SEARS Report

St Anthony of Padua Concept Proposal & Stage 1

125-165 Tenth Avenue and 140-170 Eleventh Avenue, Austral

ESD SERVICES

JHA

CONSULTING ENGINEERS

DOCUMENT CONTROL SHEET

Title	**SEARS Report**
Project	St Anthony of Padua Concept Proposal & Stage 1
Description	Report for ESD SEARS
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EXECUTIVE SUMMARY

This report has been prepared by JHA to document the Ecologically Sustainable Design (ESD) initiatives which have been considered in the St Anthony of Padua Concept Proposal & Stage 1 project located at 125-165 Tenth Avenue and 140-170 Eleventh Avenue, Austral NSW 2179.

This report demonstrates compliance with the Secretary's Environmental Assessment Requirements (SEARs) which apply to the project and has been prepared to accompany a State Significant Development Application to the NSW Department of Planning and Environment. This report should be read in conjunction with the Architectural design drawings and other consultant design reports submitted as part of the application.

The report identifies how the principles of Ecologically Sustainable Design (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) will be incorporated in the design and on-going operation phases of the development.

Section One of this report applies to the Concept Proposal, including the Church and the Trade Training Centre. Section Two of this report applies to Stage 1 Works, including all works except the Church and Trade Training Centre which are subject to separate approval.

1. SECTION ONE: CONCEPT PROPOSAL

1.1 Introduction

1.1.1 Project Description

The site of the proposed St Anthony of Padua development is located at 125-165 Tenth Avenue and 140-170 Eleventh Avenue, Austral NSW 2179.

The Concept Proposal includes the Church and Trade Training Centre.

1.1.2 Site Location

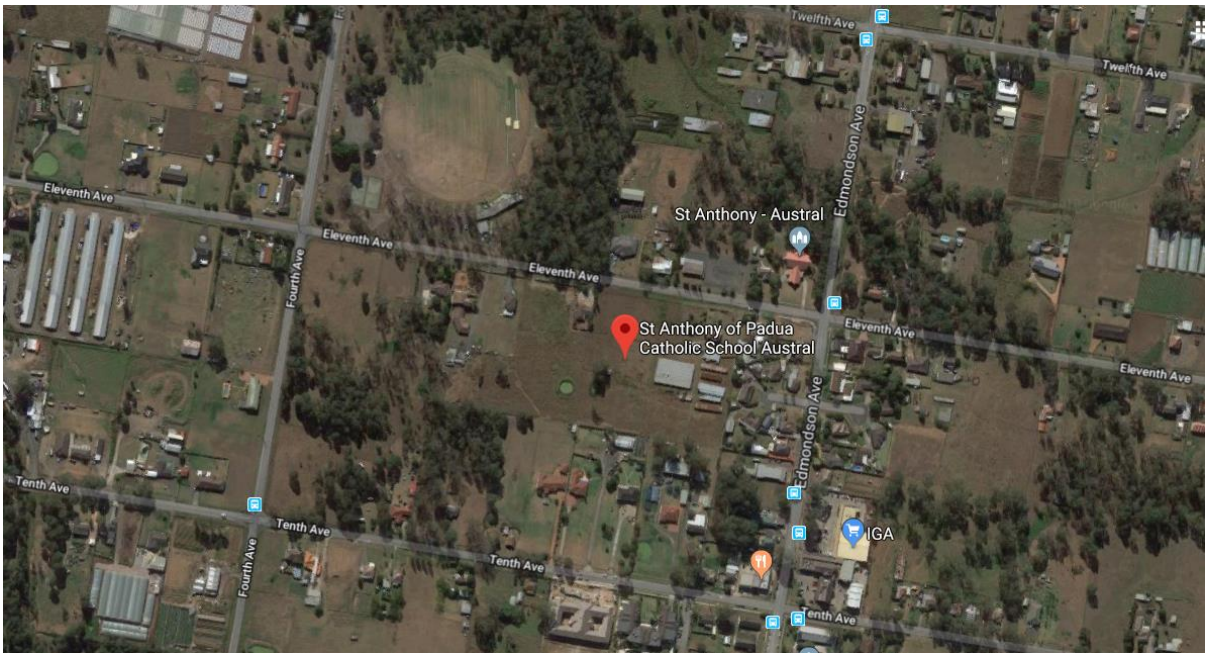

Figure 1 – Aerial photo of site

The site is located at 125-165 Tenth Avenue and 140-170 Eleventh Avenue, Austral NSW 2179.

1.1.3 Secretary's Environmental Assessment Requirements (SEARs)

This report acknowledges the SEARs prepared by the Secretary which notes the following in Section 7 of Concept Proposal:

Concept Proposal – 7. Ecologically Sustainable Development (ESD)

- *Detail how the 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 and assessment of the impacts of the development on the water quality of the receiving waters for both surface and groundwater.*
- *Demonstrate how the development achieves Water Quality Objectives referred to in www.environment.nsw.gov.au.*
- *Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.*

The above SEARS requirements are addressed in the subsequent sections of this report.

1.2 Principles of Ecologically Sustainable Development

The principles of Ecologically Sustainable Development as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 have been incorporated into the design and on-going operation phases of the development as follows:

1.2.1 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.

Project response:

This development is being designed in accordance with a wide range of ESD goals that pertain to the design, construction and operational stages. The development team will ensure that the building minimises the impact on the environment in the areas of energy, water and materials. A strong focus on electrical and mechanical strategies, including the use of renewable energy contributes to significant strides toward minimising climate change impacts.

The aim of the ESD objectives is to encourage a balanced approach to designing a new school project; to be resource efficient, cost-effective in construction and operation; and to deliver enhanced sustainability benefits with respect to impacts on the environment and on the health and well-being of students, staff and visitors whilst providing the best possible facilities for a constructive student learning experience.

Initiatives are arranged into the following categories:

- Management
- Envelope
- Electrical
- HVAC
- Lighting
- Water
- Materials
- Waste
- Sustainable Transport
- Water Sensitive Urban Design

In accordance with the above categories, the development will implement a holistic and integrated approach to ecologically sustainable design, maximising passive opportunities with the selective application of modern technology where appropriate. Initiatives will be chosen with due regard to whole of lifecycle cost benefits to the school.

The ESD initiatives and targets outlined within this document have been compiled based on the following:

- BCA/NCC Section J – Energy Efficiency
- Green Building Council Australia (GBCA) Green Star benchmarking
- Best practice design principles

1.2.2 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.

Project response:

This development will not cause any significant impact on the health, diversity and productivity of the environment and will provide a community benefit in the form of increased student capacity, upgraded teaching and learning facilities, as well as added amenities such as a vegetable garden, rooftop terrace, a playground, and student learning portal focused on the school's ESD features including a solar panel viewing station. The project will contribute to a lively community environment and add architectural interest to the surrounding area.

1.2.3 Conservation of Biological Diversity and Ecological Integrity

Namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration

Project response:

Refer to Arborist Report for details of project response to the conservation of biological diversity and ecological integrity of the site.

1.2.4 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.*

Project response:

The design of this development has employed costing of different options to determine the optimum strategy with regards to major items of plant, with decisions being made based on whole of life costs in addition to capital expenditure.

1.3 Comparison Against Industry Benchmark Rating Scheme

1.3.1 Green Star

This project is not pursuing a formal Green Star rating through the certification procedures of the Green Building Council Australia (GBCA). However, the project team has benchmarked it against the Green Star Education V1 (or applicable equivalent) Rating System, with a goal of a five (5) Star Green Star rating.

For the purposes of comparison, the following table has been prepared which outlines the sustainability initiatives which have been considered for this project and are recognised by the Green Star Rating Tool.

A Green Star Design workshop will be held early in the design stage, led by the ESD consultant and include the project architect, building services engineering consultants, civil engineer, and structural engineer among others.

Initiative	Green Star Education V1			
	Points Available	Targeted Points	Tentative Points	Comment
Green Star Accredited Professional	2	2		Achievement Anticipated
Commissioning Clauses – Requirement for Commissioning	1	1		Achievement Anticipated
Commissioning Clauses – Design Intent	1	1		Achievement Anticipated
Building Tuning	1	1		Achievement Targeted; Pending Contract
Independent Commissioning Agent	1	1		Achievement Targeted; Pending Contract
Building Guides – Building User's Guide	1	1		Achievement Anticipated
Building Guides – Building Maintenance Guide	1	1		Achievement Anticipated
Environmental Management – Environmental Management Plan	1	1		Achievement Anticipated
Environmental Management – Environmental Management System	1	1		Achievement Anticipated
Waste Management	2	2		Achievement Anticipated
Learning Resources	1	1		Learning via solar PV and water initiatives
Maintainability	1	1		Achievement Anticipated
Ventilation Rates	3	2		Mechanically and naturally ventilated areas to comply required ventilation rates
Air Change Effectiveness	2	2		Excluding required modelling
Carbon Dioxide and VOC Monitoring and Control	1	1		Achievement Anticipated
Daylight – Desk Level	3	1	2	Deep floor plate hinders full achievement
Daylight – Primary and Secondary Daylight Factor	1	1		Achievement Anticipated
Thermal Comfort	3	3		PMV requirements to be met
Hazardous Materials	1	1		Hazardous materials survey completed
Internal Noise – Building Services	1	1		Via acoustics consultant
Internal Noise – Overall Building	1	1		Via acoustics consultant
VOCs - Paints	1	1		Achievement Anticipated
VOCs – Adhesives and Sealants	1	1		Achievement Anticipated
VOCs – Carpets and Flooring	1	1		Achievement Anticipated
VOCs – Tenancy Fitout Items	1			Achievement unlikely
Formaldehyde Minimisation	1	1		Achievement Anticipated
Air Distribution System	1	1		System specs to comply
Daylight Glare Control	1	1		Achievement Anticipated
High Frequency Ballasts	1	1		Achievement Anticipated
Electric Lighting Levels	1	1		Achievement Anticipated
External Views	1		1	Credit under consideration
Greenhouse Gas Emissions	20	8		Excluding required modelling
Energy Submetering	1	1		Achievement Anticipated
Peak Energy Demand Reduction	2		2	Credit under consideration
Lighting Zoning	1	1		Achievement Anticipated

Unoccupied Areas	2	2		Achievement Anticipated
Stairs	1	1		Open stairs included in design
Efficient External Lighting	1	1		Achievement Anticipated
Shared Energy Systems	1			n/a
Provision of Car Parking	2			Currently not complying
Fuel Efficient Transport	1		1	Credit under consideration
Cyclist Facilities – Facilities for Students	2			Space constraints; Storage for 20% of students
Cyclist Facilities – Facilities for Staff	2	2		Achievement Anticipated; Storage for 10% of staff
Commuting Mass Transit	5			Limited public transport
Transport Design and Planning	1	1		Dedicated pedestrian route + site specific Travel Plan
Occupant Amenity Water	5	5		Achieved via WELS fixtures and rainwater tank
Water Meters	1	1		Achievement Anticipated
Landscape Irrigation	3	3		Large non-irrigated area with native plants
Heat Rejection Water	4	4		No cooling tower; Credit achieved by default
Fire System Water	1			n/a - no sprinkler system
Potable Water Use in Laboratories	2			n/a - < 10% of areas is devoted to laboratories
Recycling Waste Storage	2	2		Achievement Targeted
Building Reuse – Existing Façade	2			No building reuse planned
Building Reuse – Existing Major Structure	4			No building reuse planned
Recycled Content and Reused Products and Materials	1			Achievement unlikely
Concrete – Portland Cement	2	2		Achievement Targeted
Concrete – Aggregate and Water	1	1		Achievement Targeted
Steel	2		2	Under consideration
PVC Minimisation	2	2		Achievement Targeted
Timber	1	1		Achievement Targeted
Design for Disassembly	1			Achievement unlikely
Dematerialisation	1			Achievement unlikely
Flooring	3		3	Under consideration
Joinery	1		1	Under consideration
Loose Furniture	3		3	Under consideration
Topsoil	1	1		Achievement Anticipated
Reuse of Land	1			
Reclaimed Contaminated Land	2			Site not designated as significantly contaminated
Change of Ecological Value	4			No significant increase
Refrigerant ODP	1	1		Refrigerants to comply
Refrigerant GWP	2			Achievement unlikely
Refrigerant Leaks	2		2	Leak detection system under consideration
Insulant ODP	1	1		Achievement Anticipated
Stormwater	3	3		Achievement Anticipated
Discharge to Sewer – Reduction in Flows to Sewer	2	2		Achievement Anticipated
Blackwater Plant	1			Not feasible
Light Pollution	1	1		Achievement Anticipated
Legionella	1	1		Achievement Anticipated

The above exercise resulted in the required 60 weighted confirmed points for the Five Star Rating and an additional 8 weighted points to be confirmed. Weighting is calculated as per the official Green Star Education V1 Scorecard.

1.4 Water Quality

1.4.1 Achieving NSW Water Quality Objectives

For each catchment in NSW, the state government has endorsed the community's environmental values for water, known as 'Water Quality Objectives' (WQOs). These were adopted following extensive consultation with the community in 1998. The NSW WQOs are the environmental values and long-term goals for consideration when assessing and managing the likely impact of activities on waterways.

Environmental values and uses protected by WQOs:

- Aquatic ecosystems
- Aquatic foods (cook before eating)
- Drinking water at point of supply
- Homestead water supply
- Irrigation water supply
- Livestock water supply
- Primary contact recreation
- Secondary contact recreation
- Visual amenity

The environmental values expressed as WQOs provide goals that help in the selection of the most appropriate management options. The guiding principles are that:

- where the environmental values are being achieved in a waterway, they should be protected; and
- where the environmental values are not being achieved in a waterway, all activities should work towards their achievement over time.

To achieve the WQOs, stormwater discharge of the proposed development will be managed and treated in accordance with local council requirements to minimise impacts on local infrastructure and mitigate pollution during storm events. This would include detention/treatment for pollutants (gross pollutants, hydrocarbons and the like).

Details to be provided by civil consultant.

1.4.2 Impacts of the Development on Water Quality

Impacts of the development on the water quality of the receiving waters for both surface and groundwater to be provided by civil consultant.

Surface water and groundwater systems are connected in most landscapes. The movement of water between groundwater and surface-water systems leads to the mixing of their water qualities. High quantities of nutrients or other dissolved chemicals in surface water can be transferred to the connected groundwater system.

1.5 Sustainable Design Initiatives

1.5.1 Management

The St Anthony of Padua project team is committed to achieving sustainability outcomes in the design and construction phases, as well as in operation.

1.5.1.1 Green Star Accredited Professional

All members of the design team are experienced in delivering sustainable outcomes for engineering services packages and the design process shall be overseen by a Green Star Accredited Professional to provide advice on achieving the sustainability targets of the project.

1.5.1.2 Building User's Guide

All relevant information about the design and correct operation of the building's environmental features will be transferred to the occupants via the Building Users' Guide.

1.5.1.3 Public Displays

In order to facilitate learning about the ESD initiatives incorporated into the building, the school will provide a public information display which includes a viewing station for information about the building's energy and water efficiency.

1.5.2 Envelope

1.5.2.1 Building Fabric Performance

The building fabric will be designed to meet or exceed the thermal and sealing performance of the BCA Section J.

1.5.2.2 Shading and Daylighting

Use of south facing glazing to allow for increased natural daylight whilst minimising unwanted passive solar heat gain. Use external shading devices to mitigate extra heat loads and glare while cutting tinting requirements that reduce natural light transmission. These passive design features allow for enriched daylighting and greater access to external views for occupants. Additional daylighting reduces the reliance on artificial light and benefits alertness, mood and productivity. External views provide a connection to nature and the school setting and also help to create an environment encouraging constructive learning.

1.5.3 Electrical

1.5.3.1 Metering

Electricity metering and sub-metering shall be specified in accordance with the Section J requirements to monitor and manage electricity consumption in the building.

1.5.3.2 Photovoltaics

The collection of solar energy will be considered for this project, with an aspirational goal of providing approximately 10% of the building's energy consumption from a renewable source.

1.5.4 HVAC

1.5.4.1 Air Conditioning

Air conditioning is to be provided to all occupied spaces as required. A Variable Refrigerant Volume/Flow (VRV/F) system is proposed to provide heating and cooling to the school. This type of system is more energy efficient and requires less maintenance than single split systems (one indoor unit served by one outdoor unit).

1.5.5 Lighting

1.5.5.1 Lighting Control

Lighting is to be controlled via by Presence Detection (PD) and/or Photo Electric (PE) methods depending on the application of the areas. Closed spaces such as cleaner's cupboards are to also have a wall switch. Voltage control (dimming) should be provided where appropriate.

1.5.5.2 Energy Efficiency

Lighting is to achieve a minimum 15% improvement over BCA Section J6 lighting power density allowances (W/m^2) predominantly through the use of LEDs.

1.5.6 Water

1.5.6.1 High Efficiency Fixtures

Water consumption shall be reduced by incorporating water efficient fixtures and fittings in accordance with the Australian Government's Water Efficiency Labelling Scheme (WELS).

1.5.6.2 Rain Water for Non-Potable Uses

Rain water capture and reuse for toilet flushing and any other non-potable uses within the development will be considered.

1.5.7 Materials

1.5.7.1 Low VOC / Low Formaldehyde Materials

Adhesives, sealants, flooring and paint products will be selected to contain low or no Volatile Organic Compounds (VOCs) and all engineered wood products used in exposed or concealed applications are specified to contain low or no formaldehyde to avoid harmful emissions that can cause illness and discomfort for occupants.

1.5.7.2 Recycled Content

Loose furnishings within the building shall be selected based on their recycled content, end-of-life recyclability and product stewardship agreements. By selecting loose furnishings which comply with independent environmental certification, for example Ecospecifier or Good Environmental Choice Australia, the project will reduce environmental impacts and waste from furnishings over the life of the building.

Steel and concrete will contain recycled content where suitable. Up to 60% by mass of all steel shall have a post-consumer recycled content greater than 50% or be reused steel. Up to half of the timber products used on the project shall be sustainable timber. Recycled concrete shall be specified using recycled aggregate or manufactured sand and reduced quantities of Portland cement to reduce environmental impacts of concrete production and embodied energy.

1.5.8 Waste

During the construction phase of the project at least 80% of building demolition and construction waste shall be recycled.

1.5.9 Sustainable Transport

1.5.9.1 Encourage Alternative Transport

The project promotes and caters for sustainable and alternative transport options. Bicycle parking and a shower facility shall be provided for staff. Building access and pedestrian connectivity allows for building users to take advantage of multiple train and bus routes in the area.

1.5.9.2 Vertical Transport

The use of lifts within the development will be discouraged by providing visually prominent staircases for all floors.

1.5.10 Water Sensitive Urban Design

External area design will implement best practices of water sensitive urban design, including permeable paving and indigenous low water usage plants to increase stormwater retention, decrease total suspended solids and mitigate the urban heat island effect. The carbon sequestration of the plants will also combat climate change contributions.

2. SECTION TWO: STAGE 1 WORKS

2.1 Introduction

2.1.1 Project Description

The site of the proposed St Anthony of Padua development is located at 125-165 Tenth Avenue and 140-170 Eleventh Avenue, Austral NSW 2179.

Stage 1 Works involves the construction and fitout of educational buildings for years 1 – 12, specialist buildings with rooms for arts, woodwork, computer labs, administration building, a multi-purpose hall and a child care centre.

2.1.2 Site Location

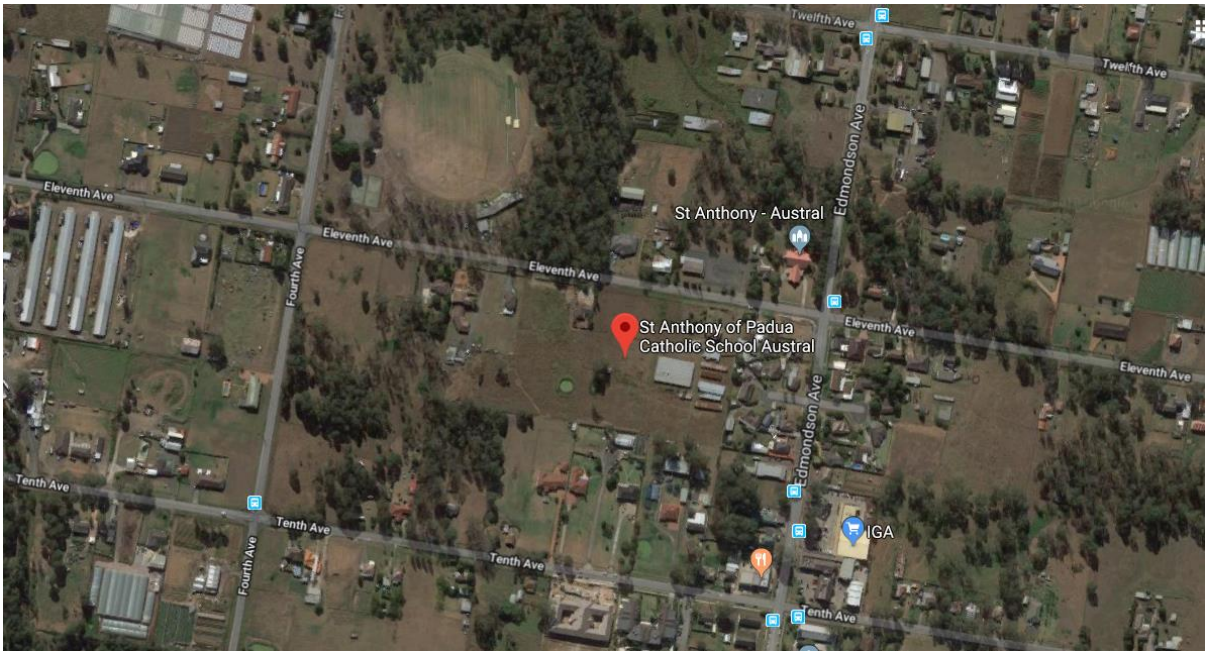

Figure 2 – Aerial photo of site

The site is located at 125-165 Tenth Avenue and 140-170 Eleventh Avenue, Austral NSW 2179.

2.1.3 Secretary's Environmental Assessment Requirements (SEARs)

This report acknowledges the SEARs prepared by the Secretary which notes the following in Section 6 of Stage 1 Works:

Stage 1 Works – 6. Ecologically Sustainable Development (ESD)

- *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.*
- *Demonstrate how the development will adapt the urban heat and reduce its contribution to urban heat island effect.*
- *Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.*

The above SEARS requirements are addressed in the subsequent sections of this report.

2.2 Principles of Ecologically Sustainable Development

The principles of Ecologically Sustainable Development as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 have been incorporated into the design and on-going operation phases of the development as follows:

2.2.1 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:

(iii) Careful evaluation to avoid, wherever practicable, serious or irreversible damage to the Environment; and

(iv) An assessment of the risk-weighted consequences of various options.

Project response:

This development is being designed in accordance with a wide range of ESD goals that pertain to the design, construction and operational stages. The development team will ensure that the building minimises the impact on the environment in the areas of energy, water and materials. A strong focus on electrical and mechanical strategies, including the use of renewable energy contributes to significant strides toward minimising climate change impacts.

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Initiatives are arranged into the following categories:

- Management
- Envelope
- Electrical
- HVAC
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In accordance with the above categories, the development will implement a holistic and integrated approach to ecologically sustainable design, maximising passive opportunities with the selective application of modern technology where appropriate. Initiatives will be chosen with due regard to whole of lifecycle cost benefits to the school.

The ESD initiatives and targets outlined within this document have been compiled based on the following:

- BCA/NCC Section J – Energy Efficiency
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- Best practice design principles

2.2.2 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.

Project response:

This development will not cause any significant impact on the health, diversity and productivity of the environment and will provide a community benefit in the form of increased student capacity, upgraded teaching and learning facilities, as well as added amenities such as a vegetable garden, rooftop terrace, a playground, and student learning portal focused on the school's ESD features including a solar panel viewing station. The project will contribute to a lively community environment and add architectural interest to the surrounding area.

2.2.3 Conservation of Biological Diversity and Ecological Integrity

Namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration

Project response:

Refer to Arborist Report for details of project response to the conservation of biological diversity and ecological integrity of the site.

2.2.4 Improved Valuation, Pricing and Incentive Mechanisms

Namely, that environmental factors should be included in the valuation of assets and services, such as:

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

(v) 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,

(vi) 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.

Project response:

The design of this development has employed costing of different options to determine the optimum strategy with regards to major items of plant, with decisions being made based on whole of life costs in addition to capital expenditure.

2.3 Comparison Against Industry Benchmark Rating Scheme

2.3.1 Green Star

This project is not pursuing a formal Green Star rating through the certification procedures of the Green Building Council Australia (GBCA). However, the project team has benchmarked it against the Green Star Education V1 Rating System, with a goal of a five (5) Star Green Star rating.

For the purposes of comparison, the following table has been prepared which outlines the sustainability initiatives which have been considered for this project and are recognised by the Green Star Education V1 Rating Tool.

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	Points Available	Targeted Points	Tentative Points	Comment
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Commissioning Clauses – Design Intent	1	1		Achievement Anticipated
Building Tuning	1	1		Achievement Targeted; Pending Contract
Independent Commissioning Agent	1	1		Achievement Targeted; Pending Contract
Building Guides – Building User's Guide	1	1		Achievement Anticipated
Building Guides – Building Maintenance Guide	1	1		Achievement Anticipated
Environmental Management – Environmental Management Plan	1	1		Achievement Anticipated
Environmental Management – Environmental Management System	1	1		Achievement Anticipated
Waste Management	2	2		Achievement Anticipated
Learning Resources	1	1		Learning via solar PV and water initiatives
Maintainability	1	1		Achievement Anticipated
Ventilation Rates	3	2		Mechanically and naturally ventilated areas to comply required ventilation rates
Air Change Effectiveness	2	2		Excluding required modelling
Carbon Dioxide and VOC Monitoring and Control	1	1		Achievement Anticipated
Daylight – Desk Level	3	1	2	Deep floor plate hinders full achievement
Daylight – Primary and Secondary Daylight Factor	1	1		Achievement Anticipated
Thermal Comfort	3	3		PMV requirements to be met
Hazardous Materials	1	1		Hazardous materials survey completed
Internal Noise – Building Services	1	1		Via acoustics consultant
Internal Noise – Overall Building	1	1		Via acoustics consultant
VOCs - Paints	1	1		Achievement Anticipated
VOCs – Adhesives and Sealants	1	1		Achievement Anticipated
VOCs – Carpets and Flooring	1	1		Achievement Anticipated
VOCs – Tenancy Fitout Items	1			Achievement unlikely
Formaldehyde Minimisation	1	1		Achievement Anticipated
Air Distribution System	1	1		System specs to comply
Daylight Glare Control	1	1		Achievement Anticipated
High Frequency Ballasts	1	1		Achievement Anticipated
Electric Lighting Levels	1	1		Achievement Anticipated
External Views	1		1	Credit under consideration
Greenhouse Gas Emissions	20	8		Excluding required modelling

Energy Submetering	1	1		Achievement Anticipated
Peak Energy Demand Reduction	2		2	Credit under consideration
Lighting Zoning	1	1		Achievement Anticipated
Unoccupied Areas	2	2		Achievement Anticipated
Stairs	1	1		Open stairs included in design
Efficient External Lighting	1	1		Achievement Anticipated
Shared Energy Systems	1			n/a
Provision of Car Parking	2			Currently not complying
Fuel Efficient Transport	1		1	Credit under consideration
Cyclist Facilities – Facilities for Students	2			Space constraints; Storage for 20% of students
Cyclist Facilities – Facilities for Staff	2	2		Achievement Anticipated; Storage for 10% of staff
Commuting Mass Transit	5			Limited public transport
Transport Design and Planning	1	1		Dedicated pedestrian route + site specific Travel Plan
Occupant Amenity Water	5	5		Achieved via WELS fixtures and rainwater tank
Water Meters	1	1		Achievement Anticipated
Landscape Irrigation	3	3		Large non-irrigated area with native plants
Heat Rejection Water	4	4		No cooling tower; Credit achieved by default
Fire System Water	1			n/a - no sprinkler system
Potable Water Use in Laboratories	2			n/a - < 10% of areas is devoted to laboratories
Recycling Waste Storage	2	2		Achievement Targeted
Building Reuse – Existing Façade	2			No building reuse planned
Building Reuse – Existing Major Structure	4			No building reuse planned
Recycled Content and Reused Products and Materials	1			Achievement unlikely
Concrete – Portland Cement	2	2		Achievement Targeted
Concrete – Aggregate and Water	1	1		Achievement Targeted
Steel	2		2	Under consideration
PVC Minimisation	2	2		Achievement Targeted
Timber	1	1		Achievement Targeted
Design for Disassembly	1			Achievement unlikely
Dematerialisation	1			Achievement unlikely
Flooring	3		3	Under consideration
Joinery	1		1	Under consideration
Loose Furniture	3		3	Under consideration
Topsoil	1	1		Achievement Anticipated
Reuse of Land	1			
Reclaimed Contaminated Land	2			Site not designated as significantly contaminated
Change of Ecological Value	4			No significant increase
Refrigerant ODP	1	1		Refrigerants to comply
Refrigerant GWP	2			Achievement unlikely
Refrigerant Leaks	2		2	Leak detection system under consideration
Insulant ODP	1	1		Achievement Anticipated
Stormwater	3	3		Achievement Anticipated
Discharge to Sewer – Reduction in Flows to Sewer	2	2		Achievement Anticipated

Blackwater Plant	1			Not feasible
Light Pollution	1	1		Achievement Anticipated
Legionella	1	1		Achievement Anticipated

The above exercise resulted in the required 60 weighted confirmed points for the Five Star Rating and an additional 8 weighted points to be confirmed. Weighting is calculated as per the official Green Star Education V1 Scorecard.

2.4 Adapting to Urban Heat

2.4.1 Adaptation Strategies

The project will incorporate climate responsive passive building design. Passive design principals will assist in minimising the peak cooling and heating thermal loads within the development.

2.4.1.1 Window to Wall Ratio (WWR)

When considering heat transfer through conduction & convection to/from the external ambient, opaque insulated solid walls can be perform up to ten times more efficient compared to high performance vision glazing (relative U-values).

An effective window-to-wall ratio for typical naturally ventilated may vary from 30% to 50%. This will maximise effective vision glazing, views and daylight penetration whilst reducing glare and unwanted thermal gains and losses through the facade.

2.4.1.2 Shading and Daylighting

Orientate the building form to maximise the area of the southern facade so that the increase of southern glazing can allow the use of natural lighting whilst minimising the passive solar heat gain.
Horizontal external shading devices to north façade can assist with reducing direct solar gains in summer (high altitude sun) while allowing passive solar heating in winter (low altitude sun). Vertical shading or mesh type screen shading to east and west facades is recommended. These shading schemes for the building facilitates the application of glazing while mitigating extra heat loads and glare that reduce natural light transmission. These passive design features allow for enriched daylighting and greater access to external views for occupants.

2.4.1.3 Glazing Thermal Performance

The minimum glazing thermal performance will be governed by the mandatory energy efficiency of the BCA Section J requirements. Either double glazing or high performance single glazing will be provided to all glazed windows and doors.

2.4.1.4 Thermal Insulation

The building fabric will be designed to meet the thermal and sealing performance of the BCA Section J requirements.

2.4.1.5 Natural & Cross Ventilation

Where applicable, the project will provide natural ventilation in accordance with the requirements of the NCC Part F4.5. A mixed of automated and manually operable doors and windows will be provided in these areas. Circulation areas can be designed to maximise the wind driven cross ventilation by strategic location of opposite facing ventilation openings.

2.4.2 Urban Heat Island

A known issue in urban areas is the heat island effect. Heat island effects occur when built up developments result in land surface retaining unwanted heat more effectively and resulting in localised elevated microclimate temperatures. Dark impervious surfaces such as asphalt, concrete, paver blocks, stone/ceramic tiles, absorb and store energy from the sun and eventually re-radiate it as heat to the surroundings and lack the evaporative cooling properties of vegetation and other pervious materials.

Heat islands are known to increase summertime peak energy demand, air conditioning costs, and result in heat-related illness amongst external users. In addition, due to increased air temperature, the effectiveness of air conditioning system to reject heat to the atmosphere is reduced due to the increased local air temperatures. This results in a decrease in capacity and efficiency of mechanical systems.

The following ESD initiatives will be implemented to mitigate this potential issue from reducing the usability of the external spaces, strategies to 'soften' the external areas in order to reduce exposure of hard surfaces to direct solar absorption and re-radiation.

2.4.2.1 Roof Material with High Solar Reflective Index

Roofing material with a high solar reflective index (SRI) can assist with reducing elevated localised temperatures (and potentially reduce air-conditioning cooling energy consumption). The use of a cool roof material also improves the efficiency of solar PV panels as they work more efficiently in reduced temperatures.

2.4.2.2 General Landscaping

The schematic design has allowed an appropriate soft green landscaping and planting area to mitigate heat island impacts, habitat potential for native fauna and reduce peak stormwater run-off and provide visual amenity.

2.5 Sustainable Design Initiatives

2.5.1 Management

The St Anthony of Padua project team is committed to achieving sustainability outcomes in the design and construction phases, as well as in operation.

2.5.1.1 Green Star Accredited Professional

All members of the design team are experienced in delivering sustainable outcomes for engineering services packages and the design process shall be overseen by a Green Star Accredited Professional to provide advice on achieving the sustainability targets of the project.

2.5.1.2 Building User's Guide

All relevant information about the design and correct operation of the building's environmental features will be transferred to the occupants via the Building Users' Guide.

2.5.1.3 Public Displays

In order to facilitate learning about the ESD initiatives incorporated into the building, the school will provide a public information display which includes a viewing station for information about the building's energy and water efficiency.

2.5.2 Envelope

2.5.2.1 Building Fabric Performance

The building fabric will be designed to meet or exceed the thermal and sealing performance of the BCA Section J.

2.5.2.2 Shading and Daylighting

Use of south facing glazing to allow for increased natural daylight whilst minimising unwanted passive solar heat gain. Use external shading devices to mitigate extra heat loads and glare while cutting tinting requirements that reduce natural light transmission. These passive design features allow for enriched daylighting and greater access to external views for occupants. Additional daylighting reduces the reliance on artificial light and benefits alertness, mood and productivity. External views

provide a connection to nature and the school setting and also help to create an environment encouraging constructive learning.

2.5.3 Electrical

2.5.3.1 Metering

Electricity metering and sub-metering shall be specified in accordance with the Section J requirements to monitor and manage electricity consumption in the building.

2.5.3.2 Photovoltaics

The collection of solar energy will be considered for this project, with an aspirational goal of providing approximately 10% of the building's energy consumption from a renewable source.

2.5.4 HVAC

2.5.4.1 Air Conditioning

Air conditioning is to be provided to all occupied spaces as required. A Variable Refrigerant Volume/Flow (VRV/F) system is proposed to provide heating and cooling to the school. This type of system is more energy efficient and requires less maintenance than single split systems (one indoor unit served by one outdoor unit).

2.5.5 Lighting

2.5.5.1 Lighting Control

Lighting is to be controlled via by Presence Detection (PD) and/or Photo Electric (PE) methods depending on the application of the areas. Closed spaces such as cleaner's cupboards are to also have a wall switch. Voltage control (dimming) should be provided where appropriate.

2.5.5.2 Energy Efficiency

Lighting is to achieve a minimum 15% improvement over BCA Section J6 lighting power density allowances (W/m^2) predominantly through the use of LEDs.

2.5.6 Water

2.5.6.1 High Efficiency Fixtures

Water consumption shall be reduced by incorporating water efficient fixtures and fittings in accordance with the Australian Government's Water Efficiency Labelling Scheme (WELS).

2.5.6.2 Rain Water for Non-Potable Uses

Rain water capture and reuse for toilet flushing and any other non-potable uses within the development will be considered.

2.5.7 Materials

2.5.7.1 Low VOC / Low Formaldehyde Materials

Adhesives, sealants, flooring and paint products will be selected to contain low or no Volatile Organic Compounds (VOCs) and all engineered wood products used in exposed or concealed applications are specified to contain low or no formaldehyde to avoid harmful emissions that can cause illness and discomfort for occupants.

2.5.7.2 Recycled Content

Loose furnishings within the building shall be selected based on their recycled content, end-of-life recyclability and product stewardship agreements. By selecting loose furnishings which comply with independent environmental certification, for example Ecospecifier or Good Environmental Choice Australia, the project will reduce environmental impacts and waste from furnishings over the life of the building.

Steel and concrete will contain recycled content where suitable. Up to 60% by mass of all steel shall have a post-consumer recycled content greater than 50% or be reused steel. Up to half of the timber products used on the project shall be sustainable timber. Recycled concrete shall be specified using recycled aggregate or manufactured sand and reduced quantities of Portland cement to reduce environmental impacts of concrete production and embodied energy.

2.5.8 Waste

During the construction phase of the project at least 80% of building demolition and construction waste shall be recycled.

2.5.9 Sustainable Transport

2.5.9.1 Encourage Alternative Transport

The project promotes and caters for sustainable and alternative transport options. Bicycle parking and a shower facility shall be provided for staff. Building access and pedestrian connectivity allows for building users to take advantage of multiple train and bus routes in the area.

2.5.9.2 Vertical Transport

The use of lifts within the development will be discouraged by providing visually prominent staircases for all floors.

2.5.10 Water Sensitive Urban Design

External area design will implement best practices of water sensitive urban design, including permeable paving and indigenous low water usage plants to increase stormwater retention, decrease total suspended solids and mitigate the urban heat island effect. The carbon sequestration of the plants will also combat climate change contributions.