Sustainable Development Plan

Upgrade to Leppington Public School

ESD SERVICES

JHA

CONSULTING ENGINEERS

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Key Contact	Jonathan Saw

Prepared By

Company	JHA
Address	Level 23, 101 Miller Street, North Sydney NSW 2060
Phone	61-2-9437 1000
Email	Jonathan.Saw@jhaengineers.com.au
Website	www.jhaservices.com
Author	Jonathan Saw
Checked	Eddith Chu
Authorised	Eddith Chu

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1 EXECUTIVE SUMMARY

This Sustainable Development Plan has been prepared to support a Review of Environmental Factors (REF) for the Department of Education (DoE) for the upgrade of Leppington Public School (LPS) (the activity). The purpose of the REF is to assess the potential environmental impacts of the activity prescribed by *State Environmental Planning Policy (Transport and Infrastructure) 2021* (T&I SEPP) as "development permitted without consent" on land carried out by or on behalf of a public authority under Part 5 of the *Environmental Planning and Assessment Act 1979* (EP&A Act). The activity is to be undertaken pursuant to Chapter 3, Part 3.4, Section 3.37 of the T&I SEPP.

The proposed activity is for upgrades to the existing LPS at 144 Rickard Road, Leppington, NSW, 2179 (the site).

The purpose of this report is to state the proposed ESD initiatives to achieve compliance with Educational Facilities Standard Guidelines (EFSG) DG02 requirements and 5 Star Green Star Design & As-Built v1.3 certification. This report should be read in conjunction with the Architectural drawings, EFSG DG02, Green Star Design & As-Built v1.3 Submission Guidelines and other consultant reports submitted as part of the application.

This report also responds to the *General Sustainability Provisions* section in accordance with the Sustainable Buildings SEPP 2022.

The ESD objectives is to encourage a balanced approach to designing new facilities for the public school project; to be resource efficient, cost-effective in construction and operation; and to deliver enhanced sustainability benefits with respect to impacts on the environment and on the health and well-being of students, staff and visitors whilst providing the best possible facilities for a constructive student learning experience.

Some of the key ESD commitments for the proposed activity are listed below:

- Good access to natural daylight
- Well-designed openings to promote natural ventilation
- Appropriate construction and glazing selection
- Energy efficient air-conditioning systems
- LED luminaires
- Rainwater recycle tank
- Efficient water fixtures
- Waste management plan
- Water-wise Landscaping

2 INTRODUCTION

2.1 SITE LOCATION

LPS is located at 144 Rickard Road, Leppington on the eastern side of Rickard Road, north of Ingleburn Road and south of Byron Road. The site has an area of 3.013 ha and comprises 4 allotments, legally described as:

- Lot 1 DP 127446
- Lot 1 DP 439310
- Lot 38E DP 8979
- Lot 39C DP 8979

The site currently comprises an existing co-education primary (K-6) public school with:

- 14 permanent buildings;
- 11 demountable structures (including 2 male/female toilet blocks);
- interconnected paths;
- covered walkways;
- play areas; and
- at-grade parking.

The site also contains locally listed heritage buildings along its southern boundary.

The buildings are 1 storey in height and there is a sports oval in the eastern portion of the site. The existing buildings are clustered in the north-western part of the site.

Figure 1 **Aerial image of the site, outlined in red (Source: NearMap, taken 24 Sept 2024)**

2.2 PROPOSED ACTIVITY DESCRIPTION

The proposed activity involves upgrades to the existing LPS, including the following:

- Demolition of existing structures and trees;
- Erection of a new 3-storey teaching space along the northern boundary that includes 20 permanent teaching spaces and 3 support teaching spaces;
- Erection of a new hall and COLA comprising of a hall, canteen and OSHC hub towards the eastern boundary of site;
- Extension of the existing library (Building E) and adjoining playground;
- Upgraded sports and play facilities;
- Relocation of the Yarning Circle;
- Erection of a substation and upgrades to site services;
- Footpaths, fencing and associated works; and
- Landscaping.

The intent of the activity is to allow for upgrades to LPS that will provide a 'CORE 35' school standard in line with the Educational Facilities Standards and Guidelines (EFSG). The activity will increase the capacity of the school from 430 to 621 students.

Figure 2 below show the scope of works for the proposed activity.

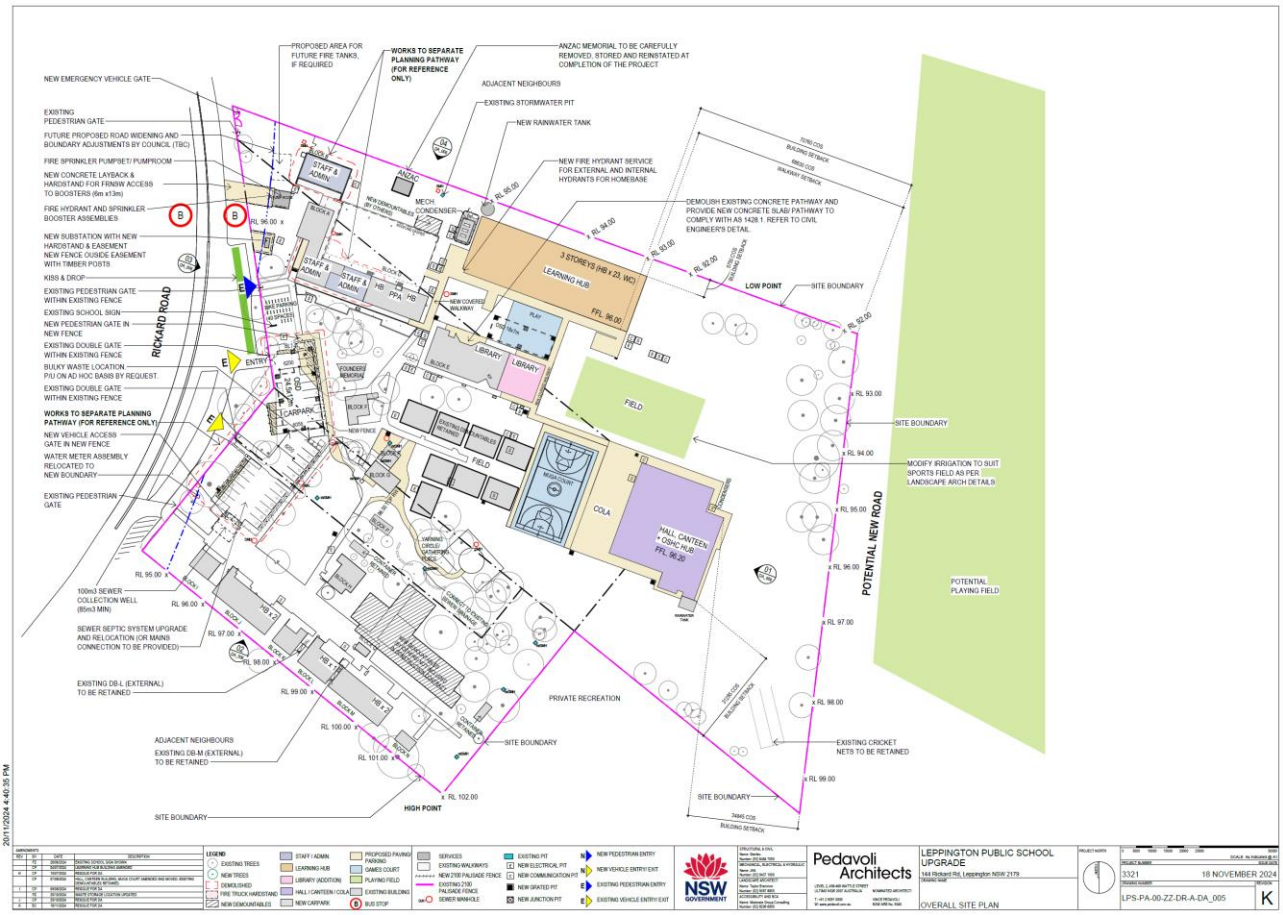

Figure 2 **Proposed Activity (Source: Pedavoli Architects, Overall Site Plan (Rev K))**

3 EFSG SUSTAINABILITY TARGETS

3.1 OVERVIEW

The Educational Facilities Standards and Guidelines (EFSG) have been developed by the NSW Department of Education, to assist the management, planning, design, construction and maintenance of new and refurbished school facilities. The EFSG is to be treated as a reference guide that provides a starting point to allow for a consistent standard of delivery across various types of school developments.

The EFSG Design Guide considers a framework incorporating several aspects of design including extensive Ecologically Sustainable Development (DG02) requirements. The following categories are covered within the EFSG DG02 Design Guide:

- Scope
- NSW Government Resource Efficiency Policy
- Energy Conservation
- Water conservation
- Sustainable Materials
- Ecological Conservation
- Waste Management
- Climate Change Adaptation
- Sustainability Benchmarking
- Views

The proceeding sections outline how the project addresses each of the requirements of the EFSG DG02 Design guideline.

3.2 SCOPE

All school projects in Planning phases must develop a Sustainable Development Plan including sustainability targets, initiatives and an ESD schedule detailing the relevant Green Star/EFSG pathway adopted for the project. The NSW Government Resource Efficiency Policy's (GREP) is a mandatory NSW Government policy to reduce the NSW Government's operating costs and lead by example in increasing resource efficiency through ESD principles. GREP requires all new projects above 1,000m^2 and project costs over $10 million to be designed to the following standard:

- 5 Stars Green Star for projects located in metropolitan Sydney, Wollongong, and Newcastle,
- 4 Stars Green Star for projects located in other areas of NSW

The proposed activity is targeting 5 Star Green Star Design & As-Built v1.3 certification, which will cover the compliance with this requirement.

3.3 NSW GOVERNMENT RESOURCE EFFICIENCY POLICY

The purpose of GREP is to reduce NSW government agency operating costs by implementing resource efficiency measures, and 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 and waste and also improving air quality.

3.4 ENERGY CONSERVATION

In accordance with the NSW Government Resource Efficiency Policy all new facilities must be designed and built so that energy consumption is predicted to be at least 10% lower than if build to minimum compliance with National Construction Code requirements. The energy consumption reduction must be achieved without including renewable energy generation in the calculation.

4 SUSTAINABLE BUILDINGS SEPP

4.1 OVERVIEW

In accordance with Chapter 3.1 of Sustainable Building SEPP 2022, the General Sustainability Provisions is applicable to all non-residential development that involves:

- The erection of a new building, if the development has a capital investment value of $5 million or more; or
- Alterations, enlargement or extension of an existing building, if the development has a capital investment value of $10 million or more.

Currently, the General Sustainability Provisions requires evidence that new activities are designed to enable the following:

- The minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials.
- A reduction in peak demand for electricity, including through the use of energy efficiency technology.
- A reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design.
- The generation and storage of renewable energy.
- The metering and monitoring of energy consumption.
- The minimisation of consumption of potable water.

While the Sustainable Building SEPP 2022 is not applicable to the project, the principles of the SEPP will be used to indicate practical sustainability measures applicable for the project type. The proposed activity is seeking formal Green Star certification. Refer to Section 4.2 of this report for details of how the proposed activity has considered and addressed the requirements of the General Sustainability Provisions.

4.2 PROPOSED ESD INITIATIVES

4.2.1 CONSTRUCTION WASTE MANAGEMENT PLAN

Effective waste collection and disposal are crucial for safeguarding the environment and public health today. To ensure responsible handling of demolition and construction waste, a comprehensive waste management plan has been prepared to accompany this REF. This plan encompasses strategies for minimizing waste generation, maximizing material reuse, recycling, and reprocessing, and reducing the volume of materials destined for landfill. Cut and excavation materials are to be reused for backfilling or for grading purposes to level the site where possible.

4.2.2 HEATING, COOLING AND VENTILATION SYSTEMS

The air-conditioning and ventilation systems will be designed to surpass the minimum requirements of the NCC 2022 Section J Energy Efficiency Part J6. The NCC Section J requirements for Part J6 includes minimum requirements for the energy efficient design and control of HVAC systems to reduce and recover energy.

A high-efficiency air-cooled heat rejection system is proposed. The control mechanisms for the air-conditioning system will be engineered to minimize energy consumption by ensuring the schedule and setpoints are appropriate to the intended operation of the buildings.

To enhance efficiency further, ductwork systems will be designed to minimize system pressure losses, thereby reducing the power required by fan motors. This includes selecting equipment that minimizes coil and fitting drops, as well as employing appropriately sized ductwork to minimize friction losses.

In spaces such as bathrooms/toilets, laundries, and equipment plant areas, natural ventilation will be prioritized wherever feasible. Mechanical ventilation will be incorporated only where necessary to ensure air quality and temperature levels.

4.2.3 LIGHTING

The lighting design will comply with NCC 2022 Section J Energy Efficiency Part J7. The illumination density will be in accordance with J7D3. To minimize energy consumption and optimize lighting efficiency, the proposed activity will be using LED fittings. The energy efficient light fittings will be complemented by an automatic control system featuring timer controls, PIR occupancy sensors and/or microwave occupancy sensors as appropriate to enhance operational efficiency.

To capitalize on natural daylight, where appropriate, lighting in regularly occupied spaces will be provided with a daylight sensor to adjust artificial light output or turn lights off when sufficient natural daylight is available to the space. For larger areas, perimeter lighting will be segregated into distinct zones to maximize natural light utilization.

External luminaires will adhere to AS 4282:1997 to prevent light pollution and maintain compliance with specified benchmarks for night sky illumination. This will ensures that the project's external lighting does not contribute to light pollution in the surrounding environment and wasting energy at the same time.

4.2.4 DOMESTIC HOT WATER

The project will use heat pump based technology for domestic hot water to generate hot water energy efficiently.

4.2.5 BUILDING ENVELOPE PERFORMANCE

The building fabric will be designed to meet and/or improve upon the minimum NCC 2022 Section J Part J4 requirements for the building envelope. Thermal breaks will be incorporated into walls, floors, and roofs where appropriate to ensure a continuous thermal barrier on the building envelope, reducing the flow of thermal energy between conductive materials.

4.2.6 BUILDING FABRIC

The indicative total construction R-value requirements to comply with NCC 2022 Section J Part J4 are provided in Section 6 of this report.

To achieve the indicative requirements, insulation will be required for the building's walls and roof/ceilings. Insulation serves to mitigate heat transfer, thereby reducing heat loss during winter and heat gain in summer. By effectively managing thermal flow, insulation significantly decreases the heating and cooling demands placed on air-conditioning systems.

Additionally, employing light-coloured roofing material with low solar absorptance (SA) is recommended. This will help deflect more sunlight, thereby minimising summer heat buildup in the roof space. Furthermore, it contributes to mitigating elevated local temperatures, known as the heat island effect. Notably, this approach will also enhance the efficiency of solar PV panels, as their efficiency improves under cooler conditions.

4.2.7 EXTERNAL GLAZING

Glazing is a major source of unwanted heat gain in the summer and can cause significant heat loss in the winter due to its low insulation performance. Therefore, a high thermal performance glazing system is recommended. Performance glazing substantially reduces heat transmission. This reduces conduction heat loss in winter and reduces the amount of direct solar heat gains in summer. This will correspond to a reduction of both heating and cooling loads.

The indicative glazing specifications to comply with Section J Part J4 Building Fabric DTS assessment are provided in Section 6 of this report.

4.2.8 SHADING AND DAYLIGHTING

Solar access offers significant benefits for indoor environmental quality by providing access to natural daylight and reducing reliance on artificial lighting. However, excessive solar access, particularly direct solar radiation heat, can lead to increased HVAC energy demands and thermal discomfort. To harness the advantages of solar access while mitigating its drawbacks, passive design principles are employed.

Passive solar heating aims to harness solar heat for free heating in winter while preventing excessive heat gain in summer. Similarly, passive cooling strategies aim to block heat entry during summer months. These principles leverage site-specific solar access to optimize indoor environmental quality and reduce HVAC energy consumption through tailored shading solutions.

In the proposed building, appropriate external shading devices in the form of eaves will be strategically utilised to block the intense summer sun while allowing the lower winter sun to penetrate for passive heating. These passive design features not only enhance daylighting and external views for occupants but also reduce the need for artificial lighting, leading to improved alertness, mood, and productivity. Additionally, connecting occupants to nature through external views fosters a positive and constructive experience within the built environment.

4.2.9 PHOTOVOLTAICS

To reduce the building's grid electricity consumption and greenhouse gas emissions with an onsite renewable source, a roof-mounted photovoltaic system (PV) is proposed for the project. It is recommended that the PV system should be sized to cover at least 20% of the roof area of a building.

The batteries storage of renewable electricity generated by the solar PV system is not recommended nor is it necessary as this is a daytime building and it will consume the solar electricity as it is generated.

4.2.10 ELECTRICITY METERING AND MONITORING

Electricity metering and sub-metering will be provided in accordance with Section J requirements to monitor and manage electricity consumption in the building. Sub-metering is to be provided to enable individual time-of-use energy data recording of the on-site renewable energy equipment. The sub-meters required will be interlinked by a communication system that collates the time-of-use energy data to a single interface monitoring system where it can be stored, analysed and reviewed.

4.2.11 FITTINGS AND FIXTURES

Water-efficient fixtures and fittings will be installed in accordance with the Australian Government's Water Efficiency Labelling Scheme (WELS) to reduce potable water consumption. All fixtures and fittings will meet the minimum WELS Rating as specified in the table below.

Water Fittings / Fixtures	Minimum WELS Rating Proposed for the Buildings	Highest Available Rating (AS/NZS 6400-2016)
Showerheads	4 (>6.0, but <= 7.5L/min)	4
Toilets	4	5
Urinals	5	5
Bathroom Taps	5	6
Dishwashers (excluding commercial equipment)	5	6
Washing Machines (excluding commercial equipment)	4	6

4.2.11.1 RAINWATER COLLECTION AND REUSE

The project will consider the capturing of rainwater for reuse in landscape irrigation and/or toilet flushing. The nominated rainwater tank sizing will be based on the available catchment area and the predicted monthly demand for rainwater reuse to be determined by the project's hydraulic consultant.

4.2.11.2 WATER-SENSITIVE URBAN DESIGN

The project implements best practices of water-sensitive design to manage stormwater runoff and reduce demand for landscape irrigation. A detailed stormwater management plan including water-sensitive urban design (WSUD) has been completed by the civil/stormwater consultant.

5 GREEN STAR DESIGN & AS BUILT

The proposed activity is targeting a 5 Star Green Star Design & As-Built v1.3 rating for the new buildings.

5.1 OVERVIEW

The Green star rating system is a comprehensive tool for assessing environmental performance of Australian buildings.

The Green Star framework incorporates ESD principles which are separated into nine categories. Points are awarded across each category for credits that are incorporated into the project. The Design and As-built documentation is then verified through two rounds of independent assessments by the Green Building Council of Australia (GBCA). This section outlines the initial review to the pathway of Leppington Public School for achieving the principles of a 5 Star certified rating under the Green Star Design and As Built tool version 1.3.

5.2 THE GREEN STAR RATING SCALE

The Green Star rating is determined by comparing the percentage of available points achieved out for the total available points. The rating scale shown below details the percentage thresholds for the star ratings awarded.

% of available points	Rating	Outcome
Less than 10	Zero Star	Assessed
10 – 19	One Star	Minimum Practice
20 – 29	Two Star	Average Practice
30 – 44	Three Star	Good Practice
45 – 59	Four Star	Australian Best Practice
60 – 74	**Five Star**	**Australian Excellence**
75+	Six Star	World Leadership

Credit points available:

Category	Total Points Available
Management	14
Indoor Environment Quality	17
Energy	22
Transport	10
Water	12
Materials	14
Land Use & Ecology	6
Emissions	5
Total	100 points + 10 innovation

5.3 SINSW UMBRELLA GREEN STAR CREDIT RECOMMENDATIONS

To support the large volume of new schools that will be certified by the GBCA using the Green Star Tool, SINSW has partnered with the GBCA to streamline the documentation and assessment process for schools.

The SINSW Green Star Credit Recommendations spreadsheet has been developed to consider how each credit in Green Star may be applied to SINSW schools. The spreadsheet also details SINSW's preferred approach for projects to achieve each credit, including any pre-approved alternate approaches agreed to by the GBCA in response to a Technical Question. It provides references to relevant sections of the EFSG or other policies or guidelines, and examples of standard project documentation that could be used as supporting evidence in claiming a credit.

5.4 DESIGN POINTS FOR THIS PROJECT

In accordance with GREP requirements, compliance with EFSG, and under SINSW Green Star umbrella, the Green Star points that can be targeted for this project are tabled as below.

Category	Total Points Targeted
Management	12
Indoor Environment Quality	12
Energy	8
Transport	10
Water	5
Materials	5
Land Use & Ecology	2
Emissions	4
Innovation	10
Total	**68** (58 points + 10 innovation)
Buffer in Achieving 5 Star	8 Points

6 SECTION J REQUIREMENTS

6.1 LEARNING HUB

Method of Compliance: JV3

Required **total R-value** including allowance for **thermal bridging**.

Elements	Total Construction R-value	Note
Roof/Exposed Ceiling Envelope	RT3.2 (Downwards, SA < 0.45)	• It is a total system performance value and **NOT** the insulation. • The impact of **Thermal Bridging** must be included in the building envelope total system R-value calculations. • As per J4D7 a slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-value of R2.0.
Envelope Walls	RT1.75	
Envelope Floors	Nil	

Required total system **U-value** and **SHGC**.

Location	Azimuth	Window Assembly (Glass & Frame)		Description
		U-value	SHGC	
External	All	5.0	0.58	Single Glazed Clear Low-e or the like

6.2 HALL, CANTEEN & COLA

Method of Compliance: JV3

Required **total R-value** including allowance for **thermal bridging**.

Elements	Total Construction R-value	Note
Roof/Exposed Ceiling Envelope	RT3.84 (Downwards, SA < 0.45)	• It is a total system performance value and **NOT** the insulation. • The impact of **Thermal Bridging** must be included in the building envelope total system R-value calculations. • As per J4D7 a slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-value of R2.0
Envelope Walls	RT1.68	
Envelope Floors	RT2.4	

Required total system **U-value** and **SHGC**.

Location	Azimuth	Window Assembly (Glass & Frame)		Description
		U-value	SHGC	
External	All	5.0	0.60	Single Glazed Low E clear or the like

6.3 BUILDING E – LIBRARY

Method of Compliance: DTS

Required **total R-value** including allowance for **thermal bridging**.

Elements	Total Construction R-value	Note
Roof & Ceilings	RT3.2 (Downwards, SA < 0.45)	• Potential Roof SA noncompliance - potential to relax roof SA requirement via J1V3/J1V2 compliance • It is a total system performance value and **NOT** the insulation. • The impact of **Thermal Bridging** must be included in the building envelope total system R-value calculations. • As per J4D7 a slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-value of R2.0 • The R-value requirements are to the proposed **NEW WORK** only. Existing building fabric does not need to be upgraded.
Envelope Walls	RT1.4	
Envelope Floors	RT2.0	

Required total system **U-value** and **SHGC**.

Location	Azimuth	Window Assembly (Glass & Frame)		Description
		U-value	SHGC	
External	All	5.1	0.69	Single Glazed Clear or the like

7 CLIMATE CHANGE RISK & ADAPTATION ASSESSMENT

A Climate Change Risk & Adaptation Assessment has been prepared to support a Review of Environmental Factors (REF) for the Department of Education (DoE) for the upgrade of Leppington Public School (LPS). Please see *Appendix D – Climate Change Adaption Plan*

The impacts of climate change were assessed across two time scales (2030 & 2070) and two Representative Concentration Pathways (RCP4.5 & RCP8.5). Climate Futures matrices were used to determine the key climate projections based on multiple climate variables for this risk assessment. The key climate projections were used to inform the climate risk assessment.

The risk priority levels of the climate risks identified pre- and post-adaptation are summarised below:

Risk rating	2030 Pre-adaptation	2070 Pre-adaptation	2030 Post-adaptation	2070 Post-adaptation
Low	8	2	13	7
Medium	8	11	3	9
High	0	3	0	0
Extreme	0	0	0	0

The results of the climate risk assessment identified two high risks items pre-adaptation. These high risks were mitigated to medium risks by the proposed adaptation actions. The responses to high risks are summarised as follows:

1. Higher maximum temperatures causing an increase in frequency and/or duration of extreme heat-days and heatwaves resulting in insufficient capacity of the HVAC system to maintain thermal comfort. This risk is mitigated by incorporate passive thermal design principles in the design and construction of the building such as appropriate levels of thermal insulation.
2. Increased rainfall causing an increase in frequency and/or duration of storm resulting in damaging rooftop plant. This risk is mitigated by services design to take possible storm risk into consider and have management strategies for extreme weather condition.
3. Severity of extreme weather is projected to increase; this can increase the likelihood of damaging the façade and roof. This risk is mitigated by design structure and faced to consider building resilience to intensified storms.

In summary all risk items identified as 'high' or 'extreme' are addressed by specific design responses in addition to at least two risks items identified in the risk assessment being addressed by specific design responses.

8 MITIGATION MEASURES

The below table outlines the mitigation measures identified in this SDP:

Mitigation Number/Name	Aspect/Section	Mitigation Measure	Reason for Mitigation Measure
Green Star 5 Star Target	General target	Target to be met during detailed design by the D&C contractor	
Sustainable Buildings SEPP	HVAC Systems	Systems to be designed to surpass the minimum requirements of the NCC 2022 Section J Energy Efficiency Part J6.	SB SEPP not a requirement for REF but used as an indicator of sustainability initiatives
	Lighting	-LED fittings to be complemented by an automatic control system featuring timer controls, PIR occupancy sensors and/or microwave occupancy sensors and daylight sensors -Low light polluting external luminaires	
	Domestic Hot Water	Electric heat pump systems to be used	
	Water fittings and fixtures	WELS ratings of all fixtures and fittings to meet or exceed the ratings set out in 4.2.11	
Section J4 Building Fabric – Total Construction R-Values	Learning Hub	Roof/Exposed Ceiling: Rt3.2 Downwards Envelope Walls: Rt1.75 Envelope Floors: Nil	
	Hall, Canteen & COLA	Roof/Exposed Ceiling: Rt3.84 Downwards Envelope Walls: Rt1.68 Envelope Floors: Rt2.4	
	Building E – Library	Roof/Exposed Ceiling: Rt3.2 Downwards Envelope Walls: Rt1.4 Envelope Floors: Rt2.0	
	Glazing	U-value 5.1, SHGC 0.69 (Single Glazed Clear or the like)	

9 CONCLUSION

Based on the overall sustainability initiatives and mitigation measures, we believe the proposed activity

1) can be adequately mitigated through recommended measures and
2) is not considered to be a significant impact.

APPENDIX A – EFSG SCHEDULE

PROJECT:	Leppington PS
REVISION	1
AUTHOR	IM

												SINSW SUSTAINABILITY REVIEW				INDEPENDENT SUSTAINABILITY VERIFICATION								
Sustainability Strategy Priority	**Sustainability initiatives / requirements** Where application, this is an extract only from the relevant EFSG. For full requirements refer to https://efsg.det.nsw.edu.au/	Project stage	Basis for Initiative	Crossover with Green Star	Recommended evidence to demonstrate compliance	Has this been implemented in the project? Y or N or NA	Contractor's ESD consultant comments	**Actual evidence** This evidence needs to show that the requirement from column C has been met	Comments	**Responsibility:** (identify party responsible to provide evidence)		Planning check Is the evidence proposed accepted? Y or N	Design Check Is the project compliant? Y or N	As Built Check Is the project compliant? Y or N	SINSW Sustainability comments	Independent ESD Review Comments (insert date)	D&C Contractors Response (insert date)	Independent ESD Review Comments (insert date)	D&C Contractors Response (insert date)	Independent ESD Review Comments (insert date)	Independent ESD Compliance Review	Potential impact of departure on Green Star Points: Y, N, N/A	Documentary Evidence provided?	Evidence Index (optional)
Act on climate change	**Improvement over NCC** All new facilities must be designed and built so that energy consumption is predicted to be at least 10% lower than if build 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 energy consumption reduction must be achieved without including renewable energy generation in the calculation.	Ph 2-5: Architectural Design	DG02.03 GREP	DAB c15E.0 GHG Emissions Reduction - Conditional Requirement	**1.** Energy modelling report / Predictive energy modelling and thermal comfort assessment. Report needs to show at least 10% improvement of building over minimum NCC requirements; and **2.** As-built evidence that model is an accurate representation of the building, e.g. drawings; and **3.** Specifications / calculations supporting modelling inputs, e.g. window energy rating scheme certificates, calculated R-values of walls, roofs, etc. 4. As an alternative to 2 and 3 above, a Statement by energy modeller confirming that the model accurately represents the building.	Y	Project targeting 5 Star Green Star certification which should surpass EFSG requirements														TBC			1
Act on climate change	**Passive design** The need for active cooling and heating shall be minimised by employing passive / sustainable design principles listed in DG 55, DG 06.02 and DG 27.12 as well as the GA NSW Environmental Design in Schools Guidelines. This includes: - Window size and shading to prioritise passive cooling in summer and heating in winter - Orientation - Thermal mass - building fabric colour and performance - shading	Ph 2-5: Architectural Design	DG55 DG06.02 DG27.12 GA NSW Environmental Design in Schools	DAB c15 GHG Emissions Reduction	**1.** Thermal modelling report **2.** As built evidence demonstrating measures implemented to reduce need for active cooling / heating **3.** Passive design report by Architect listing all passive design initiatives implemented	Y	Can be achieved via passive design elements, compliance demonstrated via energy/thermal modelling report														TBC			2
Act on climate change	**Energy efficient lighting design and modelling** - LED lighting must be installed - The design of the lighting systems and the selection of fittings is to be undertaken based on a Whole of Life approach, such as diodes and control gear with a long life - Section J part 6 maximum illumination power density provisions must be adhered to, along with all other elements of part 6 - System must support sustainable design principles including reducing energy consumption, such as timed or sensor feedback functionality - Lighting designs should be carried out utilising industry standard lighting design software such as AGI32, Dialux or Relux.	Ph 2-5: Services Design	DG2.3.1 DG63.01 DG63.04 DC63.05 DG63.03.02	DAB c15 GHG Emissions Reduction	**1.** Lighting drawings **2.** Lighting specifications / schedules **3.** Lighting modelling report showing compliant power densities	Y	Electrical to show efficient lighting selected in luminare schedule														TBC			3
Act on climate change	**Lighting control and switching** - The use of lighting controls will assist in substantially improving energy efficiency on sites, and should be considered for all new lighting systems, in new build or site refurbishments. - Lighting control should be simple to operate and adhere to all requirements of DG 63.06 - Constant Light Output and Daylight Harvesting systems are recommended given their ability to reduce lighting energy whilst maintaining comfortably lit spaces. Consideration should be given to these strategies as stipulated in DG 63.06 - Including daylight sensors in rooms to reduce light output or turn off light 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 - Local switching should be provided where it is identified that the users can benefit from manual operation of the lighting and other lighting automation technology is considered cost prohibitive. The switching should be clearly marked and robust. Provisions for energy efficient switching in Schools are outlined within DG63 and DG65.	Ph 2-5: Services Design	DG63.06 DG63.07 DG65.03.01	DAB c15 GHG Emissions Reduction DAB c4 Building Information	**1.** Electrical & lighting drawings showing switching groups and automatic controls **2.** Lighting modelling report showing compliant power densities **3.** Lighting operations and maintenance manual	Y	Electrical & lighting drawings to show compliance	Electrical reports													TBC			4
Act on climate change	**Energy efficient appliances & equipment** Electrical equipment must be at least 0.5 stars above the market average star rating or comply with high efficiency standards specified in the GREP HVAC system must have timed or sensor feedback functionality for energy conservation Systems shall be designed to minimise energy consumption. System design / equipment selection is to be based on whole of life cost analysis. Specific requirement are outlined in the EFSG.	Ph 2-5: Services Design	DG2.3.3 DG55	DAB c15 GHG Emissions Reduction	**1.** Schedule of appliances and equipment with their star ratings or performance standards, signed by head contractor or architect. All appliances and equipment required in the GREP must be listed, incl air conditioning equipment, electric motors, transformers, etc. **2.** As built mechanical drawings / statement from head contractor; **3.** Whole of life cost analysis demonstrating systems were selected based on WOL performance.	Y	FFE Schedule/receipt to demonstrate compliance	FFE Schedule to show compliance													TBC			5
Act on climate change	**Heat loss/gain** The design must take steps to control heat loss from the building during cooler winter months and heat gain during the warmer months. Refer to HVAC Design considerations in DG04.01	Ph 2-5: Services Design	DG04.01	DAB c15 GHG Emissions Reduction	1. Thermal modelling report 2. As built evidence demonstrating that model is an accurate representation of the building 3. Specifications/ calculations supporting modelling inputs	Y	Energy model to demonstrate compliance	Project Energy Modelling report													TBC			6
Act on climate change	**Indoor environment controls** - Both the thermal comfort and indoor air quality shall be controlled automatically within specified parameters. - Controls shall be simple and intuitive to use. - A "traffic light" light system (described in DG 55.01 Thermal Comfort and Indoor Air Quality Policy) should be used to inform users of the suitability of outdoor conditions to utilise natural ventilation.	Ph 2-5: Services Design	DG55 DG 55.01 Thermal Comfort and Indoor Air Quality Policy	DAB c15 GHG Emissions Reduction	**1.** As built evidence demonstrating controls have been installed as required. **2.** Commissioning report / statement by head contractor confirming controls have been set as required	Y	Mechanical to demonstrate compliance	Mechanical report													TBC			7
Act on climate change	**Renewable energy** A grid connected solar PV system must be installed in line with DG66 requirements Where feasible, PV systems shall be installed to offset as much of the electricity consumed by the school as is practicable	Ph 2-5: Services Design	DG2.3.4 DG55	DAB c15 GHG Emissions Reduction; DAB c16 Peak Electricity Demand Reduction	**1.** As installed drawings of PV system **2.** Energy modelling report showing renewable energy generation	Y	SINSW standard practice	PV layout and specs, PV to be included in energy model													TBC			8
Act on climate change	**Battery Energy Storage System** A battery energy storage system shall only be designed in consultation with SINSW Sustainability sustainability.enquiries@det.nsw.edu.au	Ph 2-5: Services Design	DG66.8.3	DAB c15 GHG Emissions Reduction; DAB c16 Peak Electricity Demand Reduction	As installed drawings of battery storage system	TBC	electrical to review			Electrical											TBC			9
Act on climate change	**Heaters** Electric heating must be preferred over gas heating. Where gas heating is considered, it must be approved by SINSW Sustainability Heating equipment must be designed from a whole-of life perspective and: - Support sustainable design principles including reducing energy consumption and carbon emissions - Be accessible and serviceable - easy to maintain with minimal impact on school use when maintenance is being performed	Ph 2-5: Services Design	DG56	DAB c15 GHG Emissions Reduction	1. If reverse cycle air conditioning is installed, confirmation that gas heaters are not installed, OR **2.** Evidence that the gas heaters installed are energy efficient	Y	No gas heaters or energy efficient gas heaters	Mechanical statement		Mechanical											TBC			10
Act on climate change	**Water heaters** - Hot water and tempered water generation for schools must be carefully considered to ensure that a Whole of Life assessment is undertaken to minimise life cycle costs and carbon emissions - Environmentally friendly options such as solar heating (if vandal resistant) and heat pumps are preferred energy sources to minimise energy consumption	Ph 2-5: Services Design	DG53.09	DAB c15 GHG Emissions Reduction	1. WOL cost assessment for hot water systems 2. Hydraulic drawings/schematics showing installed DHW systems	Y	Hydraulic drawings/schematics showing installed DHW system	Hydraulic drawings		Hydraulic											TBC			11
Build resilience	**Site investigations for resilience** The following detailed reports/ surveys/ information should be considered in developing the business case: - Slope, drainage and erosion issues including flood risks (if any) - Geotechnical and soil conditions - Airborne pollutants - Bushfire risks - Appraisal of available services infrastructure - Climate change risk assessment must be undertaken considering at least two different climate change scenarios An environmental risk report will be required for developments proposed within sensitive natural environments or sites subject to natural risks (i.e. flood prone sites, bush fire areas).	Ph 1: Site Selection and Masterplan	DG03.02	DAB c3 Adaptation and Resilience	**1.** Detailed reports or surveys developed **2.** Environmental risk report **3.** Evidence demonstrating recommendations have been implemented and risks addressed through design responses.	Y	Head contractor to provide reports or site survey to demonstrate compliance	detailed reports or surveys													TBC			12
Build resilience	**Bushfire protection** REF applications on bush fire prone land must be accompanied by a Bush Fire Assessment Report demonstrating compliance with the aim and objectives of Planning for Bush Fire Protection and the specific objectives and performance criteria for the land use proposed. Local Authorities and the Rural Fire Service can provide advice on the design of buildings in bush fire prone areas. The Building Code of Australia and AS3959 "Construction of buildings in bushfire-prone areas" set out the requirements for buildings which are within close proximity to a defined bush fire zone. Mandatory landscape management strategies: - Keep the amount of fuel (leaves, twigs, logs, dead grass) in the vicinity of buildings to a minimum. - Ensure trees are located at away from buildings to avoid branches overhanging and leaves collecting on roofs. - Do not plant shrubs against buildings. - The crowns of trees planted on the hazard side of the development should not be contiguous. - Plant fire resistant trees and shrubs on the hazard side of the development to reduce the potential impact of wind, fire intensity, radiant heat, and rate of spread as well as intercepting burning embers. - Avoid combustible fencing materials. - Provide irrigation and garden sprinklers to water areas near the buildings (subject to water authority approval).	Ph 1: Site Selection and Masterplan	DG13.01	DAB c3 Adaptation and Resilience	**1.** Bush fire assessment report **2.** Statement by Architect / fire consultant outlining building strategies implemented in line with BCA and AS3959. **3.** Bush fire management plan outlining management strategies implemented **4.** Landscape plans detailing bush fire management measures implemented	Y	Landscape consultant or relative consultant to provide drawing/reports to demonstrate compliance	Bushfire assessment report or plans													TBC			13
Build resilience	**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. An initial assessment of natural hazards and project vulnerability must be carried out, in consultation with resilience experts, to inform the business case and identify hazards where further analysis is required. The assessment must report on at least two different timescales (2050 and 2070) 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 Where significant risks are identified in the initial assessment, a comprehensive climate change risk assessment must be undertaken. Any high or extreme risks identified must be addressed through design measures.	Ph 1: Site Selection and Masterplan	DG02.08	DAB c3 Adaptation and Resilience	**1.** Climate risk assessment, and **2.** Climate adaptation plan **3.** Emergency management plan	Y	Required by Green star as well	Climate Adaptation Plan and/or Emergency Management Plan													TBC			14
Build resilience	**Weather protection** Circulation areas provided between administrative, staff and all student spaces (except Agriculture), should be protected from sun, rain and unfavourable winds.	Ph 2-5: Architectural Design	DG08.05	Not covered in Green Star	As built drawings showing circulation areas are protected as required	Y	Architect to confirm														TBC			15
Build resilience	**Urban Heat Island Mitigation - Roof Colour** The roof colour will also have an impact on the thermal performance of the roof, therefore the product's Solar Reflectance Index (SRI) should be considered to mitigate the heat island effect. The product selected must meet the following three-year Solar Reflectance Index (SRI) requirements: For roof pitch < 15, minimum SRI of 64 For roof pitch > 15, minimum SRI of 34 Where a three-year SRI is not available, the following requirements must be met: For roof pitch < 15, minimum SRI of 82 For roof pitch > 15, minimum SRI of 39'	Ph 3-4: Product and Material Selection	DG20 Fabric	DAB c25 Heat Island Effect	**1.** Site Plan highlighting all relevant areas as referenced within the area schedule; **2.** Area Schedule listing the areas of each of the relevant site elements and where relevant, the SRI values and referencing plan drawings for the site; and **3.** Supplier Documentation material data sheet for compliant roofing and hardscape materials.	Y	Required by Green star as well	Architectural plans to demonstrate compliance													TBC			16
Consume responsibly	**Building User's Guide** Produce a Building User's Guide to enable the client to understand the building systems and operate systems to maximise efficiency. This must: - Clearly and concisely describe the operation of building and its services - Detail a reasonable maintenance program - Advise the user of the most suitable replacements for consumables	Ph 7-9: Construction, Commissioning Post Occupancy and Operation		DAS c4 Building Information	**1.** Building user's guide	Y	Head contractor to provide Building User's Guide	Building User's guide													TBC			17
Consume responsibly	**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	Ph 1: Site Selection and Masterplan	DG2.4.3	DAB c26 Stormwater	**1.** Stormwater modelling report showing stormwater pollution and flows. **2.** Civil / Hydraulic drawings showing management measures. **3.** Water sensitive urban design report (if WSUD was use4)	Y	Civil to demonstrate compliance	Civil drawings showing management measures													TBC			18
Consume responsibly	**Drinking water catchment protection** For developments within drinking water catchment areas, a water cycle management study is to be included with the Development Application for Education Facility developments involving: - Agriculture facilities - Biosolids and effluent re-use schemes - Sewerage systems or works (including package sewerage treatment plants) - Stormwater or works involving the disposal of untreated runoff	Ph 1: Site Selection and Masterplan	DG51.07	GSC c24 Integrated Water Cycle	**1.** Water cycle management study **2.** Evidence that recommendations in the study have been followed / implemented	TBC	Hydraulic to confirm		According to Water NSW map (see attached), the site is not in a drinking water catchment												TBC			19
Consume responsibly	**Hazardous materials** Where a new school is to be developed a Hazardous materials study is to be conducted, including: - Asbestos Containing Materials (ACM) - Synthetic Mineral Fibres (SMF) - Polychlorinated Biphenyl's (PCB) - Lead Paint - Ozone Depleting Substances Any existing structures and all parts of the site should be examined in order to determine the presence of hazardous materials before commencement of any renovation or demolition. Inspection should be conducted in accordance with DG48. Where hazardous materials are found a Hazardous Materials Management Plan should be prepared	Ph 1: Site Selection and Masterplan	DG48.01	DAB 24.2 Contamination and Hazardous Materials	**1.** Hazardous materials study / site inspection report / survey **2.** Management plans for hazardous materials identified **3.** Remediation strategies implemented **4.** Environmental auditor certificates / clearance certificates	Y	Head contractor to provide Hazardous Materials Management Plan	Hazardous materials management plan													TBC			20

Consume responsibly	**Operational waste** A waste storage area must be included in all new school sites. The provision of space must include source separation including bin clusters and appropriate signage of waste and receptacles for multiple waste streams, including: - Organics - Comingled containers - Paper & cardboard - Container deposit scheme - Soft plastic - General waste Designers must refer to AS 4123.7 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. 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 address all requirements from DSI 2.7.2	P3: 2- Concept Design - Space planning	DSI02.7.7.1	DAR.08 Operational Waste	Operational waste management plan Operational waste reports showing diversion rates	Y	Head contractor to provide Operational Waste Management Plan	Operational waste management plan														TBC			21
Consume responsibly	**Building flexibility** Position structural members considering the future flexibility of the structure. Avoid ad hoc placing of columns internally, giving preference to uniformity in layout. Design all internal walls as non-load bearing to enable future flexibility.	P3: 2- Concept Design - Space planning	DSI01.1.39	Not covered in Green Star	As built drawings or statement by relevant pro/tecnical	Y	Drawing to demonstrate building flexibility if/if required	As built drawings to show compliance														TBC			22
Consume responsibly	**Hydraulic services** Hydraulic services should: - Support sustainable design principles including reducing water consumption and waste production. - Appropriately treat any trade waste to ensure minimal environmental impact. - Be accessible and serviceable - easy to maintain with minimal impact on school use when maintenance is being performed - Use products with a long life span – many hydraulic services are concealed so durability is essential	P3: 1- Services Design	DSI05.1.01	DAR.11B Potable Water	1. Hydraulic report showing sustainability initiatives implemented to reduce potable water consumption 2. As built drawings showing trade waste arrestors	Y	Letter from Hydraulic to show the sustainability initiatives implemented to reduce potable water consumption	Letter from Hyd														TBC			23
Consume responsibly	**Water sub-metering** In addition to the main water meter for the site provide sub meters for the following: - Mixed irrigation systems - Laboratory buildings - Amenities blocks - Canteens - Any other major water use on the site	P3: 2- Services Design	DSI05.3.04	DAR.08.11 Metering	1. As built hydraulic drawings	Y	As-built hydraulic drawing to show the sub-meters and comply the requirement	Hydraulic drawings														TBC			24
Consume responsibly	**Rainwater collection** Include roof water harvesting and tank storage in new schools and where practical in existing schools to reduce the demand on drinking water supplies. Tank water can connect to drip irrigation systems for adjacent landscape/gardens with the major preference being for gravity fed supply to minimise ongoing maintenance. The rainwater tanks must be connected to toilets for toilet flushing. If this is not feasible, approval must be granted by SYDNEY.	P3: 1- Services Design	DSI05.3.10 DSI02.4.2 DSI03.3.01	DAR.11BB.2 Rainwater Reuse	1. As built hydraulic drawings showing tank connection to end uses and capacity	TBC	Drawing to show tank connection to end uses and capacity	Hydraulic/civil drawings to demonstrate compliance	Request for rainwater tanks to be connected to landscape irrigation only (not toilet flushing)													TBC			25
Consume responsibly	**Fire system water reuse** Where schools are required to install a sprinkler system for fire safety, it is recommended to install a closed loop system must be installed to capture and reuse fire systems testing and maintenance water, or by using an alternative non-potable water source.	P3: 2- Services Design	DSI2 .4.2	DAR.11BB.5 Fire System Test Water	Fire engineering report	TBC	If sprinkler system is in use for this project, otherwise not applicable	Fire engineering report to demonstrate compliance if sprinkler system is in use	As per response in the Green Star scorecard, we may now have a sprinkler system for the new buildings but will not likely have a fire tank for detention and reuse (TBC). Therefore we may not have tanks connected to the toilets. unless we exclude fire tanks purely for this reason.													TBC			26
Consume responsibly	**Ground water** Where ground water is available for use for irrigation purposes in drought affected locations, enquiries must be undertaken with the Department of Planning, Industry and Environment to determine the suitability of a ground water system.	P3: 2- Services Design	DSI05.3.03	DAR.11B Potable Water	1. Relevant due diligence report / investigation	TBC	Hydraulic to confirm		There is no intention to utilise groundwater for irrigation purposes at this stage.													TBC			27
Consume responsibly	**Trade waste** Arrestors for acid, grease, plaster and clay of adequate capacity must be installed to treat wastewater from science laboratories, kitchens, art rooms and canteens as required in DSI3.2	P3: 2- Services Design	DSI3.2	DAR.11B Potable Water	1. As built drawings showing trade waste arrestors or 2. Letter by Hydraulic Engineer confirming arrestor have been installed as required	Y	Arrestors to be installed where required	Hydraulic design to show arrestors where required	Ok													TBC			28
Consume responsibly	**Water fixture efficiency** All products must be rated to 4.5 6/000 to the following minimum WELS ratings: - Tapware to 5 star flow rating requirements - Showers to have 3 star flow rating requirements - Water Closet Pans to 4 star flow rating requirements - Urinals to 5 star flow rating requirements - 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. - New and replacement urinals must use manual in lieu of automatic flushing mechanisms. A minimum e-activated urinal flushing system may be used as an alternative. In any case, all new water-using appliances must be at least 0.5 stars above the average WELS star rating by product type, except toilets and urinals, which must be purchased at the average WELS star rating. Where WELS rating is not available, use the alternative WaterMark rating scheme.	P3: 6- Product and Material selection	DSI3.3.02 DSI2 .4.1	DAR.11BB.1 Potable Water - Sanitary Fixture Efficiency	1. Schedules of materials, fixtures, fittings and equipment with WELS/WaterMark ratings, demonstrating compliance and identifying those with flow restrictors and timed flow.	Y	FFE Schedule/receipt to demonstrate compliance	FFE Schedule to show compliance														TBC			29
Consume responsibly	**Life cycle assessment (environmental)** Environmental impacts of products and materials has been assessed and informs material selection	P3: 6- Product and Material selection	DSI01.3.03	DAR.11BA - Life cycle assessment	Life cycle assessment report	TBC																TBC			30
Consume responsibly	**Whole of life costing (WOL)** Total cost of ownership (TCO) assessment / Analysis of direct and indirect costs and benefits / life cycle costing analysis When calculating the whole of life cost for the different materials / building elements or systems, the following must be considered: - the total initial capital cost of the system/s – including design, project management, builder and building services works in connections etc. - resources (energy and where applicable water) consumption. - Maintenance - the replacement of component parts. - disposal costs - ecological or claimable options - durability - ventilation - safety The whole of life cost shall be calculated over the estimated life of the asset/s.	P3: 6- Product and Material selection	DSI01 All design guides for selection of materials and building systems.	DSIC.1.02 - Return on Investment	Life cycle costing report for relevant system	TBC																TBC			31
Consume responsibly	**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 lifecycle (refer to DSI 4) - Low in volatile organic compounds substances (e.g. low VOC) to ensure effective indoor environmental quality. Reduce the demand for scarce/ 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 their useful life.	P3: 6- Product and Material selection	DSI02.1 DSI02.DSI.01	DAR.11B1 Sustainable Products	1. Environmental Product Declarations of products / materials used, Product certificate. (like GBCA, FSC, etc) 2. Suppliers' declarations confirming recycled contents in products 3. BOM quantities	Y	Head contractor to provide Product certificate/statement to demonstrate compliance	Product certificate/statement														TBC			32
Consume responsibly	**Sustainable timber** - Yes can/cane/ timbers, or timbers from high conservation forests, are to be used unless plantation grown. Use only recycled timber, engineered wood/glued timber composite products, or timber from plantations or from sustainably managed regrowth forests that is FSC, AFS or PEFC certified - All timber used is to be termite (white ant) resistant or treated to be termite resistant to the appropriate hazard level.	P3: 6- Product and Material selection	DSI2 .5.1 DSI17.DSI.01	DAR.11B2 Responsible Building Materials - Timber	1. Evidence of chain of custody 2. BOM quantities	Y	Head contractor to provide Product certificate/statement to demonstrate compliance	Product certificate/statement														TBC			33
Consume responsibly	**Built for disassembly** Consider the use of building materials which are able to be disassembled for re-use, in conjunction with considerations for the addition and removal of accommodation over time.	P3: 6- Product and Material selection	DSI02.07			Y	Head contractor to provide statement to demonstrate compliance	Product certificate/statement														TBC			34
Consume responsibly	**Concrete** - Use materials complying with 4S based on the Whole of Life approach to materials selection. - Do not use limestone dolerite in concrete mixes. - Fly ash is a manufacturing by-product that can be used as a cement replacement but should limited to a maximum of 25% by weight of cement content.	P3: 6- Product and Material selection	DSI2.1.02	DAR.11BB.1	1. Structural specifications and drawings 2. Structural Engineer's report showing % cement replacement	Y	Contractor to provide structural specifications and drawings to demonstrate compliance	Structural specification														TBC			35
Consume responsibly	**Construction waste** Targets must be established to increase diversion of waste sent to landfill, with a minimum diversion rate target of 90%. Consider opportunities for re-use and recycling of materials in the construction phase	P3: 7- Construction, Commissioning, Post Occupancy and Operation	DSI02.07	DAR.12.2 Construction and Demolition Waste	Construction waste reports showing percentage (minimum 90%) of waste re-used and recycled (diverted from landfill)	Y	Contractor to provide construction waste report that demonstrate compliance	Waste report														TBC			36
Consume responsibly	**Maintainability** All systems and equipment that is installed within a school is to be provided with suitable access to ensure that this equipment is safely and efficiently maintainable. In order to ensure that maintenance is available, on the completion of all buildings, drawings are to be provided showing the completed (As-Built) building including all equipment and equipment access arrangements. Any mechanical ventilation system within the building must be designed to provide adequate access for maintenance, to both sides of all insertion and debris catching components, within the air distribution system. Moisture-producing and debris-catching components include items such as cooling coils, heating coils, fan coil units, humidifiers and filters in the air handling system. The project team should demonstrate that there is a project level review process in place to ensure that the building has been designed as per the FFDS, that any issues identified have been closed out and that the outcomes can be communicated to the relevant facilities/ operations teams Maintenance required and cost of this maintenance are to be considered in assessment of the project's life cycle cost. Operation and Maintenance manuals (O&M Manuals) are to be provided, written in clear, concise English covering the various building elements, assemblies, equipment, services installations and systems incorporated into the Works.	P2: 5- Services Design	DSI06.10 DSI15.DSI	DAR.11.2 Services and Maintainability Review DAR.09.1.2 Ventilation System Attributes DAR.08 Building Information	1. As built drawings including all equipment access arrangements for maintenance	Y	Head contractor to provide Operation and Maintenance manuals	Operational and maintenance manual														TBC			37
Foster connections	**Site investigations for place-making / community connections** The following detailed reports/ surveys/ information should be considered in developing the business case: - Local environment/ character - Climate and microclimate - Ecology of the site and context - Appraisal of physical and visual factors affecting site development - Available transport/ road infrastructure servicing the site - Geo-technical and test reports will be required for each site to investigate the suitability of the topsoil and anticipated sub-grade materials for horticultural purposes. - Testing for toxic residues must be undertaken in all areas identified as being a possible risk - i.e. filled or dumped ground.	P3: 1- Site Selection and Masterplan	DSI03.02	DSIC.12 Culture, Heritage and Identity DAR.01.1.2 Contamination and Hazardous Materials	1. Relevant reports/surveys developed (these ideally include recommendations for further development stages) 2. Evidence demonstrating recommendations / best practice solutions have been implemented/addressed.	Y	Head contractor to provide reports or site survey to demonstrate compliance	Reports or site surveys to demonstrate compliance														TBC			38
Foster connections	**Ecological conservation** Schools sites must conserve for future generations, the biological diversity of genetic materials, species and ecosystems on that site and consider the surrounding natural environment. An Ecological Assessment Report must be prepared for the site in order to understand the existing conditions and future conservation strategies. The design of the facilities must provide unique and valuable environmental conservation learning opportunities and effective environmental modelling to the wider community. Schools must connect with nature and incorporate biophilic design principles. Open space must allow for exploration, and biodiversity and earth education to enhance the site's outdoor learning potential.	P3: 1- Site Selection and Masterplan	DSI02.09	DAR.13 Ecological Value DSIC.1.09 Ecological Value (incl Biodiversity Enhancement)	1. Biodiversity or ecological assessment / local flora and fauna survey 2. Ecological Assessment Report which documents 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 value throughout project planning, construction, and occupancy. community and local stakeholder expectations including Aboriginal or Torres Strait Islander cultural and environmental groups 3. Adequate due diligence must be conducted where an area of biodiversity or high ecological value is identified on the site, where at least 30% of the area must be retained. 4. Biodiversity management plan describing measures for the conservation and protection of threatened species or communities, biodiversity enhancement, tree protection, etc. 5. Evidence demonstrating measures have been implemented to protect and enhance endangered species / ecological communities identified, to preserve or re-establish native flora, etc.	Y	Contractor to provide Biodiversity Management plan that demonstrate compliance	Biodiversity Management Plan												TBC			39
Foster connections	**Productive landscape** Consider including opportunities for development of community garden within the site and relationships with community groups for this to occur.	P1: 1- Site Selection and Masterplan	DSI2 .06	DSIC.13.E.2 Local Food Production	Site plan demonstrating location and size of community garden	TBC	Landscape plans to demonstrate compliance, otherwise lodge departure with SINSW	Landscape to demonstrate community garden, otherwise departure with SINSW														TBC			40
Foster connections	**Bicycle storage** Provide 1 space for every 20 students to AS2890.3 standard	P2: 2- Concept Design - Space planning	SDI3.5.2 .SL .3b	DAR.11.7 Sustainable Transport		Y	Provide bicycle storage as per required	Architect/arborist plans to demonstrate compliance														TBC			41
Foster connections	**Community use of facilities** Some school facilities are used out of hours for activities such as weekend church groups, sport events and public meetings. Liaise with the Project Director to gain an understanding of any shared use, or community use arrangements that are being considered for the site. New schools should be designed so that direct access to the open play space, fields , hall and gym can be achieved without the public gaining access to the buildings.	P3: 2- Concept Design - Space planning	DGDoL.08 Department of Education's Community Use of School Facilities Implementation Procedure.	DAR.13DB Community Benefits	1. Confirmation by the Architect that direct access has been provided to open space and any other facilities that could be shared with the community. 2. A list of community engagement activities undertaken to develop a community benefits strategy. 3. Plans clearly outlining how the outcomes from the community benefits strategy have been implemented in the project. 4. Joint-use or lease agreements where already in place	Y	Architect to confirm that direct access has been provided to open space and could comply with the requirement	Architect/arborist plans to demonstrate compliance														TBC			42

Foster connections	**Open play space** Open play space must be provided for students to access during recess, lunch breaks and for outdoor learning. Open play space can be comprised of: • Paved and grassed areas • Rooftops and terraces • Covered outdoor areas The designated open play space must be easily monitored and managed by school staff. Where a joint use agreement can be negotiated with a local council or land owner, the required play space can be located off-site, providing the facilities are • In close proximity to the school • Safe to access • Safe and secure Designs must aim to achieve a minimum of 10m2 per student. Where this figure is not achievable the proposed not per student of the completed project must not be less than the existing net per student currently on the site.	P1-2: Concept Design - Space planning	DSSD.03	Not covered in Green Star	Plan view drawings showing provision of open space		Architectural drawings to demonstrate compliance with open play space	Architectural drawings															TBC			43
Foster connections	**Staff room** Staff rooms should adequately accommodate staff work and recreation, and focus on indoor environment quality, enjoyment and interaction through provision of the following: •Daylight • Ventilation • Views • Landscaping/Indoor Plants • Acoustic Comfort	P1-2: Concept Design - Space planning	EFSG Staff Unit	SSV-i Amenity Space	**1.** Extracts from the EFSG requirements for staff rooms **2.** Evidence of staff room delivered accordingly		Mechanical drawing to demonstrate the staff rooms are designed as required	Mechanical drawings to demonstrate compliance															TBC			44
Foster connections	**Reconciliation action plan (RAP)** The project should adopt formalised steps to provide opportunities for Aboriginal and Torres Strait Islander peoples Projects must implement strategies during design, construction and operation that contribute positively towards reconciliation with Australia's first people and address socio-inequalities within Australia is between Indigenous and non-Indigenous Australians. The project demonstrates a relationship to, and a role in delivering the action items within the Department of Education's RAP. This could include incorporation of Indigenous design strategies and Indigenous designers, celebration of Indigenous culture on the site through art or landscape, and procurement from Indigenous suppliers and workers. Refer to the tick NSW 'Designing with Country' Discussion paper for guidance and examples. The project must adopt all relevant requirements within the NSW Government's Aboriginal Procurement Policy (January 2021)	P1-2-3: Architectural Design	Department of Education's Reconciliation Action Plan NSW Government Aboriginal Procurement Policy GANSW 'Designing with Country' discussion paper+	DIAN-2DSD Reconciliation Action Plan	**1.** Evidence of the project's relationship with the RAP, e.g. actions implemented in line with RAP, etc.		Head contractor to provide Reconciliation Action Plan	Reconciliation Action Plan															TBC			45
Foster connections	**Security** Safety in Design and Crime Prevention Through Environmental Design (CPTED) principles are to be implemented in project planning stage. Advice on the electronic surveillance systems can be sought early in the design phase. CCTV systems are required in several locations where indicated in the Rooms and Spaces Technical Data table, including: • Secondary Gate • Primary Gate • Library	P1-2-3: Services Design	DSSG.10 DSSH.08 DSSS.10	SSC-13 Safe Places	**1.** Crime risk assessment or equivalent **2.** Evidence of designing out crime principles implemented **3.** Security services plans, schedules and forms by School Security Unit (SSU) **4.** SSU specification and evidence of input on project specification		School Security Unit to provide Security Services Policy, Schedules and Forms	Security services plans, schedules and forms															TBC			46
Foster connections	**Digital infrastructure** New buildings and refurbishments are required to provide a common wireless solution compatible across the school, providing a consistent user experience and support mechanism. This involves the replacement of existing legacy wireless equipment, such as access points and site controllers.	P1-2-3: Services Design	DSSK.12.02	SSC-12.2 Digital Infrastructure	**1.** Contracts describing the network infrastructure specification and operational requirements		Contracts that describing the network infrastructure specification and operational requirements	Network contracts															TBC			47
Foster connections	**Sustainable Transport Planning / Transport Assessment** Transport planning must prioritise the delivery of feasible, connected networks and rectify transport deficiencies. The **School Transport Assessment** process must prioritise critical transport infrastructure to satisfy community expectations and statutory planning obligations. The assessment seeks to address school travel demand efficiently, safely and sustainably by maximising the most active and sustainable transport modes and reducing car parking capital expenditure and car travel demand. The School Travel Plan must be developed to inform the design response, construction traffic management, travel plan and post-occupancy operations to meet daily travel demand to school	P1-1: Site Selection and Masterplan	Schools Transport Practice Note	DIAN-1LT Sustainable Transport	**1.** Transport Assessment, which must address: • A review of the school's travel demand; • The establishment of transport modes to promote during construction and operation; • Identification of transport improvements required to meet school travel demand; • Actions to inform the site design, master plan, Construction Traffic and Pedestrian Management Plan and Travel Plan; • Actions to address road safety concerns; and • Compliance with the Transport Planning Advisory Note.		Contractor to provide Transport Assessment to demonstrate compliance with this requirement	Transport Assessment															TBC			48
Unlock human potential	**Green cleaning** Designs should support the implementation of a Green Cleaning policy for the school, this may include: • Appropriate cleaning areas are to be provided to safely store chemicals and equipment. • Hand washing stations • Use of HEPA filtration in vacuum equipment • Use of materials and surfaces that are easily cleaned • Consideration of operational waste procedures and the safe and simple transfer of waste throughout the school	P1-7-9: Construction, Commissioning Post Occupancy and Operation	Work Facilities NZ	GSP-16 Green Cleaning	**1.** NSW Clean School Use Guide **2.** Green Cleaning specifications		Head contractor to provide Green Cleaning specification which complies with this requirement	Green Cleaning specifications															TBC			49
Unlock human potential	**Healthy canteen policy** The NSW Healthy School Canteens Strategy applies to all NSW Government school (primary, secondary and central schools) with a canteen. The school should play a role in encouraging healthy dietary options in an effort to help reduce childhood obesity through food provided in the school canteens. As such, School canteens should be designed to encourage onsite preparation, storage, display and promotion of healthy 'everyday' foods.	P2-2: Concept Design - Space planning	Department of Education's Healthy Canteen Policy	DIAN-1DSD Integrating Healthy Environments	**1.** Research report behind Healthy Canteen Policy **2.** Evidence that policy initiative has been incorporated into the school under assessment.		Head contractor to provide research report behind Healthy Canteen Policy	Develop reports to demonstrate compliance															TBC			50
Unlock human potential	**Daylight glare control** Discomforting glare and brightness contrasts must be avoided. Designers must seek to: • Exclude direct sunlight from all learning spaces, libraries, administrative offices and staff studies for the period of 9:00am to 3:30pm including Eastern Daylight Saving Time between 23:1 September to 21st March (equinoxes). • Exclude direct sunlight from desk level in all learning spaces between 9am and 3:30p.m. Sun reducers 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'. Blinds must only be controlled by blinds as a last resort. Designers must prepare sun diagrams in the design phase as a minimum requirement.	P1-2-3: Architectural Design	DSSC.2 DSSD.7.01	DIAN-LL2.0 Glare Reduction	**1.** Daylight glare modelling report / sun diagrams showing direct sunlight has been excluded as required. **2.** Drawings supporting inputs of model, showing location of blinds and any other glare control device		An Ausbl drawing to have eaves/shading to the facades that has direct sunlight	Architectural drawings and/or daylight report															TBC			51
Unlock human potential	**Acoustic Performance** Design of internal spaces must address the following Acoustic outcomes: • **Internal Noise Levels** : An internal noise level assessment must be carried out for all new buildings to ensure comfortable acoustic conditions for the spaces occupied. The internal noise levels within the space must meet the levels stipulated in Table 11.3b.1 of Section 11.3B Acoustic Performance Guidelines or be within the range stipulated in Table 1 of the AS/NZS 2107:2016 standard. The	P1-2-3: Architectural Design	DSS.11.06 DSS.11.03 DSS.11.02	DIAN-LL3 Acoustic Comfort	**1.** Report by qualified acoustic consultant demonstrating noise measurements are compliant **2.** Detailed drawings indicating sound insulation details and other relevant Acoustic design features		Acoustic report and/or drawings to demonstrate compliance	Acoustic report to confirm compliance with all Acoustic requirements															TBC			52
Unlock human potential	**Noise emission (to the environment)** Generally noise emission to the environment from mechanical services noise sources (such as air conditioners) are the subject of a development consent conditions. In NSW the development consent conditions will refer to the Industrial Noise Policy (INP) or local Council requirement. Where no condition regarding noise sources exists for a school development, noise emission from such sources should be designed, in principle, to satisfy the requirements of the Industrial Noise Policy.	P1-2-3: Architectural Design	DSSS.1.04	Not covered in Green Star	**1.** Report by qualified acoustics consultant		Acoustic consultant to demonstrate compliance	Acoustic consultant to confirm compliance with Acoustic design certificate for construction															TBC			53
Unlock human potential	**Fly/bee indoors** Fly screening must be provided in all schools to the doors, windows and other openings in food preparation, biology, and non-water-closet toilet spaces or where specifically nominated in the BFSS. Schools in localities where fly incidence constitutes a health hazard (especially trachoma or other nuisance) will require fly screens to all opening sashes.	P1-2-3: Architectural Design	DSSS.1.01	Not covered in Green Star	As-built drawings showing fly screening has been provided as required		Fly screens to where required, otherwise not applicable	If these areas are applicable to the proposed development, provide fly screening															TBC			54
Unlock human potential	**Accessibility** • All new facilities must meet current DTS provisions of the NCC and the associated standards. Generally AS 1428.1 is the minimum design standard for access and mobility. However, it is DoE's policy that any enhanced accessibility measures in AS 1428.2 are also to be met. • Additionally, DoE have enhanced circulation requirements as noted in DSL/CIRCULATION • Provide hearing augmentation system for areas that have amplification, generally within Gymnasium, libraries, movement studios and Communal Halls, provide a system to assist the audibly challenged to hear music and speech within the main auditorium and on the stage • Provide the international Symbol for Deafness to indicate that an assistive hearing device is installed.	P1-2-3: Architectural Design	DSSD.9.01 DSSH.1.6	DIAB 30DD Universal design	**1.** Accessibility plan **2.** As-built drawings or other evidence demonstrating that minimum and enhanced accessibility requirements have been provided for walkways, corridors, ramps, etc. **3.** Photographic or other evidence of signage installed		Head contractor to provide photographic or other evidence of signage installed	Reference specification															TBC			55
Unlock human potential	**Access to 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' Note: Primary Spaces are defined as spaces that where students or staff are expected to work, or remain for an extended period of time. typically longer that 2 hours. This includes classrooms, laboratories, computer labs and office/administration areas.	P1-2-3: Architectural Design	DSSE.10	DIAN-LL2.2 Views	**1.** Views Calculations and Mark-up This must be done in accordance with the GBCA's Daylight and Views Manual Calculation Guide: https://www.gbca.org.au/uploads/79/35919/Green%20Star_Daylight%20Calculation%20Manual%20Calculation%20Guide%20May%202015%20REVA3M.pdf)		Calculations and Mark-up to demonstrate compliance with this requirement	Views (Facility advisor and Mark-up to contribute to GSAT)															TBC			56
Unlock human potential	**Access to Daylight** Designers must seek to maximise natural daylight in all learning and administration spaces to improve indoor amenity and create a visually comfortable environment, reduce energy usage through windows and skylights • Access to high levels of daylight must be ensured for at least 80% of primary occupied spaces per floor. A space is considered to have high levels of daylight if: the space has minimum 150 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' Note: Primary Spaces are defined as spaces that where students or staff are expected to work, or remain for an extended period of time. typically longer that 2 hours. This includes classrooms, laboratories, computer labs and office/administration areas.	P1-2-3: Architectural Design	DSSE.3.1 DSSE.2	DIAN-LL2 Visual Comfort	**1.** Daylight modelling report demonstrating how natural daylight has been maximised in all habitable spaces; and **2.** As-built drawings demonstrating that the model accurately represents the building (i.e. window size and location, skylights installed, etc.); and **3.** Specifications supporting inputs used in modelling (e.g. skylights and glass types)		Green Star hand calculation to demonstrate compliance	Green Star hand calculation and/or daylight modelling															TBC			57
Unlock human potential	**Ventilation and Indoor Air Quality** The maximum CO2 concentration must not exceed **1,100ppm** for more than 20 consecutive minutes in each day A ventilation strategy must be developed to ensure that sufficient ventilation is provided to all spaces to meet the requirements of the AS/NZS/NCC and associated standards. Specifically, ventilation equipment must be designed from a whole-of-life perspective and support healthy indoor environments, energy efficiency and ease of maintenance. This must also meet requirements for: • Natural ventilation mode and cross ventilation: in line with DSDS .01 • Mechanically Assisted cross ventilation: In two storey blocks where cross flow ventilation is not possible to the lower floor, mechanically assisted cross ventilation is to be provided to the lower floor learning spaces nominated in the BFSS, the design must adhere to DSSV7.1.B. • Roof ventilator control: in line with DSDS 1.9 • Wind powered roof ventilators: Designed to suit local ambient climatic conditions to ensure correct sizes, locations and numbers as detailed in DSSV7.1.E • Mixed mode ventilation: Document natural ventilation or mechanical ventilation, to disperse odours and /or humidity in line with • Cross ventilation: is to be used where possible. • Provide mechanical ventilation to all Disabled Toilets. • Ventilation in storage spaces: in line with DSSS.05 • Ventilation in permanent learning spaces and libraries: in line with DSSS • Outdoor air requirements and control of indoor CO2 levels - designs must adhere to DSSS.02 • Ventilation in printing rooms: The ventilation system is to be designed to serve the whole room and is not intended to provide localised exhaust at equipment. Adhere to ventilation requirements set out in DSSV7.07. • Chemical store ventilation: Provide mechanical exhaust system with high and low level exhaust points to all chemical stores, with a minimum of 15 air changes per hour flow rate. Adhere to ventilation requirements set out in DSSV7.09	P1-2-3: Services Design	DSSV7.01 DSSS.02 DSSS.05 DSSZ.7.16 DSSE5.01 DSSZ7.18 DSSE5.02 DSSV7 DSSE5.16 Thermal Comfort and Indoor Air Quality – Performance Brief	DIAN-LL5 GHG Emissions Reduction	**1.** Cooling system strategy including WCB. analysis **2.** Concept plans **3.** Construction drawings **4.** Trade-based specification **5.** As-built drawings, including indication of windows and cross ventilation		Mechanical design to demonstrate compliance	Mechanical design to incorporate															TBC			58
Unlock human potential	**Lighting comfort** • Consider the furniture layout to determine the orientation of luminaires. Especially when positioning luminaires in Materials Technology Studios to provide adequate illumination on machines and work surfaces. • Avoid potential stroboscopic effects and avoid shadows from equipment • Mount luminaires as high as possible, but generally no higher than 4000mm AFFL (excluding Gymnasiums and Halls), to improve luminance uniformity and reduce direct glare in the direction of normal view. • The standard lamp colour temperature is 4,000°K, except in certain toilet areas where the Design Guide requires the use of blue colours. • The Colour Rendering Index (CRI) for light sources must be minimum 80 or higher • Compliance with the uniformity requirements stipulated in Table 2.2 of the AS/NZS 1680 standard should be demonstrated by the presentation of the output from lighting design software. • The Unified Glare Rating (UGR) must be calculated in accordance with the procedure outlined in Clause 8. 3.3 of AS/NZS 1680.1:2006 standard, and the calculated value must not exceed the maximum values specified in Table B.2 of the standard. • The average illuminance values must meet the recommended levels as specified in the AS/NZS 1680 standard., and the maintained illuminance values achieve a uniformity of no less than the values given in Table 3.2 of AS 1680.1:2006, with an assumed standard maintenance factor of 0.8. • To ensure Flicker Free lighting, the following lamp/ballast requirements should be considered: LED lighting – electronic drivers with 12 bit or greater resolution • Modelling must provide output that clearly demonstrates that the proposed design is compliant with the standards including but not limited to the parameters listed in DSSS.05.02	P1-2-3: Services Design	DSSS.3.03	DIAN-LL1 Lighting Comfort DIAN-LL1.1 General Illuminance and Glare Reduction	**1.** Lighting drawings **2.** Architectural drawings **3.** Lighting specifications / schedules **4.** Product data sheets **5.** Dialux plot drawings **6.** Lighting modelling report showing compliant uniformity and UGRs		Electrical design to demonstrate compliance with the requirement	Elec drawings															TBC			59

Unlock human potential	**Thermal comfort** The inclusion of active cooling within school facilities is directed by the Department's Air Cooling policy: 1.1 Schools with a long term average mean maximum January temperature of 33 oC and above Generally, air conditioning is to be provided to all school buildings. 1.2 Schools with a long term average mean maximum January temperature of below 33oC: Air conditioning is to be installed in all permanent learning spaces and libraries forming part of each projects scope. - Thermal modelling is undertaken to demonstrate that learning spaces and libraries have been designed to achieve a predicted mean vote (PMV) of +/- 1 for 95% of occupied hours	PY-2-1- Services Design	DSD5.03 DSD5.03 DSD5.02	DAB:13.6 Thermal Comfort	1. Mechanical drawings showing HVAC systems installed, or 2. Confirmation from sub-contractors that services have been installed and commissioned as required; and 3. Modelling report showing required PMV is achieved. Modelling report to be done in line with methodology described in Draft thermal comfort and indoor air quality interim performance brief for DSD5	Y	Mechanical providing as as per ASI1668.2 requirements, energy modelling required to show PMV compliance	Energy modelling														TBC			60
Unlock human potential	**Microbial control** As a measure to prevent legionella, heated water to hand basins, showers etc. shall be stored at temperature above 65 C. Thermostatic mixing valves are to be used for tempered water generation at each point of use. Valves need to comply with microbe disinfection requirements - "Code of Practice for Thermostatic Mixing Valves NSW" as approved by the NSW Health Department.	PY-2-1- Services Design	DSD1.09 DSD3.11	DAB:12B Microbial Control	1. Letter by hydraulic engineer confirming hot water is stored above 65 deg and that valves comply with code of practice	Y	Hydraulic to confirm		Hydraulic will comply															TBC			61
Unlock human potential	**External access lighting** External Access lighting shall be provided to illuminate building entrances, footpaths, sheltered walkways, roadways and car park. Lighting shall be designed: - Be minimal and designed to prevent glare to pedestrians, nearby residents and to motorists. Evidence of compliance with AS4282, AS/NZS 1158 and other applicable Australian Standards must be provided by the designer. - Be located so as to link various sources of illumination such as street lighting (for carpark and roadways) and internal security lighting (for footpaths, walkways and entrances). - Illuminate building entry doors. - Highlight "accident-prone" areas such as changes in level, stairs and ramps. - Provide vertical illumination.	PY-2-1- Services Design	DSD3.08.01	DAB:17.0 Light Pollution to Neighbouring Bodies	1. A cluelt drawings indicating the location of alrecternal luminaires 2. Letter by lighting designer describing glare prevention measures	Y	Electrical drawings indicating the location of all external luminaires	Elec drawing																TBC			62
Unlock human potential	**Low VOC-emitting materials** 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 must meet the limits stipulated in the Australian Paint Approval Scheme's (APAS) VOC limits for low VOC paints. - 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	PY-3-4- Product and Material Selection	DSD 5.2	DAB:13.5 Indoor Pollutants	1. Product specifications, certificates, safety datasheets that demonstrate low VOC contents 2. BOM of quantities	Y	Head contractor to provide product specifications, certificates, datasheets that demonstrate compliance with VOC contents	Product certificate/statement																TBC			63
Unlock human potential	**Low formaldehyde-emitting materials** Only low formaldehyde-emitting engineered wood products should be used, such as those that meet the Australian Standards for formaldehyde emission limit E1 (ENZ969 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 dissimilar overlaid wood panels. This requirement excludes formwork.	PY-3-4- Product and Material Selection	DSD 5.2	DAB:13.5 Indoor Pollutants	1. Product specifications, certificates, safety datasheets that demonstrate low formaldehyde contents Bill of quantities	Y	Head contractor to provide product specifications, certificates, datasheets that demonstrate compliance with formaldehyde contents	Product certificate/statement																TBC			64
Unlock human potential	**Acoustic post-occupancy evaluation** Post-occupancy evaluations are often undertaken to assess the performance of recently completed or existing facilities. Where a Post-Occupancy Evaluation is to be undertaken it should be conducted by the project team or acoustic engineer and should be undertaken of selected acoustic parameters only. Evaluation must include (as per the above criteria) - Internal noise levels, - Room acoustics, - Noise emission, - Room-to-room acoustic performance The noise measurement and documentation must be provided by a qualified acoustic consultant and in accordance with AS/NZS 2107:2016 Measurements shall be conducted in at least 10% of regularly occupied spaces.	PY-7-9- Construction, Commissioning Post Occupancy and Operation	DSD1.07	DEP-13 Internal Noise Levels	1. Commitment by SI to conduct acoustic post-occupancy evaluation	Y	Acoustic report to demonstrate compliance	Acoustic report to confirm compliance with all acoustic requirements																TBC			65
Unlock human potential	**Pesticide free environments** Schools must be designed, constructed and maintained, without using chemicals for termite and other pest control. No chemical pesticides and termiticide to be used. Preventive treatments to be by physical means and careful design to minimise risk	PY-7-9- Construction, Commissioning Post Occupancy and Operation	DSD 5.3	Not covered in Green Star	Statement by head contractor that no pesticides or termites have been used.	Y	Head contractor to provide statement that no pesticides or termites have been used	Statement of compliance																TBC			66

APPENDIX B – GREEN STAR MATRIX

Green Star: Design & As Built v1.3 - Credit Recommendations for Leppington

Registration # GS-7321DA

GS-7321DA		5 Star - Australian Excellence	Design Points	Points TBC/Can be Targeted	5 Star - Australian Excellence
Points Requires					60
Design & As Built v1.3 - core credits only			58	0	58
Design & As Built v1.3 - including Innovation credits			68	0	68
Safety Margin					8

	Targeted Points	Points TBC	
Core Credits	58	0	
Innovation	10	0	TBC
Total	68	0	0

Education
School Infrastructure

Green Star - Design and As Built v1.3 Requirements						SINSW Approach to achieving											
Category/Credit	Code	Credit Criteria	Points Available	Aim	Compliance requirements	SINSW preferred approach - including pre-approved TQ alternate	Relevant EFSG section or other SINSW guideline	Example project specific evidence (For Green Star certification all evidence must be accompanied by	Consultant(s) Responsible	SINSW SME	Targeted Points	Points TBC /Can be Targeted	TBC	ESD Comments	EFSG Equivalence	MMC Responsibility	Phase 2 Project Team Comments/status
Management			**14**								**12**	**0**					
Green Star Accredited Professional (GSAP)	1.0	Accredited Professional	1	Recognises projects that engage a GSAP to support the Green Star certification process.	Appoint GSAP at all stages of the project, leading to certification	ESD consultant is engaged at early design and throughout development process to coordinate ESD input in building design	● Sustainability Practice Note ● ESD consultant scope of services	● Letter from PD stating the ESD Consultant fulfilled the role gasp certificate ● ESD consultant outputs (e.g. letters of advice, reports, etc.)	Project Manager		1			ESD Consultant/GSAP to submit **GSAP Confirmation Letter** for each Phase of the project from Phase 3 - Schematic Design onwards. **Project GSAP**: Phase 0-2 - Ivan Miao (JHA) Phase 3 to 9 - TBC	High	Main Works - ESD	
Commissioning and Tuning	2.0	Environmental Performance Targets	Mandatory for this Credit	Recognises commissioning, handover and tuning initiatives for building services to operate at their full potential and as designed.	Set environmental performance targets	SINSW set out environmental performance targets for each school type	● SINSW Environmental Performance Plan	● SINSW Environmental Performance Plan (Populated with project information) ● SI NSW Design Intent Report	SINSW Sustainability	Sustainability	Y			SINSW **Environmental Performance Plan** template available. Design Team to populate **Environmental Performance Plan**	Med	SINSW	
	2.1	Services and Maintainability Review	1		Conduct a services and maintainability review during design and prior to construction and develop a 'Service and Maintainability Report'	Refer GBCA Response R-14417 - The GBCA has approved an alternative approach where	● DG 16.10 - Access for Maintenance Project Governance Frame	The project team should demonstrate that there is a project level review process in place to ensure that the building has been designed as per the EFSG, that any	Project Manager	Commissioning Team	1			During Phase 4 - Design Development, Design Team to complete the **Services and Maintainability Review** template demonstrating project specific	High	MFS	
	2.3	Building Systems Tuning	1		Commit to a tuning process for all nominated building systems including: ● quarterly adjustments ● measured first 12	Not currently addressed in SINSW D&C constructio		● Building Tuning Commitment or contract demonstrating that there is a requirement for a	Head Contractor	Commissioning Team	1			May be targeted for additional fees to head contractor.	Low		
	2.4	Independent Commissioning Agent (ICA)	1		● Appoint an ICA from schematic design	At construction and commissioning phases, the Commissioning & Handover Procedure requires comprehensive	● Commissioning & Handover Procedure	• Evidence outlining the purpose, role and responsibilities of the Commissioning and Temporary Schools Program Team. • CVs demonstrating that the team are suitably qualified commissioning	Project Manager	Commissioning Team	1			**GBCA Response R-14422**, projects within the Schools Infrastructure NSW Umbrella (GS-6039DA) may use the Commissioning and Temporary Schools Program Team in lieu of engaging a dedicated independent	High	SINSW	
Adaptation and Resilience	3.0	Implementation of a Climate Adaptation Plan	2	Recognises projects that are resilient to the impacts of a changing climate and natural disasters.	Engage a qualified professional to prepare a project-specific Climate Adaptation Plan (CAP) and implement recommendations into the design and construction.	Site selection is informed by Eagle Eye or XDI Systems which are	● DG 03.02 - Site Investigations ● DG 13 - Bushfir	Climate adaptation plan	ESD Consultant	Sustainability	2			JHA-ESD to provide Climate adaptation plan during Phase 2 - Concept Design Campus-wide credit	High	MFS	
Building Information	4.0	Building Information	1	Recognises projects that make available building information that facilitates understanding of building systems operation and maintenance requirements, and their environmental targets for optimised performance	● Provide operations and maintenance (O&M) information and log book to facilities management team and stakeholders, and ● Provide building user information to all relevant stakeholders	The EFSG require a building user's guide is developed and the Commissioning & Handover Procedure requires on-site training is provided to staff as well as handover of manuals, as built and warranties. SINSW has developped a template that can be populated to develop	● DG 64.10 - Manuals and Training ● DG 65.02 - Energy Conservation ● DG 16.10 - Access for Maintenance ● Commissioning & Handover Procedure	• Template SI NSW Building User Information ● Project specific manuals, as-builts, warranties, etc. ● AMS online portal pdf	SINSW Sustainability	Sustainability	1			**As per GBCA Response R-15394**, in lieu of Building Log Book, compliance with 4.1.2 is achieved by demonstrating that the buildings asset maintenance information is captured through the NSW Government FMWeb Maintenance platform. Contractor is responsible for providing **Operations and Maintenance Information** in accordance with 4.1.1 & **Building User Information** in accordance with 4.1.2	Med	SINSW	
Commitment to Performance	5.1	Environmental Building Performance	1	Encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance.	Set, measure and report for at least 2 building performance metrics i.e. energy, water, waste and IEQ	SINSW monitor energy and water performance of		● ERM Power customer online portal ● Principal's Dashboard ● GREP annual	SINSW Sustainability	Sustainability	1			SINSW has provided standard Commitment to Environmental Performance letter for schools.	Med	SINSW	
	5.2	End of Life Waste Performance	1		Commitment to extend the life of the interior fit out or finishes to at least	Life of interiors in schools	● EFSG multiple	- Commitment letter from AMU Executive Director	AMU		1			SINSW has provided a End of Life Waste	Med	SINSW	
Responsible Building Practices	7.0	Environmental Management Plan (EMP)	Mandatory for this Credit	Rewards responsible construction practices that manage environmental impacts, enhance staff health and wellbeing, and improve sustainability knowledge on site	Develop and implement a best practice EMP	An EMP is required for all SINSW contracts	● GC21 provisions	● Contract EMP	Head Contractor		Y			Head Contractor must develop & implement a project-specific best practice EMP. Campus-wide credit	High	MFS	
	7.1	Formalised Environmental Management System	1		A 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	ISO14001 accredited EMS contractors required	● NSW Government construction scheme	● Head contractor's ISO certificate	Head Contractor		1			Head Contractor must have ISO14001 accredited EMS. Campus-wide credit	High	MFS	
	7.2	High Quality Staff Support	1		Promote mental and physical health of staff and train up in sustainability practices through on-site, off-site and/or online classes	Not in GC21 contract.		- commitment from head contractor	Head Contractor		1			Not recommended in the first instance but could be targeted if Head Contractor has "high quality staff	Low	MFS	
Operational Waste	8A	Performance Pathway		Recognises projects that implement waste management plans that facilitate the re-use, upcycling, or conversion of waste into energy, and stewardship of items to reduce the quantity of outgoing waste.	Qualified waste auditor prepares and Implements an Operational Waste Management Plan (OWMP) which is then reflected in design of building facilities	Can do either option School Operational Waste Management Plans	● DG 02.07 - Waste Management	● School waste management plan	Waste consultant	Only one of the pathway can be targeted	1			Waste consultant required to prepare and implement an Operational Waste Management Plan (OWMP) for the project.	High	SINSW	
Indoor Environment Quality			**17**								**12**	**0**					
Indoor Air Quality	9.1	Ventilation System Attributes	1	Recognises projects that provide high indoor air quality to occupants.	● Minimise outdoor air pollutants ● Design HVAC for ease of maintenance ● Clean prior to occupation	The EFSG require ventilation systems are designed	● DG 55.02 - Thermal Comfort and	● As built mechanical drawings ● Confirmation of cleaning by head contractor	Mechanical		1			Mechanical consultant must ensure the HVAC system is compliant with this credit.	Med	MFS - Mechanical	
	9.3	Exhaust or Elimination of Pollutants	1		Sources of pollutants (printing, photocopying, cooking and vehicle) compliant with minimum emissions standards or be exhausted directly to outside	The EFSG contain provisions for exhaust or elimination of pollutants for	● DG 57.07 - Duplicating / Printing Room Ventilation ● DG	● Product data sheets or certificates of emissions compliant MFDs ● As built mechanical drawings - SINSW Printing	Mechanical		1			SINSW have purchase contract in place with FUJIFILM in provide low emission printers and photocopiers to all schools. **FAQ-F-00169** and	High	MFS - Mechanical	
	10.1	Internal Noise Levels	1		● Internal ambient noise levels no more than 5db(A) above lower figure in table 1 of AS/NZA 2107:2016 ● Compliance shall be demonstrated through	The EFSG set acoustic performance requirements for the different spaces.	● DG 55.02 - Thermal Comfort and Indoor		Acoustic		1			Acoustic consultant to ensure compliance with this credit.	High	MFS - Acoustic	

Acoustic Comfort	10.2	Reverberation	1	Rewards projects that provide appropriate and comfortable acoustic conditions for occupants.	● Reverberation time below max stated in table 1 of AS/NZS 2107:2016 ● Compliance shall be demonstrated through measurement	spaces, including noise levels, reverberation and acoustic separation. These requirements	As above	● Detailed drawings ● Acoustic report ● Commissioning report ● Acoustic post occupancy evaluation	Acoustic		1			Acoustic consultant to ensure compliance with this credit.	High	MFS - Acoustic	
	10.3	Acoustic Separation	1		Reduce noise transmission between enclosed spaces Rw of at least 35 for partitions with doors and at least 45 for partitions without a door	Note (Rw) from 30 to 35 for glazed operable walls between enclosed spaces only. (Refer **GBCA response R-14412**)	● DG 11.05 - Room to Room Noise Control		Acoustic		1			Acoustic consultant to ensure compliance with this credit, noting for **glazed operable walls** between enclosed spaces, sound reduction index (Rw) of 30 (instead of 35) applies (Refer **GBCA response R-14412**). **The following needs to be provided in resopnse to this TQ:** **Acoustic Report including,** •an outline of the functional requirements of the space •confirmation of (Rw) of 30 for this type of operable glazed wall is best	High	MFS - Acoustic	
Lighting Comfort	11.0	Minimum Lighting Comfort	Mandatory for this Credit	Recognises well-lit spaces that provide a high degree of comfort to users	Lights in the nominated area (all primary and secondary spaces) are Flicker-free lights and min Colour Rendering Index (CRI) of 80	The EFSG include best practice provisions for lighting comfort, illuminance levels, glare reduction, surface illuminance and lighting controls. Modelling is required to inform design and demonstrate outcomes.	● DG 63.03 - Lighting Design ● SG951 - Lighting Specification	● Lighting drawings ● Architectural drawings ● Lighting specifications / schedules ● Isolux drawings	Electrical		Y			Electrical consultant to ensure compliance with this credit.	High	MFS - Electrical	
	11.1	General Illuminance and Glare Reduction	1		● Lighting levels and quality comply with the GBCA best practice guidelines and ● Glare is reduced				Electrical		1			Electrical consultant to ensure compliance with this credit.	High	MFS - Electrical	
	11.2	Surface Illuminance	1		Combination of lighting and surfaces improve uniformity of lighting				Electrical		1			Requires a plain ceiling to achieve uniform surface reflectance of at least 0.75. Architect	High	MFS - Electrical	
Visual Comfort	12.0	Glare Reduction	Mandatory for this Credit	Recognises well-lit spaces that provide high levels of visual comfort to building occupants.	Reduce glare through a combination of blinds, screens, fixed devices, or other means	The EFSG require daylight glare controls	● DG 12 - Light - Natural	● Architectural drawings	Architect		Y			Architect to ensure compliance with this credit.	High	MFS	
	12.1	Daylight	2		● 1 point - 40% of the nominated area (all primary spaces) receives high levels of daylight ● 2 points - 60% of the nominated area (all primary spaces) receives high levels of daylight	The EFSG require to maximise natural daylight in all habitable spaces to improve indoor amenity and create a pleasant environme	● DG 2.3.1 - Lighting ● DG 12 - Light - Natural	● Daylight modelling report	ESD Consultant	Sustainability	1			ESD consultant to undertake Daylight Autonomy modelling to confirm compliance with this credit during Phase 4 - Design Development.	High	Main works - ESD	
	12.2	Views	1		60% of the nominated area (all primary spaces) has a clear line of sight to a high quality internal or external view ● External View – A high quality external view must extend to the outside towards natural elements such as large bodies of vegetation, a body of water, frequent movement of (people, vehicles, or animals) or	This is not explicitly required in the EFSG but 100% achievable based on typical room design, window location and quality landscapin	● DG 90 - Landscape Design	● Landscape design report ● Architectural drawings ● Short Report / calculation	Architect, ESD consultant	Sustainability	1			ESD consultant to finalise Views calculation to confirm compliance with this credit during Phase 4 - Design Development.	High	Main works - ESD	with the relatively deep floor plates of the hub layouts, the modelling for most projects is now indicating they will achieving the min. 40% daylighting targets with additional design interventions where required (including adjustments to layouts, increasing window heights where required etc.)
Indoor Pollutants	13.1	Paints, Adhesives, Sealants and Carpets	1	Recognises projects that safeguard occupant health through the reduction of internal air pollutant levels.	● No paints, adhesives, sealants or carpets are used in the building; or ● 95% of all internal paints, adhesives, sealants	The EFSG require low VOC and formaldehyde content in line with Green Star requirements.	● DG 2.5.2 - Low VOC	● Materials specifications	Architect, Mech, Elec, Hyd, Fire	Sustainability	1			All consultants to ensure their specifications comply with credit requirements	Med	MFS	
	13.2	Engineered Wood Products	1		● No new engineered wood products are used in the building; or ● At least 95% of all engineered wood		● DG 2.5.2 - Low VOC	● Materials specifications	Architect	Sustainability	1			All consultants to ensure their specifications comply with credit requirements.	Med	MFS	
Thermal Comfort	14.1	Thermal Comfort	1	Recognises projects that achieve high levels of thermal comfort.	80% of occupants satisfied - equivalent to PMV between -1 and +1	Schools are naturally ventilated	● DG 55.02 -	● Drawings ● Thermal comfort modelling report	Mechanical	Sustainability	1			ESD consultant to undertake PMV modelling to	Med	Main Works - ESD	
Energy			**22**								**8**	**0**					
Greenhouse Gas Emissions	15E.0	Conditional Requirement: Reference Building Pathway	Mandatory for this Credit and Certification	Encourages energy efficient buildings and the reduction of greenhouse gas (GHG) emissions associated with the use of energy in building operations.	Projects targeting: ● 4 Star - Proposed building must achieve 10% improvement on NCC Section J reference building. Equivalent to GBCA Benchmark Building	The EFSG require 'energy consumption is predicted to be at	● DG 02.03 - Energy Conservation	● Section J modelling report	ESD	Sustainability	Y			ESD consultant to undertake energy modelling to confirm compliance with this credit during Phase 4 - Design	High	MFS & Main works	
	15E.1	Reference Building Pathway	20		Points awarded for emissions reduction: ● Building fabric relative to NCC Section J to Reference Building - 1 point for 5%, 2 point for 10%, 3 point for 15%, max. 4 point for 20% ● Proposed building relative to GBCA Benchmark Building - 1.6 point for 10%, 3.2 point for 20%, 4.8 point for 30%, 6.4 point for 40% etc.	The EFSG require a number of measures for reduced energy consumption including: - Passive design (building envelope, orientation, daylighting, insulation, etc.) - Energy efficient air conditionin	● DG66 - Photovoltaic Solar Power Generator ● DG 02.03 - Energy Conservation ● DG 65.02 - Energy Conservation (special electric al	● Energy modelling report	ESD, Architect, Mechanical, Electrical	Sustainability	6			It is anticipated that SINSW projects should be able to achieve at least 4 points (conservative estimation), with possibility to achieve 2 additional points to be confirmed with energy modelling. ESD consultant to undertake energy modelling to confirm points achievable under this credit during Phase 4 - Design Development.	High	MFS & Main works	
Peak Electricity Demand Reduction	16A	Prescriptive Pathway - On-site Energy Generation		Encourages the reduction of peak demand load on the electricity network infrastructure.	1 point - On-site electricity generation systems reduces the total peak	The EFSG require installation of PV systems. Batteries may be installed if substantiated	● DG66 - Photovoltaic Solar Power Generator Guidelines ● SG933 - Schedule of Photovoltaic Solar Power	Energy modelling report	ESD, Electrical	Sustainability	1			Size of the buildings and limit of 100kW may limit	Med	MFS & Main works	JHA Electrical: Based on ESFG DG66, a 70 kW solar PV system will need to be installed for 35-core primary school.
	16B	Performance Pathway - Reference Building	2		Project's predicted peak electricity demand has been reduced below that of a Reference Building: ● 1 point - 20% reduction ● 2 points - 30% reduction				ESD, Electrical	Sustainability	1			ESD consultant to undertake peak demand modelling to confirm compliance with this credit during Phase 4 - Design Development.	Med	MFS & Main works	JHA Electrical: No further comment – ESD to action.
Transport			**10**								**10**	**0**					
Sustainable Transport	17A	Performance Pathway	10	Rewards projects that implement design and operational measures that reduce the carbon emissions arising from occupant travel to and from the project, when compared to a reference building. This also promotes the health and fitness of commuters, and the increased liveability of the location. note: Typically projects are expected to gain more points using the 17A pathway. However if projects cannot comply with 17A, the prescriptive pathway may be applied.	● GBCA response R-14426 accepts the SINSW School Transport Planning Process as an alternative to standard Green Star Requirements for Credit 17- Performance Pathway ● Transport Plans undertaken for all SINSW project must follow the SINSW School Transport Planning process outlined in the Practice Note: School Transport Planning. This Practice note is available to project teams on T-Reign.	BN AMD21/289 approved by Chief Exec April 2021 approved the use of the SINSW School Transport Planning Process for all infrastructure upgrades . Transport planners must be engaged in the master planning phase and in the ongoing	● SEARs/ Planning approval requirements ● T-Reign Practice Note 16: SINSW Transport Planning Document pack ● Exec approval for provided in BN AMD2	SINSW Schools Transport Assessment Process outcomes including: • A summary of the project specific School Travel Plan. • A copy of the Transport Assessment template and evidence that the School Transport Plan framework has been completed as per the template including excerpts from the Plan documenting; transport goals, policies and procedures, information on the school transport operations, the	Architect	Sustainable Transport Technical Advisor	10			Under SINSW Umbrella may target 10 points according to **R-14426.** Project team to complete **SINSW Transport Assessment template** during Phase 4 - Design Development. The project team are required to demonstrate outcomes of this transport assessment in line with the SINSW transport assessment process, including: • A review of the school's travel demand; • The establishment of	High	Main Works - Transport	
Water			**12**								**5**	**0**					

Potable Water	18A	Performance Pathway	12	Typically projects are expected to gain more points using the 17A pathway.	Completion of the Green Star Potable Water Calculator that awards points based on water saving in comparison with a reference building.	EFSGs require a number of initiatives to reduce potable water consumption. This includes rainwater harvesting, water efficient fixtures and fittings, drought tolerant vegetation for landscaping, etc. The calculator will reward points by	● DG 53 - Water ● DG02 2.4.1 - Water Conservation ● DG 51.01 - Hydraulics	● Hydraulic drawings ● Schedule of Fixtures ● WELS certificates or Manufacturers information ● Potable water calculations using GBCA water calculation tool	Hydraulic (and Fire Consultant if applicable)	Sustainability	-			Project to target Prescriptive Pathway during Phase 3 - Schematic Design. ESD consultant can change pathway to Performance Pathway during subsequent project phases if desired/required.	High	MFS	
	18B	Prescriptive Pathway	1		18B.1 Sanitary Fixture Efficiency	WELS rating adhere to	● DG 53 - Water	● Schedule of Fixtures ● WELS certificates	Architect	Sustainability	1			Architect to ensure compliance with this credit. All	High	MFS	
			1		18B.2 Rainwater Reuse	Typically required by DG53.14 Water Tanks	● DG 53 - Water ● DG02 2.4.1 - Water	● Hydraulic drawings showing connection to on site rainwater tank(s)	Hydraulic Engineer	Sustainability	1			Hydraulics consultant to ensure compliance with this credit. Rainwater tank volume - 10 L/m2 of GFA	Med	MFS	We were considering providing rainwater tanks for one of the new buildings only per school in order to keep the costs down. Not sure how this will impact on the ability to achieve points for this item (presumably impacts Code 18A).
			2		18B.3 Heat Rejection	Expected to be achievable	● DG55 Coolin	● Hydraulic drawings showing connection to on	Mechanical Engineer	Sustainability	2			Mechanical consultant to confirm comoliance	Med	MFS	
			1		18B.4 Landscape Irrigation	GBCA have approved a best practice landscape irrigation system to be used on ovals, sports fields and sports courts - Refer **GBCA Response R-14546.** The landscape irrigation system must incorporate a moisture sensor override feature or similar	● DG 53 - Water ● DG02 2.4.1 - Water Conservation ● DG 51.01 - Hydraulics	● Manufacturer's information showing that the application efficiency for the landscape irrigation system.	Landscape Architect	Sustainability	1			Landscape architect to ensure compliance with this credit. Landscape must be irrigated by drip irrigation only with moisture sensor override installed. Note Alternative Approach as per GBCA Response **R-14546** - For ovals, sports fields and sports courts compliance is achieved if the landscape irrigation system incorporates a moisture sensor override feature or similar control technology. Documentation Requirements: Please provide the	Med	Mainworks	
			1		18B.5 Fire Protection System Test Water	18B.5 Fire Protection System Test Water - Most schools are exempt from requiring a sprinkler system under Part E of the NCC - when this is the case the credit becomes N/A	● DG 53 - Water ● DG02 2.4.1 - Water Conservation ● DG 51.01 - Hydraulics	Extracts from the Fire Engineering Report where it states that the building's fire system has no sprinklers	Hydraulic (and Fire Consultant if applicable), Architect	Sustainability				Fire consultant to advise if this credit is applicable/achievable for this project. Credit is NA if a water-based fire protection system is not required for the project. If sprinkler systems are installed, 1 point if each floor is fitted with isolation valves for system-by-system testing.	High	Mainworks	
Materials			**18**								**5**	**0**					
Life Cycle Impacts	19B.1	Concrete	3		Requires reduced use of: ● Portland cement content by at least 30% ● potable water by at least 50% replacement with recycled or reclaimed water. ● course aggregate by 40% or fine aggregate by	EFSG recommend fly ash can be used in concrete mixes. This is a procureme	Not currently supported by EFSG ● DG 21.02 - Concre	Structural Specifications, drawings, Engineers report including: ● Summary calculation for the product replacement	Structural		-				Low	Main Works	this is a credit that many projects are now targeting as becoming more mainstream and it can be cost neutral, as many suppliers now offer this as a standard cement alternative. Admixtures including fly ash and slag for higher strength concrete to compensate for reduced cement & aggregate content. Low carbon concrete mixes eg. Envisia to be considered in future design stages.
	19B.2	Steel	1		Requires reduced use of steel in framing or reinforcement. This can be demonstrated by a reduction of at least 5% in the mass of steel. For framing this can also be achieved by replacement with high strength steel.	Not required in EFSG. This is a procurement decision that varies across projects.		Evidence relevant to the reduction targeted , may include: ● Structural Engineer's or Quantity Surveyors Report demonstrating the reduction in mass of structural steel framing or reinforcing steel in the building. ● Summary of steel quantities produced by BIM model. ● Drawings supporting claims of optimal fabrication techniques. ● Quantities (by mass) of structural and reinforcing steel as percentages of the	Structural		-				Low		Higher strength steel & rigid design connections to reduce beam sizes and overall mass of structural steel. Post-Tensioned concrete system to be considered to reduce mass of steel in concrete slab structure in future design stages.
	19B.4	Structural Timber	3		Requires a minimum 30% of the building's structure by GFA to be responsibly sourced structural timber. All structural timber must	Not required in EFSG. This is a procureme	Certification covered in the	● Product Certification certificates	Architect, Structural		-				Low	MFS	Achievable, however structural Timber would be an unlikley material to be used as the structure frame element (rather structural steel or reinforced concrete) in future design stage.
Responsible Building Materials	20.1	Structural and Reinforcing Steel	1	Rewards projects that include building materials that are responsibly sourced or have a sustainable supply chain.	Requires 95% of the buildings steel is sourced from a responsible steel maker . There are additional requirements depending on whether the building is steel or concrete framed.	Not required in EFSG but typically steel from responsible manufacturers is procured.		● Bill of Quantities or similar report from qualified professional. ● Structural drawings/specification ● Evidence supplier is a responsible steel maker	Architect, Structural		1			Procurement from Australian Steel manufacturers will meet this requirement.	Low	MFS	This is achievable - to be noted in drawings specificati
	20.2	Timber Products	1		95% (by cost) of all timber used is certified or reused	The EFSG require that only sustainable	● DG02 2.5.1 - Sustain	● Bill of Quantities or similar report from qualified professional.	Architect, Structural		1			Compliant timber with chain of custody code may be difficult/costly	High	MFS	Non-structural timber products to be specified by architect to meet Green Star requirements
	20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1		Requires that only sustainably produced PVC is used	Not required in EFSG. This is a procurement decision that varies across projects.		● Bill of Quantities or similar report from qualified professional. ● Evidence of best practice product certification and data sheets ● Invoices	Architect, Structural, Electrical, Hydraulic, Mechanical		1			All consultants to ensure their specifications comply with credit requirements. Campus-wide credit	Low	MFS	Design to not include any permanent formwork & stormwater pipes less than 225mm diameter to be PVC. It doesn't seem that any points are being targeted for this item. We can specify as noted, but not sure how available the materials will be.
Sustainable Products	21.0	Product Transparency and Sustainability	3	Encourages sustainability and transparency in product specification.	Requires a proportion of all materials used in the project to meet transparency and sustainability	The EFSG encourage the use of sustainable materials.	● DG02 02.05 - Sustainable	● Evidence of project cost, and cost of certified products from qualified	Architect, Services, Head Contractor, Cost Planner	Sustainability	1			Targeting 1 point Campus-wide credit	Low		
Construction and Demolition Waste	22.0	Reporting Accuracy	Mandatory for this Credit	Rewards projects that reduce construction waste going to landfill by reusing or recycling building materials.	All waste contractors and waste processing facilities that provide waste management and reporting services must demonstrate compliance	GC21 construction contract contains provisions to minimise	● GC21 ● DG 02.07 Waste Management	● Compliance Verification summaries and Disclosure Statement from waste contractors	Head Contractor		Y			Head Contractor to ensure compliance with this credit. Campus-wide credit	Med	MFS	
	22B	Percentage Benchmark	1		90% of construction and demolition waste generated to be diverted from landfill or Less than	construction and demolition waste. DG 2.7.1 requires			Head Contractor		1			Head Contractor to ensure compliance with this credit.	High	MFS	
Land Use & Ecology			**6**								**2**	**0**					

Sustainable Sites	24.0	Conditional Requirement	Mandatory for this Credit and Certification	Rewards projects that choose to develop sites that have limited ecological value, that reuse previously developed land, and that remediate contaminated land.	Site did not include old growth forest, prime agricultural land, wetland of high national importance or impact on matters of national significance	The EFSG require comprehensive due diligence studies are undertaken to inform site selection when a new school is developed. Ecologist report confirming no issues of concern present onsite. Or option for DA/SSD projects only - conditions showing	● DG03 - Site Selection	● Ecologist report ● CV of Ecologist ● Where applicable the project may use a statement acknowledging the length of time that the school has been in operation in lieu of providing the date of site purchase or option contract (previous condition of the site) and evidence of the site that existed at this time. (Approved in GBCA Request R-14474)	Ecologist	Statutory Planning	Y			Mandatory "Conditional Requirement" for all Green Star projects. Ecologist to confirm compliance with this credit. Campus-wide credit	High	SINSW	Existing school site. N/A
	24.1	Reuse of Land	1		Requires that 75% of the site was previously developed land at the date of site purchase	Most of SINSW projects are refurbishments of existing schools i.e. previously developed land. SINSW preferred approach is to avoid the need for new development	● DG03 - Site Selection	● Service Need Report ● Business Case Report ● Aerial photographs showing areas of previously developed land	SINSW Sustainability	Project Director	1			Architect to confirm if at least 75% of new buildings are on "previously developed land". "Previously developed land" includes land this was occupied by a permanent structure, associated curtilage, road, car park or other hardstand. Campus-wide credit	High	SINSW	Existing school site. N/A
	24.2	Contamination and Hazardous Materials	1		Environmental site assessment concludes site is contaminated and is to be remediated prior to development	The EFSG require investigation of presence of contamination and hazardous materials and appropriate remediatio	● DG48 Hazardous materials	● Hazardous materials surveys ● Decontamination reports and clearance certificates	Environmental Services consultant					This Credit is only applicable if there is substantial recommendations for containment and/or removal made in the site contamination report. Architect to confirm. Campus-wide credit	High	SINSW	Awaiting site contamination report
Heat Island Effect	25.0	Heat Island Effect Reduction	1	Recognises projects that reduce the contribution of the project site to the 'heat island effect'.	75% of the total project site area comprises of elements to reduce heat island effect - vegetation, light colour roof, shading	The EFSG contain multiple provisions to this end: - Recommend use of lightly coloured roofs. - Minimum open space provision typically include landscaped areas - Tree preservation - PV installation (absorb heat)	● DG 27 - Roofing ● DG 66 - PV solar generator ● DG 90 - Landscape design	● Site drawing ● Roofing and hardscape materials data sheets showing SRI for products	Architect		1			Architect to ensure compliance with this credit. Campus-wide credit	Med	MFS	
Emissions			**5**								**4**	**0**				
Stormwater	26.1	Stormwater Peak Discharge	1	Rewards projects that minimise peak storm water outflows from the site and reduce pollutants entering the public sewer infrastructure or other water bodies.	Post-development peak average recurrence interval (ARI) event discharge from site does not exceed pre-development	EFSGs require stormwater system to be integrated with relevant authority requirements, especially the local council and water authority.	● DG 2.4.3 - Stormwater Management ● DG95 Stormwater	● Civil/Hydraulics drawings and specifications ● Modelling/calculations report	Civil		1			Civil consultant to ensure compliance with this credit. Campus-wide credit	Med	MFS & Main works	Development Requirement in Section 2.3.2 of the 2016 DCP requires that post-development peak discharge does not exceed pre-development for 1%, 50%, and 20% AEP events. Conformance of this will be confirmed via DRAINS modelling at future design stages.
	26.2	Stormwater Pollution Targets	1		Additional point awarded for stormwater site discharge to meet GBCA pollution reduction targets	EFSGs require stormwater treatment to minimise the transportation of toxicants to waterways and other offsite environments, and maintain the existing hydrological regimes. Local gov't may provide pre-determined infrastructure solutions that are 'deemed to comply' with the aim of this credit.		● Performance certifications for stormwater treatment devices	Civil		1			Civil consultant to ensure compliance with this credit. Campus-wide credit	Med	MFS & Main works	Development Requirement in Table 2-1 of the 2016 DCP requires following water quality targets to be met: Gross Pollutants (>5mm) 90%; Total suspended solids 85%; Total phosphorous 65%; Total nitrogen 45%. These targets align with Column B of Table 26.2 in the Green Star Submission Guidelines. Conformance with this will be confirmed via MUSIC modelling at future design stages.
Light Pollution	27.0	Light Pollution to Neighbouring Bodies	Mandatory for this Credit	Rewards projects that minimise light pollution.	Requires that external luminaires meet Australian Standard to avoid light pollution to neighbouring development	EFSGs require external lights to be designed to prevent glare to nearby residents	● DG 63.08.01 - External Access Lighting	● As built drawings ● Luminaire schedule ● Calculation Plots	Lighting Designer		Y			Electrical consultant to ensure compliance with this credit. Campus-wide credit	High	MFS & Main works	
	27.1	Light Pollution to Night Sky	1		Requires that external luminaires do not emit light pollution to the night sky above a given benchmark	Not an EFSG requirement, however external lighting is minimal and luminaires typically meet the benchmark required.					1			Electrical consultant to ensure compliance with this credit. Campus-wide credit	Med	MFS & Main works	
Microbial Control	28.0	Legionella Impacts from Cooling Systems	1	Minimise the impacts associated with harmful microbes in building cooling systems.	● Building naturally ventilated, or ● Has waterless heat rejection system, or ● Has water-based heat rejection systems that includes measures for Legionella control and Risk Management	Typically waterless air conditioning systems are installed.	● DG 51.09 - Microbial Control	● Mechanical system specifications	Mechanical Engineer		1			Mechanical has confirmed they are targetting	High	MFS	
Innovation			**17**								**10**	**0**				
30A Innovative Technology or Process	30A	On-site Renewable Energy	2	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or	Up to two (2) points may be awarded for installing on-site renewable energy sources. Partial points	EFSG requires all new buildings to have on-site	● DG66 - Photovoltaic Solar Power	● Electrical specifications ● As built drawings ● Product data	Electrical		1			Refer Calculation Guide, maximum 2	High	Main works	JHA Electrical: Based on ESFG DG66, a 70 kW solar PV system will need to be installed for 35-core primary school.

30B Market Transformation	30B	DfMA	**1**	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world	Requires DfMA objectives to be achieved on the project, with the benefits of this approach presented through the SI NSW DfMA discussion paper, analysing the lifecycle impacts, greenhouse gas emissions and energy analysis of prefabricated reusable building modules.	**GBCA Response R-14427** has approved projects delivered by Schools Infrastructure NSW to target one (1) point under 30B Market Transformation in Green Star - Design & As Built for seeking to integrate sustainability in the approach 'Design for Manufacture and Assembly' (DfMA).	DFMA Guideline for Schools	• A short narrative outlining the purpose of the DfMA analysis • DfMA Guideline document outlining how sustainability principles can be embedded throughout prefabricated building processes/ component-based construction. • Evidence outlining how DfMA has been used on the project • Evidence outlining how the sustainability advice in the Guideline was integrated into the construction of component-based structures; addressing a minimum of 3 items from the guidelines for each project (items may be the same on multiple projects)			1			Under SINSW Umbrella may target 1 points according to **R-14427** for seeking to integrate sustainability in the approach 'Design for Manufacture and Assembly' (DfMA).. Architect to confirm if this is applicable for this project. Campus-wide credit	High	MFS & Main works	
30D Innovation Challenge	30D	Community Benefits	1	Encourages investment in infrastructure for use by the broader community, such as the incorporation of spaces that are publicly accessible.	Requires a needs analysis of the surrounding community and a strategy for how the project will provide social/community benefits and consult with the broader community on the proposed plan	The GBCA response R-14478 has accepted the Department of Education's	● Community Use of School Faciliti es Policy	● Community Use of School Facilities ● Share Our Spaces' program ● Confirmation of spaces accessible for community uses	Architect		1			Projects within the Schools Infrastructure NSW v1.3 Umbrella (GS-6039DA) may target one (1) point under	High	SINSW	
	30D	Financial Transparency	1	Increase the amount of information available to industry on the costs and benefits of sustainable building	Requires submission of the 'Financial Transparency Disclosure Template' that	Not currently supported by SINSW.					1				Med		
	30D	Incorporation of Indigenous Design	1	Encourages the incorporation of Aboriginal and Torres Strait Islander participation in the design development of the projects and visibility throughout the project's life cycle using Indigenous Design and Planning principles	Project teams must demonstrate that the Australian Indigenous Design Charter guiding principles are incorporated in the design of the building.		GAO Designi ng with Countr y	Connecting to country engagement strategy Meeting minutes Design outcomes	Architect		1				High	MFS	
	30D	Integrating Healthy Environments	1	Supports high-performance, cost-effective and health-promoting project outcomes through an early analysis of the interrelationships among systems.	Requires an analysis of community health needs and to address those needs through implementation of adequate strategies	The GBCA have commende d the Department of Education for encouragin g healthy	● Health y Canteen Strateg y	● Healthy Canteen Strategy • Research report behind Healthy Canteen Policy. • A Letter of Commitment that the program will be implemented by the school	School Principal		1			Projects within the Schools Infrastructure NSW v1.3 Umbrella (GS-6039P) may target one (1) point under Innovation Challenge-	High	SINSW	
	30D	RAP	1	Encourages organisations to take formalised steps to provide opportunities for Aboriginal and Torres Strait Islander peoples.	A reconciliation action plan endorsed by Reconciliation Australia is required	The Departmen t of Education has a RAP in place which the GBCA has confirmed can be used to target the innovation challenge through the frequently asked question **FAQ F-00101**	●DOE Reconc iliation Action Plan - Reflect ● GA NSW Designi ng with Countr y ● NSW Govern ment Aborigi nal Partici pation in	● Aboriginal community engagement or measures implemented in project ● Design Reports which detail how design principles celebrate indigenous cultural heritage ● Targets or strategies regarding engagement of Aboriginal and Torres Straight Islander individuals or organisations within the project team	Project Manager Architect Head Contractor		1			The DOE Reflect RAP was dated January 2019 – January 2020. The RAP currently in the process of being reviewed and updated to the next iteration. Organisation Reconciliation Action Plan (RAP) can be used to demonstrate compliance with this Innovation	Med	MFS & Main works	
	30D	Universal Design	1	Encourages projects to provide safe, equitable and dignified access for persons with disabilities.	Require to develop and implement an accessibility plan based on a needs analysis	The EFSG contain extensive provisions to ensure universal design. Refer GBCA Response R-14538 The GBCA have accepted the EFSG provisions for universal design in lieu of needs analysis.	● DG19 Access for People With Disabili ties ● DG 65.14 - Hearin g Augme ntation System	● As built drawings ● DDA compliance reports			1			Projects within the Schools Infrastructure NSW v1.3 Umbrella (GS-6039P) may target one (1) point under Innovation Challenge- Universal Design, providing the Education Facilities Sustainable Guidelines (EFSG) in lieu of a needs analysis report. Campus-wide credit	High	MFS	Subject to constraints of existing buildings
30 E Global Sustainability	30E	Stakeholder Engagement Strategy [GSC 3.1]	1	Recognises projects that develop and implement a comprehensive, project specific stakeholder engagement strategy early in the planning process.	The project has a Stakeholder Engagement Strategy prepared in accordance with specified requirements.	Extensive stakeholder engagement is undertaken for all capital projects via project reference groups (PRG), project control groups (PCG) and broader community consultation. Stakeholders needs and comments are assessed and responded.	● Project Governanc e Framewor k	● Service need report ● Education rationale ● PRG meeting minutes ● Business case report ● Community consultation strategy and materials ● Responses to community feedback			1			Projects within the Schools Infrastructure NSW Umbrella project GS-6039DA may target one (1) point under 30E Global Sustainability for Green Star-Communities v1.1 credit 3.1 Stakeholder Engagement Strategy using the SINSW Community Communication s Strategy. Campus-wide credit	High	SINSW	
	30E	Design for Safety [GSC 15.1]	1	Recognises projects that take into consideration designing out crime principles.	Requires incorporation of CPTED principles	The EFSG contain provisions to guarantee occupant safety and security. Safety in Design and	● DG14 - Safety - Accident Avoidance ● DG65.08 - Electronic Surveillanc e	● CPTED assessment ● Safety by design report ● CCTV drawings			1			TQ yet to be submitted by SINSW Sustainability confirming requirements	High	MFS	

APPENDIX C – ESD MARK-UP

EXISTING PEDESTRIAN GATE

FUTURE PROPOSED ROAD WIDENING AND BOUNDARY ADJUSTMENTS BY COUNCIL (TBC)

PROPOSED AREA FOR FUTURE FIRE TANKS, IF REQUIRED

WORKS TO SEPARATE PLANNING PATHWAY (FOR REFERENCE ONLY)

04 REF: 1986

ADJACENT NEIGHBOURS

BLOCK B STAFF & ADMIN

NEW STAFF

NEW FIRE SPRINKLER BOOSTER ASSEMBLY

CONCRETE HARDSTAND FOR FRNSW

FHBA | FSBA

ANZAC

NEW RAINWATER TANK

RL 95.00 x

SITE BOUNDARY

NEW FIRE HYDRANT BOOSTER ASSEMBLY

NEW FIRE HYDRANT & SPRINKLER PUMPSET (SEPARATE) IN COMBINED ENCLOSURE

RL 96.00 x

BLOCK A

NEW DEMOUNTABLES (BY OTHERS)

MECH. CONDENSER

NEW 1000kVA SUBSTATION

NEW SUBSTATION WITH NEW HARDSTAND & EASEMENT
NEW FENCE OUSIDE EASEMENT WITH TIMBER POSTS

SPORT COURT / ASSEMBLY / COLA

SUPPORT HUB

RL 94.00 x

5730 - COS

RL 93.00 x

03 REF: 1986

RICKARD ROAD

NEW FLAGPOLES

BLOCK D STAFF & ADMIN

BLOCK D HB

NEW ADMIN

HB /

HB

GLS HUB

SERVICES

AMENITIES

AMENITIES

LIFT

COMBINED FIRE HYDRANT AND SPRINKLER MAINS CONNECTION

BIKE PARKING

(40 SPACES)

DEMOLISH EXISTING CONCRETE PATHWAY AND PROVIDE NEW CONCRETE SLAB/ PATHWAY TO COMPLY WITH AS 1428.1

OSD 18x7m

WORKS TO SEPARATE PLANNING PATHWAY (FOR REFERENCE ONLY)

EXISTING SCHOOL SIGN

DEMOLISH EXISTING CONCRETE PATHWAY AND PROVIDE NEW CONCRETE RAMP TO COMPLY WITH AS 1428.1

NEW KLA

BLOCK E

EXTENT OF EXISTING CARPARK SHOWN DASHED RED

ENTRY

EXT. LIBRARY

NEW LIBRARY

NEW COVERED WALKWAY

FOUNDERS MEMORIAL

OSD 24.5x12m

RL 95.00 x

SITE BOUNDARY

CARPARK

BLOCK F

FIELD

EXISTING DEMOUNTABLES RETAINED

BULK WASTE

EXIT

BLOCK R

COLA

NCC 2022 Volume One Preface Section J4 DtS Requirements Building Fabric Required total system R-Values

Envelope Walls	- Rt 1.75
Roof and Ceiling	- Rt 3.2

Glazing (Glass + Frame) requirements:
U-value 5.0 SHGC 0.58

Note:
1) The R-value is a total system performance value and NOT insulation.
2) The above construction are only to be applied to non-glazed portions of the envelope and spandrel panels; glazing must be installed as per the architectural layouts with its thermal performances pursuant to the respective glazing specifications stated in the Section J report.
3) The above requirements are to the proposed new works only, existing building fabric does not need to be upgraded.

JHA
MARKUP / SKETCH

DOCUMENT No.: 220269
DOCUMENT TITLE: Leppington Public School - Learning Hub
NCC 2022 Section J Part J4 Building Fabric Requirement
DOCUMENT REV: A5
DOCUMENT BY: JB DATE: 17/01/25

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AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	04/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUED FOR REF

Admin & Staff
Amenities
Canteen
Circulation
Existing
GLS & Homebase
Hall
Library
OSHC
Sport
Storage & Services
DEMOLISHED
NEW 2100 PALISADE FENCE
EXISTING 2100 PALISADE FENCE
NEW DEMOUNTABLES

NSW GOVERNMENT

STRUCTURAL & CIVIL
Name: Stantec
Number: (02) 8484 7000
MECHANICAL, ELECTRICAL & HYDRAULIC
Name: JHA
Number: (02) 9437 1000
LANDSCAPE ARCHITECT
Name: Taylor Brammer
Number: (02) 9387 8855
ACCESSIBILITY AND BCA
Name: Mckenzie Group Consulting
Number: (02) 8298 6800

Pedavoli Architects
LEVEL 2, 458-468 WATTLE STREET
ULTIMO NSW 2007 AUSTRALIA
T: +61 2 9291 0000
W: www.pedavoli.com.au
NOMINATED ARCHITECT:
VINCE PEDAVOLI
NSW ARB No. 5045

LEPPINGTON PUBLIC SCHOOL UPGRADE
144 Rickard Rd, Leppington NSW 2179
DRAWING NAME
SITE PLAN - GROUND FLOOR
COMPOSITE PLANS - SHEET 01

PROJECT NORTH

0 2000 4000 6000 8000 10000 20000
SCALE 1 : 200 @ A1

PROJECT NUMBER: 3321
ISSUE DATE: 16 JANUARY 2025
DRAWING NUMBER: LPS-PA-00-GF-DR-A-REF_101
REVISION: B

NCC 2022 Volume One Preface Section J4 DtS Requirements Building Fabric Required total system R-Values

Envelope Walls - Rt 1.75
Roof and Ceiling - Rt 3.2

Glazing (Glass + Frame) requirements: U-value 5.0 SHGC 0.58

Note:
1) The R-value is a total system performance value and NOT insulation.
2) The above construction are only to be applied to non-glazed portions of the envelope and spandrel panels; glazing must be installed as per the architectural layouts with its thermal performances pursuant to the respective glazing specifications stated in the Section J report.
3) The above requirements are to the proposed new works only, existing building fabric does not need to be upgraded.

JHA
MARKUP / SKETCH
DOCUMENT No.: 220269
DOCUMENT TITLE: Leppington Public School - Learning Hub
NCC 2022 Section J Part J4 Building Fabric Requirement
DOCUMENT REV: A5
DOCUMENT BY: JB DATE: 17/01/25

RICKARD ROAD

SITE BOUNDARY

ADJACENT NEIGHBOURS

SITE BOUNDARY

SITE BOUNDARY

BLOCK B

BLOCK A

BLOCK D

BLOCK E

BLOCK F

BLOCK R

ASSEMBLY

NEW DEMOUNTABLES (BY OTHERS)

EXISTING DEMOUNTABLES RETAINED

FIRE SPRINKLER PUMPSET/ PUMPROOM

3° FALL

2° FALL

2° FALL

18° FALL

18° FALL

18° FALL

18° FALL

GENERAL LEARNING SPACE

MULTI-PURPOSE ROOM

GLS HUB

LEARNING COMMONS

STAIR

LIFT

WALKWAY

FDR

COMMS

SERVICES

PLANT

AMENITIES

GIRLS

BOYS

ACC. WC

CLN

SERVICE WALKWAY

MUGA

01 00121
02 00121
03 00121
04 00122
05 00122
06 00122

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AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	04/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUED FOR REF

Admin & Staff
Amenities
Canteen
Circulation
Existing
GLS & Homebase
Hall
Library
OSHC
Sport
Storage & Services
DEMOLISHED
NEW 2100 PALISADE FENCE
EXISTING 2100 PALISADE FENCE
NEW DEMOUNTABLES

NSW GOVERNMENT

STRUCTURAL & CIVIL
Name: Stantec
Number: (02) 8484 7000
MECHANICAL, ELECTRICAL & HYDRAULIC
Name: JHA
Number: (02) 9437 1000
LANDSCAPE ARCHITECT
Name: Taylor Brammer
Number: (02) 9387 8855
ACCESSIBILITY AND BCA
Name: Mckenzie Group Consulting
Number: (02) 8298 6800

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LEVEL 2, 458-468 WATTLE STREET
ULTIMO NSW 2007 AUSTRALIA
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W: www.pedavoli.com.au
NOMINATED ARCHITECT:
VINCE PEDAVOLI
NSW ARB No. 5045

LEPPINGTON PUBLIC SCHOOL UPGRADE
144 Rickard Rd, Leppington NSW 2179
DRAWING NAME
SITE PLAN - LEVEL 1 COMPOSITE PLANS - SHEET 01

PROJECT NORTH
NORTH

0 2000 4000 6000 8000 10000 20000
SCALE 1 : 200 @ A1
PROJECT NUMBER 3321
ISSUE DATE 16 JANUARY 2025
DRAWING NUMBER LPS-PA-00-L1-DR-A-REF_103
REVISION B

NCC 2022 Volume One Preface Section J4 DtS Requirements Building Fabric Required total system R-Values

Envelope Walls - Rt 1.75
Roof and Ceiling - Rt 3.2

Glazing (Glass + Frame) requirements: U-value 5.0 SHGC 0.58

Note:
1) The R-value is a total system performance value and NOT insulation.
2) The above construction are only to be applied to non-glazed portions of the envelope and spandrel panels; glazing must be installed as per the architectural layouts with its thermal performances pursuant to the respective glazing specifications stated in the Section J report.
3) The above requirements are to the proposed new works only, existing building fabric does not need to be upgraded.

JHA
MARKUP / SKETCH
DOCUMENT No.: 220269
DOCUMENT TITLE: Leppington Public School - Learning Hub
NCC 2022 Section J Part J4 Building Fabric Requirement
DOCUMENT REV: A5
DOCUMENT BY: JB DATE: 17/01/25

01 00121

BLOCK B

3° FALL

FIRE SPRINKLER PUMPSET/ PUMPROOM

BLOCK A

NEW DEMOUNTABLES (BY OTHERS)

ASSEMBLY

SITE BOUNDARY

BLOCK D

2° FALL

2° FALL

2° FALL

05 00122

STAIR

GENERAL LEARNING SPACE

MULTI-PURPOSE ROOM

GLS HUB

LEARNING COMMONS

EDR

LIFT

WALKWAY

PLANT

SERVICES

COMMS

AMENITIES

BOYS

GIRLS

ACC. WC

CLN

SERVICE ALKWAY

01 00121

BLOCK E

18° FALL

18° FALL

18° FALL

18° FALL

18° FALL

05 00122

BLOCK F

EXISTING DEMOUNTABLES RETAINED

SITE BOUNDARY

BLOCK R

MUGA

16/01/2025 2:45:21 PM

AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	04/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUED FOR REF

DEMOLISHED
NEW 2100 PALISADE FENCE
EXISTING 2100 PALISADE FENCE
NEW DEMOUNTABLES

NSW GOVERNMENT

STRUCTURAL & CIVIL
Name: Stantec
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Number: (02) 9437 1000
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NOMINATED ARCHITECT:
VINCE PEDAVOLI
NSW ARB No. 5045

LEPPINGTON PUBLIC SCHOOL UPGRADE
144 Rickard Rd, Leppington NSW 2179
DRAWING NAME
SITE PLAN - LEVEL 2 COMPOSITE PLANS

PROJECT NORTH
NORTH

0 2000 4000 6000 8000 10000 20000
SCALE 1 : 200 @ A1
PROJECT NUMBER 3321
ISSUE DATE 16 JANUARY 2025
DRAWING NUMBER LPS-PA-00-L2-DR-A-REF_104
REVISION B

JHA
MARKUP / SKETCH

DOCUMENT No.: 220269
DOCUMENT TITLE: Leppington Public School - Learning Hub
NCC 2022 J Part J4 Building Fabric Requirement
DOCUMENT REV: E
DOCUMENT BY: JB DATE: 17/01/25

Preliminary J1 fabric mark-up

Roof & Ceiling	- Rt 3.84 (Downward) (SA<0.45)
Envelope Floors	- Rt 2.4 (Downward)
Envelope Walls	- Rt 1.68

Note:
1) All R-values must account for the impact of Thermal Bridging.
2) The R-value is a total system performance value and NOT insulation. Slab on ground floors are considered to achieve Rt2.0.
3) All requirements only applies to proposed **NEW WORKS**. No requirement to update the existing elements.

Glazing (Glass + Frame) requirements:
Canteen & Hall - U-value 5.0 & SHGC 0.60

RL 95.00 x
OSD 24.5x12m
CARPARK
BULK WASTE
EXIT
BLOCK F
BLOCK R
BLOCK G
BLOCK P
BLOCK H
BLOCK J
BLOCK K
BLOCK L
BLOCK M
BLOCK Q
HB x 2
EXISTING DEMOUNTABLES RETAINED
EXISTING CONTAINER RETAINED
NEW COVERED WALKWAY
BENCH SEATS
WORKS TO SEPARATE PLANNING PATHWAY (FOR REFERENCE ONLY)
NEW DEMOUNTABLES (BY OTHERS) NOT INCLUDED IN CONSTRUCTION CONTRACT
SITE BOUNDARY
SPORTS
MUGA COURT
COLA
CANTEEN SERVERY COVERED AREA
CANTEEN
CANTEEN OFFICE/STORE
KITCHENETTE
ENTRY
OSHC OFFICE
OSHC STORE
BULK STORE
HALL STORE
CORRIDOR
COMMUNAL HALL
LIN SUPPLIES STORE
GARDEN STORE
STAGE
COMMS
HALL, CANTEEN + OSHC HUB
PERFORMANCE STORE
SPORTS STORE
GIRLS WC
RAINWATER PUMP AND FILTRATION
RAINWATER TANK
02 CERT. BMD

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AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	04/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUED FOR REF

Admin & Staff, Amenities, Canteen, Circulation
Existing, GLS & Homebase, Hall, Library
OSHC, Sport, Storage & Services

NSW GOVERNMENT

STRUCTURAL & CIVIL
Name: Stantec
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W: www.pedavoli.com.au
NOMINATED ARCHITECT:
VINCE PEDAVOLI
NSW ARB No. 5045

LEPPINGTON PUBLIC SCHOOL UPGRADE
144 Rickard Rd, Leppington NSW 2179
DRAWING NAME
SITE PLAN - GROUND FLOOR COMPOSITE PLANS - SHEET 02

PROJECT NORTH

0 2000 4000 6000 8000 10000 20000
SCALE 1 : 200 @ A1

PROJECT NUMBER 3321
ISSUE DATE 16 JANUARY 2025
DRAWING NUMBER LPS-PA-00-GF-DR-A-REF_102
REVISION B

APPENDIX D – CLIMATE CHANGE ADAPTATION PLAN

Climate Change Risk & Adaptation Assessment

Upgrade to Leppington Public School

ESD SERVICES

JHA

CONSULTING ENGINEERS

This report is prepared for the nominated recipient only and relates to the specific scope of work and agreement between JHA and the client (the recipient). It is not to be used or relied upon by any third party for any purpose.

DOCUMENT CONTROL SHEET

Project Number	220269
Project Name	Leppington Public School
Description	Climate Change Risk & Adaptation Assessment
Key Contact	Ivan Miao

Prepared By

Company	JHA
Address	Level 23, 101 Miller Street, North Sydney NSW 2060
Phone	61-2-9437 1000
Email	Jonathan.Saw@jhaengineers.com.au
Website	www.jhaservices.com
Author	Ivan Miao, Eddith Chu
Checked	Jonathan Saw
Authorised	Eddith Chu

Revision History

Issued To	Revision and Date								
SINSW	REV	P1	P2	A	B	C			
	DATE	17/03/2023	31/03/2023	30/04/2024	31/05/2024	25/02/2025			
	REV								
	DATE								
	REV								
	DATE								

CONTENTS

1 INTRODUCTION

This Climate Change Risk & Adaptation Assessment has been prepared for the Leppington Public School located at 144 Rickard Road, Leppington and will form part of the Sustainable Development Plan submission for the project.

In accordance with EFSG DG02.08 and Green Star Design & As Built v1.3 requirements the purpose of this assessment is to provide:

- Details of stakeholder consultation that was undertaken during plan preparation, incorporating their responses (see Section 1.1)
- Summary of the project's characteristics (site, location, climatic characteristics) (see Section 2)
- Assessment of climate change scenarios and impacts on the project using two time scale relevant to the project anticipated lifespan (see Section 3)
- Summary of potential direct and indirect climate change impacts (environmental, social and economic) (see Section 4)
- Identification of the potential risks for the project and people based on recognised standard (see Section 4)
- A list of actions and responsibilities for 'high' and 'extreme' risks identified (see Section 4)

1.1 STAKEHOLDERS CONSULTED

Stakeholders engaged in the development as a part of the CAP process are listed below.

Stakeholder	Discipline
Sonia Giles – SINSW	SINSW Sustainability | Project Director
Caryn Lim – SINSW	SINSW Sustainability | Project Director
Katherine Longhurst – Pedavoli	Project Lead | Architect
Sam Regoli - Pedavoli	Project Lead | Architect
Jonathan Saw – JHA	ESD Engineer | GSAP
Adrian Casar – JHA	Hydraulic Engineer
Benjamin Ng – JHA	Electrical Engineer
Dominic Wong – JHA	Mechanical Engineer
Jeremy Sokkar – Cardno	Structural Engineer
Sam Sarijloo - Cardno	Civil Engineer

2 PROJECT'S CLIMATIC CHARACTERISTICS

Leppington is located in NCC Climate Zone 6, which is described as having hot to very hot summer with moderate humidity and mild to cold winter with low humidity. The main aims in this zone are to reduce the need for cooling in summer and heating in winter. This zone offers good cost-effective opportunities to achieve energy-efficient outcomes.

2.1 BASELINE CLIMATIC CONDITIONS

The baseline climatic conditions for Leppington is taken from the closest weather station data available from the BOM. The closest weather station is Badgerys Creek AWS, which is approx. 9.9 km North-West of Leppington.

Monthly Climate Statistics for 'Badgerys Creek AWS'

- **Site name:** Badgerys Creek
- **Site number:** 067108
- **Latitude:** 33.90 °S **Longitude:** 150.73 °E
- **Elevation:** 55 m

Statistic Element	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	An.
Maximum temperature													
Mean maximum temperature (Degrees C)	30.2	28.7	26.7	24.1	20.7	17.8	17.5	19.3	22.5	24.9	26.5	28.6	24
Highest temperature (Degrees C)	47.6	46.5	40	36	29.4	25.2	27	28.8	36.4	37.4	41.9	44.6	47.6
Minimum temperature													
Mean minimum temperature (Degrees C)	17.3	17.1	15.4	11.5	7.7	5.5	4.2	4.8	7.8	10.6	13.6	15.5	10.9
Lowest temperature (°C)	8.2	8.5	6.4	-0.1	-1.1	-3	-4.5	-2	-0.5	2.2	5.3	6.6	-4.5
Rainfall													
Mean rainfall (mm)	78.3	111.6	112.4	47.9	38.5	56.5	33.9	36.5	35.8	58.9	69.9	56.5	675
Highest rainfall (mm)	192.2	433	561.4	253.4	155.6	250.4	280	231	82.2	186.8	173.2	131.2	1674.6
Solar Exposure													
Mean Solar Exposure (MJ/m^2)	22	19.1	16.2	13.6	10.6	8.8	10	13.2	16.8	19.7	21.2	22.5	22
Highest Solar Exposure (MJ/m^2)	27	22.7	20.5	15.9	11.9	10.1	11.3	15.2	19.9	23.6	27.1	25.7	27

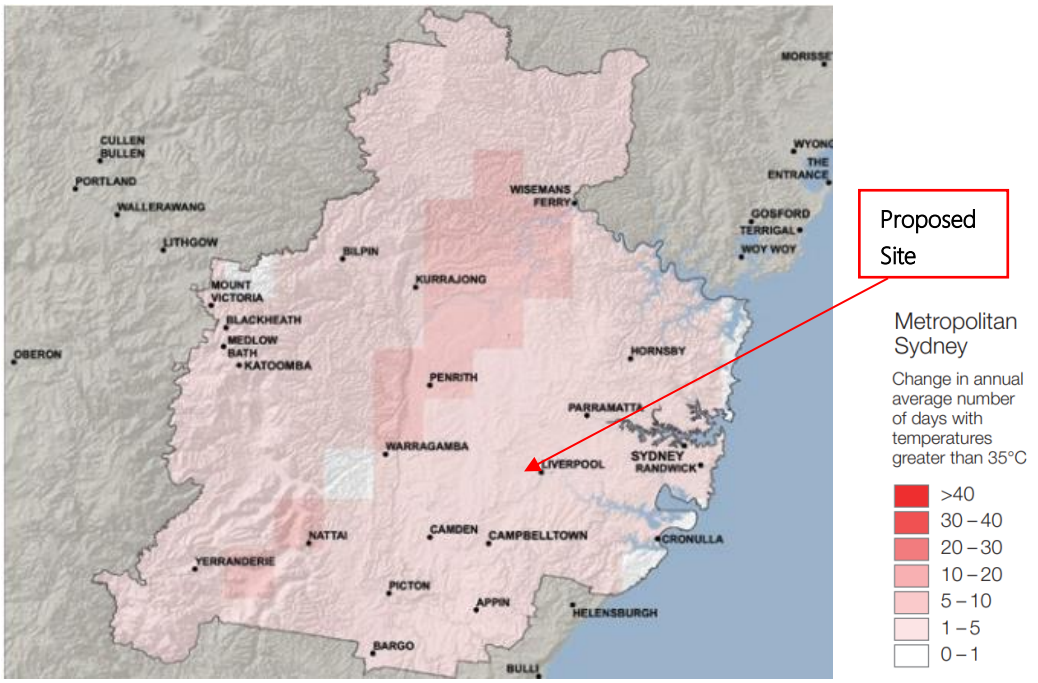
Red = highest value & Blue = lowest value

2.2 EXISTING CLIMATE CONDITONS AND PROJECTIONS

Extreme events that have impacted a site in the past help project possible extreme events that will impact the site in the future. The identification of past extreme events will help highlight the climate risks which needs to be taken into consideration for this risk assessment.

Past climatic events that have impacted the site and/or the Liverpool/Metropolitan Sydney region are summarised below:

- Heatwaves – Based on long-term (1910–2013) observations, temperatures in the Metropolitan Sydney region have been increasing since about 1960, with higher temperatures experienced in recent decades.
  The region is projected to continue to warm during the near future (2020–2039) and far future (2060–2079), compared with recent years (1990–2009). The warming is projected to be on average about 0.7°C in the near future, increasing to about 1.9°C in the far future. Inland, away from the coast, the number of high temperature days is projected to increase. Fewer cold nights are projected in inland areas and the Blue Mountains.
  [Source: NARCLiM]



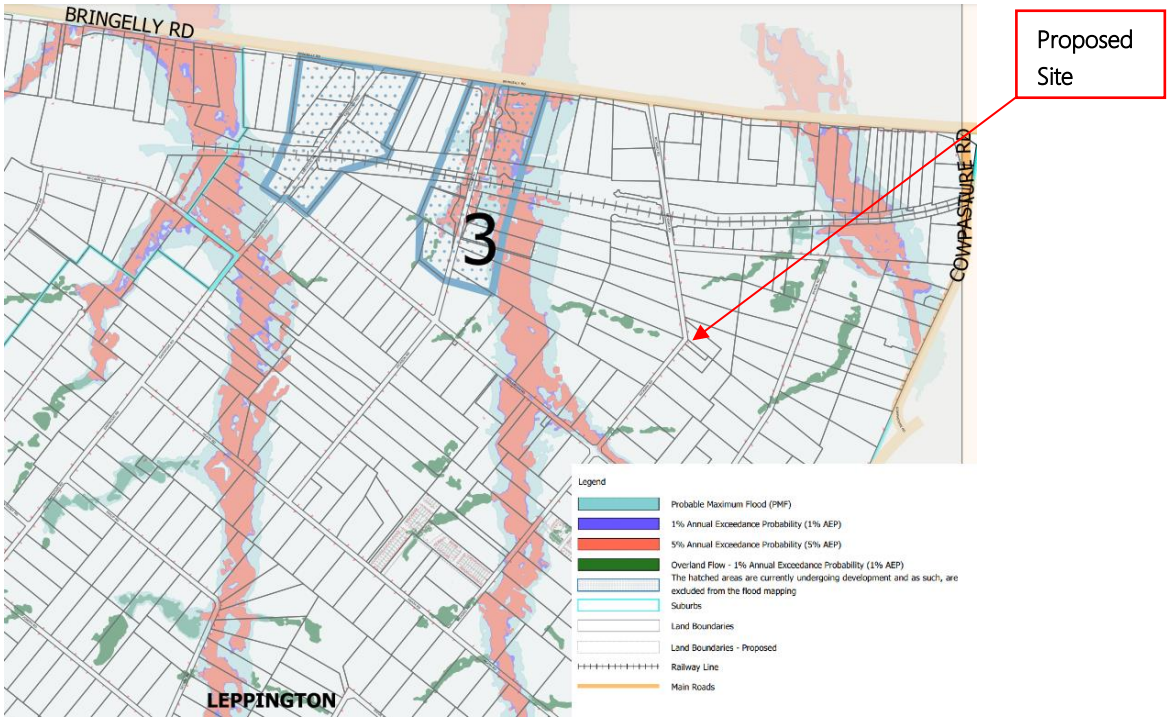
Near future (2020-2039) projected changes in the number of days per year with maximum temperatures above 35°C

Far future (2060-2079) projected changes in the number of days per year with maximum temperatures above 35°C

- Bushfire – Leppington is not designated as part of a bush fire prone land according, however with recent extreme bushfire activity, bushfire resilience should still be considered. It is expected that Sydney will experience an increase in average and severe fire weather in the near future and far future.
  [Source: NARCLiM]

- Rainfall- The Sydney region currently experience great rainfall variability, these variabilities affect climate variables such as floods and droughts. Although this variability raises some issues with rainfall projections, the majority of models agree that rainfall is projected to increase in autumn for the near future and far future and spring rainfall will decrease in the near future.
  [Source: NSW government]

- Floods – The Upper South Creek Area is prone to flooding as it is a natural feature of the area due to it being situated in a floodplain area. Large floods are rare, but even small floods can cause damage and disruption. The flood map below shows the extent of flood of a 1% AEP (annual expectancy period), the proposed site is well far away from any projected flood zones.
  [Source: Camden council]



2.3 PROJECT SPECIFIC RISK STATEMENTS

Based on the project's baseline climatic characteristics and past extreme events, the following project specific climate risk statements are formulated:

1. Higher maximum temperatures and more humid conditions causing increase in frequency and/or duration of extreme heat days (over 35 °C), heatwave events and serve fire weather.
2. More extreme rainfall conditions causing increase in possibility and severity of extreme weather.

3 CLIMATE CHANGE SCENARIOS AND IMPACTS

3.1 REGIONAL OVERVIEW

The subject site is located within the East Coast South sub-cluster.

East Coast South sub-cluster

The East Coast south sub-cluster comprises Natural Resource Management (NRM) regions in the central part of the eastern seaboard of Australia. The area encompasses important headwater catchments for a high proportion of Australia's population.

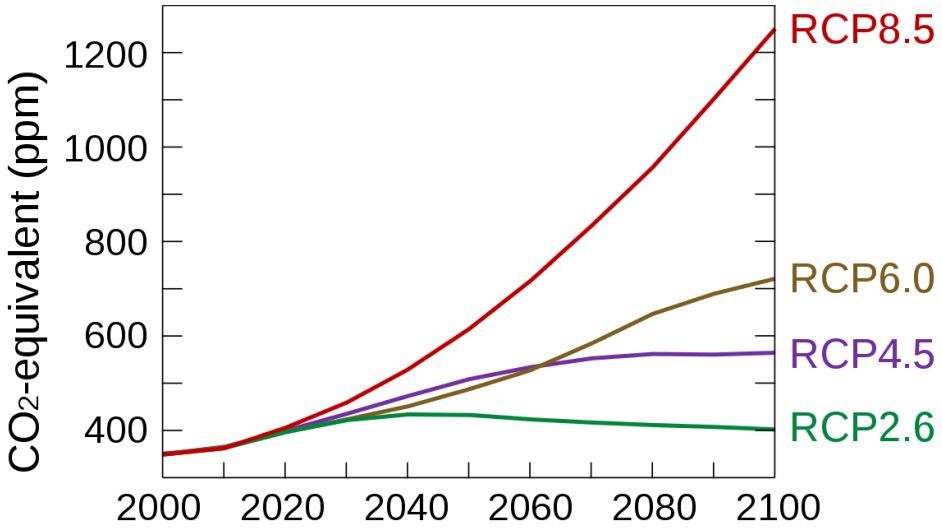
The sub-cluster area has a predominantly sub-tropical climate, with regional variations such as some temperate influences in the south.

Key projection messages for this sub-cluster:

- Average temperatures will continue to increase in all seasons (very high confidence).
- More hot days and warm spells are projected with very high confidence. Fewer frosts are projected with high confidence.
- Decreases in winter rainfall are projected with medium confidence. Other changes are possible but unclear.
- Increased intensity of extreme rainfall events is projected, with high confidence.
- Mean sea level will continue to rise and height of extreme sea-level events will also increase (very high confidence).
- A harsher fire-weather climate in the future (high confidence).
- On annual and decadal basis, natural variability in the climate system can act to either mask or enhance any long-term human induced trend, particularly in the next 20 years and for rainfall.

3.2 REPRESENTATIVE CONCENTRATION PATHWAY

In order to source relevant climate projection, appropriate Representative Concentration Pathway (RCPs) based on the latest Intergovernmental Panel on Climate Change (IPCC) report are chosen. The RCPs provide plausible climate futures that may eventuate over the coming years. There are four pathways: RCP8.5, RCP6, RCP4.5, RCP2.6, where the numbers of each RCP refer to the amount of radiative forcing produced by greenhouse gases in 2100.



IPCC Representative Concentration Pathway

The RCP 8.5 scenario has been selected as one future climate projection for this assessment as it is the most conservative pathway and because current emissions are tracking close to RCP 8.5. RCP 8.5 reflects a future with less curbing of emissions and continued increase in fossil fuel use. It is the generally taken as the basis for worst-case climate change scenarios.

The RCP 4.5 is chosen to represent a stabilisation pathway in which lower emissions is achieved by application of some mitigation strategies and technologies. RCP 4.5 reflects a future where emissions peak around 2040, and the CO_2 concentration reaches 540 ppm by 2100.

3.3 PROJECTION TIME SCALE

The lifespan of the project components were considered to determine the appropriate projection time scale. Based on components design life of school building, the time series that is selected to understand the future climate impacts across the project's life are 2030 and 2070.

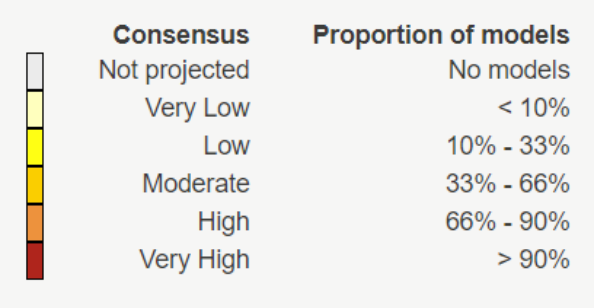
3.4 CLIMATE VARIABLES OF INTEREST

Based on the project's characteristics, the climate variables of interest for this site are:

Events	Variables	Key Cases
Bushfires	Average temperature and rainfall (annual)	"Best Case": Climate Future with the least increase in average temperature and the least decrease (or most increase) in rainfall (shorthand: "coolest and wettest") "Worst Case": Climate Future with the greatest increase in average temperature and the greatest decrease (or least increase) in rainfall (shorthand: "hottest and driest")
Heatwaves	Maximum daily temperature and humidity (summer)	"Best Case": Climate Future with the least increase in maximum daily temperature and the least increase (or most decrease) in humidity (shorthand: "coolest and least humid") "Worst Case": Climate Future with the greatest increase in maximum daily temperature and the greatest increase (or least decrease) in humidity (shorthand: "hottest and most humid")
Droughts	Rainfall and Humidity (annual)	"Best Case": Climate Future with increase in rainfall and the least increase in average humidity (shorthand: "wettest and most humid") "Worst Case": Climate Future with decrease in rainfall and the decrease in humidity (shorthand: "driest and least humid")
Storms	Rainfall and temperature (annual)	"Best Case": Climate Future with the least increase (or most decrease) in rainfall and the least increase in average temperature (shorthand: "driest and coolest") "Worst Case": Climate Future with the greatest increase (or least decrease) in rainfall and the greatest increase in average temperature (shorthand: "wettest and hottest")
Floods	1-in-20 year rainfall and average rainfall (annual)	"Best Case": Climate Future with the least increase (or most decrease) in 1-in-20 year rainfall and the least increase (or most decrease) in rainfall (shorthand: "least intense and driest") "Worst Case": Climate Future with the greatest increase (or least decrease) in 1-in-20 year rainfall and the greatest increase (or least decrease) in rainfall (shorthand: "most intense and wettest")

3.5 CLIMATE FUTURE PROJECTIONS

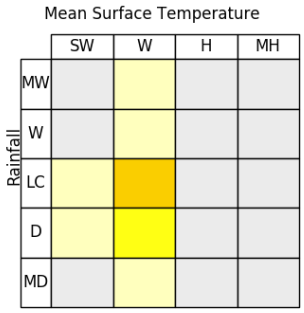
The series of climate futures matrices representing the combination of time periods and greenhouse gas scenarios and classified by the combined changes of the climate variables identified above are provided in table below. All climate future matrices are sourced from CSIRO and Bureau of Meteorology, Climate Change in Australia website - www.climatechangeinaustralia.gov.au, cited 20/06/2022.



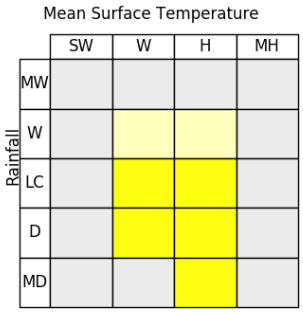
Colour legend of climate future projection consensus levels

3.5.1 ANNUAL AVERAGE TEMPERATURE AND RAINFALL MATRICES (BUSHFIRES)

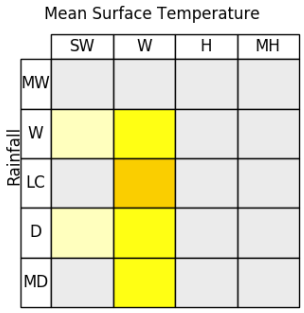
2030 RCP 4.5



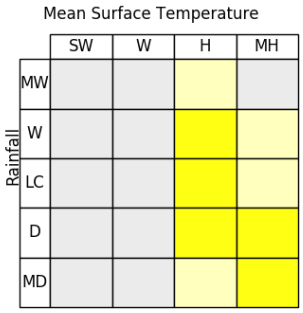
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



Keys

Mean Surface Temperature

SW	Slightly Warmer	< 0.50
W	Warmer	0.50 to 1.50
H	Hotter	1.50 to 3.00
MH	Much Hotter	> 3.00

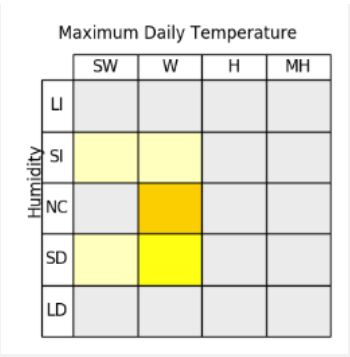
Rainfall

MW	Much Wetter	> 15.00
W	Wetter	5.00 to 15.00
LC	Little Change	-5.00 to 5.00
D	Drier	-15.00 to -5.00
MD	Much Drier	< -15.00

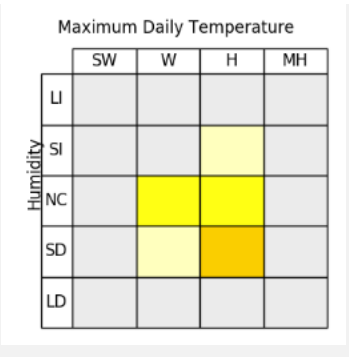
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Slightly warmer and little change in rainfall (Consensus: Very low)	Slightly warmer and wetter (Consensus: Very low)	Warmer and wetter (Consensus: Very low)	Hotter and much wetter (Consensus: Very Low)
"Worst"	Warmer and much drier (Consensus: Very low)	Warmer and much drier (Consensus: Low)	Hotter and much drier (Consensus: Low)	Much hotter and much drier (Consensus: Very low)
"Maximum consensus"	Warmer and little change in rainfall (Consensus: Moderate)	Warmer and little change in rainfall (Consensus: Moderate)	Warmer to hotter and little change to much drier (Consensus: Low)	Hotter to much hotter and wetter to much drier (Consensus: Low)

3.5.2 SUMMER MAXIMUM DAILY TEMPERATURE AND HUMIDITY MATRICES (HEATWAVES)

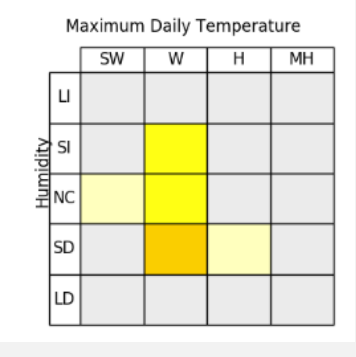
2030 RCP 4.5



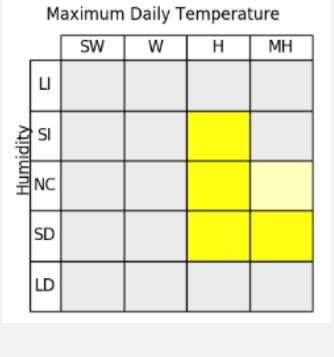
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



Keys

Maximum Daily Temperature

SW	Slightly Warmer	< 0.50
W	Warmer	0.50 to 1.50
H	Hotter	1.50 to 3.00
MH	Much Hotter	> 3.00

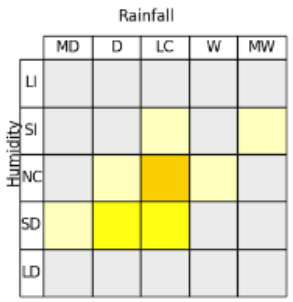
Humidity

LI	Large Increase	> 10.00
SI	Small Increase	1.00 to 10.00
NC	No Change	-1.00 to 1.00
SD	Small Decrease	-10.00 to -1.00
LD	Large Decrease	< -10.00

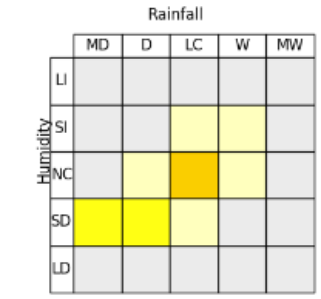
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Slightly warmer and small increase in humidity (Consensus: Very low)	Slightly warmer and no change in humidity (Consensus: Very low)	Warmer and no change in humidity (Consensus: Low)	Hotter and small increase in humidity (Consensus: Low)
"Worst"	Warmer and small decrease in humidity (Consensus: Low)	Hotter and small decrease in humidity (Consensus: Very low)	Hotter and small decrease in humidity (Consensus: Moderate)	Much hotter and small decrease in humidity (Consensus: Low)
"Maximum consensus"	Warmer and no change in humidity (Consensus: Moderate)	Warmer and small decrease in humidity (Consensus: Moderate)	Hotter and small decrease in humidity (Consensus: Moderate)	Hotter to much hotter and small increase to small decrease in humidity (Consensus: Low)

3.5.3 ANNUAL RAINFALL AND HUMIDITY MATRICES (DROUGHTS)

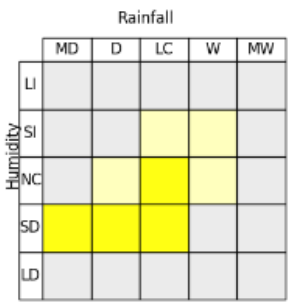
2030 RCP 4.5



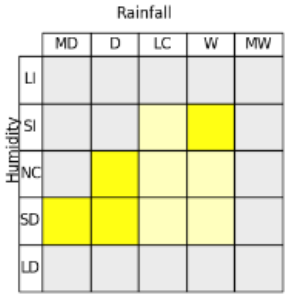
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



Keys

Rainfall

MW	Much Wetter	> 15.00
W	Wetter	5.00 to 15.00
LC	Little Change	-5.00 to 5.00
D	Drier	-15.00 to -5.00
MD	Much Drier	< -15.00

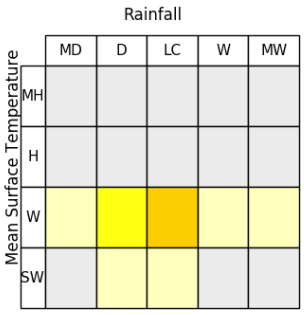
Humidity

LI	Large Increase	> 10.00
SI	Small Increase	1.00 to 10.00
NC	No Change	-1.00 to 1.00
SD	Small Decrease	-10.00 to -1.00
LD	Large Decrease	< -10.00

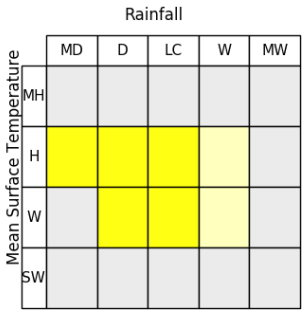
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Much wetter and small increase in humidity (Consensus: Very low)	Wetter and small increase in humidity (Consensus: Very low)	Wetter and small increase in humidity (Consensus: Very low)	Wetter and small increase in humidity (Consensus: Low)
"Worst"	Much drier and small decrease in humidity (Consensus: Very Low)	Much drier and small decrease in humidity (Consensus: Low)	Much drier and small decrease in humidity (Consensus: Low)	Much drier and small decrease in humidity (Consensus: Low)
"Maximum consensus"	Little change in rainfall and no change in humidity (Consensus: Moderate)	Little change to much drier in rainfall and no change to slight decrease in humidity (Consensus: Low)	Little change in rainfall and no change in humidity (Consensus: Moderate)	Wetter to much drier in rainfall and slight increase to slight decrease in humidity (Consensus: Low)

3.5.4 ANNUAL RAINFALL AND AVERAGE TEMPERATURE MATRICES (STORMS)

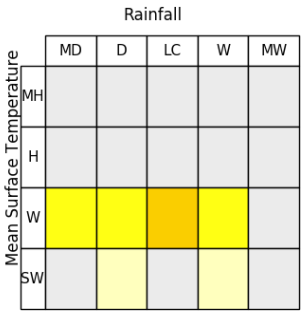
2030 RCP 4.5



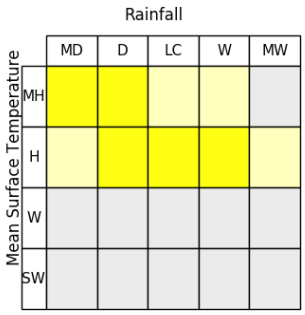
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



Keys

Rainfall

MD	Much Drier	< -15.00
D	Drier	-15.00 to -5.00
LC	Little Change	-5.00 to 5.00
W	Wetter	5.00 to 15.00
MW	Much Wetter	> 15.00

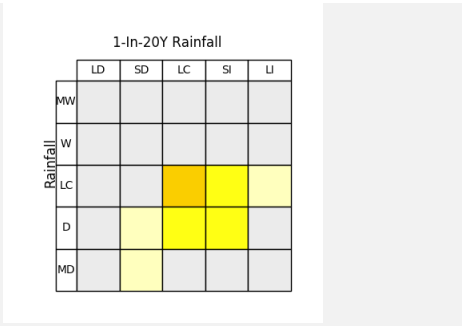
Mean Surface Temperature

MH	Much Hotter	> 3.00
H	Hotter	1.50 to 3.00
W	Warmer	0.50 to 1.50
SW	Slightly Warmer	< 0.50

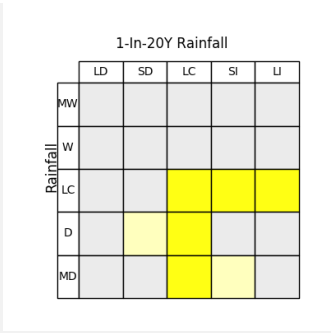
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Much drier and warmer (Consensus: Very low)	Drier and slightly warmer (Consensus: Very low)	Much dryer and hotter (Consensus: Low)	Much dryer and much hotter (Consensus: Low)
"Worst"	Much wetter and warmer (Consensus: Very low)	Wetter and warmer (Consensus: Low)	Wetter and warmer (Consensus: Very low)	Much wetter and hotter (Consensus: Very low)
"Maximum consensus"	Little change and warmer (Consensus: Moderate)	Little change in rainfall and warmer (Consensus: Moderate)	Little changed to much Drier in rainfall and hotter to warmer (Consensus: Low)	Wetter to much drier and much hotter to hotter (Consensus: Low)

3.5.5 1-IN-20 YEAR RAINFALL AND AVERAGE RAINFALL MATRICES (FLOODING)

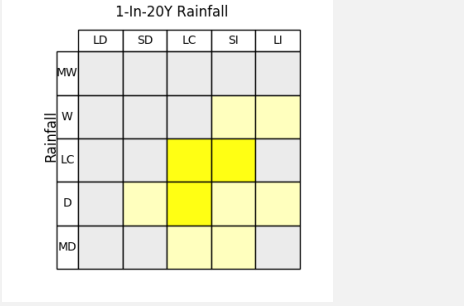
2030 RCP 4.5



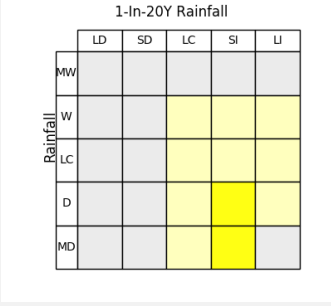
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



Keys

1-In-20Y Rainfall			Rainfall		
LD	Large Decrease	< -30.00	MW	Much Wetter	> 15.00
SD	Small Decrease	-30.00 to -10.00	W	Wetter	5.00 to 15.00
LC	Little Change	-10.00 to 10.00	LC	Little Change	-5.00 to 5.00
SI	Small Increase	10.00 to 30.00	D	Drier	-15.00 to -5.00
LI	Large Increase	> 30.00	MD	Much Drier	< -15.00

Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Small decrease 1-in-20 and much drier (Consensus: Very low)	Small decrease 1-in-20 and drier (Consensus: Very low)	Small decrease 1-in-20 and drier (Consensus: Very low)	Little change 1-in-20 and little much drier (Consensus: Very Low)
"Worst"	Large increase 1-in-20 and little change in rainfall (Consensus: Low)	Large increase 1-in-20 and wetter (Consensus: Very low)	Large increase 1-in-20 and little change in rainfall (Consensus: Low)	Large increase 1-in-20 and wetter (Consensus: Low)
"Maximum consensus"	Little change 1-in-20 and little change in rainfall (Consensus: Moderate)	Little change to small increase 1-in-20 and little change to drier in rainfall (Consensus: Low)	Little change to small increase 1-in-20 and little change in rainfall Consensus: Low)	Small increase 1-in-20 and drier to much drier in rainfall Consensus: Low)

4 CLIMATE RISK ASSESSMENT

The qualitative descriptions used in the risk assessment to categorise risks as low, medium, high and extreme depending on the likelihood and consequence are in accordance with the AGO's Climate Change Risks and Impacts: A Guide for Government and Business. Details of the qualitative descriptions are provided in Appendix A.

4.1 RISK ASSESSMENT TABLE

Climate Variable	Climate Projection	Climate Impact	2030			2070			Responsibility	Adaptation	2030 PA			2070 PA		
			Consequence	Likelihood	Risk	Consequence	Likelihood	Risk			Consequence	Likelihood	Risk	Consequence	Likelihood	Risk
Bushfire	Increase in fire weather	Increased likelihood of bushfire to the building surroundings	Major	Unlikely	Medium	Major	Unlikely	Medium	Bushfire	Investigate locations of vulnerability, remove potential fuel sources surrounding the building such as removing dead vegetation as part of ongoing landscaping/ maintenance works.	Major	Rare	Low	Major	unlikely	Medium
		Extreme bushfire damaging building	Catastrophic	Rare	Medium	Catastrophic	Rare	Medium	Bushfire	Use of non-combustible construction materials as per regulation. Put in place evacuation plan in case of fire threatening building.	Catastrophic	Rare	Medium	Catastrophic	Rare	Medium

Heatwave	Increase in average temperatures annually and number of hot days	Increased demand on HVAC will exacerbate urban heat island effect	Moderate	Likely	Medium	Moderate	Almost Certain	High	ESD Architect Landscaping	Incorporate passive thermal design principles in the design and construction of the building such as appropriate levels of thermal insulation.	Moderate	Unlikely	Medium	Moderate	Possible	Medium
		Number of people dissatisfied in terms of thermal comfort will increase	Minor	Possible	Low	Moderate	Likely	Medium	ESD Mechanical Architect	Incorporate passive thermal design principles in the design and construction of the building such as appropriate levels of thermal insulation.	Minor	Unlikely	Low	Moderate	Possible	Medium
		Electricity grid will be overloaded leading to loss of power site wide	Minor	Possible	Low	Minor	Likely	Medium	Electrical	Equipment should be gradually upgraded as required to cope with more extreme conditions.	Minor	Unlikely	Low	Minor	Possible	Low
		Extreme heat may impact the operation of electrical equipment	Minor	Unlikely	Low	Moderate	Possible	Medium	Electrical	In the future, current temperature ratings for electrical equipment should be able to cope with projected temperature increase relevant to the components design life.	Minor	Rare	Low	Moderate	Unlikely	Medium
		Mechanical plant may struggle to maintain space conditioning	Minor	Unlikely	Low	Minor	likely	Medium	Mechanical	When replacing HVAC units at the end of service life, consider upsizing capacity of units	Minor	Rare	Low	Minor	Unlikely	Low

		during extreme heatwaves								in line with change in climatic conditions.						
		Increase in electrical peak loads	Minor	Unlikely	Low	Moderate	Possible	Medium	Electrical	Provide on-site renewable energy.	Minor	Rare	Low	Moderate	Unlikely	Medium
		Solar PV panels lose efficiency	Minor	Unlikely	Low	Minor	Possible	Low	Electrical	Provide consistent maintenance to the system to ensure the performance.	Minor	Rare	Low	Minor	Unlikely	Low
Storm	Increased storm intensity	Extreme weather damaging rooftop plant	Major	Unlikely	Medium	Major	Possible	High	Electrical Mechanical Hydraulics	Services design to take possible storm risk into consider and have management strategies for extreme weather condition.	Major	Rare	Medium	Major	Unlikely	Medium
		Extreme weather damaging solar PV panels	Moderate	Unlikely	Medium	Moderate	Possible	Medium	Electrical	Electrical design to take possible storm risk into consider and have better layout or design solution to cope with extreme weather.	Moderate	Rare	Low	Moderate	Rare	Low
		Extreme weather damaging façade and roof	Moderate	Unlikely	Medium	Major	Possible	High	Structural Façade	Structural and facade design to consider building resilience to intensified storms.	Moderate	Rare	Low	Major	Unlikely	Medium
		Extreme weather causing disruption in building services	Minor	Unlikely	Low	Moderate	Possible	Medium	Electrical Mechanical Hydraulics	Implement management strategies so that in the case of extreme weather the building services can still in function.	Minor	Rare	Low	Moderate	Unlikely	Medium

Flood	Increased intensity of extreme rainfall events	Flooding affecting site runoff and overwhelming drainage	Minor	Possible	Medium	Minor	Possible	Medium	Civil	Adopt higher drainage design requirements such as higher average recurrence level (ARI)	Minor	Rare	Low	Minor	Unlikely	Low
		Water leakage into building	Moderate	Unlikely	Medium	Moderate	Unlikely	Medium	Façade	All critical infrastructure such as switch rooms and substations should be located above the Flood Level.	Moderate	Rare	Low	Moderate	Rare	Low
		Flooding of outdoor areas	Minor	Unlikely	Low	Minor	Possible	Low	Civil	At street level to reduce surface runoff, incorporating more permeable surfaces.	Minor	Unlikely	Low	Minor	Unlikely	Low

4.2 RESPONSES TO HIGH AND EXTREME RISKS

The risk assessment identified three high risks for the proposed development by 2070 (Zero high risk by 2030). No extreme risks were identified. The responses to high risks are summarised as follows.

1. Higher maximum temperatures causing an increase in frequency and/or duration of extreme heat-days and heatwaves resulting in insufficient capacity of the HVAC system to maintain thermal comfort. This risk is mitigated by incorporate passive thermal design principles in the design and construction of the building such as appropriate levels of thermal insulation.
2. Increased rainfall causing an increase in frequency and/or duration of storm resulting in damaging rooftop plant. This risk is mitigated by services design to take possible storm risk into consider and have management strategies for extreme weather condition.
3. Severity of extreme weather is projected to increase; this can increase the likelihood of damaging the façade and roof. This risk is mitigated by design structure and faced to consider building resilience to intensified storms.

4.3 RISKS SUMMARY

Risk rating	2030 Pre-adaptation	2070 Pre-adaptation	2030 Post-adaptation	2070 Post-adaptation
Low	8	2	13	7
Medium	8	11	3	9
High	0	3	0	0
Extreme	0	0	0	0

The above table shows all risk items identified as 'high' or 'extreme' are addressed by specific design responses and at least two risks items identified in the risk assessment are addressed by specific design responses.

5 CONCLUSION

A Climate Change Risk & Adaptation Assessment report has been prepared for the Leppington Public School in accordance with EFSG DG 2.08 and Green Star – Design & As-Built v1.3 requirements.

In particular, this Climate Change Risk & Adaptation Assessment specifically addressed:

- The details of stakeholder consultation that was undertaken during plan preparation in Section 1.3;
- The project's characteristics in Section 2;
- The assessment of climate change scenarios and impacts on the project in see Section 3;
- The potential direct and indirect climate change impacts in Section 4;
- The potential risks for the project and people in Section 4; and
- The actions to reduce 'high' and 'extreme' risks identified in Section 4.

The impacts of climate change were assessed across two time scales (2030 & 2070) and two Representative Concentration Pathways (RCP4.5 & RCP8.5). Climate Futures matrices were used to determine the key climate projections based on multiple climate variables for this risk assessment. The key climate projections were used to inform the climate risk assessment.

The results of the climate risk assessment identified two high risks items pre-adaptation. These high risks were mitigated to medium risks by the proposed adaptation actions.

APPENDIX A – RISK ASSESSMENT FRAMEWORK

The following risk assessment framework is used to determine consequence and likelihood ratings. Based on these ratings, the risk rating has been determined.

CONSEQUENCE CRITERIA

	SUCCESS CRITERIA				
Rating	Public safety	Local economy & growth	Community & lifestyle	Environment & sustainability	Public administration
Catastrophic	Large numbers of serious injuries or loss of lives	Regional decline leading to widespread business failure, loss of employment and hardship	The region would be seen as very unattractive, moribund and unable to support its community	Major widespread loss of environmental amenity and progressive irrecoverable environmental damage	Public administration would fall into decay and cease to be effective
Major	Isolated instances of serious injuries or loss of lives	Regional stagnation such that businesses are unable to thrive and employment does not keep pace with population growth	Severe and widespread decline in services and quality of life within the community	Severe loss of environmental amenity and a danger of continuing environmental damage	Public administration would struggle to remain effective and would be seen to be in danger of failing completely
Moderate	Small numbers of injuries	Significant general reduction in economic performance relative to current forecasts	General appreciable decline in services	Isolated but significant instances of environmental damage that might be reversed with intensive efforts	Public administration would be under severe pressure on several fronts
Minor	Serious near misses or minor injuries	Individually significant but isolated areas of reduction in economic performance relative to current forecasts	Isolated but noticeable examples of decline in services	Minor instances of environmental damage that could be reversed	Isolated instances of public administration being under severe pressure
Insignificant	Appearance of a threat but no actual harm	Minor shortfall relative to current forecasts	There would be minor areas in which the region was unable to maintain its current services	No environmental damage	There would be minor instances of public administration being under more than usual stress but it could be managed

LIKELIHOOD CRITERIA

Rating	Recurrent risks	Single events
Almost certain	Could occur several times per year	More likely than not – Probability greater than 50%.
Likely	May arise about once per year	As likely as not – 50/50 chance.
Possible	May arise once in ten years	Less likely than not but still appreciable – Probability less than 50% but still quite high.
Unlikely	May arise once in ten years to 25 years	Unlikely but not negligible – Probability low but noticeably greater than zero.
Rare	Unlikely during the next 25 years	Negligible – Probability very small, close to zero.

RISK PRIORITY LEVELS

	Consequences				
Likelihood	Insignificant	Minor	Moderate	Major	Catastrophic
Almost certain	Medium	Medium	High	Extreme	Extreme
Likely	Low	Medium	High	High	Extreme
Possible	Low	Medium	Medium	High	High
Unlikely	Low	Low	Medium	Medium	Medium
Rare	Low	Low	Low	Low	Medium

The interpretation of the priority levels is usually as follows:

- Extreme risks demand urgent attention at the most senior level and cannot be simply accepted as a part of routine operations without executive sanction.
- High risks are the most severe that can be accepted as a part of routine operations without executive sanction but they will be the responsibility of the most senior operational management and reported upon at the executive level.
- Medium risks can be expected to form part of routine operations but they will be explicitly assigned to relevant managers for action, maintained under review and reported upon at senior management level.
- Low risks will be maintained under review but it is expected that existing controls will be sufficient and no further action will be required to treat them unless they become more severe.