ESD REPORT

ST JOSEPH'S COLLEGE

Hunters Hill, NSW

S.SJC-0101-St Joseph's-ESD-RP001

Report Date: 12/07/2018

Umow Lai

engineering sustainable environments

REPORT AUTHORISATION

PROJECT: St Joseph's College

Hunters Hill, NSW

Date	Rev	Comment	Prepared by	Checked by	Authorised by
11/01/18	0	Draft Issue	DAA	HM	
23/02/18	1	Final Issue	DAA	HM	PE
12/07/18	2	Updated to incorporate PM comments	DAA	HM	PE

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1.0 INTRODUCTION

1.1 GENERAL

This ESD Report has been prepared by Umow Lai on behalf of Marist Brothers St Joseph's College (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD 8970 for the development of 'St Joseph's College Physical Education and Sports Precinct Project (PESPP)' at Mark Street, Hunters Hill, NSW (the 'Site').

The purpose of this ESD Report is to outline the measures that are proposed to be implemented to minimise consumption of resources, energy and water, and to demonstrate that the PESPP project has been assessed against a suitable accredited rating framework.

The sustainability initiatives proposed for the development including water and energy efficiency initiatives are in addition to the minimum compliance requirements of the BCA (i.e. Section J).

As a result of the sustainability initiatives discussed within this report, the St Joseph's College development is expected to achieve a high level of environmental sustainability. The proposal also seeks to achieve an informal Green Star rating of 4-Stars, which is considered a 'Best Practice' equivalency outcome.

1.2 PROJECT DESCRIPTION

1. **Demolition** of the following existing buildings (which are not heritage significant) near the intersection of Luke Street and Gladesville Road:
   (a) College Shop
   (b) Healy Gym and Maintenance Workshop
   (c) Outdoor Sports Courts
   (d) Workshop/Storage and Shed.
2. **Construction** of the Physical Education and Sports Precinct Project (PESPP) comprising the following facilities:
   (a) Lower Ground Floor: New car parking, maintenance workshops, storage, offices, amenities etc. A net increase of 55 car parking spaces is proposed (85 new spaces to be provided in the PESPP basement less 30 at grade spaces to be removed)
   (b) Ground Floor: Three indoor sports courts, amenities, kitchen and entry lobbies
   (c) First Floor: Void over sports courts, bench seating (180 seats), staff facilities, two general learning areas and foyer
   (d) Driveway entry to the PESPP (no new vehicular cross overs)
   (e) Landscaping and tree removal/replacement.
3. **Construction** of a new single storey building to accommodate the relocated Healy Gym in the north-western corner of the site near the intersection of Mary Street and Mark Street.
4. **New** kiosk substation and landscaping in the north-eastern corner of the site.
5. **Use** of the completed works as an educational establishment.
6. **Staging** which would facilitate completion of the PESPP in up to two stages (noting that the entire project may be completed in one stage).

1.3 REFERENCED STANDARDS

This report has been undertaken with reference to the following:

- Clause 7(4) Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulations)
- Green Building Council of Australia, Green Star Design & As-Built v1.2 Rating Tool
- NCC 2016 Building Code of Australia – Volume 1

1.4 SOURCE DOCUMENTATION

The project's architectural documentation has been used in preparation of this report. Inputs have also been coordinated with all relevant Consultants.

1.5 LIMITATIONS OF THIS REPORT

Due care and skill has been exercised in the preparation of this report.

The purpose of this ESD Report is to outline the measures that are proposed to be implemented to minimise consumption of resources, energy and water, and to demonstrate that the project has been assessed against a suitable accredited rating scheme, as detailed within the EIS. It should be read in conjunction with the current project documentation and specific applications may vary during the design development of the project.

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 Umow Lai for detailed advice which will take into account that party's particular requirements.

2.0 SCHEDULE 2 OF EP&A REGULATION 2000

The followings section details how the proposed St Joseph's College incorporates the principles of ecologically sustainable development (ESD) in accordance with Schedule 2 Clause 7(4) of the *Environmental Planning and Assessment Regulation 2000* (EP&A Regulation).

2.1 THE PRECAUTIONARY PRINCIPLE

Per Schedule 2 Clause 7(4) of the EP & A Regulation:

*(a) 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:*

(i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and

(ii) an assessment of the risk-weighted consequences of various options.

2.1.1 PROJECT RESPONSE

The precautionary principle has been adopted and all potential impacts have been considered and mitigated where a risk is present, as outlined in this report and any accompanying documentation.

The built form embraces sustainable design principles as it has been planned to maximise the passive (i.e. energy free) performance of the building by introducing abundant natural daylight and harnessing natural ventilation.

A study of proposed roof forms has been undertaken to maximise the platform for on-site renewable energy generation, stormwater design will ensure post-development peak event discharge rates do not exceed pre-development rates and design development will explore the feasibility for all rainwater from new roofs is to be captured and re-used for the irrigation of nearby sports fields. Roof materials and colours will also be carefully selected in order to contribute to a cooler microclimate and mitigate any potential for the 'Heat Island Effect'.

Building services, lighting and equipment will be specified to be highly energy efficient using current best practice approaches and products.

Whilst a comprehensive climate risk assessment has not been carried out on this site, any potential future climate-driven risks relating to this site have been considered, with the highest risk being an increase in maximum temperatures and the length and frequency of heat events.

In relation to any predicted increases in temperatures, the current concept design pays particular attention to addressing high external heat loads by proposing measured glass to façade ratios and other passive measures to support energy efficient mechanical solutions. Design development will further explore options for enhancements to the building thermal envelope through increased insulation, high-performance glazing and careful consideration of thermal mass.

Therefore the design directly addresses Greenhouse Gas Emissions (GHG Emissions) and their impact on climate change.

2.2 INTER-GENERATIONAL EQUITY

Per Schedule 2 Clause 7(4) of the EP & A Regulation:

*(b) **"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.*

2.2.1 PROJECT RESPONSE

The concept design has embraced Indoor Environmental Quality as a fundamental requirement by focusing on delivering fresh air, optimum thermal comfort, quality acoustics, and low toxicity materials and finishes.

The proposed design places an emphasis on access to natural ventilation and daylight that will result in the project actively engaging its occupants with their surroundings, considered a key factor in the link between building design and occupant wellbeing – commonly referred to as our 'biophilic response'.

A focus on energy efficiency will have a measurable reduction in energy consumption and associated GHG Emissions. GHG Emissions are a known key contributor to human-caused climate change, considered one of the most critical inter-generational issues of our time.

2.3 CONSERVATION OF BIOLOGICAL DIVERSITY AND ECOLOGICAL INTEGRITY

Per Schedule 2 Clause 7(4) of the EP & A Regulation:

*(c) **"conservation of biological diversity and ecological integrity"** , namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration.*

2.3.1 PROJECT RESPONSE

The proposed works have minimal impact on existing vegetation and biological communities on the site, moreover the intended works include re-instating additional site vegetation. The landscape design will consider a range of initiatives to enhance the biodiversity on the site. Refer to the landscape architectural package for more information on proposed landscape.

2.4 IMPROVED VALUATION, PRICING AND INCENTIVE MECHANISMS

Per Schedule 2 Clause 7(4) of the EP & A Regulation:

*(d) **"improved valuation, pricing and incentive mechanisms"**, namely, that environmental factors should be included in the valuation of assets and services, such as:*

(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,

(ii) 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,

(iii) 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.

2.4.1 PROJECT RESPONSE

The environmental targets for the project have largely been embedded in the nature of the development rather than as additional 'add-on' items. For example, the proposed areas will have a high degree of thermal efficiency and careful considerations has been given to incorporate excellent distribution of daylight and optimisation of natural ventilation into the sports courts, learning spaces and supplementary areas – reducing ongoing operating costs for the school. A utility monitoring strategy is also proposed for on-going management of energy and water consumption.

A reduction in waste directed to landfill will be realised through planned waste management strategies and as such a cost saving may be realised. Further cost savings will be achieved by a reduction in potable water consumption via rainwater harvesting and re-use. Finally, by ensuring the total volume of stormwater discharge is not increased this development will place no greater strain on existing infrastructure, thus negating the need to upgrade said infrastructure. The cost of which ultimately gets passed onto the rate payer in the medium to long term.

3.0 RATING SCHEME EQUIVALENCE - GREEN STAR

Green Star has been selected by the Client/Applicant as a framework for the proposal's sustainability attributes. Green Star is a comprehensive environmental rating system for buildings and communities. Green Star separately evaluates the environmental initiatives of design, projects and/or buildings based on a number of criteria, including energy and water efficiency, indoor environmental quality and resource conservations.

The proposal's informal (i.e. not formally certified by the Green Building Council of Australia, the administrators for Green Star) rating achieves 4-Stars, which is considered 'Best Practice' equivalency outcome.

The Green Star environmental rating system for buildings was created for the property industry in order to:

- Establish a common language;
- Set a standard of measurement for green buildings;
- Promote integrated, whole-building design;
- Recognise environmental leadership;
- Identify building life-cycle impacts; and
- Raise awareness of green building benefits.

3.1 GREEN STAR CATEGORIES

The Green Star rating systems is made up of the following environmental categories:

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

The categories are then divided into individual credits, each of which addresses an initiative that improves or has the potential to improve, a design, project or building's environmental performance. Points are awarded in each credit for actions that demonstrate the project has met the overall objectives or Green Star and the specific aims of the rating tool.

In establishing the project's level of alignment with the Green Star rating tool 'scorecard', several assumptions must be made relating to how the future school will be managed and operated. Given that Green Star rewards projects not only for built works but also for how the completed building is operated, it is necessary during design phases to assume a minimum or best practice level of operational performance. The assumptions made within are considered 'typical' for new buildings and will without exception contribute to better environmental and financial performance of the completed school.

3.1.1 MANAGEMENT

The management category encourages and rewards the adoption of practices and processes that enable and support best practice sustainability outcomes throughout the different phases of a project's design, construction and its ongoing operation. The management category recognises projects which improve their sustainability performance by influencing areas where decision-making is critical, rewarding the implementation of processes and strategies that support positive sustainability outcomes during construction. The category also promotes practices that ensure a project will be used to its optimum operational potential.

The Project will include the following initiatives:

1. The Project team will establish ongoing environmental performance targets relating to its consumption of energy and water, production and recycling of waste, and to the ongoing maintenance and improvement of good indoor environmental quality. Furthermore the school will monitor and report on nominated targets to ensure consequential outcomes.
2. During design and documentation, the Project team will review the design for its ease of maintenance for all building services and building fabric.
3. Comprehensive pre-commissioning and commissioning activities will be performed for all nominated building systems.
4. Building user guides will be produced by the Contractor to help users interact effectively with the buildings, optimising building performance and user comfort. The Guides will include guidance on all sustainability attributes of the site, and also information on maintenance requirements.
5. Building services will include metering on all major energy and water-consuming equipment, providing the facility manager with information on system performance and allowing them to closely manage efficient use of resources on site.
6. A systematic and methodical Environmental Management plan will be formalised for implementation during the construction phase by the Contractor.
7. The design will include infrastructure for operational waste management and the separation of waste streams.

3.1.2 INDOOR ENVIRONMENTAL QUALITY

The Indoor Environment Quality category aims to encourage and reward initiatives that enhance the comfort and well-being of occupants. The credits within this category address issues such as air quality, thermal comfort and acoustic comfort. This category rewards projects that achieve sustainability performance improvements in a manner that also improves occupants' experience of the space. The 'Indoor Environment Quality' category recognises that buildings are designed for people and that a holistic approach should be taken where reductions in energy use and occupants' health and wellbeing are not pursued to the detriment of each other.

The Project will include the following initiatives:

1. Mixed-mode ventilation is proposed for the sports court areas, providing natural ventilation for the majority of the time when used as a sports facility, or in "sports mode". This is combined with active cooling & heating which can be used in non-sports mode. The strategy should allow the proposal to significantly exceed the requirements for the provision of outdoor air as per 1668.2:2012.

2. The project will address noise transmission in enclosed spaces through acoustic separation, whereby appropriate partitions between the sports court, staff facilities, general learning spaces and amenities will be constructed to achieve a weighted sound reduction index of at least 45.
3. Light fittings shall be selected, where possible, such that glare is controlled or reduced and where required glare from sunlight will be reduced through a combination of blinds, screen, fixed devices, or other means. Occupants will also have the ability to control lighting in the spaces through manual lighting controls.
4. All habitable areas will be extensively daylit through the inclusion of skylights and windows, delivering high levels of daylight.
5. All paints, sealants, adhesives, floor coverings and composite timbers used internally will meet low VOC (Volatile Organic Compound) emissions limits in accordance with Green Star Design and As-Built v1.2 VOC Emissions limits tables.
6. Any engineered wood products will meet stipulated formaldehyde limits as per Green Star Design and As-Built v1.2 Table 13.2: Formaldehyde Emissions Limit Values for Engineering Wood Products.

3.1.3 ENERGY

The Energy category aims to reward projects that are designed and constructed to reduce their overall operational energy consumption below that of a comparable standard-practice building. Such reductions are directly related to reduced greenhouse gas emissions, lower overall energy demand as well as reductions in operating costs for building owners and occupants. The Energy category rewards projects that facilitate reductions in greenhouse gas emissions through energy efficient design and encourage the utilisation of energy generated by low-emission sources.

The Project will include the following initiatives:

1. Energy modelling demonstrating a reduction in energy consumption and GHG emissions of the proposed building as compared to a reference building; for 7 points as per Credit 15 of the Green Star pathway.
2. A high percentage of lighting will be controlled either through occupant detection, daylight controls or time clock controlled to meet BCA Section J6 requirements.
3. A mixed-mode ventilation strategy will provide low energy, mechanically assisted, natural ventilation for most of the occupied hours. Active cooling & heating only will only be utilised in the sports court when being used for alternative purposes (such as assembles or the like). In staff facilities and general learning areas, the intention is to operate air-conditioning only on days with markedly high ambient temperatures, subject to thermal comfort analysis.
4. The domestic hot water system (DHW) will be low–emission, utilising one or any combination of the following technologies (to be selected during detailed design):
    a. Natural gas with solar pre-heat
    b. Natural gas with high-efficiency condensing boilers
    c. Heat-pump technology. Heat-pumps utilising natural refrigerants (e.g. CO_2) will be preferred over those using conventional refrigerants

5. The project will make provisions for the inclusion of solar photovoltaic (PV) arrays to supplement energy consumption and reduce ongoing operating costs. It is proposed the available roof space is reviewed and a suitable PV system be assessed for feasibility in detailed design stage.

3.1.4 TRANSPORT

The Transport category aims to reward projects that facilitate a reduction in the dependency on private car use and promote the use of alternative means of transport to reduce overall greenhouse gas emissions.

If reliance on individual motor vehicle transportation is to be reduced, it is necessary to maximise alternative transportation options. Rather than limiting access to private fossil fuel vehicles, the Transport category aims to encourage and reward initiatives that reduce the need for their use. This may include initiatives that encourage and make possible the use of mass transport options, cycling or walking, and the selection of sites that are close to a large number of amenities.

The Project will include the following initiatives:

1. The site is highly accessible by various bus routes with the closest being less than 5 minutes' walk. In addition the site is in close proximity to a number of community services.

3.1.5 WATER

The Water category aims to encourage and reward initiatives that reduce the consumption of potable water through measures such as the incorporation of water efficient fixtures and building systems and water re-use.

Reductions in operational water consumption may be achieved through the maximisation of water efficiency within the project.

The Project will include the following initiatives:

1. The proposal includes rainwater harvest and re-use.
2. All bathroom fixtures (toilet pans, urinals, hand basin taps and showers) will meet minimum WELS ratings in accordance with the applicable Green Star Guidelines:
    a. Basin taps and urinals to be equal to or more than 5 Star WELS
    b. Showers to be equal to or more than 3 Star WELS
    c. Toilets to be equal to or more than 4 Star WELS
3. Landscape areas will be irrigated using sub-soil drip irrigation with wherever practical automated control to limit unnecessary irrigation.

3.1.6 MATERIALS

The Materials category aims to address the consumption of resources within a building construction context, by encouraging the selection of lower-impact materials. The category also encourages absolute reductions in the amount of waste generated or the recycling of as much of the waste generated as possible.

The Project will include the following initiative:

1. A minimum 90% of all construction waste generated will be diverted from landfill by either re-use or recycling.

In addition the following options are being explored and may also be incorporated:

1. A high percentage of PVC products used in the project including those in all formwork, pipes, flooring, blinds and cables shall meet the *Best Practice Guidelines for PVC in the Built Environment*, published by the Green Building Council of Australia.
2. A high percentage of timber used in building and construction will be from a reused source or certified by a forest certification scheme.

3.1.7 LAND USE AND ECOLOGY

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

The Project addresses this category through the following:

1. The total proposed works are contained within the existing site and the site's current ecological value will be improved through well-considered landscape design. This includes the replacement of trees along the eastern boundary (Luke Street) which need to be removed during construction.
2. Rooftops that will contribute to a cooler microclimate through the use of light coloured roof materials to reduce the 'Heat Island Effect'.

3.1.8 EMISSIONS

The Emissions category aims to assess the environmental impacts of 'point source' pollution generated by projects. Negative impacts commonly associated with buildings might include increased stormwater discharge and pollutants entering the public sewer or disturbances to native animals and their migratory patterns as a result of light pollution.

The Project will include the following initiatives:

1. The lighting design shall be compliant with AS1158: Lighting for Roads and Public Spaces and AS4282: Control of the Obtrusive Effects of Outdoor Lighting. This would be achieved through control of upward light output ration (LOR) or control of direct illuminance.
2. Landscape concepts will be applied to achieve a high level of stormwater performance across the site, improving water quality prior to discharge from the site.

3.1.9 INNOVATION

The Innovation category is a way of encouraging, recognising, and rewarding the spread of innovative practices, processes and strategies that promote sustainable communities and cities.

The Innovation category acknowledges efforts which demonstrate that sustainable development principles have been incorporated not only for the community for which the Green Star criteria apply, but also in a broader sense. This may include collaboration between developers and other parties, and is recognised separately from any outcomes rewarded in other categories.

At this early stage of the project the details of potential Innovations have not yet been developed, which typically require extensive input from the design team, final facility operators, managers and users.

4.0 RESOURCES, ENERGY AND WATER

As described in the previous sections, the project has adopted multiple initiatives that combine to reduce the consumption of resources, energy and water during construction and operation, and also to support the adoption of more sustainable resources.

4.1 RESOURCES

- The proposal aims to minimise the consumption of resources by utilising a high percentage of timber, formwork, pipes, flooring, blinds and cables in the project to be responsibly sourced or have a sustainable supply chain.

4.2 ENERGY

- The proposed spaces have been designed to allow daylight harvesting, leading to improved amenity and subsequently to reduced energy consumption. Mixed-mode ventilation, which will utilise natural ventilation as often as possible will broaden the energy savings opportunities and reduce costs.
- The proposal is investigating the provisions for the future inclusion of solar PV arrays to further reduce ongoing energy costs for the school.

4.3 WATER

- The proposal includes rainwater tanks and re-use of rainwater for irrigating of nearby sports fields and landscaping.
- The proposed stormwater design will ensure current discharge rates are not increased and where ever possible are reduced. System design will also incorporate Pollution Reduction Targets.
- Potable water consumption will be reduced through the installation of highly water efficient fittings and fixtures.
- 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.

5.0 SUSTAINABLE TRANSPORT

As the proposal is an additions and alterations the below outlines site wide sustainable transport initiatives which offer various transport options in order to reduce a dependency on private car use and promote the use of healthy means of transport as an important means of reducing overall greenhouse gas emissions. The proposal seeks to utilise and enhance these initiative where ever possible.

5.1 ACCESS TO PUBLIC TRANSPORT

The site has almost immediate access to public transport options, Sydney CBD can be reached by bus in under 40 minutes and they operate approximately every 15 minutes at peak times.

5.2 ACTIVE TRANSPORT FACILITIES

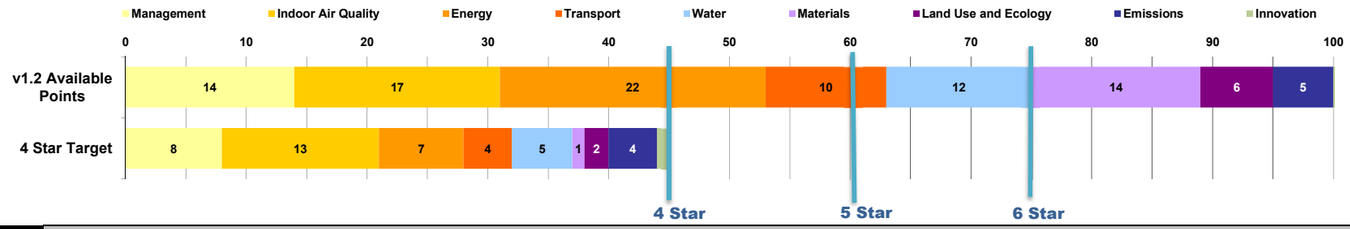
The proposal seeks to improve upon the sites existing active transport facilities by utilising bicycle parking and providing additional associated services for students and staff.

5.3 WALKABLE NEIGHBOURHOOD

The site is located in an area which has numerous amenities within easy walking distance, limiting the need for access via motor vehicle transportation.

6.0 APPENDIX A – GREEN STAR PATHWAY

ST.JOSEPH'S SCP: GREEN STAR PATHWAY



New South Wales	Green Star Design & As-Built Credit	v1.2 Available Points	4 Star Target	Optional for Consideration	Compliance Requirements & Comment	Credit Responsibility Delegation: Client	Design Team	Consultant	Contractor	Green Star Equivalency Cost Comments: Cost Impact	Comment
MANAGEMENT		**14%**									
1.0	Green Star Accredited Professional	1	1	-	A Green Star Accredited Professional (GSAP) to be included on the project. Umow Lai are providing GSAP role.		Y	ESD	Y	Negligible	ESD consultant engaged already
2.0	Environmental Performance Targets	-	Complies	-	Targets for energy and water consumption to be set and documented. E.g. 25% improvement on min DTS Energy Performance. 50% potable water reduction than typical school building.		Y	ALL		Negligible	No cost to developing targets internally
2.1	Services and Maintainability Review	1	1	-	School FM staff to review design during design stage and prior to construction. FM to consider commissionability, controlability, maintanability, fit for purpose and safety.	Y				Negligible	This would be done by School as good practice
2.2	Building Commissioning	1	1	-	Pre-commissioning & commissioning must be undertaken to CIBSE, ASHRAE and/or AIRAH standards/guidelines. Now also requires air tightness testing. This is largely standard practice now for upper tier builders, with the exception of airtightness testing.		Y	ALL	Y	Low	Commissioning activites primarily negligible cost, with exception of airtightness testing.
2.3	Building Systems Tuning	1		-	Not claimed.	-	-		-		
2.4	Independent Commissioning Agent	1		-	Not claimed.	-	-		-		
3.1	Implementation of a Climate Adaptation Plan	2		-	Not claimed.	-	-		-		
4.0	Building Information	1	1	-	Development of Building User Information guide to be included in Head Contractor scope. Involves developing package for occupants about building functions, initiatives to enhance energy efficiency, and O&M Information package and a Building Log Book. Intent to provide central point of information for those managing the facility.				Y	Negligible	Generally included within Contractor scope as best practice hand-over materials.
5.1	Environmental Building Performance	1	1	-	Require the School to commitment to set, measure and report on Environmental Performance targets set through Credit 2.0.	Y				Negligible	No cost to developing targets internally
5.2	End of Life Waste Performance	1		-	Not claimed. Conctratually limits the extent of fitouts within a specific period.	-	-		-	NA	-
6.0	Metering	-	Complies	-	Metering to be provided to monitor building energy and water consumption. Sub-metering must be provided to all major energy/water/gas demands (more extensive than minimum compliance).		Y	MECH ELEC HYDRO	Y	Low	Allowance above base Section J metering
6.1	Monitoring Systems	1	1	-	Requires strategy for how to monitor and use data from collected from BMS. Cloud based technology platforms can be applied for utility management and benchmarking.		Y	SCHOOL MECH ELEC HYDRO	Y	Low	Base functionality provided by BMS, however dedicated cloud platforms are better suited.
7.0	Environmental Management Plan	-	Complies	-	A comprehensive project-specific Environmental Management Plan (EMP) must be in place for consutruction. To be included in Head contractor clauses/specification.				Y	Negligible	Good site practice anyway.
7.1	Formalised Environmental Management System	1	1	-	Formalised, systematic and methodical approach to planning, implementing and auditing the EMP to ensure conformance to EMP. To be included in Head contractor clauses/specification. Requires ISO14001 certification for the head contractor.				Y	Negligible	Expected of responsible contractor
7.2	High Quality Staff Support	1		-	Not claimed.	-	-		-		
8B	Operational Waste	1	1	-	Requires on-site waste recycling system which are consistent with best practice requirements.		Y	SCHOOL ARCH		Negligible	Integrated with school waste management practices
	Category Total	14	**8**								
INDOOR ENVIRONMENTAL QUALITY		**17%**									
9.1	Ventilation System Attribiutes	1	1	-	Ventilation system design must meet best practice requirements with regards to intakes and exhaust locations	-	-		-	Negligible	Good design practices
9.2	Provision of Outdoor Air	2	1	-	1 points awarded for increase of 50% on AS 1668 minimum OA requirements.		Y	MECH		Low	Marginal increase in some ventilation systems
9.3	Exhaust or Elimination of Pollutants	1		-	Not claimed.	-	-		-		
10.1	Internal Noise Levels	1		-	Not claimed.	-	-		-		
10.2	Reverberation	1		-	Not claimed.	-	-		-		
10.3	Acuostic Separation	1	1	-	Acoustic Consultant to confirm. Partition between spaces should achieve a weighted sound reduction index (Rw) of at least 45.		Y	ACOUSTIC		Negligible	Minimum requirements met by NCC anyway
11.0	Minimum Lighting Comfort	-	Complies	-	Electrical Consultant to confirm. Lights to be flicker free and address perception of colour in the spaces.		Y	ELEC		Negligible	Good lighting design and fitting selection

New South Wales	Green Star Design & As-Built Credit	v1.2 Available Points	4 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Consultant	Contractor	Cost Impact	Comment
11.1	General Illuminance and Glare Reduction	1	1	-	Electrical Consultant to confirm. Lighting levels will comply with best practice guidelines (AS 1680.2.4) and glare is eliminated.		Y	ELEC		Low	May require alternative fitting selection
11.2	Surface Illuminance	1		-	Not claimed.	-	-		-	-	-
11.3	Localised Lighting Control	1		-	Not claimed.	-	-		-	-	-
12.0	Glare Reduction	-	Complies	-	Limited extent of glazing.		Y	ARCH ESD		Low	
12.1	Daylight	2	1	-	Requires space to achieve good levels of daylight. Requires daylight modelling.		Y	ARCH ESD		Low	Modelling costs to verify
12.2	Views	1		-	Not claimed.	-	-		-		
13.1	Paints, Adhesives, Sealants and Carpets	1	1	-	Internally applied paints, adhesives, sealants and carpets meet stipulated Total VOC Limits. Refer to Green Star Design and As-Built guidelines for limits.		Y	SCHOOL ARCH	Y	Negligible	Standard industry practice now
13.2	Engineered Wood Products	1	1	-	All engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building. Refer to Green Star Design and As-Built guidelines for limits. Includes particleboard, plywood, fibreboard etc.		Y	SCHOOL ARCH	Y	Negligible	Standard industry practice now
14.1	Thermal Comfort	1		-	Not claimed.	-	-		-		
14.2	Advanced Thermal Comfort	1		-	Not claimed.	-	-		-		
	Category Total	17	**7**								
ENERGY		**22%**									
15A.0	Conditional Requirement	-	Complies	-	Requires minimum Deemed-to-Satisfy (DTS) requirements of Parts J1 (building fabric) and J2 (glazing) of Section J to be exceeded by 5%.	-	-		-	-	-
15A.1	Building Envelope			-	Nominal increase of 15% over Section J minimum R-Value requirements for building fabric.	-	-		-	-	-
15A.2	Glazing			-	Requires 15% improvement on minimum Section J Glazing U-Value and SHGC requirements.	-	-		-	-	-
15A.3	Lighting			-	UL Electrical Engineers have confirmed lighting power density is 30% less than maximum allowed in Section J. Automated lighting control systems (occupant detection, daylight, time switches) provided.	-	-		-	-	-
15A.4	Ventilation and Air Conditioning			-	Confirmed by Umow Lai Mechanical. The space is naturally ventilated or 15% improvement on Section J efficiency requirements for fan, pump, water heater and air conditioning equipment.	-	-		-	-	-
15A.5	Domestic Hot Water			-	Domestic Hot Water to be powered by electric heat pump. Can be powered by natural gas but this is least preferrable option.	-	-		-	-	-
15A.6	Building Sealing			-	Not Claimed. Requires a pressurised building air leakage test to be carried out on the completed building.	-	-		-	-	-
15A.7	Accredited GreenPower			-	Not Claimed. Achievable but requires ongoing purchase of green power energy premium.	-	-		-	-	-
15E	GHG Emissions Reduction - Modelled Performance	20	7	-	Requires energy modelling to demonstrate reduction in energy consumption and GHG emissions of the propsed building as compared to a reference building. Points are awarded based on efficient building services, PV renewable energy generation.		Y	ESD WITH FEEDBACK FROM ALL		High	Likely require higher cost mechanical services and PV renewable energy system
16A	Peak Electricity Demand Reduction - On-Site Energy Generation	2		-	Not claimed.	-	-		-		
	Category Total	22	**7**								
TRANSPORT		**10%**									
17B.1	Access by Public Transport	3	2	-	Based on accessibility of the site by public transport. Site achieves a good 'Walk Score'.		Y	ESD		Negligible	Product of site characteristics
17B.2	Reduced car Parking Provision	1		-	Not claimed.	-	-		-		
17B.3	Low Emisson Vehicle Infrastructure	1		-	Not claimed.	-	-		-		
17B.4	Active Transport Facilities	1	1	-	Requires bicycle parking, access to showers and lockers on site for occupants/visitors.		Y	SCHOOL ARCH		Low	Product of good design in context of larger school site.
17B.5	Walkable Neighbourhoods	1	1	-	The site achieves a good walk score (minimum required is 80).	-	Y	ESD	-	Negligible	Product of site characteristics
	Category Total	7	**4**								

New South Wales	Green Star Design & As-Built Credit	v1.2 Available Points	4 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Consultant	Contractor	Cost Impact	Comment
WATER		**12%**									
18A	Potable Water - Performance Pathway	12	5	-	Fixtures to meet minimum WELS ratings: taps (6 *), urinals (6 *), toilets (5 *), showers (3 *), rainwater harvesting (TBC), avoidance of water-based heat rejection, efficient landscape irrigation system and fire system test water harvesting (TBC fire protection system).		Y	ARCH HYDRO LANDSCAPE MECH		High	May require the inclusion of rainwater harvesting system and reticulation of non-potable water.
	Category Total	12	**5**								
MATERIALS		**14%**									
19	Life Cycle Impacts	7		-	Not claimed.	-	-		-		
20.1	Structural and Reinforcing Steel	1		-	Not claimed.	-	-		-		
20.2	Timber Products	1		-	Not claimed.	-	-		-		
20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1		-	Not claimed.	-	-		-		
20.1	Product Transparency and Sustainability	3			Not claimed.	-	-		-		
22B	Construction and Demolition Waste	1	1	-	Requires reducing construction waste going to landfill by reusing or recycling 90% of the waste generated during construction.				Y	Negligible	Good contractor practices
	Category Total	14	**1**								
LAND USE & ECOLOGY		**6%**									
23.0	Endangered, Threatened or Vulnerable Species	-	Complies	-		Y				Negligible	Product of site characteristics
23.1	Ecological Value	3		-	Not claimed.	-	-		-		
24.0	Sustainable Site	-	Complies	-			Y	ESD		Negligible	Product of the site characteristics
24.1	Reuse of Land	1	1	-	Given based on site located on previously developed land.		Y	ESD		Negligible	Product of site characteristics
24.2	Contamination and Hazardous Materials	1		-	Assumed not applicable.	-	-		-		
25.0	Heat Island Effect Reduction	1	1	-	Generally requires appropriate selection of roof materials, selection of hardscape treatment and extent of landscape/tree coverage.		Y	ARCH LANDSCAPE		Low	Appropriate selection of roof material
	Category Total	6	**2**								
EMISSIONS		**5%**									
26.1	Stormwater: Reduced Peak Discharge	1	1	-	Civil Engineer to confirm. Post-development peak event discharge from site does not exceed the pre-development peak event discharge. This may be challenging pending the existing site condition as greenfield.		Y	CIVIL		Moderate	Civil works for stormwater detention
26.2	Stormwater: Reduced Pollution Targets	1	1	-	Civil Engineer to confirm. All stormwater from the site meets specified Pollution Reduction Targets.		Y	CIVIL		Moderate	Civil works for proprietary treatment systems
27.0	Light Pollution to Neighbouring Bodies	-	Complies	-	Electrical Engineer to confirm. Project to comply with AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting		Y	ELEC		Negligible	Product of good lighting design
27.1	Light Pollution to Night Sky	1	1	-	Electrical Engineer to confirm. It can be demonstrated that a specified reduction in light pollution has been achieved.		Y	ELEC		Negligible	Product of good lighting design
28.0	Legionella Impacts From Cooling Systems	1	1	-	Water-based heat rejection avoided for mechanical services.		Y	MECH		Negligible	Product of appropriate mechanical services design
29.0	Refrigerants Impacts	1		-	Not claimed. Exceptionally challenging credit to achieve.	-	-		-	-	-
	Category Total	5	**4**								
INNOVATION											
30A	Innovative Technology or Process			-		-	-		-	-	-
30B	Market Transformation			-		-	-		-	-	-
30C	Exceeding Green Star Benchmarks	10	1	-	Civil engineer to confirm. Project improving on pollution reduction targets. We have assumed that the proposed stormwater management strategy of infiltration swales will achieved pollution reduction Targets B or C.		Y	CIVIL		Moderate	Civil works for proprietary treatment systems
30D	Innovation Challenge			-			Y				
30E	Global Sustainability			-		-	-		-	-	-
	Category Total	10	**1**								

New South Wales	Green Star Design & As-Built Credit	v1.2 Available Points	4 Star Target	Optional for Consideration	Compliance Requirements & Comment	Client	Design Team	Consultant	Contractor	Cost Impact	Comment
TOTAL			**45.0**								