ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) MEASURES

Catherine McAuley Catholic College
507 Medowie Road & 2 Kingfisher Close
Medowie NSW 2318

Figure 01 - Perspective illustrating proposed Senior College Entry
(Architect's concept impression only)

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REVISION B

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Contents

Attachments

1.0 INTRODUCTION

This report has been prepared by Webber Architects, on behalf of the Catholic Diocese of Maitland Newcastle. This report is intended to provide an overview of the proposed ecologically sustainable development (ESD) principles in line with the relevant Secretary's Environmental Assessment Requirements (SEARs) and the Environmental Planning and Assessment Act (EP&A). Additional information is also included in the *Design Verification Statement* prepared by Webber Architects and in the body of the *Environmental Impact Statement*.

1.1 Overview

The project is the development of a new Catholic College at Medowie which includes a seven-stream high school, three stream primary school, early learning centre and chapel. The site is a large Greenfield site in Medowie which has a largely flat cleared area surrounded by constraints such as Koala Habitat, SEPP 14 wetlands, Endangered Ecological Communities, flood and bushfire prone land and an electrical easement located across the frontage of the site. To the north of the site are large lot housing subdivisions, the Pacific Dunes Golf Course is located opposite on Medowie Road and there is an electrical substation located on the north east corner of the site. The college has been situated in the cleared area of the site endeavouring to leave a 50m buffer to the ecology, limiting clearing requirements in order to create the required bushfire asset protection zone. The existing streetscape consists mainly of widely spaced single and two storey residential properties and the College aims to fit in with this context limiting development to single and two storey forms. This site provides a unique opportunity for an ESD outcome which links to the learning environment and pedagogy of the College on a day to day basis.

2.0 SUSTAINABILITY FRAMEWORK

The following statutory framework considerations have been identified as applicable to the ESD principles of the project.

2.1 SEARs Conditions

The SEARs conditions note that the following assessment framework should be addressed in the EIS and supporting documentation:

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

The information set out in this report and elsewhere in the EIS, outline the sustainable initiatives and measures implemented to minimise resource consumption which have been incorporated in the project and the Green Star 4 Star Pathway outlined addresses the second point above.

2.2 Environmental Planning & Assessment Regulation

The EP&A Act Regulation 2000, Schedule 2, Clause 7(4) notes a number of considerations in regards to ESD principles.

The principles of ecologically sustainable development are as follows:
(a) the "precautionary principle", namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by:
i. careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
ii. an assessment of the risk-weighted consequences of various options,
(b) "inter-generational equity", namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,
(c) "conservation of biological diversity and ecological integrity", namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
(d) "improved valuation, pricing and incentive mechanisms", namely, that environmental factors should be included in the valuation of assets and services, such as:
i. polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
ii. the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,
iii. environmental goals, having been established, should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.

2.3 National Construction Code (BCA) Section J - Energy Efficiency

Section J of the National Construction Code sets out minimum statutory energy efficiency requirements relating to building design and include items such as thermal performance, sustainability of building services such as mechanical systems & lighting, and building envelope sealing and insulation. A Section J compliance report has been prepared by WEBB Australia and is attached to this report.

2.4 Compliance

The SEARs require the EP&A requirements be met, in addition to demonstrating the development has been assessed against a suitably accredited rating system. This report outlines that although not seeking formal Green Star accreditation, the development will be designed and construction to an equivalent 4 Star Green Star standard, indicating “Best Practice.”

2.5 Green Star Equivalency

The intent is that this development is designed to meet an equivalent of a 4 Star Green Star Design & As Built Development. The Catholic Diocese of Maitland Newcastle does not require a formal Green Star rating be pursued, hence this is not planned.

The Green Building Council of Australia has developed the Green Star suite of rating tools to assess the level of ESD that may be incorporated into a building. The Green Star Design and As-Built tool v1.2 was released on 03/07/2017 and incorporates nine categories and credits:

- Management
- Indoor Environment Quality (IEQ)
- Energy
- Transport
- Water
- Materials
- Land use and ecology
- Emissions
- Innovation

The 4-star rating toward which this development has been designed is equivalent to “Best Practice.” In order to achieve a 4-star rating a minimum of 45 points is required. The proposed development has been assessed using the Green Star rating tool and currently sits at approximately 48 stars, dependent on specification of materials and finalisation of building services designs, demonstrating a 4 Star equivalent design. Information in this regard is contained in Attachment 2.

The environmental measures outlined in this statement and in the Green Star assessment table in Attachment 2 are intended to be adopted in the development and all best efforts will be made to adopt these initiatives. However, it is noted that as this is a staged development over a number of years, some of these items may prove difficult to achieve, hence the Catholic Diocese of Maitland Newcastle is not intending to pursue a formal 4 Star Green Star Rating.

3.0 ECOLOGICAL DESIGN RESPONSE

In order to satisfy the Sustainability Framework, set out in item 2 and mitigate the negative ecological impacts of the development, the preliminary design response and targeted ESD initiatives for the proposed development will target these elements through the 4 Star Green Star Pathway. This pathway is outlined below and documented in the Attachment.

3.1 Ecology and Landscape

The ecology of the site will be changed from its current state, due to the project being a significant new College development on a previously rural residential site. Efforts have been made within the master plan approach and in the design development to limit the impacts on the surrounding ecology. The following points outline the considerations and methods adopted to reduce impacts on the surrounding ecology and landscape:

- Built form located in the largely cleared area which was already present on the site.
- Developing an engineered solution to stormwater to not adversely affect runoff from the site to catchments.
- Performing an extensive contamination assessment of the site, Hazmat review of the existing structures, with the intent to remediate contamination identified.
- 20 metre setback from the informal watercourse in the southern section of the site.
- Limiting overlap of 50m APZ with Endangered Ecological Communities.
- Retaining existing trees within the developed area of the site, where possible.
- Providing a comprehensive landscape plan outlining the use of native species.

A combination of low-demand vegetation and low ratios of hard surface areas will assist in the objectives of the SEARs by reducing run-off impacts of the development and the overall impact on the surrounding ecology.

3.2 Energy, Greenhouse Gas Emissions

Energy efficiency, reductions in greenhouse gas emissions and renewable energy are key drivers for sustainability measures within the project. Energy use within buildings during operation represent a large percentage of all energy related greenhouse gas emissions in Australia. Annual greenhouse emissions can be lowered by planning for greater energy efficiency within new developments. The energy efficiency initiatives proposed for inclusion within the College include:

- Incorporating thermal mass, quality glazing and orientation appropriate shading reduces dependence on air conditioning.
- Limiting each building size, in the form of ‘pods’ to encourage natural light and a connection to nature, reducing artificial lighting requirements.
- Low artificial lighting densities and use of mainly LED lights
- Incorporating timers on lights and occupancy sensors to reduce energy consumption.
- Efficient air conditioning and fan selections
- Inclusion of solar PV panel arrays, with plans to incorporate monitoring of performance in educational programs.

The energy consumption of the buildings will be reduced through the inclusion of these measures.

3.3 Water Resources / Potable Demand Reduction

Water efficiency and the reduction of demand on potable water has been addressed via the incorporation of the following initiatives:

- All water fittings and fixtures are to meet high Water Efficiency Rating Scheme (WELS) ratings, outlined elsewhere.
- Water use will be tracked via water meters, with plans to incorporate monitoring of performance in educational programs.
- Harvesting rainwater for use in irrigation and toilets pending final design.

3.4 Emissions

Damaging emissions will be addressed via the following initiatives:

- Stormwater runoff is collected in detention ponds and Atlantis cells.
- External lighting is limited, not pointed up at the night sky and will be on timers and sensors.
- Low or zero VOC paints and adhesives.
- Low formaldehyde content in any engineered wood products selected.

3.5 Indoor Environment Air Quality

The design aims to provide a contemporary, flexible environment commensurate to learning and targets a number of areas to increase the indoor environment quality, including:

- Air pollutants exhausted externally
- Printing equipment pollutants reduced via selection of printers.
- Acoustic comfort of occupants considered in the design of spaces, high levels of acoustic separation.
- Consideration of sound reverberation in choice of finishes.
- Quality lighting solutions through surface illumination.
- Reducing glare via inclusion of blinds and external shading devices.
- Use of low / no VOC paints & low formaldehyde engineered wood products to reduce health risks.
- Incorporating external views and daylight where possible.
- Incorporating sunshades on exposed facades.

3.6 Waste

Operational and construction waste management is planned to be addressed in the following ways:

- Dedicated waste recycling storage areas are planned for the site.
- Recycling facilities will be provided around the site for separation of different waste streams.
- Diverting a percentage of construction / demolition waste from landfill.

3.7 Management

To ensure the appropriate ongoing performance of the site, in line with the intended Green Star rating, the following management strategies will be considered:

- Commissioning of services in line with relevant standards.
- Maintain finishes for as long as possible to reduce waste of materials.
- Set and measure environmental performance targets for common areas and services.

4.0 DESIGN RESPONSE

The project will incorporate a number of measures which will be detailed to full technical resolution for implementation during the next stage of the project. These will provide positive environmental and resource efficiency outcomes, and which embody best practice ESD principles. There are a number of individual, but interconnected passive design measures, including building orientation, arrangement of fenestration, maximising natural light & ventilation, which combine to improve occupant comfort and reduce reliance on active systems such as artificial lighting and air conditioning. Where active building systems are necessary, these will be carefully considered in the detailed design to ensure good ESD outcomes and assessment against whole-of life-cycle costs.

The environmental measures outlined in this statement and in the Green Star assessment table in Attachment 2 are intended to be adopted in the development and all best efforts will be made to adopt these initiatives. However, it is noted that as this is a staged development over a number of years, some of these items may prove difficult to achieve, hence the Catholic Diocese of Maitland Newcastle is not intending to pursue a formal 4 Star Green Star Rating.

4.1 Passive Design Measures

NATURAL LIGHT

The design aims to provide an amount of natual light to spaces whereby lights seldom need turning on during the day. Methods incorporated into the design to achieve this include:

- Provision of daylight into all learning spaces and the majority of other spaces.
- High level windows in ‘pop up’ roof elements to bring daylight into central spaces
- Internal glazing enabling borrowed light in deep floor plates

Occupant comfort and passive building performance are enhanced through the use of louvre windows, overhangs, screens to openings and walkways which aid in screening external windows from undesirable solar access. Refer Figures 02, 03 & 04.

NATURAL & ASSISTED VENTILATION

There are different approaches to ventilation due to the different built forms on the site. The majority of spaces are provided with cross flow ventilation and/or mechanically assisted ventilation. Figure 02, 03 & 04 illustrated method adopted, which include:

- Operable windows on two sides, where possible.
- High level operable windows, to achieve cross flow ventilation where openings on two sides of a space is not achievable.
- Mechanically assisted cross flow ventilation to spaces with limited access to outside.
- Internal spaces adopt borrowed ventilation through other spaces.
- Ceiling fans incorporated in some spaces to enhance occupant comfort.

BUILDING INSULATION

Thermal insulation to the building envelope will be detailed to exceed the R values required under the mandatory National Construction Code (BCA) Section J – Energy Efficiency Values. This increase has been adopted not only to achieve credit requirements set out under the Green Star 4 Star credits but also to provide a noticeable improvement in building occupant comfort levels and reduce the reliance on active systems such as ceiling fans, air conditioning and space heating.

4.2 HYDRONIC HEATING

An assessment will be carried out during the detailed design phase into the thermal comfort levels for the Chapel. It Is the clients preference to avoid air conditioning within this space, hence passive cooling methods are being adopted and hydronic heating will be investigated. This system could either have centralised gas fired boilers, or an electric boiler powered by PV panels, which heat water, that is then circulated around a piped ring main in the Chapel, radiating controlled heat into the space.
A whole of life cycle economic assessment is proposed to be carried out to determine whether this method of heating the Chapel is economically feasible in the long term.

4.3 AIR CONDITIONING

Although the design of the spaces within the project has incorporated ESD principles and energy efficient active comfort systems, it is also planned to include air conditioning in some of these spaces. These include the Early Education Centre, the Primary School and High School administration & staff spaces, canteen, general and specialist learning spaces. For these spaces the air conditioning will be designed during the detailed design stage to be best practice in terms of energy efficiency. Solar PV panels are also incorporated into the design which will have capacity to offset the expected power consumption of the air conditioning plant.

4.4 ENERGY CONSERVATION

The electrical design will incorporate a number of measures to minimise energy consumption including renewable energy supply systems and intelligent control.

PV SOLAR SYSTEM

The inclusion of roof mounted grid connected PV solar systems has been planned for the majority of the new buildings on site. The full master plan is being built over a number of stages, hence this will provide on site electricity generation to supplement the load demand at the school and can be assessed as the school develops, with additional PV panels included in subsequent stages as needed.

ARTIFICIAL LIGHTING

Energy conservation outcomes will be a high priority when designing and selecting the artificial lighting approach throughout the proposed project. All new light fittings are proposed to be LED based luminaires, which have a lower power consumption and longer life than fluorescent, halogen or incandescent lamps.

Intelligent lighting controls are also being considered in the design, including provision of automatic switching in learning areas which are linked to class times, automatically turning off at fixed times after the end of a class. This can be overridden if lighting is required for the next class and lighting can also be switched off at any time if not needed.

CENTRAL CONTROL SYSTEM

A central control system is also being considered for the air conditioning systems, which would be connected back to a common point, such as Administration. This would include a central on/off point for all systems enabling greater control and monitoring to improve energy efficiency.

4.5 POTABLE WATER USAGE & CONVSERVATION

The hydraulic design for the project to be developed during the next stage of documentation, will include specification of water efficient sanitary fixtures and tapware. These will be based on exceeding the minimum requirements of the Water Efficiency Labelling and Standards Scheme (WELS) and in line with the intended Green Star rating the project is being targeted toward. The WELS ratings being targeted are as follows:

- Basins, sinks & bubblers 6 star
- Showers 3 star
- Toilets 5 star
- Urinals 6 star

A comprehensive rainwater reuse system supplying non-potable water to the amenity areas for flushing of toilets and to external hose taps for landscape irrigation is planned to be detailed in the next stage of documentation.

4.6 GENERAL ESD APPROACH IN ELEMENTS

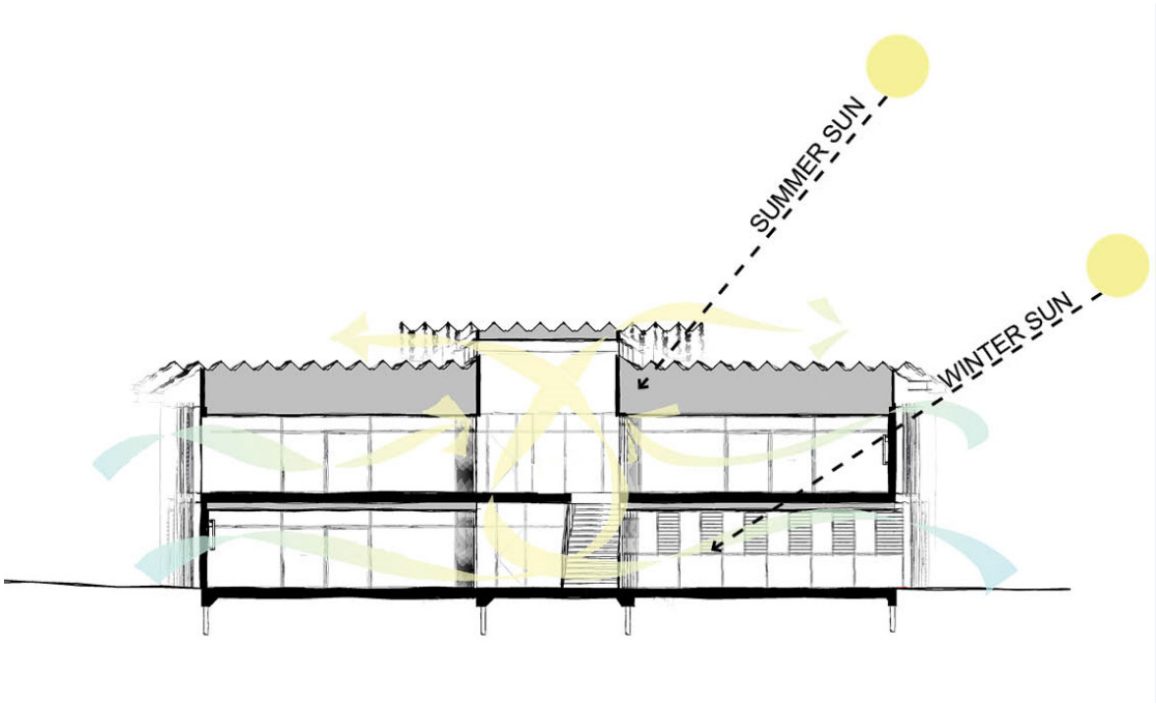

Figure 02: Typical High School Block Ventilation strategies and solar access

The design of the high school blocks incorporates operable windows at low and high level to encourage natural ventilation, roof overhangs and window awnings to block summer sun, while encouraging winter solar access. Other sustainability initiatives which are to be incorporated into the detailed design include rainwater reuse, solar panels and building monitoring systems which will form part of the pedagogical approach.

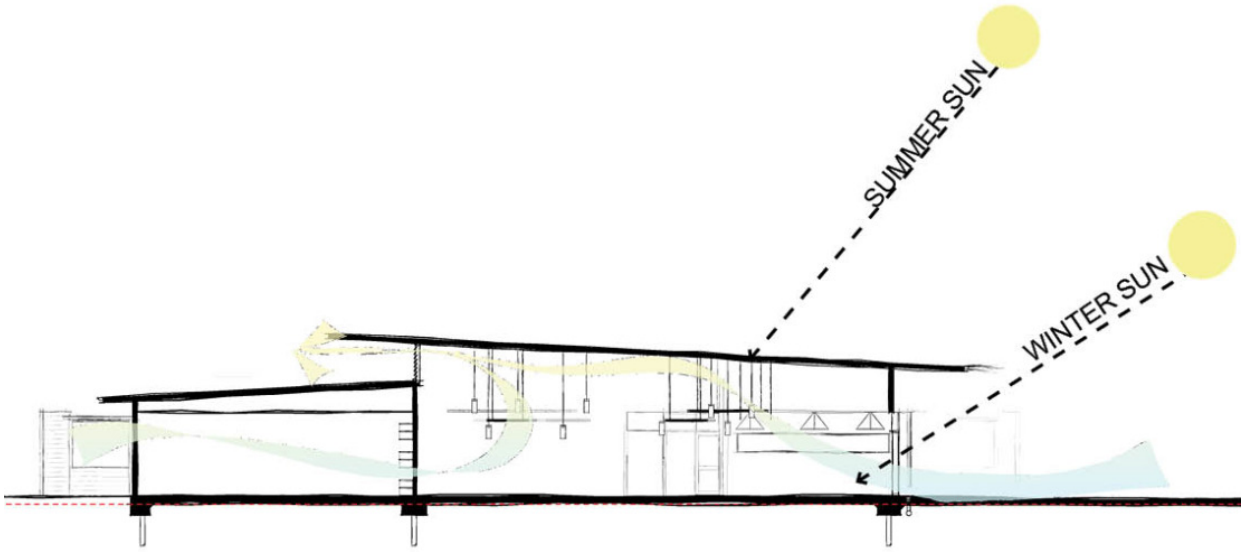

Figure 03: Typical Primary School Block Ventilation strategies and solar access.

The design of the primary school classrooms incorporates operable windows at low and high levels to encourage natural ventilation, roof overhangs, window awnings and operable louvre blades to block summer sun, while encouraging winter solar access. Other sustainability initiatives which are to be incorporated into the detailed design include rainwater reuse, solar panels and building monitoring systems which will form part of the pedagogical approach.

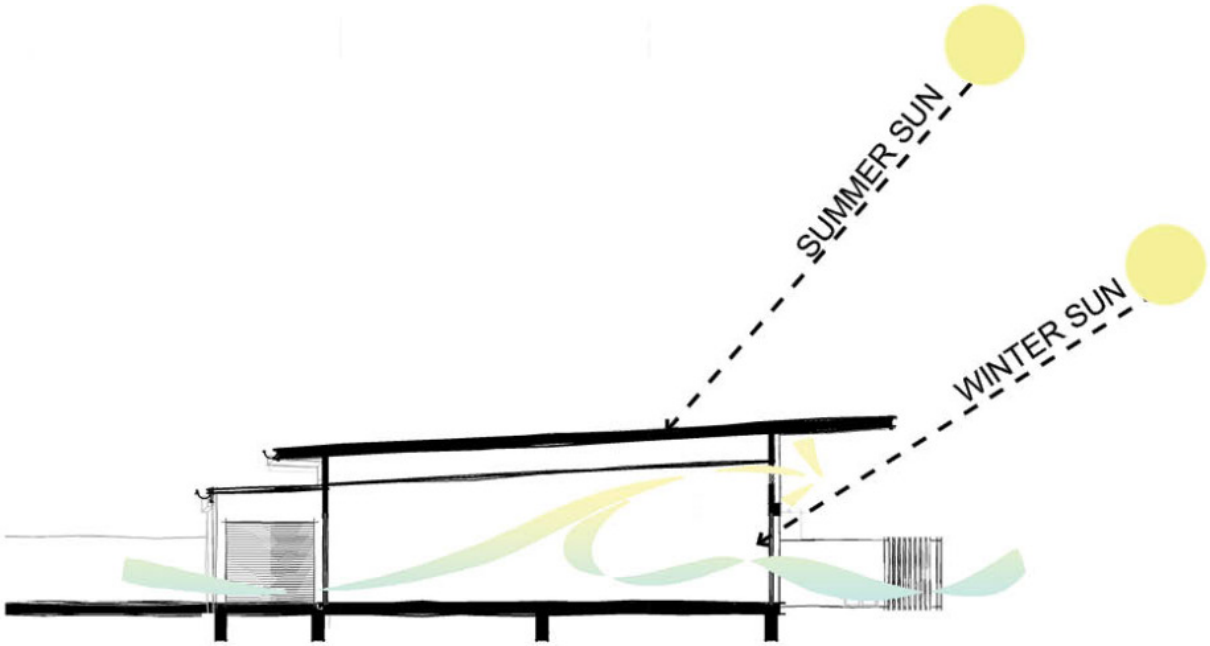

Figure 04: Early Learning Classroom Ventilation strategies and solar access.

The design of the Early Learning Centre incorporates a linear & narrow building form which promotes excellent cross flow ventilation and natural light. The use of building orientation, breezeways, large roof/verandah overhangs and high & low-level louvre windows assists passive design principles. Raked ceiling forms within play spaces improve the internal environment, promote the stack ventilation effect and the suspended ceilings provide a void to assist in the thermal performance of the roof structure. Roof overhangs shade not only glazed areas but large wall expanses. Rainwater reuse, energy efficient plant, lighting & water fixtures will be incorporated in the detail design of the project. Sheltered and screened outdoor breakout areas are anticipated to be located directly off internal play spaces to increase building occupant amenity.

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BCA SECTION J COMPLIANCE REPORT

Issued For:	INFORMATION	✓
	TENDER	
	CONSTRUCTION	

Authorised By: Paul Moro

Date: 6 June 2018

WEBB

TABLE OF CONTENTS

1 INTRODUCTION

This report has been prepared by Webb Australia to provide an assessment of the design documentation against the Deemed-to-Satisfy requirements of the Building Code of Australia (BCA) 2016, Volume One, Section J.

The report is based on the following design drawings:

TBA.

It should be noted that not all details pertaining to the design of the building are included in the drawings, and to ensure full compliance with the (DTS) provisions of the BCA, the recommendations provided in this report should be incorporated into the design documentation for approval.

2 LIMITATIONS

The following limitations apply to the assessment:

- The assessment is limited to the design documentation provided and referenced in Section 1 of this report;
- The assessment does not take into consideration the remainder of the BCA, other than section J;
- The assessment does not take into consideration Council's local planning policies;
- The assessment does not take into consideration other documentation forming part of the construction certificate application;
- The thermal comfort and overall energy efficiency of the building has not been assessed, apart from the prescribed Deemed To Satisfy provisions of the BCA;
- The assessment does not consider other requirements of legislation, which might address building works such as the OH&S Act, the Construction Safety Act or similar; and
- The impact of FRL's by use of insulation is not assessed.

3 BUILDING INPUTS

The following information critical to for the correct assessment of the building has been shown below:

Climate Zone – The site is in Climate Zone 5, in accordance with Fig A1.1 and Table A1.1 of the BCA 2016

Building Class – The Building is Class 9b, in accordance with Part A3 of the BCA 2016.

4 READING THIS REPORT

Generally, all the parts of Section J of the BCA are listed in this report whether they apply or not to this project.

The status column will indicate if a part of the BCA is applicable or not applicable to this project and additionally, generally any non-applicable parts or clause will be struck through in the description column.

The relevant sections of any table reference in the report will be highlighted for ease of identification.

The comments column will contain any additional information required or recommendations.

5 BCA SECTION J ASSESSMENT

This section of the report details a clause by clause assessment of the DTS provisions of BCA 2016 and what items are considered applicable or not, in reference to the proposed design.

5.1 SECTION J1 DEEMED TO SATISFY PROVISIONS

J1.1 APPLICATION PART		
Description	Status	Comments
The Deemed-to-Satisfy Provisions of this Part apply to building elements forming the envelope of a Class 2 to 9 building other than: (a) A Class 7, 8 or 9b building that does not have a conditioned space; or (b) An atrium or solarium that is not a conditioned space and is separated from the remainder of the building by an envelope.	Applicable	Building is Class 9b
J1.2 THERMAL CONSTRUCTION – GENERAL		
Description	Status	Comments
(a) Where required, insulation must comply with AS/NZS 4859.1 and be installed so that it: (i) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must be against the member; and (ii) forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and (iii) does not affect the safe or effective operation of a service or fitting.	Applicable	Applicable if selected in lieu of item C below
(b) Where required, reflective insulation must be installed with: (i) the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and (ii) the reflective insulation closely fitted against any penetration, door or window opening; and (iii) the reflective insulation adequately supported by framing members; and (iv) each adjoining sheet of roll membrane being: (A) overlapped not less than 50 mm; or (B) taped together.	Applicable	
(c) Where required, bulk insulation must be installed so that: (i) it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and (ii) in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.	**Applicable**	
(d) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification J1.2.	**Applicable**	
J1.3 ROOF AND CEILING CONSTRUCTION		
Description	Status	Comments
(a) A roof or ceiling that is part of the envelope, other than of a sole-occupancy unit of a Class 2 building or a class 4 part of a building, must achieve the Total R-Value specified in Table J1.3a for the direction of heat flow.	Applicable	Roof Material and colour choice are import factors in insulation requirements,

Table J1.3a ROOFS AND CEILINGS - MINIMUM TOTAL R-VALUE FOR EACH CLIMATE ZONE

Climate zone	1, 2, 3, 4 and 5	6	7	8
Direction of heat flow	Downwards		Upwards	
Minimum *Total R-Value* for a roof or ceiling with a roof upper surface solar absorptance value of not more than 0.4	3.2	3.2	3.7	4.8
Minimum *Total R-Value* for a roof or ceiling with a roof upper surface solar absorptance value of more than 0.4 but not more than 0.6	3.7	3.2	3.7	4.8
Minimum *Total R-Value* for a roof or ceiling with a roof upper surface solar absorptance value of more than 0.6	4.2	3.2	3.7	4.8

(b) For compliance with Table J1.3a, roof and ceiling construction is deemed to have the thermal properties listed in Specification J1.3.	Applicable	Roof Structure R Value: Unventilated: R0.54 Ventilated: R0.72 Required Additional Insulation: Unventilated: R2.3 Ventilated: R2.5
(c) Where, for operational or safety reasons associated with exhaust fans, flues or recessed downlights, the area of required ceiling insulation is reduced, the loss of insulation must be compensated for by increasing the R-Value of the insulation in the remainder of the ceiling in accordance with Table J1.3b	Applicable (To First Floor Only)	Based on Standard A/C units and recessed lights, the area of ceiling without insulation will be approximately 8.5%. ($56.9m^2/666m^2$), this is outside of the allowable range.
~~(d) A roof that:~~ ~~(i) is required to achieve a minimum Total R-Value; and~~ ~~(ii) has metal sheet roofing fixed to metal purlins, metal rafters or metal battens; and~~ ~~(iii) does not have a ceiling lining or has a ceiling lining fixed directly to those metal purlins, metal rafters or metal battens (see Specification J1.3 Figure 2(c) and(f),~~ ~~must have a thermal break, consisting of a material with an R-Value of not less than R0.2, installed between the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens~~	Not Applicable	The Following Options are recommended. 1. Cassette air conditioning units to be ceiling suspended type similar to Daikin FXUQ-MAV1 with insulation over, 2% reduction. 2. Lights in fixed plasterboard areas to be ceiling mounted, 1.5% reduction. 3. Insulation over

eg. Colorbond roofing absorptance varies form from .35 to .96 depending on colour which makes a difference in R values of 1.0.

Project Roof Materials:
Colorbond Profiled Metal
Colour: Windspray
Absorptance: 0.58
Require R Value: R3.2

TABLE J1.3B - ADJUSTMENT OF MINIMUM R-VALUE FOR LOSS OF CEILING INSULATION		recessed light fillings, 5% reduction. Recommend that recessed lights be insulated, installation to comply with AS3000 section 4.5.2.3.1. Note if insulation cannot be laid directly onto lights then a box formed from rigid insulation be used to cover the lights.

Percentage of Ceiling Area Uninsulated	Minimum R-Value of ceiling insulation required to satisfy J1.3(a)							
	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	Adjusted minimum R-Value of ceiling insulation required to compensate for loss of ceiling area insulation.							
0.5% to less than 1.0%	2.8	3.4	4.0	4.7	5.4	6.2	6.9	
1.0% to less than 1.5%	2.9	3.6	4.4	5.2	6.1	7.0		
1.5% to less than 2.0%	3.1	3.9	4.8	5.8	6.8			
2.0% to less than 2.5%	3.3	4.2	5.3	6.5				
2.5% to less than 3.0%	3.6	4.6	5.9					
3.0% to less than 4.0%	4.2	5.7	Not Permitted					
4.0% to less than 5.0%	5.0							
5.0% or more								

NOTE: Where the minimum R-Value of ceiling insulation required to satisfy J1.3 (a) is between the values stated, interpolation may be used to determine the adjusted minimum R-Value.

Note: Depending on the amount of roof penetrations (exhaust, ventilation, flues, etc) impacting on the percentage of insulation required to satisfy clause J1.3, the table above will need to be implemented, which may alter the R-value previously prescribed (R3.2).

2RJ1.4 ROOF LIGHTS

Description	Status	Comments
~~Roof lights, including any associated shaft and diffuser, that form part of the envelope, other than of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, must:~~ ~~(a) if the roof lights are not required for compliance with Part F4, comply with Table J1.4; or~~ ~~(b) if the roof lights are required for compliance with Part F4:~~ ~~(i) have an area not more than 150% of the minimum area required by F4.6; and~~ ~~(ii) have transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of not more than:~~ ~~(A) 0.29 SHGC; and~~ ~~(B) 2.9 Total U-Value~~	Not Applicable	Not part of the design

J1.5 WALLS

Description	Status	Comments
(a) Each part of an external wall that is part of the envelope, other than of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, must satisfy one of the options in Table J1.5a except for:	Applicable	Required R Values for envelope walls according to

(i) Opaque non-glazed openings in external walls such as doors (including garage doors), vents, penetrations, shutters and the like; and
(ii) glazing; and
(iii) an earth retaining wall or earth-berm, in other than climate zone 8.

Table J1.5a OPTIONS FOR EACH PART OF AN EXTERNAL WALL THAT IS PART OF AN ENVELOPE

Climate zone	Options
1, 2 and 3	(a)(i) Achieve a minimum *Total R-Value* of 3.3.
	(ii) The minimum *Total R-Value* in (i) is reduced—
	(A) for a wall with a surface density of not less than 220 kg/m^2, by 0.5; and
	(B) for a wall that is—
	(aa) facing the south orientation as described in Figure J2.3, by 0.5; or
	(bb) shaded with a projection shade angle in accordance with Figure J1.5 of—
	(AA) 15 degrees to not more than 45 degrees, by 0.5; or
	(BB) more than 45 degrees, by 1.0; and
	(C) if the outer surface solar absorptance value is not more than 0.6, by 0.5.
	(b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like—
	(i) achieve a minimum *Total R-Value* of 1.4; and
	(ii) satisfy *glazing* energy index Option B of Table J2.4a.
4, 5 and 6	(a)(i) Achieve a minimum *Total R-Value* of 2.8.
	(ii) The minimum *Total R-Value* in (i) is reduced—
	(A) for a wall with a surface density of not less than 220 kg/m^2, by 0.5; and
	(B) for a wall that is—
	(aa) facing the south orientation as described in Figure J2.3, by 0.5; or
	(bb) shaded with a projection shade angle in accordance with Figure J1.5 of—
	(AA) 30 degrees to not more than 60 degrees, by 0.5; or
	(BB) more than 60 degrees, by 1.0.
	(b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like—
	(i) achieve a minimum *Total R-Value* of 1.4; and
	(ii) satisfy *glazing* energy index Option B of Table J2.4a.
7	(a) Achieve a minimum *Total R-Value* of 2.8.
	(b) Where the only space for insulation is provided by a furring channel, top hat section, batten or the like—
	(i) achieve a minimum *Total R-Value* of 1.4; and
	(ii) satisfy *glazing* energy index Option B of Table J2.4a.
8	(a) Achieve a minimum *Total R-Value* of 3.8.
	(b) Where the wall is an earth retaining wall or earth-berm, achieve a minimum *Total R-Value* of 2.0.

orientation:

North – R2.8

South – R2.3

East – R2.3

West – R2.8

Open Break Out Space – R1.8

All proposed wall types indicated on drawings comply with Section J requirements. Refer to attachment 3 for wall type descriptions and R values

(b) Any wall, other than an external wall, that is part of the envelope must achieve the Total R-Value in Table J1.5b Table J1.5b AN ENVELOPE WALL OTHER THAN AN EXTERNAL WALL – MINIMUM TOTAL R-VALUE	Applicable	

Location			Climate zone							
			1	2	3	4	5	6	7	8
(a)	Where the adjacent enclosed non-*conditioned space* has—									
	(i)	ventilation of not more than 1.5 air changes per hour of outside air during occupied hours; and	1.0	1.0	Nil	Nil	1.0	1.0	1.5	2.5
	(ii)	glazing in the external *fabric* as *required* by Part J2; and								
	(iii)	*roof lights* in the external *fabric* as *required* by J1.4.								
(b)	For other than (a)		2.3	2.3	2.3	1.8	1.8	1.8	2.8	3.8
Note:	When assessing the glazing and *roof lights* as *required* by Part J2 and J1.4, assess the glazing and *roof lights* as if the non- *conditioned space* is the same separate *conditioned space*.									

(c) A wall that— (i) is required to achieve a minimum Total R-Value; and (ii) has lightweight external cladding such as weatherboards, fibre-cement or metal sheeting fixed to a metal frame; and (iii) does not have a wall lining or has a wall lining that is fixed directly to the same metal frame, must have a thermal break, consisting of a material with an R-Value of not less than R0.2, installed between the external cladding and the metal frame. (d) For compliance with Table J1.5a and Table J1.5b, wall construction is deemed to have the thermal properties listed in Specification J1.5.		

J1.6 FLOORS

Description	Status	Comments
(a) A floor that is part of the envelope of a building, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, including a floor above or below a carpark or a plant room— (i) must achieve the Total R-Value specified in Table J1.6; and (ii) with an in-slab heating or cooling system, must be insulated around the vertical edge of its perimeter with insulation having an R-Value of not less than 1.0.	Applicable	Note that this requirement only applies to the ground floor slab. Required R Value for GF slab – Nil.
(b) In climate zones 1 to 6, the minimum Total R-Value required in (a) may be reduced by R0.5 provided R0.75 is added to the Total R-Value required for the roof and ceiling construction.	Acceptable Option	No additional work Required.
~~(c) A concrete slab on ground—~~ ~~(i) with an in-slab heating or cooling system; or~~ ~~(ii) located in climate zone 8,~~ ~~must have insulation installed around the vertical edge of its perimeter.~~	Not Applicable	
~~(d) Insulation required by (c) must—~~	Not Applicable	

~~(i) have an R-Value of not less than 1.0; and~~ ~~(ii) be water resistant; and~~ ~~(iii) be continuous from the adjacent finished ground level—~~ ~~(A) to a depth of not less than 300 mm; or~~ ~~(B) for the full depth of the vertical edge of the concrete slab-on-ground.~~ (e) Floor construction is deemed to have the thermal properties listed in Specification J1.6.	Applicable	

Table J1.6 FLOORS — MINIMUM TOTAL R-VALUE

Location			Climate zone						
			2	3	4	5	6	7	8
Direction of heat flow			Downwards and upwards		Downwards				
(a)	A slab on ground:								
	(i)	Without an in-slab heating or cooling system	Nil	Nil	Nil	Nil	Nil	1.0	2.0
	(ii)	With an in-slab heating or cooling system	1.25	1.25	1.25	1.25	1.25	1.25	2.25
(b)	A suspended floor without an in-slab heating or cooling system where the non-*conditioned space* is— (i) enclosed; and (ii) where mechanically ventilated by not more than 1.5 air changes per hour.		1.0	Nil	Nil	1.0	1.0	1.5	2.5
(c)	A suspended floor with an in-slab heating or cooling system where the non-*conditioned space* is—		1.25	1.25	1.25	1.25	1.25	1.75	2.75

5.2 SECTION J2 EXTERNAL GLAZING

J2.1 APPLICATION OF PART		
Description	**Status**	**Comments**
The Deemed-to-Satisfy Provisions of this Part apply to elements forming the envelope of a building other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building.	Applicable	

J2.4 GLAZING		
Description	**Status**	**Comments**
(a) The glazing in each storey, including any mezzanine, of a building must be assessed separately in accordance with (b) and (c) for (i) glazing in the external fabric facing each orientation; and (ii) glazing with a P/H value of not less than 2 in the internal fabric using the south orientation sector energy constants in Table J2.4b and shading multipliers in Table J2.4c and Table J2.4d; and (iii) glazing with a P/H value of less than 2 in the internal fabric as for glazing in the external fabric in accordance with (i). (b) The aggregate air-conditioning energy value attributable to the glazing must not exceed the allowance obtained by multiplying the facade area that is exposed to the conditioned space for the orientation by the energy index in Table J2.4a.	All Applicable	Refer to Glazing Calculations in Attachments 1 and 2 for required Glazing U and SHGC Values.

Table J2.4a ENERGY INDEX

Application	Energy index option	Climate zone							
		1	2	3	4	5	6	7	8
Glazing in a Class 3 building and a Class 9c *aged care building*	A	0.067	0.132	0.091	0.086	0.092	0.090	0.059	0.027
	B	0.060	0.124	0.078	0.063	0.071	0.061	0.037	N/A
Display *glazing* in a shop or showroom	A	0.180	0.217	0.221	0.227	0.257	0.220	0.170	0.046
	B	0.173	0.209	0.208	0.204	0.236	0.191	0.148	N/A
Glazing in other than, a Class 3 building, a Class 9c *aged care building* or display *glazing* in a shop or showroom	A	0.130	0.181	0.172	0.142	0.175	0.116	0.083	0.023
	B	0.123	0.173	0.159	0.113	0.145	0.082	0.058	N/A

Note:

Option A applies to all *glazing* other than where compliance with Option B is *required* by Table J1.5a.

(c) The aggregate air-conditioning energy value must be calculated by adding the air-conditioning energy value through each glazing element in accordance with the following formula:

$$A1[SHGC1(CAxSH1+CBxSC1)+CCxU1] + A2[SHGC2(CAxSH2+CBxSC2)+CCxU2] + \ldots$$

where—

A1, 2, etc = the area of each glazing element; and

CA, B and C = the energy constants A, B and C for the specific orientation from Table J2.4b; and

SHGC1, 2, etc = the Total System SHGC of each glazing element; and

SH1, 2, etc = the heating shading multiplier for each glazing element obtained from Table J2.4c; and

SC1, 2, etc = the cooling shading multiplier for each glazing element obtained from Table J2.4d; and

U1, 2, etc = the Total System U-Value of each glazing element.

(d) For the purposes of (c), where the air-conditioning energy value of a glazing element is calculated to be negative, it must be taken to be zero.

J2.5 SHADING

Description	Status	Comments
Where shading is required to comply with J2.4, it must- (a) be provided by an external permanent projection, such as a verandah, balcony, fixed canopy, eaves or shading hood, which— (i) extends horizontally on both sides of the glazing for the same projection distance P in Figure J2.4; or	Applicable	Fix shading provide in this this project.

(ii) provides the equivalent shading to (i) with a reveal or the like; or ~~(b) be provided by an external shading device, such as a shutter, blind, vertical or horizontal building screen with blades, battens or slats, which —~~ ~~(i) is capable of restricting at least 80% of summer solar radiation; and~~ (ii) ~~if adjustable, is operated automatically in response to the level of solar radiation.~~		

5.3 SECTION J3 BUILDING SEALING

J3.1 APPLICATION OF PART		
Description	Status	Comments
The Deemed-to-Satisfy Provisions of this Part apply to elements forming the envelope of a Class 2 to 9 building, other than— (a) ~~a building in climate zones 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler~~; or (b) ~~a permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance~~; or (c) ~~a building or space where the mechanical ventilation required by Part F4 provides sufficient pressurisation to prevent infiltration~~. (d) parts of a building that cannot be fully enclosed (NSW).	Applicable	
J3.2 CHIMNEYS & FLUES		
Description	Status	Comments
~~The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue~~	Not Applicable	
J3.3 ROOF LIGHTS		
Description	Status	Comments
~~(a) A roof light must be sealed, or capable of being sealed when serving:~~ ~~(i) a conditioned space; or~~ ~~(ii) a habitable room in climate 4, 5, 6, 7 or 8.~~ ~~(b) A roof light required by (a) to be sealed, or capable of being sealed, must be constructed with –~~ ~~(i) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or~~ ~~(ii) a weatherproof seal; or~~ (iii) ~~a shutter system readily operated either manually, mechanically or electronically by the occupant.~~	Not Applicable Not Applicable	
J3.4 WINDOWS & DOORS		
Description	Status	Comments
(a) A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like forming part of: (i) the envelope of a conditioned space; or (ii) the external fabric of a habitable room or public area in climate zones 4, 5, 6, 7 or 8. (b) The requirements of (a) do not apply to: (i) a window complying with AS 2047; or	All Applicable	

(ii) a fire door or smoke door; or (iii) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security (c) A seal required by (a): (i) for the bottom edge of an external swing door, must be a draft protection device; and (ii) for the other edges of an external door or the edges of an openable window or other such opening, may be a foam or rubber compression strip, fibrous seal or the like. (d) An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, revolving door or the like, other than: (i) where the conditioned space has a floor area of not more than 50 m2; or ~~(ii) where a cafe, restaurant, open front shop or the like has:~~ ~~(A) a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and~~ (B) ~~at all other entrances to the cafe, restaurant, open front shop or the like, self-closing doors.~~		
J3.5 EXHAUST FANS		
Description	Status	Comments
A miscellaneous exhaust fan, such as a bathroom or domestic kitchen exhaust fan, must be fitted with a sealing device such as a self-closing damper or the like when serving – (a) a conditioned space; or (b) a habitable room in climate zones 4,5,6,7 or 8.	Applicable	
J3.6 CONSTRUCTION OF ROOFS, WALLS & FLOORS		
Description	Status	Comments
(a) Roofs, ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage in accordance with (b) when forming part of- (i) the envelope; or (ii) the external fabric of a habitable room or public area in climate zone 4, 5, 6, 7 or 8. (b) Construction required by (a) must be: (i) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or (ii) sealed by caulking, skirting, architraves, cornices or the like. (c) The requirements of (a) do not apply to openings, grilles and the like required for smoke hazard management	All Applicable	
J3.7 EVAPORATIVE COOLERS		
Description	Status	Comments
~~An evaporative cooler must be fitted with a self-closing damper or the like when serving-~~ ~~(a) a heated space; or~~ (b) ~~a habitable room or a public area of a building in climate zones 4, 5, 6, 7 or 8.~~	Not Applicable	

5.4 SECTION J5 AIR CONDITIONING AND VENTILATION

J5.2 AIR-CONDITIONING AND VENTILATION SYSTEMS

Description	Status	Comments
(a) An air-conditioning unit or system must- ~~(i) be capable of being deactivated when the sole-occupancy unit, building or part of the building served is not occupied; and~~ (ii) where the air-conditioning unit or system has motorised outside air and return dampers, close the dampers when the air-conditioning unit or system is deactivated; and ~~(iii) when serving a sole-occupancy unit of a Class 3 building, not operate when any external door including a door opening to a balcony, patio, courtyard or the like is open for more than 1 minute; and~~ (iv) have any supply and return ductwork sealed and insulated in accordance with Specification J5.2; and (v) when serving more than one air-conditioning zone or area with different heating and cooling needs— (A) thermostatically control the temperature of each zone or area; and (B) not control the temperature by mixing actively heated air and actively cooled air; and (C) limit reheating to not more than— (aa) for a fixed supply air rate, a 7.5 K rise in temperature; and (bb) for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and (vi) other than where a packaged air-conditioning unit is used, have a variable speed fan when its supply air quantity is varied; and (vii) where the air-conditioning system provides the required mechanical ventilation, in other than process related applications where humidity control is needed, have an outdoor air economy cycle— (A) in climate zone 2 and 3, when the air-conditioning unit capacity is over 50 kWr; and (B) in climate zones 4, 5, 6, 7 and 8, when the air-conditioning unit capacity is over 35 kWr; and ~~(viii) in a Class 3 building, be capable of controlling the temperature of a sole-occupancy unit at a different temperature during sleeping periods than during other periods; and~~ (ix) be designed so that the total fan motor power of the air-conditioning supply air and return air fans in the building, divided by the floor area served by those fans is, in accordance with Table J5.2, except the following need not comply with this requirement: (A) fans in unducted air-conditioning units with a supply air capacity of less than 1000 L/s, (B) The power for a fan in an energy reclaiming system that preconditions outdoor air. (C) The power for process related components such as high efficiency particulate air filters. Table J5.2 MAXIMUM FAN MOTOR POWER	Applicable	Air conditioning system to be confirmed.

Air-conditioning sensible heat load (W/m² of the *floor area* of the *conditioned space*)	Maximum *fan motor power* (W/m² of the *floor area* of the *conditioned space*)	
	For an *air-conditioning* system serving not more than 500 m²	For an *air-conditioning* system serving more than 500 m²
Up to 100	5.3	8.3
101 to 150	9.5	13.5
151 to 200	13.7	18.3
201 to 300	22.2	28.0
301 to 400	30.7	37.0

Note:

For more than 400 W/m² *air-conditioning* sensible heat load—

(a) in a building of not more than 500 m² *floor area*, use 0.09 W of *fan motor power* for each Watt of *air-conditioning* sensible heat load; and

(b) in a building of more than 500 m² *floor area*, use 0.12 W of *fan motor power* for each Watt of *air-conditioning* sensible heat load.

(b) A system that provides mechanical ventilation to other than a sole-occupancy unit in a Class 2 building or a Class 4 part of a building, either as part of an air-conditioning system or as a separate ventilation system, must—

(i) be capable of being deactivated when the building or part of the building served by that system is not occupied; and

(ii) when serving a conditioned space—

(A) not provide mechanical ventilation in excess of the minimum outdoor air quantity required by Part F4 for a mechanical ventilation system, where relevant, by more than 20% other than where there is—

(aa) additional unconditioned outside air supplied to provide free cooling or to balance process exhaust such as from a health-care building or laboratory; or

(bb) additional exhaust ventilation needed to balance the required mechanical ventilation; or

(cc) an energy reclaiming system that preconditions all the outside air; and

(B) in other than climate zone 2, where the number of square metres per person is 1 or less as specified in D1.13 and the air flow rate is more than 1000 L/s, have—

(aa) an energy reclaiming system that preconditions outside air; or

(bb) the ability to automatically modulate the mechanical ventilation required by Part F4 in proportion to the number of occupants; and

(iii) when the mechanical ventilation is provided by means other than an air-conditioning system and the air flow rate is more than 1000 L/s—

(A) have a fan motor power to air flow rate ratio of 0.65 W/(L/s) without filters or 0.98 W/(L/s) with filters for a general mechanical ventilation system; and

(B) for carpark exhaust, when serving a carpark with more than 40 vehicle spaces, be controlled by an atmospheric contaminant monitoring system in accordance with AS

1668.2. (c) The requirements of (a) and (b) must not inhibit— (i) the smoke hazard management operation of air-conditioning and mechanical ventilation systems; and (ii) essential ventilation such as for a garbage room, lift motor room, gas meter enclosure or gas regulator enclosure or the like. (d) The provisions of (b)(iii) do not apply to the following: (i) The power for an energy reclaiming system that preconditions outside air. (ii) The power for process related components such as high efficiency particulate air filters. (iii) The power for a miscellaneous exhaust system complying with J5.5. (iv) The power for a mechanical ventilation system for a Class 8 electricity network substation.		

J5.3 TIME SWITCH

Description	Status	Comments
(a) A time switch in accordance with Specification J6 must be provided to control each of the following: (i) An air-conditioning system of more than 10 kWr. (ii) A ventilation system with an air flow rate of more than 1000 L/s. (iii) A heating system of more than 10 $kW_{heating}$. ~~(b) The requirements of (a) do not apply to—~~ ~~(i) an air-conditioning system or ventilation system that serves only one sole-occupancy unit of—~~ ~~(A) a Class 2 or 3 building; or~~ ~~(B) a Class 4 part of a building; or~~ ~~(C) a Class 9c aged care building; or~~ ~~(ii) a building where air-conditioning or ventilation is needed for 24 hour occupancy such as a manufacturing process or emergency services; or~~ (iii) ~~a Class 8 electricity network substation.~~	Applicable Not Applicable	The A/C system will incorporate a central time clock function

J5.3 HEATING AND COOLING SYSTEMS

Description	Status	Comments
(a) Systems that provide heating or cooling for air-conditioning systems must— (i) have any piping, vessels, heat exchangers or tanks containing heated or chilled fluid, other than those with insulation levels covered by Minimum Energy Performance Standards (MEPS), insulated in accordance with Specification J5.4; and ~~(ii) where water is circulated by pumping at greater than 2 L/s—~~ ~~(A) be designed so that the total of the pump power to the pump is in accordance with Table J5.4a; and~~ ~~Table J5.4a MAXIMUM PUMP POWER~~	Applicable Not Applicable	

~~Cooling or heating load~~ (W/m^2 ~~of the *floor area* of the *conditioned space*~~)	~~Maximum pump power (W/m2 of the floor area of the conditioned space)~~		
	~~Chilled water~~	~~Condenser water~~	~~Heating water~~

Up to 100	1.3	0.9	1.0
101 to 150	1.9	1.2	1.3
151 to 200	2.2	2.2	1.7
201 to 300	4.3	3.0	2.5
301 to 400	5.0	3.6	3.2
More than 400	5.6	5.6	3.6

(B) have the pump capable of varying its speed in response to varying load when it is rated at more than 3 kW of pump power, except where the pump is needed to run at full speed for safe or efficient operation; and

(iii) if the system contains more than one water heater used for heating a building, chiller or coil, be capable of stopping the flow of water to those not operating.

(b) A heater —

(i) for heating a space via water, such as a boiler, that is part of an air conditioning system, must —

(A) achieve a thermal efficiency complying with Table J5.4b when tested in accordance with BS 7190; and

(B) use reticulated gas where it is available at the allotment boundary; and

Table J5.4b MINIMUM THERMAL EFFICIENCY OF A WATER HEATER

Fuel type	Rated capacity (kWheating)	Minimum gross thermal efficiency (%)
Gas	Not more than 750	80
	More than 750	83
Oil	All capacities	80

(ii) for heating a space other than via water, must be —

(A) a solar heater; or

(B) a gas heater; or

(C) an oil heater, but only if reticulated gas is not available at the allotment boundary; or

(D) a heat pump heater; or

(E) a solid fuel burning heater; or

(F) a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or

(G) an electric heater if —

(aa) the heating capacity is not more than —

(AA) 10 W/m2 of the floor area of the conditioned space in climate zone 1; or

(BB) 40 W/m2 of the floor area of the conditioned space in climate zone 2; or

(CC) the value specified in Table J5.4c where reticulated gas is not available at the allotment boundary; or

(bb) the annual energy consumption for heating is not more than 15 kWh/m2 of the floor area of the conditioned space in climate zones 1 to 5; or

(cc) the in-duct heater complies with J5.2(a)(v)(C); or

(H) a combination of (A) to (G); and

Table J5.4c MAXIMUM ELECTRIC HEATING CAPACITY IF RETICULATED GAS IS NOT AVAILABLE AT THE ALLOTMENT BOUNDARY

Floor area of the conditioned space	Climate zone				
	3	4	5	6	7
	W/m2 of floor area				
Not more than 500 m^2	50	60	55	65	70
More than 500 m^2	40	50	45	55	60

(iii) for heating a bathroom in a Class 3 or Class 9c aged care building, may be electric if the heating capacity is not more than 1.2 kW; and

(iv) that is a fixed space heating appliance installed outdoors, must be controlled to automatically turn off when not needed by an outdoor air temperature sensor, timer, motion detector, or the like.

(c) Package air-conditioning equipment with a capacity of not less than 65 kWr, including a split unit and a heat pump, must have an energy efficiency ratio when cooling complying with Table J5.4d when tested in accordance with AS/NZS 3823.1.2 at test condition T1.

Table J5.4d MINIMUM ENERGY EFFICIENCY RATIO FOR PACKAGED AIR-CONDITIONING EQUIPMENT

Equipment	Minimum energy efficiency ratio ($W_r/W_{input\ power}$)	
	65 kWr to 95 kWr capacity	More than 95 kWr capacity
Air-conditioner—cooling	2.70	2.80
Heat pump—cooling	2.60	2.70

(d) A refrigerant chiller up to 350 kWr capacity that is part of an air-conditioning system, must have an energy efficiency ratio complying with Table J5.4e when determined in accordance with AHRI 550/590.

Table J5.4e MINIMUM ENERGY EFFICIENCY RATIO FOR REFRIGERANT CHILLERS

Equipment	Minimum energy efficiency ratio ($W_r/W_{input\ power}$)	
	For full load operation	For integrated part load
Water cooled chiller	4.2	5.2
Air cooled or evaporatively cooled chiller	2.5	3.4

~~(e) The fan motor of an air-cooled condenser that is part of an air-conditioning system, other than one that is part of package air-conditioning equipment in (c) or that is part of a Liquid Chilling Package, using the vapour compression cycle in (d), must not use more than 42 W of fan motor power, for each kW of heat rejected from the refrigerant when determined in accordance with AHRI 460.~~ ~~(f) The fan of a cooling tower that is part of an air-conditioning system must not use more than —~~ ~~(i) if a propeller or axial fan, 310 W of fan motor power for each L/s of cooling water circulated; or~~ ~~(ii) if a centrifugal fan, 590 W of fan motor power for each L/s of cooling water circulated.~~ ~~(g) The fan of a closed circuit cooler that is part of an air-conditioning system must not use more than —~~ ~~(i) if a propeller or axial fan, 500 W of fan motor power for each L/s of cooled fluid circulated; and~~ ~~(ii) if a centrifugal fan, 670 W of fan motor power for each L/s of cooled fluid circulated.~~ ~~(h) The fan of an evaporative condenser that is part of an air-conditioning system must not use more than —~~ ~~(i) if a propeller or axial fan, 18 W of fan motor power for each kW of heat rejected; and~~ ~~(ii) if a centrifugal fan, 22 W of fan motor power for each kW of heat rejected.~~ (i) ~~The spray water pump of a closed circuit cooler or evaporative condenser that is part of an air-conditioning system must not use more than 150 W of pump power for each L/s of spray water circulated.~~		

J5.3 MISCELLANEOUS EXHAUST SYSTEMS

Description	Status	Comments
(a) A miscellaneous exhaust system with an air flow rate of more than 1000 L/s, that is associated with equipment having a variable demand such as a stove in a commercial kitchen or a chemical bath in a factory, must—	Applicable	
(i) have the means for the operator to—		
(A) reduce the energy used, such as by a variable speed fan, and		
(B) stop the motor when the system is not needed; and		
(ii) be designed to minimise the exhausting of conditioned air.		
~~(b) The requirements of (a) do not apply —~~	Not Applicable	
~~(i) within a sole-occupancy unit of a Class 2 or 3 building, Class 4 part of a building or Class 9c aged care building; or~~		
~~(ii) where additional exhaust ventilation is needed to balance the required outside air for ventilation; or~~		
~~(iii) where air flow must be maintained for safe operation; or~~		
(iv) ~~to a Class 8 electricity network substation.~~		

5.5 SECTION J6 ARTIFICIAL LIGHTING

J6.2 ARTIFICIAL LIGHTING

Description	Status	Comments
(b) In a building other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building— (i) for artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the maximum illumination power density in **Table J6.2a (refer to table 6.2)**; and (ii) the aggregate design illumination power load in (i) is the sum of the design illumination power loads in each of the spaces served; and (iii) in determining the design illumination power load for (ii) the following must be used: (A) Where there are multiple lighting systems serving the same space— (aa) the total illumination power load of all systems; or (bb) for a control system that permits only one system to operate at a time, the design illumination power load is— (AA) based on the highest illumination power load; or (BB) determined by the formula— [H x T/2 + P x (100 - T/2)] / 100 Where: H = the highest illumination power load; and T = the time for which the maximum illumination power load will occur, expressed as a percentage; and P = the predominant illumination power load. (B) Where there is adjustable position lighting such as trapeze lighting or track lighting other than trunking systems that accept fluorescent lamps— (aa) the rating of the circuit breaker protecting the track; or (bb) of extra low voltage, 80% of the power rating of the transformer; or (cc) of mains voltage, 100 W per metre of track. (c) The requirements of (a) and (b) do not apply to the following: (i) Emergency lighting in accordance with Part E4. (ii) Signage and display lighting within cabinets and display cases that are fixed in place. ~~(iii) Lighting for accommodation within the residential part of a detention centre.~~ ~~(iv) A heater where the heater also emits light, such as in bathrooms.~~ ~~(v) Lighting of a specialist process nature such as in an operating theatre, fume cupboard or clean workstation.~~ ~~(vi) Lighting of performances such as theatrical or sporting.~~ (vii) ~~Lighting for the permanent display and preservation of works of art or objects in a museum or gallery other than for retail sale, purchase or auction.~~ Table J6.2a MAXIMUM ILLUMINATION POWER DENSITY Space / Maximum *illumination power density* (W/m2) Office - artificially lit to an ambient level of 200 lx or more: 9 School – general purpose learning areas and tutorial rooms: 8	All Applicable	

Storage with shelving no higher than 75% of the height of the aisle lighting	8		
Storage with shelving higher than 75% of the height of the aisle lighting	10		
Toilets , locker rooms, staff room, rest room and the like	6		

J6.3 INTERIOR ARTIFICIAL LIGHTING AND POWER CONTROL

Description	Status	Comments
(a) Artificial lighting of a room or space must be individually operated by a switch or other control device. (b) An occupant activated device, such as a room security device, a motion detector in accordance with Specification J6, or the like, must be provided in the sole-occupancy unit of a Class 3 building, other than where providing accommodation for people with a disability or the aged, to cut power to the artificial lighting, air-conditioner, local exhaust fans and bathroom heater when the sole-occupancy unit is unoccupied. (c) An artificial lighting switch or other control device in (a) must— (i) if an artificial lighting switch, be located in a visible position— (A) in the room or space being switched; or (B) in an adjacent room or space from where the lighting being switched is visible; and (ii) for other than a single functional space such as an auditorium, theatre, swimming pool, sporting stadium or warehouse— (A) not operate lighting for an area of more than 250 m2 if in a Class 5 building or a Class 8 laboratory; or (B) not operate lighting for an area of more than— (aa) 250 m2 for a space of not more than 2000 m2; or (bb) 1000 m2 for a space of more than 2000 m2,if in a Class 3, 6, 7, 8 (other than a laboratory) or 9 building. (d) 95% of the light fittings in a building or storey of a building, other than a Class 2 or 3 building or a Class 4 part, of more than 250 m2 must be controlled by— (i) a time switch in accordance with Specification J6; or (ii) an occupant sensing device such as— (A) a security key card reader that registers a person entering and leaving the building; or (B) a motion detector in accordance with Specification J6. ~~(e) In a Class 5, 6 or 8 building of more than 250 m2, artificial lighting in a natural lighting zone adjacent to windows must be separately controlled from artificial lighting not in a natural lighting zone in the same storey except where—~~ ~~(i) the room containing the natural lighting zone is less than 20 m2; or~~ ~~(ii) the room's natural lighting zone contains less than 4 luminaires; or~~ (iii) ~~70% or more of the luminaires in the room are in the natural lighting zone~~. (f) The requirements of (a), (b), (c), (d) and (e) do not apply to the following: (i) Emergency lighting in accordance with Part E4.	Applicable	

(ii) Where artificial lighting is needed for 24-hour occupancy such as for a manufacturing process, parts of a hospital, an airport control tower or within a detention centre. (g) The requirements of (d) do not apply to the following: (i) Artificial lighting in a space where the sudden loss of artificial lighting would cause an unsafe situation such as in a patient care area in a Class 9a building or in a Class 9c aged care building. (ii) A heater where the heater also emits light, such as in bathrooms.		

5.6 SECTION J7 HOT WATER SUPPLY AND SWIMMING POOL AND SPA PLANT

J7.2 HOT WATER SUPPLY		
Description	Status	Comments
A hot water supply system for food preparation and sanitary purposes, other than a solar hot water supply system in climate zones 1, 2 and 3, must be designed and installed in accordance with Section 8 of AS/NZS 3500.4.	Applicable	

5.7 SECTION J8 ACCESS FOR MAINTENANCE AND FACILITIES FOR MONITORING

J8.1 APPLICATION OF PART		
Description	Status	Comments
~~The Deemed-to-Satisfy Provisions of this Part do not apply—~~ ~~(a) within a sole-occupancy unit of a Class 2 building or a Class 4 part of a building; or~~ (b) ~~to a Class 8 electricity network substation.~~	Not Applicable	
NSW J8.2 ACCESS FOR MAINTENANCE		
Description	Status	Comments
Access for maintenance must be provided to— (a) adjustable or motorised shading devices; and (b) time switches and motion detectors; and (c) room temperature thermostats; and (d) plant thermostats such as on boilers or refrigeration units; and (e) motorised air dampers and control valves; and (f) reflectors, lenses and diffusers of light fittings; and (g) heat transfer equipment; and (h) plant that receives a concession under JV3(b) for the use of energy obtained from— (i) an on-site renewable energy source; or (ii) another process as reclaimed energy.	Applicable	Suitable, safe access is to be provided to all plant and equipment. Consideration must be given to location of fixed furnishings so as not to impeded access.
J8.3 FACILITIES FOR ENERGY MONITORING		
Description	Status	Comments
(a) A building or sole-occupancy unit with a floor area of more than 500 m2 must have the facility to record the consumption of gas and	Applicable	Meters monitoring the buildings gas and

electricity. ~~(b) A building with a floor area of more than 2,500 m2 must have the facility to record individually the energy consumption of —~~ ~~(i) air conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and~~ ~~(ii) artificial lighting; and~~ ~~(iii) appliance power; and~~ ~~(iv) central hot water supply; and~~ ~~(v) internal transport devices including lifts, escalators and travelators where there is more than one serving the building; and~~ ~~(vi) other ancillary plant.~~ (c) ~~The provisions of (b) do not apply to a Class 2 building with a floor area of more than 2,500 m2 where the total area of the common areas is less than 500 m2.~~	Not Applicable Not Applicable	electric consumption are required.

6 ATTACHMENTS

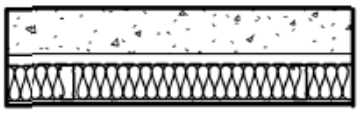
ATTACHMENT 1 – GLAZING CALCULATIONS

ATTACHMENT 3 – PROJECT WALL STRUCTURE R VALUES

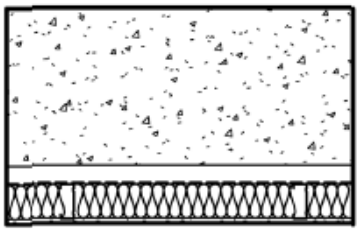
ATTACHMENT 4 – PROJECT ROOF STRUCTURE R VALUES

6.1 ATTACHMENT 1 – GLAZING CALCULATIONS

6.2 ATTACHMENT 3 – PROJECT WALL STRUCTURE R VALUES

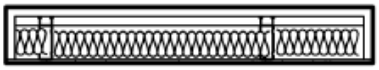


WA02b **EXTERNAL PRECAST CONCRETE PANEL - CPP1**
120mm - CONCRETE PANEL R0.08
30mm - CAVITY R0.16
VAPOUR PERMEABLE MEMBRANE
92mm - STEEL STUD @ 600ctrs + R2.5 GLASSWOOL INSULATION +
13mm - PLASTERBOARD R0.7
TOTAL R - VALUE 2.9

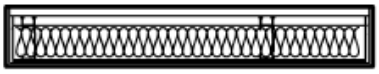


WA02c **EXTERNAL PRECAST CONCRETE PANEL - CPP1**
420mm - CONCRETE PANEL R0.35
50mm - CAVITY R0.16
VAPOUR PERMEABLE MEMBRANE
92mm - STEEL STUD @ 600ctrs+ R2.5 GLASSWOOL INSULATION
13mm - PLASTERBOARD R0.7
TOTAL R - VALUE 3.0

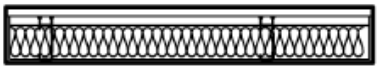
WA03a **EXTERNAL STUD WALL - LWC 6 , 5 & 4**
13mm - PLASTERBOARD R0.07
92mm - STEEL FRAMING @ 600ctrs + R2.5 GLASSWOOL INSULATION
35mm - FIBRE CEMENT SHEETING R0.06
TOTAL R - VALUE 2.8



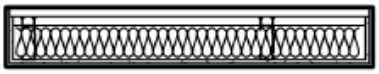
WA03b **EXTERNAL LIGHT WEIGHT CLADDING - LWC1**
25 - METAL CLADDING
25mm - BATTEN AS REQUIRED R0.16
VAPOUR PERMEABLE MEMBRANE
92mm - STEEL FRAMING @ 600ctrs + R2.5 GLASSWOOL INSULATION
10mm - PLASTERBOARD R0.59
TOTAL R - VALUE 2.8



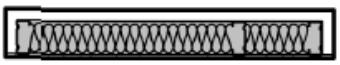
WA03c **EXTERNAL LIGHT WEIGHT CLADDING - LWC1**
25mm - METAL CLADDING
25mm - BATTEN AS REQUIRED R0.16
VAPOUR PERMEABLE MEMBRANE
92mm - STEEL STUD @ 600ctrs + R2.5 GLASSWOOL INSULATION
10mm - WET AREA PLASTERBOARD R0.59
10mm - WALL TILE R0.07
TOTAL R - VALUE 2.8



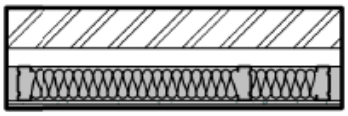
WA03d **EXTERNAL LIGHT WEIGHT CLADDING - LWC 2**
25mm - METAL CLADDING
25mm - BATTEN AS REQUIRED R0.16
VAPOUR PERMEABLE MEMBRANE
92mm - STEEL STUD @ 600ctrs + R2.5 GLASSWOOL INSULATION
10mm - PLASTERBOARD R0.59
TOTAL R - VALUE 2.8



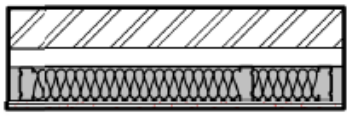
WA03e **EXTERNAL LIGHT WEIGHT CLADDING - LWC2**
25mm - METAL CLADDING
25mm - BATTEN AS REQUIRED R0.16
VAPOUR PERMEABLE MEMBRANE
92mm - STEEL STUD @ 600ctrs + R2.5 GLASSWOOL INSULATION
10mm - WET AREA PLASTERBOARD R0.59
10mm - WALL TILE R0.07
TOTAL R - VALUE 2.8



WA03h **EXTERNAL LIGHT WEIGHT CLADDING - LWC7**
16mm - JAMES HARDIE - SCYON LINEA WEATHERBOARD, CON
HARDIEWRAP WEATHER BARRIER
92mm - STEEL STUDS @ 600ctrs + R2.5 GLASSWOOL INSULATI
10mm - PLASTERBOARD, PAINT FINISH
TOTAL R - VALUE 2.94

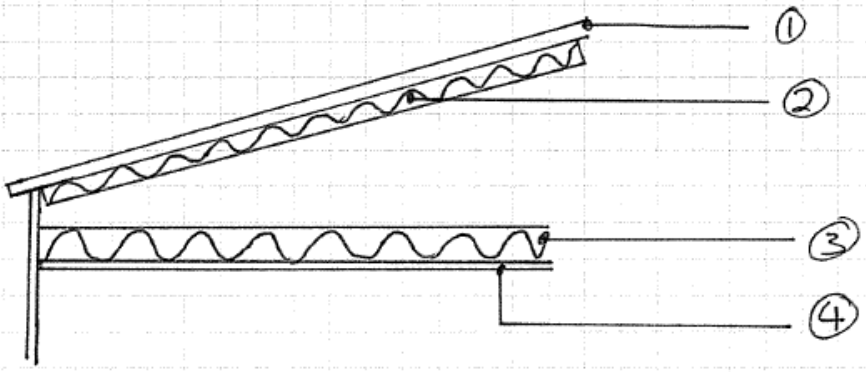


WA05b **EXTERNAL BRICK VENEER WALL - BW5**
110mm - CLAY BRICK (PAINTED)
50mm - CAVITY
92mm - STEEL STUDS @ 600ctrs + R2.5 GLASSWOOL INSULATION
10mm - FIBEROCK, PAINT FINISH
TOTAL R - VALUE 3.3



WA05c **EXTERNAL BRICK VENEER WALL (FRL 90/90/90) - BW5**
110mm - CLAY BRICK (PAINTED)
50mm - CAVITY
92mm - STEEL STUDS @ 600ctrs + R2.5 GLASSWOOL INSULATION
2 x 13mm - FIRESTOP, PAINT FINISH
TOTAL R - VALUE 3.3

6.3 ATTACHMENT 4 – PROJECT ROOF STRUCTURE R VALUES



		R Value.
	Outdoor Air Film	0.04
①	Metal Roof	0
②	Bradford Anticon 60mm	1.3
	Air Gap	0.15
③	Insulation Batts - Cold 140mm	2.5
④	Plaster Board.	0.077
	Indoor Air Film.	0.16
	Total.	4.227

Typical Roof Construction.

Green Star - Design & As Built Scorecard

Project:	Catherine McAuley Catholic College
Targeted Rating:	4 Star - Best Practice

Core Points Available	Total Score Targeted
100	45.0

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	POINTS TARGETED	COMMENTS
Management				14		
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	0	CMCC: A formal rating is not being pursued. 1 point is available where a Green Star Accredited Professional – Design & As Built (GSAP) has been contractually engaged to provide advice, support and information related to Green Star principles, structure, timing and processes, at all stages of the project, leading to certification.
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	Complies	CMCC: Targets for energy and water use to be included in CMCC Management Plan. In order for the minimum requirement to be met, documented targets for the environmental performance of the project must be set.
		2.1	Services and Maintainability Review	1	1	CMCC: Full services and maintainability review required to be included in scope. 1 point is available where a comprehensive services and maintainability review of the project is performed.
		2.2	Building Commissioning	1	1	CMCC: Building to be commissioned to relevant standards. 1 point is available where comprehensive pre-commissioning and commissioning activities are performed for all nominated building systems.
		2.3	Building Systems Tuning	1	1	CMCC: Building to be tuned to DOMN requirements. Required 12 month tuning commitment post completion 1 point is available where a tuning process is in place that addresses all nominated building systems.
		2.4	Independent Commissioning Agent	1	0	CMCC: No plan for ICA to be involved. 1 additional point is available for utilisation of an Independent Commissioning Agent (ICA) to advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning and tuning phases.
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	0	CMCC: No Climate Change Adaptation plan, N/A 2 points are available where: - A project specific Climate Adaptation Plan has been developed in accordance with a recognised standard; and - Solutions have been included into the building design and construction that specifically address the risk assessment component of the adaptation plan.
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	1	CMCC: O&M manual development to be included, developed in line with the credit criteria. 1 point is available where it is demonstrated that comprehensive Operations and Maintenance information is developed and made available to the facilities management team
Commitment to Performance	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1	CMCC: Management must commit to environmental performance targets for building through internal policy, etc. 1 point is available where there is a commitment to set targets and measure results for the environmental performance of the building.
		5.2	End of Life Waste Performance	1	0	CMCC: Staging of the master plan with interim uses makes this difficult to achieve. 1 point is available where there is a commitment to set targets and measure results for the construction waste from end-of-life of interior fitouts or other building attributes.

Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-	Complies	CMCC: All meters to be accessible. To qualify for this credit, it is a minimum requirement that accessible metering be provided to monitor building energy and water consumption, including all energy and water common uses and major uses, and sources.
		6.1	Monitoring Systems	1	1	CMCC: Monitoring strategy implemented inline with a standard system. 1 point is available where a monitoring strategy is addressed through a monitoring system, capable of capturing and processing the data produced by the installed energy and water meters, and accurately and clearly presenting data consumption trends.
Responsible Building Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	Complies	CMCC: An EMP must be developed and in place for the construction process. To qualify for this credit, it is a minimum requirement that a comprehensive project-specific Environmental Management Plan (EMP) must be in place for construction.
		7.1	Formalised Environmental Management System	1	1	CMCC: An EMS must be developed and implemented during construction. Follows from EMP above. 1 point is available where a formalised, systematic and methodical approach to planning, implementing and auditing is in place during construction, to ensure conformance with the EMP.
		7.2	High Quality Staff Support	1		
Operational Waste	Performance Pathway	8A	Performance Pathway - Specialist Plan	1	1	CMCC: Preparation of an Operational Waste Management Plan (OWMP) under consideration. 1 point is available where a waste professional specialist, prepares and implements an Operational Waste Management Plan (OWMP) for the project in accordance with best practice approaches and this is reflected in the building's design.
		8B	Prescriptive Pathway - Facilities	-		CMCC: DOMN will have separate waste collection facilities 1 point is available where facilities are in place to collect and separate distinct waste streams, and where these facilities meet best practice access requirements for collection by the relevant waste contractor.
Total				**14**	**8**	

	Indoor Environment Quality				**17**		
☐	**Indoor Air Quality**	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	1	CMCC: Ventilation system attributes to comply with Green Star credit criteria. Standard to mechanical design. 1 point is available where: - The entry of outdoor pollutants is mitigated; - The system is designed for ease of maintenance and cleaning; and - The system has been cleaned prior to occupation and use.
☐			9.2	Provision of Outdoor Air	2	0	CMCC: Rooms largely naturally ventilated. Air conditioned spaces unlikely to be supplied above AS1668.2 minimum. 2 points are available where the nominated area is provided with sufficient outdoor air to ensure levels of indoor pollutants are maintained at acceptable levels. Options are available for mechanically and naturally ventilated buildings and for outdoor air provision or contaminant monitoring.
☐			9.3	Exhaust or Elimination of Pollutants	1	1	CMCC: Print room, Canteen, Food tech & hospitality to be exhausted direct to outdoors. 1 point is available where nominated pollutants, such as those arising from printing equipment, cooking processes and equipment, and vehicle exhaust, are limited by either removing the source of pollutants from the nominated area, or exhausting the pollutants directly to the outside while limiting their entry into other areas of the project.
☐	**Acoustic Comfort**	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	1	CMCC: Acoustic consultant has been engaged to provide input during documentation. 1 point is available where internal ambient noise levels in the nominated area are suitable and relevant to the activity type in the room. This includes all sound generated by the building systems and any external noise ingress.
☐			10.2	Reverberation	1	1	CMCC: Acoustic consultant has been engaged to provide input during documentation. 1 point is available where the nominated area has been built to reduce the persistence of sound to a level suitable to the activities in the space.
☐			10.3	Acoustic Separation	1	1	CMCC: Acoustic consultant has been engaged to provide input during documentation. 1 point is available where the nominated enclosed spaces have been built to minimise crosstalk between rooms and between rooms and open areas.

☐	**Lighting Comfort**	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	Complies	CMCC: Electrical consultant to nominate in suitable lighting in specification to achieve requirements. The minimum requirement is met where lights are flicker-free and accurately address the perception of colour in the space.
☐			11.1	General Illuminance and Glare Reduction	1	1	CMCC: Design to include glare eliminated through blinds or shading to AS1680.1. Contractor to note compliance requirements. 1 point is available where, in the nominated area: - Lighting levels and quality comply with best practice guidelines; and - Glare is eliminated. Consider General Illuminance, General Glare Reduction, Individual Control, Surface Illuminance
☐			11.2	Surface Illuminance	1	1	CMCC: Intent to achieve this in detailed design, electrical consultant to note compliance, achieved through designing in line with AS 1680.1 1 point is available where, in the nominated area, a combination of lighting and surfaces improve uniformity of lighting to give visual interest.
☐			11.3	Localised Lighting Control	1	0	CMCC: Localise lighting controls not likely to be achieved in larger spaces such as staff work rooms, classrooms, learning hub. 1 point is available where, in the nominated area, occupants have the ability to control the lighting in their immediate environment.
☐	**Visual Comfort**	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	Complies	CMCC: Blinds, screens, fixed devices are nominated. The minimum requirement is met where the glare in the nominated area from sunlight through all viewing façades is reduced through a combination of blinds, screens, fixed devices, or other means.
☐			12.1	Daylight	2	1	CMCC: 40% of the floor area of the proposed spaces are likely to achieve this level of daylight. Up to 2 points are available where a percentage of the nominated area receives high levels of daylight: - For 40% of the nominated area – 1 point; - For 60% of the nominated area – 2 points.
☐			12.2	Views	1	1	CMCC: This will be achieved given the high number of windows with uninterrupted views to bushland, courtyards, outside, etc. 1 point is available where 60% of the nominated area has a clear line-ofsightto a high quality internal or external view.
☐	**Indoor Pollutants**	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and Carpets	1	1	CMCC: This will be the goal for the project, although specific selections have not yet been made. 1 point is available where at least 95% of all internally applied paints, adhesives, sealants and carpets meet stipulated 'Total VOC Limits', or, where no paints, adhesives, sealants or carpets are used in the building.
☐			13.2	Engineered Wood Products	1	1	CMCC: This will be the goal for the project, although specific selections have not yet been made. 1 point is available where at least 95% of all engineered wood products meet stipulated formaldehyde limits or no new engineered wood products are used in the building.
☐	**Thermal Comfort**	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1	CMCC: Majority of spaces will be air conditioned, thermal modelling proposed to be carried out to achieve this item. 1 point is available where a high degree of thermal comfort is provided to occupants in the space, equivalent to 80% of all occupants being satisfied in the space.
☐			14.2	Advanced Thermal Comfort	1	0	CMCC: Given some spaces are not air conditioned this may not be achievable. Although thermal modelling is proposed and this can be determined in detailed design. 1 additional point is available where a high degree of thermal comfort is provided to occupants in the space, equivalent to 90% of all occupants being satisfied in the space.
	Total				**17**	**12**	

Energy						
				22		
		15A.0	Conditional Requirement: Prescriptive Pathway	-	Complies	CMCC: Intent in design is to comply Up to 5 out of 20 points are available where it is demonstrated that the predicted building GHG emissions have been reduced by employing 'best practice' attributes. This pathway may be applied to NCC Class 3 to Class 9 buildings. The Conditional Requirement must be met as outlined within this pathway.
		15A.1	Building Envelope	1	1	CMCC: Intent in design to comply, increased insulation requirements to be included in documentation & specifications. 1 point is awarded where the roof and ceiling, walls, and flooring construction achieves a 15% increase on the minimum required R-values specified in J1.3, J1.5 and J1.6.
		15A.2	Glazing	1	0	CMCC: Some buildeings exceed this criteria. 1 point is awarded where the glazing complies with the following conditions: - For vertical glazing, the total energy used for each orientation and each storey is not greater than 85% of the total allowance according to the Australian Building Codes Board glazing calculator or the calculated aggregated air-conditioning energy value as defined in part J2.4 of the NCC; and - Where there are roof lights, the SHGC and total U-Value of these roof lights exceed the requirements of section J1.4 by 15%.
		15A.3	Lighting	1	1	CMCC: Intent in design is to comply. Electrical consultant to document in detailed design. 1 point is awarded where the lighting complies with the following conditions: - The actual installed aggregate illumination power density is 30% less than the maximum illumination power densities defined in Table J6.2a; - Automated lighting control systems, such as occupant detection and daylight adjustment, are provided to 95% of the nominated area; and - For Class 5 and 9a buildings only, the size of individually switched lighting zones does not exceed 100m2 for 95% of the nominated area.
		15A.4	Ventilation and Air-conditioning	1	1	CMCC: Intent in design is to comply. Mechancial consultant to document in detailed design. 1 point is awarded where all spaces comply with the following conditions: Mechanically ventilated spaces The HVAC systems comply with the following conditions: - The installed fan motor power and pump power, is at least 15% less that the maximum fan motor powers and pump powers defined in Tables J5.2 and J5.4a; - The thermal efficiency of the installed water heater is 15% more than the required minimum as defined in Table J5.4b; and - The required minimum energy efficiency ratio for packaged air conditioning equipment and refrigerant chillers – as defined in Tables J5.4d and J5.4e, OR, MEPS, where Section J does not apply to the equipment capacity – is increased by at least 15%. Naturally Ventilated Spaces The building is naturally ventilated in accordance with the Indoor Air Quality credit.
Greenhouse Gas Emissions	Performance Pathway	15A.5	Domestic Hot Water Systems	1	0	CMCC: Possible point with electric hot water units connected to PV Solar array. 1 point is awarded where domestic hot water systems are powered by one of the following heat sources: - Renewable Energy; - Natural Gas; - Electric heat pump (minimum COP 3.5 under design conditions); or - Waste heat or heat recovered from another process.
		15A.6	Accredited GreenPower	5	0	CMCC: No commitment has been made to procure GreenPower. Projects which have committed to procure GreenPower can be rewarded for supporting grid-connected renewable energy supply infrastructure. - 1 point is awarded where a supply contract is in place to procure at lease 50% of the building's electricity consumption through accredited GreenPower. - 2 points are awarded where a supply contract is in place to procure at lease 100% of the building's electricity consumption through accredited GreenPower. The length of time of the commitment is for a minimum period of ten years after Practical Completion.

		15B.0	Conditional Requirement: NatHERS Pathway	-	N/A	CMCC: Not applicable. Up to 12 out of 20 points are available where a NatHERS rating and 'best practice' building attributes demonstrate that the predicted building GHG emissions have been reduced compared to a typical dwelling or residence. This pathway may be applied to residential projects located in all states and territories, except New South Wales. The Conditional Requirement must be met as outlined within this pathway.
		15B.1	NatHERS Pathway	-	N/A	CMCC: Not applicable.
		15C.0	Conditional Requirement: BASIX Pathway	-	N/A	CMCC: Not applicable. Up to 16 out of 20 points are available where a BASIX certificate is used to demonstrate that the predicted building GHG emissions have been reduced compared to a dwelling or residence. This pathway may only be applied to residential projects located in New South Wales. The Conditional Requirement must be met as outlined within this pathway.
		15C.1	BASIX Pathway	-	N/A	CMCC: Not applicable.
		15D.0	Conditional Requirement: NABERS Pathway	-	N/A	CMCC: Not applicable. Up to 16 out of 20 points are available where a NABERS Energy Commitment Agreement is used to demonstrate that the predicted building GHG emissions have been reduced compared to an average building. The Conditional Requirement must be met as outlined within this pathway.
		15D.1	NABERS Energy Commitment Agreement Pathway	-	N/A	CMCC: Not applicable.
		15E.0	Conditional Requirement: Reference Building Pathway	-	N/A	CMCC: Not applicable. Up to 20 out of 20 points are available where it is demonstrated that there is a specified reduction in the predicted energy consumption and GHG emissions of the proposed building. Points are awarded based both on improvements to the building's façade, and on the project's predicted ability to reduce its energy consumption and emissions towards 'net zero operating emissions'. The Conditional Requirement must be met as outlined within this pathway.
		15E.1	Comparison to a Reference Building Pathway	-	N/A	CMCC: Not applicable.
Peak Electricity Demand Reduction	Prescriptive Pathway	16A	Prescriptive Pathway - On-site Energy Generation	1	1	CMCC: Inclusion of Solar PV systems reduces total peak electricity demand. Documentation to ensure 15% reduction. 1 out of 2 points are available where it is demonstrated that the use of on-site electricity generation systems reduces the total peak electricity demand by at least 15%
		16B	Performance Pathway - Reference Building	-	0	CMCC: Not applicable. Up to 2 points are available where it is demonstrated that the project's predicted peak electricity demand has been reduced below that of a Reference Building: - 0-10%: 0 point - 20% : 1 point - 30%: 2 points
Total				**11**	**4**	

Transport				**10**		
Sustainable Transport	Prescriptive Pathway	17A.1	Performance Pathway	10	N/A	CMCC: Not applicable Up to 10 points are available where projects provide access to sustainable transport infrastructure which decreases greenhouse gas emissions from transport, decreases mental and social impacts of commuting, and encourages the uptake of healthier transport options by building occupants.
		17B.1	Access by Public Transport	3	1	CMCC: Buses will be travelling to the school. Confirmation required as to suitability of number to site. Up to 3 points are available based on the accessibility of the site by public transport.
		17B.2	Reduced Car Parking Provision	0	0	CMCC: No reduction in carparking spaces 1 point is available where there is a reduction in the number of car parking spaces in the proposed building when compared to a standard-practice building.
		17B.3	Low Emission Vehicle Infrastructure	0	0	CMCC: No availability 1 point is available where parking spaces and/or dedicated infrastructure is provided to support the uptake of low-emission vehicles.
		17B.4	Active Transport Facilities	0	1	CMCC: Bicycle parking & end of trip facilities provided. 1 point is available where bicycle parking and associated facilities are provided to regular building occupants and visitors.
		17B.5	Walkable Neighbourhoods	0	0	CMCC: Location does not permit this. 1 point is available where the project is located conveniently to amenities or the project achieves a specified walk score.
Total				**10**	**2**	

Water						12		
Potable Water	Prescriptive Pathway		18A.1	Potable Water - Performance Pathway	0	0	CMCC: Potential to achieve points in this category, due to low number of water using fixtures. Detailed calculations required to allocate these points. Up to 12 points are available based on the magnitude of the predicted reduction in potable water Consumption, when the project is compared against a Reference Building.
			18B.1	Sanitary Fixture Efficiency	1	1	CMCC: Fixtures will be selected to meet these requirements. 1 point is awarded where all fixtures are within one star of the WELS rating stated below: Fixture / Equipment Type — WELS Rating Taps — 6 Star Urinals — 6 Star Toilet — 5 Star Showers — 3 Star (> 4.5 but <= 6.0) Clothes Washing Machines — 5 Star Dishwashers — 6 Star
			18B.2	Rainwater Reuse	1	0	CMCC: Rainwater tanks are to be located throughout the site. Stormwater Management Plan notes 4000L tank / building. Floor area approx 18,000m2, 17 buildings on site equate to 68kL, hence not yet meeting this criteria. Consideration to be given to increasing teh capacity of the rainwater tanks to meet this criteria. 1 point is awarded when a rainwater tank is installed to collect and reuse rainwater, within the project's site boundary, and the rainwater tank size meets the following criteria: Gross Floor Area (GFA in m2) — Rainwater Tank Volume (kL) 2,500 — 25 5,000 — 50 10,000 — 100 20,000 — 200
			18B.3	Heat Rejection	2	2	CMCC: Some buildings naturally ventilated, some with A/C which EVC confirmed does not use water for heat rejection. Intent to comply with this criteria. 2 points are awarded where no water is used for heat rejection. To comply, the project must be either naturally ventilated (allowing for the use of ceiling fans or similar) or the HVAC system must not use water for heat rejection. To claim that the project is naturally ventilated, it must be demonstrated that the building is naturally ventilated in accordance with AS1668.4-2012 The use of ventilation and air- conditioning in buildings – Part 4: Natural Ventilation of buildings. To claim that no water based heat rejection system is used it must be demonstrated that the air conditioning needs of the project are met by means other than water based heat rejection.
☐			18B.4	Landscape Irrigation	1	1	CMCC: Drip irrigation with moisture sensor override to be incorporated into Landscape Design. 1 point is awarded where either drip irrigation with moisture sensor override is installed, or where no potable water is used for irrigation. The landscaping and associated systems must be designed to reduce the consumption of potable water required for irrigation through the installation of subsoil drip irrigation and moisture sensor controls. In the case of a xeriscape garden, the provision of irrigation systems must be able to be removed within three months of landscaping installation and the landscaping must not require watering after this time.
☐			18B.5	Fire System Test Water	1	0	CMCC: TBC 1 point is awarded when one of the following conditions is met: -The fire protection system does not expel water for testing; or -The fire protection system includes temporary storage for 80% of the routine fire protection system test water and maintenance drain-downs for reuse on-site. If sprinkler systems are installed, each floor must be fitted with isolation valves or shut-off points for floor-by-floor testing.
Total					**6**	**4**	

Materials					14		
			19A.1	Comparative Life Cycle Assessment	0	N/A	CMCC: No LCA undertaken Up to 6 points are available where a whole-of-building, whole-of-life (cradle-to-grave) life cycle assessment (LCA) is conducted for the project and a reference building. Points are awarded based on the extent of environmental impact reduction achieved against environmental impacts categories, when compared to a reference building.
			19A.2	Additional Life Cycle Impact Reporting	4	N/A	CMCC: No LCA 1 additional point is available where the LCA conducted by the project includes reporting of five impact categories in addition to those required under the 'Comparative Life Cycle Assessment' credit element.

Life Cycle Impacts	Prescriptive Pathway	19B.1	Concrete	3	0	CMCC: MPC noted these requirements were very difficult to achieve without committing to a specific concrete supplier and the items come at a significant cost increase. Portland Cement Reduction Up to 2 points are available where the Portland cement content in all concrete used in the project has been reduced by replacing it with supplementary cementitious materials 1 point is available where the Portland cement content is reduced by 30%, measured by mass across all concrete used in the project compared to the reference case; or 2 points are available where the Portland cement content is reduced by 40%, measured by mass across all concrete used in the project compared to the reference case. Water Reduction 0.5 point is available where the mix water for all concrete used in the project contains at least 50% captured or reclaimed water (measured across all concrete mixes in the project). Aggregates Reduction 0.5 point is available where either: At least 40% of coarse aggregate in the concrete is crushed slag aggregate or another alternative materials (measured by mass across all concrete mixes in the project), provided that use of such materials does not increase the use of Portland cement by over five kilograms per cubic meter of concrete; or At least 25% of fine aggregate (sand) inputs in the concrete are manufactured sand or other alternative materials (measured by mass across all concrete mixes in the project), provided that use of such materials does not increase the use of Portland cement by over five kilograms.
		19B.2	Steel	1	1	CMCC: Use of Aramax roof sheeting reduces the amount of steel roof structure required. Use of timber studs will eliminate steel stud framing. Up to 1 point is available when there is a reduction in the mass of steel framing used when compared to standard practice. Up to 1 point is available when there is a reduction in the mass of steel reinforcement used when compared to standard practice.
		19B.3	Building Reuse	4	0	CMCC: All new construction, no points available. Façade Reuse 1 point is available where at least 50% (by area) of the building façade is retained; or 2 points are available where the proportion retained is 80%. Structure Reuse 1 point is available where at least 30% (by mass) of the existing major structure is retained; OR 2 points are available where the proportion retained is 60%.
		19B.4	Structural Timber	4	0	
☐		20.1	Structural and Reinforcing Steel	1	1	CMCC: To be incorporated into the steelwork specification. Steel Specification to nominate requirements 1 point is available where 95% of the building's steel (by mass) is sourced from a Responsible Steel Maker; and A. For steel framed buildings, at least 60% of the fabricated structural steelwork is supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute (ASI); OR B. For concrete framed buildings, at least 60% (by mass) of all reinforcing bar and mesh is produced using energy-reducing processed in its manufacture (measured by average mass by steel maker annually).
☐	**Responsible Building Materials**	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.2	Timber Products	1	1	CMCC: Forest Certified timbers to be used and nominated in Specifications as such. 1 point is available where at least 95% (by cost) of all timber used in the building and construction works is either: A. Certified by a forest certification scheme that meets the GBCA's 'Essential' criteria for forest certification; OR B. Is from a reused source.
. .			20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	CMCC: Best Practice Guidelines for PVC to be nominated in documentation. 1 point is available where 90% (by cost) of all permanent formwork, pipes, flooring, blinds and cables in a project either: A. Do not contain PVC and have an Environmental Product Declaration (EPD); OR B. Meet Best Practice Guidelines for PVC

Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3	1	CMCC: Materials are not yet all selected. Intent for a proportion of mateirals to comply. Up to 3 points are available when a proportion of all materials used in the project meet transparency and sustainability requirements under one of the following initiatives: A. Reused Products; B. Recycled Content Products; C. Environmental Product Declarations; D. Third-Party Certification; or E. Stewardship Programs Points are calculated based on specified benchmarks for the percentage of compliant products used in the project.
Construction and Demolition Waste	Fixed Benchmark	22A	Fixed Benchmark	1	0	CMCC: N/A use Percentage Benchmark 1 point is available where the construction waste going to landfill is reduced by either: A. Minimising the total amount of waste sent to landfill when compared against a typical building; OR B. Diverting a significant amount of waste from going to landfill as a proportion of waste generated.
		22B	Percentage Benchmark	-	1	CMCC: Contractor to incorporate this element. 1 point is available where the construction waste going to landfill is reduced by either: A. Minimising the total amount of waste sent to landfill when compared against a typical building; OR B. Diverting a significant amount of waste from going to landfill as a proportion of waste generated.
Total				**12**	**6**	

Land Use & Ecology				**6**		
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies	CMCC: Some areas identified on site, built form located clear of these areas, impact reduced & offsets appplicable. To meet the minimum requirement for this credit, the project must demonstrate that no critically endangered, endangered, or vulnerable species, or ecological communities were present on the site at time of purchase.
		23.1	Ecological Value	3	1	CMCC: Site is being improved with previously cleared areas being regenerated and remediation of contaminated areas being undertaken. Up to 3 points are awarded where the ecological value of the site is improved by the project The number of points awarded is determined by the Ecological Value Calculator based on a comparison of the condition of the site before and after design/construction.
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies	CMCC: Complies. The Conditional Requirement is met where, at the date of site purchase or date of option contract, the project site did not include old growth forest or wetland of 'High National Importance', or did not impact on 'Matters of National Significance'.
		24.1	Reuse of Land	1	0	CMCC: Build undertaken on a previously cleared and developed site, but not to 75%. 1 point is available where 75% of the site was Previously Developed Land at the date of site purchase or (for previously owned land) at the project's Green Star registration date.
		24.2	Contamination and Hazardous Materials	1	1	CMCC: Contaminated fill mounds to be removed. 1 point is available where the site, or an existing building, was previously contaminated and the site has been remediated in accordance with a best practice remediation strategy.
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	1	CMCC: Large portion of the site to remain as bushland, proposed design incorporates considerable amounts of additional landscaping. 1 point is available where at least 75% of the total project site area comprises building or landscaping elements that reduce the impact of the heat island effect.
Total				**6**	**3**	

Emissions				5		
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	1	CMCC: Civil stormwater design details this item as compliant, subject to local flooding. 1 point is available where the post-development peak event discharge from the site does not exceed the pre-development peak event discharge.
		26.2	Stormwater Pollution Targets	1	0	CMCC: Possible point, will require additional modelling. 1 additional point is available, where the first point has been achieved and all stormwater discharged from site meets specified Pollution Reduction Targets.
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies	CMCC: Requirement for light pollution to be limited due nearby RAAF Base. For the project to be awarded a point for this credit, the project must comply with AS 4282:1997 Control of the Obtrusive Effects of Outdoor Lighting.
		27.1	Light Pollution to Night Sky	1	1	CMCC: Requirement for light pollution to be limited due nearby RAAF Base. 1 point is available where it can be demonstrated that a specified reduction in light pollution has been achieved by the project. Two options are available for demonstrating a reduction in light pollution.
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	1	CMCC: Air conditioned spaces to a large portion of the project, EVC confirmed A/C to have a waterlesss heat-rejection system. 1 point is available where: - The building is naturally ventilated; or - The building has waterless heat-rejection systems; or - The building has water-based heat rejection systems that includes measures for Legionella control and Risk Management.
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	0	CMCC: Possible - this item would need to be confirmed with the detailed design 1 point is awarded where one of the following criteria is achieved: - The combined Total System Direct Environmental Impact (TSDEI) of the refrigerant systems in the building is less than 15; or - The combined TSDEI of the refrigerant systems is between 15 and 35, AND a leak detection system ||with automated refrigerant recovery is in place ||R1.29.01; or - All refrigerants in the project have an ozone depletion potential of zero, and a global warming potential of 10 or less; or - Where there are no refrigerants employed by nominated building systems, this point is awarded.
Total				**5**	**3**	

Innovation				10		
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10		
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.	30B	Market Transformation			
Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Green Star Benchmarks		2	Potential credits - Ultra Low VOC Paints - Setting up site as a Biodiversity Stewardship Site is being considered
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools.	30D	Innovation Challenge		2	Potential credits - Incorporating culturally significant elements into design - Innovative learning environments, incorporating site specific environmental surrounds into the educational outcomes
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star rating tools.	30E	Global Sustainability			
Total				**10**	**3**	

TOTALS	AVAILABLE	TARGETED
CORE POINTS	100	42.0
CATEGORY PERCENTAGE SCORE		42.0
INNOVATION POINTS	10	4.0
TOTAL SCORE TARGETED		46.0