Sustainable Development Plan

Upgrade to Austral Public School

ESD SERVICES

JHA

CONSULTING ENGINEERS

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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 Austral Public School (APS) (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 the upgrades to the existing APS at 205 Edmondson Avenue, Austral, 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

APS is located at 205 Edmondson Avenue, Austral on the south-eastern corner of the intersection between Edmondson Avenue and Tenth Avenue. The site has an area of 2.986 ha and comprises of 6 allotments, legally described as:

- Lot 1 DP 398105
- Lot 1 DP 398106
- Lot 1 DP 509613
- Lot 1 DP 512119
- Lot 2 DP 509613
- Lot 865 DP2475

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

- 8 permanent buildings;
- 14 demountable structures;
- interconnected paths;
- covered walkways;
- play areas: and
- at-grade parking.

The Austral Community Pre-school is also located within the site.

The existing buildings are clustered in the northern part of the site, ranging between 1 to 2 storeys in height. There is a sports oval in the south-eastern portion of the site, and a densely vegetated informal play area located in the south-western portion of the site.

Figure 1 Aerial image of site (source: NearMap, taken 7 Sept 2023)

2.2 PROPOSED ACTIVITY DESCRIPTION

The proposed activity involves alterations and additions to the existing APS, including the following:

- Demolition of existing structures and removal of trees, as well as other site preparation works;
- The erection of a new 3-storey building comprising teaching spaces that includes 20 permanent teaching spaces and 3 support teaching spaces;
- Conversion of the first floor of Building B from a Library to staff annex (staff room) and minor modifications on the ground floor;
- Refurbishment and change of school function of Building I from classrooms to a Library;
- At-grade parking (57 new spaces, including 1 accessible space);
- New driveway and access gate from Edmondson Road;
- Erection of a substation within the site on the northern boundary;
- Upgrade of the sports field;
- Internal pathways, fencing, utility upgrades and associated works; and
- Off-site public domain improvements including retention and upgrading of the Kiss & Drop area and a temporary pedestrian road crossing on Tenth Avenue.

The intent of the activity is to allow for upgrades to APS that will provide a CORE 35 primary school compliant with the EFSG. The works will increase the capacity of the school from 681 students and 40 FTE teachers to 734 students and 64 FTE teachers, respectively. Furthermore, provision within the expanded 734 student capacity will be made for the creation of 30 support class students places.

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

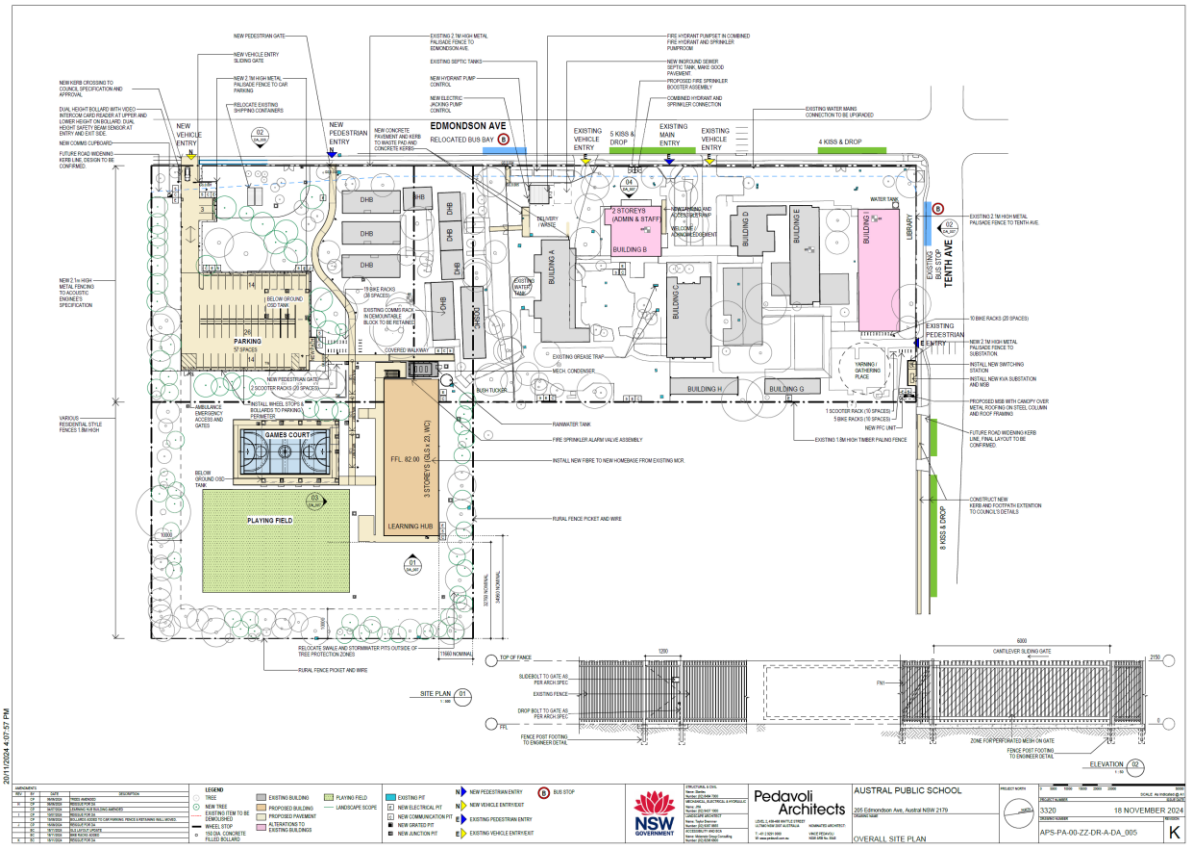


Figure 2 Proposed Site Plan (Source: Pedavoli Architects, Overall Site Plan (Rev K)

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 activity 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 developments 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.

The Sustainable Building SEPP 2022 is applicable to the project, and as such will incorporate 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 will be devised and implemented. This plan will encompass strategies for minimizing waste generation, maximizing material reuse, recycling, and reprocessing, and reducing the volume of materials destined for landfill. Cut and excavation materials will also be reused for backfilling or for grading purposes to level the site where possible. As part of the project's waste minimization efforts, the aim is to divert up to 80% of construction and demolition waste from ending up in landfills.

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.

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 HEAT REJECTION SYSTEM

The project will use of air-cooled heat rejection systems as opposed to water-based heat rejection to reduce water demand.

4.2.11.2 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.

4.2.11.3 WATER-SENSITIVE URBAN DESIGN

The project will implement 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) will be completed by a civil/stormwater consultant.

5 GREEN STAR DESIGN & AS BUILT

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 categories 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 Austral 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	7
Transport	10
Water	5
Materials	6
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	

The above construction thermal mark-ups are attached in Attachment C.

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

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 Austral Public School (APS). 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	14	7
Medium	7	9	2	9
High	0	4	0	0
Extreme	1	1	0	0

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

1. Increase in fire weather days can increase the chance of fire activity, as the site is located within a bushfire prone area, bushfire damage to the building and surrounds needs to be considered as a possibility. The development should incorporate the principals of removing and potential fuel sources surrounding the building and maximise usage on non-combustible materials for construction. Additionally, the follow items will also be incorporated to help address this risk:
    a. A detailed Bush Fire Emergency Management and Evacuation Plan will be completed prior to occupation of proposed buildings.
    b. A management plan is to be prepared that describes the maintenance measures required to maintain the APZ (Asset protection zone) to IPA (Inner Protection Area) standards.
    c. The site has direct access to public roads, and access and egress for emergency vehicles and evacuation is adequate.
    d. Defendable space is provided for on all sides of the existing and proposed buildings.
    e. Proposed buildings to be constructed to BAL-12.5 in compliance with AS3959:2018
2. 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.
3. 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.
4. 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	
	Glazing	U-value 5.0, SHGC 0.58 (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:	P20270 SINSW Cluster / Austral Public School
REVISION	A
AUTHOR	Iain Miao

										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	**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	DA8 c1	SE.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.** An 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	DA8 c1	5 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	DA8 c1	5 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 DG63.03.01	DA8 c1	5 GHG Emissions Reduction DA6 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	DA8 c1	5 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	DA8 c1	5 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	DA8 c1	5 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	DA8 c1|5 GHG Emissions Reduction; DA8 c1|6 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	DA8 c1|5 GHG Emissions Reduction; DA8 c1|6 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	DA8 c1|5 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	DG63.09	DA8 c1|5 GHG Emissions Reduction	**1.** WOL cost assessment for hot water systems 2. Hydraulic drawing/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	DA8 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	DA8 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	DA8 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	DG04.05	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	DA8 c2	5 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		DA5 c6 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 used)	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												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 stations 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 DG 2.7.2	Ph 2: Concept Design - Space planning	DG02.7.1	DAB-c8 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.	Ph 2: Concept Design - Space planning	DG2.1.1.16	Not covered in Green Star	As built drawings or statement by relevant professional	Y	Drawing to demonstrate building flexibility/statement	As built drawing 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	Ph 2-5: Services Design	DG5.1.01	DAB-c18 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	Ph 2-5: Services Design	DG5.1.04	DAB-c6.0 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 SINSW.	Ph 2-5: Services Design	DG5.1.14 DG2.4.2 DG5.1.01	DAB-c18B.2 Rainwater Reuse	**1.** As built hydraulic drawings showing tank connection to end uses and capacity	Y	Drawing to show tank connection to end uses and capacity	Hydraulic/Civil drawings to demonstrate compliance											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.	Ph 2-5: Services Design	DG2.4.2	DAB-c18B.5 Fire System Test Water	Fire engineering report	TBC	If sprinkler system is in use for the project, otherwise not applicable	Fire engineering report to demonstrate compliance if sprinkler system is in use											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.	Ph 2-5: Services Design	DG5.1.03	DAB-c18 Potable Water	1. Relevant due diligence report / investigation	TBC	Hydraulic to confirm												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 DG5.2.	Ph 2-5: Services Design	DG5.2	Not covered in Green Star	**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											TBC			28
Consume responsibly	**Water Fixture efficiency** All products must be rated to AS 6400 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 microwave-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.	Ph 3-4: Product and Material Selection	DG5.1.02 DG2.4.1	DAB-c18B.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 inform material selection	Ph 3-4: Product and Material Selection	DG5.1.03	DAB-c19A - 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. - resource (energy and where applicable water) consumption. - Maintenance. - the replacement of component parts. - disposal costs - ecological sustainable options - durability - vandalism - safety The whole of life cost shall be calculated over the estimated life of the asset/s.	Ph 3-4: Product and Material Selection	DG01 All design guides for selection of materials and building systems	GSC c20 - 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 life cycle (refer to DG 3) - Contain reduced or no hazardous substances (e.g. low VOC) to ensure effective indoor environmental quality. Reduce the demand for rare or non-renewable resources. - Have low embodied energy and water. - Are made from or contain recycled materials or can be reused or recycled at the end of their useful life.	Ph 3-4: Product and Material Selection	DG02.05	DAB-c21 Sustainable Products	**1.** Environmental Product Declarations of products / materials used; Product certificates (like GECA, FSC, etc) **2.** Suppliers' declarations confirming recycled contents in products **3.** Bill of quantities	Y	Head contractor to provide Product certificate/statement to demonstrate compliance	Product certificate/statement											TBC			32
Consume responsibly	**Sustainable timber** - No rainforest timbers, or timbers from high conservation forests, are to be used unless plantation grown. Use only recycled timber, engineered and glued timber composite products, or timber from plantations or from sustainably managed regrowth forests that is FSC, AFS or PEFC certified - All timber used is to be termite (white ant) resistant or treated to be termite resistant to the appropriate hazard level.	Ph 3-4: Product and Material Selection	DG2.5.1 DG21.05.01	DAB-c20.2 Responsible Building Materials - Timber	**1.** Evidence of chain of custody **2.** Bill of 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.	Ph 3-4: Product and Material Selection	DG02.07			Y	Head contractor to provide statement to demonstrate comliance	Product certificate/statement											TBC			34
Consume responsibly	**Concrete** - Use materials complying with AS based on the Whole of Life approach to materials selection. - Do not use brecia or dolerite in concrete mixes. - Fly ash is a manufacturing bi-product that can be used as a cement replacement but should limited to a maximum of 20% by weight of cement content.	Ph 3-4: Product and Material Selection	DG2.1.02	DAB-c19B.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	Ph 7-9: Construction, Commissioning Post Occupancy and Operation	DG02.07	DAB-c22 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 moisture 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 EFSG, 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, service installations and systems incorporated into the Works.	Ph 2-5: Services Design	DG16.10 DG-01.04	DAB-c2.1 Services and Maintainability Review DAB-c9.1.2 Ventilation System Attributes DAB-c4 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 - Heritage significance / impact - Appraisal of physical and visual factors affecting site development - Available transport/ road infrastructure servicing the site - Geo-technical and Soil 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.	Ph 1: Site Selection and Masterplan	DG03.02	GSC c12 Culture, Heritage and Identity DA8-24.2 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 survey 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.	Ph 1: Site Selection and Masterplan	DG02.06	DA8-c23 Ecological Value GSC c29 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 values throughout project planning, construction, and occupancy community and local stakeholder expectations including Aboriginal or Torres Strait Islander groups and environmental groups - Adequate due diligence must be conducted where an area of biodiversity or high ecological value is identified on the site, where at least 50% of this area must be retained. **3.** Biodiversity management plan describing measures for the conservation and protection of threatened species or communities, biodiversity enhancement, tree protection, etc. **4.** 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.	Ph 1: Site Selection and Masterplan	DG2.06	GSC c14.2 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	Ph 2: Concept Design - Space planning	SGS2 4.3.6	DA8-c17 Sustainable Transport		Y	Provide bicycle storage as per required	Architectural 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.	Ph 2: Concept Design - Space planning	DG16.08 Department of Education's Community Use of School Facilities Implementation Procedures	DA8-c30B 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 this requirement	Architectural 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 - Easily accessible - Safe and secure Designs must aim to achieve a minimum of 10m2 per student. Where this figure is not achievable the proposed m2 per student of the completed project must not be less than the existing m2 per student currently on the site.	Ph 2: Concept Design - Space planning	DG10.03	Not covered in Green Star	Plan view drawings showing provision of open space	Y	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	Ph 2: Concept Design - Space planning	EFSG Staff Unit	GSI c Amenity Space	**1.** Extracts from the EFSG requirements for staff rooms **2.** Evidence of staff room delivered accordingly	Y	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 social inequalities within Australia is between Indigenous and non-Indigenous Australians. The project demonstrate 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 GA 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)	Ph 2-L: Architectural Design	Department of Education's Reconciliation Action Plan NSW Government Aboriginal Procurement Policy GANSW 'Designing with Country' discussion paper 4	DA8-c30D Reconciliation Action Plan	**1.** Evidence of the project's relationship with the RAP, e.g. actions implemented in line with RAP, etc.	Y	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 clinic - Primary sick bay - Library	Ph 2-S: Services Design	DG14.10 DG01.08 DG01.10	GSC c15 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	Y	School Security Unit to provide Security Services Plans, 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 wireless access points and site switches	Ph 2-S: Services Design	DG64.12.02	GSC c22.2 Digital Infrastructure	**1.** Contracts describing the network infrastructure specification and operational requirements	Y	Head contractor to provide contracts that describing the network infracture 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	Ph 1: Site Selection and Masterplan	Schools Transport Practice Note	DA8-c17 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 post-occupancy; • 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.	Y	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	Ph 7-H: Construction, Commissioning Post Occupancy and Operation	WoG Facilities M	GSP cG Green Cleaning	**1.** WEB Clean School User Guide **2.** Green Cleaning specifications	Y	Head contractor to provide Green Cleaning specification which complies with this requirement	Green Cleaning Specification											TBC			49
Unlock human potential	**Healthy canteen policy** The NSW Healthy School Canteens Strategy applies to all NSW Government schools (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.	Ph 2: Concept Design - Space planning	Department of Education's Healthy Canteen Policy	DA8-c30D Integrating Healthy Environments	**1.** Research report behind Healthy Canteen Policy **2.** Evidence that policy initiative has been incorporated into the school under assessment.	Y	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 21st September to 21st March (equinoxes). - Exclude direct sunlight from desk level in all learning spaces between 9am and 3.30pm. Sun exclusion and glare control can be achieved by the use of elements such as sun shades, eave extensions, tinted glazing, screens, vertical blades and the like Glare must only be controlled by blinds as a last resort. Designers must prepare sun diagrams in the design phase as a minimum requirement.	Ph 2-L: Architectural Design	DG12 DG07.01	DA8-c12.0 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	Y	As-built 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 limits stipulated in Table 11.06.1 of Section 11.06 Acoustic Performance Guidelines or be within the range stipulated in Table 1 of the AS/NZS 2107:2016 standard. The	Ph 2-C: Architectural Design	DG 11.06 DG 11.03 DG 11.02	DA8-c10 Acoustic comfort	**1.** Report by qualified acoustics consultant demonstrating noise measurements are compliant. **2.** Detailed Drawings indicating sound insulation details and other relevant acoustic design features.	Y	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 source exists for a school development, noise emission from such sources should be designed, in principle, to satisfy the requirements of the Industrial Noise Policy.	Ph 2-C: Architectural Design	DG11.04	Not covered in Green Star	1. Report by qualified acoustics consultant	Y	Acoustic consultant to demonstrate compliance	Acoustic consultant to confirm compliance with acoustic design certificate for construction											TBC			53
Unlock human potential	**Fly free 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 EFSG. Schools in localities where fly incidence constitutes a health hazard (especially trachoma or other nuisance) will require fly screens to all opening sashes.	Ph 2-C: Architectural Design	DG11.01	Not covered in Green Star	As-built drawings showing fly screening has been provided as required	Y	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 requirements noted in AS 1428.2 be incorporated in any new design. -Additionally, DoE have enhanced circulation requirements as noted in DC / 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 aurally 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.	Ph 2-S: Architectural Design	DG19.01 DG01.14	DA8-30D 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	Y	Head contractor to provide photographic or other evidence of signage installed	Signage evidence											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 Space 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.	Ph 2-5: Architectural Design	DG2.10	DA8 c12.2 Views	**1.** Views Calculations and Mark-up this must be done in accordance with the GBCA's *Daylight and Views Hand Calculation Guide*: https://www.gbca.org.au/uploads/79/35919/Green%20Star_Daylight%20and%20Views%20Hand%20Calculation%20Guide%20May%202015%20REL4GE.pdf)	Y	Calculations and Mark-up to demonstrate compliance with the requirement	View Calculations and Markups according to GBCA										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 pleasant environment and reduce energy usage through windows and skylights - Access to high levels of daylight must be ensured for at least 40% of primary occupied spaces per floor. A space is considered to have high levels of daylight if: the space has minimum 160 lux due to daylight during 80% of the nominated hours OR the following requirements are met: No overshadowing – external shading should not impinge on the direct 25 degree line from centre of the window Minimum 40% Visual Light Transmittance (VLT) for building glazing' 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.	Ph 2-5: Architectural Design	DG2.3.1 DG3.2	DA8 c12 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)	Y	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 BCA/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 made and cross ventilation: in line with DG5.01 -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 EFSG, the design must adhere to DGG7.16. - Roof ventilator control: in line with DGG5.16 - Wind powered roof ventilators: Designed to suit local ambient climatic conditions to ensure correct sizes, locations and numbers as detailed in DG7.14 - Sanitary Space: sufficient natural ventilation or mechanical ventilation, to dispense 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 DG5.05 - Ventilation in permanent learning spaces and libraries in line with DG55 - Outdoor air requirements and control of Indoor CO2 levels - designs must adhere to DG55.02 - 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 DG57.07. - 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 DG57.09	Ph 2-5: Services Design	DGG7.01 DG05.04 DG55.05 DG57.16 DG05.01 DG57.18 DG55.02 DG17 DGG5.16 Thermal Comfort and Indoor Air Quality – Performance Brief	DA8 c15 GHG Emissions Reduction	**1.** Cooling system strategy including WOL analysis **2.** Concept plans **3.** Construction drawings **4.** Trade-based specification **5.** As built drawings, including indication of windows and cross ventilation	Y	Mechanical design to demonstrate compliance	Mechanical design to incorporate										TBC			58
Unlock human potential	**Lighting comfort** - Consider the furniture layouts to determine the orientation of luminaires. Especially when positioning luminaires in Materials Technology spaces to ensure adequate illumination on machines and work surfaces; - avoid potential stroboscopic effects and avoid shadows from ductwork - 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 3.2 of the AS/NZS 1680 standard, and the maintained illuminance values achieve a uniformity of no less than the value given in Table 3.2 of AS 1680.1:2006, with an assumed standard maintenance factor of 0.8. - 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 8.2 of the standard - The maintained illuminance levels 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 value 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 luminaire 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 DG 63.03.02	Ph 2-5: Services Design	DGG3.03	DA8 c11 Lighting Comfort DA8 c11.1 General Illuminance and Glare Reduction	**1.** Lighting drawings **2.** Architectural drawings **3.** Lighting specifications / schedules **4.** Product data sheets **5.** Isolux plot drawings **6.** Lighting modelling report showing compliant uniformity and UGRs	Y	Electrical design to demonstrate compliance with the requirement	Elec drawing										TBC			59
Unlock human potential	**Thermal comfort** The inclusion of active cooling within school facilities is directed by the Department's Air Cooling policy: 2.1 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. 2.2 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	Ph 2-5: Services Design	DGD6.03 DGD5.01 DGS1.02	DA8 c14 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 DGS5	Y	Mechanical providing ac as per AS1668.2 requirments, 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.	Ph 2-5: Services Design	DGS1.09 DGS3.11	DA8 c28 Microbial Control	1. Letter by hydraulic engineer confirming hot water is stored above 65 deg and that valves comply with code of practice.	TBC	Hydraulic to confirm													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. External Access Lighting must: - 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.	Ph 2-5: Services Design	DGL3.08.01	DA8 c27.0 Light Pollution to Neighbouring Bodies	**1.** As built drawings indicating the location of all external luminaires **2.** Letter by lighting designer describing glare prevention measures	Y	Electrical drawings indicating the location of all external luminaries	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.	Ph 3-4: Product and Material Selection	DG2.5.2	DA8 c13 Indoor Pollutants	**1.** Product specifications, certificates, safety datasheets that demonstrate low-VOC contents **2.** Bill 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 (NCNAS classification) or lower. The engineered wood products must not exceed the emissions limits stipulated in the Green Star Buildings rating tool. Engineered wood products include particleboard; plywood; Medium Density Fibreboard (MDF); laminated Veneer Lumber (LVL); High-Pressure Laminate (HPL); Compact Laminate and decorative overlaid wood panels. This requirement excludes formwork.	Ph 3-4: Product and Material Selection	DG2.5.2	DA8 c13 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 acoustics 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.	Ph 7-9: Construction, Commissioning Post Occupancy and Operation	DG1.07	GSP c13 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 termicide to be used. Preventive treatments to be by physical means and careful design to minimise risk	Ph 7-9: Construction, Commissioning Post Occupancy and Operation	DG2.5.3	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 Austral PS (SD PHASE 3)

Targeted Rating:			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

	SINSW Suggested Points	Targeted Points	Points TBC
Core Credits	51	58	0
Innovation	10	10	0
Total	61	68	0

NSW GOVERNMENT Education School Infrastructure

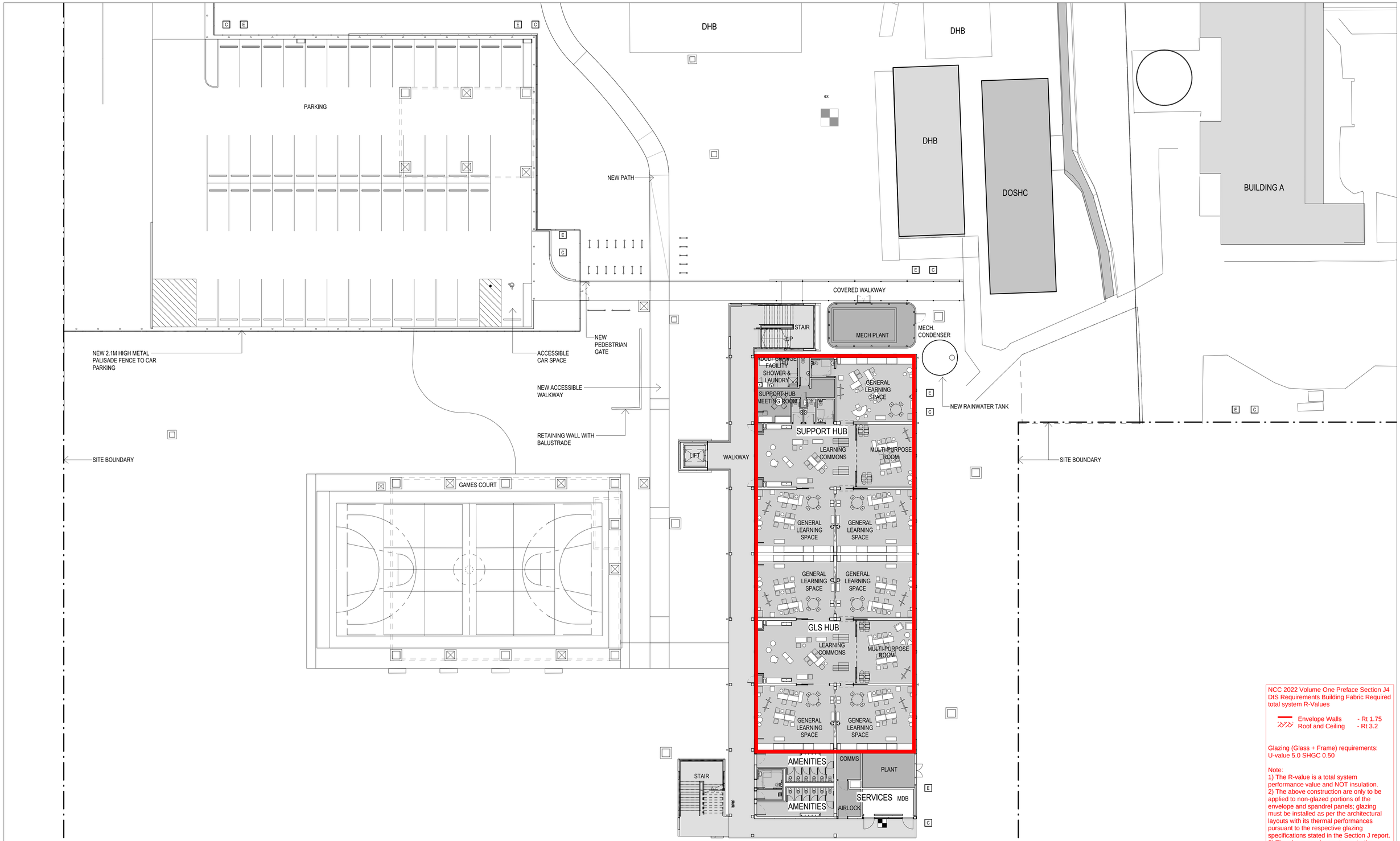
Green Star - Design and As Built v1.3 Requirements						SINSW Approach to achieving Green Star Credits								
Category/Credit	Code	Credit Criteria	Points Available	Aim	Compliance requirements	Consultant(s) Responsible	SINSW SME	SINSW Suggested Points	Targeted Points	Points TBC /Can be Targeted	ESD Comments	EFSG Equivalence	MMC Responsibility	Phase 2 Project Team Comments/status
Management			**14**					**10**	**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	Project Manager		1	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 Sustainability	Sustainability	-	Y		SINSW **Environmental Performance Plan** template available. Design Team to populate **Environmental Performance Plan** and/or **Design Intent Report** with project specific information during Phase 4 - Design Development.	Med	SINSW	
	2.1	Services and Maintainability Review	1.0		Conduct a services and maintainability review during design and prior to construction and develop a 'Service and Maintainability Report'	Project Manager	Commissioning Team	1	1		During Phase 4 - Design Development, Design Team to complete the **Services and Maintainability Review** template demonstrating project specific input from the design team, the facilities manager and operations staff, including evidence that any issues identified have been rectified and that any actions have been incorporated into the design intent report.	High	MFS	
	2.3	Building Systems Tuning	1.0		Commit to a tuning process for all nominated building systems including: ● quarterly adjustments ● measured first 12 months after occupation ● review of manufacture warranties	Head Contractor	Commissioning Team	0	1		May be targeted for additional fees to head contractor.	Low		
	2.4	Independent Commissioning Agent (ICA)	1.0		● Appoint an ICA from schematic design	Project Manager	Commissioning Team	1	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 commissioning agent (ICA). SINSW to provide evidence that: •The ***Commissioning and Temporary Schools Program*** Team has been engaged as the project's commissioning team. •Evidence outlining the purpose, role and responsibilities of the Commissioning and	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.	ESD Consultant	Sustainability	2	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	SINSW Sustainability	Sustainability	1	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 4.1.3. **As per GBCA Response R-14554:** Whole of Government Facilities Management Services (Maintenance) contract in lieu of confidential documents for the operations and maintenance information on the following condition(s): • All nominated building systems are covered within the contract • It is demonstrated there is a process for relevant on-site school staff to access to Whole of Government Facilities Management Services (Maintenance) contractors when needed.	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 Sustainability	Sustainability	1	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 ten years.	AMU		1	1		SINSW has provided a End of Life Waste Performance Letter template for schools. Campus-wide credit	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	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	Head Contractor		1	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	Head Contractor		0	1		Not recommended in the first instance but could be targeted if Head Contractor has "high quality staff support practices" in place. Campus-wide credit	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	Waste consultant	Only one of the pathway can be targeted	1	1		Waste consultant required to prepare and implement an Operational Waste Management Plan (OWMP) for the project.	High	SINSW	
Indoor Environment Quality			**17**					**12**	**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 ASHRAE Standard 62.1:2013 is referenced	Mechanical		1	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	Mechanical		1	1		SINSW have purchase contract in place with FUJIFILM in provide low emission printers and photocopiers to all schools. FAQ-F-00169 and FUJIFILM Low Emission Certificates	High	MFS - Mechanical	

Acoustic Comfort	10.1	Internal Noise Levels	1	Rewards projects that provide appropriate and comfortable acoustic conditions for occupants.	• 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 measurement provided by a qualified acoustic consultant	Acoustic		1	1		Acoustic consultant to ensure compliance with this credit.	High	MFS - Acoustic	
	10.2	Reverberation	1		• Reverberation time below max stated in table 1 of AS/NZS 2107:2016 • Compliance shall be demonstrated through measurement	Acoustic		1	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	Acoustic		1	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 practice	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	Electrical		-	Y		Electrical consultant to ensure compliance with this credit.	High	MFS - Electrical	JHA Electrical: JHA Electrical has reviewed this item and have no specific concerns at this
	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	1		Electrical consultant to ensure compliance with this credit.	High	MFS - Electrical	JHA Electrical: JHA Electrical has reviewed this item and have no specific concerns at this stage. Targeted credit will be incorporated within detailed design.
	11.2	Surface Illuminance	1		Combination of lighting and surfaces improve uniformity of lighting	Electrical		1	1		Requires a plain ceiling to achieve uniform surface reflectance of at least 0.75. Architect to confirm if this credit is to be targeted.	High	MFS - Electrical	JHA Electrical: JHA Electrical has reviewed this item and have no specific concerns at this stage. Targeted credit will be incorporated within detailed design.
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	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	ESD Consultant	Sustainability	1	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 sky • Internal View - A high quality internal view is defined as a view towards an area that is landscaped or contains a water feature, or an atrium	Architect, ESD consultant	Sustainability	1	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 and carpets meet total VOC limits	Architect, Mech, Elec, Hyd, Fire	Sustainability	1	1		All consultants to ensure their specifications comply with credit requirements. Campus-wide credit	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 products meet formaldehyde emission limits	Architect	Sustainability	1	1		All consultants to ensure their specifications comply with credit requirements. Campus-wide credit	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	Mechanical	Sustainability	1	1		ESD consultant to undertake PMV modelling to confirm compliance with this credit during Phase 4 - Design Development.	Med	Main Works - ESD	
Energy			**22**					**5**	**7**	**0**				
Greenhouse Gas Emissions	15A	Conditional Requirement		Encourages energy efficient buildings and the reduction of greenhouse gas (GHG) emissions associated with the use of energy in building operations.	Project teams must demonstrate that the minimum Deemed-to-Satisfy performance requirements stipulated within Part J1 of the	ESD	Sustainability	-				High		
	15A	Prescriptive Pathway	10		Comply with prescriptive requirements for; • Building Envelope • Wall-Glazing Construction • Lighting • Ventilation and Air Conditioning • Domestic Hot Water • Transition Plan • Fuel Switching • On-site Storage • Vertical Transportation	ESD, Architect, Mechanical, Electrical	Sustainability	-			**Project will undertake 15E**	High		
	15E.0	Conditional Requirement: Reference Building Pathway	Mandatory for this Credit and Certification		Projects targeting: • 4 Star - Proposed building must achieve 10% improvement on NCC Section J reference building. Equivalent to GBCA Benchmark Building • 5 Star - Minimum points threshold = 3 points • 6 Star - Minimum points threshold = 6 points	ESD	Sustainability	-	Y		ESD consultant to undertake energy modelling to confirm compliance with this credit during Phase 4 - Design Development, without including renewable energy generation in the calculation. All services consultant to provide at least 10% improvement in energy efficiency compared to the minimum requirements in NCC Section	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.	ESD, Architect, Mechanical, Electrical	Sustainability	4	5		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 electricity demand by at least 15%	ESD, Electrical	Sustainability	-	1		Size of the buildings and limit of 100kW may limit some projects being able to achieve.	Med	MFS & Main works	JHA Electrical: Based on ESFG DG66, a 70 kW solar PV system will need to be installed for
	16B	Performance Pathway - Reference Building	2.0		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	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 furthe
Transport			**10**					**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.	Architect	Sustainable Transport Technical Advisor	10	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 transport modes to promote during construction and post-occupancy; • 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. Documentation Requirements: Please provide the following in your submission:	High	Main Works - Transport	
Water			**12**					**5**	**5**	**0**				
Potable Water	18B	Prescriptive Pathway	1		18B.1 Sanitary Fixture Efficiency	Architect	Sustainability	-	1		Architect to ensure compliance with this credit. All fixtures must be within one star of highest WELS rating available.	High	MFS	
			1		18B.2 Rainwater Reuse	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
			2		18B.3 Heat Rejection	Mechanical Engineer	Sustainability	-	2		Mechanical consultant to confirm compliance with this credit.	Med	MFS	
			1		18B.4 Landscape Irrigation	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 following in your submission: • Datasheets, technical specifications or similar evidence detailing the performance and features of the proposed water irrigation system for ovals, sport field and sport courts. • A description justifying how the proposed system is better than a standard practice landscape irrigation system that would typically be used on ovals, sports fields and sport courts. • A copy of this response.	Med	Mainworks	
Materials			**18**					**2**	**6**	**0**				
Life Cycle Impacts	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 hold either FSG or PEFC certification. Points awarded based on % included	Architect, Structural		0	1			Low	MFS	Achievable, however structural Timber would be an unlikley material to be used as the structure frame
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.	Architect, Structural		0	1		Procurement from Australian Steel manufacturers will meet this requirement.	Low	MFS	
	20.2	Timber Products	1		95% (by cost) of all timber used is certified or reused	Architect, Structural		1	1		Compliant timber with chain of custody code may be difficult/costly to source. Hence not recommended but point could be targeted.	High	MFS	This is achievable - to be Non-structural timber products to be specified by architect to meet Green Star
	20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1		Requires that only sustainably produced PVC is used	Architect, Structural, Electrical, Hydraulic, Mechanical		0	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	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 requirements. Points awarded based on % of compliant product used.	Architect, Services	Sustainability	0	1		Confirmed targeting 1 point Campus-wide credit	Low	MFS	
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 with *Green Star Construction and Demolition Waste Reporting Criteria*	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 10kg/m^2 of GFA goes to landfill	Head Contractor		1	1		Head Contractor to ensure compliance with this credit. Campus-wide credit	High	MFS	
Land Use & Ecology			**6**					**3**	**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	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	SINSW Sustainability	Project Director	1	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
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	Architect		1	1		Architect to ensure compliance with this credit. Campus-wide credit	Med	MFS	
Emissions			**5**					**4**	**4**	**0**				
	26.1	Stormwater Peak Discharge	1		Post-development peak average recurrence interval (ARI) event discharge from site does not exceed pre-development	Hydrologist		1	1		Civil consultant to ensure compliance with this credit. Campus-wide credit	Med	MFS & Main works	Requirement in Section 2.3.2 of the 2016 DCP requires that post-development peak

Stormwater	26.2	Stormwater Pollution Targets	1	Rewards projects that minimise peak storm water outflows from the site and reduce pollutants entering the public sewer infrastructure or other water bodies.	Additional point awarded for stormwater site discharge to meet GBCA pollution reduction targets	Hydrologist		1	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	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			1	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	Mechanical Engineer		1	1		Mechanical has confirmed they are targetting	High	MFS	
Innovation			**17**					**10**	**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 the world	Up to two (2) points may be awarded for installing on-site renewable energy sources. Partial points available - 1 point is 15% and 2 is 30%	Electrical		1	1		Refer Calculation Guide, maximum 2 points available for 30% renewable Energy Contribution	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.			1	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.	Architect		1	1		Projects within the Schools Infrastructure NSW v1.3 Umbrella (GS-6039DA) may target one (1) point under Innovation Challenge-Community Benefits, using the Schools Infrastructure policy 'Community Use of School Facilities' and the 'Share Our Spaces' program guide in lieu of a Needs Analysis Report. Campus-wide credit	High	SINSW	
	30D	Financial Transparency	1.0	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 comprehensively itemises design, construction,				1			Med	MFS	
	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.	Architect		1	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	Requires an analysis of community health needs and to address those needs through implementation of adequate strategies	School Principal		1	1		Projects within the Schools Infrastructure NSW v1.3 Umbrella (GS-6039P) may target one (1) point under Innovation Challenge-Integrating Healthy	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	Project Manager Architect Head Contractor		1	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 Challenge as per F-00101. Campus-wide credit	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			1	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	
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.			1	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 Communications Strategy. Campus-wide credit	High	SINSW	Subject to constraints of
	30E	Design for Safety [GSC 15.1]	1	Recognises projects that take into consideration designing out crime principles.	Requires incorporation of CPTED principles			1	1		TQ yet to be submitted by SINSW Sustainability confirming requirements	High	MFS	

APPENDIX C – ESD MARK-UP



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 0.50

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.: 220270
DOCUMENT TITLE: REF
DOCUMENT REV: J
DOCUMENT BY: JB DATE: 17/01/2025

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AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	05/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUE FOR REF

NSW GOVERNMENT

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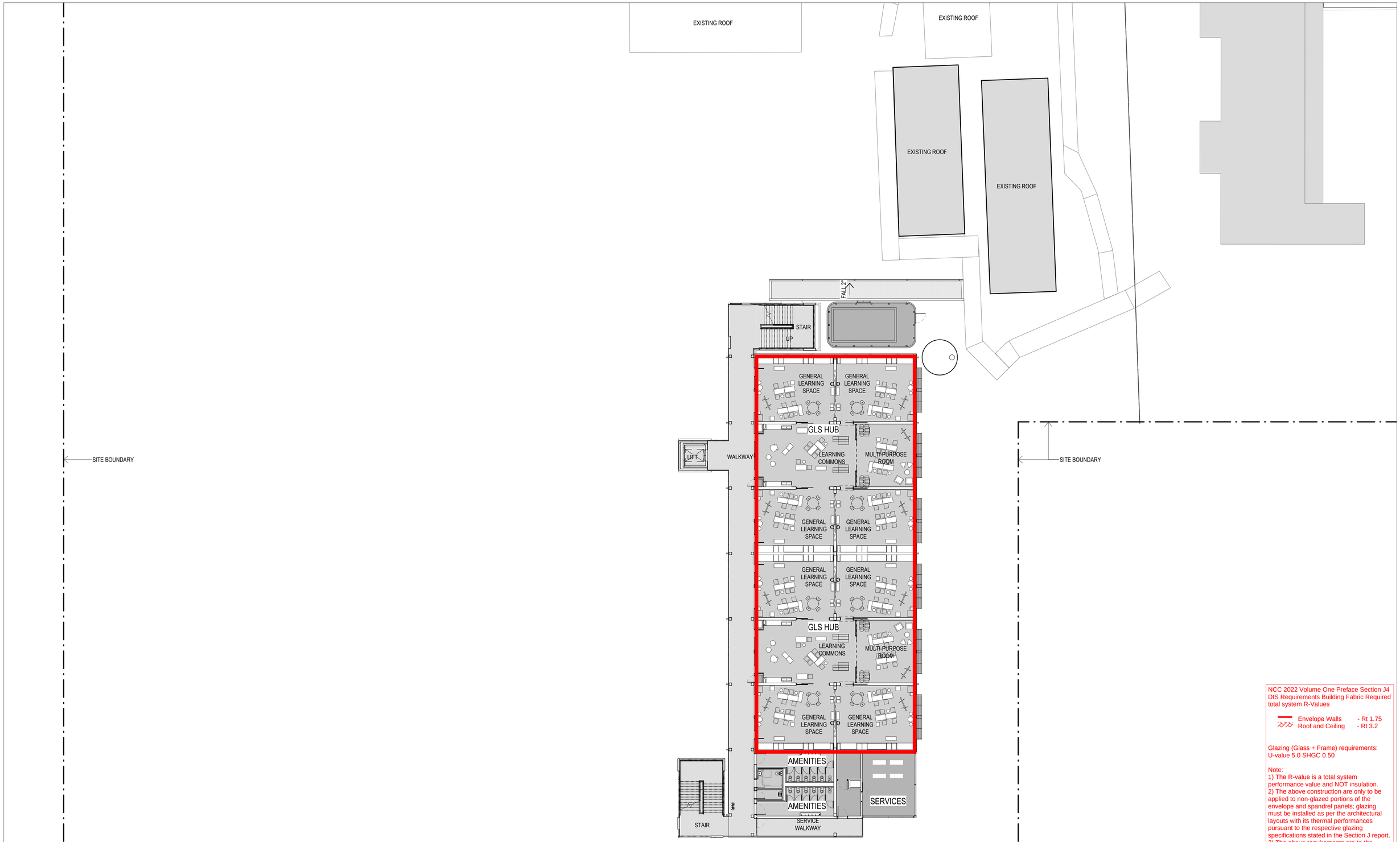
205 Edmondson Ave, Austral NSW 2179
DRAWING NAME
SITE PLAN - GROUND FLOOR COMPOSITE PLANS - SHEET 02

PROJECT NORTH

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

PROJECT NUMBER: 3320
ISSUE DATE: 16 JANUARY 2025
DRAWING NUMBER: APS-PA-00-GF-DR-A-REF_102
REVISION: B



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

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Note:
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DOCUMENT No.: 220270
DOCUMENT TITLE: REF
DOCUMENT REV: J
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AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	05/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUE FOR REF

Admin & Staff
Amenities
Circulation
Existing
GLS & Homebase
Library
Specialties
Storage & Services

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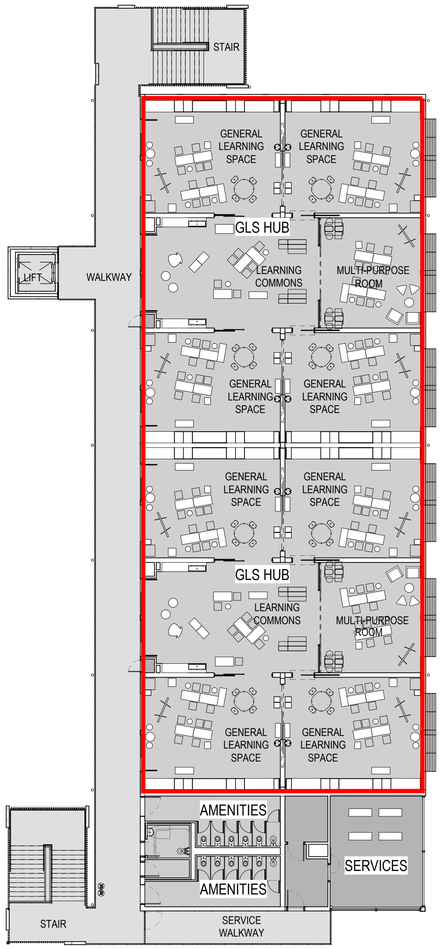
205 Edmondson Ave, Austral NSW 2179

DRAWING NAME
SITE PLAN - LEVEL 1 COMPOSITE PLANS - SHEET 02

PROJECT NORTH
NORTH

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

PROJECT NUMBER: 3320
ISSUE DATE: 16 JANUARY 2025
DRAWING NUMBER: APS-PA-00-L1-DR-A-REF_104
REVISION: B



EXISTING ROOF

EXISTING ROOF

EXISTING ROOF

SITE BOUNDARY

SITE BOUNDARY

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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 0.50

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.
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REV	BY	DATE	DESCRIPTION
A	CP	05/12/2024	ISSUE FOR REF
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AUSTRAL PUBLIC SCHOOL UPGRADE
205 Edmondson Ave, Austral NSW 2179
DRAWING NAME
SITE PLAN - LEVEL 2 COMPOSITE PLANS - SHEET 02

PROJECT NORTH
NORTH

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

PROJECT NUMBER	ISSUE DATE
3320	16 JANUARY 2025
DRAWING NUMBER	REVISION
APS-PA-00-L2-DR-A-REF_106	B

APPENDIX D – CLIMATE CHANGE RISK & ADAPTATION ASSESSMENT

f

Climate Change Risk & Adaptation Assessment

Austral 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	220270
Project Name	Austral Public School
Description	Climate Change Risk & Adaptation Assessment
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Prepared By

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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 upgrade to Austral Public School 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

Austral 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 Austral is taken from the closest weather station data available from the BOM. The closest weather station is Badgery Creek AWS, which is approx. 8.5 km West of Austral.

Monthly Climate Statistics for 'Badgery Creek AWS'

- **Site name:** Badgery 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

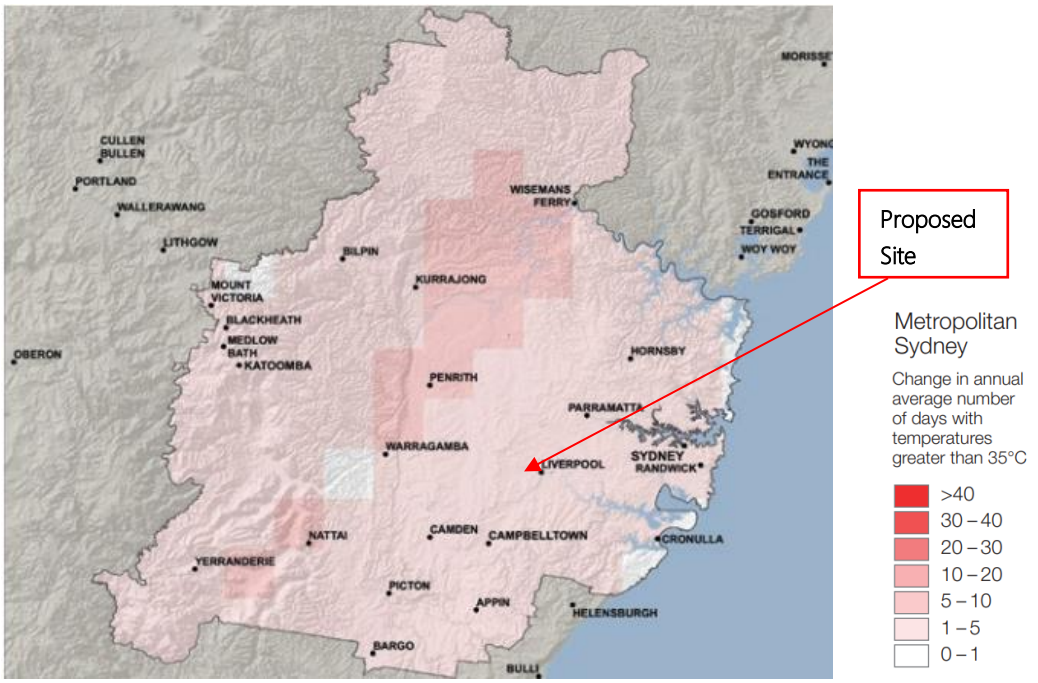
Red = highest value & Blue = lowest value

2.2 EXISTING CLIMATE CONDITONS AND PROJECTIONS

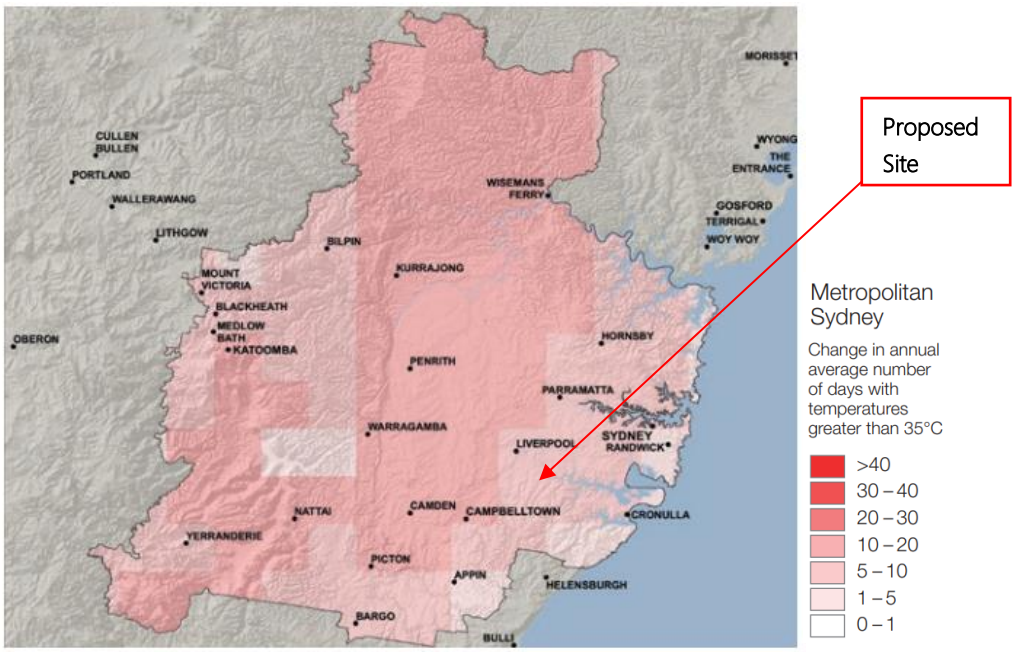
Extreme events that have impacted a site in the past help project possible extreme events that will impact the site in the future. The identification of past extreme events will help highlight the climate risks which needs to be taken into consideration for this risk assessment.

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

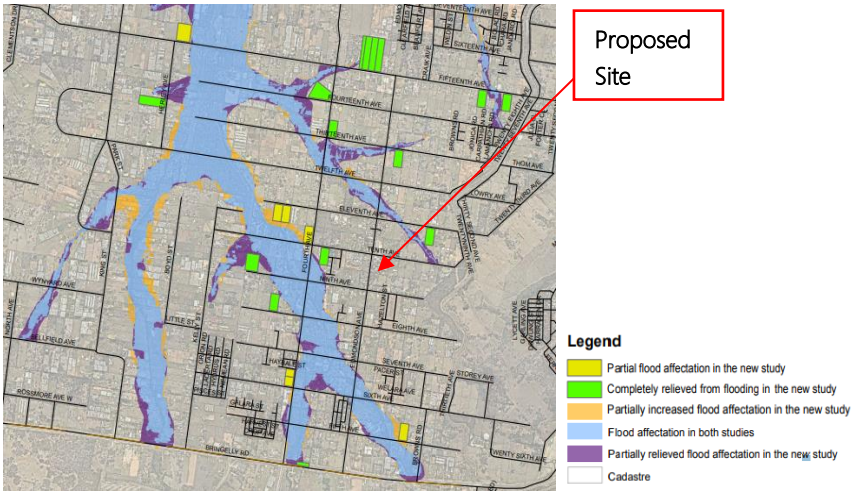


Far future (2060-2079) projected changes in the number of days per year with maximum temperatures above 35°C

- Bushfire – Austral is designated as part of a bush fire prone land according to NSW Rural Fire Services and the site is located within a Vegetation Buffer Zone. Sydney area had been subjected to recent extreme bushfire activity, hence this extreme should not be taken lightly. It is expected that Sydney will experience an increase in average and severe fire weather in the near future and far future.
  [Source: NSW Government]

- Rainfall- The Sydney region currently experience great rainfall variability; these variabilities affect climate variables such as floods and droughts. Specifically in the near future there is expected to be a 1.71% increase in annual rainfall period and in the far future an increase of 9.90%. [Source: NARCLiM]

- Floods – The Austral-Kemp 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 floodmap below show the extent of flood of a 1% AEP (annual expectancy period).
  [Source: City of Liverpool]



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 flooding.

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.

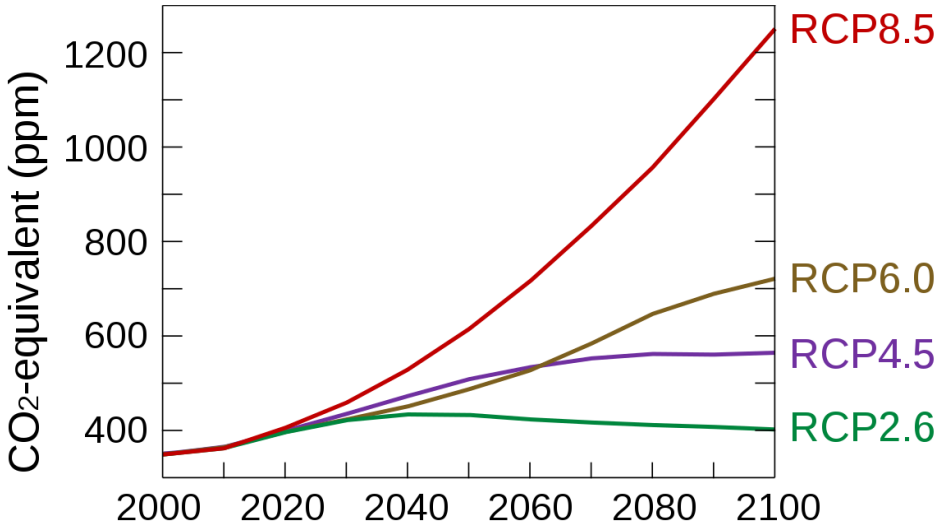
The sub-cluster area has a predominantly sub-tropical climate, with regional variations such as some temperate influences in the south.

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

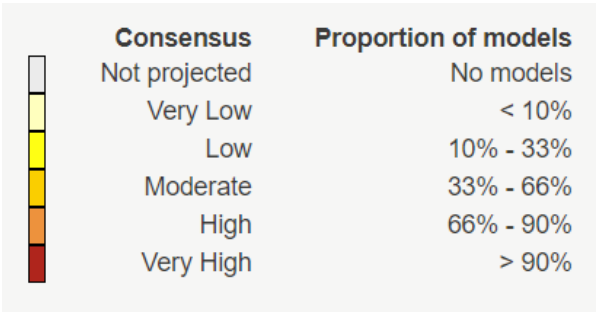
Based on the project's characteristics, the climate variables of interest for this site are:

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

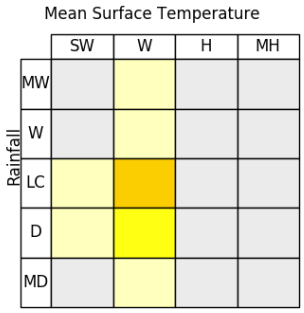
The series of climate futures matrices representing the combination of time periods and greenhouse gas scenarios and classified by the combined changes of the climate variables identified above are provided in table below. All climate future matrices are sourced from CSIRO and Bureau of Meteorology,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



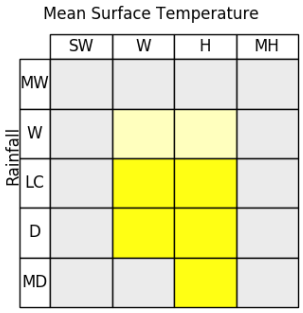
Colour legend of climate future projection consensus levels

3.5.1 ANNUAL AVERAGE TEMPERATURE AND RAINFALL MATRICES (BUSHFIRES)

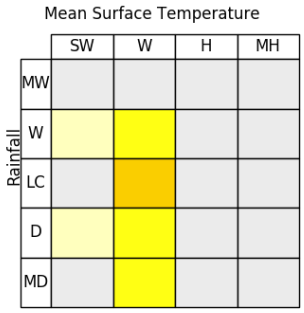
2030 RCP 4.5



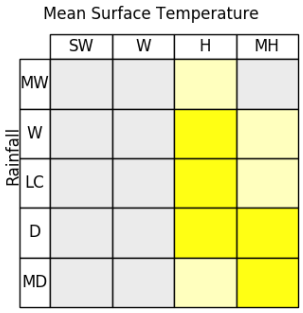
2070 RCP 4.5



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

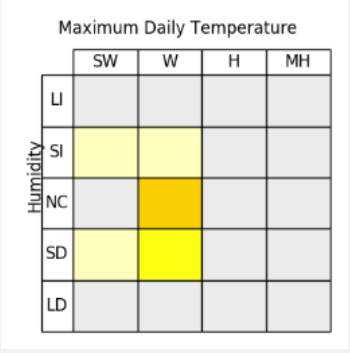
Rainfall

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

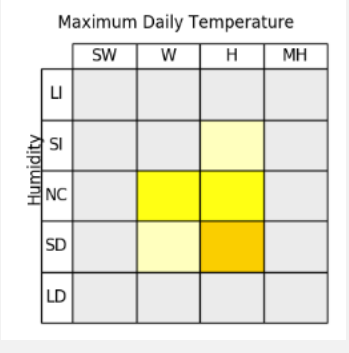
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Slightly warmer and little change in rainfall (Consensus: Very low)	Slightly warmer and wetter (Consensus: Very low)	Warmer and wetter (Consensus: Very low)	Hotter and much wetter (Consensus: Very Low)
"Worst"	Warmer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

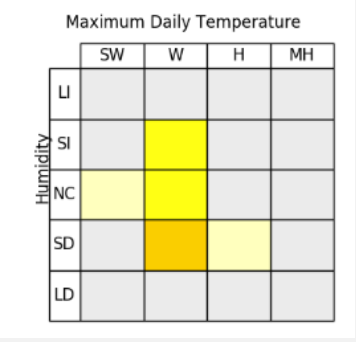
2030 RCP 4.5



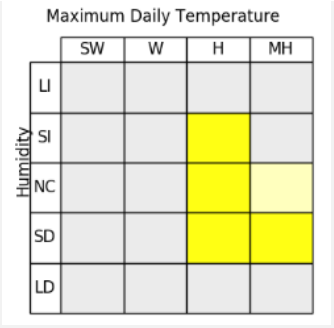
2070 RCP 4.5



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

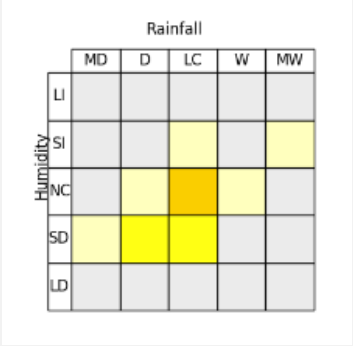
Humidity

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

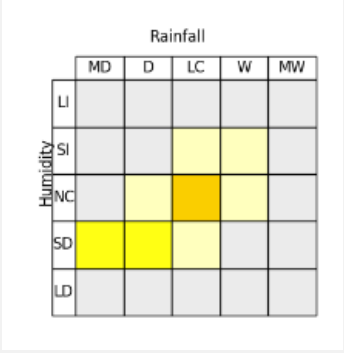
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Slightly warmer and small increase in humidity (Consensus: Very low)	Slightly warmer and no change in humidity (Consensus: Very low)	Warmer and no change in humidity (Consensus: Low)	Hotter and small increase in humidity (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)

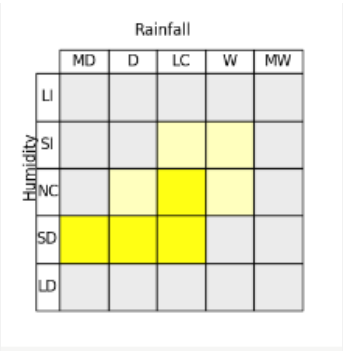
2030 RCP 4.5



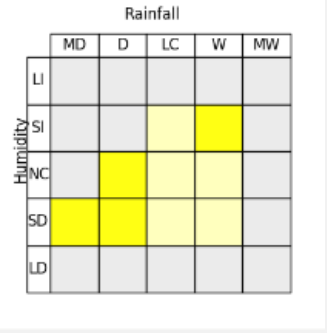
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



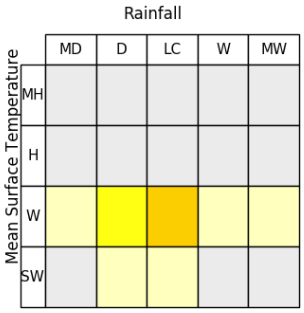
Keys

Rainfall			Humidity		
MW	Much Wetter	> 15.00	LI	Large Increase	> 10.00
W	Wetter	5.00 to 15.00	SI	Small Increase	1.00 to 10.00
LC	Little Change	-5.00 to 5.00	NC	No Change	-1.00 to 1.00
D	Drier	-15.00 to -5.00	SD	Small Decrease	-10.00 to -1.00
MD	Much Drier	< -15.00	LD	Large Decrease	< -10.00

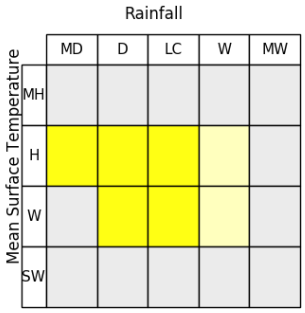
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Much wetter and small increase in humidity (Consensus: Very low)	Wetter and small increase in humidity (Consensus: Very low)	Wetter and small increase in humidity (Consensus: Very low)	Wetter and small increase in 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)

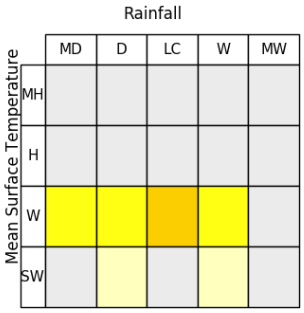
2030 RCP 4.5



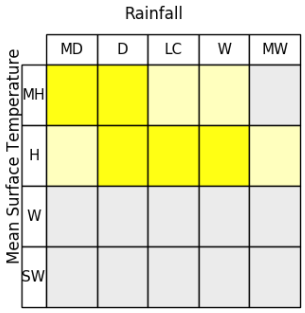
2070 RCP 4.5



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

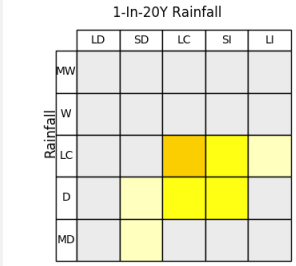
Mean Surface Temperature

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

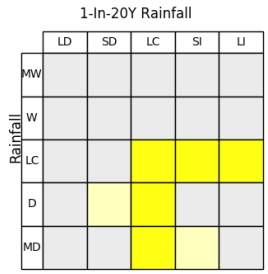
Case	2030 Climate Future		2070 Climate Future	
	RCP 4.5	RCP 8.5	RCP 4.5	RCP 8.5
"Best"	Much drier and warmer (Consensus: Very low)	Drier and slightly warmer (Consensus: Very low)	Much dryer and hotter (Consensus: Low)	Much dryer and much hotter (Consensus: Low)
"Worst"	Much wetter and warmer (Consensus: 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)

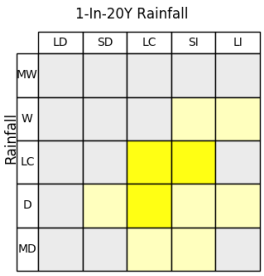
2030 RCP 4.5



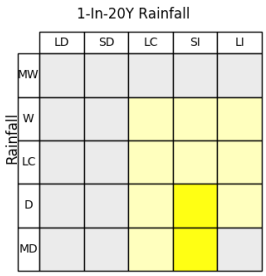
2070 RCP 4.5



2030 RCP 8.5



2070 RCP 8.5



Keys

1-In-20Y Rainfall		
LD	Large Decrease	< -30.00
SD	Small Decrease	-30.00 to -10.00
LC	Little Change	-10.00 to 10.00
SI	Small Increase	10.00 to 30.00
LI	Large Increase	> 30.00

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"	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	Possible	High	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	Possible	Extreme	Catastrophic	Possible	Extreme	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	Minor	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.	Minor	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 during extreme heatwaves	Minor	Unlikely	Low	Minor	Likely	Medium	Mechanical	When replacing HVAC units at the end of service life, consider upsizing capacity of units in line with change in climatic conditions.	Minor	Rare	Low	Minor	Unlikely	Low

		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	Low	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 design to take possible storm into consider and have better structural which could be capable to tolerate in extreme case.	Moderate	Rare	Low	Moderate	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 four high risks for the proposed development by 2070, and a single extreme risk was identified by 2030 and 2070 (Zero high and extreme risk by 2030). The responses to high risks are summarised as follows.

1. Increase in fire weather days can increase the chance of fire activity, as the site is located within a bushfire prone area, bushfire damage to the building and surrounds needs to be considered as a possibility. The development should incorporate the principals of removing and potential fuel sources surrounding the building and maximise usage on non-combustible materials for construction. Additionally, the follow items will also be incorporated to help address this risk:
    a. A detailed Bush Fire Emergency Management and Evacuation Plan will be completed prior to occupation of proposed buildings.
    b. A management plan is to be prepared that describes the maintenance measures required to maintain the APZ (Asset protection zone) to IPA (Inner Protection Area) standards.
    c. The site has direct access to public roads, and access and egress for emergency vehicles and evacuation is adequate.
    d. Defendable space is provided for on all sides of the existing and proposed buildings.
    e. Proposed buildings to be constructed to BAL-12.5 in compliance with AS3959:2018
2. 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.
3. 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.
4. 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	14	7
Medium	7	9	2	9
High	0	4	0	0
Extreme	1	1	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 upgrade to Austral 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.

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17 January 2025

Carmichael Tompkins Property Group

Suite 9.03, Level 9 Aurora Place

88 Philip Street, Sydney NSW 2000

Attention: Rocco Bombardiere

Dear Rocco,

RE: National Construction Code (NCC) 2022 Volume One Section J Part J4 Statement of Compliance

JOB NO.: 220270

REVISION NO.: D

SUBJECT PREMISE: Upgrade to Austral Public School Learning Hub | 205 Edmondson Ave, Austral NSW 2179

This Part J4 Statement of Compliance has been prepared to support a Review of Environmental Factors (REF) for the Department of Education (DoE) for the upgrade of Austral 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 the upgrades to the existing APS at 205 Edmondson Avenue, Austral, NSW, 2179 (the site).

The purpose of this NCC Section J Part J4 statement is to demonstrate design compliance for the new development of Austral Public School Learning Hub located at 205 Edmondson Ave, Austral NSW 2179.

Site Description

The proposed development is located in climate Zone 6 as defined by the NCC 2022 Building Code of Australia – Volume One.

APS is located at 205 Edmondson Avenue, Austral on the south-eastern corner of the intersection between Edmondson Avenue and Tenth Avenue. The site has an area of 2.986 ha and comprises of 6 allotments, legally described as:

- Lot 1 DP 398105
- Lot 1 DP 398106
- Lot 1 DP 509613
- Lot 1 DP 512119
- Lot 2 DP 509613
- Lot 865 DP2475

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

- 8 permanent buildings;
- 14 demountable structures;
- interconnected paths;
- covered walkways;
- play areas: and
- at-grade parking.

The Austral Community Pre-school is also located within the site.

The existing buildings are clustered in the northern part of the site, ranging between 1 to 2 storeys in height. There is a sports oval in the south-eastern portion of the site, and a densely vegetated informal play area located in the south-western portion of the site.

Figure 1 Aerial image of site (source: NearMap, taken 7 Sept 2023)

Proposed Activity Description

The proposed activity involves alterations and additions to the existing APS, including the following:

- Demolition of existing structures and removal of trees, as well as other site preparation works;
- The erection of a new 3-storey building comprising teaching spaces that includes 20 permanent teaching spaces and 3 support teaching spaces;
- Conversion of the first floor of Building B from a Library to staff annex (staff room) and minor modifications on the ground floor;
- Refurbishment and change of school function of Building I from classrooms to a Library;
- At-grade parking (57 new spaces, including 1 accessible space);
- New driveway and access gate from Edmondson Road;
- Erection of a substation within the site on the northern boundary;
- Upgrade of the sports field;
- Internal pathways, fencing, utility upgrades and associated works; and

- Off-site public domain improvements including retention and upgrading of the Kiss & Drop area and a temporary pedestrian road crossing on Tenth Avenue.

The intent of the activity is to allow for upgrades to APS that will provide a CORE 35 primary school compliant with the EFSG. The works will increase the capacity of the school from 681 students and 40 FTE teachers to 734 students and 64 FTE teachers, respectively. Furthermore, provision within the expanded 734 student capacity will be made for the creation of 30 support class students places.

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

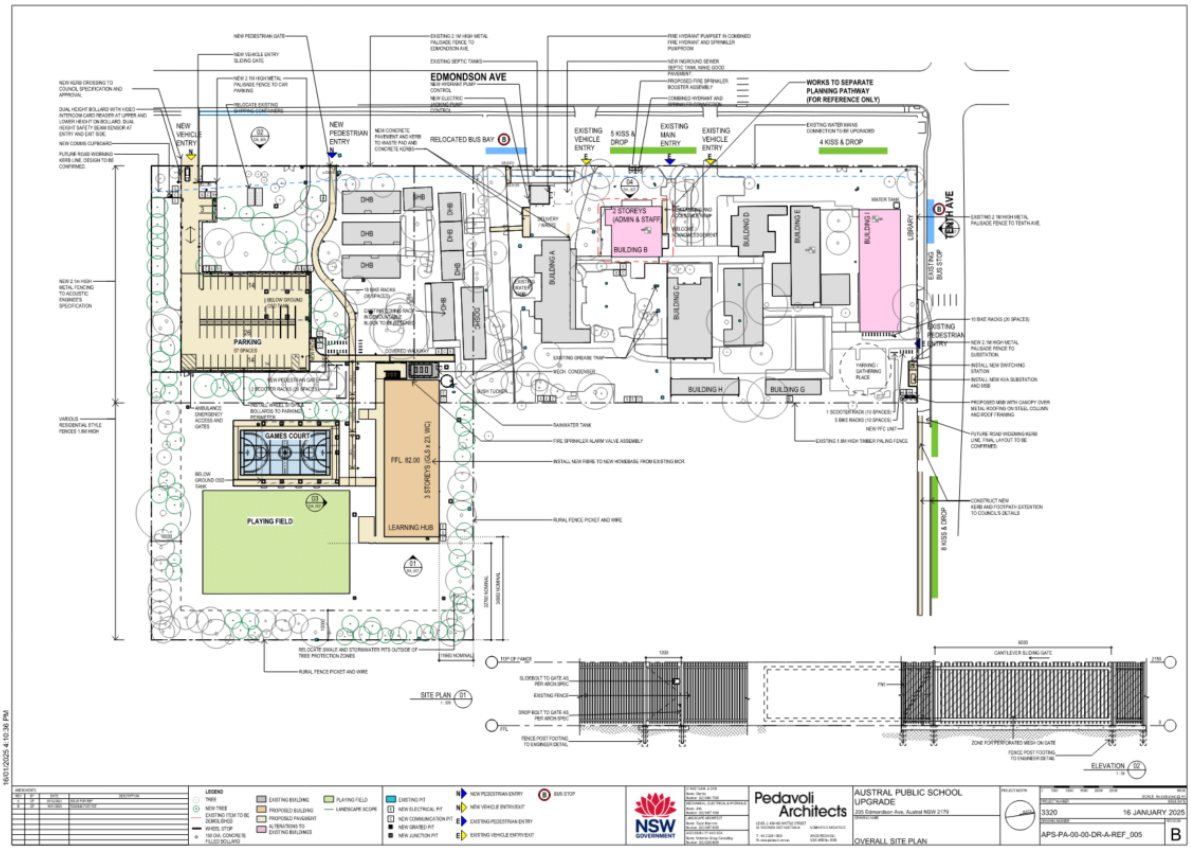


Figure 2 Proposed Site Plan (Source: Pedavoli Architects, Overall Site Plan (Rev B)

In accordance with A2G1, compliance with the NCC is achieved by complying with the Governing Requirements of the NCC and the Performance Requirements. The Performance Requirements are satisfied by Performance Solution, Deemed-to-Satisfy Solution or a combination of both.

The table below shows the areas assessed, NCC 2022 Building Classification the Performance Requirements, the Method of Compliance, and the DTS Provisions subjected to Performance Solution.

Building Area Description	NCC Classification	Performance Requirements	Method of Compliance	DTS Provisions subjected to Performance Solution
Learning Hub	9b	JP1	J1V3	J1.3 – J1.6

Compliance with Performance Requirement JP1 will be achieved subject to this report and compliance with J4D3 (1-5), J3, J5, J6, J7, J8 & J9 being met by the relevant designers / contractors.

The assessment is based on the architectural drawings listed below.

Architectural Drawings Pedavoli Architects
Project no.
Issued 16/01/2025

Building	Title	Drawing No	Revision
Austral Public School- Learning Hub	Site Plan - Ground Floor Composite Plans - Sheet 02	APS-PA-00-GF-DR-A-REF_102	B
	Site Plan - Level 1 Composite Plans - Sheet 02	APS-PA-00-L1-DR-A-REF_104	B
	Site Plan - Level 2 Composite Plans - Sheet 02	APS-PA-00-L1-DR-A-REF_106	B
	Elevations - Sheet 01	APS-PA-00-ZZ-DR-A-REF_111	B
	Elevations - Sheet 02	APS-PA-00-ZZ-DR-A-REF_112	B
	Composite Sections - Sheet 01	APS-PA-00-ZZ-DR-A-REF_121	B
	Composite Sections - Sheet 02	APS-PA-00-ZZ-DR-A-REF_122	B

A JV Verification Method can be used to show compliance in areas where the proposed building fabric is not complying with the minimum DTS requirements.

The J1V3 energy modelling simulation results were obtained using energy modelling software, IESVE. The results demonstrating design compliance are attached in Attachment A for J1V3 (1)(a)(ii) and Attachment B for J1V3 (1)(b).

As per J1V3 Verification Method Provisions of **NCC 2022 Volume One**, design compliance with Part J4 can be met subject to the following specifications:

Part J4 Building Fabric

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

Elements	Total Construction R-value	Notes
Roof/Exposed Ceiling Envelope	RT3.2 (Downwards, SA < 0.45)	1. It is a total system performance value and **NOT** the insulation. 2. The impact of **Thermal Bridging** must be included in the building envelope total system R-value calculations. 3. 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. 4. The R-value requirements are to the proposed **NEW WORK** only. Existing building fabric does not need to be upgraded.
Envelope Walls	RT1.75	
Envelope Floors	Nil	

Note: Mark-ups of above construction thermal requirements are attached in Attachment C.

Required **Total System U-value** and **SHGC**.

Location/Type	Window Assembly (Glass & Frame)		Description
	U-value	SHGC	
All	5.0	0.58	Single Glazed Low E Clear or the like

MITIGATION MEASURES

Not applicable for this Statement

Additional Section J Compliance Notes

Note project needs to adhere to the following NCC 2022 Section J construction requirements as applicable:

- *J4D3 (1-4) Thermal Construction – general* installation requirements for insulations
- *J4D3 (5)* The required total R-value and total system U-value, including thermal bridging calculation.

JHA recommend the following general construction requirements from Section J of the NCC 2022 be included in the architectural specification and drawings to ensure compliance.

- *Part J5 – Building Sealing*
  - *J5D3 Chimneys and flues*
  - *J5D4 Roof lights*
  - *J5D5 Windows and doors*
  - *J5D6 Exhaust fans*
  - *J5D7 Construction of ceilings, walls and floors*
  - *J5D8 Evaporative coolers*

Full Name of Designer:	Jasmin Bayocot
Qualifications:	BSCE
Address of Designer:	JHA Level 20, 2 Market Street SYDNEY NSW 2000
Business Telephone No:	(02) 9437 1000
Name of Employer:	JHA

Yours sincerely,

Jonatha. Saw

Sustainability Engineer

Disclaimer

This statement 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.

Revision History

REV	DATE	Amendment
P1	09/02/24	Draft DA report
P2	12/02/24	95% Schematic Design
P3	26/02/24	Final Draft DA
P4	12/03/2024	Final DA
A	30/04/2024	SD
B	31/05/2024	30% DD
C	05/12/2024	REF

Attachment A – J1V3 (1)(a)(ii) Modelling Results:

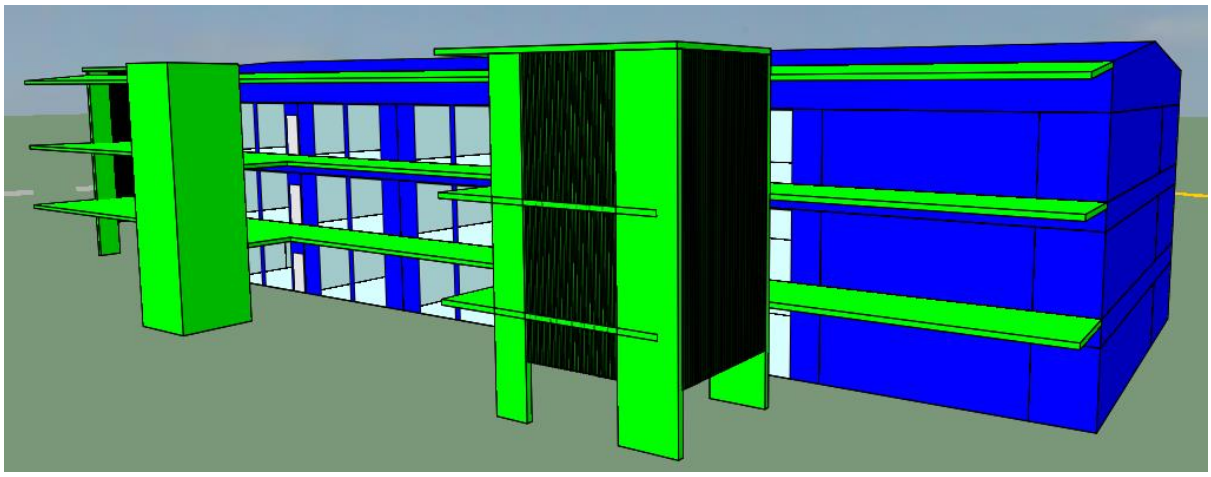
Thermal modelling was undertaken to demonstrate Building Fabric compliance with the Performance Requirement for JP1 of Section J, NCC 2022, Volume One. Energy simulation was conducted in accordance with NCC 2022, Volume One J1V3 requirements, including *Specification 33 Additional requirements*, *Specification 34 Modelling parameters for J1V3* & *Specification 35 Modelling profiles for J1V3*.

For a Class 3, 5, 6, 7, 8 or 9 building or common area of a Class 2 building, compliance with J1P1 is verified when it is determined that the annual greenhouse gas emissions of the proposed building are not more than the annual greenhouse gas emissions of a reference building.

Results

Building	Modelled Items	Calculated Annual Greenhouse Gas Emission [$kgCO_2$-e/m2.annum]
Austral Public School- Learning Hub	Reference Building	57
	Proposed Building J1V3(1)(a)(ii)	56

The Annual Greenhouse Gas Emission of the Proposed Building is less than Annual Greenhouse Gas Emission of Reference Building. Therefore, the proposed Building Fabric including Glazing is compliant with Section JP1 requirements.



IES Energy Simulation Model of the Proposed Building

Model Inputs

Building Fabric Total R-Value.

Building Fabric Parameter Summary		
Elements	DTS Reference Building	Proposed Building
Envelope Roof	RT3.2 (SA < 0.45)	RT3.2
Envelope Walls	RT1.4	RT1.75
Envelope Floors	RT2.0	Nil

Building Fabric Total System (Glass & Frame) U-Value and SHGC.

Window Assembly (Glass & Frame)				
Location/Type	DTS Reference Building		Proposed Building	
	U-Value	SHGC	U-Value	SHGC
All	5.3	0.30	5.0	0.58

Modelling Results

Energy Use		DTS Reference Building	Proposed Building
		Electricity [MWhr]	Electricity [MWhr]
Space Heating		2.49	3.81
Space Cooling		94.75	91.40
Heat Rejection		21.86	21.09
Interior Central Fans		3.48	3.48
Pumps		3.48	3.48
Interior Lighting		21.15	21.15
Total [GJ/annum]		529.98	519.90
Greenhouse Gas Emissions factor	NSW	256	256
Greenhouse Gas Emission [tCO_2-e/annum]		135675.1	133095.2
Total Conditioned Areas [m2]		2384.4	
Greenhouse Gas Emission [$kgCO_2$-e/m2.annum]		56.90	55.82

Attachment B – J1V3 (1)(b) PMV Modelling Results

For NCC 2022, J1V3 additionally requires that the proposed building achieve a thermal comfort level of between a Predicted Mean Vote (PMV) of -1 to +1 is across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building.

PMV Model Inputs

Space Operative Temperature Set Points and Comfort Parameters

Parameters	Values	Description
Operative Temperature (ºC)	21 – 24	As per NCC 2022 Specification 34
Clothing Level (CLO)	0.67 – 0.97	Light Clothing (Summer) & Warm Clothing (Winter)
Activity Level (MET)	1.1	Seated, reading, relaxed
Nominal Air Velocity (m/s)	0.15	As per ASHRAE Standard 55-2017
Infiltration (ACH)	0.70 when AC plant is not operating, 0.35 at all other times	As per NCC 2022 Specification 34

Internal Heat Gains

Locations	Lighting [W/m^2]	Internal Sensible [W/m^2]	Heat Gains per Person	
			Sensible	Latent
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
Multi-purpose	4.5	5	75 W	55 W
Learning Commons	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
Withdrawal	4.5	5	75 W	55 W
Learning Commons	4.5	5	75 W	55 W
Toilet	4.5	5	75 W	55 W
Acc Toilet	4.5	5	75 W	55 W
AMB. WC	4.5	5	75 W	55 W
AMB. WC	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
Multi-purpose	4.5	5	75 W	55 W
Learning Commons	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W

General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
Multi-Purpose	4.5	5	75 W	55 W
Learning Commons	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
Multi-purpose	4.5	5	75 W	55 W
Learning Commons	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W
Multi-Purpose	4.5	5	75 W	55 W
Learning Commons	4.5	5	75 W	55 W
General Learning Space	4.5	5	75 W	55 W

Note:

- *All comfort parameters in accordance with "ASHRAE Standard 55-2017".*
- *Modelling profiles are as per NCC 2022 Specification 35.*

PMV Modelling Results

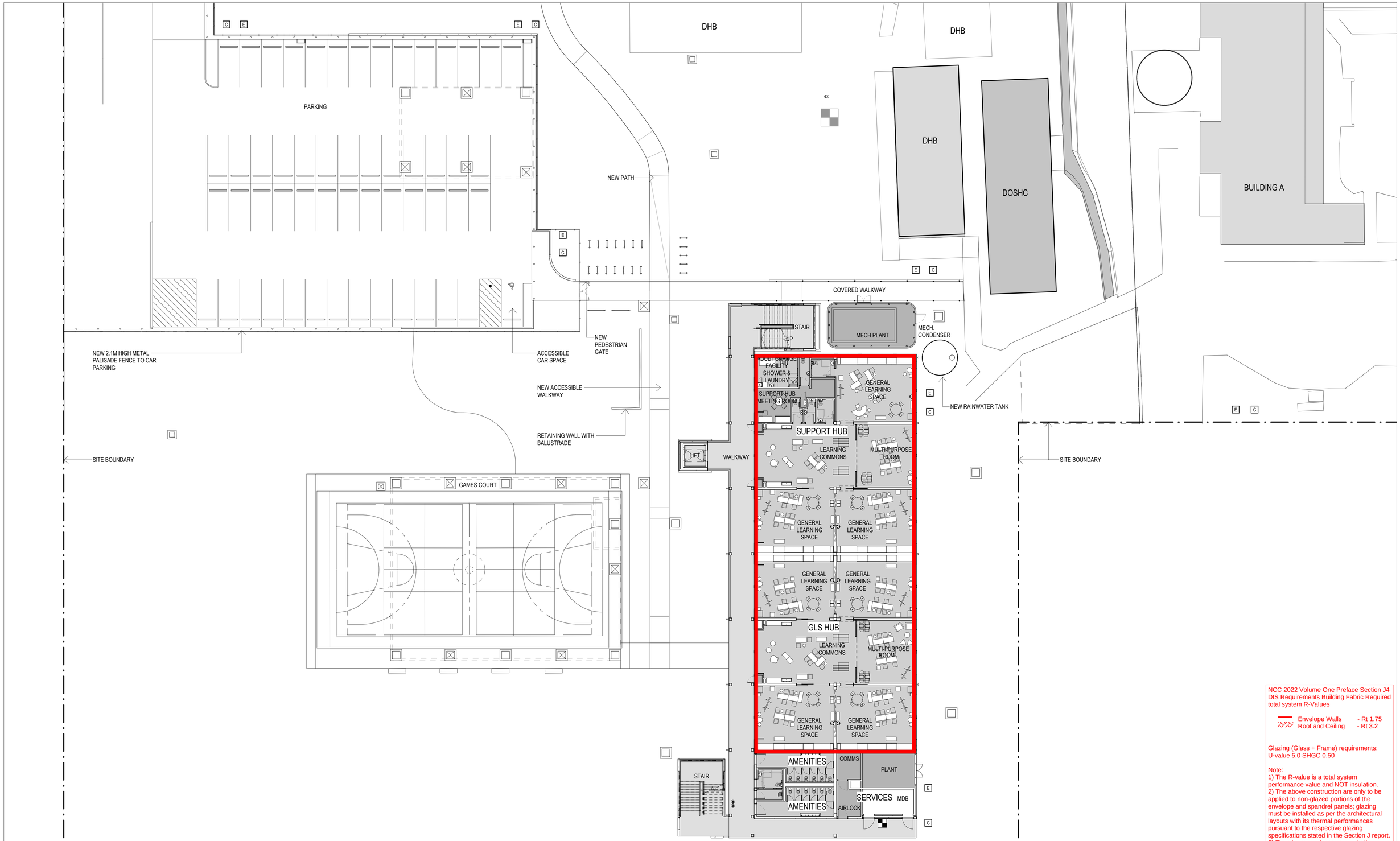
Locations	Area (m2)	PMV (% hours in range)			Meets J1V3 (1)(b) criteria	Compliant Areas (m2)
		<-1.0	≥-1.0 & ≤1.0	> 1.0		
GF_General Learning Space	67.5	0	100	0	Y	67.5
GF_General Learning Space	67.5	0	100	0	Y	67.5
GF_Multi-purpose	28.9	0	100	0	Y	28.9
GF_Learning Commons	104.2	0	100	0	Y	104.2
GF_General Learning Space	68	0	100	0	Y	68
GF_General Learning Space	68	0	100	0	Y	68
GF_General Learning Space	68.4	0	100	0	Y	68.4
GF_General Learning Space	68.4	0	100	0	Y	68.4
GF_General Learning Space	68.9	0	100	0	Y	68.9
GF_Withdrawal	28.7	0	100	0	Y	28.7
GF_Learning Commons	103.6	0	100	0	Y	103.6
GF_Toilet	7	0	100	0	Y	7
GF_Staff WC	6.1	0	100	0	Y	6.1

GF_Acc Toilet	3.7	0	100	0	Y	3.7
GF_AMB. WC	3.7	0	100	0	Y	3.7
GF_AMB. WC	67.5	0	100	0	Y	67.5
L1_General Learning Space	67.5	0	100	0	Y	67.5
L1_General Learning Space	28.9	0	100	0	Y	28.9
L1_Multi-purpose	104.2	0	100	0	Y	104.2
L1_Learning Commons	68	0	100	0	Y	68
L1_General Learning Space	68	0	100	0	Y	68
L1_General Learning Space	68.4	0	100	0	Y	68.4
L1_General Learning Space	68.4	0	100	0	Y	68.4
L1_General Learning Space	68.9	0	100	0	Y	68.9
L1_General Learning Space	28.7	0	100	0	Y	28.7
L1_Multi-Purpose	103.6	0	100	0	Y	103.6
L1_Learning Commons	68.8	0	100	0	Y	68.8
L1_General Learning Space	67.5	0	100	0	Y	67.5
L2_General Learning Space	67.5	0	100	0	Y	67.5
L2_General Learning Space	28.9	0	100	0	Y	28.9
L2_Multi-purpose	104.2	0	100	0	Y	104.2
L2_Learning Commons	68	0	100	0	Y	68
L2_General Learning Space	68	0	100	0	Y	68
L2_General Learning Space	68.4	0	100	0	Y	68.4
L2_General Learning Space	68.4	0	100	0	Y	68.4
L2_General Learning Space	68.9	0	100	0	Y	68.9
L2_General Learning Space	28.7	0	100	0	Y	28.7
L2_Multi-Purpose	103.6	0	100	0	Y	103.6
L2_Learning Commons	68.8	0	100	0	Y	68.8
L2_General Learning Space	67.5	0	100	0	Y	67.5
Total	2384.4					2384.4 (100%)

The results show **100%** of floor areas achieve a thermal comfort level of between a Predicted Mean Vote (PMV) of -1 to +1 for not less than 98% of the annual hours of operation of the building.

Therefore, PMV modelling results demonstrate that the proposed building **meets** the J1V3 Verification Method thermal comfort level requirements.

Attachment C – Building Fabric Requirements Markups



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 0.50

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.: 220270
DOCUMENT TITLE: REF
DOCUMENT REV: J
DOCUMENT BY: JB DATE: 17/01/2025

16/01/2025 4:12:15 PM

AMENDMENTS

REV	BY	DATE	DESCRIPTION
A	CP	05/12/2024	ISSUE FOR REF
B	CP	16/01/2025	REISSUE FOR REF

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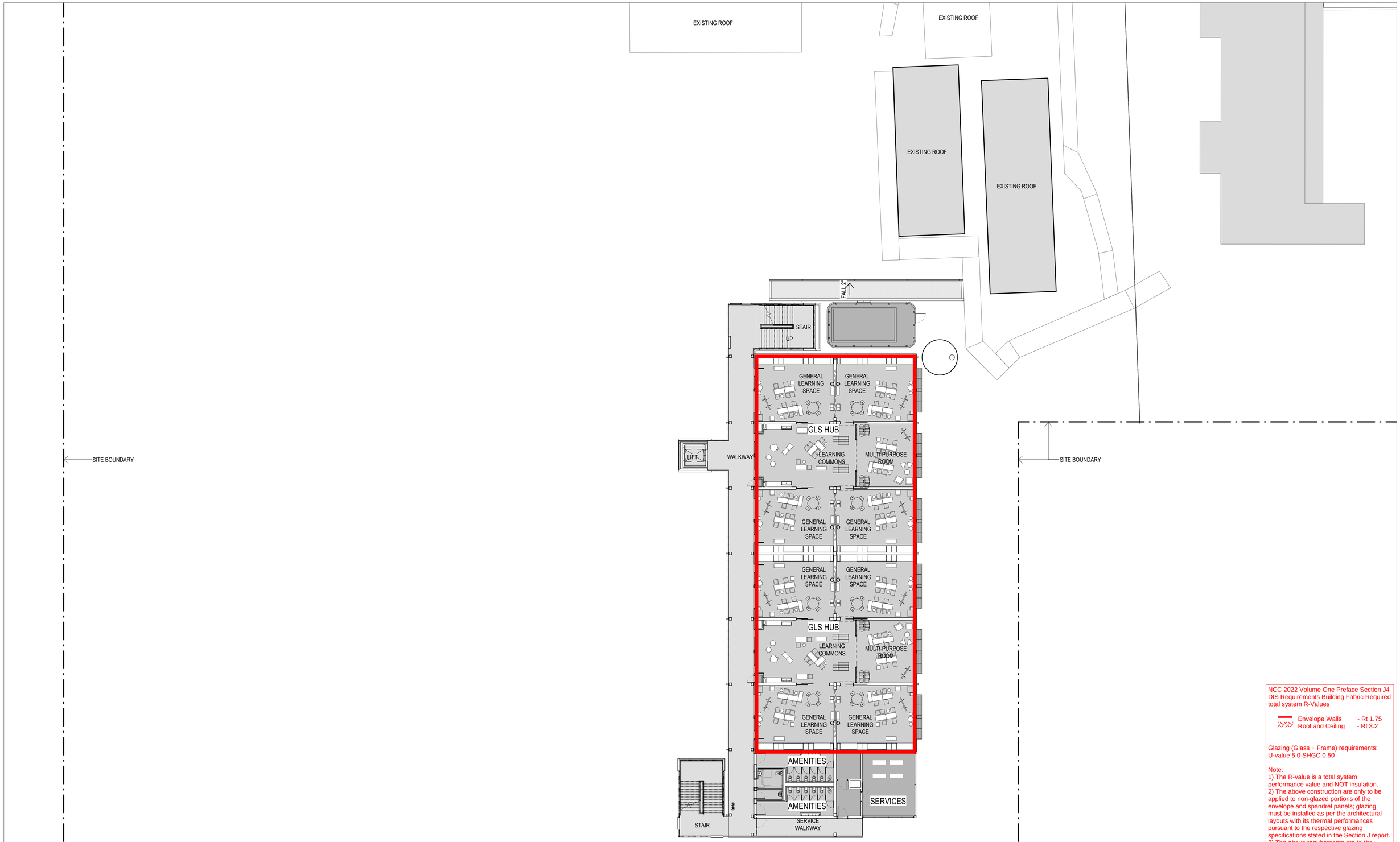
DRAWING NAME
SITE PLAN - GROUND FLOOR COMPOSITE PLANS - SHEET 02

PROJECT NORTH

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

PROJECT NUMBER: 3320
ISSUE DATE: 16 JANUARY 2025
DRAWING NUMBER: APS-PA-00-GF-DR-A-REF_102
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 0.50

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.: 220270
DOCUMENT TITLE: REF
DOCUMENT REV: J
DOCUMENT BY: JB DATE: 17/01/2025

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AMENDMENTS

REV	BY	DATE	DESCRIPTION
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Existing
GLS & Homebase
Library
Specialties
Storage & Services

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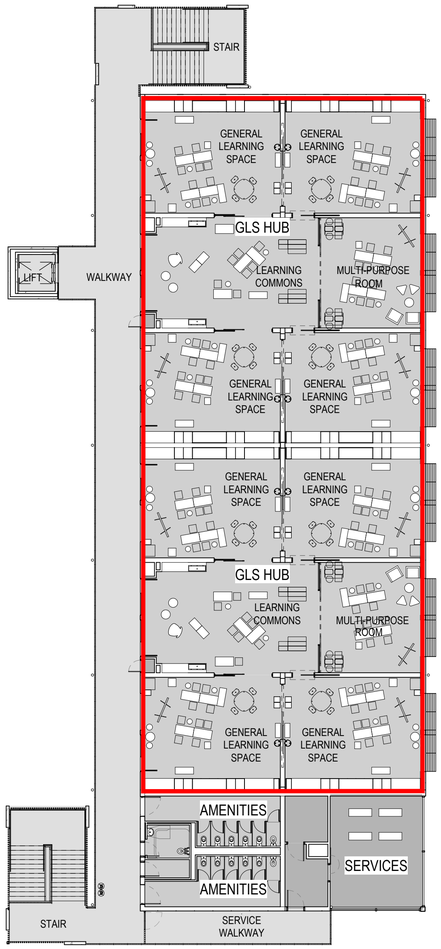
DRAWING NAME
SITE PLAN - LEVEL 1 COMPOSITE PLANS - SHEET 02

PROJECT NORTH
NORTH

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

PROJECT NUMBER: 3320
ISSUE DATE: 16 JANUARY 2025
DRAWING NUMBER: APS-PA-00-L1-DR-A-REF_104
REVISION: B



EXISTING ROOF

EXISTING ROOF

EXISTING ROOF

SITE BOUNDARY

SITE BOUNDARY

16/01/2025 4:12:58 PM

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 0.50

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.
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AMENDMENTS

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DRAWING NAME
SITE PLAN - LEVEL 2 COMPOSITE PLANS - SHEET 02

PROJECT NORTH
NORTH

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

PROJECT NUMBER	ISSUE DATE
3320	16 JANUARY 2025
DRAWING NUMBER	REVISION
APS-PA-00-L2-DR-A-REF_106	B