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**Arne Jacobsen**

Mechanical Engineering  
Lighting Design  
Sustainable Design  
Electrical Engineering

Copenhagen  
London  
Sydney  
Hong Kong  
New York

Level 8, 9 Castlereagh Street  
Sydney, NSW, 2000, Australia  
ABN 50 001 189 037  
t : +61 / 02 9967 2200  
e : info@steensenvarming.com

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# Redlands School & Stage 1 Master Plan ESD Report



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Sydney, NSW, 2000, Australia  
ABN 50 001 189 037  
t : +61 / 02 9967 2200  
e : info@steensenvarming.com

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**Garry Luu**  
Sustainability Consultant  
garry.luu@steensenvarming.com

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# 1.0 Introduction

This ESD report has been prepared on behalf of SCECGS Redlands Ltd (“the Proponent”). It accompanies an environmental impact statement (EIS) prepared in support of State Significant Development Application SSD14\_6454 for the staged development of the SCECGS Redlands Senior Campus (“Redlands”).

This application seeks a staged development approval comprising a concept proposal for the school over five stages and consent for a detailed proposal for the first stage development referred to as “Stage 1”. Details of the project are described below:

- (1) Concept Proposal:** A Concept Proposal has been prepared for the site to guide its future redevelopment and is intended to provide a statutory framework for the long term planning of the site. The Concept Proposal will be delivered in five stages and will generally involve the following buildings and works:
- Stage 1 – New Learning Hub:
- Demolition of existing buildings and structures
  - Construction of a new multi-purpose education building with basement car park and associated vehicular entry off Gerard St
  - Temporary fitout of a portion of the basement carpark shell for music and general education uses
  - Construction of landscaped podium over new basement carpark and music facilities
  - Creation of a new internal vehicular link between Waters Rd and Military Rd
- Stage 2 - Sports and Performing Arts Centre:
- Demolition of existing buildings and structures
  - Construction of a new sports and performing arts centre
- Stage 3 - Redlands Hall, Roseby Building and Liggins Building Refurbishment:
- Internal alterations and additions of existing buildings
- Stage 4 - Humphery Learning Hub and Resource Centre:
- Construction of a new multi-purpose education building with swimming pool and associated facilities at roof top level
  - Decanting of temporary music facilities upon completion of the new Humphery Learning Hub providing additional carparking
- Stage 5 - Adams Centre Extension:
- Alterations and additions to the Adams Centre at 219 Military Road
- (2) Detailed Proposal for “Stage 1” development – New Learning Hub:**
- Demolition of existing buildings and structures (Mowll Building, 1, 3, 7, 9 and 11 Gerard Street, 7 and 8 Monford Place, staff offices, multi-purpose building and Design and Technology buildings on the western boundary).
  - Fit-out of 7 and 8 Monford Pl for temporary use as an educational facility
  - Construction of a new purpose built education building generally comprising a four storey building with basement car park and outdoor learning area at roof level.
  - Temporary fitout of a portion of the basement carpark shell for music and general education uses

- Construction of landscaped podium over new basement carpark and music facilities
- Creation of new vehicular access road off Gerard Street for the new basement car park.
- Creation of new internal vehicular access link facilitating ingress from Waters Rd and egress onto Military Rd
- Associated landscaping improvements.
- New services infrastructure.
- New servicing area including loading dock and waste enclosure
- Erection of temporary demountable classrooms.

The purpose of this 'Response to Director General's Requirements' report is to provide an assessment of the proposal as described above and detailed within the EIS.

## 1.1 Site Plan

SCECGS Redlands is located at 272 Military Road, Cremorne and adjoining land.



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### 1.1.1 Building Identification Plan



Ref	Building Details
1	Adams Centre
2	Staff offices
3	Main reception and administration (2 Monford Place)
4	Hattersley Sports Courts
5	Multi-purpose building accommodating medical room, meeting rooms, staff rooms and classroom
6	Liggins Building
7	Roseby Building (drama studio and science)
8	Residential flat building (8 Monford Place)
9	Residential flat building (7 Monford Place)
10	Residential flat building (5 Monford Place)
11	Dwelling house (6 Winnie Street)
12	Design and technology
13	Canteen & assembly hall
14	Mowll Building
15	Design and technology (21 Waters Road)
16	Humphery Building (Humanities / library)(23 Waters Road)
17	Lang Gymnasium (25-27 Waters Road)
18	Facilities / ICT (1 Gerard Street)
19	Music tuition (3 Gerard Street)
20	Performing arts (7 Gerard Street)

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21	Music (9 Gerard Street)
22	Visual arts (11 Gerard Street)

## 1.2 Terms of Reference

Applicant	SCECGS Redlands Ltd (the applicant)
Site Address	SCECGS Redlands at 272 Military Road, Cremorne and adjoining land (Redlands)
Property Description	Refer to Site Plan above
Site Area	Approximately 15,500sqm
Application Format	Staged State Significant Development Application (SSDA) for (1) Concept Proposal <u>and</u> (2) detailed plans for Stage 1 development. A single application will be provided.
Approval Authority	The SSDA (concept proposal and detailed plans for Stage 1 development combined) will be lodged with and assessed by the NSW Department of Planning and Environment and determined by the Minister for Planning or her delegate, the Planning Assessment Commission (PAC).
Report Type	Environmental Impact Statement (EIS)
Application Reference	SSD 14_6454
Development Description	Staged redevelopment of the SCECGS Redlands Senior Campus
Overview of proposed works (refer to building identification plan)	
Stage 1 New Learning Hub	<ul style="list-style-type: none"> <li>▪ Erection of temporary demountable classrooms.</li> <li>▪ Demolition of existing buildings and structures (Mowll Building (14), 1, 3, 7, 9 and 11 Gerard Street (18-22), 7 and 8 Monford Place (9 and 8), staff offices (2), multi-purpose building (5) and Design and Technology buildings (12 and 15) on the western boundary).</li> <li>▪ Construction of stage 1 carpark and temporary music hub.</li> <li>▪ Construction of four storey multi-purpose education building with accessible roof top, basement car park, outdoor learning area at roof level</li> <li>▪ Creation of new vehicular access road off Gerard Street for the new basement car park.</li> <li>▪ Creation of new internal vehicular access link facilitating ingress from Waters Rd and egress onto Military Rd</li> <li>▪ Associated landscaping improvements.</li> <li>▪ New services infrastructure</li> <li>▪ New servicing area including loading dock and waste enclosure</li> </ul>
Stage 2 Sports and Performing Arts Centre	<ul style="list-style-type: none"> <li>▪ Demolition of the main reception and administration building (2 Monford Place) (3).</li> <li>▪ Construction of four storey sports and performing arts centre generally accommodating rooftop tennis courts, sports courts, fitness centre,</li> </ul>

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	<p>studios and changing facilities, spectator seating, lecture theatre, teaching and learning spaces, meeting rooms.</p> <ul style="list-style-type: none"> <li>▪ Associated landscaping</li> <li>▪ Services upgrades</li> </ul>
Stage 3 Roseby Building, Redlands Hall and Liggins Building Refurbishment	<ul style="list-style-type: none"> <li>▪ Erection of demountable classrooms adjacent to the Adams Centre (1) (to be removed at completion of Stage 4)</li> <li>▪ External alterations to Liggins Building (6) including the creation of a verandah (associated with student café)</li> <li>▪ Internal alterations to Liggins Building (6) to create a new canteen and student café at ground floor level and relocated library and resources facility at first floor level</li> <li>▪ Alterations and additions to Roseby building (7) including minor demolition works Associated landscaping</li> <li>▪ Services upgrades</li> </ul>
Stage 4 Humphery Learning Hub and Resource Centre	<ul style="list-style-type: none"> <li>▪ Internal refurbishment of Lang Gymnasium (17) to create classrooms</li> <li>▪ Demolition of existing buildings and structures including Humphery building (16) and existing canteen / assembly building (13).</li> <li>▪ Construction of new four storey education building accommodating rooftop swimming pool and accessible rooftop, reception and administration offices, staff rooms, library, meeting rooms, classrooms and teaching spaces and amenities with roof top swimming pool and associated facilities.</li> <li>▪ Covered outdoor learning area</li> <li>▪ Associated landscaping</li> <li>▪ Decant interim Music Faculty into new Humphery Learning Hub and create additional car spaces in basement</li> <li>▪ Visitor parking area (up to 6 spaces)</li> <li>▪ Services upgrades</li> <li>▪ Removal of the Stage 3 temporary demountables adjacent to the Adams Centre (1)</li> </ul>
Stage 5 Adams Centre Extension	<ul style="list-style-type: none"> <li>▪ Alterations and additions to Adams Centre (1) including some minor demolition works and construction of a three storey extension to the western elevation to accommodate dance studios.</li> <li>▪ Associated landscaping</li> <li>▪ Services upgrades</li> </ul>
Development Timeframe	20 years
Local Government Area	North Sydney
Local Planning Instruments	North Sydney Local Environmental Plan 2013 (NSLEP 2013) North Sydney Development Control Plan 2013 (NSDCP 2013)

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## 2.0 Environmental Sustainable Design (ESD)

As required under the **Director General's Requirements (DGR)** item 6, an integrated design approach has been developed for the development of the New Learning Hub proposed within Stage 1 of the Master Plan.

The proposed development will incorporate ESD principles in the design. The design will be implemented as part of the construction by the selected contractor. The ongoing operation phases of the building will be managed by Redlands in accordance with the building user guides and maintenance manuals.

### **Director General's Requirements:**

#### ***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, construction and ongoing operation phases of the development.*

*Include a description of the measures that would be implemented to minimise consumption of resources, water (including water sensitive urban design) and energy.*

Refer to sections 3.0 for the ESD approach and section 4.0 for the Key ESD strategies in meeting the Director Generals Requirements.

## 3.0 ESD approach

An integrated design approach will be implemented to ensure a sustainable design outcome, and provide environmental and economic benefit. From an ESD perspective, the key objectives are ones that support the nature of teaching and learning spaces. For school buildings, the key priorities are:

- Achieving a high level of occupant comfort i.e. daylighting, thermal comfort, acoustics etc.
- Designing the building as an educational tool
- Energy efficiency, and
- Water conservation.

### 3.1 Site/Climatic Considerations

The design will be considerate of site specific issues. This is especially important for designs which incorporate passive strategies such as natural ventilation and to identify the appropriateness of the ESD strategies such as rainwater collection or renewable power generation.

Key site/climatic considerations the New Learning Hub will include:

- Temperature
- Relative Humidity
- Rainfall
- Prevailing winds
- Noise
- Pollution
- Solar Exposure

### 3.2 Sustainability Framework

As part of the ESD approach, a Sustainability Framework has been developed for the New Learning Hub, and will be used to guide the design process. The Sustainability Framework contains strategies/ opportunities considered for the New Learning Hub. The purpose of the Sustainability Framework is to ensure that the proposed ESD strategies meet the priorities objectives of Redlands, and support the nature of teaching and learning spaces.

The ESD strategies/opportunities are categorised into the 6 Sustainability categories and a campus wide category for strategies that are more appropriate at a masterplanning level. The sustainability framework contains the following categories:

- Occupant Comfort and Wellbeing
- Education
- Energy
- Water Conservation
- Environmentally Preferable Materials
- Emissions
- Campus-Wide Strategies.

## 4.0 Key ESD strategies

The following sections of this report outline the key ESD strategies proposed and likely to be considered for the New Learning Hub during design, construction and operation of the building.

### 4.1 Design

#### 4.1.1 Occupant Comfort and Wellbeing

Achieving a high level of occupant comfort and wellbeing is a key priority for Redlands. The following strategies have been addressed in the proposed design for the New Learning Hub.

- Good levels of daylighting
- High levels of Thermal comfort and Air quality
- Control of Noise
- Views and connectivity to the external environment
- Internal finishes and materials with low off-gassing i.e. low Volatile Organic Compounds (VOC) finishes and low formaldehyde products/materials.

#### 4.1.2 Education

The following sustainability initiatives have been considered to generate awareness about sustainability, and to also serve as an educational teaching tool.

- Contrasting scenarios – Incorporation of educational features specific to sustainable design and the school curriculum provides teachers with an onsite educational tool. For example, install contrasting roof surface materials to educate students about albedo.
- LCD screens (Learning resource display screens) – Electronic LCD screens are being considered in public areas of the New Learning Hub to display the environmental features of the building. The intent is to raise awareness about sustainability and the impact occupants have on resource consumption. Metered information about energy and water use will also be displayed on the LCD screens.
- Renewable energy generations systems such as solar photovoltaics have been proposed for the New Learning Hub and will be visible on the NLH outdoor education area.

#### 4.1.3 Energy

Key design strategies have been proposed in order to achieve a low-energy high-performance building embodied with sustainable design principles. Appropriate passive and active design strategies have been incorporated into the proposed design to reduce energy consumption. This has primarily been based on core passive design principles supplemented with complementary mechanical heating

and cooling systems. The intent of these initiatives is to ensure a long-life, low-energy and low maintenance outcome for the building.

### 4.1.3.1 Passive Design Strategies

The primary objective of passive design systems is to provide an environment that is comfortable with reduced reliance on active systems that consume energy, such as air-conditioning. The following passive strategies have been proposed to improve occupant comfort and to reduce reliance on active systems.

- High performance building envelope
- Narrow plan design, with denser classrooms along the façade line
- Natural ventilation and associated controls
- Ceiling fans to assist natural ventilation in the movement of air
- Night-purge ventilation and Exposed thermal mass (in ceilings and several walls) assists in regulating internal conditions
- Maximising natural daylight and integrating with high efficiency electric lighting.

#### High Performance Building Envelope

As shown in figure 2, the building envelope integrates passive design into the building through facade systems such as solar shading, natural ventilation openings, glazing etc.

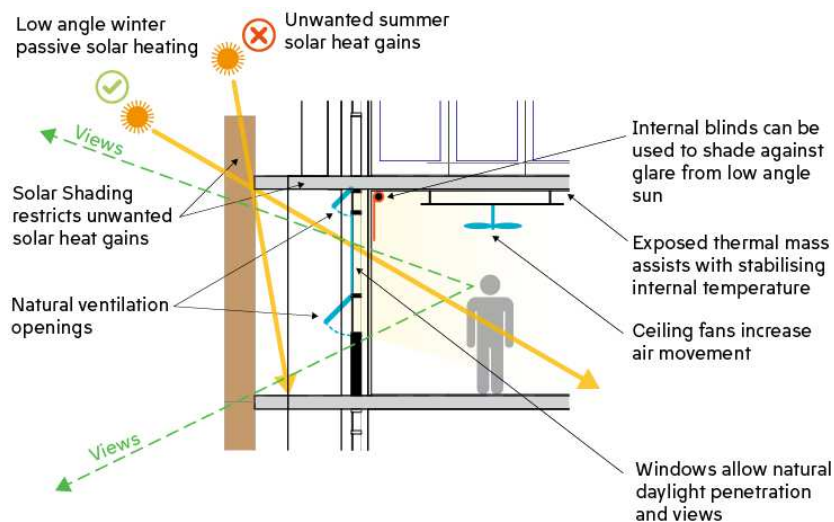


Figure 1: Passive strategies incorporated in a typical perimeter classroom.

#### Natural Ventilation

Natural Ventilation has been included in the New Learning Hub to service the classrooms, learning spaces and offices.

#### Mixed Mode/Natural Ventilation Strategy

The New Learning Hub will maximise the use of natural ventilation when the external conditions are favourable. This will be achieved using the three natural ventilation air flow paths in buildings; i.e. cross, buoyancy driven (stack) and single sided ventilation.

**Cross Ventilation** - Natural Cross ventilation uses the prevailing winds on-site and pressure-differentials to move air through a space via windows/external openings on either side of a space. Façade openings and acoustic transfers between perimeter and central spine spaces allow for air to move through the building.

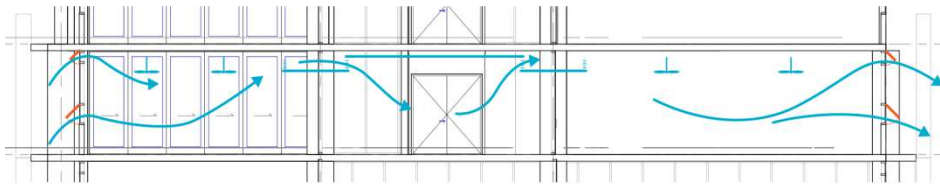


Figure 2: Cross flow ventilation through a typical level.

**Buoyancy driven (Stack)** - Buoyancy driven natural ventilation uses a column of air at higher temperatures to generate pressure differences. This pressure difference drives the movement of hotter air up and out of the building/space through a relief air outlet. Voids and ventilated roof lights have been included in the design to facilitate buoyancy driven ventilation.

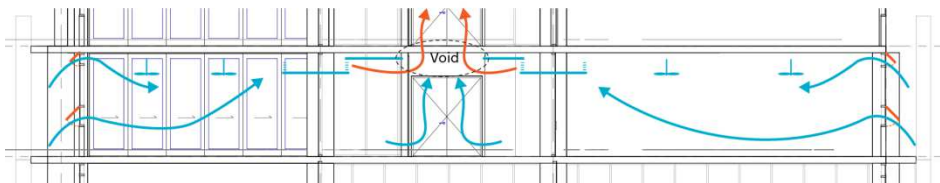


Figure 2: Buoyancy driven ventilation through a typical level.

**Single-sided ventilation** - Single sided ventilation will be used in perimeter classroom spaces when external conditions do not allow for cross flow or buoyancy driven ventilation. Single sided ventilation uses prevailing winds and temperature differences (stratification) to ventilate spaces.

When conditions cause internal temperatures to stray from acceptable comfort bands the windows will close to a minimum vent position, and the air tempering system will be activated.

### **Exposed Thermal Mass/Night Purge**

Exposed thermal mass has been incorporated in the New Learning Hub to facilitate passive solar heating and night purging ventilation. Thermal mass can be used in buildings to reduce the dependence on mechanical heating and cooling systems. The key benefits of using the building's thermal mass are:

- Delayed occurrence of peak indoor temperatures
- Ability to absorb internally generated heat and to absorb solar radiation.
- It can also be used to store and transfer heat energy from a time in the day when it would otherwise be harmful, to a time in the day where it will be useful

The Figure 3 and 4 illustrate how thermal mass can be used to reduce heating loads in winter through passive heating, and cooling loads in summer through night purging and pre-cooling.

■ Winter – Passive Heating

Exposed thermal mass absorbs heat during the day from direct solar penetration. During the cool night, the absorbed heat is re-radiated to warm the space.

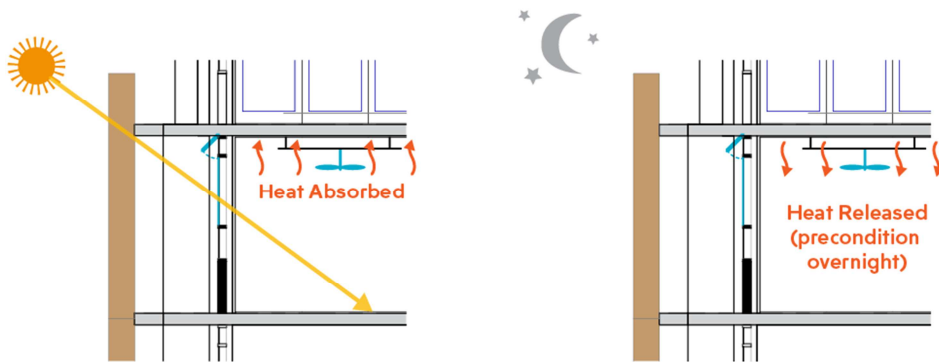


Figure 3: Winter passive heating

■ Summer – Night Purge

Solar shading protects the thermal mass from absorbing heat from direct solar penetration. At night, the windows can be opened to allow cool breezes to remove heat generated during the day and pre-cool the space for the next day.

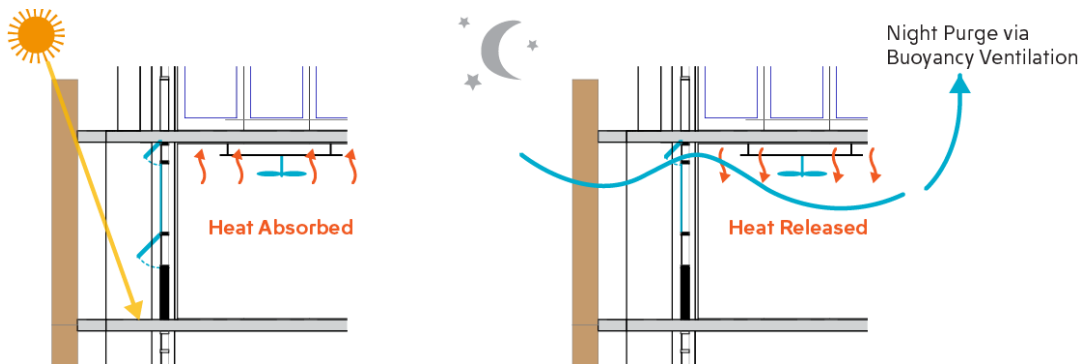


Figure 4: Summer Night Purge

Natural night purge would be employed, whereby secure penetrations on the façade and central zone would be opened to encourage air movement through the spaces, flooding the classrooms with cool air. The cool air displaces warm air that has accumulated near ceiling level. As a result the space and adjacent thermal mass is cooled. By cooling the fabric of the building by night ventilation, the mean radiant temperature of the space is reduced improving occupant thermal comfort for the following day.

## 4.1.3.2 Active Strategies

### **Mechanical Ventilation Strategy for Classrooms**

For the majority of the year the classrooms will be naturally ventilated, utilising the prevailing north-easterly winds during summer and west/north-westerly winds in winter to create positive and negative pressures around the building envelope and encourage cross ventilation.

Ventilation will be facilitated by openable windows located on opposite sides of each classroom, with the pressure differential creating the driving force to push air from one side of the building to the other. Ceiling fans will further increase air movement, helping to keep occupants comfortable when the wind patterns are less favourable. To complement, thermal mass of the exposed concrete soffits and carefully placed solar shading will help to reduce internal peak temperatures.

The measures described above should keep the space relatively comfortable for the majority of the year; however, the deep building plan and high occupancy rates will significantly limit the positive effect of natural ventilation during the warmer summer days.

To help keep the classroom comfortable when the temperatures rise above comfort conditions there are a number of systems that can be employed.

### **Preferred Strategy**

A tempered air system is being considered to provide limited cooling of the spaces during the hottest days of the year. In this instance there would be no mechanical fan to boost airflow. Instead the system selected to provide heating to the classrooms during the winter months would also provide limited cooling during the summer.

When external temperatures rise above a pre-set limit a visual indication in each of the classrooms would inform the teaching staff to close the large windows. This may take the form of a traffic light system; green for natural ventilation mode and red for tempered cooling mode. Once the windows are closed, a fan coil unit housed in a bulkhead in the ceiling of each classroom would activate and recirculate cooler air within the space. Note that this system would not provide full air conditioning; it would merely reduce the peak temperatures in the space by 3 or 4 degrees to within more acceptable comfort levels.

Alternate strategies may be investigated during the next design stage.

### **Low Energy Lighting & Control**

It is proposed that lighting control to general learning areas will be via local switching combined with daylight sensors to reduce energy when sufficient daylight is present.

Within corridors and circulation areas lighting can be controlled by the Building Management System, timer or by central switching, to suit the operational requirements of the school.

Store rooms and amenities can be controlled by occupancy sensors and timers so that lighting automatically turns off if movement is not detected for a preset time.

#### **4.1.4 Renewable Energy**

Renewable energy such as solar photovoltaics and small roof top wind turbines are being considered for the project. Although their contribution would be minimal given the size of the school, they can be incorporated to generate small amounts of power in offsetting energy use and to be used primarily as an educational resource.

Where wind turbines are installed, they will be considerate of noise disruption to neighboring properties. A low noise wind turbine will be given priority.

An existing 16kV photovoltaic array located on the roof of Redlands Hall will be relocated to an alternative appropriate roof (possibly the New Library).

#### **4.1.5 Water Conservation**

The following water conservation strategies are being considered for the New Learning Hub to reduce demand on potable water consumption.

- Low flow fixtures and fittings to reduce potable water consumption
- Rainwater harvesting
- Low water landscaping/xeriscaping
- Drip irrigation

#### **4.1.6 Environmentally Preferable Materials**

The New Learning Hub will incorporate environmentally preferable materials. The following are being considered:

- materials with high-recycled content and/or highly recyclable;
- sustainable timber;
- Third Party Certified / Eco Labels
- rapidly renewable materials; and
- concrete with recycled content.

#### **4.1.7 Emissions**

The following initiatives are being considered to reduce emissions from the school to the natural environment:

- Low Ozone Depletion Potential (ODP) insulants
- Design external artificial lighting to reduce light pollution to the night sky.
- Adoption of a formal environmental management system in line with established guidelines during construction.

## 4.1.8 Campus Wide Initiatives

The following campus wide strategies are being considered for Redlands.

- Community vegetable/herb garden
- Waste minimisation strategies during construction and operation
- Cyclist facilities and end of trip facilities for teachers and staff (i.e. lockers and showers) to discourage reliance on the use of private vehicles as the primary mode of transport to/from school.
- Dedicated car park spaces for fuel efficient vehicles and/or carpooling

## 4.2 Construction

The demolition and construction operations for new developments can impact the environment in a number of ways, such as the generation of pollution and construction waste and water and energy use. The following initiatives are being considered to reduce environmental impact from demolition and construction of the New Learning Hub.

- Contractual requirement for the contractor to be accredited and hold a valid ISO 14001 Environmental Management System (EMS).
- Contractual requirement for the contractor to develop and implement a project-specific Environmental Management Plan (EMP) in accordance with Section 4 of the NSW Environmental Management System guidelines 1998. The EMP will include site specific procedures such as;
  - Reduce energy consumption
  - Reducing water consumption
  - Reducing emissions from construction equipment
  - Reduced waste to landfill.

## 4.3 Operation

The following initiatives are being considered by Redlands to reduce the resource consumption associated with the operation of the New Learning Hub.

- Traffic Light System and Weather station - The effectiveness of any natural ventilation strategy is reliant on occupant behaviour. We suggest a traffic light system and weather station be considered in each naturally ventilated space to assist teachers and staff. The Traffic light system consists of a red and green light.
- Develop and make available a Building Users Guide (BUG) for all teachers and staff. The BUG is intended to improve the knowledge of sustainable design. A BUG consists of simple and easy to understand information relating to the everyday functions of the buildings.
- Energy and water monitoring - As part of the LCD Screens Initiative (see section 4.1.2), energy and water consumption will be monitored and recorded. This information will assist facility managers with identifying waste usage and managing resource consumption. In addition, the data from the meters will also

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be used as an educational tool by faculties to show students how much energy and water is being used.

- Building Tuning and Commissioning – Building tuning and commissioning ensures optimum occupant comfort and energy efficient services performance throughout the year.