

# Bankstown North Public School

## Ecological Sustainable Development Report

**Prepared for:** JDH Architects

**Attention:** Vlad Hripac

**Date:** 16 April 2020

**Prepared by:** Alex Kobler

**Ref:** 45342

**Wood & Grieve Engineers now part of Stantec**

Level 6, Building B, 207 Pacific Highway, St Leonards NSW 2065

Tel: +61 2 8484 7000 Email: [sydney@wge.com.au](mailto:sydney@wge.com.au) [www.wge.com.au](http://www.wge.com.au)

P:\43194\PROJECT DOCUMENTATION\SUSTAINABILITY\GENERAL\SU-RE\_001.DOCX



WOOD & GRIEVE ENGINEERS

NOW PART OF



# Revision

Revision	Date	Comment	Prepared By	Approved By
1	30/03/2020	For SSD Submission	ALK	ALK
2	16/04/2020	For SSD Submission	ALK	ALK

# Contents

<b>1. Executive Summary</b>	<b>1</b>
<b>2. Introduction</b>	<b>2</b>
2.1 General Overview	2
2.2 Documentation	2
2.3 Site Location	3
2.4 Sustainable Design Framework	4
2.5 City of Canterbury-Bankstown (DCP) 2015	4
2.6 NCC Section J – Energy Efficiency	5
<b>3. Project Design Response</b>	<b>7</b>
3.2 City of Canterbury-Bankstown DCP (2015)	13
3.3 NCC Section J (2019) – Energy Efficiency Design Response	15
<b>4. Summary</b>	<b>16</b>

## Appendix A – Green Star Credit Schedule

# 1. Executive Summary

This Ecological Sustainable Development Report has been prepared on behalf of JDH Architects for the proposed Bankstown North Public School development, located at 322 Hume Highway, Bankstown NSW 2200. The report provides an overview of the proposed Ecologically Sustainable Development (ESD) principles and sustainability initiatives to be included within the project.

Information contained within this report has been prepared in direct response to the:

- NSW Environmental Planning and Assessment Act 1979;
- NSW Environmental Planning and Assessment Regulation 2000; and
- City of Canterbury Bankstown – Development Control Plan (2015)

In coordination with the above, the project will implement a number of sustainable design principles and includes initiatives designed to mitigate the environmental impact. These benchmarks include:

- A response to NSW Environmental Planning and Assessment Regulation 2000;
- A minimum 4 Star Green Star Equivalency; (To demonstrate the project has been designed to environmental best practice);
- Designed to meet the EFSG Standards;
- A list of initiatives designed to minimise energy and water demand for the project;
- A response to the energy efficiency provisions of NCC Section J 2019.

The development uses Green Star Design and As Built Standards to demonstrate Australian best practice in the following areas:

- Energy and Greenhouse Gas Emissions Reduction
- Potable Water Consumption Reduction
- Materiality
- Indoor Environment Quality
- Waste Management
- Sustainable Transport

The development's design response to the above sustainable elements and more are expanded on in this report.



## 2. Introduction

The proposed development consists of an expansion of the Proposed Bankstown North Public School development, located at 322 Hume Highway, Bankstown NSW 2200. An overview of the proposed development is further detailed below.

### 2.1 General Overview

The proposed development of the Bankstown North Public School includes a new 3-storey building to the existing school site located at 322 Hume Highway, Bankstown NSW 2200 to provide a purpose-built education facilities for the students. The new building consists of two blocks (Block 2 and Block 4) and connected by an assembly courtyard.

The proposed development application includes:

- 24 new permanent Homebases.
- New staff and administration facilities.
- New library and special programs areas.
- New Auditorium.
- 658m<sup>2</sup> Assembly Courtyard.
- A new games court in the proximity of the proposed building

### 2.2 Documentation

This ESD Report has been prepared based on the following documentation:

- Green Star Design & As-Built v1.3 Submission Guidelines;
- Architectural Drawings - Stage 4 Schematic design; received date: 24/01/2019 (JDH Architects)
- Mechanical Drawings – Preliminary P1 – P3 Issue; received date: 26/02/2019 (Erbas Engineers)
- Mechanical Specification – Preliminary P1 Issue; received date: 26/02/2019 (Erbas Engineers)
- Hydraulic Drawings – Preliminary P3 Issue; received date: 07/01/2019 (Erbas Engineers)
- Hydraulic Specification – Preliminary P2 Issue; received date: 26/02/2019 (Erbas Engineers)
- Electrical Drawings – Preliminary P3 Issue; received date: 26/02/2019 (Erbas Engineers)
- Electrical Specification – Preliminary P1 Issue; received date: 26/02/2019 (Erbas Engineers)
- Civil Drawings C10.01 Catchment Plan – Preliminary P2 Issue; received date: 11/02/2019 (Northrop Engineers)
- BCA 2019 Section JV3 report, Rev 02 dated 31/01/2020 (Wood & Grieve Engineers now part of Stantec)
- Green Star Analysis Report, Rev 05, dated 30/03/2020 (Wood & Grieve Engineers now part of Stantec)

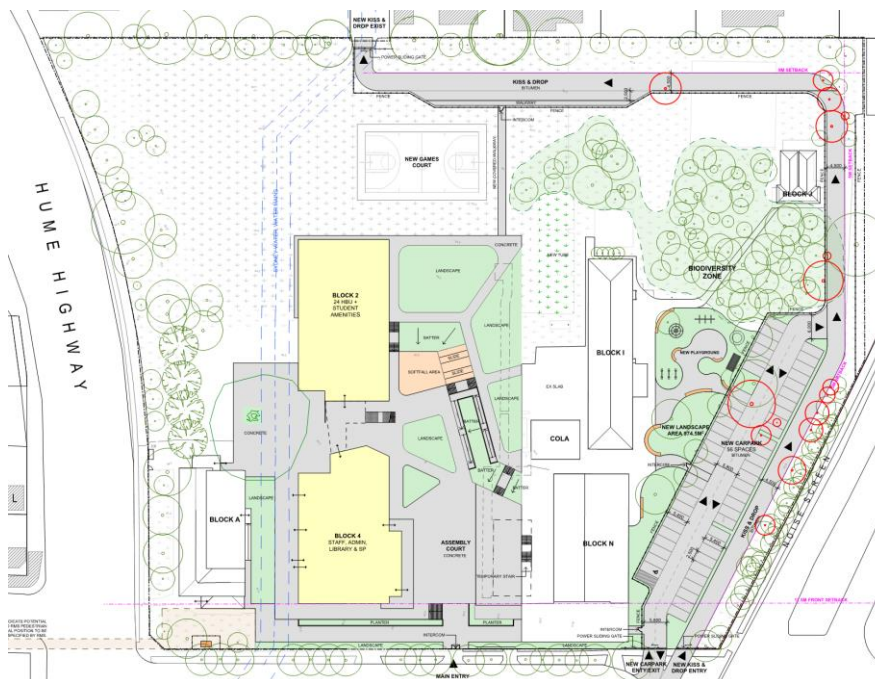


## 2.3 Site Location

The existing buildings located at located at 322 Hume Highway, Bankstown NSW 2200



**Figure 1:** Existing Site Location. Source: Google Maps



**Figure 2:** Proposed Site Plan. Source: JDH Architects.

## 2.4 Sustainable Design Framework

In pursuit of the ensuring the development includes ESD design principles, the Bankstown North Public School development will pursue Ecological Sustainable Development (ESD) excellence benchmarked from a number of sources.

These include best practice design initiatives from:

- A response to NSW Environmental Planning and Assessment Regulation 2000;
- A minimum 4 Star Green Star Equivalency (To demonstrate the project has been designed to environmental best practice);
- Designed to meet the EFSG Standards
- A list of initiatives designed to minimise energy and water demand for the project;
- A response to the energy efficiency provisions of NCC Section J 2019.

The report also addresses City of Canterbury Bankstown (2015), Part B4 – Sustainable Development, inclusive of the associated objectives and requirements.

In response, this report utilises best practice sustainable design principals and references to industry best practice benchmarks to define the ESD approach for the project.

## 2.5 City of Canterbury-Bankstown (DCP) 2015

The City of Canterbury-Bankstown has a specific DCP developed in 2015 with aim of addressing the conservation of both energy and water within the municipality. The ESD requirements identified within the DCP include:

### **Objectives:**

- To have the design and operation of development incorporate water conservation measures.
- To have the design and operation of development incorporate energy efficient practices

### **Requirements-**

- Water efficient fixtures must be installed
- A site water management plan must be prepared
- Buildings are to be designed to minimise energy and water consumption;
- Building must be designed to enhance energy efficiency
- Energy efficient hot water systems, air conditioners and lighting must be installed



## 2.6 NCC Section J – Energy Efficiency

Given the project timeline, the project will be required to demonstrate compliance with the new provisions outlined within NCC Section J 2019. NCC 2019 method represents a significant overhaul of the previous version of the NCC (2016) with significant amendments to Section J – energy efficiency provisions.

Section J outlines minimum performance requirements including,

- Maximum greenhouse gas emissions (GHG) levels;
- Minimum thermal envelope performance for building elements such as walls, floors, roof and external glazing;
- Treatment of thermal bridging across construction systems;
- Minimum performance requirements for building sealing;
- Maximum lighting power densities for internal lighting design;
- Minimum performance levels for building air-conditioning and ventilation systems;
- Minimum requirements for energy and water metering;
- Minimum requirements for energy and water data collection; and
- Minimum access for maintenance requirements.

The proposed new performance standards for Section J (2019) will increase the thermal performance requirements for code compliant façade designs, meaning consideration must be shown for the amount of exposed glazing included within the façade design.

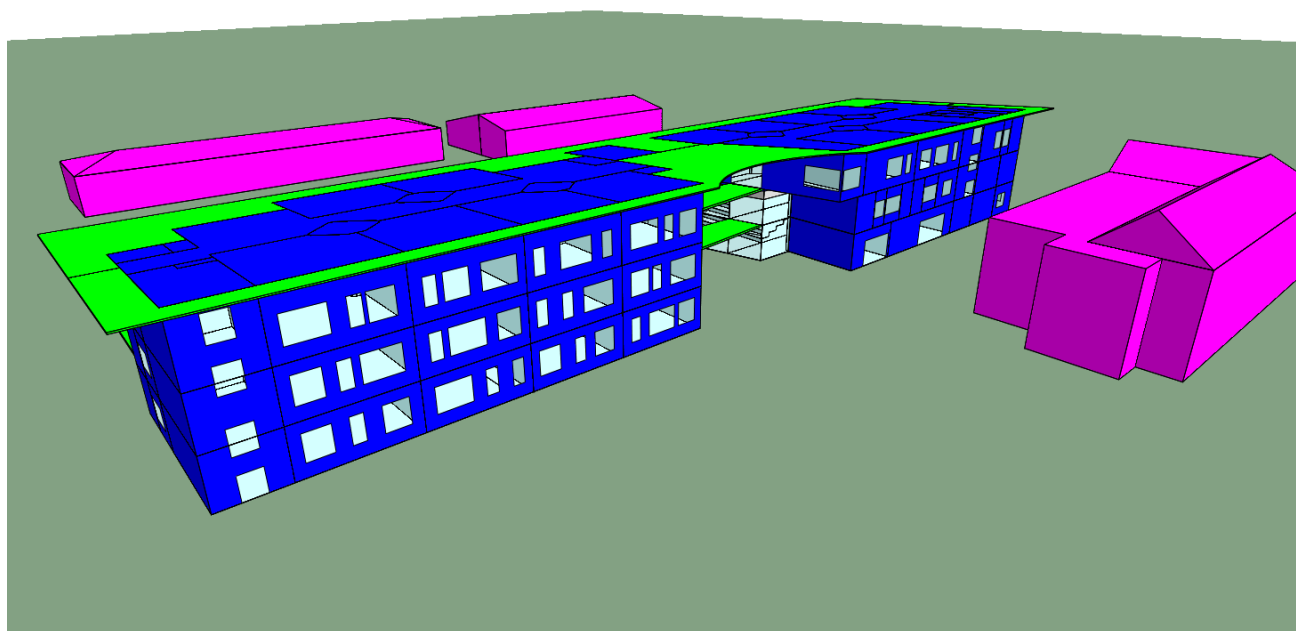
The design has been analysed for compliance and has been found to meet NCC Section J, 2019 with the following overall performance values:

Building Element forming part of Section J Envelope	Minimum Total R-Value* of Building Element (m <sup>2</sup> K/W)	Additional Notes
Roof/Ceiling	R <sub>T</sub> 3.2 (Heat flow Downwards)	<ul style="list-style-type: none"> <li>• Solar absorptance of the upper surface of a roof must be not more than 0.45.</li> <li>• Total Roof-value must be calculated in accordance with AS/NZS 4859.2</li> </ul>
External Walls – Brick Veneer Construction	R <sub>T</sub> 1.6	<ul style="list-style-type: none"> <li>• Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2</li> </ul>
External Walls – Lightweight Cladding Wall and Spandrel Panel Construction	R <sub>T</sub> 1.2	<ul style="list-style-type: none"> <li>• Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2</li> </ul>
Internal Walls	R <sub>T</sub> 1.4	<ul style="list-style-type: none"> <li>• Total Wall R-value must be calculated including thermal bridging and in accordance with AS/NZS 4859.2</li> </ul>
Suspended Floor Slab (no in-slab heating or cooling)	R <sub>T</sub> 2.0 (Heat flow Downwards)	<ul style="list-style-type: none"> <li>• Total Floor R-value must be calculated in accordance with NCC2019 Specification J1.6 or Section 3.5 of CIBSE Guide A</li> </ul>
Slab-on-ground (no in-slab heating or cooling)	No Additional Insulation Requirement	<ul style="list-style-type: none"> <li>• Ground Floor Slab insulation has been engineered out by JV3</li> </ul>





Window Type (Glazing + Frame)	Total System U-value (W/m <sup>2</sup> K)*	Total System SHGC*	Additional Notes
All Section J Envelope Glazing	4.6	0.46	<ul style="list-style-type: none"> <li>Likely Single Glazed Low E Neutral Tone with Standard Aluminium Frame as a minimum, TBC by façade contractor or window supplier.</li> </ul> <p>Generally, apply to all conditioned areas. (refer Appendix A for further detail)</p>



The modelled results are listed below:

Energy Consumption	Source	Energy Demand (MWh/annum)		Energy Demand Improvement on Reference
		Reference	Proposed	
Heating	Grid Electricity	35.9	36.9	
Cooling	Grid Electricity	226.0	224.4	
Indoor Fan Energy	Grid Electricity	107.5	107.5	
Lighting Energy	Grid Electricity	71.9	71.9	
<b>TOTAL Energy Demand (MWH/annum)</b>		441.3	440.7	
<b>TOTAL Greenhouse Gas Emission (kgCO<sub>2-e</sub>)</b>		406,082.6	406,635.5	0.14%



### 3. Project Design Response

#### 3.1.1 ESD Principles – Schedule 2, Clause 7(4) EPAR 2000

The principles of ecologically sustainable development (as documented within the Environmental Planning and Assessment Regulation 2000) are defined within Section 2.4 above. The following provides a direct response to the specific principles a) through d) as follows:

***The Precautionary Principle:***

There are no threats of serious or irreversible environmental damage as a result the proposed works. The proposed buildings are to be located on a previously developed site within an established urban area, which is already dedicated to the school. As the proposed development is not a greenfield project, the risk of creating environmental damage often associated with building on a greenfield site is considered low. No threatened or endangered species are located on the land due to the previous development of the site.

The proposed development is proposed to carry out predominantly the same use as the current building(s) on the site. Therefore, no serious or irreversible environmental damage is expected due to the operation of the proposed building. Supporting design such as stormwater management, sediment & erosion control, environmental management plan during construction shall all be implemented to ensure the precautionary principle for the proposed development is supported.

***Inter-generational equity:***

The proposed development conserves inter-generational equity through minimising the consumption of resources whilst providing both an education facility and workplace which will ensure the health and well-being of students, staff and visitors into the future. The project will ensure a lower demand for resources than a standard practice development by introducing a number of best practice energy and water conservation measures. These initiatives will conserve more resources for future generations, instead of their immediate consumption by the current generation.

As the site is already developed, the existing environment condition is unlikely to be significantly altered. The proposed development shall include new landscaping which will maintain pockets of planted environment similar to those currently present on the site.

All waste streams will be dealt with in ecologically safe methods; waste water and storm water will be plumbed to the sewers or storm water drains as required by law. In addition, waste water will be lower for this development compared with a standard practice development as low-flow fixtures and fittings will be used to reduce water consumption throughout the building. Existing services infrastructure upgrades will be documented & included within the project where relevant and connect to the existing major services infrastructure currently serving the site.

***Conservation of biological diversity and ecological integrity:***

There is limited biological diversity on the current site due to the property being previously developed. The proposed development will have limited, if any impact on the current level of biological diversity and ecological integrity as there is little ecological valued landscaping on the current site that will be replaced by built development in this project.

The project's sustainability targets will aim to ensure improved conservation of resources than a comparative standard practice development. This means that the proposed development is likely to have a smaller gross biological and ecological footprint than other similar projects.

Energy conservation measures will reduce the project's demand for electricity and gas, which slows or reduces the need for new energy infrastructure in the broader energy markets. This indirectly reduces the land required for new infrastructure, and the pollution caused by electricity generation.

***Improved valuation, pricing and incentive mechanisms:***

This project will integrate a number of initiatives which aim to internalise pollution and other undesirable environmental outcomes. Contractors will be requested to provide and abide by an Environmental Management Plan and Environmental Management System which are in accordance with NSW Environmental Management Systems Guidelines or a similar standard. This places a value on environmentally responsible building practices and places a form of "polluter pays" onto



the contractors to ensure they are held responsible for the environmental management of the building site as they complete their work.

The costs associated with the construction waste will be borne by the project team. They shall be required to target 80% recycling of construction waste. This will have a greater financial cost to the project; however, it provides a more accurate reflection of the full life cycle costs of the materials which were on the site, and the waste from the new materials as a result of the construction. The increased cost of recycling construction materials will also incentivise the purchase of less materials, thereby reducing over-ordering and material wastage.

The costs of producing the following pollution: sewage, landfill waste, and CO<sub>2</sub> emissions are partially borne by project team and accounted for in the project's sustainability initiatives. The project has voluntarily elected to:

- improve their water consumption efficiency, thereby paying to reduce their production of sewage;
- reduce their energy consumption, which means solutions to reducing CO<sub>2</sub> emissions will be paid to be investigated during the design phase;
- recycle waste streams in the construction and operation of the project, which will cost more than standard practice where all material waste is directed to landfill.

### 3.1.2 Best Practice Sustainable Development Framework – Green Star Design & As-built



The development proposes using the Green Star framework for benchmarking the performance of the development. This reflects 'national best practice sustainable building principles' as a minimum performance requirement.

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

This development proposes to demonstrate a 4 Star Green Star Equivalency (no formal rating), through the use of the Green Star Design and As Built v1.3

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

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

Consultation with the project design team to date has suggested the project will seek to ensure the minimum project performance outcome of **4 Star Green Star (Design & As-built v1.3)**, consistent with Australian Best Practice sustainable



building principles. Due to the project timeline, the project may elect to amend and/or update the Green Star certification tool in order to be consistent with the current industry recognised best practice framework.

An eligibility criterion of Green Star certification includes spatial differentiation, meaning the building receiving certification must be clearly identifiable and distinct from surrounding buildings.

It is important to note, the proposed project Green Star scope and application for development approval will focus on the new building components to be constructed only.

Additional information is provided below regarding more specific initiatives and performance targets within Section 3.1.3.

### 3.1.3 Green Star Analysis

The development has assessed the Green Star creditability of the project, in conjunction with the Building Services team, SINSW and the Architect. This has allowed an initial assessment to demonstrate the school is designed to a 4 Star Green Star equivalence level.

A provisional list of ESD and environmental initiatives in accordance with the Green Star framework has been identified below.

- Green Star accredited professionals shall be engaged throughout the project to guide the design team and ensure a high level of environmental performance is achieved;
- High WELS rated water fittings ensuring lower building water demand;
- On-site rainwater harvesting & reuse will reduce the site discharge levels and maintain the overall health & ecological integrity of receiving water bodies;
- LED lights, which have longer lives, consume less energy and produce a higher quality light than their counterparts, reducing overall energy demand;
- Passive thermal design features such as fixed external shading, operable external louvers for natural ventilation and cross-flow and optimised daylight performance via performance glass;
- Low-VOC paints, sealants, adhesives and carpets, which do not emit dangerous volatile components, risking the health of users;
- Steel sourced from manufacturers who are members of the Australian Steel Institute Sustainability Charter for sustainable and energy reducing steel manufacture;
- Best practice PVC plastics in formwork, piping, cables and conduits. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process;
- Operational waste procedures including defined streams for effective material recycling;
- A target of 90% of construction and demolition waste will be diverted from landfill;
- On-site stormwater management in accordance with EPA/WSUD best practice guidelines;
- Contractors will be requested to provide and abide by an Environmental Management Plan and Environmental Management System that is in accordance with NSW Environmental Management Systems Guidelines;
- Engineered wood products will limit formaldehyde levels via architectural specification in accordance with industry best practice standards; and
- Consideration of additional material specifications which select & prefer materials and products which include reused content, environmental product declarations, third party sustainability certifications or product stewardship programs;
- Landscape design shall focus on the inclusion of local, indigenous species with drought tolerant capability;



- Sub-soil landscape irrigation systems;
- Completion of a dedicated climate change impact study and management plan during detailed design phase;
- Acoustic performance in accordance with both Green Star and education guidelines;
- Dedicated site-specific transport plan including suitable provision for sustainable modes of transport to be utilised by students, staff and visitors;
- Detailed design to undertake a detailed life-cycle assessment to inform and manage holistic material impacts for the project;
- Any identified hazardous materials to be removed and disposed of in accordance with relevant EPA and NSW best practice legislation;
- Light pollution shall be managed via effective external lighting design;
- Legionella risks shall be managed via air-cooled HVAC systems;
- Efficiency, high performance HVAC systems with a focus on energy efficiency to be installed. Consideration of mixed-mode natural ventilation shall be considered further during detailed design phase; and
- Additional Green Star innovation challenges as relevant and identified.

A provisional Green Star certification list of initiatives demonstrating the projects ability to achieve the minimum 4 Star Green Star performance outcome has been included within Appendix A of this report. Note, the provisional list of initiatives will be subject to further amendment during project detailed design phase following development approval.

### 3.1.4 Government Architect NSW Environmental Design in Schools

The guideline provided by the GANSW outlines a number of key impact categories and initiatives design to improve the environmental performance as well as improve the quality of schools' design for the students, staff and stakeholders.

The NSW Government Architect guide generally outlines a number of key performance indicators, including:

- Air
- Comfort
- Light
- Noise
- Water
- Energy
- Landscape; and
- Materials

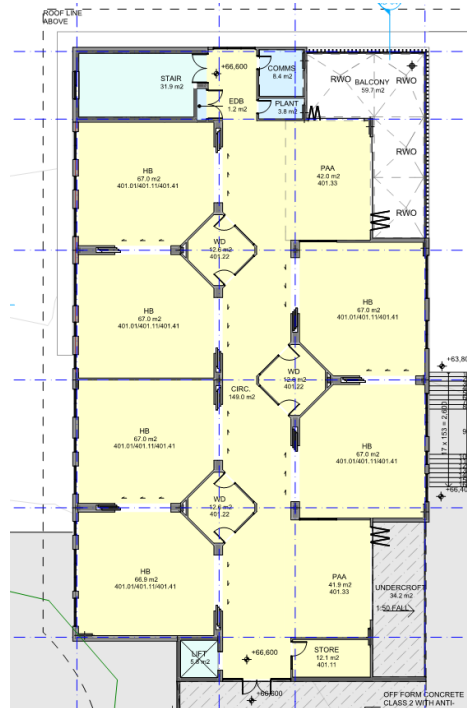
Additional commentary is provided below with regards to the proposed project design response.

**Air** and **Comfort** are to be managed via a dedicated approach to ensuring the passive thermal design elements of the project are fundamental to the project design approach. Whilst utilising the existing building form, the proposed design has sought to achieve a balance between ensuring effective natural daylight and optimised energy efficiency.

As part of the minimum design compliance requirements, compliance with NCC Section J (2019) energy efficiency provisions shall be required. This will ensure a minimum level of façade performance and is further defined within Section 3.3 of this report.

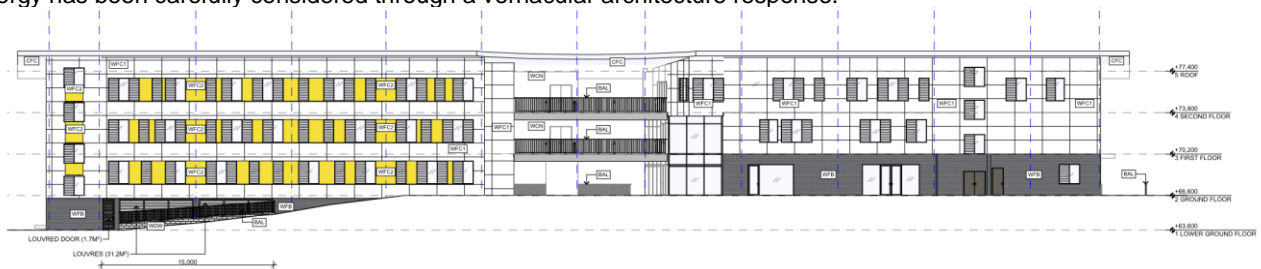


Further to the above, the project is also considering in great detail the passive thermal performance of the project design inclusive of thermal comfort and appropriate design response. The development has designed maximum façade frontage to learning areas and Homebases, which maximise fresh air and daylight, while providing an internal circulation space through spill air.



**Figure 4:** General layout. Source: JDH Architects.

**Light** shall be optimised via a dedicated design response to include optimum levels of natural daylight to all dedicated teaching and learning zones. The following elevation details façade, which incorporates high-performance glazing to maximise views, but a responsible ratio of window-to-wall area to maximise energy performance. The balance of light and energy has been carefully considered through a vernacular architecture response.



**Figure 6:** High level natural light through façade – Source: JDH Architects

Providing optimum levels of natural daylight to learning spaces is known to benefit concentration, productivity and physical comfort for students. The south-facing high-level skylights provide diffuse daylight with good natural colour rendering into the space and a connection to the outdoors without direct solar heat gains.

**Noise** shall be mitigated and managed via a dedicated Acoustic design response. In addition to the Government Architect Environmental design guide, the performance requirements identified within Green Star are likely to be included within the project design as part of the targeted Green Star equivalency strategy.

**Energy, Water, Landscape and Materials** impacts shall all be managed and optimised via the projects commitment to Green Star certification, refer additional commentary provided within Sections 3.1.2 and 3.1.3 above and further information provided within Appendix A of this report.

### 3.1.5 Projected Impacts of Climate Change

As part of the provisional design response for the project, an assessment of project risks associated with the predicted impacts of Climate Change has been undertaken for the proposed development. The assessment has been undertaken to ensure the project design allows for suitable provisions for the predicted impact of climate change scenarios.

The project design team has conducted a site-specific analysis of the likely scenarios which represent the most significant projected impacts of climate change. The assessment has been undertaken in accordance with CSIRO and Australian Bureau of Meteorology data.

The table below summarises the projected impacts of climate change across two scenarios (RCP4.5 and RCP8.5\*): the near future 2020-2039 (referred to 2030) and far future 2080-2099 (referred to 2090). These projections are generalised for the 'East Coast (South) Cluster' region as defined by the CSIRO and BOM (2015) and is taken as the most representative of the proposed site's future climate-change enhanced conditions in Sydney.

RCP4.5 represents normalised emission levels. 8.5 represents worst case scenario based upon 2005 emissions trends.

Climate Variable	Climate Projections (change relative to 1986 – 2005 baseline)			
	2030		2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5
Mean temperature change (°C)	0.9 (0.6 to 1.1)	1.0 (0.7 to 1.3)	1.8 (1.3 to 2.5)	3.7 (2.9 to 4.6)
Extreme temperature (days per year over 35°C)	7.21	7.82	11.12	19.84
	Substantial increase in intensity and frequency of extreme temperature days			
Mean annual rainfall change (%)	-3 (-10 to 6)	-1 (-11 to 6)	-2 (-16 to 9)	-3 (-20 to 16)
Extreme rainfall	Extreme rainfall events to increase in intensity			
Drought	Time spent in drought conditions to increase			
Bushfire weather	Severity of fire-weather climate to increase			
Solar radiation (%)	0.5 (-0.5 to 1.9)	0.8 (-0.7 to 2.7)	1.5 (-0.3 to 3.7)	1.3 (-1.2 to 3.4)
Relative humidity (% absolute)	-0.5 (-1.6 to 0.8)	-0.6 (-1.4 to 0.9)	-1.0 (-3.1 to 0.3)	-1.5 (-3.8 to 1.3)
Wind Speed (%)	-1.1 (-2.9 to 0.5)	-0.5 (-2.3 to 1.9)	-1.0 (-4.2 to 0.2)	-1.1 (-6.9 to 4.2)
Sea level rise (m)	0.13 (0.09 to 0.18)	0.14 (0.10 to 0.19)	0.47 (0.30 to 0.65)	0.66 (0.45 to 0.88)

**Table 1:** Summary of Climate Change Projects (CSIRO, 2015)



#### Summary of major impacts assessment:

#### **Mean & Average Temperature**

With very high confidence, air temperatures are projected to increase due to continued substantial warming from a mean warming of around 0.4 to 1.3°C by 2030 relative to the climate of 1986-2005. As a consequence of rising temperatures, peak temperature events will become more frequent whereby the number of days above 35°C are expected to nearly double under RCP4.5 and nearly triple under RCP8.5 by 2090 (CSIRO and BOM, 2015).

In response to the above, the project design seeks to ensure the passive thermal design elements are fundamentally sound ensuring that average daily temperature and peak extreme temperature days are managed as best as possible. External shading, glazing design, HVAC and natural ventilation shall all be fundamentally proven to ensure the proposed project design responds appropriately to the projected risks of climate change.

## 3.2 City of Canterbury-Bankstown DCP (2015)

The following section details a provisional list of ESD initiatives for inclusion within the design & development of the project in direct response to the City of Canterbury-Bankstown DCP (2015)

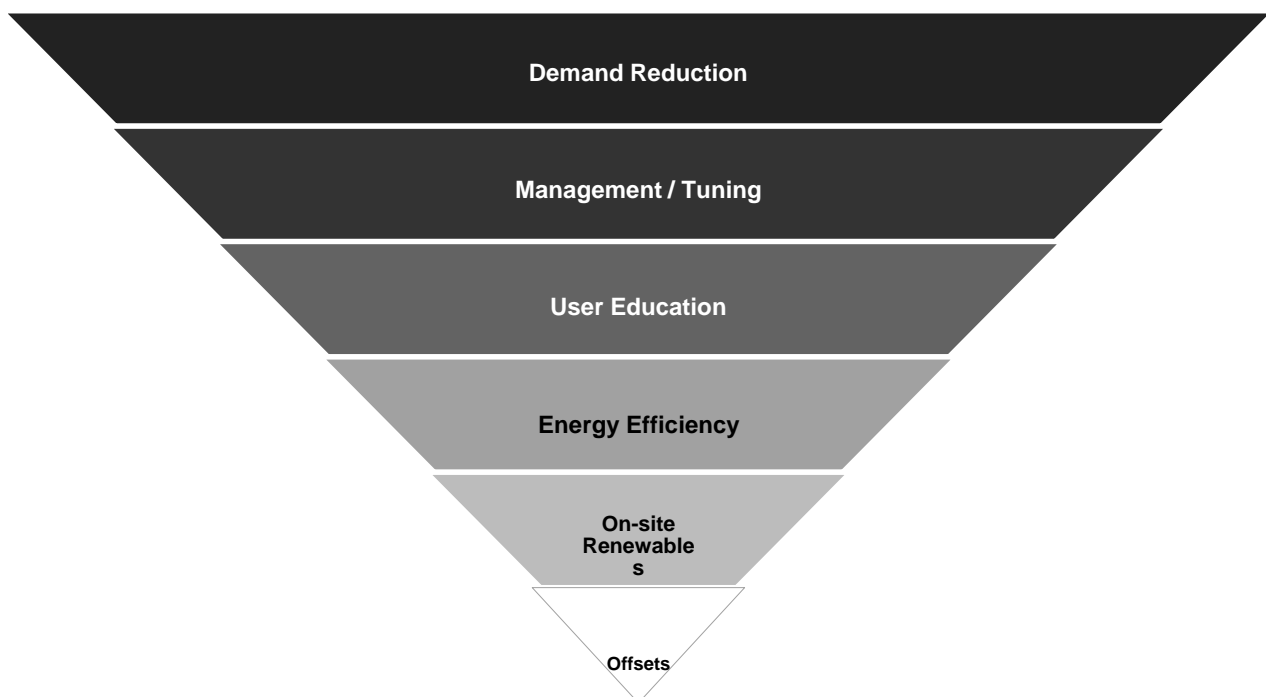
Part B4 – Conservation of Energy & Water – focuses on ensuring the development includes suitable design elements in order to efficiency use & reduce overall annual demand for both energy & water. The following commentary is provided with regards to the applicable design elements which focus on reducing the overall building demand for both energy and water.

#### **Layout, Natural Ventilation and Solar**

Utilisation of natural ventilation, daylight and solar access has been considered heavily within the proposed design response. In addition to the DCP requirements, additional performance standards as defined within both National Construction Code – Section J energy efficiency and NSW Government Architect environmental schools design guide which further support the approach to both natural ventilation and daylight/solar access.

#### **Energy and Water consumption**

The overall building design will reduce demand for both energy and water via the documented design response to the performance design requirements as defined both NCC Section J and Green Star. The overall project design approach has been influenced by the following design hierarchy:



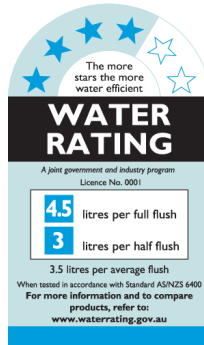
**Figure 8:** Energy & Water efficiency design hierarchy.





Additional design considerations and initiatives likely to be included within the project design in response to DCP Part B4:

- Façade design for optimised passive thermal performance. Refer additional commentary provided above.
- Efficient lighting e.g. LEDs. This will reduce the electrical load on the grid for the same electrical output. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials – applicable to both administration building/ processing plant.
- Lighting controls including timing and occupancy sensors to reduce the demand on the lighting systems.
- Sub-metering will allow for effective energy management & optimisation of building performance.
- External lighting to timeclock controlled for optimised energy efficiency.
- Energy and water efficient appliances – lowering energy demand.
- Localised hot water systems for lower GHG emissions impact & on demand response.
- Water efficient fixtures and fittings – includes taps, wash basins, WCs, Urinals, showers and supplementary water uses.



**Figure 9:** Example of a WELS water efficiency rating label.

In accordance with industry best practice standards, the following performance schedule identified within Green Building Council of Australia's – Green Star scheme will ensure potable water demand is effectively reduced:

Nominated WELS Fixtures – Green Star Design & As-built V1.3	
Fixture / Equipment Type	WELS Rating (minimum)
Taps	6 Star
Toilet	5 Star
Showers	3 Star (>4.5 but <= 6.0 L/min)
Dishwashers	6 Star

- Water meters will ensure inefficiencies such leaks are detected prior to the significant loss of water;
- On-site rainwater harvest – offset on-site irrigation demand reducing the demand from potable water supplies.

#### Landscape

The project landscape design will seek to include the following initiatives designed to reduce energy & water demand:

- Irrigation supply from non-potable sources such as rainwater etc.
- Irrigation supply to be delivered via sub-soil infrastructure.

- Plant selection shall focus on native, indigenous and drought tolerant species. Consideration of deciduous species to ensure seasonal passive thermal solar gains shall also be included within the design.
- External lighting design to be controlled by either daylight sensor or timer.

### Stormwater

The project stormwater design shall respond to minimum DCP, EPA and relevant associated legislation. In addition, the approach to Green Star certification is likely to include a design response to stormwater quality. Refer civil engineers report and supporting documentation for further commentary.

## 3.3 NCC Section J (2019) – Energy Efficiency Design Response

NCC 2019 will require new developments is to comply with the new provisions outlined within NCC Section J 2019.

The proposed new performance standards for NCC Section J will increase the thermal performance requirements for code compliant façade designs, meaning consideration must be shown for the amount of exposed glazing included within the façade design. Glazing thermal performance, solar control, visible light transmittance and inclusion of appropriate shading features within the design response must be considered in accordance with the increased performance requirements of NCC Section J 2019.

The proposed development will seek to optimise energy efficiency & thermal performance via design external façade design elements which improve the building passive thermal performance (i.e. fixed external shading, insulated façade elements, etc.). Particular focus will be on the western façade inclusive of the existing heritage elements and also replacement of the existing precast wall panels and curtain walls with new high-performance building envelope elements.

In addition to the above, thermal comfort modelling will be included to demonstrate compliance with the new NCC 2019 code, with a minimum performance of  $-1.0 < PMV < 1.0$  in each mechanically conditioned zone. The design of the building fabric will demonstrate compliance with this clause through dynamic modelling of the building against a reference case.

### 3.3.1 Shading

The proposed design is inclusive of fixed external shading on both the North and West facades. The proposed shading devices will have a significant impact on the overall energy performance of the building in association with the predicted climatic changes as documented within Section 3.1.5 above.

### 3.3.2 Performance Requirements

NCC Section J – energy efficiency provisions will apply to the design & construction of the development with the intent to ensure the build form and associated building services demonstrate a minimum level of energy efficiency performance.

The proposed building fabric will likely exceed prescriptive values in order to work with the architecture and mechanical performance of the building, including:

- **External Walls:** Min R2.5 additional insulation (90mm). Total R1.4
- **Roof and Ceilings:** Min R5.0 additional insulation (155mm) Total R3.7
- Light coloured roofs if aesthetically possible and pending reflectivity requirements ( $<0.45$  Absorptance)
- **Windows:** Have been modelled and will be High-performance low-e clear to exceed compliance requirements.

Refer to the Section J Report by WGE for full detail on the Section J Compliance strategy.



## 4. Summary

Ecologically Sustainable Design is a driving consideration in the development of the proposed Bankstown North Public School located at 322 Hume Highway, Bankstown NSW 2200. As described within the report above, the project will incorporate a number of ESD and environmentally conscious initiatives in both design & operation aimed at ensuring the principles of sustainable development are both demonstrated & achieved throughout.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of categories including:

- A response to NSW Environmental Planning and Assessment Regulation 2000;
- A minimum 4 Star Green Star equivalent standard
- A response to Canterbury-Bankstown DCP, including a list of initiatives designed to minimise energy and water demand for the project;
- A response to NSW Government Architect design guide, including detail on the minimum performance of natural daylight levels; and
- A response to the new energy efficiency provisions of NCC Section J 2019.

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

We trust this Ecological Sustainable Development report provides sufficient overview of the project commitment to environmentally sustainable design and the sustainability vision for the proposed Bankstown North Public School development.



# Appendix A – Green Star Credit Schedule



Green Star - Design & As Built Scorecard v1.3

Project:	Bankstown North Public School
Targeted Rating:	4 Star - Best Practice

Core Points Available	4 Star Pathway
100	50.0

NA	CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED	COMMENTS
	Management				14		
	Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	1	WGE are Green Star Accredited Professional (GSAP) status so credit claimed on basis of design review
	Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies	Project Design Intent Report (DIR) to be developed by Design Team and targets for energy & water consumption to be outlined within DIR. Water and Energy targets should conform with EFSG requirements (Design Guide 02.02), the project shall conform to NSW Government Resource Efficiency Policy which establishes environmental performance targets (i.e. energy & water use, waste, and indoor air quality) consistent with Green Star. <b>This is deemed to satisfy the intent of Green Star.</b> The following items will suffice as suitable evidence in demonstrating compliance: - Provision of rooftop solar PV system; - Proposed building fabric exceeding Section J DTS Building Fabric Compliance; - Thermal comfort targets in line with EFSG minimum standard requirements; and - Provision of in-ground rainwater tanks
			2.1	Services and Maintainability Review	1	1	<b>Contractual Requirements.</b> Head Contractor to lead Services & Maintainability Review with input from all subcontractors. Review must include items relating to Commissioninability, Controllability, Maintainability, Operability and Safety.
			2.2	Building Commissioning	1	0	<b>Credit not targeted</b>
			2.3	Building Systems Tuning	1	0	<b>Contractual Requirements.</b> Building owner to commit to 12 month tuning process with quarterly adjustment and measurements. Head Contractor and subcontractors to sign up to tuning process.
			2.4	Independent Commissioning Agent	1	0	<b>Credit not targeted</b>
	Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	0	<b>Credit not targeted</b>
	Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	1	Operations & Maintenance Manuals, Building Log Book and Building Users Guide must be developed in accordance with Green Star standards. Building user information must be delivered in a digital format e.g. through digital signage, website or mobile applications. Additional reporting requirements for sub-contractors.

Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1	<p>Minimum 80% of the projects Gross Floor Area (GFA) is to have a commitment to set, measure and report on its environmental performance. For this project, the targets will likely be for operational energy and water consumption.</p> <p>Head Contractor to ensure metering and monitoring infrastructure (water &amp; energy) is installed to track operational consumption against the established benchmarks.</p> <p>Based on EFSG requirements (Design Guide 02.02), the project shall conform to NSW Government Resource Efficiency Policy which establishes environmental performance targets (i.e. energy &amp; water use, waste, and indoor air quality) consistent with Green Star. <b>This is deemed to satisfy the intent of Green Star.</b></p>
		5.2	End of Life Waste Performance	1	1	<p><b>Contractual Requirements.</b> Minimum 80% of the projects GFA is to have a commitment to reduce demolition waste at the end of life of an interior fitout or base building component. For this project, the building owner must commit to extending the life of the interior fitout or finishes to at least 10 years, barring minor wear and tear or minor repairs.</p>
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-		<b>Credit not targeted</b>
		6.1	Monitoring Systems	1	0	<b>Credit not targeted</b>
Construction Environmental Management	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies	A project-specific best practice EMP is to be developed and implemented in accordance with the <i>NSW Environmental Management Systems Guidelines</i> .
		7.1	Formalised Environmental Management System	1	1	<p><b>Contractual Requirements.</b> Head Contractor to provide a formal audited Environmental Management System (EMS) against the ISO14001 standard. This certification must be maintained throughout the duration of the project.</p>
		7.2	High Quality Staff Support	1	0	<b>Credit not targeted</b>
Operational Waste	Prescriptive Pathway	8B	Prescriptive Pathway - Facilities	1	1	<p>The project is require to provide the following:- 8B.1 Seperation of Waste Streams 3 separate lines of Waste Streams (i.e General Waste, paper waste, e-waste, organics waste or batteries waste etc) 8B.2 Dedicated Waste Storeage Area. Dedicated Waste Storage area sized to accommodate all bins or containers to handle one collection cycle as outlined within third party best practice guidelines. 8B.3 Access to Waste Storage Area Access to waste Storage area as outlined within third-party best practic guidelines.</p>
Total				14	7	

Indoor Environment Quality						17	
<input type="checkbox"/>	Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	1	9.1.1 Entry of Outdoor Pollutants: <b>Mechancial drawings demonstrated Credit Compliance</b> 9.1.2 Design of Ease of Maintenance and Cleaning: <b>Mechancial drawings demonstrated Credit Compliance</b> 9.1.3 Cleaning Prior to Use and Occupation - <b>Contractor Requirement</b> Before installation/occupation, all existing ductwork must have been cleaned and all new ducts must be kept sealed / free of moisture and debris.
<input type="checkbox"/>			9.2	Provision of Outdoor Air	2	0	<b>Credit not targeted</b>
<input type="checkbox"/>			9.3	Exhaust or Elimination of Pollutants	1	0	<b>Credit not targeted</b>
<input type="checkbox"/>	Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1	Internal ambient noise levels to primary & secondary spaces to be no more than 5dB(A) above the lower figure in AS/NZS 2107:2016. Measurements are to be taken in at least 10% of spaces at project completion to verify the required levels are met.
<input type="checkbox"/>			10.2	Reverberation	1	1	Requires reverberation times in primary & secondary spaces to meet AS/NZS 2107. This includes general learning spaces, auditorium, Staff rooms, Library etc. More difficult to achieve if the space is mainly comprise of hard surfaces.
<input type="checkbox"/>			10.3	Acoustic Separation	1	0	<b>Credit not targeted</b>
<input type="checkbox"/>	Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies	Internal lights are to be flicker free and have a CRI>80.
<input type="checkbox"/>			11.1	General Illuminance and Glare Reduction	1	1	Internal lighting to primary & secondary spaces to comply with AS 1680 AND be fitted with glare reduction features (opaque diffusers). <b>Electrical Specification demonstrated all electrical works comply with AS1680.</b>
<input type="checkbox"/>			11.2	Surface Illuminance	1	0	<b>Credit not targeted</b>
<input type="checkbox"/>			11.3	Localised Lighting Control	1	0	<b>Credit not targeted</b>
<input type="checkbox"/>	Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies	Requires blinds/screens with VLT < 10% to ALL window/skylight/glazed doors forming part of the external envelope to all School Primary spaces. (i.e. Homebases,General learning spaces and staff adminstration rooms., etc)
<input type="checkbox"/>			12.1	Daylight	2	1	The project requires to achieve a daylight factor > 2% to at least 40% of all primary spaces. (i.e. Homebases,General learning spaces and staff adminstration rooms., etc) <b>Provisional review by WGE confirmed design to be compliant with mimimum credit criteria.</b>



12.2

Views

1

1

The Project is require to achieve an external views area (minimum 60% of primary area) based on Green Star calculation methodology (i.e. 8m of view away from external window)  
**Provisional review by WGE confirmed design to be compliant with mimimum credit criteria.**



<input type="checkbox"/>	Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and Carpets	1	1	At least 95% of paints, adhesives, sealants (by volume) and carpets (by area) to meet Green Star emissions limits. Requires additional documentation, careful tracking and monitoring during construction. <b>Architect FFE schedules demonstrated all carpets meets the credit emission limits.</b>	
<input type="checkbox"/>			13.2	Engineered Wood Products	1	1	The project is require to demonstrate that either no timber or at least 95% (by area) of all engineered wood products meet the Green Star formaldehyde emission limites. Requires additional documentation, careful tracking and monitoring during construction. <b>Architect FFE schedules demonstrated all engineered wood products are EO and meets the credit emission limits.</b>	
<input type="checkbox"/>	Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1	The project is require to demonstrate all primary and secondary spaces (with normal air-con) to achieve thermal comfort of -1<PMV<+1 for 98% of the year. <b>Provisional review by WGE confirmed design to be compliant with minimum credit criteria.</b>	
<input type="checkbox"/>			14.2	Advanced Thermal Comfort	1	0	<b>Credit not targeted</b>	
Total						17	9	

Energy					22		
Greenhouse Gas Emissions	E. Modelled Performance Pathway	15E.0	Conditional Requirement: Reference Building Pathway	-	Complies	Complies with minimum requirement.	
		15E.1	GHG Emissions Reduction: Building Fabric (Intermediate Building relative to Reference Building)	4	0	<b>Credit not targeted</b>	
		15E.2	GHG Emissions Reduction (Proposed Building relative to Benchmark Building)	16	7	Project will need to target 33% less greenhouse gas emissions (estimated) than benchmark building (equivalent to 4 points under Credit 15E.2) through the following energy efficient initiatives: - LED based lighting; - Efficient Air-conditionoing units (i.e. VRV/VRF units); - Building fabric performance exceeding NCC 2019 Section J DTS requirements - 99.6 kW Solar Photovoltaic System. Provision of 99.6 kW solar PV system can achieve credit criteria. <b>Provisional review by WGE confirmed design to be compliant with credit criteria.</b>	
		15E.3	Off-Site Renewables	8	0	<b>Credit not targeted</b>	
		15E.4	District Services	7	0	<b>Credit not targeted</b>	
		15E.5.1	Transition Plan	1	0	<b>Credit not targeted</b>	
		15E.5.2	Fuel Switching	2	0	<b>Credit not targeted</b>	
		15E.5.3	On-site storage	1	0	<b>Credit not targeted</b>	

Peak Electricity Demand Reduction	Performance Pathway	16B	Performance Pathway - Reference Building	2	2	Requires at least 20% reduction in peak electricity demand. Provision of 99.6 kW solar PV system can achieve credit criteria. Provisional review by WGE confirmed design to be compliant with credit criteria.
Total				20	9	

Transport				10		
Sustainable Transport	Performance Pathway	17A.1	Performance Pathway	10	2	Transport Consultant can be engaged to develop a Green Travel Plan. Site is predominantly accessible by car and bus.  Estimated 2 points targeted for future expansion of pedestrian access, promotion/encouragement of public transportation, electric vehicle charging spaces and provision of secure bicycle parking spaces.  Having a regular shuttle bus service may also be beneficial
Total				10	2	

Water12					
Potable Water	Performance Pathway	18A.1Potable Water - Performance Pathway	12	8	Estimated 8 points targeted through the following water efficiency initiatives: - High-efficient WELS fixtures & appliances; - Re-use of rainwater for landscape irrigation around the site.  WGE reviewed architectual FFE Schedules with Hydraulic documentation and confirmed design to be compliant with credit criteria.
Total			12	8	

Materials14					
Life Cycle Impacts	Prescriptive Pathway - Life Cycle Impacts	19A.1Comparative Life Cycle Assessment	0	0	Credit not targeted
		19A.2Additional Life Cycle Impact Reporting	0	0	Credit not targeted
		19B.1Concrete	3	0	Credit not targeted
		19B.2Steel	1	0	Credit not targeted
		19B.3Building Reuse	4	0	Credit not targeted
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1Structural and Reinforcing Steel	1	1	95% of steel (by mass) is sourced from a responsible steel maker and at least 60% by mass of all reinforcing bar and mesh is produced using energy-reducing processes. Steel to be sourced from compliant producers/suppliers
		20.2Timber Products	1	0	Credit not targeted
		20.3Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	0	Credit not targeted
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1Product Transparency and Sustainability	3	1	3% of products to have sustainability credential. Can be achieved through use of environmentally certified products (flooring, plasterboard, paints, steel)  Estimated one (1) point is awarded on the basis of providing sustainable materials as per EFSG requirements (Design Guide 02.05) and in support of Credit 13 and Credit 20. This is deemed to satisfy the intent of Green Star.
Construction and Demolition Waste	Percentage Benchmark	22BPercentage Benchmark	1	1	At least 90% of waste generated during construction and demolition (excluding contaminated materials, excavation waste) is to be diverted from landfill. Waste contractors & waste facilities must hold Green Star waste compliance verification summaries and provide monthly waste reports.
Total			12	3	

Land Use & Ecology					6	
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Sp	-	Complies	As per EFSG (Design Guide 02.06), new works has no impact on biodiversity within the existing school site. <b>This is deemed to satisfy the intent of Green Star.</b>
		23.1	Ecological Value	3	0	Based on the proposed new landscape area, For conservatism, 0 point is estimated to be achieved.
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies	<b>Deemed to comply</b> with Green Star conditional requirements as new works is developed on previously existing school site.
		24.1	Reuse of Land	1	1	<b>Deemed to satisfy</b> the intent of Green Star as new works is developed on previously existing school si
		24.2	Contamination and Hazardous Materials	1	1	Site-specific Geotechnical and Contamination reports is require to identify presence of asbestos. Assumed compliance based on remediation and validation works to be carried out by appropriate contractor in accordance with EPA/OH&S requirements.
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	0	<b>Credit not targeted</b>
Total				6	2	

Emissions					5	
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Reduced Peak Discharge	1	1	Post development stormwater discharge to not exceed pre-development discharge. Based on EFSG requirements (Design Guide 02.04), rainwater tanks will be provided reduce flow into the stormwater system. This is deemed to satisfy the intent of Green Star. <b>Civil Catchment Plan demonstrated Credit Compliance</b>
		26.2	Reduced Pollution Targets	1	0	<b>Credit not targeted</b>
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies	External lights to be AS 4282 compliant
		27.1	Light Pollution to Night Sky	1	1	External lights shall not exceed 5% ULOR. Alternatively, external lights design to meet external illuminance requirements.
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	1	This is achieved based on air cooled HVAC system and natural ventilation. <b>Mechancial drawings demonstrated Credit Compliance</b>
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	0	<b>Credit not targeted</b>
Total				5	3	

Innovation					10	
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10	0	
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in	30B	Market Transformation		0	
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks		2	Powered by renewables - 2 points for >10% PV power <b>Electrical drawings demonstrated Credit Compliance</b>
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		4	Financial Transparency (1 pt) - by Head Contractor Community Benefits (1Pt) - By Department of Education Universal Design (1 Pt) - by architect - <b>(EFSG DG19 Access for people with Disabilites deems to satisfy this requirements)</b> Reconciliation Action Plan (1 pt) - <b>(NSW DOE Draft Reflect RAP and APIC Policy June 2018 documents by Department of Education Deems to satisfy this requirements)</b>
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star	30E	Global Sustainability		1	Green Cleaning (1 pt) - By Building Owner
Total				10	7	

TOTALS	AVAILABLE	TARGETED
CORE POINTS	100	43.0

CATEGORY PERCENTAGE SCORE		43.0
INNOVATION POINTS	10	7.0
TOTAL SCORE TARGETED		50.0

Design with  
**community** in mind

Level 6, Building B  
207 Pacific Highway  
St Leonards NSW 2065  
Tel +61 +61 2 8484 7000  
E [sydney@wge.com.au](mailto:sydney@wge.com.au)

For more information please visit  
[www.wge.com.au](http://www.wge.com.au)



WOOD & GRIEVE ENGINEERS

NOW PART OF

