

May, 2011

ECOLOGICAL SUSTAINABLE DEVELOPMENT Case Studies - Background Information

In response to recent workshop facilitated by *sbe* on 'Environmental Sustainability Review, the following design information for NSW government schools is provided to assist in the review and case studies.

For new government school buildings in NSW an extensive range of ESD initiatives have been incorporated into the design, systems, materials and fittings being delivered under the Building the Education Revolution – Primary Schools for the 21st Century (P21).

The template designs used for the P21 projects have been developed by DET over the last 35 years. One major component of that development is the research, trialling and performance measurement of a range of ESD initiatives which are now seen as a natural part of a project and not something 'special' or additional.

This extensive and ongoing research has culminated in the designs attaining the following Green Star Ratings:

Component Design Range (CDR) – non air conditioned or evaporative cooled zones

- 5 Star (recognises Australian Excellence)
- 1,311 buildings in P21

Component Design Range (CDR) – air conditioned zones

- 4 Star (recognises Best Practice)
- 202 buildings in P21

Modular Design Range (MDR) – all areas of NSW

- 4 Star (recognises Best Practice)
- 207 buildings in P21

Total buildings at 4 – 5 Star = 1,720

The Green Star rating was undertaken by ARUP and their summary reports are attached at Tab A.

ESD INCLUSIONS

<i>Innovation/Solution/System</i>	<i>Impact Improved.....</i>
Natural light is maximised by roof strip lights integrated with roof ventilation. (See Diagram 1)	EE,TC
Artificial lighting utilises highly efficient luminaries – T5s	EE



Control of Lights is by a switching system linked to the period bell or timers.	EE
Star rating of white goods and other equipment maximized.	EE
Optimum building orientation allows control of sunlight penetration to assist passive control of heating and ventilation.	EE, TC
Natural cross ventilation is the primary means of achieving good air movement and comfort conditions, assisted by roof turbo ventilators. Room and ceiling spaces are both ventilated. (See Diagram 2)	EE,TC
Heating is designed for optimum efficiency and safety. Gas convection heaters are preferred.	EE,TC
Insulation (two layers in roof and one in walls) reduces heat gain in summer and heat loss in winter. Selection is to avoid products containing formaldehyde and volatile organic compounds (VOC).	EE,TC
Use of building overhangs eg eaves and covered ways. Buildings have 2.4 m verandahs. Other windows where sun penetration may be an issue, sun screens installed.	EE,TC
Internal blinds provided to all windows.	EE, TC
Ceiling and wall fans installed.	TC
3 – 5 kW photovoltaic cells (PV) installed.*	EE
Low or nil VOC (volatile organic compounds) materials and finishes are specified to minimise off-gassing, have reduced PVC and toxic chemicals content, and low or nil formaldehyde.	IAQ
Low maintenance finishes and materials are chosen to minimise cleaning with VOC emitting substances.	IAQ



Carpets are either 100% wool level loop or 90% wool, Spaced Dyed Nylon.	IAQ,TC
Soft underlay: either high density needled underfelt, high density bonded polyurethane foam, natural rubber underlay or pad underlay using recycled textile fabric.	IAQ,TC
Adhesives: non-solvent, low odour, commercial grade, suitable for double bonding and direct stick application.	IAQ
Heat bonding Tapes: low odour and low smoke, commercial grade fibre and cotton thermoplastic adhesive tape.	IAQ
Paints/Finishes - Low solvent (VOC) and low odour latex (acrylic) paint for ceilings and internal walls.	IAQ
Pinboard walls - Fabric faced foam or polyester backing, must be glued to the plywood wallboard lining substrates by the manufacturer off-site, using water-based adhesive.	IAQ
Timbers: <ul style="list-style-type: none"> • No Rainforest timbers unless plantation grown • No timbers from high conservation forests • Use recycled timber, engineered and glued timber composite products, timber from plantations or from sustainably managed regrowth forests. 	N/A
Termite management: <ul style="list-style-type: none"> • No chemical pesticides and termiticides to be used. • Preventive treatments to be by physical means and careful design to minimise risk. 	IAQ
Tapware meets 4 WELS.	WE
5,000 to 10,000 litre rainwater tanks (RWT) installed* for: <ul style="list-style-type: none"> • Landscape maintenance • In certain circumstances connections to WCs 	WE

LEGEND

- EE Energy Efficiency
- TC Thermal Comfort
- IAQ Indoor Air Quality
- WE Water Efficiency

* During the BER P21 Program, PVs and/or RWT were some of the items (ie items that did not impact on the structure/intent and could be easily fitted at a later date were selected) to be descoped from a project if needed. Schools where this occurred are now having them installed.

Diagram 1 Light Strip Design

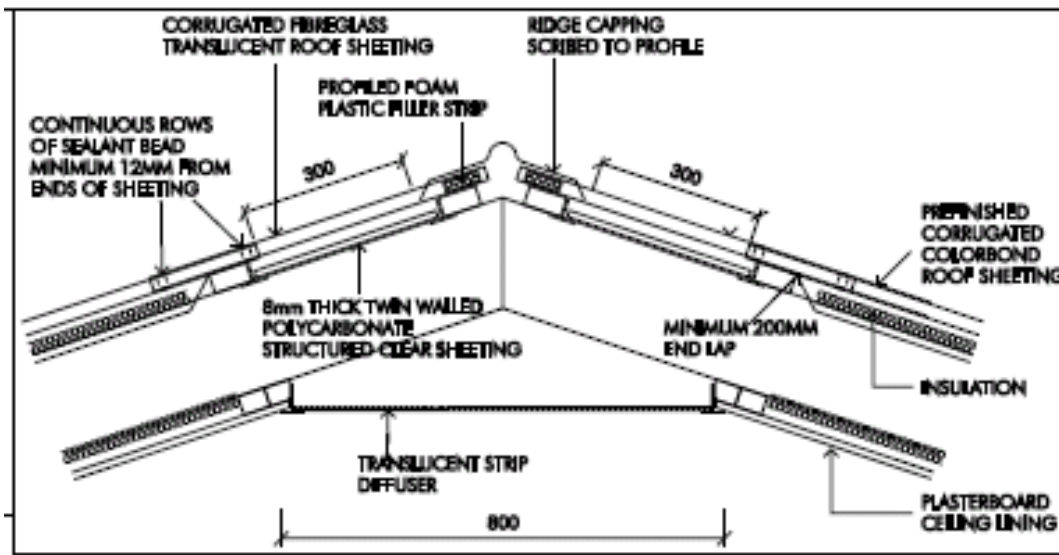
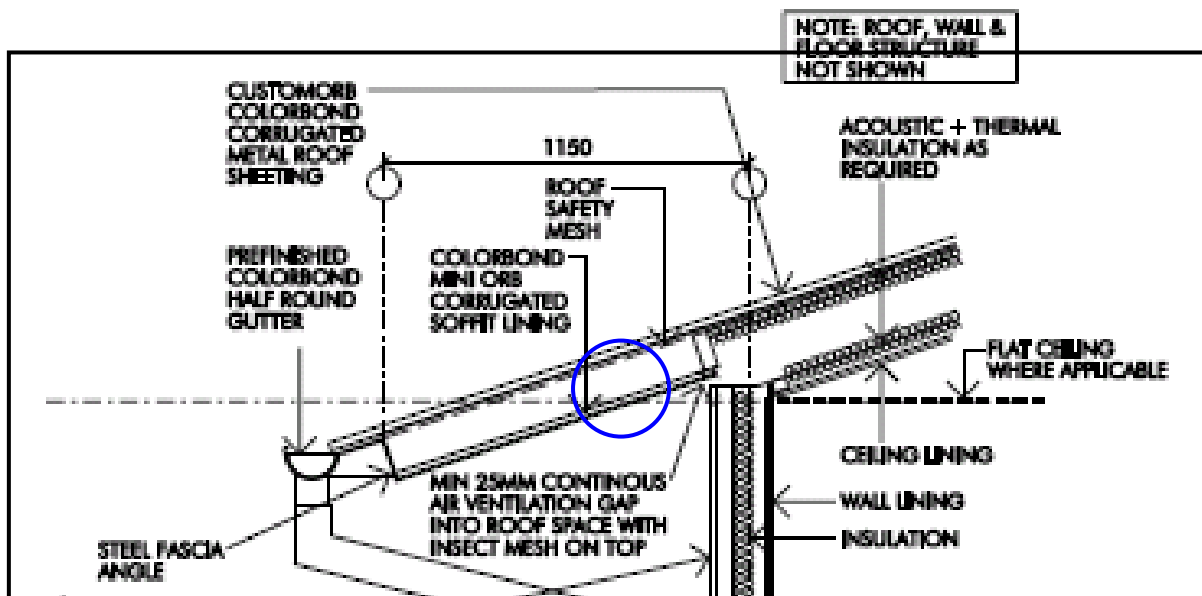


Diagram 2 Natural Cross Ventilation



EXCLUSIONS

1. Performance Glazing

Consideration has been given to installing Performance Glazing to DET products. However, after undertaking a Green Star Rating of the CDR home base in 2007, it was determined that the addition of this glazing style to the CDR would have nil impact. This was the view of the University of New South Wales's (NS Global).

2. Rainwater Tanks Pumps

RWTs were to be installed in P21 projects. Where possible these tanks were to operate on gravity feed.

The installation of RWTs without pumps has a twofold strategy:

- To capture a portion of the stormwater runoff and recycle for landscape maintenance through a gravity feed system
- To demonstrate to students that a number of activities eg landscaping/gardening can be achieved without the attachment of electricity (ie energy savings) through the application of physics

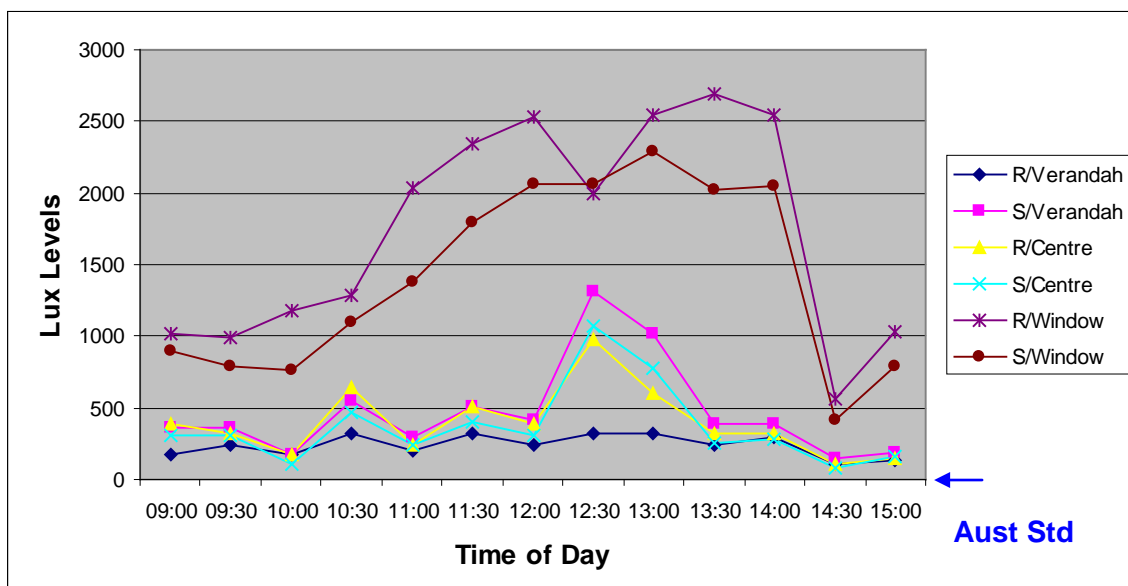
PERFORMANCE MEASUREMENT

1. Improved Energy Efficiency – Natural Light

Energy efficiency is achieved through the introduction of a sophisticated light strip design that maximises natural light while minimising heat gain into rooms.

The following graph demonstrates the amount of natural light available in a CDR Home Base from lux level recordings measured over the course of a day.

Lux Levels at Different Locations Within a Home Base



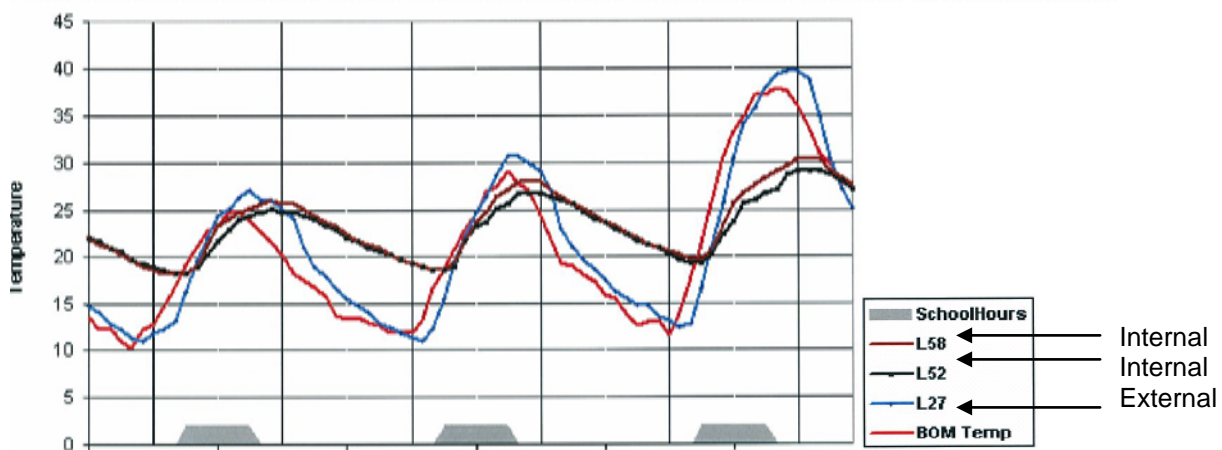
2. Improved Energy Efficiency - Artificial Light

Research into and measurement of the impact of changing the lighting specification to T5 lamps has resulted in a 13% decrease in electricity consumption. This result was calculated by measuring pre and post energy consumption at over 50 schools where new luminaires were installed throughout the schools.

3. Improved Thermal Comfort

The positive outcomes of the thermal comfort design of the CDR home base are demonstrated in the following data. The data provides a comparison between the BOM temperature, an external, locally logged temperature and internal temperatures at seating height.

Prestons Temperature All Loggers compared with BOM Temperature at HorsleyPark



Further the design of the CDRs also moderates the external temperatures. Over a three year period during Term 1, BOM temperatures were compared to internally logged temperatures. Using 29.5°C as the benchmark, a total of 88 'BOM' days (all sites) were recorded while only 62 days (all sites) above this benchmark were recorded internally.

On average 11 days per Term 1 were above 29.5°C for BOM while within the CDR only 5 days per Term 1 were above 29.5°C. (Note these are temperatures recorded during 'school hours').

4. Improved Water Efficiency

Although the products specified for use in schools have a high WELS rating, greater water efficiency is achieved when these products are combined with a curriculum element. In conjunction with Sydney Water a range of curriculum resources and tools were developed to improve water conservation in schools. These tools and resources are available on the DET intranet site.



From advice from Sydney Water, water usage targets were established for primary and secondary schools. For primary schools these were:

- Good 9 litres/day/student
- Excellent 6 litres/day/student

Extensive monitoring was undertaken at a number of schools to assess the impact these curriculum resources could have on water consumption. The results of that monitoring at a few of the schools are indicated below using the draft NABERS for Schools Star Rating System for Water.

	Pre Star Rating	Post Star Rating
School A	2.5	5.0
School B	2.0	4.0
School C	1.5	3.0
School D	3.0	5.0
School E	0.5	5.0

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2 May 2011

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BER Green Star Benchmark
CDR Homebase Green Star Assessment

Green Star Assessment

BER—Green Star rating

The intent of the BER—Green Star rating is to assess the building design attributes of the BER school design template against Green Star Education Tool v1.

The site specific credit of the tool were excluded in this assess,et. After the consultation process with NSW DET, the agreed site specific credit of this project are listed below:

<i>Category</i>	<i>Energy</i>
ENE-9	Efficient External Lighting
<i>Category</i>	<i>Transport</i>
TRA-1	Car Park Minimisation
TRA-2	Fuel Efficient Transport
TRA-3	Cyclist Facilities
TRA-4	Commuting Mass Transport
TRA-6	Transport Design and Planning
<i>Category</i>	<i>Ecology & Land Use</i>
ECO-1	Topsoil
ECO-2	Reuse of land
ECO-3	Reclaimed Contaminated Land
ECO-4	Ecological Value of Site
<i>Category</i>	<i>Emission</i>
EMI-5	Watercourse Pollution

With the exclusion of the above credits, the overall score were adjusted accordingly to reflect appropriate rating scale.

The following table outlines the overall score and ratings of the BER—Green Star assessment. This represent the building attribute performance only. A formal Green Star rating should address all environmental attributes on a project and site basis.

Sydney

	Sydney N-S		Sydney E-W	
	Overall Score	BER- Green Star Rating	Overall Score	BER- Green Star Rating
Template Design—Gas heating, no cooling	68	5 Star	66	5 Star
Variation 1—Electric heating, no cooling	56	4 Star	56	4 Star
Variation 2—Gas heating, evaporative cooling	62	5 Star	62	5 Star
Variation 3—Reverse cycle A/C for heating and cooling	58	4 Star	56	4 Star

Cobar

	Cobar N-S		Cobar E-W	
	Overall Score	BER- Green Star Rating	Overall Score	BER- Green Star Rating
Template Design—Gas heating, no cooling	68	5 Star	65	5 Star
Variation 1—Electric heating, no cooling	48	4 Star	48	4 Star
Variation 2—Gas heating, evaporative cooling	61	5 Star	59	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	52	4 Star	51	4 Star

Wagga Wagga

	Wagga N-S		Wagga E-W	
	Overall Score	BER- Green Star Rating	Overall Score	BER- Green Star Rating
Template Design—Gas heating, no cooling	59	4 Star	57	4 Star
Variation 1—Electric heating, no cooling	46	4 Star	46	4 Star
Variation 2—Gas heating, evaporative cooling	53	4 Star	51	4 Star
Variation 3—Reverse cycle A/C for heating and	47	4 Star	47	4 Star

Refer to Appendix A for the detail credit criteria and points for Sydney N-S Template design. The credit points might varies based on the variations and modelling results. It also includes the possible points to be achieved and the associated description of information to be included in the design for improvement.

In summary, the CDR Home Base design template has the best performance out of the variations for all locations. Evaporation cooling is beneficial to warm climate, such as Sydney and Cobar. The drawback of this option is the influence on specific water consumption and emission credit, i.e. WAT-4 Heat Rejection Water and EMI-8 Legionella.

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BER Green Star Benchmark
 MDR Home Base

Green Star Assessment

BER—Green Star rating

The intent of the BER—Green Star rating is to assess the building design attributes of the BER school design template against Green Star Education Tool v1.

The site specific credit of the tool were excluded in this assessment. After the consultation process with NSW DET, the agreed site specific credit of this project are listed below:

<i>Category</i>	<i>Energy</i>
ENE-9	Efficient External Lighting
<i>Category</i>	<i>Transport</i>
TRA-1	Car Park Minimisation
TRA-2	Fuel Efficient Transport
TRA-3	Cyclist Facilities
TRA-4	Commuting Mass Transport
TRA-6	Transport Design and Planning
<i>Category</i>	<i>Ecology & Land Use</i>
ECO-1	Topsoil
ECO-2	Reuse of land
ECO-3	Reclaimed Contaminated Land
ECO-4	Ecological Value of Site
<i>Category</i>	<i>Emission</i>
EMI-5	Watercourse Pollution

With the exclusion of the above credits, the overall score were adjusted accordingly to reflect appropriate rating scale.

The following table outlines the overall score and ratings of the BER—Green Star assessment. This represent the building attribute performance only. A formal Green Star rating should address all environmental attributes on a project and site basis.

Sydney

	Overall Score	BER—Green Star Rating
Template Design— Reverse Cycle A/C, North & South Orientation	58	4 Star
Variation 1— Reverse Cycle A/C, East & West Orientation	57	4 Star

Cobar

	Overall Score	BER—Green Star Rating
Template Design— Reverse Cycle A/C, North & South Orientation	54	4 Star
Variation 1— Reverse Cycle A/C, East &	51	4 Star

Wagga Wagga

	Overall Score	BER—Green Star Rating
Template Design— Reverse Cycle A/C, North & South Orientation	47	4 Star
Variation 1— Reverse Cycle A/C, East & West Orientation	47	4 Star

Refer to Appendix A for the detail credit criteria and points for Sydney N-S Template design. The credit points might varies based on the variations and modelling results. It also includes the possible points to be achieved and the associated description of information to be included in the design for improvement.

In summary, the MDR Home Base design template locates in all three locations have achieved 4 star Green Star rating.

21/01/2011
 Job Number 220997-00

BER Green Star Benchmark
 21 Core CDR Admin/Staff

Green Star Assessment

BER—Green Star rating

The intent of the BER—Green Star rating is to assess the building design attributes of the BER school design template against Green Star Education Tool v1.

The site specific credit of the tool were excluded in this assessment. After the consultation process with NSW DET, the agreed site specific credit of this project are listed below:

<i>Category</i>	<i>Energy</i>
ENE-9	Efficient External Lighting
<i>Category</i>	<i>Transport</i>
TRA-1	Car Park Minimisation
TRA-2	Fuel Efficient Transport
TRA-3	Cyclist Facilities
TRA-4	Commuting Mass Transport
TRA-6	Transport Design and Planning
<i>Category</i>	<i>Ecology & Land Use</i>
ECO-1	Topsoil
ECO-2	Reuse of land
ECO-3	Reclaimed Contaminated Land
ECO-4	Ecological Value of Site
<i>Category</i>	<i>Emission</i>
EMI-5	Watercourse Pollution

With the exclusion of the above credits, the overall score were adjusted accordingly to reflect appropriate rating scale.

The following table outlines the overall score and ratings of the BER—Green Star assessment. This represent the building attribute performance only. A formal Green Star rating should address all environmental attributes on a project and site basis.

Sydney

	Sydney N-S		Sydney E-W	
	Overall Score	BER- Green Star Rating	Overall Score	BER- Green Star Rating
Template Design—Gas heating, no cooling	64	5 Star	63	5 Star
Variation 1—Electric heating, no cooling	51	4 Star	51	4 Star
Variation 2—Gas heating, evaporative cooling	59	4 Star	59	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	56	4 Star	55	4 Star

Cobar

	Cobar N-S		Cobar E-W	
	Overall Score	BER- Green Star Rating	Overall Score	BER- Green Star Rating
Template Design—Gas heating, no cooling	63	5 Star	61	5 Star
Variation 1—Electric heating, no cooling	44	-	43	-
Variation 2—Gas heating, evaporative cooling	57	4 Star	56	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	51	4 Star	49	4 Star

Wagga Wagga

	Wagga N-S		Wagga E-W	
	Overall Score	BER- Green Star Rating	Overall Score	BER- Green Star Rating
Template Design—Gas heating, no cooling	54	4 Star	53	4 Star
Variation 1—Electric heating, no cooling	43	-	43	-
Variation 2—Gas heating, evaporative cooling	51	4 Star	49	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	45	4 Star	45	4 Star

Refer to Appendix A for the detail credit criteria and points for Sydney N-S Template design. The credit points might varies based on the variations and modelling results. It also includes the possible points to be achieved and the associated description of information to be included in the design for improvement.

In summary, the 21 Core CDR Admin/Staff design template has the best performance out of the variations for all locations. Evaporation cooling is beneficial to warm climate, such as Sydney and Cobar. The drawback of this option is the influence on specific water consumption and emission credit, i.e. WAT-4 Heat Rejection Water and EMI-8 Legionella.

21/01/2010
 Job Number 220997-00

BER Green Star Benchmark
 14 Core Hall/ COLA

Green Star Assessment

BER—Green Star rating

The intent of the BER—Green Star rating is to assess the building design attributes of the BER school design template against Green Star Education Tool v1.

The site specific credit of the tool were excluded in this assessment. After the consultation process with NSW DET, the agreed site specific credit of this project are listed below:

<i>Category</i>	<i>Energy</i>
ENE-9	Efficient External Lighting
<i>Category</i>	<i>Transport</i>
TRA-1	Car Park Minimisation
TRA-2	Fuel Efficient Transport
TRA-3	Cyclist Facilities
TRA-4	Commuting Mass Transport
TRA-6	Transport Design and Planning
<i>Category</i>	<i>Ecology & Land Use</i>
ECO-1	Topsoil
ECO-2	Reuse of land
ECO-3	Reclaimed Contaminated Land
ECO-4	Ecological Value of Site
<i>Category</i>	<i>Emission</i>
EMI-5	Watercourse Pollution

With the exclusion of the above credits, the overall score were adjusted accordingly to reflect appropriate rating scale.

The following table outlines the overall score and ratings of the BER – Green Star assessment. This represent the building attribute performance only. A formal Green Star rating should address all environmental attributes on a project and site basis.

Sydney

	Sydney N-S	
	Overall Score	BER—Green Star Rating
Template Design—Gas heating, no cooling	64	5 Star
Variation 1—Electric heating, no cooling	50	4 Star
Variation 2—Gas heating, evaporative cooling	59	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	55	4 Star

Cobar

	Cobar N-S	
	Overall Score	BER—Green Star Rating
Template Design—Gas heating, no cooling	64	5 Star
Variation 1—Electric heating, no cooling	42	4 Star
Variation 2—Gas heating, evaporative cooling	59	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	52	4 Star

Wagga Wagga

	Wagga N-S	
	Overall Score	BER—Green Star Rating
Template Design—Gas heating, no cooling	55	4 Star
Variation 1—Electric heating, no cooling	41	4 Star
Variation 2—Gas heating, evaporative cooling	50	4 Star
Variation 3—Reverse cycle A/C for heating and cooling	45	4 Star

Refer to Appendix A for the detail credit criteria and points for Sydney N-S Template design. The credit points might varies based on the variations and modelling results. It also includes the possible points to be achieved and the associated description of information to be included in the design for improvement.

In summary, the 14 Core Hall/ COLA Staff design template has the best performance out of the variations for all locations. Evaporation cooling is beneficial to warm climate, such as Sydney and Cobar. The drawback of this option is the influence on specific water consumption and emission credit, i.e. WAT-4 Heat Rejection Water and EMI-8 Legionella.

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BER Green Star Benchmark
 14 Core Hall/ COLA

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Appendix A BER Green Star Matrix

Introduction

ARUP has been commissioned by NSW Department of Education and Training to assess the generic environmental performance of the following school template design against the Green Star Education v1 tool.

- CDR Home Base—Standard Template Design
- 21 Core CDR Admin/ Staff—Standard Template Design
- 14 Core Hall/ COLA—Standard Template Design
- MDR Home Base—Standard Template Design
- BDR Home Base—Standard Template Design

These templates has been developped for the BER program to meet the timelines established by the Commonwealth Government for school development across NSW.

This report provide a description of the Green Star tool and the project methodology. The Green Star Education v.1 assessment of 14 Core Hall/ COLA template design are present in Section 4. The following design variations has also been undertaken to assess the annual energy consumption and thermal comfort impact for Sydney, Cobar and Wagga Wagga and the impact to the Green Star rating.

- Base Case— Gas heating, no cooling
- Variation 1—Electric heating, no cooling
- Variation 2—Gas heating, evaporative cooling
- Variation 3—Reverse cycle A/C for heating and cooling

Results

The 21 Core CDR Admin/ Staff Standard Template Design has achieved the follow Green Star Rating, with the exclusion of site related credits.

- Sydney 5 Star
- Cobar 5 Star
- Wagga 4 Star

This rating only represent the building design attributes and further site specific investigations are require for formal Green Star Certification.

Also, the actual operation and temperature set points of the BER buildings has been used in credit Ene-1 and IEQ-5. These profiles do not coincide with GBCA standard operational hours. For formal Green Star certification under Green Star Education tool v1, a technical clarification from GBCA is required to confirm the validity of this approach. Refer to BER Green Star Benchmark—modelling for Green Star Education tool v1 Issue 4 for details.

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BER Green Star Benchmark
 14 Core Hall/ COLA

Description of Green Star Tool

The Green Star set of rating tools were developed by the Green Building Council of Australia (GBCA), an independent not for profit organisation, to establish a benchmark environmental rating that could be used to differentiate the success of high-performance green building in the various sectors (Office, Industrial, Multi- residential Units, Healthcare and others)

Green Star is not a standard and is not mandatory or required by building codes, but rather is a voluntary system that can be successfully used to implement green building principles in an effective and measurable way in the development of a new building. Green Star rates buildings across several key environmental criteria and then assigns a star rating, from 4 to 6 Stars. The categories for rating include: Management, Indoor Environmental Quality, Energy, Transport, Water, Materials, Land Use and Ecology, and Emissions. Each category is also weighted differently amongst Australian States and Territories based on their specific environmental significance

Green Star Rating

The Green Star tool is a design based rating tool that benchmarks buildings based on a pre defined set of design initiatives, rather than the actual performance of a building in operation. An official rating process involves the adoption of a specific number of initiatives that results in a score. The Green Star rating is determined by coming the overall score with the rating scale shown below:

Overall Score	Rating
0-44	Not eligible for Formal Certification
45-59	4 Star (Recognises Best Practice)
60-74	5 Star (Recognises Australian Excellence)
75+	6 Star (Recognises World Leader)

Continual Improvement

The Green Star is a rating tool in constant change and improvement. Updates on benchmarks and design requirements are often released. Buildings seeking official rating from the GBCA must comply with latest requirements for the applicable tool (Green Star Office Design, Green Star Healthcare, Green Star Multi- Residential Units, etc) that

are usually identified by v1, v2, v3 ('v' meaning 'version') – e.g. Green Star Office Design v3; Green Star Healthcare v1, etc. Each type of tools is usually in a different stage of development (different version).

Prior to the release of a v1 tool, the GBCA usually releases the PI-LOT version, which is submitted to industry feedback to comment on applicability, achievability, benefits and benchmarks of each credit. The industry feedback is analysed by the GBCA, which then amends the specific tool according to industry feedback. The v1 is then released to the market, and projects can then start applying for a formal certification. Pilot tools cannot be used for official ratings under the GBCA's endorsement. When this project commenced only the Pilot tool was available. The requirement of the project brief was that the Pilot tool was to be used in the process.

Detail information of Green Star

Detailed guidelines are provided with Green Star tools to facilitate the use of the tool and explain the requirements for demonstrating compliance with each of the criteria. This is compiled in what is called the Green Star Technical Manual. The Technical Manual has a standard structure to present each credit, as summarised below:

Aim of Credit: Describes what environmental benefits are expected from the adoption of the initiative. i.e. the reason behind the requirements (e.g. Credit Emi-1 Refrigerant ODP: "To encourage and recognise the selection of refrigerants that do not contribute to long-term damage to the Earth's stratospheric ozone layer";

Credit Criteria: Describes the design requirements to enable the credit compliance and the number of points that will be awarded if the design complies with that (e.g. Credit Emi-1 Refrigerant ODP: "One point is awarded where all HVAC refrigerants have an Ozone Depleting Potential –ODP, of zero; OR no refrigerants are used");

Green Star Documentation (or Green Star Submission): Presents a set of documents that will enable the GBCA assessor to verify compliance with the Credit Criteria (e.g. Credit Emi-1 Refrigerant ODP: "A short report describing the HVAC type system and all its

components...; tender Drawings; Extracts from Specifications where the requirements for the HVAC system is stipulated; etc)

Additional Guidance: Contains extra information usually necessary for a full comprehension of the credit criteria, such as standards, clarifications, references etc. In most cases, being aware of the Additional Guidance section is essential to enable full credit compliance (e.g. Credit Emi-1 Refrigerant ODP: "All ODP values to be determined from HB40.1-2001: The Australian Refrigeration and Air-conditioning Code of Good Practice (Appendix 3 and 4) or AIRAH Refrigerant Selection Guide 2003, ..."

Green Star Education Tool v1

The Green Star—Education v1 rating tool was released in 2008. It is intent to assesses the environmental attributes of new and refurbished education facilities in every state across Australia. It consist of eight environmental impact categories and an innovation category, as listed below:

- Management (MAN)
- Indoor Environment Quality (IEQ)
- Energy (ENE)
- Water (WAT)
- Materials (MAT)
- Land Use & Ecology (ECO)
- Emissions (Emi)
- Innovation (INN)

These categories are common across all Green Star Tool.. With the consultant of the Education Section, GBCA has included 'sector specific' that differentiate the Green Star Education v1 tool from other Green Star tools, for example, Learning resource which encourage and recognise the building and site attributes that serve as an environmental learning resource to all building users.

21/01/2010
Job Number 220997-00

BER Green Star Benchmark
14 Core Hall/ COLA

Project Methodology

The intent of this project is to assess the generic environmental performance of the following design templates and establish a Green Star rating of each design.

- CDR Home Base—Standard Template Design
- 21 Core CDR Admin/ Staff—Standard Template Design
- 14 Core Hall/ COLA—Standard Template Design
- MDR Home Base—Standard Template Design
- BDR Home Base—Standard Template Design

In reference to the Green Star Education v1, developments such as schools are commonly split over several buildings. Such buildings can either be rated individually or a single rating for the entire development. Considering the design templates will be stand-alone buildings each design template is rated separating.

As some of the design templates do not include toilet facilities (e.g. CDR Home Base), the 14 Core toilet design template, provided by NSW Department of Education and Training (NSW DET), are incorporated in the individual ratings of each facility where applicable.

Green Star Rating Assessment

The design of each facility is assessed against each of the Green Star points for Education Design V1. Where design documentation is adequate points will be awarded for the specific initiative.

Where all information is not available to the level of detail required for a submission we will provide the department with a description of information to be included will be provided to the department. These points will be included in possible points to be achieved.

Site Related Credit

Green Star tool assess the environmental impact of the building in a holistic approach, this involves both building and site attributes of a project. In considering BER program is predominantly only delivering stand-alone buildings and the intent of this exercise is to assess the building only, site related credit is deemed to be not applicable

for this assessment. Further assessment should be undertaken for formal Green Star rating certification.

Simulation and Modelling

Computer simulation and modelling has been undertaken to show compliance for the following points:

- IEQ – 4 Daylight;
- IEQ – 5 Thermal comfort control;
- IEQ – 11 Daylight glare control;
- ENE 1 – Green house gas emissions;

For thermal comfort control and Green house gas emissions the results are dependant on the installation of air conditioning. Three locations, including Sydney, Cobar and Wagga Wagga were selected for this assessment.

The following design variations has also been undertaken for 14 Core Hall/ COLA to assess the impact of design options:

- Base Case—Gas Heating, no cooling
- Variation 1—Electric heating, no cooling
- Variation 2—Gas heating, evaporative cooling
- Variation 3—Reverse cycle A/C for heating and cooling

Refer to 'Modelling for Green Star Education tool v1' for modelling details.

Architectural drawings and School Facilities Standards (SFS) provided by the BER program were used in this assessment.