning spaces.
		12.1	Daylight	2	1	E-LAB	Med	0001c Design Checklist - Sustainability	0.06 Energy Conservation - Lighting and daylight	Minimum 40% of floor area to be provided with high levels of daylight. Based on layouts, should be achievable. To be confirmed with daylight modelling.
		12.2	Views	1	1	E-LAB	Low	0001c Design Checklist - Sustainability	0.06 Energy Conservation - Views	Minimum 60% of floor area to have high quality external view. Based on layouts, should be achievable. To be confirmed via calculations.
Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1 Paints, Adhesives, Sealants and Carpets	13.1.1 Paints, Adhesives and Sealants	1	1	ADCO	Med	0001c Design Checklist - Sustainability 01 GENERAL/ 0181 ADHESIVES, SEALANTS AND FASTENERS	0.08 Sustainable Matials - Low VOC Materials VOC Limit to comply with Green Star requirements	Requires 95% of products comply with Total VOC limits prescribed. Carpets to be selected to be compliant (through test certificates or GECA/GreenTag certification)
			13.1.2 Carpets					0001c Design Checklist - Sustainability 06 Finish / 0652 Carpets	0.08 Sustainable Matials - Low VOC Materials VOC Limit to comply with Green Star requirements	
		13.2	Engineered Wood Products	1	1	ADCO	Med	0001c Design Checklist - Sustainability	0.08 Sustainable Matials - Timber and low formaldehyde-emitting engineered wood products	Requires 95% of products to comply with formaldehyde limits prescribed. E0 or E1 typically.
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1	MECHANICAL / E-LAB	Low	0001c Design Checklist - Mechanical	0.02 Cooling Policy - DG55 (as an interim policy) 0.03 Heating	High degree of thermal comfort to be provided (-1<PMV<+1). Demonstrated via ESD Consultant modelling.
		14.2	Advanced Thermal Comfort	1		MECHANICAL / E-LAB	N/A			Not targeted - Very high degree of thermal comfort to be provided (-0.5<PMV<+0.5). May not be achievable with mixed mode spaces.
Total				17	12					

Green Star - Design & As Built Scorecard

Project:	Northern Rivers School
Targeted Rating:	4 Star - Best Practice

Rev 02
CM | 10 / 07 / 2023
Project: P00700

Core Points Available	Total 4 Star Score Targeted
100	51



CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED 4 STAR	RESPONSIBLE PARTY	RISK	EFSG Technical Standard	Relevant EFSG section/ information	COMMENTS
Energy				22						
Greenhouse Gas Emissions	E. Reference Building Pathway	15E.0	Conditional Requirement: Reference Building Pathway	-	Complies	E-LAB	Low	0001c Design Checklist - Sustainability	0.06 Energy Conservation	Minimum improvement of 10% against NCC 2019 reference building.
		15E.1	GHG Emissions Reduction: Building Fabric	4		MECHANICAL, ELECTRICAL, ARCHITECT	Med			Anticipated that SINSIW projects should be able to achieve at least 4 points with possibility to achieve 2 additional points to be confirmed with energy modeling. EFSG design considerations below • Thermal insulation – Greater than minimum code stipulations to ensure adequate insulation in installed to achieve low cooling and heating demand.
		15E.2	GHG Emissions Reduction	16	4	MECHANICAL, ELECTRICAL, ARCHITECT	Med			• Thermal bridge free envelope – Insulation is continuous with penetrations insulated. • High performance windows – Prioritisation of sealed double or triple glazed windows. • Building design to support heat recovery and energy efficient mechanical plant – to recover energy from exhausted air and reduce electricity & natural gas consumption.
		15E.3	Off-Site Renewables	8			N/A			Not targeted. Requires SINSIW would need to enter into Power Purchase Agreement to source electricity from certified renewable electricity for 10 years.
		15E.4	District Services	7			N/A			Not targeted as no precinct scale services.
		15E.5 Additional Prescriptive Measures	15E.5.1 Transition Plan	1			N/A			Not targeted. Requires the development of a plan to move away from fossil fuels by 2030.
			15E.5.2 Fuel Switching	2		ADCO	Med			2 additional points if no Gas is used on site
			15E.5.3 On-Site Storage	1			N/A			Not targeted, requires battery storage system. Likely not feasible given cost & usage pattern
Peak Electricity Demand Reduction	B. Performance Pathway	16B	Modelled Performance Pathway: Reference Building	2	1	E-LAB	Low	0001c Design Checklist - Sustainability	0.06 Energy Conservation - Renewable Energy Generation	Peak demand modelling to confirm compliance with this credit
Total				22	5					

Transport				10						
Sustainable Transport	A. Performance Pathway	17A	Performance Pathway	10	10	TRANSPORT	Med	SINSW TQ with the GBCA		Note: SINSIW has a Transport Assessment: Template which has been approved by the GBCA. If this template is followed to produce a specific School Transport Plan, 10 points are available. School Transport Plan to be reviewed.
Total				10	10					

Water											12			
Potable Water	B. Prescriptive Pathway	18B.1	Sanitary Fixture Efficiency	1	1	ARCHITECT	Low	0001c Design Checklist - Sustainability	0.07 Water Conservation - Water efficient Appliances	High efficiency WELS fixtures in line with EFSG (6 star taps, 4 star toilets, <6 L/min showers, 6 star urinals, dishwashers, washing machine)				
		18B.2	Rainwater Reuse	1	1	HYDRAULIC	Med	0001c Design Checklist - Sustainability	0.07 Water Conservation - Roof water harvesting and tank storage	Re-use of rainwater for landscape irrigation (connected to taps) EFSG requires rainwater connection to urinals				
		18B.3	Heat Rejection	2	2	MECH	Low	0001c Design Checklist - Sustainability		Waterless heat rejection systems				
		18B.4	Landscape Irrigation	1	1	LANDSCAPE	Low	0001c Design Checklist - Sustainability		TQ 14546 Landscape irrigation to be persued.				
		18B.5	Fire Protection System Test Water	1										
Total				12	5									

Green Star - Design & As Built Scorecard

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100	51



CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED 4 STAR	RESPONSIBLE PARTY	RISK	EFSG Technical Standard	Relevant EFSG section/ information	COMMENTS
Materials				14						
Life Cycle Impacts	A. Performance Pathway - Life Cycle Assessment	19B.1	Comparative Life Cycle Assessment	6		ADCO	N/A			It is not mandatory under the EFSG and there may be costs associated to achieve in regional areas.
		19B.2	Additional Reporting	4		ADCO	N/A			Additional reporting and LCA design review.
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1		ADCO STRUCTURE	N/A			Steel sourced from responsible steel maker.
							N/A			Steel sourced from responsible steel fabricator and at least 60% produced using energy reducing processes.
		20.2	Timber	1		ADCO STRUCTURE	N/A			Requires at least 95% by cost of timber to be FSC/PEFC certified with CoC or reused.
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1		ADCO HYDRAULICS FIRE MECHANICAL ELECTRICAL	N/A			90% of cables, pipes, flooring, blinds either: - do not contain PVC - meet Best Practice Guidelines for PVC Typically BAU across items tracked. Includes non PVC items
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3		ADCO	N/A			Products need to have the relevant certifications i.e. EPDs, recycled/reused content, 3rd party certification or product stewardship. Relevant products include rebar, paints, flooring/finishes with EPD's.
Construction and Demolition Waste	B. Percentage Benchmark	22.0	Reporting Accuracy	-	Complies	ADCO WASTE	Med			Waste contractors and facilities to hold compliance verification summaries. TBC if can be achieved in regional locations otherwise disclosure statements can be used.
		22B	Percentage Benchmark	1	1	ADCO WASTE	Med	0001c Design Checklist - Sustainability	0.10 Waste Management - Construction and demolition waste	1 pt - 90%+ diversion from landfill. Requires Waste Contractor to hold compliance Summary verification, and provide reporting in line with Green Star Standard.
Total				14	1					

Land Use & Ecology				6						
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies	E-LAB / LANDSCAPE	Low	0001c Design Checklist - Sustainability	0.09 Ecological Conservation	No endangered species on site
		23.1	Ecological Value	3		ADCO	N/A			Unlikely to be achieved
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies	E-LAB	Low			Site does not contain old growth forest, prime agricultural land or wetland of 'High National Importance'.
		24.1	Reuse of Land	1		ADCO	N/A			Not targeted - 75% of the land needed to be developed to target this credit
		24.2	Contamination and Hazardous Materials	1		ADCO	N/A			Could be targeted if site was previously contaminatinated
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.1	Heat Island Effect Reduction	1	1	ARCHITECT	Low			Architect to ensure compliance with this credit.
Total				6	1					

Emissions				5						
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1		CIVIL	Low	0001c Design Checklist - Sustainability 02 Site, Urban and open spaces/ 0224 Stormwater - site	0.07 Water Conservation - Stormwater management	No specific requirement in the EFSG to reduce the peak discharge
		26.2	Stormwater Pollution Targets	1		CIVIL	Low	0001c Design Checklist - Sustainability 02 Site, Urban and open spaces/ 0224 Stormwater - site	0.07 Water Conservation - Stormwater management	No specific requirement in the EFSG to reduce improve storm water quality
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies	LANDSCAPE / ELECTRICAL	Low			All outdoor lighting to comply with AS4282:1997 for light spill to inhabited boundaries. Electrical consultant to ensure compliance
		27.1	Light Pollution to Night Sky	1	1	LANDSCAPE / ELECTRICAL	Low			Requires upward light output ratio <5%; OR Max direct illuminance of 0.5 lux to site boundary and 0.1 lux to 4.5m beyond site boundary. Electrical consultant to ensure compliance.
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28	Legionella Impacts from Cooling Systems	1	1	MECHANICAL	Low			Waterless VRF heat rejection systems proposed.
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.1	Refrigerants Impacts	1		MECHANICAL	N/A			Not targeted, requires use of low ODP refrigerants and leak detection & auto recovery.
Total				5	2					

Green Star - Design & As Built Scorecard

Project:	Northern Rivers School
Targeted Rating:	4 Star - Best Practice

Rev 02
CM | 10 / 07 / 2023
Project: P00700

Core Points Available	Total 4 Star Score Targeted
100	51



Category / Credit	Aim of the Credit / Selection	Code	Credit Criteria	Points Available	Points Targeted 4 Star	Responsible Party	Risk	EFSG Technical Standard	Relevant EFSG section/ information	Comments
Innovation				10						
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10	2	ADCO	Low			Principles Dashboard - pre approved with GBCA (1), On-Site Renewable Energy.
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in the project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points	30B	Market Transformation			ADCO	Low			DrMA - pre approved with GBCA (1)
Improving on Green Star 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	30C	Improving on Green Star Benchmarks			ADCO	Med			Ultra Low VOCs (1)
Innovation Challenge	Where the project addresses a sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		3	ADCO	Med			Financial Transparency (1) Integrating Healthy Environments (healthy canteen policy) - pre approved with GBCA (1) Universal Design - pre approved with GBCA via EFSG (1)
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	30E	Global Sustainability				Low			
Total				10	5					

TOTALS	AVAILABLE	TARGETED 4 STAR
CORE POINTS	100	46.0
CATEGORY PERCENTAGE SCORE		46.0
INNOVATION POINTS	10	5.0
TOTAL SCORE TARGETED		51.0





0001c Design Checklist - Sustainability

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00 Design Principles

0.01 Scope

SINSW is committed to operating in a manner consistent with Sustainable Development principles (Bruntland, 1987 and UN SDGs), federal and state legislation requirements and industry best practice.

The NSW Department of Education has committed to five sustainability priorities:

- Unlock human potential: Empower each person with the health, wellbeing, confidence, creativity and resources to succeed.
- Foster connections: Embed respect and caring for Country, nature, history, diversity and community across everything we do.
- Act on climate change: Achieve net zero emissions.
- Consume responsibly: Operate efficiently, design out waste and uphold high labour and environmental standards in our supply chain.
- Build resilience: Equip school communities to withstand and adapt to change.

And has developed nine goals to 2030 to deliver on these priorities:

1. Sustainability is embedded into school practices.
2. Every school is a verified healthy and inclusive learning environment.
3. Every school is an asset for its community, all year round.
4. We are net zero emissions in operation.
5. We eliminate resource waste.
6. We have a robust plan for adaptation.
7. We demonstrate leadership by investing in innovation.
8. Department staff confidently contribute towards achieving our sustainability goals.
9. We measure our social and environmental impact.

School Infrastructure NSW projects should incorporate these priorities and goals into the planning, design, and construction of new and refurbished/upgraded school buildings.

Ecologically Sustainable Development (ESD) principles must be applied in the design, construction, operation, and end of life, of all state assets and are an important contribution to developing a considered whole of life cost development approach. These principles include

- Responsible use of energy, water, and resources in the construction, operation, refurbishment, maintenance, management and their ultimate disposal.

-
- The protection and support biological and ecological diversity.
 - Minimising or eliminating the flow of pollutants into our natural environment.

It is expected that spaces will have the ability to be easily reconfigured to allow for different activities, and that buildings will be able to easily adapt over time helps in making the facilities sustainable over their expected life.

0.02 NSW Government Resource Efficiency Policy

The [NSW Government Resource Efficiency Policy's](#) (GREP) purpose is to reduce NSW government's operating costs by implementing resource efficiency measures. Its implementation is mandatory for all NSW Government agencies, including the Department of Education. The policy includes measures, targets and minimum standards to drive efficiency in energy and water use, waste and also improving air quality.

All new building and upgrade projects must comply and demonstrate adherence to the GREP.

It requires all school projects, with total project costs over \$10 million and new building gross floor area greater than 1000m², to be **designed** to the following standard:

- 5 Star Green Star – Design & As Built for projects located in metropolitan Sydney, Wollongong, and Newcastle, or
- 4 Star Green Star – Design & As Built for projects located in other areas of NSW.

The department reports annually against the GREP.

0.03 Sustainability Benchmarking

While Green Star certification is encouraged by GREP, it is not mandatory. However, to alleviate any concern about greenwashing or the misuse of the Green Building Council of Australia's (GBCA) certification trademark of Green Star, the Department of Education has committed to the **certification** of all new buildings over \$10M or 1000m². Refer to the SINSW Green Star Practice Note for detailed overview of the Green Star certification process for SINSW projects.

Where a project is unable to register for Green Star certification, due to site or project constraints limiting the ability of the project to meet Green Star's conditional requirements, SINSW has developed an alternate independent verification method, which can be applied in specific scenarios with written approval from the SINSW Executive. Refer to the ISV Practice Note for further details.

0.04 Sustainable Development Plan

ESD principles must be included in any new school buildings. All school projects in planning phases must develop a sustainability strategy which is summarised in the Sustainable Development Plan, detailing sustainability targets, and initiatives. This is to be appended with the SINSW ESD Schedule, and where applicable Green Star scorecard, detailing the relevant pathway adopted for the project.

A Green Star Accredited Professional (GSAP) must be engaged on the projects certifying to Green Star to provide ongoing advice across all project elements related to Green Star.

0.05 Climate Change Adaptation

Sites and school communities must be able to withstand natural and urban hazards and adaptively respond to climate change over time, especially for projects involving vulnerable communities e.g. climate generating exacerbated flood, storm surge, inundation, heatwaves, bush fires, extreme storm and other weather events.

School facilities must be able to withstand natural hazards and adapt to shocks and stresses to avoid social and economic costs of interrupted operation and repairing or replacing damaged assets. To achieve this, increasing resilience to natural hazards must be considered in the business case development so that associated costs are budgeted.

Initial assessment

An initial assessment of natural hazards and project vulnerability must be carried out during concept design, in consultation with resilience experts, to inform the business case and identify hazards where further analysis is required and ensure resilient development. Both historic and future data should be accounted for in the initial assessment.

Refer to site investigations and surveys to determine local environmental character, climate and microclimate, heritage significance and impact, appraisal of physical and visual factors, social impacts, transport infrastructure, geo-technical and soil testing.

Comprehensive climate change risk assessment

Where significant risks are identified in the initial assessment, a comprehensive climate change risk assessment must be undertaken. The assessment must report on at least two different timescales (2040-2050 and 2070-2090) and consider high emissions scenarios consistent with 2C and 4C for each timescale. The Intergovernmental Panel on Climate Change (IPCC) endorsed emissions scenarios should be used to dictate the assessed scenarios. The assessment must align with AS5334:2013 *Climate change adaptation for*

settlements and infrastructure; and the principles of risk management outlined in AS/NZ ISO31000:2009 *Risk Management*.

Any high or extreme risks identified must be addressed through design measures and be documented.

0.06 Energy Conservation

In accordance with the NSW GREP and Green Star requirements, all new facilities must be designed and built so that energy consumption is modelled to be at least 10% lower than if built to minimum compliance with National Construction Code requirements.

Each building's system and façade must comply with the corresponding Section J requirements in the National Construction Code. That is, the building cannot show that their façade, or any system, performs worse than the reference building.

The total building's energy consumption reduction must be achieved without including renewable energy generation in the calculation.

The following initiatives must be achieved by each project to promote a high level of energy efficiency:

Passive Design

Passive design elements should be maximised to minimise energy consumption.

During planning stages, the design team must consider the following passive design elements:

- Climate and micro-climate: This data must come from the current AIRAH handbook and where a specific area is not referenced in the handbook, the Bureau of Meteorology statistics must be utilised.
- Orientation
 - Exposure to solar radiation for heat and power generation, and
 - Air movement and wind for natural ventilation and cross ventilation.

During building design stages, the design team must consider the following passive design elements:

- Air tightness – best practice sealing of the building envelope to minimise uncontrolled air infiltration which can compromise the heating and cooling systems.
- Thermal insulation – Greater than minimum code stipulations to ensure adequate insulation is installed to achieve low cooling and heating demand.
- Thermal bridge free envelope – Insulation is continuous with penetrations insulated.

-
- High performance windows – Prioritisation of sealed double or triple glazed windows.
 - Building design to support heat recovery and energy efficient mechanical plant – to recover energy from exhausted air and reduce electricity & natural gas consumption.

Lighting and daylight

Energy efficiency LED lighting must be installed in all new school buildings and major upgrades of existing school buildings.

For artificial lighting requirements see [09 ELECTRICAL/0951 LIGHTING](#)

Natural daylight reduces energy usage and improves the indoor environmental quality of spaces. Natural daylight encourages learning and has beneficial effect on health and wellbeing. Designers must seek to maximise natural daylight in all learning and administrations paces to reduce energy usage, improve the indoor amenity and create a pleasant environment.

Natural day light can be provided via windows, skylight, and the like.

Maximise Natural Daylight in all learning and working spaces, to reduce energy usage, improve the indoor amenity and create a pleasant environment. Designers must consider the following:

- Discomforting glare and brightness contrasts must be avoided.
- Learning spaces need to facilitate the use of audio-visual learning aids. Provide brownout function to spaces as nominated in the individual room data table. Where a room is required to have a brownout function, skylights must include a method to sufficiently adjust light levels.
- Movement Areas will require natural and/or artificial light to at least BCA minimum.
- Consult a lighting specialist for artificial lighting design.
- Ensure energy efficiency of lighting by:
 - Including daylight sensors to rooms to reduce light output or turn off lights when sufficient daylight is provided within the space.
 - When the space is large and perimeter lighting is adjacent to windows, perimeter lighting is on a separate zone to make maximum use of daylight.
 - On exposed facades subject to direct sunlight (due north, east and west), external window shading must be provided.

Access to high levels of daylight must be demonstrated through modelling for at least 40% of primary occupied spaces per floor. As prescribed within Green Star, a space is considered to have high levels of daylight if:

- the space has minimum 160 lux due to daylight during 80% of the nominated hours

OR

- the following requirements are met:
 - No overshadowing – external shading should not impinge on the direct 25-degree line from centre of the window
 - Minimum 40% Visual Light Transmittance (VLT) for building glazing

Views

Building design must ensure that at least 60% of primary occupied spaces have a clear line of sight to high quality internal or external views. The space must be within 8m from the view.

High quality views include:

- External views - vegetation, body of water, sky, or frequent outdoor movement (people, vehicles, animals)
- Internal views - landscaped area, water features, atrium

Glare control and shading

Controlling direct sunlight into spaces is necessary to reduce unwanted heat gain and reduce the adverse effects of glare into a work environment. Therefore, designers must seek to:

- Exclude direct sunlight from all learning spaces, libraries, and administrative offices and staff studies for the period of 9.00am to 3.30pm including Eastern Daylight Saving Time between 21st September to 21st March (equinoxes).
- Exclude direct sunlight from desk level in all learning spaces between 9am and 3:30pm.

Designers must prepare sun diagrams in the design phase as a minimum requirement.

Sun exclusion and glare control can be achieved by the use of elements such as sun shades, eave extensions, tinted glazing, screens, vertical blades and the like.

Glare must only be controlled by blinds as a last resort.

Lighting and HVAC Controls

All new lighting and HVAC systems installed in schools must have timed or sensor feedback functionality for energy conservation.

For HVAC system controls see [07 MECHANICAL/0773 BUILDING MANAGEMENT SYSTEMS](#)

For lighting control requirements see [09 ELECTRICAL/0951 LIGHTING](#)

Energy efficient appliances and equipment

In accordance with the NSW Government Resource Efficiency Policy, all new electrical equipment must be at least 0.5 stars above the market average star rating. In categories where no star ratings are available, equipment purchased should be recognised as high efficiency either by being ENERGY STAR® accredited, in a high efficiency band under Australian Standards or being above-average efficiency of Greenhouse and Energy Minimum Standards (GEMS) registered products.

Refer to the GREP for specific energy rating requirements for different appliance or equipment types.

The following Technical Standards contain items that are subject to these minimum requirements:

[01 GENERAL/0191 SUNDRY ITEMS](#)

[00 PLANNING AND DESIGN/ 0001c DESIGN PRINCIPLES - HYDRAULIC](#)

[00 PLANNING AND DESIGN/ 0001c DESIGN PRINCIPLES - MECHANICAL](#)

[00 PLANNING AND DESIGN/ 0001c DESIGN PRINCIPLES – ELECTRICAL](#)

[00 PLANNING AND DESIGN/ 0001c DESIGN PRINCIPLES – BUSHFIRE PROTECTION](#)

Renewable Energy Generation

For new schools and new building/s (on an existing school site) a photovoltaic (PV) solar power grid- connect rooftop system must be provided to offset power consumption costs at the school.

PV systems must be installed in line with [09 ELECTRICAL/ 0933 POWER GENERATION - PHOTOVOLTAIC](#)

0.07 Water Conservation

Water efficient appliances

In accordance with the NSW Government Resource Efficiency Policy, all fixtures and fittings must be at least the average WELS star rating by product type. Where WELS rating is not available, use the alternative WaterMark rating scheme.

All new water-using appliances must be at least 0.5 stars above the average Water Efficiency Labelling and Standards (WELS) star rating by product type, except toilets and urinals, which must be purchased at the average WELS star rating.

Refer to the GREP for specific energy rating requirements for different appliance or equipment types.

The following Technical Standards contain items that are subject to these minimum requirements:

[08 HYDRAULICS/ 0811 SANITARY FIXTURES](#)

[08 HYDRAULICS/ 0812 TAPWARE](#)

[01 GENERAL/ 0191 SUNDRY ITEMS](#)

In addition:

- Flow restrictors can be used to minimise water usage and wastage for staff amenities.
- Taps with timed flow can be used to minimise water usage and wastage in student amenities.

Roof water harvesting and tank storage

New schools and school upgrades (where applicable) must design for the capture of rainwater from available roof space and an appropriate quantity of tank storage must be included to store water for applicable uses to reduce the demand on drinking water supplies.

The rainwater tank water must be connected to:

- Irrigation systems for adjacent landscape/gardens with the major preference being for gravity fed supply to minimise ongoing maintenance.
- Flushing of toilets and urinals. If this is not feasible, approval must be granted by SINSW.

Where schools are required to install a sprinkler system for fire safety, a closed loop system must be installed to capture and reuse testing and maintenance water, or an alternative non-potable water source.

For more details see:

[08 HYDRAULICS/ 0825 RAINWATER STORAGE SYSTEMS](#)

[08 HYDRAULICS/ 0826 GREYWATER SYSTEMS](#)

[02 SITE, URBAN AND OPEN SPACES/ 0254 IRRIGATION](#)

Stormwater Management

Stormwater management must aim to minimise the transportation of toxicants to waterways and other offsite environments, and maintain the existing hydrological regimes. Due diligence for flooding must be done early to inform building and landscaping design. Projects must implement initiatives that achieve the following

- Water sensitive urban design
- Reduction in area and connection of impervious surfaces.
- Use of road gutters, overflow pipes, verges, swales, living streams.
- Retention or detention of stormwater runoff from constructed impervious surfaces, including roof water tank, grass swales, end-of-line sand filter and irrigation reuse.
- Control of pollutants at their source.
- Improvement in water quality, via soil and vegetation filtration.
- Management of flow rates to prevent erosion.

Refer to relevant local regulations for stormwater pollution reduction targets.

Refer to the following for further requirements:

SITE DESIGN - 0074 STORMWATER DRAINAGE

During construction - [02 SITE, URBAN AND OPEN SPACES/ 0224 STORMWATER – SITE](#)

0.08 Sustainable Materials

Construction materials must be selected based on the following:

- Adequately and economically perform their intended functions, and also have lower adverse environmental impacts throughout their life cycle. Refer to [00 PLANNING AND DESIGN/ 0001r DESIGN REFERENCE](#)
- Contain reduced or no hazardous substances (e.g. low VOC) to ensure effective indoor environmental quality.
- Reduce the demand for rare or non-renewable resources.
- Have low embodied energy and water.
- Are made from or contain recycled materials or can be reused or recycled at the end of life.

Timber and low formaldehyde-emitting engineered wood products

No rainforest timbers, or timbers from high conservation forests, are to be used unless plantation grown. Use only recycled timber, engineered and glued timber composite products, or timber from plantations or from sustainably managed regrowth forests that is FSC, AFS or PEFC certified.

Only low formaldehyde-emitting engineered wood products should be used, such as those that meet the Australian Standards for formaldehyde emission limit E1 (NICNAS classification) or lower. The engineered wood products must not exceed the emissions limits stipulated in the Green Star Buildings rating tool. Engineered wood products include particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels. This requirement excludes formwork.

Numerous sections have included this requirement in their specifications. The below list is not exhaustive, and care should be taken to identify any other products used:

[01 GENERAL/ 0185 COMMON REQUIREMENTS - TIMBER PRODUCTS. FINISHES & TREATMENT](#)

[03 STRUCTURE/ 038 TIMBER/](#)

[05 INTERIOR/ 0551 JOINERY](#)

06 FINISH/ 0655 TIMBER FLOORING

Low VOC materials

In accordance with the Government Resource Efficiency Policy, all surface coatings, and other volatile organic compound (VOC) emitting products including adhesives, sealants, carpets, carpet tiles and carpet underlays, must be made from low-VOC emission materials.

Paints, adhesives and sealants must not exceed the maximum VOC limits stipulated in the Green Star Buildings rating tool.

Carpets must not exceed the total VOC limits stipulated in the Green Star Buildings tool.

Numerous sections have included this requirement in their specifications. The below list is not exhaustive, and care should be taken to identify any other VOC containing products used:

01 GENERAL/ 0181 ADHESIVES, SEALANTS AND FASTENERS

06 FINISH/ 0652 CARPETS

06 FINISH/ 0671 PAINTING

Pesticides

Schools must be designed, constructed and maintained, without using chemicals for termite and other pest control.

New Buildings: no chemical pesticides and termicide to be used. Preventive treatments to be by physical means and careful design to minimise risk.

0.09 Ecological Conservation

School sites must conserve for future generations, celebrate the biological diversity of genetic materials, species and ecosystems on the site and consider the surrounding natural environment. The design of the built environment must promote environmental conservation and acknowledge the learning opportunities and community values that can be achieved through the use of the natural landscape.

Schools must model best practice design, material use, systems and operational practices, demonstrating a connection to nature.. The natural heritage of the site should be incorporated through biophilic design principles, which are known to have positive effects on wellbeing and cognitive function. Open space must allow for exploration, active play/exercise and earth education to enhance the site's outdoor learning potential.

New and refurbished schools must:

- Preserve or re-establish native flora (unless it poses a safety risk or cannot be designed around) and create new landscapes through liaising with local government authorities, Landcare and environmental groups, and the use of native low water use plants.
- Consider opportunities for development of community garden within the site and relationships with community groups for this to occur.

An Ecological Assessment Report must be developed for the site to document the following:

- ecological values (current, future, and past) identified for the site and their protection measures
- ecological impacts from light and noise pollution and water quality and their mitigation requirements
- existing vegetated areas and biodiversity values being retained
- how biodiversity has been considered within the project's material supply chain
- list of management strategies to protect the integrity of ecological values throughout project planning, construction, and occupancy
- community and local stakeholder expectations including Aboriginal or Torres Strait Islander groups and environmental groups

Adequate due diligence must be conducted where an area of biodiversity or high ecological value is identified on the site, where at least 50% of this area must be retained. For more details see [02 SITE, URBAN AND OPEN SPACES/ 025 LANDSCAPE CULTIVATION/](#)

0.10 Waste Management

Construction and demolition waste

Targets must be established to increase diversion of waste from landfill, with a minimum diversion rate target of 90%. Opportunities for re-use and recycling of materials in the construction phase must be identified and implemented. Designers must seek to use building materials which are able to be disassembled for re- use, in conjunction with considerations for the addition and removal of accommodation over time.

For more details see [01 GENERAL/ 0136 GENERAL REQUIREMENTS \(CONSTRUCTION\)](#).

Operational Waste

A waste storage area must be included in all new school sites. The size and location should be determined by the waste specialist in the OWMP. The space must include source receptacles for multiple waste streams and appropriate signage.

Table 01: Bin Stations and Signage

Bin Colour	Waste Stream	Waste type
Lime Green	Organics	Food Organics and Garden Organics
Yellow	Recycling	Comingled containers
Blue	Recycling	Paper & cardboard
White	Recycling	Container Deposit Scheme
Any colour	Recycling	Soft Plastic
Red	General	General waste

Designers must refer to AS4123.7 Mobile waste containers - Colours, markings, and designation requirements for further guidance on bin colour, waste stream and waste type.

Safe methods for vehicle access and the transfer of waste must also be considered.

Operational waste management plan

For new and refurbished schools, an operational waste management plan (OWMP) must be developed to establish operational waste targets, identify opportunities for reuse and recycling in the operation of the facilities and make adequate provision for the facilities to accommodate for the OWMP. The OWMP must consider the below.

A school is committed to maximising conservation of natural resources and minimising environmental harm from waste and the disposal of waste. It is also committed to an effective waste management system that includes recycling and reusing waste products, and safe disposal of waste.

Waste management service contract

Schools must use Contract 9698 as stated on the [buy.nsw](#) website. This contract is mandatory and covers waste management services (bins, collection, transport,

processing, treatment, and disposal). Waste streams include general waste, organic, grease trap, recycling, secure destruction and clinical.

Waste avoidance

Reduce consumption of resources that have the potential to become waste through strategies such as green purchasing - purchasing items with reusable, recyclable, have no packaging, or are biodegradable.

Waste minimisation

All stakeholders must minimise waste through strategies such as:

Reducing waste

- Examining all processes to determine where wastes are produced and to devise measures for waste prevention or reduction
- Devising ways of reducing waste with students so they too can share in the savings (for example rewards for students who reduce waste)
- Partnering with others to assist with waste minimisation.
- Keeping track of changes and improvement.

Reusing

- Reusing drums, cartridges and containers where possible.
- Selling or donating usable waste materials to other organisations.

Increase recycling

- Investigating alternative uses for organic waste that cannot be reduced or reused, e.g. composting, bio-gas from waste, digester, etc.
- Diverting recyclable wastes from the general waste
- Provision for a bin station at a central location in school with the option of source separation. Provision of clear waste signage to ensure source separation
- Explore opportunities for recycling waste types not included in the mandatory stream separation, e.g. batteries, coffee cups, e-waste, etc.

Waste disposal

Students, staff and cleaners dispose of waste in accordance with the Waste Management Policy:

General waste

Handled with appropriate care and stored in the bins provided for collection by an appropriate authorised service provider under Contract 9698 for transport to a facility appropriate for the purposes of disposing of that waste.

Sanitary waste

Sanitary (including clinical waste where applicable) waste handled by trained (or qualified) personnel using appropriate personal protective equipment and stored in dedicated bins and containers for collection by an appropriate qualified and licensed service provider for transport to a facility appropriate for the purpose of disposing of that waste.

