



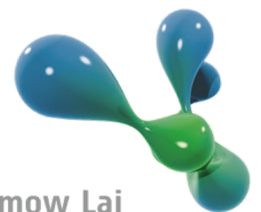
ESD REPORT

HURLSTONE AGRICULTURAL HIGH SCHOOL (HAWKESBURY)

2 College Drive Richmond, NSW

HASH-00-SD-ES-RP-0001

Report Date: 15/05/2018



Umow Lai

engineering sustainable environments

REPORT AUTHORISATION

PROJECT: Hurlstone Agricultural High School (Hawkesbury)
2 College Drive Richmond, NSW

Date	Rev	Comment	Prepared by	Checked by	Authorised by
07/09/17	0	Draft Issue	NJM	-	PJE
12/09/17	1	Updated draft issue	NJM	-	PJE
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15/05/18	3	Updated to reflect 4-Star Green Star	DAA	-	PJ

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Melbourne Office
10 Yarra Street
South Yarra VIC 3141
Australia
Tel: +61 3 9249 0288
Fax: +61 3 9249 0299
Email: ulmelb@umowlai.com.au
Web: www.umowlai.com.au

Sydney Office
Level 7 657 Pacific Highway
St Leonards NSW 2065
Australia
Tel: +61 2 9431 9431
Fax: +61 2 9437 3120
Email: ulsyd@umowlai.com.au
Web: www.umowlai.com.au

Brisbane Office
123 Charlotte Street
Brisbane QLD 4000
Australia
Tel: +61 7 3210 1800
Fax: +61 7 3210 1799
Email: ulbris@umowlai.com.au
Web: www.umowlai.com.au



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1.0 INTRODUCTION

1.1 GENERAL

This ESD Report has been prepared by Umow Lai on behalf of the New South Wales Department of Education (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of State Significant Development Application SSD 8614 for the development of 'Hurlstone Agricultural High School (Hawkesbury)' at College Drive, Richmond, 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 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 Hurlstone Agricultural High School (Hawkesbury) development is expected to achieve a high level of environmental sustainability.

1.2 PROJECT DESCRIPTION

The site is located within the Hawkesbury City Council Government Area. The proposed development consist of a new Science Technology Engineering Maths (STEM) agricultural high school. Landscaping and pedestrian improvements throughout the site are also included, such as new central outdoor learning area.

The School will contain high quality classrooms, collaborative learning spaces, open play spaces and associated facilities including a gymnasium with a sports court, as well as a library and canteen.

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 v1.1 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 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.

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2.0 SCHEDULE 2 OF EP&A REGULATION 2000

The followings section details how the proposed Hurlstone Agricultural High School (Hawkesbury) 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 supporting environmental and ecological assessments and conclusions.

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

Roof form has been arranged to maximise the platform for on-site renewable energy generation, and design development will explore the feasibility for all rainwater from new roofs is to be captured and re-used for irrigation across a range of agricultural inspired landscape zones.

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, the future climate-driven risks relating to this site have been considered, with the highest risks being flooding and an increase in maximum temperatures and the length and frequency of heat events.

In relation to predicted increases in temperatures, the current concept design pays particular attention to addressing high external heat loads by providing roof overhangs and shading. 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 focussing on delivering fresh air, optimum thermal comfort, quality acoustics, and low toxicity materials and finishes.

The proposed site conditions in combination with the proposed landscape design 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'.

The extensive harnessing of daylight will also have a measurable reduction in energy consumption and associated GHG Emissions by reducing demand for artificial lighting.

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

A Biodiversity Assessment Report (BAR) has been prepared by Narla Environmental Pty. Ltd. to accompany the State Significant Development (SSD) Application (8614) relating to the proposed development of the new Hurlstone Agricultural High School (Lot 2/DP1051798).

The biodiversity impacts for the proposed development are assessed in accordance with the Framework for Biodiversity Assessment (FBA) (OEH 2014).

Per the conclusions of this BAR:

- The proposed development has been assessed consistent with the FBA, including the preparation of a site scale vegetation map and completion of the eight Biometric plots and transects.
- The results of the assessment found that zero (0) ecosystem credits were required to offset 0 ha of impact to native vegetation from the proposed development (this may be subject to change following provision of a Bushfire Fire Assessment Report). No species credits are required for the proposal. (this may be subject to change following provision of a Bushfire Fire Assessment Report).
- The application of threshold III in the FBA (OEH 2014) means the development is not required to determine an offset. (this may be subject to change following provision of a Bushfire Fire Assessment Report). It is therefore proposed that the development proceeds without the purchase or retirement of ecosystem or species credits irrespective of the credit calculation results.



Please refer to this BAR for further details of the conservation of biological diversity and ecological integrity within the site.

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 floor plate design for the buildings present a narrow floor plate and allows excellent distribution of daylight and optimisation of natural ventilation into learning and teaching spaces – reducing ongoing operating costs for the school.



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. 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 at least a 4-Star Best Practice equivalency outcome, per the NSW Department of Education EFSG Guidelines DG02 Ecologically Sustainable Development Clause 02.03.

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 of 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 the projects who improve a projects' 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 School 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.
2. During design and documentation, the School 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. The design will include infrastructure for 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 reductions in energy use should never be made at the expense of the occupants' health and wellbeing.

The Project will include the following initiatives;

1. Habitable rooms including teaching and learning spaces will seek to apply natural ventilation in accordance with AS 1668.4-2012. It is noted that the project will likely exceed these requirements to ensure an effective natural ventilation strategy.
2. Indoor noise levels will provide a high level of acoustic comfort, with internal noise levels being no higher than 5db(A) above the 'satisfactory' sound levels in Table 1 of AS/NZS 2107:2000. Attainment of these levels will be in context of the inclusion of natural ventilation within some spaces;



3. The project will address noise transmission in enclosed spaces through acoustic separation, whereby appropriate partitions between teaching spaces and non-teaching spaces (e.g. private offices, libraries etc.) will be constructed to achieve a weighted sound reduction index of at least 45. Attainment of these levels will be in context of the inclusion of glazing partitions between teaching spaces;
4. Light fittings shall be selected, where possible, such that glare is controlled or reduced and occupants will have the ability to control lighting in the spaces through manual lighting controls;
5. Teaching and learning spaces are also extensively daylit through the inclusion of windows in all teaching and learning spaces, delivering high levels of daylight;
6. Occupants have extensive views to the surrounding landscape, a key factor in a building's connection to occupants' health and wellbeing;
7. 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 v1.1 VOC Emissions limits tables.

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 encouraging the utilisation of energy generated by low-emission sources.

The Project will include the following initiatives;

1. The building envelope will exceed NCC BCA Section J Parts J1 Building Fabric and J2 Glazing by at least 15% as demonstrated through the DTS (or JV3) pathway;
2. A high percentage of lighting will be controlled either through occupant detection, daylight controls, the period bell system or time clock controlled to meet BCA Section J6 requirements;
3. Habitable rooms including teaching and learning spaces will seek to apply natural ventilation to majority of the school with the objective of limiting active cooling systems to IT infrastructure areas only, pending 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. CO₂) 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 a 100 kWp 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 of the dependency on private car use and promote the use of healthy means of transport as an important means of reducing 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 proposal includes cyclist facilities for students and staff;
2. Richmond train station is located 2.5 km from the site. The Department of Education and Western Sydney University will be working in partnership to provide a shuttle bus service to and from the train station. Public bus routes are also proposed to be developed to serve the site.

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 maximisation of water efficiency within a project, as well as through the utilisation of reclaimed water sources.

The Project will include the following initiatives;

1. Substantial stormwater harvesting and re-use. It is currently proposed to incorporate 150kL of rainwater storage for different agricultural inspired landscape zones;
2. All bathroom fixtures (toilet pans, urinals, hand basin taps and showers) will meet minimum WELS ratings in accordance with the most recent EFSG Design 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. Areas with mass planting will be irrigated using sub-soil drip irrigation with wherever practical, automated control to limit unnecessary irrigation. Water will be sourced via onsite water storage tanks to minimise the use of potable water.
4. The mechanical services where providing active cooling, will avoid water-based heat rejection.



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 initiatives;

1. A significant amount of construction waste going to landfill will be diverted to recycling.

3.1.7 LAND USE AND ECOLOGY

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

The Project addresses this category through the following;

1. Negative impacts on the site's current ecological value due to the development will be compensated through the proposed landscape architecture design and selection of plantings;

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 include damage to the environment through refrigerant leaks or disturbances to native animals and their migratory patterns as a result of light pollution.

The Project will include the following initiatives;

1. 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.
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. It is noted that the overland stormwater flows enter the site through the North West corner.

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 in 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 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 required for construction by a high percentage of timber, formwork, pipes, flooring, blinds and cables used in the project will be responsibly sourced or have a sustainable supply chain.

4.2 ENERGY

- The narrow floor plates of the proposal are ideally laid out to permit high quality daylight, leading to superior learning and teaching space amenity and can lead to reduced energy consumption for lighting. The narrow floor plates also facilitate effective natural cross ventilation, further contributing to reduced energy consumption and costs.
- The proposal will include provisions for the future inclusion of solar PV arrays to further reduce ongoing energy costs for the school.

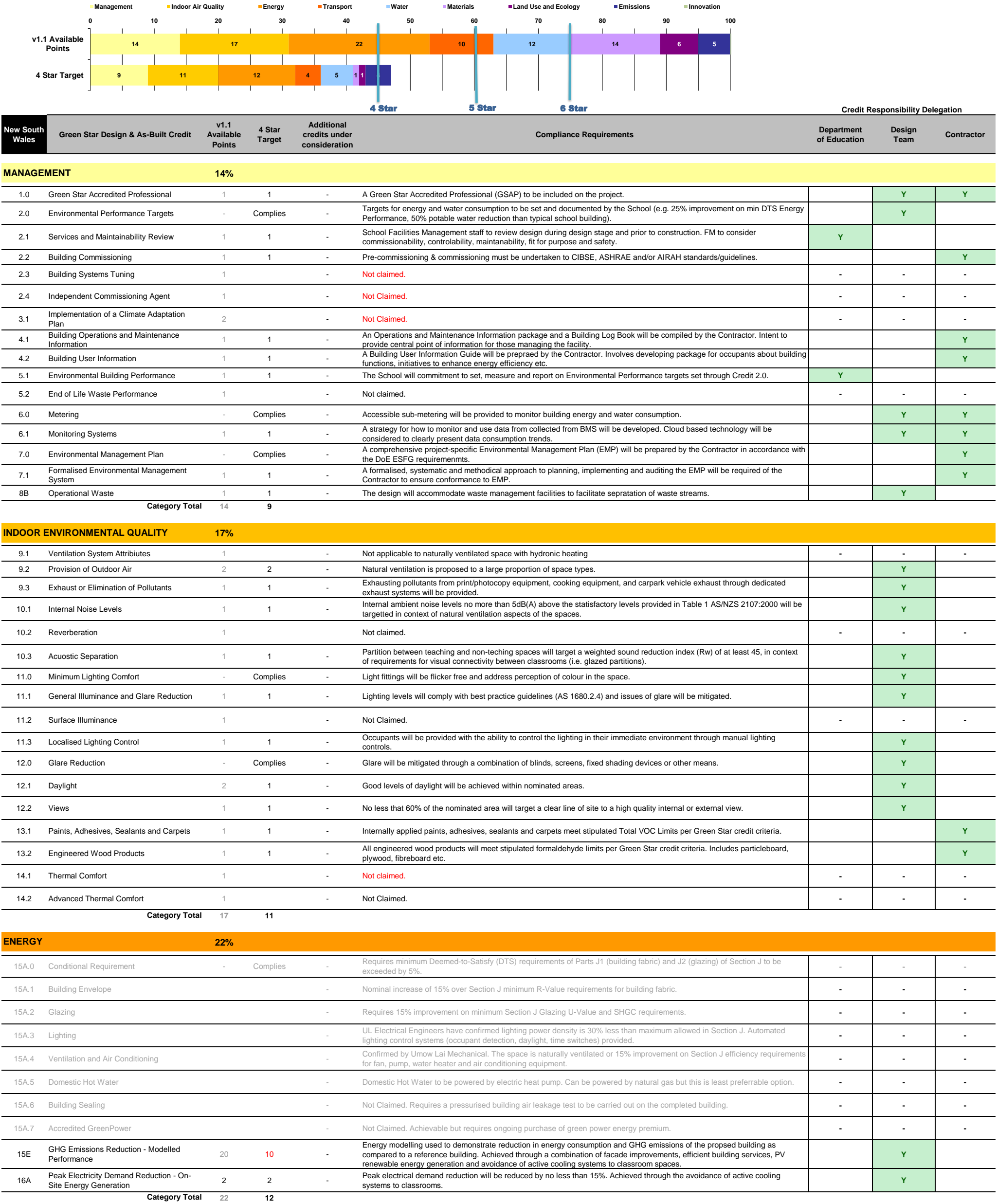
4.3 WATER

- The proposal includes substantial stormwater harvesting and re-use of rainwater for irrigating mass-planted areas of agricultural inspired landscape zones.
- The agricultural inspired landscape zones will provide a mixture of cropping/food production spaces and low water demand planting.



5.0 APPENDIX A – GREEN STAR PATHWAY







New South Wales	Green Star Design & As-Built Credit	v1.1 Available Points	4 Star Target	Additional credits under consideration	Compliance Requirements	Department of Education	Design Team	Contractor
TRANSPORT		10%						
17B.1	Access by Public Transport	3	2	-	Based on accessibility of the site by public transport. Good connectivity to train station and UWS campus through future shuttle bus services.	Y		
17B.2	Reduced car Parking Provision	1	1	-	Based on minimal on-site car parking	Y		
17B.3	Low Emission Vehicle Infrastructure	1		Y	Not Claimed. Requires provision of electric vehicle charging infrastructure and/or dedicated car share spaces.	-	-	-
17B.4	Active Transport Facilities	1	1	-	Dilligent consideration of bicycle parking, access to showers and lockers on site for occupants will be further resolved.		Y	
17B.5	Walkable Neighbourhoods	1		-	Not claimed. The site achieves walk score of approx 25 (minimum required is 80).	-	-	-
Category Total		7	4					
WATER		12%						
18A	Potable Water - Performance Pathway	12	5	-	Fixtures to meet minimum WELS ratings: taps (6-Star), urinals (6-Star), toilets (5-Star), showers (3-Star), clothes washing machines (5-Star) and dishwashers (6-Star), Approx 100 - 150kL rainwater harvesting system, avoidance of water-based heat rejection, efficient landscape (non-agricultural) irrigation system and fire system test water harvesting (TBC fire protection system).		Y	
Category Total		12	5					
MATERIALS		14%						
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	-	Greater than 90% of demolition and construction waste will be diverted from landfill for recycling.			Y
Category Total		7	1					
LAND USE & ECOLOGY		6%						
23.0	Endangered, Threatened or Vulnerable Species	-	Complies	-		Y		
23.1	Ecological Value	3	1	-	Based on ecological value of site being improved by project (e.g. Inclusion of Landscaping).		Y	
24.0	Sustainable Site	-	Complies	-	Development not located on old growth forest or wetland as confirmed by the ecologists report.		Y	
24.1	Reuse of Land	1		-	Not Claimed. Site is greenfield.	-	-	-
24.2	Contamination and Hazardous Materials	1		-	Pending site investigations, likely to be Not Applicable for the site.	-	-	-
25.0	Heat Island Effect Reduction	1		-	Not claimed.	-	-	-
Category Total		6	1					
EMISSIONS		5%						
26.1	Stormwater: Reduced Peak Discharge	1	1	-	Post-development peak event discharge will not exceed the pre-development peak event discharge to mitigate impacts of stormwater volumes. Use of landscape to mitigate stormwater volumes.		Y	
26.2	Stormwater: Reduced Pollution Targets	1	1	-	Stormwater discharge from the site will meet specified Pollution Reduction Targets per Green Star guidelines. Use of landscape to mitigate stormwater quality.		Y	
27.0	Light Pollution to Neighbouring Bodies	-	Complies	-	The project will have responsible exterior lighting to mitigate light pollution.		Y	
27.1	Light Pollution to Night Sky	1	1	-	The project will have responsible exterior lighting to mitigate light pollution.		Y	
28.0	Legionella Impacts From Cooling Systems	1	1	-	The mechanical services, where active cooling provided, will not rely on water based heat rejection systems.		Y	
29.0	Refrigerants Impacts	1		-	Not claimed.	-	-	-
Category Total		5	4					
INNOVATION								
30A	Innovative Technology or Process	10		-		-	-	-
30B	Market Transformation			-	Not claimed.	-	-	-
30C	Exceeding Green Star Benchmarks			-	Not claimed.	-	-	-
30D	Innovation Challenge			-	Not claimed.	-	-	-
30E	Global Sustainability			-		-	-	-
Category Total		10	0					
TOTAL		47.0						
Once certified the following rating could be achieved			4	Stars	Stars			