JONES NICHOLSON
CONSULTING ENGINEERS

ESD REPORT

FOR

FAIRVALE HIGH SCHOOL

PREPARED IN COORDINATION

WITH

JDH architects

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OUR REFERENCE: SDRPT-20161274.01B

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bsi. ISO 9001 Quality Management FS 594728 | ISO 14001 Environmental Management EMS 594729 | AS/NZS 4801 Occupational Health & Safety Management OHS 594730

OFFICE LOCATIONS
BRISBANE
GOLD COAST
SINGLETON
SYDNEY-CBD
SUTHERLAND
WOLLONGONG
MOSS VALE
NOWRA
GOULBURN

REVISION HISTORY

REVISION	DATE	BY	CHECKED	COMMENTS
A	16/10/17	DF	BJ	For Issue
b	29/10/17	DF	BJ	Revised For Issue

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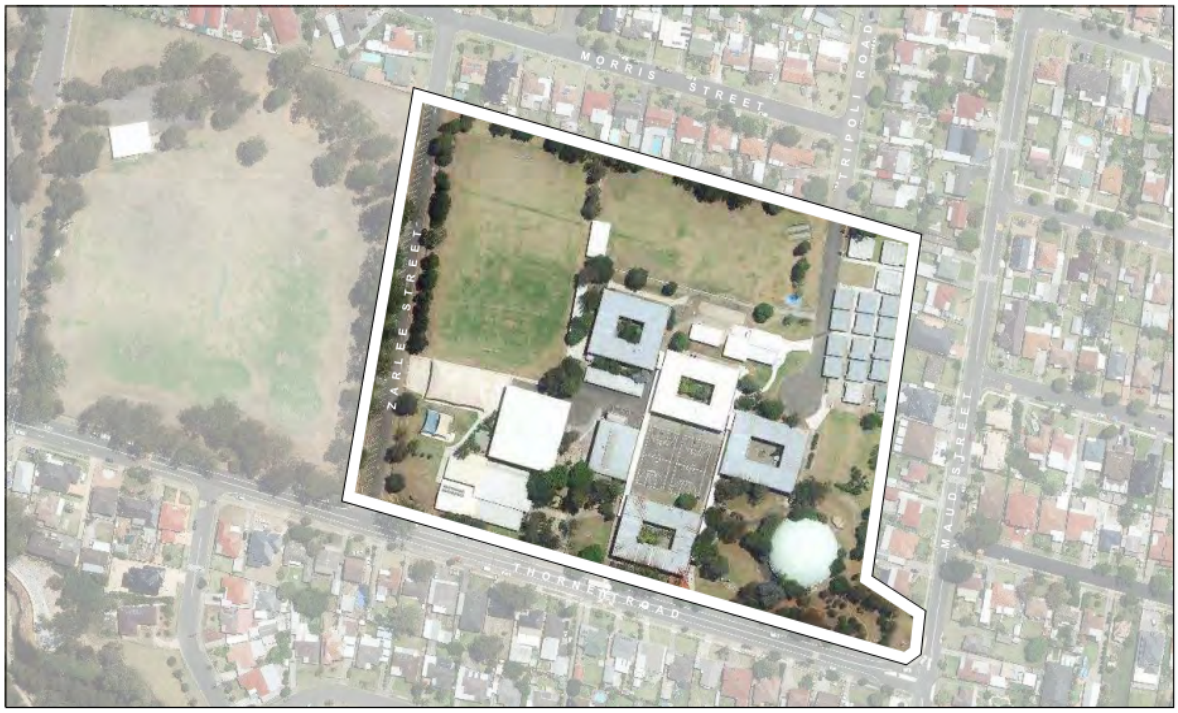
1 INTRODUCTION

This ESD report has been prepared by Jones Nicholson consulting engineers as part of the SSD 8677 application for the development at Fairvale High School, 1 Thorney Road, Fairfield West.



This report details how ESD principles will be incorporated into the design and ongoing operational phases of the development in accordance with the Educational Facilities Standards and Guidelines (EFSG) and Clause 7(4) of schedule 2 of the Environmental Planning and Assessment Regulation 2000 as per the requirements of the SEARs report for application SSD 8677.

Numerous measures have been implemented to minimise consumption of resources, water and energy which have been categorised by discipline below.

Together these support the requirements of a Green Star 4 Star rating, which is considered to be best practice within the Australian building industry. The current version of the rating tool is: Green Star Design & As Built v1.2 (which supersedes Green Star – Education v1 Design).

The proposed works involves the demolition and removal of Block C, Block G, Cola's and demountable buildings and construction of new Multi Purpose Hall and 3 Storey Teaching and Learning space. Building A will be refurbished as part of the works and New COLA's constructed.

2 SEARS REQUIREMENTS

The Secretary's Environmental Assessment Requirements, Item 6 Ecologically Sustainable Design states the follow must be achieved for application SSD8677.

- Detail how ESD principles (as defined in Clause 7(4) of schedule of the Environmental Planning and Assessment Regulation 2000, will be incorporated in the design and ongoing operation phases of the development.
- Demonstrate that the development has been assessed against a suitably accredited rating scheme to meet industry best practice.
- Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.

3 DEFINITIONS AND PLANNING REGULATIONS

DEFINITION

Ecologically Sustainable Development (ESD) is defined in Australia as: using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased.

PLANNING REGULATION PRINCIPLES

According to Clause 7(4) of schedule 2 of the Environmental Planning and Assessment Regulation 2000, the principles of ESD are as follows:

- The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
    - Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
    - An assessment of the risk-weighted consequences of various options,
- Inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,
- Conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
- Improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as:
    - Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
    - The users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
    - Environmental goals, having been established, should be pursued in the most cost effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

Applying ESD principles to the design will ensure the project meets the aim of NSW Government Resource Efficiency Policy (GREP), which is to reduce Government's operating costs and to lead by example in increasing resource productivity. The policy aims to drive resource efficiency by Government agencies in three main areas: energy, water and waste, and reduce harmful air emissions from government operations.

4 OBJECTIVES

In order to meet the requirements of the Department of Education (DoE) for new school buildings, the project team will need to follow the policies set out in the EFSG design guide:

- Section 2.03 Environmental Design Polices of the EFSG requires that any new school buildings on an existing or new site will be able to achieve a minimum 4 Star Green Star Rating, which the EFSG states is an expected consequence of complying with the policies set out within the EFSG design guide. It is not, however, a requirement that the project obtain a formal Green Star certification.

- Section 2.04 Environmental Design Features of Education Facilities of the EFSG also states that a major objective in the design of Education Facilities is to achieve good indoor environmental quality and comfort conditions with minimum energy consumption. This project will employ passive design principles wherever possible to achieve this.

- Furthermore, the development will meet all regulatory sustainability requirements including Section J Energy Efficiency of the National Construction Code (NCC).

5 GREENSTAR EQUIVALENCE SUSTAINABILITY INITIATIVES

This section describes the sustainability initiatives that are targeted by the Fairvale High School project, organised by discipline with reference to the appropriate Green Star credits.

5.1 BUILDING SERVICES

Sustainability Initiative	Green Star Credit
Best practice commissioning, handover and tuning initiatives will be undertaken to ensure all building services operate to their full potential and as designed. These shall include: documented targets for environmental performance, comprehensive services and maintainability review of the project, comprehensive pre-commissioning and commissioning activities and a tuning process that addresses all nominated buildings.	2. Commissioning and Tuning
Comprehensive operations and maintenance (O&M) information will be provided to the facilities management team including a building log book. The intent is to provide a central point of information to facilitate operator understanding of the building's systems, their O&M requirements and their environmental targets to enable optimised performance.	4. Building Information
Accessible metering to be provided to all energy and water common uses and major uses, and to energy and water sources provided by the project. A monitoring strategy will be addressed through a monitoring system, capable of capturing and processing the data produced by the installed energy and water meters. The monitoring system must accurately and clearly present the metered data and include reports on consumption trends.	6. Metering and Monitoring
Adhesives and sealants are to meet stipulated 'Total VOC Limits' in order to safeguard occupant health through the reduction in internal air pollutant levels.	13. Indoor Pollutants
A high percentage of pipes and cables used in the project will be responsibly sourced or have a sustainable supply chain.	20. Responsible Building Materials 21. Sustainable Products

5.1.1 MECHANICAL SERVICES

Sustainability Initiative	Green Star Credit
Natural ventilation is used wherever practicable since it is the preferred option to maintain good indoor environmental air quality throughout school areas. In simple buildings this is achieved by the use of operable windows located on two opposite sides to enable natural cross ventilation. Where natural cross ventilation cannot be provided, other forms of assisted ventilation will be required. The type of ventilation selected is to be determined based on a Whole of Life assessment of the individual situation. As per the EFSG, rooms will incorporate fans to assist ventilation.	9. Indoor Air Quality
No conditioned air will be provided to classrooms, based on EFSG guidelines for schools on the east coast of NSW. Split systems will be provided to Comms rooms and critical areas only. Since the majority of spaces are naturally ventilated, there is a huge reduction in the energy consumption and, hence, greenhouse gas emissions associated with the development during its working life.	15. Greenhouse Gas Emissions.
Roof and wall insulation are to achieve the required NCC Section J Part J1 Building Fabric insulation requirements as a minimum which contribute to good passive design.	15. Greenhouse Gas Emissions.
No mechanical system is to employ water based heat rejection used which is beneficial to reducing potable water consumption and removes the risk of waterborne microbial diseases.	18. Potable Water 28. Microbial Control
The calculated Total System Direct Environmental Impact (TSDEI) of the refrigerant systems in the building is less than 15 to ensure the environmental impacts of refrigeration and air conditioning equipment are minimised.	29. Refrigerant Impacts

5.1.2 ELECTRICAL SERVICES

Sustainability Initiative	Green Star Credit
Lighting will be flicker free and address perception of colour in the space, complying with best practice illumination guidelines.	11. Lighting Comfort
The narrow floorplates of the proposal are ideally laid out to permit extensive high-quality daylight, leading to superior learning and teaching space amenity and can additionally lead to reduced lighting power density and energy consumption for lighting.	11. Lighting Comfort 15. Greenhouse Gas Emissions.
Period Bell Light switching systems or equivalent (such as occupancy sensors) to automatically switch lights off when room is unoccupied are to be in all new schools, major conversions and additions. As per the EFSG, this is to be installed in each classroom to automatically turn off luminaires after class. All luminaires in rooms are to automatically turn off five minutes after the period bell has rung and all students have left the room. A conscious decision is required to run the lights on again. Motion sensors are to be in infrequently used rooms such as store rooms, plant rooms, staff toilets and the like. Together, this allows significant savings on luminaire energy consumption and ongoing running costs in schools.	15. Greenhouse Gas Emissions.
The proposal includes PV (photovoltaic) arrays to further reduce ongoing energy costs for the school. The area of roof could potentially accommodate a large amount of PV panels to satisfy a significant proportion of the electrical usage of the school and potentially export electricity back to the grid.	15. Greenhouse Gas Emissions. 16. Peak Electricity Demand Reduction
Exterior and landscape lighting shall be carefully selected to ensure there has been a reduction in light pollution through either the control of upward light output ratio (ULOR) or control of direct illuminance.	27. Light Pollution

5.1.3 HYDRAULIC SERVICES

Sustainability Initiative	Green Star Credit
The proposal includes rainwater tanks and re-use of rainwater for irrigating mass-planted areas of landscape. The proposed landscape will be low water demand, and any irrigation will be via sub-soil drip irrigation in order to further minimise water consumption and costs.	18. Potable Water
High efficiency fixtures and fitting are used throughout the development to comply with minimum Water Efficiency Labelling and Standards Scheme (WELS) star ratings as stipulated under w3 of the NSW GREP. Internal flow controllers can be used to minimise water usage and wastage for staff amenities. Taps with timed flow can be used to minimise water usage and wastage in student amenities. Dual flushing cisterns with minimum WELS rating of 4 are to be used to reduce water usage and minimise waste. Appropriate cisterns must be used with a suitably rated pan to ensure effective use. Manual flushing urinals are preferred. Waterless urinals should only be considered in new facilities with appropriate drainage. Maintenance of waterless urinals should be strictly in line with the manufacturers recommendations to ensure effective use.	18. Potable Water

5.2 STRUCTURAL

Sustainability Initiative	Green Star Credit
Adhesives and sealants are to meet stipulated 'Total VOC Limits' and engineered wood products are to meet stipulated formaldehyde limits in order to safeguard occupant health through the reduction in internal air pollutant levels.	13. Indoor Pollutants
The project aims to minimise the consumption of resources required for construction, through, where practicable, the adaptive reuse of existing buildings on site.	19. Life Cycle Impacts
The project seeks to reduce the usage of Portland cement in all concrete by replacing it with supplementary cementitious materials. Mix water for all concrete used in the project contains at least 50% captured or reclaimed water. A large proportion of coarse aggregate in the concrete is crushed slag aggregate or another alternative material. A large proportion of fine aggregate inputs in the concrete are manufactured sand or other alternative materials.	19. Life Cycle Impacts
A high percentage of the building's structural and reinforcing steel is to be sourced from a Responsible Steel Maker.	20. Responsible Building Materials
A high percentage of all timber used in the building and construction works will be responsibly sourced or have a sustainable supply chain. Only recycled timber, engineered and glued timber composite products, timber from plantations or from sustainably managed regrowth forests are to be used.	20. Responsible Building Materials 21. Sustainable Products

5.3 CIVIL

Sustainability Initiative	Green Star Credit
The post-development peak event discharge from site shall not exceed the pre-development peak event discharge.	26. Stormwater
Stormwater from the site reduces pollutants entering public waterways. A gross pollutant trap (or similar) and swale landscapes will assist in the treatment of stormwater prior to discharge from the site.	26. Stormwater

6 SUMMARY

This project has met the sustainability requirements of the EFSG by incorporating the above sustainability initiatives as set out in the guidelines. Together, the above initiatives contribute to Green Star Credits:

- Credit 2 – Commissioning and Tuning
- Credit 4 – Building Information
- Credit 6 – Metering and Monitoring
- Credit 9 – Indoor Air Quality
- Credit 11 – Lighting Comfort
- Credit 13 – Indoor Pollutants
- Credit 15 – Greenhouse Gas Emissions
- Credit 16 – Peak Electricity Demand Reduction
- Credit 18 – Potable Water
- Credit 19 – Life Cycle Impacts
- Credit 20 – Responsible Building Materials
- Credit 21 – Sustainable Products
- Credit 26 – Stormwater
- Credit 27 – Light Pollution
- Credit 28 – Microbial Control
- Credit 29 – Refrigerant Impacts

Whilst the project is not formally providing a Greenstar rating it has been designed in accordance with the EFSG, which could potentially contribute to a Green Star Design & As Built v1.2 rating of 4 Stars, which is considered best practice within the Australian building industry.