NORTHROP

ECOLOGICALLY SUSTAINABLE DEVELOPMENT REPORT

The New Primary School at Warnervale

75 Warnervale Road, Warnervale, NSW, 2259

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Ecologically Sustainable Development Report

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1. Executive Summary

This report describes how ESD principals (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of The New Warnervale Primary School Project, how the project addresses risks posed by a changing climate and how the design utilizes the Educational Facilities Services Guide (EFSG) to benchmark the project to industry best practice. Specifically, the report details how the project addresses the following;

- The precautionary principle – through the implementation of environmental management, maintainability and climate change adaption planning the project is actively including adaptability and resilience within the project. These plans and corresponding design responses demonstrate that the design is actively considering the concepts behind the precautionary principle to create a space that can both accommodate for changes that may eventuate in the future and one that carefully evaluates and avoids serious or irreversible damage to the environment.
- Inter-generational equity to ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations – through the inclusion of zero ozone depleting materials, sustainably sourced timber, low impact steel and concrete, alongside a focus on native vegetation, water sensitive urban design and support for better connection with nature, the project demonstrates a strong commitment to the preservation of environmental health, diversity an productivity for future generations.
- Conservation of biological diversity and ecological integrity – through the planting of endemic native vegetation, improvement of stormwater runoff from the site and use of landscaping that blends with the surrounding parklands, the project will act to improve, conserve and support the local biological diversity and integrity.
- Improved valuation, pricing and incentive mechanisms - the project has involved significant input from the Quantity Surveyor who will continue to be involved throughout the entire design process to ensuring that the project both remains on budget and effectively considers environmental factors in the valuation of assets and services. Furthermore, the project will look at maintainability and the operational costs associated with individual design initiatives and the overall design.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses sustainability within the design and adequately equips the project for its long-term operation thereby addressing the requirements of the SSDA and those set internally by the Department of Education.

2. Introduction

Schools Infrastructure NSW (SINSW) are preparing a State Significant Development Application for the development of 'The New Warnervale Primary School' located at 75 Warnervale Road, Warnervale, NSW, 2259. This report addresses how the project will meet the requirements of item 9 of the Secretaries Environmental Assessment Requirements (SEARs) with a specific focus on how the project incorporates compliance against the EFSG benchmark requirements.

The project consists of the construction of a new primary school at Warnervale on the central coast. Specifically, it will entail the construction of the following;

- New Core 35 Hall
- New Core 21 Administration & Staff Building
- New Core 21 OOSH
- New Core 21 Canteen
- New Core 21 Library
- New Core 21 (2x) Special Programs
- New Teaching Spaces 20 (Includes 2 Special Education Teaching Spaces)
- New Core 21 Student Amenities
- New Core 21 COLA
- Considerations for Future Expansion
- Staff Carpark 21 Spaces
- 5 Visitor Parking
- 2 Accessible Parking Spaces
- Related Road Works & Drop off/pick up Zone
- New Games Court

2.1 Response to Secretaries Environmental Assessment Requirements (SEARs)

Item 9 of the SEARs lists four requirements which are outlined below, alongside is listed where the response to each can be found within this report;

Item	Action to Address the Requirement	Report Location
Detail how ESD principals (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the project.	This ESD report details how the project aims to address the ESD Principles and their incorporation into the design and ongoing operation of the project through the EFSG sustainability requirements.	Section 2 & 4
Include a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact.	The project is being assessed against Department of Education Educational Facilities Services Guide (EFSG) which provides a clear framework to benchmark educational facilities against Industry Best Practice Sustainability. Additionally, the school, once operational, will contribute to broader social outcomes through the provision of Out of School Hours (OOSH) care, providing access to community gardens and healthier food options both grown on site and sold through the school canteen.	Section 2
Include preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance.	By targeting the Adaptation and Resilience initiatives outlined within section 5.2.3 of this report the project commits to addressing all high and extreme risks posed to the project by Climate Change over the forecast building lifetime.	Section 5.2.3
Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change.	A design statement has been provided by BLP outlining how the project has incorporated design initiatives for climate adaption.	Refer to BLP Design Statement Part 2.2.2

2.2 Sustainability Objectives

Northrop has been engaged to provide input to The New Warnervale Primary School project in order to meet the objectives outlined by the Department of Education and as a result of this how the project addresses the SEARs. The project is targeting the following sustainability outcomes:

EFSG Outcomes

- Compliance with the Educational Facilities Standards and Guidelines (EFSG) by the Department of Education (DoE).
- Exceeding the requirements of Section J of the National Construction Code (NCC) by 10% as per the Government Resource Efficiency Policy.
- Incorporation of Ecologically Sustainable Development principles considered to be best practice within the Australian building industry.

SEARS Outcomes

- Demonstration of how ESD principles will be incorporated into the design and ongoing operation of the development;
- Demonstration that the development has been assessed against a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy;
- Inclusion of preliminary consideration of building performance and mitigation of climate change, including consideration of Green Star Performance; and
- Confirmation of how the design of the future development is responsive to the CSIRO projected impacts of climate change.

As the EFSG requirements provide a project specific design guide benchmarked to Australian Best Practice ESD and ensures that the project is designed to address future climate related events, this standard allows the project to address the above.

The project team have harnessed the strong alignment between all of the targeted goals and have therefore used the EFSG framework to demonstrate how this facility both incorporates industry recognised best practice sustainability and ESD, as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000.

2.3 Disclaimer

Due care and skill has been exercised in the preparation of this advice. No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of this report by any third party. Any third party wishing to act upon any material contained in this report should first contact Northrop for detailed advice, which will take into account that party's particular requirements.

3. EFSG Sustainability Requirements

3.1 Overview

The Educational Facilities Standards and Guidelines (EFSG) have been developed by the NSW Department of Education (DoE) 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 benchmark framework to allow for a consistent best practice 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:

- NSW Government Resource Efficiency Policy
- Environmental Design Policies
- Environmental Design Features of Educational Facilities
- Insulation
- Ventilation
- Pesticides
- Water Conservation

The proceeding sections outline the requirements for the above categories of the EFSG DG02 Design Guideline.

3.2 NSW Government Resource Efficiency Policy (GREP)

The GREP aims to both lead by example and reduce the Government's operating costs by increasing resource productivity. This policy drives resource efficiency by Government agencies in energy, water and waste and reducing harmful air emissions from associated operations.
The policy ensures to:

- Meet the challenge of rising prices expected for energy, fuel, water and waste management.
- Use purchasing power to drive down cost of resource efficient technologies and services.
- Demonstrate leadership by incorporating resource efficiency in decision making.
- Design Buildings that achieve a 10% reduction on a minimum National Construction Code Complaint Building. This will generally be exceeded for an EFSG compliant school.

3.3 Environmental Design Policies

3.3.1 Green Building Design and Green Star

The EFSG deemed the Green Star – Education v1 rating tool the most appropriate for assessing the sustainable design principals of new educational facilities. Policies set out within the EFSG incorporate many of the green building design concepts outlined in the Green Star framework. The Green Star – Education v1 legacy rating tool has since been replaced by the Green Building Council of Australia and as such Northrop has selected initiatives from the most recent Green Star Design & As Built v1.2 tool for consideration by SINSW to compliment areas not covered by the primary initiatives of the EFSG.

3.3.2 Framework Requirements

The DoE requires that any new school building on a new or existing site achieve best practice sustainability within the Australian building industry. Policies set out by the EFSG are expected to achieve this standard against the GBCA framework most relevant to the project.

A potential compliance pathway has been developed and its implementation is being considered as part of the design development process to ensure that The New Warnervale Primary School incorporates the Australian Best Practice Sustainability. The measures under consideration are outlined in Section 5 of this report to address areas not covered by the EFSG.

3.3.3 Environmental Management Plan

It is mandatory that all new projects prepare a site-specific Environmental Management Plan (EMP) prior to the commencement of the relevant site works. Contractors will be required to prepare an EMP as a condition of contract.

For projects equal to $10 million or greater, including projects under $10 million which are environmentally sensitive, contractors will be required to develop a corporate Environmental Management System (EMS) accredited by a NSW government construction agency.

The head contractor is also required to implement an environmental management system certified to ISO14001. This will be a requirement imposed on the successful D&C contractor for the project.

3.3.4 Timber

The project is to contain no rainforest timbers (unless plantation grown), no timbers from high conservation forests and use only recycled timber, engineered and glued timber composite products, timber from plantations or sustainably managed regrowth forests.

This requirement will be included in the project specifications to ensure that compliance is achieved.

3.3.5 Ecologically Sustainable Development

The project must:

- Ensure the preservation, maintenance and sustainable use of the community's natural and mineral assets.
- Protect and support biological and ecological diversity.
- Restrict the flow of pollutants into our natural environments.

Through planting native vegetation and promoting improved interaction with the natural environment, the project is aiming to improve the site's ecology and minimise the ongoing environmental impact of the project.

The project is currently implementing the following:

- Extensive native vegetation endemic to the local area;
- Minimisation of light spill from the facility which impacts on migratory animals and insects; and
- Reduced dissolved pollutants in stormwater discharged from the site.

3.3.6 Environmentally Friendly Materials / Products

The project must encourage the use of materials and products which:

- Adequately and economically perform their intended functions while having low adverse environmental impacts throughout their life cycle.

- Contain reduced or no hazardous substances (low VOC)
- Reduce the demand for rare or non-renewable resources.
- Are made form or contain recycled materials or can be recycled at the end of their useful life.

3.3.7 Conservation of Biological Diversity

The project must conserve for future generations, the biological diversity of genetic materials, species and ecosystems. Project and purchasing impacts must be assessed on the natural environment during all project phases and adopt a precautionary approach where risk is high.

3.3.8 Pesticides

No chemical pesticides and/or termiticides are to be used on the project. Physical design measures must be taken to prevent and minimise risks.

3.3.9 Waste

The EFSG DG02 requires consideration to eliminate unnecessary waste by better planning and more efficient use of natural and manufactured resources. The project will incorporate several waste initiatives as part of the detailed design.

Effective waste management throughout demolition, construction and operation of the site will help to promote resource efficiency and minimise the adverse environmental impacts of the project. The following should be implemented as part of the design:

- Dedicated waste recycling spaces;
- Provision of accessible water sources for drinking water to reduce the use of bottled water on site;
- Provision of waste education resources linking with waste companies;
- Minimisation of construction and demolition waste sent to landfill; and
- Provision of separated waste streams for recycling and general waste.

3.4 Environmental Design Features of Educational Facilities

3.4.1 Natural Light

The intention of incorporating good daylighting is to minimise energy consumption and ongoing running costs and ultimately provide natural light to the students and staff. Natural daylight improves the indoor environmental quality of spaces and encourages beneficial learning. The EFSG DG02 Design Guideline requires that:

- Natural daylight is to be provided to all teaching spaces unless otherwise identified.
- Natural daylight can be provided via windows, skylights and roof-lights. Where a room is required to have a brownout function, roof-lights and skylights will need to include a method to sufficiently adjust light levels.
- Include daylight sensors to rooms to reduce light output or turn off lights when sufficient daylight is provided within the space.
- When the space is large, it is recommended that perimeter lighting adjacent to windows be on a separate zone to make maximum use of daylight.

3.4.2 Sun Shading

On exposed facades of the project which are subject to direct sunlight, external window shading should be considered as part of the building design to ensure energy efficiency and thermal comfort.

3.4.3 Period Bells

Energy consumption should be minimised in the development where possible. An area that is to be addressed as part of the new development is to include the following initiatives as part of the period bells design:

- Period Bell Light switching systems are to be in all new schools, major conversions and additions.
- All luminaries in rooms are to automatically turn off five minutes after the period bell rung and all students have left the room. Alternatively, systems should be in place to turn off lights in a room when not in use.
- A conscious decisions is required to turn the lights on again.

3.4.4 Appliances and Equipment

Minimum standards for new electrical appliances and equipment is to be compliant with the NSW Government Resource Efficiency Policy Part E3 and must have the minimum Greenhouse and Energy Minimum Standards (GEMS) star ratings as stipulated in the policy.

3.4.5 Air Cooling and Heating Systems

Air cooling and heating systems for the project are to include the following:

- Timed or sensor operation functionality for all air cooling systems.
- Centralised control of HVAC plant with programmable schedules for the school year.
- Consider one single infrastructure for heating and cooling where it demonstrates whole life cycle cost savings.

3.4.6 Electricity Meters

Electricity meters for the project are to be installed with capacity for monitoring in order to lower electricity maintenance costs by selecting a fit-for-purpose meter and allowing better access to energy consumption data at the school.

3.4.7 Renewable Energy Generation

A photovoltaic (PV) solar power grid-connect rooftop system must be provided for new schools to offset power consumption and costs. The EFSG Design Guide section DG66.3.1recommends a system capacity of up to 70kW depending on the size of the student population. The designer and/or installer of the PV system must be fully accredited by the Clean Energy Council of Australia and adhere to the system design requirements given in within the EFSG Design Guideline.

Allowances have bene made in the concept design for a solar PV system to be implemented at The New Warnervale Primary school. At least 350m2 of roof space has been designated to house a system of at least 40kW capacity.

3.5 Insulation

Insulation is to be compliant with the Building Code of Australia under Section J, Part J1 – Building Fabrics of the National Construction Code. It is required that the project utilise passive building elements such as insulation to keep heat out of classrooms during summer and reduce heat loss during winter.

3.6 Ventilation

Natural ventilation is to be used where possible to maintain good environmental air quality through all school areas. Natural ventilation principals are required to be incorporated into the project design where possible. Mechanical ventilation should only be used in areas where natural ventilation cannot be achieved, such as school performances spaces, duplicating rooms, dark rooms and internal toilets.

Single loaded covered walkways are encouraged as a means of maximizing cross ventilation, while roof turbo ventilators can be employed to enhance natural ventilation of a single storey or upper storey of a multi-storey building.

3.7 Pesticides

The project should be designed, constructed and maintained, without using chemicals for termite and other pest control. See section 3.3.8.

3.8 Water Conservation

The EFSG requires that measures be taken to implement practical water conservation systems for new educational facilities. These include:

- All fixtures and fittings are to have a minimum WELS rating as given in W3 of the NSW Government Resource Efficiency Policy.
- Internal flow controllers that minimise water usage for staff amenities.
- Timed flow taps for student facilities.
- Dual flushing cisterns with a minimum WELS rating of 4 stars in all toilets.
- Manual flushing systems are preferred.
- Rainwater harvesting and storage tank facilities for non-potable end uses.

4. National Construction Code 2016

The Deemed-to-Satisfy (DTS) provisions of Section J apply to building elements forming the envelope of the building. The development is located in NCC Climate Zone 5, and is classified as a Class 9b assembly building. The DTS requirements for Section J1 (building fabric) and J2 (glazing) are described in the following sections.

4.1 Building Fabric

4.1.1 Roofs and Ceilings:

The roof areas of conditioned spaces must achieve;

- Minimum total R-Value of 3.2m2.K/W if roof solar absorptance is greater than 0.4
- Minimum total R-Value of 3.7m2.K/W if roof solar absorptance is greater than 0.4 and less than 0.6
- Minimum total R-Value of 4.2m2.K/W if roof solar absorptance is greater than 0.6

4.1.2 External Envelope Walls:

The external envelope walls of the conditioned spaces must achieve a minimum Total R-Value of 2.8m2.K/W.

4.1.3 Internal Envelope Walls:

Where the adjacent non-conditioned space is enclosed with mechanical ventilation of not more than 1.5 air changes per hour of outside air, the internal envelope walls must achieve a minimum Total R-Value of 1.0m2.K/W.

All other internal envelope walls must achieve a minimum Total R-Value of 1.8m2.K/W.

4.1.4 Floors – Suspended Slab:

A suspended floor without an in-slab heating or cooling system where the non-conditioned space is enclosed with mechanical ventilation of not more than 1.5 air changes per hour of outside air, requires a minimum Total R-Value of 1.0 m2/K/W in the downwards direction.

Where the non-conditioned space is enclosed with mechanical ventilation of not more than 1.5 air changes per hour of outside air, the suspended floor must achieve a minimum Total R-Value of 1.25 m2.K/W in the downwards direction.

4.2 Glazing

The glazing in the external fabric facing each orientation in each storey, including any mezzanine, must be assessed separately in accordance with the DTS Glazing Calculators as issued by the BCA. Compliance is determined by the glazing area, the façade orientation, the area of the facade, horizontal shading provided, and the glazing performance. Vertical shading cannot be entered in to the Glazing Calculator. Glazing performance is measured by Total U-Value (the total U-Value for the glazing unit including the frame) and the Solar Heat Gain Coefficient (SHGC).

It is the intent of the design to achieve a result that utilises a high performance single glazing solution uniform across the school. The targeted glazing properties are;

- Glazing performance: U-value (Uw): 4.2 W/m²K, SHGC: 0.52

This will be confirmed in design development JV3 modelling during the detailed design phases of the project however have been determined as feasible within the current stage through the use of the DTS Glazing Calculator.

5. Green Building Council of Australia Design Framework

5.1 Overview

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

This section provides a brief summary of the additional elements drawn from the Green Star tool being applied at The New Warnervale Primary School. The Green Star system incorporates ESD principals across nine major categories:

- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land Use and Ecology
- Emissions
- Innovation

It is noted that no specific Green Star rating is being targeted at this stage.

5.2 Management

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

5.2.1 Accredited Professional

The project team have engaged with an accredited professional to provide advice, support and information related to sustainability principles and processes, at all stages of the project.

5.2.2 Commissioning and Tuning

5.2.2.1 Services and Maintainability Review

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

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

- Commissionability;
- Controllability;

- Maintainability;
- Operability, including ‘Fitness for Purpose’; and
- Safety

5.2.2.2 Building Commissioning

The project team will demonstrate that the pre-commissioning and commissioning activities have been performed based on the approved standards and guidelines.

5.2.3 Adaption and Resilience

5.2.3.1 Implementation of a Climate Action Plan

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

Climate Adaption Plan

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

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

5.3 Indoor Environment Quality

5.3.1 Lighting Comfort

5.3.1.1 Minimum Lighting Comfort

The project lighting design has ensured that all lights in teaching spaces are flicker free and accurately address the perception of colour in the space.

Flicker-free lighting refers to luminaires that have either:

- A minimum Class A1 & A2 ballast;
- High frequency ballasts for all fluorescent lamps, or
- Electronic ballasts in High Intensity Discharge (HID) lighting.

5.3.1.2 General Illuminance and Glare Reduction

The project team has also ensured that, in the nominated area, lighting levels comply with best practice guidelines for Office Spaces; corresponding to Table 3.1 of AS 1680.2. and that glare is eliminated through the use of baffles, louvers, translucent diffusers, ceiling design, or other means that obscures the direct light source from all viewing angles of occupants.

5.3.2 Indoor Pollutants

5.3.2.1 Paints, Adhesives, Sealants and Carpets

In addition to the indoor pollutants elements of the EFSG at least 95% of all internally applied paints, adhesives, sealants and carpets meet the below stipulated 'Total VOC Limits' (TVOC).

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

Table 1 Maximum TVOC Limits for Paints, Adhesives and Sealants

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

To demonstrate compliance for the use of carpets all products will be certified under a recognised Product Certification Scheme or other recognised standards. With the certification current at the time of specification.

5.3.2.2 Engineered Wood Products

At least 95% of all engineered wood products including: particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels meet stipulated formaldehyde limits or no new engineered wood products are used in the building.

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

Table 2 Formaldehyde Emission Limit Values for Engineered Wood Products

Test Protocol	Emission Limit/Unit of Measurement
AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood	≤1mg/ L
AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1.5 mg/L
AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16	≤1mg/ L
AS/NZS 4357.4 - Laminated Veneer Lumber (LVL)	≤1mg/ L
Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL	≤1mg/ L
JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460	≤1mg/ L
JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates)	≤0.1 mg/m²hr*
ASTM D5116 (applicable to high pressure laminates and compact laminates)	≤0.1 mg/m²hr
ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates	≤0.1 mg/m²hr (at 3 days)
ASTM D6007	≤0.12mg/m³**
ASTM E1333	≤0.12mg/m³***
EN 717-1 (also known as DIN EN 717-1)	≤0.12mg/m³
EN 717-2 (also known as DIN EN 717-2)	≤3.5mg/m²hr

*mg/m²hr may also be represented as mg/m²/hr.
**The test report must confirm that the conditions of Table 3 comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.
***The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.

5.4 Energy

The 'Energy' category aims to facilitate reductions in greenhouse gas emissions by facilitating efficient energy usage and encouraging the utilisation of energy generated by low-emission sources.

5.4.1 Greenhouse Gas Emissions – Comparison to a Reference Building Pathway

The current project design is targeting a 40% reduction in the predicted energy consumption and GHG emissions compared to a minimum code compliant building exceeding the requirements of the GREP.

Prediction of the building performance against this benchmark is to be confirmed using building performance modelling that assesses potential energy use for building services systems including:

- Mechanical Services
- Electrical Services
- Communications, AV and security systems
- Hydraulic Services
- Vertical Transportation Systems

5.4.2 Peak Electricity Demand Reduction – Reference Building

Through the use of efficient systems and on-site generation sources the project is targeting a reduction in peak electricity demand by at least 30%. Peak electricity demand is the predicted annual peak calculated as the sum of all distribution boards (to include all miscellaneous loads) relevant to the building as shown in the as-installed electrical schematics.

5.5 Sustainable Transport

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

5.5.1 Access by Public Transport

The site is not particularly well connected to public transport. However, through the expansion of the sites bus bays and installation of waling connections to the site it is providing strong support for students and staff to mode switch utilize more sustainable transport options.

5.5.2 Reduced Car Parking Provision

The project is incorporating a reduction in the number of car parking spaces when compared to a standard practice building. Minimal car parking required by council will be provided.

5.6 Water

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

5.6.1 Sanitary Fixture Efficiency

The project is looking to further improve fixture water efficiency to achieve WELS ratings within one star or those stated in the table below:

Table 3 Sanitary Fixture Efficiencies

Fixture / Equipment Type	WELS Rating
Taps	6 Star
Urinals	6 Star
Toilet	5 Star
Showers	3 Star (> 4.5 but <= 6.0)
Clothes Washing Machines	5 Star
Dishwashers	6 Star

5.6.2 Heat Rejection Water

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

5.6.3 Landscape Irrigation

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

5.7 Materials

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

5.7.1 Responsible Materials

5.7.1.1 Permanent Formwork, Pipes, Flooring, Blinds and Cables

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

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

5.7.2 Construction and Demolition Waste – Percentage Benchmark

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

5.8 Land Use and Ecology

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

5.8.1 Endangered, Threatened or Vulnerable Species

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

5.8.2 Heat Island Effect Reduction

At least 75% of the whole site area (when assessed in plan view) comprises of one or a combination of the following:

- Vegetation;
- Green roofs;
- Roofing materials, including shading structures, having the following:
    - For roof pitched <15°– a three year SRI >64; or
    - For roof pitched >15°– a three year SRI >34.
- Only where the three year Solar Reflectance Index (SRI) for products is not available, use the following:
    - For roof pitched <15° – an initial SRI > 82; or
    - For roof pitched >15° – an initial SRI > 39.
- Unshaded hard-scaping elements with a three year SRI > 34 or an initial SRI > 39;
- Hard-scaping elements shaded by overhanging vegetation or roof structures, including solar hot water panels and photovoltaic panels;
- Areas directly to the south of vertical building elements, including green walls and areas shaded by these elements at the summer solstice.

5.9 Emissions

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

5.9.1 Reduced Peak Discharge

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

5.9.2 Reduced Pollution Targets

Additionally the project aims to demonstrate that all stormwater discharged from the site meets the pollution reduction targets in Table 4 below.

Table 4 Minimum Pollution Reduction Targets

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

5.9.3 Light Pollution to Neighbouring Bodies

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

5.9.4 Light Pollution to Night Sky

Outdoor lighting has been designed to achieve the following;

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

5.9.5 Microbial Control

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

5.10 Innovation

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

5.10.1 Market Transformation

The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world. Through the targeting of world leading sustainability principles at The New Warnervale Primary School is contributing to a broader market transformation that repositions tenant health and well-being as a key indicator of sustainability.

5.10.2 Innovation Challenge – Financial Transparency

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

5.10.3 Innovation Challenge – Microbial Control in Hot Water Systems

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

5.10.4 Innovation Challenge – Provision of Community Facilities

As part of the design development the project conducted an assessment of the community needs is performed and community facilities have therefore been incorporated into the building design.

6. Conclusion

Through the initiatives outlined in this report the project demonstrates how The New Warnervale Primary School project meets both the objectives outlined by the Department of Education and those required by the SEARs. These are as follows

- Compliance against the Educational Facilities Standards and Guidelines (EFSG) by the Department of Education (DoE).
- Compliance with the requirements of Section J of the National Construction Code.
- Incorporate Ecologically Sustainable Development principles considered to be best practice within the Australian building industry.
- Demonstration of how ESD principles will be incorporated into the design and ongoing operation of the development;
- Demonstration that the development has been assessed against a framework for how the future development will be designed to consider and reflect national best practice sustainable building principles to improve environmental performance and reduce ecological impact. This should be based on a materiality assessment and include waste reduction design measures, future proofing, use of sustainable and low carbon materials, energy and water efficient design (including water sensitive urban design) and technology and use of renewable energy; and
- Inclusion of consideration of building performance and mitigation of climate change, including consideration of Green Star Performance; and
- Confirmation of how the design of the future development is responsive to the CSIRO projected impacts of climate change.

As the EFSG requirements provide a project specific design guide benchmarked to Australian Best Practice ESD and ensures that the project is designed to address future climate related events, this standard has been used as the benchmark framework to demonstrate the achievement of the above objectives. Further sustainability outcomes have also been drawn from the Green Star rating system.