St Edmund's College

Ecologically Sustainable Design (ESD) Report

Prepared for: St Edmunds College c/- Midson Group Pty Ltd

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Date: 03 Dec 2019

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Revision

Revision	Date	Comment	Prepared By	Approved By
01	28.11.2019	Draft – For Client Review	MB	ALK
02	03.12.2019	DA Issue	MB	ALK

Disclaimer

This report has been developed based on the Development level of information provided to Wood & Grieve Engineers. WGE have taken every effort to ensure the information presented in this report is an accurate reflection of the development but cannot guarantee the final performance of the building. The content of the development, including systems, materiality and finishes is subject to final architectural and client approval and subject to change.

Contents

1. Executive Summary

This Ecological Sustainable Development Report has been prepared for St Edmund's College and Midson Group Pty Ltd for the proposed alterations and additions of the St Edmund's College located at 60 Burns Road, Wahroonga NSW 2076. This report is intended to provide an overview of the proposed ecologically sustainable development (ESD) principles and efficiency measures integrated into the design and is intended to form part of the Development Application. This is a direct design response to the ESD components of Ku-Ring-Gai Council's DCP requirements around Clause 23.2 – 23.10, the NSW Environmental Planning and Assessment Regulation 2000, as required by the NSW Environmental Planning and Assessment Act 1979 No 203.

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers);
- Project approach to the Ku-Ring-Gai Council's DCP requirements around Clause 23.2 (Green Buildings) and how this is proposed to be addressed;
- Detail regarding specific ecological sustainable development initiatives through all phases of the project;
- Initiatives that will minimise the consumption of material resources, water and energy.

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

- The NSW Environmental Planning and Assessment Act 1979;
- The NSW Environmental Planning and Assessment Regulation 2000; and
- Ku-ring-gai Council DCP (2015).

2. Sustainability Commitments

The project's Sustainability Commitments are listed below. These will be achieved through implementation of a number of sustainable design principles and initiatives designed to achieve the targeted environmental outcome.

- The project will be designed to an equivalent 4 Star Green Star standard – in lieu of formal registration and GBCA certification as outlined within Ku-ring-gai DCP 2015 (Part 23.2 Green Buildings).

In order to satisfy the intent of Green Star condition from the Ku-ring-gai DCP 2015 (Part 23.2 Green Buildings), St Edmund's College is committed to incorporate ESD principles that will achieve an equivalent standard of 4 Star Green Star in design. This will be substantiated and demonstrated prior to the commencement of works through the provision of:

1) Construction plans and drawings incorporating the ESD commitment outlined within this report, which were carefully analyzed and proposed by the project team and ESD consultant to represent a 4 Star Green Star Design & As-Built design standard.

2) Letter from an independent and experienced Green Star Accredited Professional stating that the St Edmund's College project design achieves equivalency to a 4 Star Green Star Design & As-Built certified design.

3) 4 Star Green Star equivalent pathway, demonstrating how initiatives implemented in the project correspond to a 4 Star Green Star standard and justifying their equivalency.

Considering the project will provide appropriate documentation to demonstrate 4 Star Green Star standards and design practices are incorporated in the school's design, a formal Green Star certification is not envisaged to add practical value neither a higher sustainability outcome to the project. For a school of the size and scale of St Edmund's College, the cost related to formally certifying the design through the Green Building Council plays a significant role and can compromise resources that could be directed to investing in more tangible and practical attributes, such as higher grade materials, more efficient systems and/or innovative initiatives.

Therefore, the proposed Green Star equivalency approach is found to be the most appropriate solution to ensure the intent of Part 23.2 Green Buildings of the Ku-ring-gai Development Control Plan is achieved in the development.

The remaining General Building Design and Sustainability guidelines from the Ku-ring-gai DCP 2015 (Part 23.3 – 23.10) will also be addressed by the project. The development will give strong consideration to potential environmental impacts by reducing it through application of best practice design and processes such as the many ESD opportunities and initiatives listed in the following Section. The documented initiatives – which are the basis for the response to the Sustainable Design Frameworks outlined above - include:

- Energy conservation and Greenhouse gas emissions reduction;
    - On-site Renewable Energy Production – Minimum 20 kW Photovoltaic system;
    - Energy Modelling will be performed to ensure optimised energy demand reduction;
    - Façade Thermal Performance to meet and exceed BCA Section J requirements, where Section J compliance will be achieved without accounting for the on-site renewable energy contribution;
    - Maintain meaningful portion of the existing superstructure where feasible to reduce project's embodied energy and limit the waste and construction materials required in the build;
    - Energy Efficient lighting systems (LED lighting selection) and lighting controls <9W/m2 across the development;
    - Centralized Hot Water Plant (Gas);

- Water conservation and water reuse;
    - A rainwater tank (minimum 20 kL) will be implemented to offset irrigation water consumption as a minimum;
    - Water efficient fixtures and fittings (WELS rating) to meet Green Star Design & As-Built v1.2 benchmarks for fixtures and fittings selections. This includes taps, WCs, Urinals, showers and supplementary water uses;
    - Water efficient appliances (WELS rating) to meet Green Star Design & As-Built v1.2 benchmarks for water appliances selections. This includes dishwasher for kitchen spaces;
    - Plants: Selection of native and low water species.
- Indoor & outdoor environmental quality of occupants;
    - Thermal comfort will be in line with the expectations for schools under the Green Star Design & As-Built v1.2 tool.
    - Glare and radiant temperature control through the inclusion of external shading devices and operable blinds where appropriate.
    - Artificial Lighting Design: General illuminance levels, lighting uniformity and glare reduction in accordance with best practice standards outlined in Green Star Design & As-Built v1.2;
    - Low volatile organic compounds (VOC) materials, such as paints, sealants, adhesives, carpets and floor;
- Waste minimization and recycling;
    - Provision of a Waste Management Plan according to Ku-ring-gai DCP guidelines;
- Construction Materials;
    - FSC, AFS or PEFC certified timbers shall be specified for construction or finishing;
    - Best practice PVC plastics in formwork, piping, cables and conduits;
    - Target of 80% of construction and demolition material waste to be diverted from landfill.

The following sections outline the development's specific sustainable design response in more detail.

Precedence

It is the project team's understanding that the proposed Green Star equivalency approach has been previously accepted by Ku-ring-gai Council for a number of educational developments, such as:

Table 1 - Agreement on Green Star equivalency approach: Educational projects precedents in Ku-ring-gai.

DA Number	LGA	Project
DA0586/18	Ku-ring-gai	Ku-ring-gai High School
DA0020/15	Ku-ring-gai	Knox Grammar School
DA0590/18	Ku-ring-gai	St Ives High School
DA0583/17	Ku-ring-gai	St Lucy's School

3. Introduction

St Edmund's College is an independent co-educational secondary college for students Years 7 to 12 with a wide range of disabilities including sensory disabilities, mild to moderate intellectual disabilities and autism. The school provides educational services not only for families in the local district but right across the Sydney Metropolitan area and Central Coast.

3.1 General Overview of Proposal

The development proposal is for alterations and additions to the various school buildings and other facilities on the site generally as follows:

- Demolition of existing structures;
- Retention of key school facilities (i.e. pool, hospitality area, existing heritage listed building);
- Refurbishment of existing buildings;
- Additions to the rear of existing buildings to be retained, including:
    - New hall;
    - New library;
    - Administration areas;
    - Amenities; and
    - Classrooms.
- A new car park (proposed on 60A Burns Road which is owned by the school) with associated internal driveway.

Overall the intention is to construct a purpose-built facility and remodel existing spaces to create an educational environment suitable to St Edmund's needs. The works will also significantly increase accessibility for the school through the removal/revision of the many level changes which is imperative for the students, staff, their families and broader school community. Preliminary Architectural drawings prepared by Glendenning Szoboszlay Architects are presented below outlining the proposed components of the development.

Figure 1 – Site Plan – Proposed Plan ***(Source: GSA drawings dated 03.12.19)***

4. Sustainable Design Framework

The proposed sustainability response for the project includes various associated drivers, including the following regulatory frameworks:

- The NSW Environmental Planning and Assessment Act 1979;
- The NSW Environmental Planning and Assessment Regulation 2000; and
- Ku-ring-gai Council Development Control Plan (2015).

4.1 The NSW Environmental Planning and Assessment Regulation 2000

Schedule 2 7(4) of the Environmental Planning and Assessment Regulation 2000 states:

"The principles of ecologically sustainable development are as follows:

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,

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,

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

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 mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems."

4.2 Ku-ring-gai Development Control Plan (DCP) 2015

The Ku-ring-gai Development Control Plan 2015 has been prepared in accordance with Section 3.43 of the Environmental Planning and Assessment Act 1979 and clause 16 of the Environmental Planning and Assessment Regulation 2000.

Part 23 General Building Design and Sustainability of the Ku-ring-gai Development Control Plan 2015 states:

23.2 Green Buildings

Controls

"All non-residential buildings with a total gross floor area above 2,000m2 are required to obtain certification under the Green Building Council of Australia Green Star - Design & As Built' rating tool to provide buildings with a sustainable structure, architecture, and performance, incorporating measures to reduce water and energy consumption which will result in a reduction of carbon emissions and building running costs."

Controls – Green Star Rating

"Where the total allowable gross floor area on a single site is above 2,000m2 but below 5,000m2, all new buildings are to achieve 4 Star Green Star ('Best Practice') Design Rating under the GBCA Green Star - Design & As Built rating tool."

4.3 Project Design Response

NSW Environmental Planning and Assessment Regulation 2000

Precautionary Principle

There are no perceived threats of serious or irreversible environmental damage as a result of proposed development on the desired site. The site of proposed development contains pre-existing buildings in a suburban built-up area, which does not hold any special ecological significance. Provided the proposed demolition of the existing building is managed accordingly, the proposed development is not likely to result in irreversible environmental damage, as the net impacts (ecological footprint) on the environment are relatively similar to that of the existing school campus boundary and not considered significant.

The proposed development is to utilize the existing major site infrastructure and upgraded to accommodate improved building amenity (as required). Therefore, no serious or irreversible environmental damage is expected due to the on-going operation of the building. During project construction the project shall be subject to a dedicated and site-specific environmental management plan.

Inter-generational equity

The proposed school redevelopment conserves inter-generational equity through minimizing the consumption of resources whilst providing an upgraded built environment that will ensure the health and well-being of occupants into the future. The design intent will reduce demand on virgin raw materials, ensuring future generations are adequately supplied with such materials. The design maintains the existing structure, increases the life of the asset and allows for a greater social outcome through it's increased capacity at the school.

As the proposed development site has previously been developed on, valuable biological utility is not diminished as a result on the new development elements. Given there is limited diversity of the environment currently on the site, it is not envisaged that this will be significantly impacted as a result of new development.

Waste streams will be dealt with in ecologically safe methods. The development is expected to benefit from a lower stormwater impact compared with a standard practice development as rainwater is to be retained for reuse.

The below methods will be implemented on this project to contribute to a greater sustainable outcome for this generation and those following:

- Only FSC, AFS or PEFC certified timbers shall be specified for construction or finishing;
- High WELS rated water fittings ensuring lower building water demand.
- LED lights, which have longer lives, consume less energy and produce a higher quality light than their counterparts.
- Low-VOC paints, which do not emit dangerous volatile components, risking the health of users.
- Best practice PVC plastics in formwork, piping, cables and conduits. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process.
- A target of 80% of construction and demolition waste will be diverted from landfill.
- Design of efficient mechanical systems to reduce ongoing operational energy.
- Maintain existing superstructure where feasible to limit the waste and construction materials required in the build.

In summary, Inter-generational equity is realized through limited resource use, quality of building, as well as the use of energy and water efficiency measures, which aim to reduce the consumption of limited resources, preserving these for future generations.

Conservation of biological diversity and ecological integrity

There is limited biological diversity on the current site due to the site being previously developed and occupied. The proposed school redevelopment will have limited, if any, impact on the current level of biological diversity and ecological

integrity. Landscaping will be provided which will not only preserve but enhance the amenity of the area. This landscaping will also serve to provide filtered views into the site from Burns Road and contribute to the heritage values of the HCA whilst also softening the built form on the school site.

Improved valuation, pricing and incentive mechanisms

This project will include the integration of a number of initiatives, which aim to internalise pollution and other undesirable environmental outcomes.

- Contractors will be requested to provide and abide by an Environmental Management Plan and Environmental Management System that is in accordance with NSW Environmental Management Systems Guidelines. This places a value on environmentally responsible building practices and places a form of "polluter pays" onto the contractors to ensure they are held responsible for the environmental management of the building site as they complete their work.
- The cost to recycle the construction and demolition waste will be borne by the project team. The project team will be required to target 80% recycling of construction waste. The increased cost of recycling construction materials will also incentivise the purchase of less materials, thereby reducing over-ordering and material wastage.
- The costs of producing the following pollution: sewage, landfill waste, and CO2 emissions are partially borne by the project team and accounted for in the project's sustainability initiatives. The project has voluntarily elected to:
    - improve their water consumption efficiency, thereby paying to reduce production of sewage;
    - reduce their energy consumption, which means the project has paid for the design and implementation of solutions which will reduce CO2 emissions; and
    - recycle waste streams in the construction and operation of the project, which will cost more than standard practice where all material waste is directed to landfill.

Ku-ring-gai Development Control Plan (DCP) 2015

In order to satisfy the intent of Green Star condition from the Ku-ring-gai DCP 2015 (Part 23.2 Green Buildings), St Edmund's College is committed to incorporate ESD principles that will achieve an equivalent standard of 4 Star Green Star in design. This will be substantiated and demonstrated prior to the commencement of works through the provision of:

1) Construction plans and drawings incorporating the ESD commitment outlined within this report, which were carefully analyzed and proposed by the project team and ESD consultant to represent a 4 Star Green Star Design & As-Built design standard.

2) Letter from an independent and experienced Green Star Accredited Professional stating that the St Edmund's College project design achieves equivalency to a 4 Star Green Star Design & As-Built certified design.

3) Indicative 4 Star Green Star pathway, demonstrating how initiatives implemented in the project correspond to a 4 Star Green Star standard.

Considering the project will provide appropriate documentation to demonstrate 4 Star Green Star standard and design practices are incorporated in the school design, a formal Green Star certification is not envisaged to add practical value neither a higher sustainability outcome to the project. For a school of the size and scale of St Edmund's College, the cost related to formally certifying the design through the Green Building Council plays a significant role and can compromise resources that could be directed on investing on more tangible and practical attributes, such as higher grade materials, more efficient systems and/or innovation trials.

Therefore, the proposed Green Star equivalency approach is found to be the most appropriate solution to ensure compliance with Part 23.2 Green Buildings of the Ku-ring-gai Development Control Plan.

It is the project team understanding that the proposed Green Star equivalency approach has been previously accepted by Ku-ring-gai Council for a number of educational developments, such as:

Table 2 - Agreement on Green Star equivalency approach: Educational projects precedents in Ku-ring-gai.

DA Number	LGA	Project
DA0586/18	Ku-ring-gai	Ku-ring-gai High School
DA0020/15	Ku-ring-gai	Knox Grammar School
DA0590/18	Ku-ring-gai	St Ives High School
DA0583/17	Ku-ring-gai	St Lucy's School

The remaining General Building Design and Sustainability objectives from the Ku-ring-gai DCP 2015 (Part 23.3 – 23.10) will also be addressed by the project. The development will give strong consideration to potential environmental impacts by reducing it through application of best practice design and processes such as the many ESD opportunities and initiatives listed in the following Section. The documented initiatives – which are the basis for the response to the Sustainable Design Frameworks outlined above - include:

- Energy conservation and Greenhouse gas emissions reduction;
- Water conservation and water reuse;
- Indoor & outdoor environmental quality of occupants;
- Waste minimization and recycling;
- Best practice Building Management;
- Responsible Construction Materials;

Any further concerns will be addressed through development of a Construction Environmental Management Plan that incorporates mitigation measures to ensure that environmental impacts to the site are minimised during construction. Contractors will also be requested to provide and abide by an Environmental Management System to be in accordance with NSW Environmental Management Systems Guidelines or a similar standard. This places a value on environmentally responsible building practices to ensure they are held responsible for the environmental management of the building site as they complete their work.

Once the new development is under activity, operational guidelines, best practice procedures and appropriate monitoring and control measures will be defined by the building owner. This will be in accordance to the sustainable strategies adopted by the development.

5. ESD Opportunities & Initiatives

This section addresses the Greenhouse Gas, Energy Efficiency and Ecologically Sustainable Development aspects in response to the Sustainable Design Frameworks (as per Section 3) for the project. It uses best practice sustainable design principals and borrows elements from external sustainability tools to develop a set of metrics for the site.

There are several Ecological Sustainable Development opportunities and initiatives that are being considered for inclusion in the project. The following examples are to be read in conjunction with design documentation prepared by Glendenning Szoboszlay Architects. Wood & Grieve Engineers now part of Stantec note the design is in its early stages, and the following concepts will be considered going forward. As the design progresses, a number of documented elements may prove unfeasible, as well as undocumented initiatives proving attainable.

General principles of ecologically sustainable development will be applied in order to achieve:

- Energy conservation and Greenhouse gas emissions reduction;
- Water conservation and water reuse;
- Indoor & outdoor environmental quality of occupants;
- Waste minimization and recycling;
- Best practice Building Management;
- Responsible Construction Materials;

Fundamental to the success of improving the ESD outcome for the project is the adoption of strong design philosophy. Passive design features have the ability to:

- Lower operational energy demand via improved thermal performance;
- Promote greater indoor environmental quality;
- Reduce the requirements for artificial lighting & power;
- Reduce the buildings' reliance on HVAC systems;
- Improve building occupant comfort; and
- Improve the project's capacity to deliver a responsible development.

The design will attempt to include several passive design options and provide a robust and environmentally sensitive framework. Furthermore, several energy efficiencies measures and intelligent selection of systems are being proposed in order to improve the environmental outcome of the development while maintaining occupant level comfort and well-being.

5.1 Australian Best Practice ESD Framework (Green Star)

The following section details a provisional list of ESD initiatives for inclusion within the design & development of the project. They have been selected on the basis they align with the *national best practice sustainable building principles to improve environmental performance and reduce ecological impact***.** In this instance, the 'national best practice building principles' have been identified as those current within the Green Building Council of Australia's – Green Star framework. Green Star is currently accepted within the building and construction industry as representative of Australian Best Practice in design & construction with reference to environmental conservation and performance. While the project will not target a formal Green Star certification, the project is seeking to respond directly to the Ku-ring-gai DCP requirements by incorporating relevant ESD principles so that the project could be benchmarked to achieve the equivalent of a 4 Star Green rating.

Green Star is Australia's foremost holistic built environment assessment tool. Design & As-built v1.2 is the current tool applicable to all building types within the industry applying for Construction Certificate prior to May 2020 and outlines a series of environmental performance criteria design to improve environmental sustainability & building performance.

There are nine performance categories within Green Star, as follows:

- Energy (GHG Emissions);
- Water;
- Materials;
- Indoor Environmental Quality (IEQ);
- Building Management;
- Transport;
- Land Use & Ecology;
- Emissions; and
- Innovation.

The following sections provide a dedicated description of the project's response to ESD and alignment with best practice principles of sustainable design.

5.2 Energy (GHG Emissions)

A variety of energy efficiency measures are applicable to the proposed development and form part of the initial design and operation plan for the school. The final strategy will be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The energy efficiency strategy follows the hierarchy below. Best practice energy conservation dictates that in the first instance demand is reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest impact and return on investment.

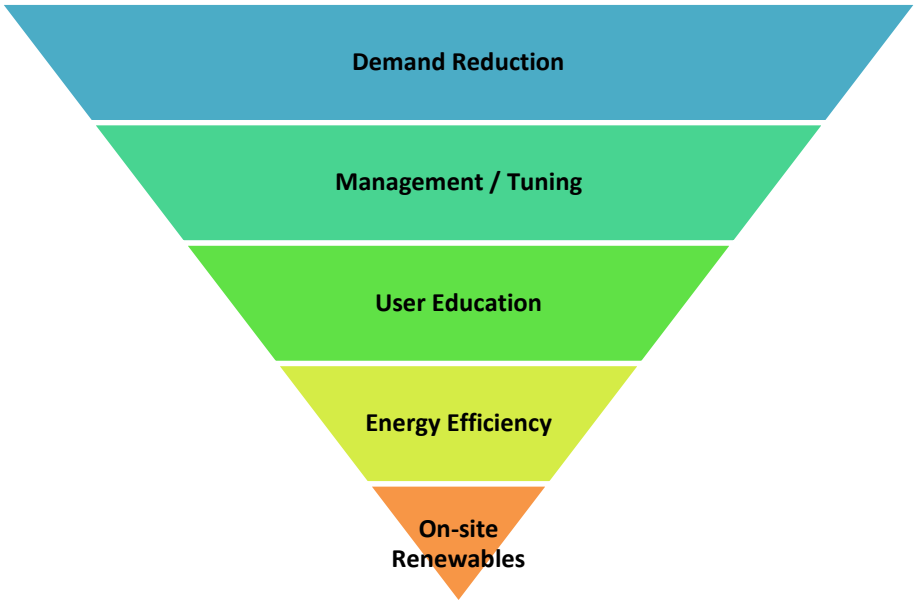

Figure 2 - Energy Efficiency Strategy Hierarchy

In order to reduce the total carbon footprint of the development and to lessen the greenhouse gas emissions associated to operations, several energy efficiency measures will be included within the building. The project is committed in providing on-site renewable electricity production (minimum 20 kW capacity).

Methods to achieving the desired energy savings and greenhouse gas emission reduction include:

5.2.1 Passive Thermal Design

In order to ensure optimised energy demand reduction is identified, the building design will be subject to detailed energy modelling which will be used to optimize glazing performance and ensure the building fabric performance is maximized. This will allow the design to team to ensure fundamental building design responds appropriate to the site-specific climate conditions as well as the identified user groups.

- **Façade Thermal Performance:** The new façade will be designed with high thermal performance glazing and building fabric. This shall exceed BCA Section J requirements with an intent of reducing heat gains and exchange rates, thus bringing down HVAC operational energy consumption. Western facade to consider double-glazing design.
- **Thermal comfort** is provided in line with the expectations for schools, while maintaining energy efficiency throughout the design. Comfort will be achieved through providing adequate insulation and glazing quality in line with the NCC to all envelope elements. This is particularly important for the students of St Edmunds, who can be more sensitive to temperature and comfort than traditional systems allow.
- **Solar Gain Reduction and Shadings:** External shading devices will be implemented in the architectural design adjacent to conditioned spaces in order to reduce solar exposure / solar gains thus reducing the reliance on

mechanical systems for internal conditioning. In order to reduce the building heat gains, louvres and awnings are included in the architectural design to the Northern and Western facades, which are the ones expected to receive the highest solar gains.

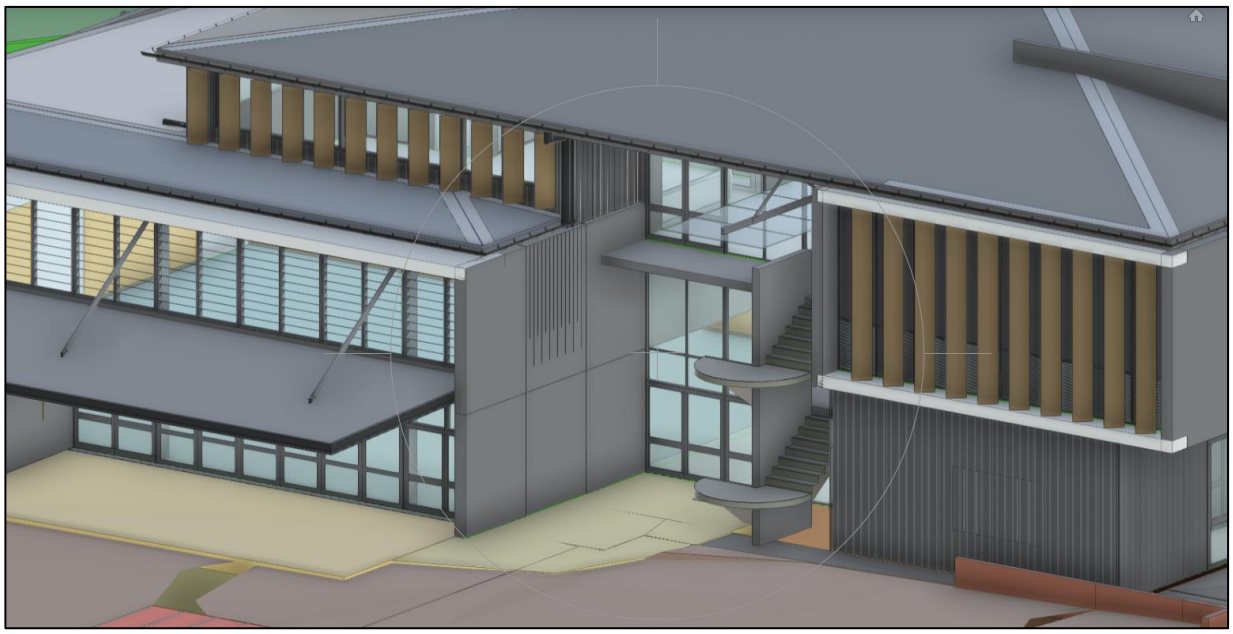

Figure 3 - Indications of shading devices - louvres and awnings - included in the design.

The building roof will be designed to be light coloured (low solar absorptance), which also reduces solar gains by reflecting light and is beneficial to the local heat island effect.

- **Encouraging natural lighting** where possible: Through classrooms proximities to glazed facades and application of translucent roof materials across the new roofing components. This reduces reliance on artificial lighting and supports an energy efficient design.

5.2.2 Lighting Systems

- **Energy Efficient lighting selection (LED lighting) and systems:** This will reduce the electrical load on the grid significantly for the same illuminance output in comparison to incandescent or fluorescent lights. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials.
- **Controls of lighting systems:** This can include zoned switching, motion sensors, lighting control systems with time clocks and lighting sensors where appropriate. This will reduce base building energy consumption by assuring artificial lighting is turned off when not required.

5.2.3 Mechanical Systems

- **Efficient HVAC System Equipment:** Efficient and bespoke HVAC systems with high COPs will be appropriately designed and sized for the development.
- **Centralized Hot Water Plant (Gas):** Centralized Gas condensing Hot Water Plant is a low intensity Greenhouse Gas Emission system if comparison to electric systems.
- **Water efficient fixtures and fittings:** By implementing low-flow water fixtures, including taps and showers, the hot water consumption associated with amenities can be reduced, thus reducing the greenhouse gas emission associated to it.

5.2.4 Materials

- **Embodied Energy:** By maintaining/reusing the existing building façade and structure, there will be considerable savings on the total building embodied energy through reduction of materials production, transport and total construction time.

5.2.5 On-site Renewable Energy

- **Inclusion of on-site renewable (solar) energy** is proposed for the development, which shall offset the school energy demands. Further feasibility will be completed regarding the ideal system sizing and capacity, but the project is committed to providing a minimum 20 kWc photovoltaic system to the development.

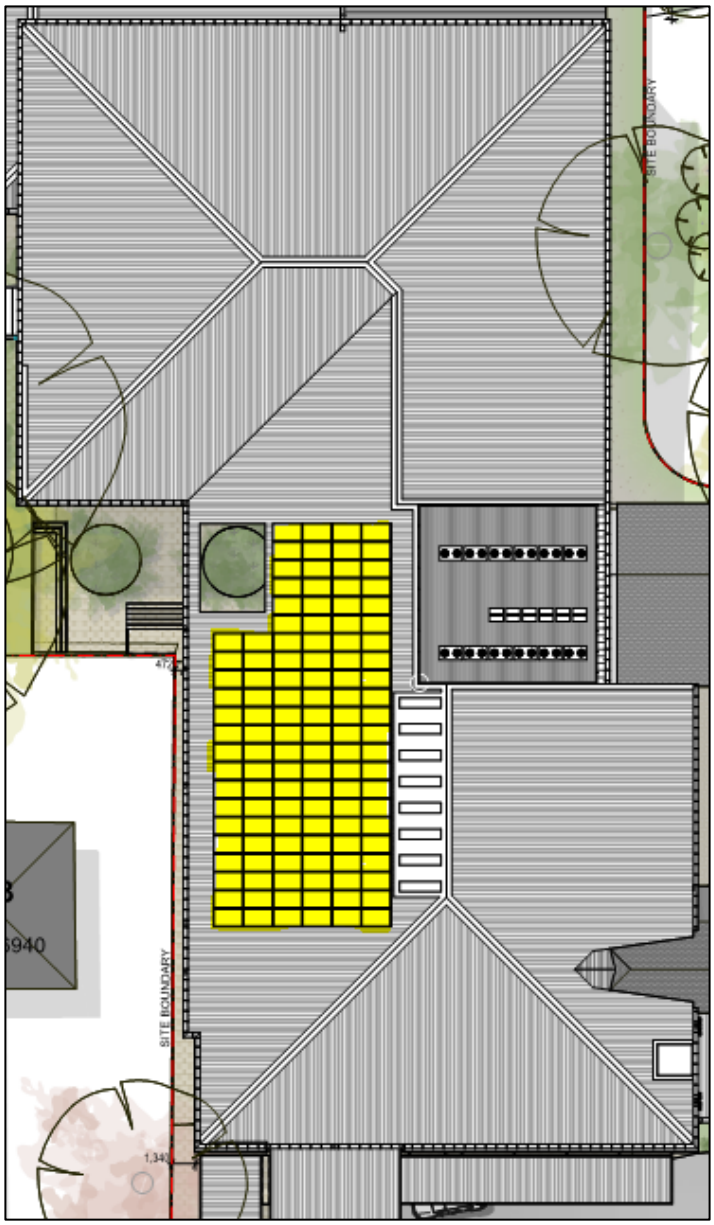

Figure 4 – Indication of on-site renewable (solar) energy inclusion in the design.
(*Source: GSA drawings dated 03.12.19)*

5.3 Water Efficiency

A variety of water efficiency measures will be applied to the proposed development. These best practice water efficiency measures implemented to reduce water consumption include:

- **Water efficient fixtures and fittings (WELS rating):** By implementing low-flow water fixtures, the consumption associated with amenities can be reduced. This includes taps, wash basins, WCs, Urinals, showers and supplementary water uses. The selections will meet the Green Star Design & As-Built v1.2 benchmarks for fixtures and fittings selections.
- **Water efficient appliances (WELS rating):** Where applicable, priority will be given to efficient water appliances, such as dishwashers for the kitchen spaces. The selections will meet the Green Star Design & As-Built v1.2 benchmarks for water appliances selections.
- **Rainwater harvesting and reuse:** A rainwater tank (minimum 20 kL capacity) will be implemented in the design, where further feasibility will be completed regarding the ideal tank sizing and capture area. and end-use for any non-potable water collected. The captured water will offset irrigation water consumption.
- **Water use metering and monitoring:** Which can identify leaks and amend losses before greater loss occurs.
- **Plants:** Native plants are designed to thrive in the Australian environment and are typically more resilient than their exotic counterparts. Low water species will reduce even more irrigation demand.

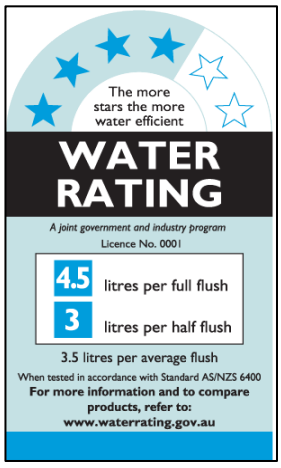

Figure 5 - Illustration of WELS rating label.

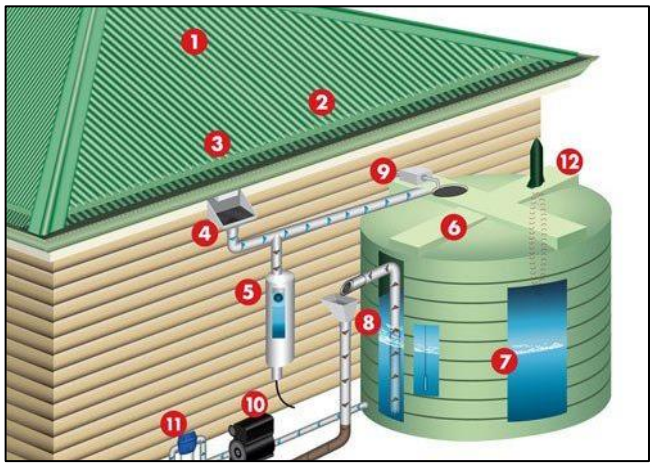

Figure 6 - Illustration of a Rainwater Harvesting System.

The above initiatives are sufficient to allow the project to meet best practice consumption benchmarks considering the HVAC mechanical design will most likely apply waterless heat rejection systems due to the size, configuration and needs spaces within the development.

5.4 Indoor & Outdoor Environmental Quality

Improved indoor environment quality is a significant by-product of sustainable building design. The architectural design by Glendenning Szoboszlay Architects will incorporate elements within the project to improve indoor environment quality.

The following design features are considered with the intent to improve indoor environmental quality.

- **High levels of daylight** to spaces frequently occupied. Natural light is preferred over artificial life because it falls in a more natural spectrum, is energy efficient and connects occupants to the outside.
- **Views** have been considered for each of the buildings to optimise the access of the building occupants to green or environment enhancing vistas.
- **Thermal comfort** will be in line with the expectations for schools under the Green Star Design & As-Built v1.2, while maintaining energy efficiency throughout the design. Comfort will be achieved through providing adequate insulation in line with the NCC to all envelope elements
- **Glare and radiant temperature control** through the inclusion of external shading devices and operable blinds where appropriate.
- **Artificial Lighting Design** – will be zoned & designed appropriately to ensure the optimum lighting comfort is achieved. This includes general illuminance, lighting uniformity and glare reduction in accordance with best practice standards outlined in Green Star Design & As-Built v1.2, optimised surface illuminance for building users and localised occupant lighting controls.
- **Acoustic comfort** – will be optimised to ensure building appropriate internal noise and reverberation levels are achieved in accordance with best practice standards. This is important to St Edmund's in light of the needs of some students with acoustic sensitivity. Examples include optimised internal materials and finishes to reduce internal noise levels and reverberation, such as partitions sound insulation capacity, ceiling and flooring types.
- **Material Selections** – will focus on reducing volatile organic compounds (VOC) levels and minimise formaldehyde impacts. Paints, sealants, adhesives, carpets, floor and material finishes will all comply with best practice VOC criteria via the architectural specification and design intent.
- The current facilities will either remain or be upgraded as part of the proposed alterations and additions. These are highly supportive of students' necessities and well-being. Current facilities include our heated swimming pool, Technology rooms for Woodwork and Food Technology, Computer Lab, playgrounds, Commercial Kitchen, Art Room, Library, Science Labs and gardens. School outdoor running area and amenities also allow for student's amusement and well-being. These facilitate social interaction and provide break-out spaces with increased levels of natural daylight, fresh air and landscaped terrain.

5.5 Building Management

Via the implementation of industry recognised best practice frameworks, the project design and built form will seek to respond to the ongoing environmental challenges of urban development and ensure the project implements a range of ESD initiatives aimed at improving ongoing building management.

Through specific contractual commitments and documented design intent the project will seek to address environmental management & building operational performance through the following initiatives.

- **Building Commissioning & Tuning Procedures:** This includes building commissioning prior to practical completion and periodic tuning 12 months post practical completion. By implementing this via project contract documents the project ensures operational efficiency & building operation is optimised in accordance with the intended building design.
- **Waste provisions:** Appropriate waste provisions are going to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.

5.6 Waste Management

Best practice initiatives will be explored through the development of a site-specific Waste Management Plan, in accordance to Ku-ring-gai DCP Waste Management Policies.

The major waste streams from schools are typically comprised of paper and cardboard from writing and study materials, mixed glass and plastics recyclables from lunch food items, and organics from canteens. Recycling will be encouraged for the students, staff and canteen staff, where the school will provide operational waste facilities in accordance with Ku-ring-gai DCP Waste Management Policies.

5.7 Construction Materials

Construction materials are a carbon intensive component of any development. They often involve very energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development.

It is noted that, by maintaining/reusing the existing building façade and structure, there will be considerable savings on the project's total building embodied energy through reduction of materials production, transport and total construction time.

The project design team will also give preference to building materials that are responsibly sourced or have a sustainable supply chain, such as:

- **FSC, AFS or PEFC certified timbers** shall be specified for construction or finishing;
- **Low-VOC paints**, which do not emit dangerous volatile components, risking the health of users.
- **Best practice PVC plastics in formwork, piping, cables and conduits**. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process.

The project has a target of 80% of construction and demolition material waste to be diverted from landfill.

6. Summary of Design Response

Ecologically Sustainable Design is a driving consideration in the St Edmund's College development. The project will incorporate a number of ESD initiatives to reduce the greenhouse gas emissions, potable water consumption and material resources of the site and the further sustainability commitments presented. These constitute the sustainability response from the project to the site applicable sustainable design frameworks, as listed within Section 4. Sustainable Design Framework.

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

- The project will be designed to an equivalent 4 Star Green Star standard – in lieu of formal registration and GBCA certification as outlined within Ku-ring-gai DCP 2015 (Part 23.2 Green Buildings);
- Energy conservation and Greenhouse gas emissions reduction;
- Water conservation and water reuse;
- Indoor & outdoor environmental quality of occupants;
- Waste minimization and recycling;
- Best practice Building Management;
- Responsible Construction Materials;

The specific initiatives the project is committed to providing are listed within the Executive Summary – Sustainability Commitments.

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and the sustainability vision for the St Edmund's College alterations and additions project.

Design with
community in mind

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