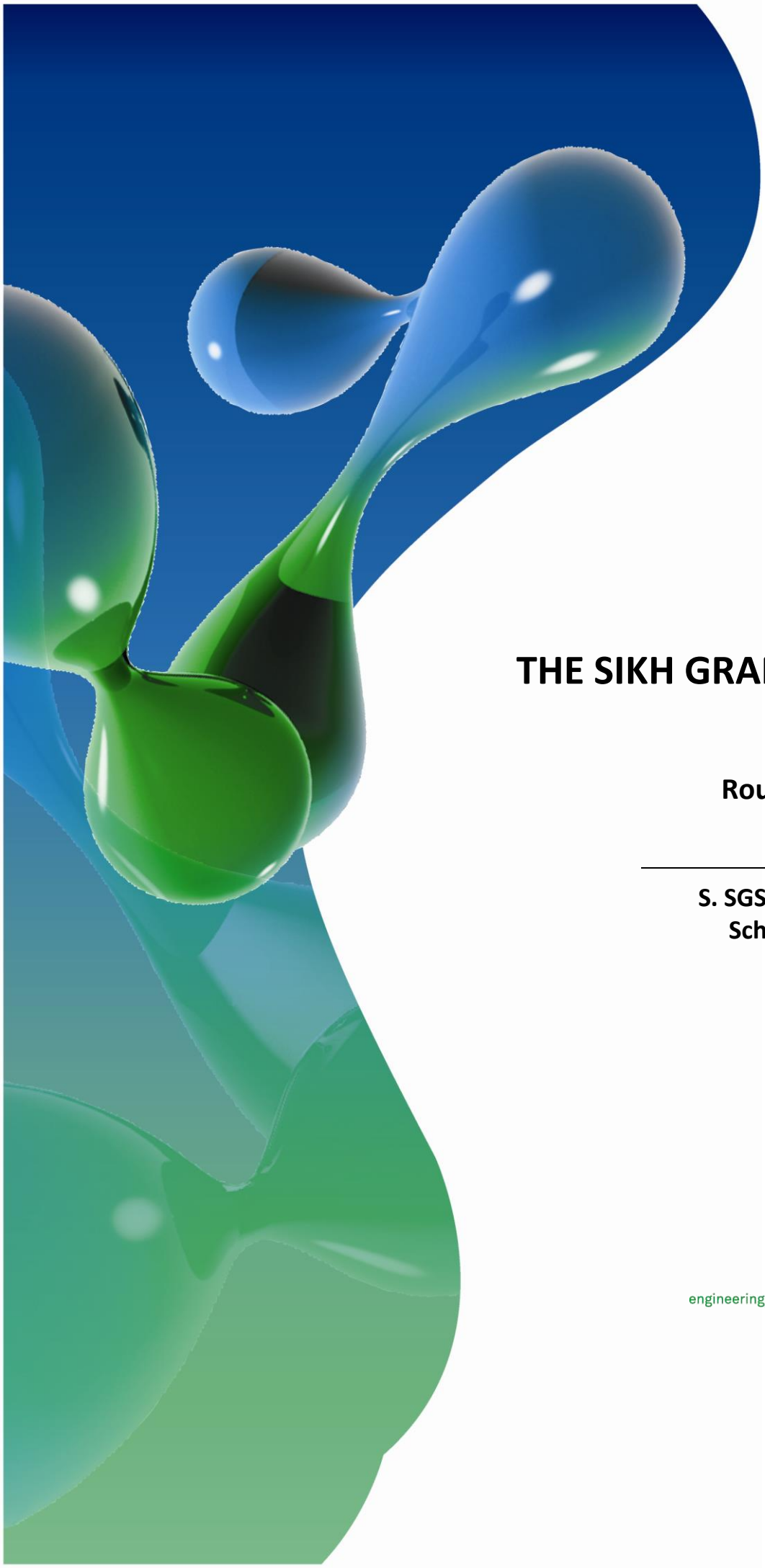

ESD REPORT

THE SIKH GRAMMER SCHOOL AUSTRALIA

Rouse Hill, Sydney, NSW

S. SGS0101-The Sikh Grammar School Australia ESD-RP001

Report Date: 21/09/2020

Umow Lai

engineering sustainable environments

REPORT AUTHORISATION

PROJECT: The Sikh Grammar School Australia

Rouse Hill, NSW

Date	Rev	Comment	Prepared by	Checked by	Authorised by
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1.0 INTRODUCTION

1.1 GENERAL

This ESD Report has been prepared by Umow Lai on behalf of The Sikh Grammar School Australia (the 'Applicant'). It accompanies an Environmental Impact Statement (EIS) prepared in support of the development of The Sikh Grammar School site at Rouse Hill, Sydney, NSW(the 'Site').

The purpose of this ESD Report is to address the items identified in part "8. Ecologically Sustainable Development" of the Planning Secretary's Environmental Assessment Requirements, application number SSD 9472; 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 Sikh Grammar School 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

The greenfield project site forms part of the Greater Western Sydney growth corridor within the Blacktown City Council. The site was formerly used for agricultural purposes but will now become part of a new urban centre which includes a new train station, housing, retail and other community infrastructure.

The School will accommodate up to 100 students and resident staff on campus. Part of the site will be used as a place of worship and will, at times, be open to the broader community as part of an all-inclusive vegetarian feast that the Sikh community provide to people of all denominations.

The Masterplan provides an overall framework for development over the next 10 to 25 years, building on existing opportunities whilst looking to the future and forecasting change. The process has included an extensive physical investigation of the site.

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
- SEARS Application number SSD 9472, relevant clauses
- CSIRO projected impacts of climate change

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 have 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 consider that party's requirements.

2.0 SCHEDULE 2 OF EP&A REGULATION 2000

The followings section details how the proposed Sikh Grammar School 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. Buildings are generally formed around a shallow plan allowing daylight to penetrate the spaces. Where buildings are designed around a deep plan, increasing the ceiling heights improves daylight availability and air movement through the spaces. Incorporating natural ventilation across the site will assist minimising energy consumption from mechanical systems. External shading detailing will reduce solar gain during the summer months in turn reducing cooling loads and the risk of overheating.

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 on site for irrigation and building services. 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 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, detailing of the building fabric to minimise unwanted infiltration 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

Good architecture often outlasts the architect, great architecture may endure ten times as long. The impact of architecture on its environment is enduring and significant. What architects do today will shape the environment for future generations. The Sikh Grammar School embodies this approach by proposing a keystone building for the site in the Gurdwara. The building acts as a gateway, welcoming visitors to worship and into the site.

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

The proposed design places an emphasis on daylight access 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'.

The building targets high levels of energy efficiency and low operational energy consumption. A low energy building minimises the GHG gas emissions during use. GHG Emissions are a known key contributor to human-caused climate change, considered one of the most critical inter-generational issues of our time. By addressing this at an early stage the building aims to "meet the needs of the present without compromising the ability of future generations to meet their own needs" a key takeaway from the infamous Brundtland Report. [1]

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.*

[1] Our Common Future ('Brundtland Report'). 1987. Brundtland. G et al.

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 mechanical ventilation systems throughout the learning 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 SEARS / CSIRO RESPONSE

This section responds to the following SEARS requirement:

Provide a statement regarding how the design of the future development is responsive to the CSIRO projected impacts of climate change, specifically:

o hotter days and more frequent heatwave events

o extended drought periods

o more extreme rainfall events

o gustier wind conditions

o how these will inform landscape design, material selection and social equity aspects (respite/shelter areas).

Climatic events such as heat waves cause additional stress on building's systems. High performance building envelopes help to mitigate the effects, shielding the environment from extreme weather events. Measures to achieve this include:

- Attention to solar gain through shading devices and high performance windows.
- Airtight construction and controlled ventilation. With a responsive cooling system providing year round thermal comfort.
- High levels of insultation minimises the heat gains through the building fabric.

Storm water detention rates will be sized to account for increase, prolonged rainfall events. By slowly releasing water from the site there is less pressure on the local storm water system, reducing the chance of flash floods.

Changes to wind patterns in future climates is unclear, with little agreement between statistical data. However, increasingly frequent extreme weather events will lead to short, intense high wind periods. Strengthening the frame and foundation design will accommodate the additional loading. Intense wind periods usually occur during storms, which subject buildings to driving rain. Driving rain will be mitigated by a tightly detailed façade stopping water ingress and preserving the building fabric.

Landscape design will maximise permeable surfaces to slow the run-off of rainfall from the site. Furthermore, green spaces in the surrounding area and green roofs will incorporate shading and rain refuge to cover occupants and visitors during climatic events.

4.0 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 several criteria, including energy and water efficiency, indoor environmental quality and resource conservations.

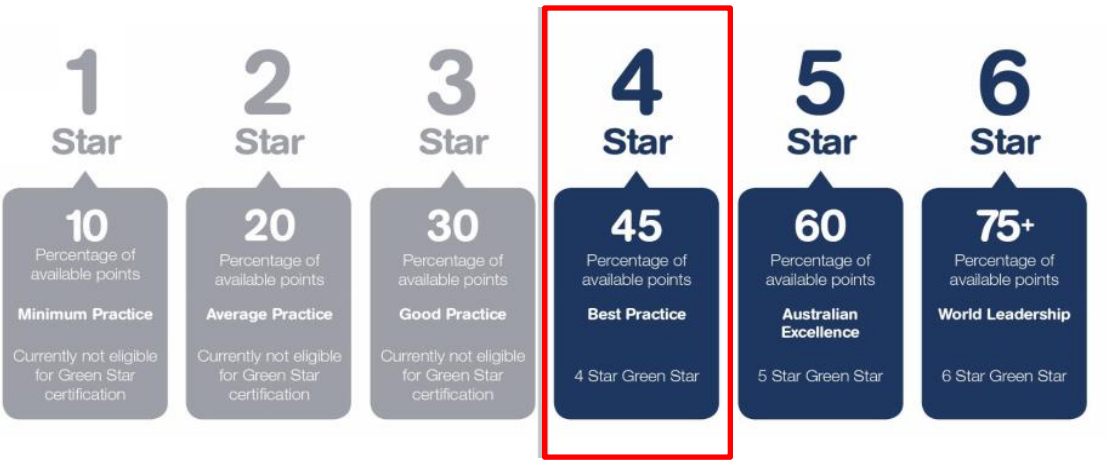
The intention would be to apply individual ratings as the stages dictate. This would ensure that each stage (or groups of stages as the program dictates) would achieve the rating independently and safeguard against the framework being skewed.

Given the complex nature of the Masterplan delivery, the adoption of Green Star ensures that as each stage (or groups of stages) is delivered it will demonstrate best practice in the context of the time at which it is constructed. Green Star regularly updates to ensure past initiatives which are now BAU do not contribute to the rating.

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.



4.1 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 site.

4.1.1 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. Post completion the project will undergo a 12 month period of building tuning, with minimum quarterly meetings, to optimise the buildings systems.

5. 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 information on maintenance requirements.
6. 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.
7. A systematic and methodical Environmental Management plan will be formalised for implementation during the construction phase by the Contractor such as ISO 14001.
8. The design will include infrastructure for operational waste management and the separation of waste streams.

4.1.2 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. In-takes and exhausts will follow best practice guidelines to avoid unwanted recirculation.
2. Exhausting pollutants from print/photocopy equipment, cooking equipment, and carpark vehicle exhaust through dedicated exhaust systems to avoid lowering IAQ of adjacent spaces.
3. The project will address noise in enclosed spaces by reducing noise levels to no more than 5dB(A) above the satisfactory levels provided in Table 1 AS/NZS 2107:2000 and mitigation reverberation. Noise transmission and reverberation times will be through detailed acoustic separation and acoustic attenuators.
4. 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 can control lighting in the spaces through manual lighting controls.
5. All habitable areas will be extensively daylit, delivered by a façade providing high levels of daylight and views for occupants.
6. 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.
7. 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.

4.1.3 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. Good passive design features will be incorporated into the proposal to achieve measurable impacts on both building services strategies and the thermal comfort of occupants.
3. LED lighting, which offers life cycle cost advantages and reduced annual energy consumption, shall be utilised wherever possible A high percentage of lighting will be controlled either through occupant detection, daylight controls or time clock controlled to meet BCA Section J6 requirements.
4. Ensuring thermal comfort on site takes a three stages approach.
    I. Stage 1 utilises natural ventilation via openable facades and ceiling fans for air movement.
    II. Stage 2 provides thermal comfort via “air tempering”. Air tempering is the delivering of air at a higher temperature than full AC, allowing for reduced loads on cooling coils to save energy.
    III. Stage 3 is full AC. This is expected to be used only during peak summer conditions. Reed switches on the windows / louvre arrangement shall be proposed so full AC mode can only be achieved when the façade is closed.
5. 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):
    I. Natural gas with solar pre-heat
    II. Natural gas with high-efficiency condensing boilers
    III. Heat-pump technology. Heat-pumps utilising refrigerants with a lower global warming potential (GWP) (e.g. CO_2) will be preferred over those using conventional refrigerants.
6. 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.

4.1.4 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 many amenities.

The Project will include the following initiatives:

1. Infrastructure allowances will be made for low emission vehicles.
2. Active transport facilities such as bicycle parking, showers and lockers will be available on site for occupants and visitors.

4.1.5 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 for irrigation. For further details on the proposed strategy please refer to Sym Studio Report: Design Analysis Diagrams – Hydrology PMD-DA-007, A page 7
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

4.1.6 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:

2. 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.
3. A high percentage of timber used in building and construction will be from a reused source or certified by a forest certification scheme.

4.1.7 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.
2. Rooftops that will contribute to a cooler microclimate using light coloured roof materials to reduce the 'Heat Island Effect'. An additional 137 trees are also proposed to provide shading and increase outdoor thermal comfort.

4.1.8 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. Stormwater design will ensure post-development peak event discharge rates do not exceed pre-development rates and that pollution reduction targets will be met.
3. Landscape solutions will be applied to achieve a high level of stormwater performance across the site, improving water quality prior to discharge from the site.
4. Water based heat rejection has been avoided to avert any potential impacts associated with harmful microbes in building cooling systems.

4.1.9 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.

5.0 APPENDIX A – GREEN STAR PATHWAY

SIKH GRAMMAR SCHOOL: 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	Client	Design Team	Contractor	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	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		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	Y	Low	Commissioning activites primarily negligible cost, with exception of airtightness testing. Suggest this testing omitted in context of informal Green Star application.
2.3	Building Systems Tuning	1	1	-	Requires formal 12month building tuning period with minimum quarterly tuning meetings and recommissioning. Differs from normal DLP activities.	Y	Y	Y	Moderate	Excellent initiative to ensure building is optimised for energy/water/IEQ performance. Cost associated with additional consultant/contractor time.
2.4	Independent Commissioning Agent	1		Y	Requires engagement of ICA to lead/coordinate commissioning & building tuning activities	Y			Moderate	ICA represents additional consultant and cost to project (e.g. $35k to $50k).
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 for schools operation team.
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.	-	-	-		
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	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	Y	Low	Base functionality provided by BMS, however dedicated cloud platforms are better suited. Data can be used within education context.
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		Y	Contractor required to implement on-site staff wellbeing practices.			Y	Negligible	Higher tier contractors likely to have site practices which are consistent with the requirements.
8B	Operational Waste	1	1	-	Requires on-site waste recycling system which are consistent with best practice requirements.		Y		Negligible	Integrated with school waste management practices. Pending Waste Management Consultant.
	Category Total	14	**9**							

SIKH GRAMMAR SCHOOL: 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	Client	Design Team	Contractor	Cost Impact	Comment
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 points awarded for increase of 50% on AS 1668 minimum OA requirements.		Y		Low	Marginal increase in some ventilation systems. Mechanically Assisted Natural Ventilation (MANV)
9.3	Exhaust or Elimination of Pollutants	1	1	-	Exhausting pollutants from print/photocopy equipment, cooking equipment, and carpark vehicle exhaust through dedicated exhaust systems. Print/photocopy must be isolated in enclosed spaces.		Y		Low	Good design practice
10.1	Internal Noise Levels	1	1	-	Acoustic Consultant to confirm. Internal ambient noise levels no more than 5dB(A) above the statisfactory levels provided in Table 1 AS/NZS 2107:2000.		Y		Low	May require acoustic systems beyond minimum requirements
10.2	Reverberation	1	1	-	Acoustic Consultant to confirm. Requires mitigation of reverberation in accordance with Australian Standard		Y		Low	Acoustic Consultant to confirm.
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		Negligible	Minimum requirements met by NCC anyway
11.0	Minimum Lighting Comfort	-	Complies	-	Pending lighting design. Lights to be flicker free and address perception of colour in the spaces.		Y		Negligible	Good lighting design and fitting selection
11.1	General Illuminance and Glare Reduction	1	1	-	Pending lighting design. Lighting levels will comply with best practice guidelines (AS 1680.2.4) and glare is eliminated.		Y		Low	May require alternative fitting selection
11.2	Surface Illuminance	1		-	Not claimed.	-	-	-	-	-
11.3	Localised Lighting Control	1		Y	Consideration of lighting control provisions within individual spaces. Classroom space types would NOT require individual control per student etc.		Y		Low	Requires further review of credit criteria in context of a school.
12.0	Glare Reduction	-	Complies	-	Limited extent of glazing.		Y		Low	
12.1	Daylight	2	1	-	Requires space to achieve good levels of daylight. Requires daylight modelling.		Y		Low	Modelling costs to verify
12.2	Views	1	1	-	Façade glazing is limited, however possible that internal views acceptable as well to achieve target		Y		Negligible	No cost
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	Y	Negligible	Standard industry practice now and contributes to conducive learning environments.
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	Y	Negligible	Standard industry practice now and contributes to conducive learning environments.
14.1	Thermal Comfort	1		Y	Verification of thermal comfort performance required through the application of thermal comfort modelling.		Y		Moderate	Requires additional engagement of thermal comfort modelling by ESD consultant.
14.2	Advanced Thermal Comfort	1		-	Not claimed.	-	-	-		
	Category Total	17	**10**							
ENERGY		**22%**								
15E	GHG Emissions Reduction - Modelled Performance	20	7	Y	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		Moderate	Likely require higher cost mechanical services and PV renewable energy system
16A	Peak Electricity Demand Reduction - On-Site Energy Generation	2	1	-	Requires to reduce total peak electricity demand by 15%. Achieved through the application of passive design features, efficient building services and embedded generation.		Y		Moderate	As above
	Category Total	22	**8**							

SIKH GRAMMAR SCHOOL: 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	Client	Design Team	Contractor	Cost Impact	Comment
TRANSPORT		**10%**								
17B.1	Access by Public Transport	3		-	Based on accessibility of the site by public transport. Site achieves a poor 'Walk Score'. Further feedback may be required to better understand future public transport plans		Y		Negligible	Product of site characteristics
17B.2	Reduced car Parking Provision	1		-	Not claimed.	-	-	-		No carparking. Would need to review any offsite parking considerations.
17B.3	Low Emisson Vehicle Infrastructure	1	1	-	Requires provision of electric vehicle charging infrastructure and/or dedicated car share spaces.	-	-	-	Moderate	Cost of chargers or car share programs
17B.4	Active Transport Facilities	1	1	-	Requires bicycle parking, access to showers and lockers on site for occupants/visitors.		Y		Low	Product of good design. Additional bicycle parking required for schools
17B.5	Walkable Neighbourhoods	1		-	The site achieves a poor walk score due to location (minimum required is 80).	-	Y	-	Negligible	Product of site characteristics
	Category Total	7	**2**							
WATER		**12%**								
18A	Potable Water - Performance Pathway	12	6	-	Fixtures to meet minimum WELS ratings: taps (6 *), urinals (6 *), toilets (5 *), showers (3 *), rainwater harvesting, avoidance of water-based heat rejection (standard for schools), efficient landscape irrigation system and fire system test water harvesting (TBC fire protection system).		Y		High	Requires the inclusion of rainwater harvesting system and reticulation of non-potable water.
	Category Total	12	**6**							
MATERIALS		**14%**								
19	Life Cycle Impacts	7		-	Not claimed.	-	-	-		
20.1	Structural and Reinforcing Steel	1		-	Not claimed.	-	-	-		
20.2	Timber Products	1	1	-	Requires timber used in building and construction to be from a reused source or certified by a forest certification scheme. To be included in Specification.			Y	Low	Generally attainable based on proactive management of sub-contractor material procurement.
20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	-	Requires materials to have no PVC and have an Environmental Product Declaration, or PVC to meet bet practice guidelines for PVC.			Y	Low	Generally attainable based on proactive management of sub-contractor material procurement.
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	**3**							
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		Negligible	Product of the site characteristics
24.1	Reuse of Land	1		-	Not claimed due to green field site		Y		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. Would require conscious review of site landscape/hardscape.		Y		Low	Would need to seek guidance on application to existing building (i.e. exist vs. proposed).
	Category Total	6	**1**							

SIKH GRAMMAR SCHOOL: 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	Client	Design Team	Contractor	Cost Impact	Comment
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.		Y		Moderate	Pending comment from Civil Engineer. Propose alignment with minimum requirements of North Sydney Council.
26.2	Stormwater: Reduced Pollution Targets	1	1	-	Civil Engineer to confirm. All stormwater from the site meets specified Pollution Reduction Targets.		Y		Moderate	Pending comment from Civil Engineer. Propose alignment with minimum requirements of North Sydney Council.
27.0	Light Pollution to Neighbouring Bodies	-	Complies	-	Pending lighting design. Project to comply with AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting		Y		Negligible	Product of good lighting design
27.1	Light Pollution to Night Sky	1	1	-	Pending lighting design. It can be demonstrated that a specified reduction in light pollution has been achieved.		Y		Negligible	Product of good lighting design
28.0	Legionella Impacts From Cooling Systems	1	1	-	Water-based heat rejection avoided for mechanical services.		Y		Negligible	Product of appropriate mechanical services design. Water based heat rejection systems not currently proposed within project.
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 will achieved pollution reduction Targets B or C.		Y		Moderate	Civil works for proprietary treatment systems
30D	Innovation Challenge		1	Y	Appropriate 'Innovation Challenge' to be selected for project. Pending further design.		Y			Further review of Innovation Challenges required to confirm attainability. 5-Star target would require no less than attainment of 4 innovation challenges.
30E	Global Sustainability			-		-	-	-	-	-
	Category Total	10	**2**							
TOTAL			**45.0**							