WOOD & GRIEVE ENGINEERS

Rouse Hill Anglican College Masterplan

Ecologically Sustainable Development Report

Prepared for:

Anglican Schools Corporation
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Date:
28 July 2017

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Project No. 28914-SYD-G
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Revision

REVISION	DATE	COMMENT	APPROVED BY
1	23/03/2017	Draft for Client Review	**ALK**
2	31/03/2017	Revised Report	**ALK**
3	28/07/2017	Revised Report	**ALK**

Contents

1.	EXECUTIVE SUMMARY	1
2.	INTRODUCTION	2
2.1	Sustainable Design Initiatives	3
2.2	Environmental Planning and Assessment Regulation 2000	3
3.	ESD OPPORTUNITIES & INITIATIVES	7
3.1	Energy Efficiency	7
3.2	Water Efficiency	11
3.3	Resource Efficiency	12
3.4	Sustainable Transport Solutions	13
3.5	Environmental & Building Management	14
3.6	Indoor and Outdoor Environmental Quality	14
3.7	Community Initiatives	15
4.	BLACKTOWN DCP REQUIREMENTS	16
4.1	Environmental Protection	16
4.2	Special Considerations	18
4.3	Landscaping	18
4.4	Shading	19
5.	SELF-ASSESSED GREEN STAR DESIGN AND AS BUILT V1.1 PATHWAY	20
6.	SUMMARY	21

1. Executive Summary

This Ecological Sustainable Development Report has been prepared for Anglican Schools Corporation for the proposed Rouse Hill Anglican College (RHAC) at 7 and 37 Worcester Road, Rouse Hill, NSW. This report is intended to provide an overview of the proposed ecologically sustainable development (ESD) principles and efficiency measures and is intended to form part of the Environmental Impact Statement (EIS) for the SSD 8006. This is a direct design response to the ESD component of the *Secretary's Environmental Assessment Requirements (SEARs),* dated 2 November, 2016.

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers)
- Detail regarding specific ecological sustainable development initiatives through all phases of the project.
- Demonstration of assessment against a suitably accredited rating scheme to meet industry best practice.
- Initiatives that would minimise the consumption of resources, water (including water sensitive urban design) and energy.
- Demonstration that that the development has been designed to promote the use of sustainable transport.

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

- The Secretary's Environmental Assessment Requirements (SEARs) from The Department of Planning and Environment, NSW; and
- Relevant State & Local Government Controls (Blacktown City Council DCP (2015) & LEP (2012)
- the Environmental Planning and Assessment Regulation 2000

In coordination with the above, the project will implement a number of sustainable design principles and includes initiatives designed to mitigate the environmental impact of the following:

- Energy – including improved energy efficiency across the buildings and its associated sources.
- Water Efficiency – including reduced potable water demand and improved stormwater quality.
- Passive Design Principles – reducing the development's overall requirement for building services.
- Ecology - Maintaining ecology through landscaping where practical
- Materiality – Considering the whole of life impact of materials and considering their selection to minimise harm to the environment, including efficiency and construction.

This report also assesses the design of the facility against the Green Star Tool Design & As built v1.1, to demonstrate its equivalence to "Industry Best Practice". This has been deemed the most suitable benchmark for the project.

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

2. Introduction

Figure 1 Overview of the site. Source: Terroir Proposed Site Plan (*MP-10-00, 2017*)

The proposed development consists of approximately:

Phase	Area	Works
Phase 01	K Block and Car Park	1,000m2 of classrooms 300m2 of car parking
Phase 02	L Block, Car Park	1,500m2 of classrooms 2,000m2 of car parking
Phase 03	Senior School	1,500m2 of classrooms
Phase 04	Library and Cola	1,000m2 library
Phase 05	Senior School	2,500m2 of classrooms
Phase 06	Multipurpose and Gym Awning	2,000m2 gym
Phase 07	Block M, Canteen and Bike Shed	1,000m2 of classrooms 70m2 bike shed
Additional	N/A	New access roads through the site exiting to Worcester Road New vegetated landscaping New hardscaping

Pre-existing developments on the site consist of approximately:

- 9,000m2 of classrooms
- 6,000m2 of car parking
- 1,000m2 of outdoor sport courts

Introduction

This report addresses the Ecologically Sustainable Development and efficiency aspects in response to the *SEARs* 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.

2.1 Sustainable Design Initiatives

In pursuit of the ecological design principles, the Rouse Hill Anglican College development will pursue excellence benchmarked from a number of sources. These include best practice design initiatives from:

- Blacktown DCP, 2015
- Blacktown Local Environmental Plan (LEP) 2015
- *Secretary's Environmental Assessment Requirements (SEARs)* item 6 for this development, &
- Green Star Design and As-Built v1.1

2.1.1 SEARs Requirements

SEARs item 6 outlines requirements for this development that must be addressed as part of the Environmental Impact Statement. These are:

- Detail how **ESD principles** (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and ongoing operation phases of the development.
- Demonstrate that the development has been assessed against a suitably accredited rating scheme to meet **industry best practice**.
- Include a description of the measures that would be implemented to **minimise consumption of resources**, water (including water sensitive urban design) and energy.
- Demonstrate that the development has been designed to promote the use of **sustainable transport**.

Water sensitive urban design (WSUD) principals are designed and documented by others, however their overarching affects are discussed within this report.

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

2.2.1 Precautionary Principle

There are no perceived threats of serious or irreversible environmental damage as a result of locating RHAC on the desired site. The site is a recognised school site and has been expected to develop over time as enrolments grow to meet the growth of Western Sydney.

There are no threats of serious or irreversible environmental damage as a result of the proposed use of RHAC and activities of its future occupants. The proposed development has predominantly the same uses as the current buildings on the site i.e. classrooms. Therefore, no serious or irreversible environmental damage is expected due to the operation of the building. The current building has similar operations and building services to the proposed project and has not created any serious or irreversible environmental damage.

The site selection and proposed use of RHAC are associated with low risks of serious environmental consequences as there are strong similarities with the current building on the site. The current building has had no serious environmental impacts due to its location or use. What's more, the RHAC development goes above and beyond accounting for environmental damage by attempting to reduce it with best practice initiatives.

2.2.2 Inter-generational equity

RHAC conserves inter-generational equity through minimising the consumption of resources whilst providing school environments which will ensure the health and well-being of occupants into the future. RHAC will reduce demand for resources by introducing a number of best practice energy and water conservation measures. These initiatives will free up more resources for future generations, instead of their immediate consumption by the current generation.

As the site is already partially developed and limited environment with biological utility still exists on the site, the state of the environment is maintained. The RHAC development includes new landscaping which will maintain pockets of planted environment similar to those currently present on the site. The limited diversity of the environment currently on the site will be maintained by this project.

All waste streams will be dealt with in ecologically safe methods; waste water and storm water will be plumbed to the sewers or storm water drains as required by law. In addition, waste water will be lower for this development compared with a standard practice development as low-flow fixtures and fittings will be used to reduce water consumption throughout the building.

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

- 4 Star Green Star equivalent Design – Green Star Design & As-Built v1.1. No formal rating
- 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.
- Careful use of water and low flow fittings.
- 90% of construction and demolition waste will be diverted from landfill.

- Consideration for low embodied energy products, recycled or green rated products, such as GECA or "Global Green Tag". This spans both construction and fitout items.
- Use of insulants in walls that are low or zero ozone depleting (ODP) and low global warming potential (GWP).

Inter-generational equity is realised in the use of energy and water efficiency measures which aim to reduce the consumption of limited resources, preserving these for future generations. In addition, the design principles outlined in the following sections are for buildings which will be occupied by the next generation. The healthy interior environments which they create will benefit occupants up to 60 years from today.

2.2.3 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 RHAC development will have limited, if any, impact on the current level of biological diversity and ecological integrity as there is limited green landscaping on the current site that will be replaced by built development in this project. Some trees will be demolished; however, these are likely to provide limited biological value due to the proximity of these trees to urbanization.

2.2.4 Improved valuation, pricing and incentive mechanisms

This project will consider the integration of a number of initiatives which aim to internalise pollution and other undesirable environmental outcomes. Contractors may be requested to provide and abide by an Environmental Management Plan and Environmental Management System which would be in accordance with NSW Environmental Management Systems Guidelines or a similar standard. 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 may be borne by the project team. The team may be required to target 90% recycling of construction waste. This would have a greater financial cost to the project, however it provides a more accurate reflection of the full life cycle costs of the materials which were on the site, and the waste from the new materials as a result of the construction. 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 CO_2 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 their production of sewage;
- reduce their energy consumption, which means the project has paid for the design and implementation of solutions which will reduce CO_2 emissions;
- 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.

2.2.5 Blacktown Local Environmental Plan (LEP) 2015

The LEP applies to RHAC as shown on the Blacktown Land Application Map and Section 33A of the Environmental Planning and Assessment Act 1979 No 203. This LEP came into effect on 7 July, 2015. This report addresses the following aims of the LEP in Clause 1.2 (2):

- To minimise risk to the community by restricting development in sensitive areas that are subject to flooding and other hazards,
- To provide for infrastructure to maintain and meet demands arising from housing and employment growth,
- to conserve and enhance Blacktown's built, natural and cultural heritage,
- To conserve, restore and enhance biological diversity and ecosystem health, particularly threatened species, populations and communities.

The development is located in Area 20 and classified as a School Zone.

2.2.6 Blacktown Development Control Plan (DCP) 2015

The Blacktown Precinct has a specific DCP developed in 2015. The ESD elements addressed by this report are replicated below:

4 ENVIRONMENTAL PROTECTION
Objectives
To ensure that development is undertaken in a manner which will enhance the existing environment or at least minimise any likely adverse environmental impacts.
Requirements
(a) Areas requiring fill
(b) Tree preservation
(c) Heritage
(d) Pollution control
(e) Noise reduction
(f) Bush fire prone land
(g) Development adjoining rail corridors and high volume roads.

8 SPECIAL CONSIDERATIONS
Requirements
(a) Solar access
Downstream owner's consent.

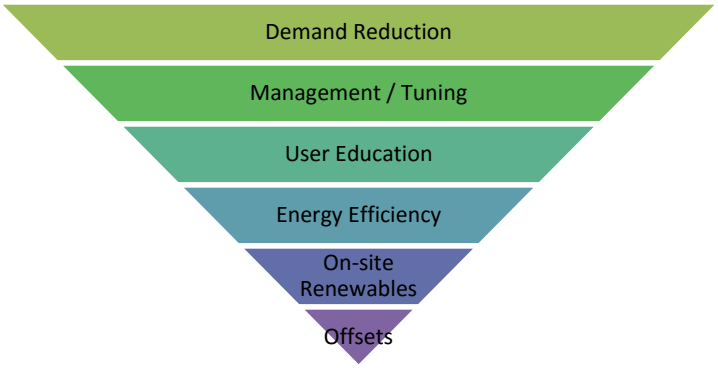
3. ESD Opportunities & Initiatives

The following section identifies Ecological Sustainable Development opportunities and initiatives for potential inclusion within the project. The following examples are to be viewed in response to the conceptual design prepared by Terroir. WGE note the developed design will be refined with the following concepts going forward. As the design progresses, a number of documented elements may prove unfeasible, as well as undocumented initiatives proving attainable.

3.1 Energy Efficiency

A variety of energy efficiency measures are applicable to the proposed college precinct and its individual buildings. These energy efficiency measures may form the part of the final in finalising the design and operation of the spaces. The final strategy will always be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The energy efficiency strategy follows the hierarchy pyramid 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 return on investment.



3.1.1 Site-wide Strategies

Energy efficiency measures to be considered across the entire site to reduce its energy consumption include:

- Designed exterior lighting layout. This ensures safety and security lighting is maintained across the site, but allows minimum lighting to be included only as required. The demand and cost is reduced through appropriate design levels.
- Efficient lighting e.g. LEDs. This will further reduce the electrical load on the grid for the same electrical output. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials
- Daylight sensors for street lighting, which will reduce the demand on the system.
- Use of recycled building waste in the road base to reduce energy consumption in production of the road base.

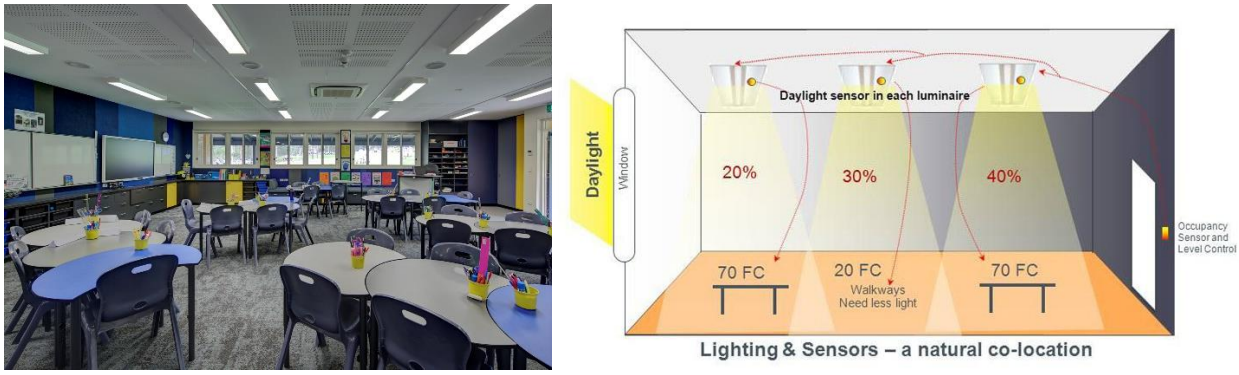


Figure 2 Left to Right: LED lighting (Photo of existing RHAC classroom courtesy of Terroir) **and daylight Sensors.**

3.1.2 Building Specific Energy Strategies

Each building has a unique energy consumption profile. There is no single "one-size-fits-all" approach in creating an energy efficiency plan for a mixed-use precinct. This project is comprised of a variety of buildings including school classrooms, canteens, and a gymnasium. Whilst it may be appropriate for the gymnasium to be naturally ventilated to reduce energy consumption, the classroom thermal comfort requirements may be too stringent for this to be an energy efficient solution.

The majority of the buildings in the school are classrooms, and an energy consumption profile typical of a school would be weighted towards heating, ventilation and air conditioning (HVAC), equipment and lighting.

Figure 3 shows a graph of the typical ratios of energy end uses in a school in NSW. Since the greatest energy consumption within the design control is HVAC, and lighting and equipment, these present the greatest opportunity for energy reduction. Energy efficiency measures integrated by the project will focus on these two energy end uses.

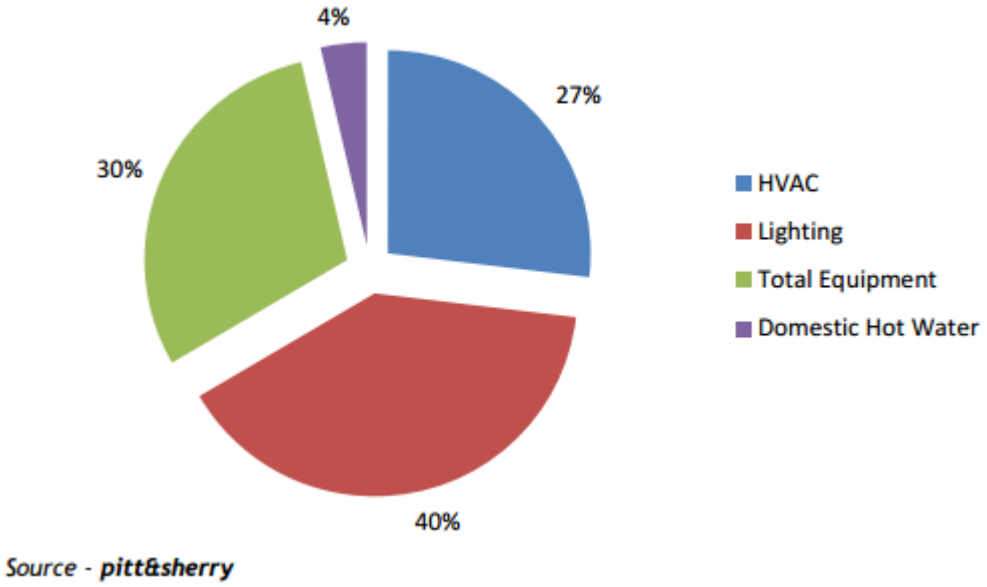


Figure 3 Typical school energy usage. *(Baseline Energy Consumption and Greenhouse Gas Emissions, 2012)*

Energy efficiency measures which could be applied to individual buildings to reduce their energy consumption include:

- Vernacular architecture, designed to maximise the specific needs of all occupants and users of the building. The buildings will be designed to deliver comfort, practicality, daylight, views and energy conservation through its architectural design intent.
- Shading, which reduces direct solar gains and increases comfort without compromising the connection to the outside. Shading allows larger glazed areas.

ESD Opportunities & Initiatives

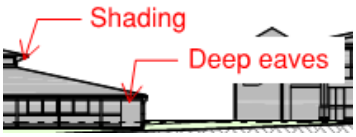


Figure 4 Shading of windows and deep eaves on corridors. Source: Terroir

- Consideration of Natural Ventilation or Mixed mode where practicality allows. Acoustic, operation and other requirements may impact this practicality, but this has the ability to deliver high levels of fresh air to a space and reduce the energy consumption associated with HVAC.

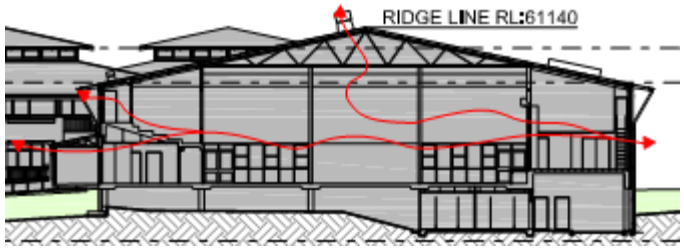


Figure 5 Natural ventilation pathways. Source: Terroir

- Solar passive design which maximizes north and south facing windows, and minimizes east-west glazing.

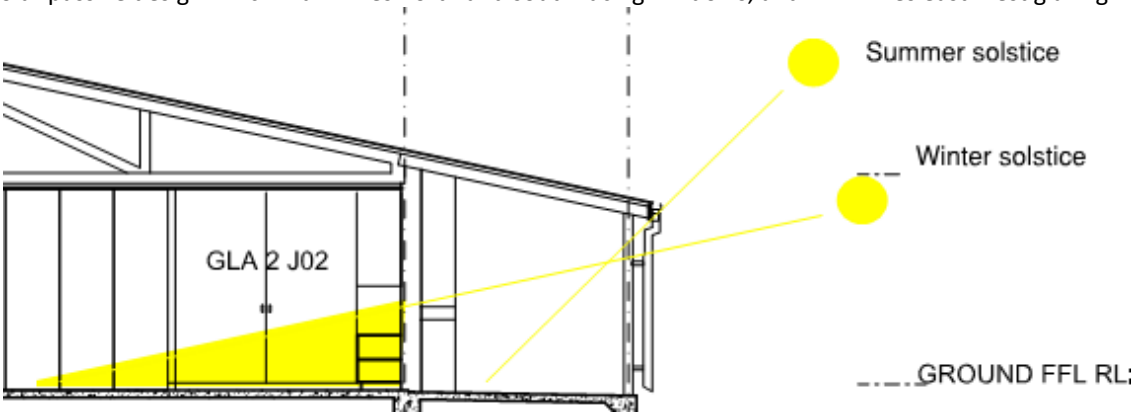


Figure 6 Solar passive design which includes deep eaves and shading to encourage sun penetration during winter, and blocks sunlight during summer. Source: Terroir

- High performance glazing, to meet or exceed the requirements of the Building Code of Australia.
- Thermally efficient construction, including consideration of thermal mass, insulation where required and the lack of insulation where beneficial.
- Efficient HVAC systems with high COPs, appropriately designed to meet the needs of the system.
- Bespoke mechanical design systems sized appropriately for the development. These systems will have adequate efficiency, possible measures include economy cycles, CO2 monitoring or temperature band fluctuation control to promote energy efficiency in the design.
- Energy and water efficient appliances
- Roof lights or translucent glazing. This increases the natural light in the space, reducing the need for artificial lighting and potentially reducing the heating demand in winter.
- Lighting controls including timing, occupancy and daylight sensors to reduce the demand on the lighting system.
- Efficient lighting systems with LED lighting.
- Potential for ceiling fans.

ESD Opportunities & Initiatives

Figure 7 Roof lighting.

Fundamental to the success of improving the ESD outcome for the project is the adoption of strong design philosophy.

Passive thermal design features have the ability to:

- Improve building occupant comfort;
- 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; and
- Improve the project's ability to deliver a responsible development.

The design will attempt to include several passive design options and provide a robust and environmentally sensitive framework.

3.2 Water Efficiency

A variety of water efficiency measures are applicable to the proposed school and its individual buildings. These water efficiency suggestions are intended to influence the architecture in finalising the design and operation of the spaces. Due to design constraints as the design progresses, not all of the below efficiency measures will be implemented in the final design.

The following chart describes the typical water consumption of a school. It can be seen that the largest use can be landscaping due to grassed sports fields. There are a number of strategies that can be implemented to reduce the overall potable water consumption of the development

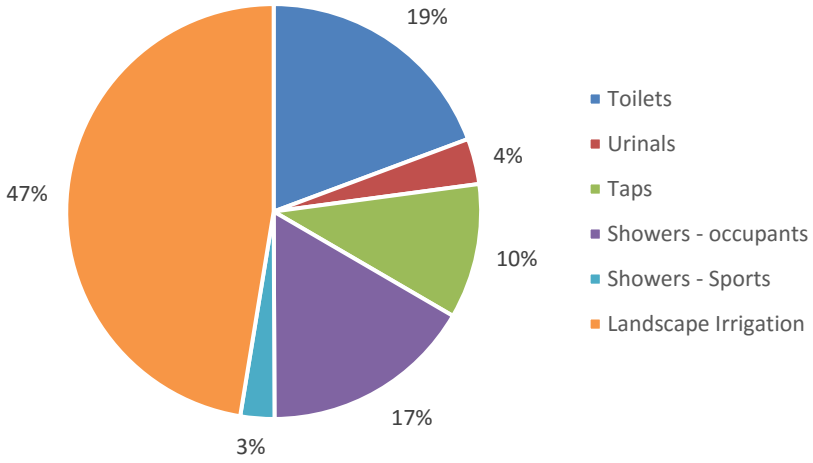


Figure 8 Typical school water consumption. *(Source: Green Star Potable Water Calculator estimation)*

Water efficiency measures which could be applied to reduce water consumption include:

- Water efficient fixtures and fittings. By implementing low-flow water fixtures, the consumption associated with amenities and shops can be reduced.
- Water monitoring systems, which can identify leaks and amend losses before greater loss occurs.
- Rainwater collection and reuse, which can offset irrigation and cooling tower water consumption
- Cooling tower management strategies and design if cooling towers are selected. Any water-based heat rejection systems serving larger demand items such as the supermarket will be carefully designed to ensure optimal energy and water use in its operation. Through correct sizing as well as commissioning and tuning, the
- Methods to reduce water consumption in landscaped areas. These could include drip-system irrigation for trees and larger plants. Consideration for the use of moisture sensors and the use of native plants in the landscaping plan. Natives are designed to thrive in the Australian environment and are typically more resilient than their exotic counterparts.
- Water education plan to provide information to users regarding their water consumption

Figure 9 Left to Right: Efficient fittings and drip irrigation.

3.2.1 Water Sensitive Urban Design

The project's water sensitive urban design (WSUD) has been developed by Taylor Thomson Whitting, refer to their Siteworks and Stormwater Plan for details. The WSUD principles outlined in Part J DCP -Water Sensitive Urban Design and Integrated Water Cycle Management have been considered for implementation by the project. These include

- **Utility meters** designed to meet metering guidelines under the weights and measurement legislation, as outlined under the current National Measurement Regulations.
- An automatic **monitoring system** which records both consumption and demand will be considered, capable of producing quarter hour, hourly, daily, monthly and annual use for all meters.
- **Rainwater Reuse -** A rainwater tank will be investigated for implementation as appropriate. Further feasibility is to be completed regarding the ideal end-use for any non-potable water uses on site. Rainwater on this site is particularly advantageous given the significant collection area across the building roofs. There are also ample reuse opportunities including toilets and the landscaping.
- **Landscape Irrigation -** Landscape irrigation supply may be sourced from on-site rainwater system resulting in a net lower potable water demand. In the event additional potable supply is to be connected, a drip irrigation system with moisture sensor override is to be installed.
- **Stormwater detention systems** have been designed to retain a signification of stormwater on-site. Refer to the Siteworks and Stormwater Plan by Taylor Thomson Whitting.
- **Stormwater treatments** – Treatments such as gross pollutant traps and filtration systems have been included I the design to improve the water quality of stormwater destined for the Sydney Water stormwater system.
- **Vegetated stormwater treatment** - Measures such as natural bioretention systems and will be considered for the WSUD sites, refer to the civil report by Taylor Thomson Whitting

3.3 Resource Efficiency

Other resources besides water and energy are consumed by a development. These include the building materials in the initial builds, the goods bought and sold through the stores, through to the food eaten by the building occupants. The following resource efficiency measures are intended to influence the architecture in finalising the design and operation of the spaces. Due to design constraints which enter as the design progresses, not all of the below efficiency measures will be implemented in the final design.

3.3.1 Construction materials

Construction materials are a highly 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. However, there are a number of environmentally friendly practices starting to become accepted by the construction industry. Depending on the materials selected for the constructions, and the options available in the area, the following may be adopted for material selections.

- Recycled content in steel, concrete, or road base.
- Minimisation of excess wasted material.
- Quantification of materials in the planning stages to reduce the risk of over ordering materials.

3.3.2 Operational materials

The major waste streams from schools are 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.

The school will provide operational waste facilities in accordance with Blacktown waste removal guidelines. A detailed recycling plan will be investigated for development to encourage students and staff to recycle their waste.

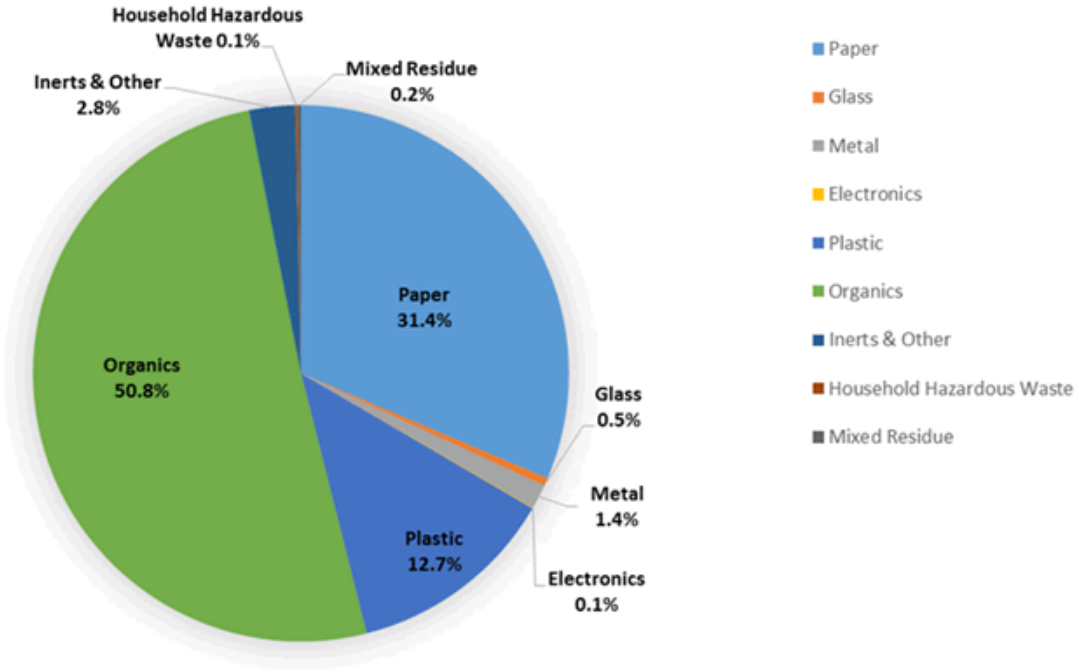
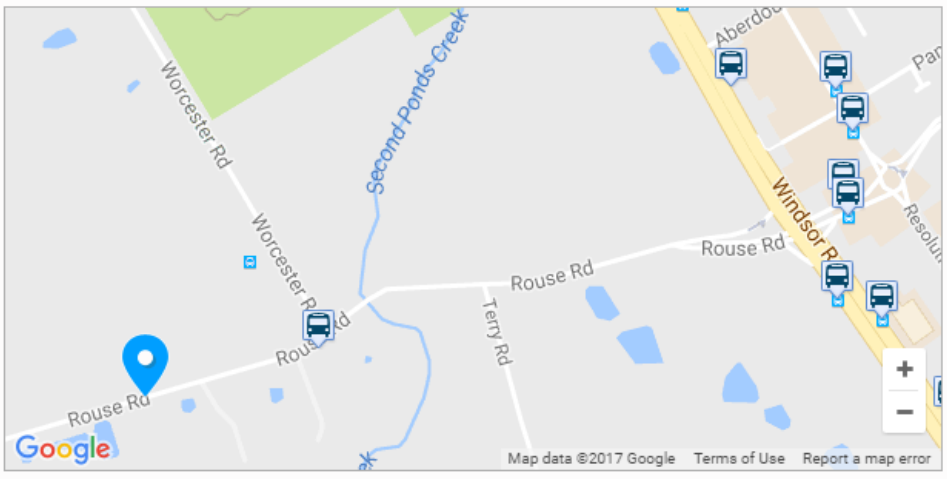


Figure 10 Typical composition of school waste streams *(Source: California Department of Resources Recycling and Recovery)*

3.4 Sustainable Transport Solutions

RHAC incorporates a number of sustainable transport solutions to aid occupants to make low carbon intensive travel decisions. Refer to the Traffic Impact Assessment by Traffix for further information on the below.

- **Public Transport –** There is a bus line along Rous Rd and Worcester Rd, and a large selection of busses in the retail district along Windsor Rd, a short walk from the school.



Bus lines:

T75 Blacktown to Rouse Hill(...	0.2 km	746 Riverstone and Box Hill/...	0.6 km
641 Rouse Hill Town Centre ...	0.9 km	608 Rouse Hill Town Centre ...	0.9 km

Figure 11 Public transport options close to RHAC. Source: Walkscore, www.walkscore.com.

- **Bespoke school busses –** There will be busses provided for the exclusive use of students to reduce car use.
- **Footpaths –** Footpaths and bike paths will be upgraded to provide safer and more enjoyable commutes to the school on a bicycle or by foot.
- **On-**site access – Access routes around the site have been designed to encourage walking and cycling. There are multiple entrances and exits which make the site more accessible to pedestrians and cyclists than if there was only one extrance/exit.
- **Bicycle racks –** A total of 66 bicycle racks will be provided. They are located close to an entrance on Worcester Rd. There are shower and changing room end of trip facilities located in the gym.

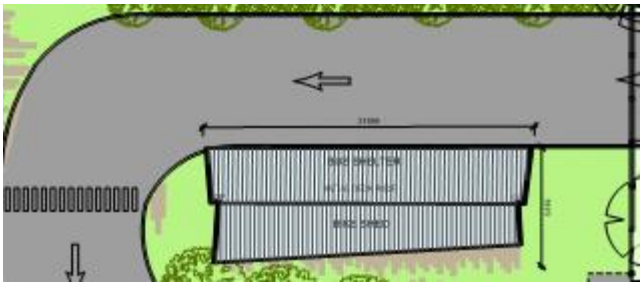


Figure 12 Image of the proposed bike shed. Source: Terroir Proposed Junior School Landscape Plan and Details, Block M and Bike Shed.

3.5 Environmental & 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 –** (prior to practical completion / 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.

- **Energy Metering –** sub-metering will provide real-time data for the use & management of building staff. Ensures operational efficiency is maintained.

- **Waste provisions –** appropriate waste provisions are to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.

3.6 Indoor and Outdoor Environmental Quality

Improved indoor environment quality is a significant by-product of sustainable building design. The architectural design by Terroir will give significant consideration to the incorporation elements within the project intent to improve indoor environment quality.

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

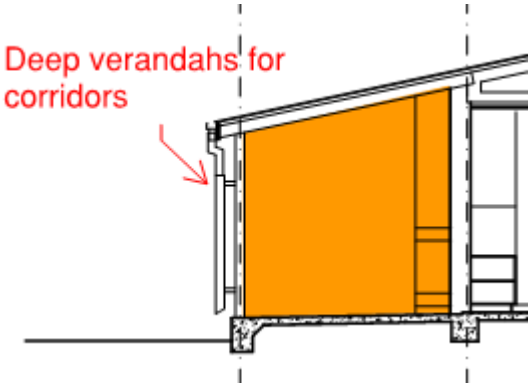


Figure 13 Overhang above corridors to provide rain protection, solar shading, and ventilated access between buildings. Source: Terroir

- **Covered walkways** have been designed to provide a solution for occupants to move between buildings. Outdoor covered corridors providing shading from the elements, a connection to nature that indoor corridors cannot provide, and are a less carbon intensive option than indoor conditioned corridors.

- **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** is provided through maintaining the internal temperature between 21 and 24degC for the occupied periods. This is applicable to all indoor conditioned areas. Comfort will be achieved through providing adequate insulation in line with the NCC to all envelope elements and reducing draft by designing the indoor air velocity to a maximum of 0.25m/s, except where natural ventilation or fans are used for adaptive cooling. This will be achieved through the mechanical design criteria.

- **Glare and radiant temperature control** through the use of operable blinds on each window.

- **Artificial Lighting Design –** will be zoned & designed appropriately to ensure the optimum lighting comfort is achieved. This includes general illuminance and glare reduction in accordance with best practice standards, optimised surface illuminance for building users and localised occupant lighting controls.

- **Acoustic comfort –** will be optimised to ensure building internal noise levels, reverberation levels and appropriate acoustic separation levels are achieved in accordance with best practice standards. Examples include optimised internal materials and finishes to reduce reverberation improved building facades in order to ensure appropriate acoustic separation is achieved.

- **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.

3.7 Community Initiatives

- **Vegetable Gardens –** will provide a hands-on educational facility to teach sustainable food production, agriculture and an understanding of the process of “farm-to-plate”. Produce will also be served by the canteen which reduces food miles and provides students with a deeper understanding of the origins of their food, and the resources which are consumed in the production of food.

- **Community Garden** – provides a means to facilitate the interaction of students and their families. Community gardens will foster a sense of community and respect for the environment. The option for students to grow their own gardens will encourage creativity and knowledge of biodiversity.

4. Blacktown DCP Requirements

The Ecologically Sustainable initiatives that are proposed for consideration in the design have been developed to align with the controls and objectives of the Blacktown DCP 2015. The following highlights where initiatives directly respond to the DCP's criteria.

4.1 Environmental Protection

Objectives
To ensure that development is undertaken in a manner which will enhance the existing environment or at least minimise any likely adverse environmental impacts.

4.1.1 Areas requiring fill

Areas requiring fill are included in Taylor Thomson Whitting's civil package.

4.1.2 Tree preservation

It is proposed to remove some existing trees on the site for the project. Council consent is sought in accordance with Section 4.3 Tree preservation of the Blacktown DCP.

Figure 14 shows the site demolition plan and the trees intended for removal.

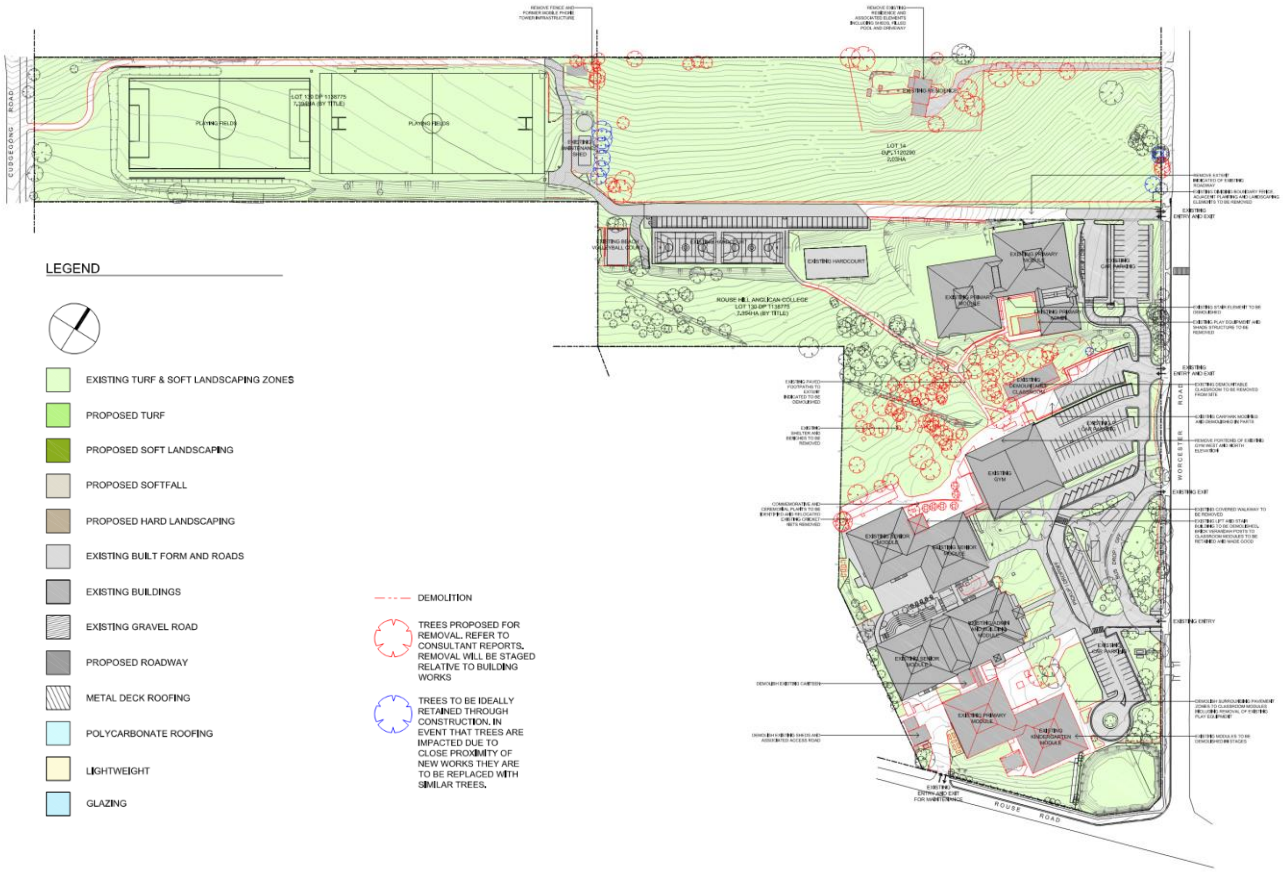


Figure 14 Site demolition plan showing demolition plan including some trees. *(Terroir MP-00-02, 2015)*

4.1.3 Heritage

The project has considered items of heritage and no known items of heritage exist on the land in accordance with Schedule 5 Environmental Heritage of the Blacktown LEP. If an item of heritage is found, as defined by clause 5.10 in the LEP, consent will be sought from the Blacktown Council authority.

4.1.4 Pollution control

Air pollution

In accordance with the Protection of the Environment Operations Act 1997, section 124, the client shall ensure suitable maintenance and operations procedures are implemented which will reduce the risk of air pollution caused by any lack of correct maintenance or operations procedures.

The project has given consideration to any possible sources of air pollution, if air pollution is caused by the occupant (project) the offending materials will be dealt with in a proper and efficient manner as outlined in the Protection of the Environment Operations Act 1997, section 126.

The project has considered the list of Scheduled Activities in Schedule 1 and if a clause becomes relevant, the project will comply with the pollution control measures.

The project will consider segregation options for potentially polluting substances if this becomes relevant in the future.

Water pollution

The project is not undertaking any of the scheduled activities listed in Schedule 1 of the Protection of the Environment Operations Act 1997. Therefore, no license or additional conditions are expected for the development. The project will consider the implementation of an Environment Management Plan if fuel is kept on-site. Taylor Thomson Whitting's civil DA submission package details water treatment methods to be implemented on-site to improve storm water quality during construction and operation of the school.

Noise pollution

Noise pollution is analysed in the Acoustic Report by Simon Kean. The report findings are summarized below:

- Mechanical Plant: Mechanical systems are expected to comply. Some temporary noise pollution for surrounding residential construction sites.
- Private road and car park: Noted as the largest potential change in noise emissions. Exceedance of noise criteria is possible during the 15-minute window of peak congestion at pick-up time.
- Maintenance: Maintenance lane expected to comply.
- Kids at play: Estimated rise of 2dBA which is regarded as barely perceptible.
- Public road traffic noise: Expected to be limited and below 2dBA.

Waste storage and removal

No incinerators will be provided on-site for waste disposal.

The project will not store waste on-site for any longer than 1 week and adequate storage for waste will be provided in the project.

Adequate space will be provided on-site for waste collection pending the final uses. Waste will be removed in accordance with Blacktown City requirements. The waste storage and removal plan will be developed by an organisation engaged by the project.

4.1.5 Noise reduction

Refer to Simon Kean's Acoustic Report. The project is not a residential development, therefore this section is not applicable.

4.1.6 Bush fire prone land

The project is within a designated bush fire prone area as identified by the Bushfire Zones in the Blacktown Online Maps. As part of the environmental strategy the project will ensure bush fire protection steps required by the NSW Rural Fire Service Guidelines are implemented in accordance with Planning for Bush Fire Protection (2006).

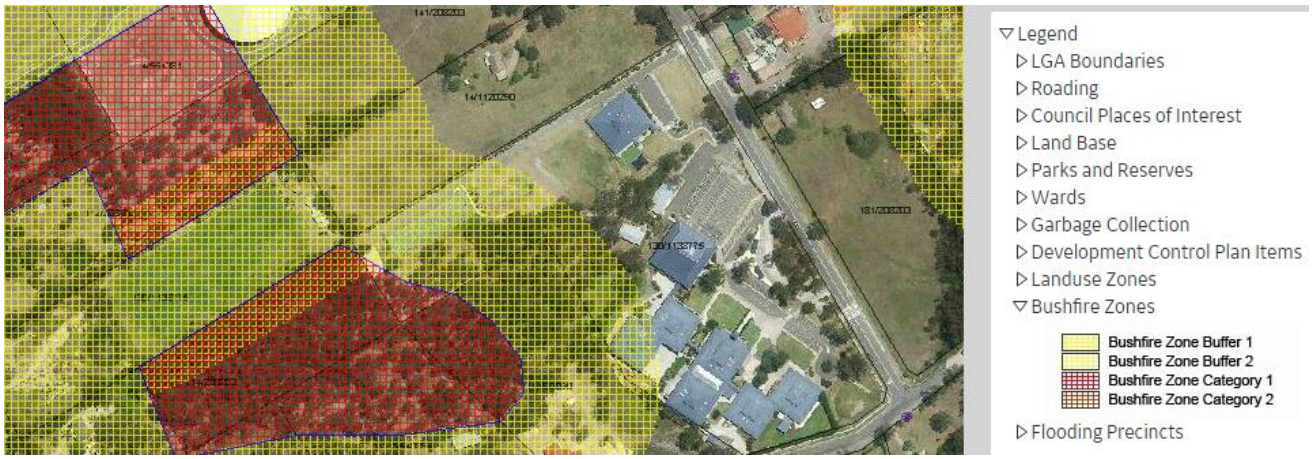


Figure 15 Bushfire zones. *(Source: Blacktown Maps Online)*

4.1.7 Development adjoining rail corridors and high volume roads.

The development is located 1 km away from the M7 and M4, therefore it is not considered to be a development adjoining high volume roads.

4.2 Special Considerations

4.2.1 Solar access

The development's location in a low density residential area and its low profile will ensure high quality levels of solar access are maintained to neighbouring properties. There is no public domain likely to be affected by this project.

4.2.2 Downstream owner's consent

The development shall ensure adequate stormwater drainage and infiltration is implemented on-site in accordance with Blacktown City requirements. All stormwater shall either be reticulated to the street gutter or piped to a suitable location as approved by the Blacktown Council. Consideration will also be given to rainwater and stormwater collection and reuse on-site.

4.3 Landscaping

The proposed project landscaping has been designed by a local greens-keeper and Terroir. It includes landscaped outdoor areas with native vegetation and a number of relocated trees, refer to Terroir's Landscaping Plan. Landscaping consideration has been given to the recommended tree species in Appendix 1 of the Blacktown DCP. Appropriate shrub and grassy landscaping been considered to complement the surrounding local species.

In addition to the native and waterwise landscaping, the grounds will also incorporate turfed areas for sports and recreation, vegetable gardens for classes, and a community garden.

SYM		BOTANICAL NAME	MATURE HEIGHT AND SPREAD	SPACING	POT SIZE	STAKING	QTY
BOUNDARY HEDGE							
	CW	Callistemon Wildfire	4m x 2m	AS SHOWN	150mm	N/A	
	CP	Callistemon Purple Cloud	2m x 2m	AS SHOWN	150mm	N/A	
	CHP	Callistemon Hot Pink	1.5m x 1m	AS SHOWN	150mm	N/A	
	CCG	Callistemon Candle Grow	0.6m x 2.5m	AS SHOWN	150mm	N/A	
MIXED TREES							
	ML	Melalauca Linariifola	10m x 8m	AS SHOWN	25 LITRE	2 x 50 x 50 x 1800	
	SG	Syncarpia Glomulifera (Turpentine)	25m high	AS SHOWN	25 LITRE	2 x 50 x 50 x 1800	
	GB	Eucalyptus Moluccana (Grey Box)	25m high	AS SHOWN	25 LITRE	2 x 50 x 50 x 1800	
	CK	Callistemon 'King's Park Special'	6m x 2m	AS SHOWN	25 LITRE	2 x 50 x 50 x 1800	
GROUND COVER							
	BVD	Babingtonia (Baeckea Virgata Dwarf)	0.3m x 0.5m	6 PER M^2	VIRO-TUBE	N/A	
	VD	Virgata Dwarf	0.3m x 0.5m	6 PER M^2	VIRO-TUBE	N/A	
	DC	Dianella Caerulea (Little Jess)	0.4m x 0.6m	4 PER M^2	VIRO-TUBE	N/A	
	GY	Gazania Yellow	0.2m x 0.3m	15 PER M^2	VIRO-TUBE	N/A	
	CG	Carpobrotus Glaucescens (Aussie Rambler)	0.3m x 2m	1 PER M^2	VIRO-TUBE	N/A	
	HV	Hardenbergia Violacea (Meema)	0.6m x 2m	1 PER M^2	VIRO-TUBE	N/A	
	GB	Westringia Fruticosa 'Grey Box'	0.6m x 0.6m	1 PER M^2	VIRO-TUBE	N/A	
	Mu	Westringia Fruticosa 'Mundi'	0.6m x 2m	1 PER M^2	VIRO-TUBE	N/A	
GRASSES							
	KD	Poa Poliformis (King Dale)	0.45m x 0.4m	4 PER M^2	VIRO-TUBE	N/A	
	Co	Poa Poliformis (Courtney)	0.5m x 0.2m	10 PER M^2	VIRO-TUBE	N/A	
BANKSIAS							
	BS	Banksia Spinulosa (Hairpin)	<0.5m x <0.5m	4 PER M^2	VIRO-TUBE	N/A	
GRASSES							
	DB	Dianelle 'Breeze'	1m x 2m	1 PER M^2	VIRO-TUBE	N/A	
	LD	Lomandra Longifolia (Tanika)	0.6m x 0.6m	1 PER M^2	VIRO-TUBE	N/A	
	LCW	Lomandra Confertifolia (Wingarra)	0.3m x <0.3m	9 PER M^2	VIRO-TUBE	N/A	

03 PLANT SCHEDULE
N/A @ A1

Figure 16 Plant schedule predominantly incorporating local native waterwise species. Source: Terroir Proposed Senior School Ground Plan.

4.4 Shading

Consideration is given to provide awnings at the roof level and over all balconies and corridors. They will be provided to reduce glare inside classrooms, and provide protection from inclement weather in balconies and corridors.

5. Self-assessed Green Star Design and As Built v1.1 Pathway

Green Star - Design & As Built Scorecard

Project:	Rouse Hill Anglican College
Targeted Rating:	4 Star - Best Practice

Core Points Available	Total Score Targeted
100	48.0

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED	ASSESSMENT COMMENTS
Management				14		
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	1	Self Assessed - WGE are the accredited professionals acting to ensure the rating tool is applied effectively.
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies	The project is targeting a 4 Star Equivalent rating. This has been documented in all consultant briefs and through this document. This is sufficient to confirm this section is achieved.
		2.1	Services and Maintainability Review	1	1	All services consultants to consider long term maintenance and confirm that their design allows for practical ongoing servicing of building. This should be standard practice but is to be considered throughout design process. Head contractor to review and co-ordinate sub-contractor review of the design to confirm that there are no maintainability issues. Should be good practise and no additional cost.
		2.2	Building Commissioning	1	0	
		2.3	Building Systems Tuning	1	1	It is good practice to review the operation of all systems throughout defects liability period to ensure correct and efficient operation. Facility management team to allow for quarterly reviews of the building operation throughout defects liability period and Contractor to allow for reviewing and rectifying any issues that arise during this period that result in inefficient operation of the systems.
		2.4	Independent Commissioning Agent	1	0	
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	0	
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Operations and Maintenance Information	1	1	This is generally standard practice.
		4.2	Building User Information	1	0	Contractor to ensure that their Owners Manual includes information for the owners on the types of sustainability systems incorporated in the development and how the building should be used to gain the most sustainable outcomes. ESD can provide additional text to ensure this credit is met..
Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1	This would involve setting of environmental targets for operational stages of the building.
		5.2	End of Life Waste Performance	1	0	This would involve setting of end-of-life fitout waste targets for operational stages of the building. This is not standard practice and so assume this will not be included.
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-	Complies	To qualify for this credit, it is a minimum requirement that accessible metering be provided to monitor building energy and water consumption, including all energy and water common uses and major uses, and sources.
		6.1	Monitoring Systems	1	0	This requires separate water, electrical, and gas meters for all major uses. Any energy load that exceeds 5% of the total load or water load that exceeds 10% should be separately metered. Additionally, all of the meters need to be monitored with a BMS or similar.
Construction Environmental Management	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies	To qualify for this credit, it is a minimum requirement that a comprehensive project-specific Environmental Management Plan (EMP) must be in place for construction.
		7.1	Formalised Environmental Management System	1	1	Main contractor to provide EMP to be in accordance with NSW Environmental Management Systems Guidelines. The requirement for this will be included in the Green Star specification.
Operational Waste	Prescriptive Pathway	8A	Performance Pathway - Specialist Plan	-	0	A waste professional specialist should be employed to prepare and implement an Operational Waste Management Plan (OWMP) for the project in accordance with best practice approaches and this is reflected in the building's design.
		8B	Prescriptive Pathway - Facilities	1	1	Generally good design although some constraints may make this difficult to achieve. The operational waste streams that should be allowed for include: - General waste - to landfill; - Paper and cardboard - to recycling; - Glass - to recycling; - Plastic - to recycling; - At least on othe waste stream (e.g. aluminium to recycling or organics to compost) This may be achieved if there is an opportunity to provide mixed recycling which will be seperated off site.
Total				**14**	**7**	

Indoor Environment Quality				17		
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	0	It is difficult to find aystems which allow for access to both sides of all coils and filters.
		9.2	Provision of Outdoor Air	2	1	The provision of additional outdoor air will generally result in additional HVAC energy consumption unless heat exchange systems are provided. Additionally, heat exchange may be required to meet BCA requirements.
		9.3	Exhaust or Elimination of Pollutants	1	1	Generally relatively easy to achieve.
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1	Acoustic engineer to confirm. Internal ambient noise levels in the nominated area is no more than 5dB(A) above the "satisfactory" sound levels provided in Table 1 of AS/NZS 2107:2000. Generally easy to achieve. Expected that acoustic consultant is business as usual.
		10.2	Reverberation	1	1	Acoustic consultant to confirm that this will be achievable and whether there will be any impacts. Reverberation time in the nominated area must be below the maximum stated in the 'Recommended Reverberation Time' provided in Table 1 of AS/NZ 2107:2000.
		10.3	Acoustic Separation	1	0	The partition between the spaces should be constructed to achieve a weighted sound reduction index (Rw) of at least 45.
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies	This is standard practice but is only required where additional points are targeted for IEQ 11.
		11.1	General Illuminance and Glare Reduction	1	1	General illuminance levels to meet minimum compliance levels which is standard practice. However, all bare light sources must be fitted with baffles, louvers, translucent diffusers, ceiling design, or other means that obscures the direct light source from all viewing angles of occupants to minimise glare.
		11.2	Surface Illuminance	1	1	Requires white coloured ceilings and a surface illuminance on the ceiling equivalent to at least 30% of the light levels on the working surface.
		11.3	Localised Lighting Control	1	1	This should be easy to achieve in most areas with standard switching to each space. Open plan office spaces generally are difficult to achieve this in.
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies	Blinds / curtains with a VLT of less than 10% to all primary spaces is generally the easiest way to demonstrate compliance. However, if external shading may be used to demonstrate compliance with this.
		12.1	Daylight	2	1	For a self-assessed rating, this will be based on estimates and rules of thumb rather than detailed daylight modelling.
		12.2	Views	1	1	Likely to be achieved based on the concept design.
Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and Carpets	1	1	Generally easy to achieve if included in the specifications.
		13.2	Engineered Wood Products	1	1	Generally easy to achieve if included in the specifications.
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1	Based on previous experience, we assume this will be achieved with a good mechanical design which maintains space temperatures with set points around 21 to 24 °C.
		14.2	Advanced Thermal Comfort	1	0	This is more difficult to confirm. Detailed modelling results are required to confirm this will be achieved.
Total				**17**	**12**	

Energy				22		
Greenhouse Gas Emissions	E. Modelled Performance Pathway	15E.0	Conditional Requirement: Reference Building Pathway	-	Complies	Project teams must demonstrate that the Proposed Building greenhouse gas (GHG) emissions are less than those of the equivalent Benchmark Building. The Benchmark Building represents a 10% improvement on the Reference Building. The Reference Building is a building which achieves minimal compliance with the NCC Section J DTS provisions.
		15E.1	Comparison to a Reference Building Pathway	20	3	Based on previous project experience.
Peak Electricity Demand Reduction	Performance Pathway	16A	Prescriptive Pathway - On-site Energy Generation	-	0	The peak electricity demand should be calculated for base building energy consumption in accordance with AS 3000:2007 with the application of diversity factors but prior to the application of contingency factors.
		16B	Performance Pathway - Reference Building	2	1	Based on previous experience, at least 1 point will be achieved for an energy efficient building design.
Total				**22**	**4**	

Transport				10		
Sustainable Transport	Performance Pathway	17A.1	Performance Pathway	10	8	No formal rating, but given the location and additional services offered by typical school services, this is likely to achieve 8 points.
		17B.1	Access by Public Transport	0	0	
		17B.2	Reduced Car Parking Provision	0	0	
		17B.3	Low Emission Vehicle Infrastructure	0	0	
		17B.4	Active Transport Facilities	0	0	
		17B.5	Walkable Neighbourhoods	0	0	
Total				**10**	**8**	

Water				12		
Potable Water	Performance Pathway	18A.1	Potable Water - Performance Pathway	12	6	Based on waterless heat rejection, relatively low-use irrigation and water demand calculated this is expected to achieve 6 points in the Performance calculation. Water use primarily driven by irrigation of site.
		18B.1	Sanitary Fixture Efficiency	0	0	
		18B.2	Rainwater Reuse	0	0	
		18B.3	Heat Rejection	0	0	
		18B.4	Landscape Irrigation	0	0	
		18B.5	Fire System Test Water	0	0	
Total				**12**	**6**	

Materials				14		
Life Cycle Impacts	Performance Pathway - Life Cycle Assessment	19A.1	Comparative Life Cycle Assessment	6	3	Based on previous experience, at least 3 points will be achieved for an energy efficient building design.
		19A.2	Additional Life Cycle Impact Reporting	1	1	Always included on a standard project with an LCA.
		19B.1	Concrete	0	0	
		19B.2	Steel	0	0	
		19B.3	Building Reuse	0	0	
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1	0	Generally easy to achieve in metropolitan areas.
		20.2	Timber Products	1	0	Generally difficult and expensive to achieve. All timber to be purchased from a certified sources OR a reused source. Certified products can be found using the following website http://www.pefc.org/certification-services/find-certified. Confirmation required of all timber uses: - Doors - Engineered wood products. - Formwork
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	This credit be generally achieved at no additional cost if specified. This is to be included in the relevant specifications.
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3	0	Architect to confirm if any products will have sustainability initiatives. Through architectural and interiors product selections we will try to maximise these. Some products that typically have a high recycled content include: - Glass wool insulation; - Plasterboard; - Recycled Brick; - Hard landscaping options
Construction and Demolition Waste	Percentage Benchmark	22A	Fixed Benchmark	-	0	Generally difficult to achieve, especially if a significant quantity of demolition is required.
		22B	Percentage Benchmark	1	1	This may be achieved using either a single bin system with off site recycling or a multiple bins on site for on site segregation of relevant recycling streams.
Total				**14**	**6**	

Land Use & Ecology				6		
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies	If the approved DA conditions do not specifically mention any endangered species then it can be assumed that this credit has been achieved.
		23.1	Ecological Value	3	0	Calculated using a calculator provided by the GBCA.
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies	Assessed based on NearMaps images of the site.
		24.1	Reuse of Land	1	0	Assessed based on NearMaps images of the site.
		24.2	Contamination and Hazardous Materials	1	0	
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	0	Achievable with light coloured roofing material and soft landscaping.
Total				**6**	**0**	

Emissions				5		
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Reduced Peak Discharge	1	1	Achieved if all storm water is infiltrated on-site.
		26.2	Reduced Pollution Targets	1	1	Achieved if all storm water is infiltrated on-site.
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies	The AS 4282 criteria must be applied to the site boundary.
		27.1	Light Pollution to Night Sky	1	1	This can be achieved all external lights have an upward light output of less than 5% and no uplights are used. This is generally easy to achieve.
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	1	No water based heat rejection is used.
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	0	This is reasonably easily achievable with water cooled chillers but is difficult to achieve with VRV or DX systems.
Total				**5**	**4**	

Innovation				10		
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10	0	
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.	30B	Market Transformation		0	
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks		1	Stormwater treatment will be provided in accordance with the DCP.
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		0	
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star rating tools.	30E	Global Sustainability		0	
Total				**10**	**1**	

TOTALS	AVAILABLE	TARGETED
CORE POINTS	100	47.0
CATEGORY PERCENTAGE SCORE		47.0
INNOVATION POINTS	10	1.0
TOTAL SCORE TARGETED		48.0

6. Summary

Ecologically Sustainable Design continues to be a driving consideration in the ongoing development of the Rouse Hill Anglican College. The college will incorporate a number of ESD initiatives from a self-assessed Green Star Design and As Built v1.1 Rating to complement the initiatives undertaken to reduce the greenhouse gas emissions, potable water consumption and material resources of the site. These have been developed around a response to the *Secretary's Environmental Assessment Requirements* by Department of Planning and Environment.

The ESD initiatives outlined in this report are intended to be used as a design guide for the college. The specific initiatives that will be installed across the precinct will be determined throughout the development application stage for each individual building and will be subject to feasibility analysis, including that of the final use and layout. The initiatives will comply with the guidelines set out by the relevant authorities.

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:

- Energy & greenhouse gas emissions
- Potable water reduction
- Minimising waste to landfill
- The indoor environment
- Occupant amenity and comfort
- Land use & ecology
- Emissions
- Building Management

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and the sustainability vision for the Rouse Hill Anglican College.