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Broken Hill Hospital Emergency & Mental Health Redevelopment ESD Review of Environmental Factors (REF) Report



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1.0 Executive Summary

This report has been prepared by Steensen Varming on behalf of the Applicant. It accompanies an Review of Environmental Factors (REF) for the Broken Hill Hospital Redevelopment (BHHR).

The purpose of this report is to summarise the Environmentally Sustainable Design (ESD) initiatives being considered for BHHR, explain how the project has addressed the REF and, provide an overview of how the proposed design is responding to sustainable planning.

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2.0 Assessment Requirements

In preparing this report, the environmental impact of the proposed development has been assessed in accordance with Part 5 of the Environmental Planning and Assessment Act 1979 through the Review of Environmental Factors (REF) pathway. The table below sets out the reference or location of these matters within this report.

Ecologically Sustainable Development

General Requirement or Key Issue	Reference / Location within this report			
Provide an ESD Statement addressing how the development will meet HI's ESD principles (DGN 058).	The ESD initiatives proposed for the project aim to reduce the environmental impacts typically associated with buildings during the construction and ongoing operation of the building. The project utilises a resource hierarchy approach, with emphasis on avoiding, then reduction of energy, water, waste and materials. Resource conservation is a key focus of the sustainability strategy, including strategies for energy, water, and material resources.			
	targets from HI's ESD Evaluation tool from DCN 058.			
	Refer to Sections 6, 7 and 8.			
Consider how the development has been designed to address the provisions of SEPP Sustainable Buildings 2022 (Chapter 3)	Upon review of the State Environmental Planning Policy (Sustainable Buildings) 2022, the non-residential development (Chapter 3) requirements are not applicable to the proposed development. It has been decided with HI Planning and the project team that since the proposed development is pursuing Part 5 of the Environmental Planning and Assessment Act 1979 through the Review of Environmental Factors (REF) pathway, the non-residential development (Chapter 3) requirements does not apply.			
	While the proposed development is not subjected to the new requirements, it still intent to achieve a 4 Star (Australia Best Practice) equivalent rating through the DGN058 sustainability framework developed by Health Infrastructure NSW.			

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3.0 Introduction

This report has been prepared by Steensen Varming for the Broken Hill Hospital Redevelopment (BHHR).

In April 2022, the NSW Government announced the Broken Hill Health Service Redevelopment project. The project includes a \$10 million upgrade to the hospital's Emergency Department (ED), which will be reconfigured to better meet the critical health needs of the region and includes tailored treatment spaces for children and those requiring mental health services.

The redevelopment also includes an enhanced Acute Mental Health Inpatient Unit (MHIPU), which is being delivered as part of the NSW Covernment's Statewide Mental Health Infrastructure Program (SWMHIP). Once complete, the upgraded mental health and inpatient unit facilities will provide a modern and contemporary therapeutic space with co-designed facilities for people with mental health needs, their families, carers and staff.



Proposed site plan with proposed Mental Health Units and Emergency Department (ED) Expansion works in blue by STH Architects

Steensen Varming has been engaged by BHHR as an independent ESD consultant. This report outlines the Ecologically Sustainability Development (ESD) requirements, principles and strategies recommended for this project required to meet HI's ESD principles.

At Steensen Varming, the approach to sustainability is to work with the client and design teams to develop best practice sustainable principles that align with the vision and respond to the unique context of the site and building requirements as well as acknowledging the unique requirements of this project as a mental health facility.

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4.0 Requirements and targets

NSW Health Infrastructure (HI) and the Local Health District (LHD) have defined highlevel ESD targets for BHHR as follows:

- The Broken Hill Acute Mental Health Unit (BHAMHIPU) is designed to address the requirements of DGN58 and achieve a minimum **of 45 points + 5 buffer points** (4-star equivalency rating), in accordance with the HI ESD Framework.
- The Broken Hill Emergency Department (ED) Expansion is a refurbishment of the existing ED and will be designed to address (where practically possible) the requirements of the HI ESD Framework.
- A minimum 10% improvement in energy efficiency compared to a baseline of NCC Section J compliance applicable to the development.

4.1 HI ESD Evaluation Tool

HI ESD evaluation tool is a list of sustainable initiative categorised in 9 sustainability sections which cover issues such as management, indoor environment quality, energy, water, waste, transport, emissions, ecology, and innovation.

BHHR is targeting a self-certified approach to achieve 'Australian Best Practice' level, which is equivalent to 50 points out of 110 available.

The self-certification pathway is based on the agreed approach between Health Infrastructure and the Department of Planning, Industry and Environment (DPIE) in demonstrating an equivalency against the Green Star rating system.

The evaluation tool also contributes towards the 2050 Net Zero goal by including several targets focused on resource conservation and minimising operational energy use. It also commits to full electrification for the new build (Mental Health Units) and aspires to transition to full electric developments for the Emergency Department Expansion.

4.2 NCC Section-J

Section-J of the National Construction Code (NCC) 2022 (Previously known as the Building Code of Australia (BCA)) relates to "energy efficiency" of buildings". Section J is a minimum performance target for standard buildings and specifies minimum performance targets known as deemed-to-satisfy (DTS) requirements, for building fabric and services.

BHHR target is to achieve a minimum 10% greenhouse gas improvement against the NCC 2022 Section J baseline. This will require to perform energy modelling and incorporate energy efficiency features into the proposed building. For this project, energy modelling is outside the ESD Consultant's scope of work; it will be performed by the Mechanical engineer during Schematic design through to Detailed Design. Any improvement in energy-efficiency beyond the minimum requirements of Section-J, will also contribute towards the project's HI ESD Evaluation Tool energy score.

NSW Government has committed to achieving net zero emissions by 2050. DPIE's NSW Net Zero Plan, Stage 1:2020-2030 report outlines key priorities for achieving this target. Recently, the NSW Government has committed to an interim target of 50%

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emission reduction from 2005 levels by 2030. Steensen Varming recommends a high performance and low carbon outcome for the BHHR project to align with the NSW Government's stated emissions reduction targets.

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5.0 Health care specific considerations

The physical environment of healthcare facilities can have a significant effect on the health and wellbeing of both patients and staff and has the potential to minimise stress. Therefore, the design team should focus on optimising the environment to ensure positive outcomes.

There has been a growing awareness among healthcare administrators and medical professionals of the need to create a healthy indoor environment that would be healing and therapeutic to enhance patient wellbeing and conducive to staff wellbeing and productivity. This list below outlines some of the key healthcare specific requirements that must be addressed, including:

P	Indoor environmental quality	Health Care facilities are one of the most complex building types, and the greatest challenge is to reduce their energy consumption, while maintaining their specific functional needs to enhance patient comfort.
Х	Daylight	Daylight is found to be a critical requirement for human beings, for both psychological and physiological wellbeing. In healthcare settings daylight is found to be beneficial to the patients as well as staff.
Ö	Views	Windows provide access to a view to the outside and establish connections to the surrounding natural environment, both in terms of weather conditions and time of day. Among patients, having such visual connections have been associated with reduced anxiety, pain, depression, and delirium.
	Outdoor Places of Respite	There is increasing evidence that proves that patients gain healing benefit from having access to outdoor gardens and places of respite.
фф ф	Biophilia	Integration of greenery improves views, air quality and connection to nature, which can reduce anxiety, pain and depression. Balconies can also support additional shading and improved energy efficiency and access to outdoor space.

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Air Quality

It is important to achieve good air quality in controlling and preventing airborne infections in healthcare facilities. Providing clean, filtered air and effectively controlling indoor air pollution through ventilation are two key aspects of maintaining good air quality. Several studies show that high-efficiency particulate air (HEPA) filters are highly effective in filtering out harmful pathogens and are strongly recommended in areas housing immunocompromised patients. Adequate ventilation rates and regular cleaning and maintenance of the ventilation system are critical for controlling the level of pathogens in the air.

Healthcare facilities can be extremely noisy. The high ambient noise levels, as well as peak noise levels in these types of buildings, can have serious impacts on patient and staff outcomes ranging from sleep loss and elevated blood pressure among patients to emotional exhaustion among staff. Poorly designed acoustic environments can pose a threat to patient confidentiality if private conversations between patients and staff or between staff members can be overheard by unintended listeners and, a poor environment impedes acoustic effective communication between patients and staff and between staff members by rendering speech and auditory signals less intelligible or detectable. Installing high-performance sound-absorbing acoustic finishes results in shorter reverberation times, reduced sound propagation, and improved speech intelligibility.



Smart Technology & Infrastructure

Acoustics

Integrate site wide data connectivity to enable open data sharing and adoption of smart technology throughout building areas.

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6.0 Climate Overview

This section provides an overview of the main climate considerations of the site. Understanding the local climatic conditions is essential for the development of appropriate, climate-responsive passive and active strategies for the building and its services. The analysis includes:

- Temperatures daily and annual heights, lows, and averages
- Humidity and dewpoint periods of muggy or dry conditions
- Wind annual average wind frequency, direction and strength
- Sun solar exposure and intensity

The following graphs show the average conditions from the Gunnedah Airport weather station. A review of likely climate change impacts is also presented to acknowledge the shifting climate conditions in the future.

Climate Variable	Period 1991-2020 Annual Average
Mean Maximum Temperature (°C)	24.8 °C (Summer: 33.8 °C Winter: 15.8 °C)
Mean Number of Days ≥ 35 °C	42.1
Mean Minimum Temperature (°C)	11.8 °C (Summer: 19.4 °C Winter: 4.8 °C)
Mean Number of Days ≤ 2 °C	17.0
Mean Rainfall (mm)	224.8
Mean number of days of rain	49.9
Mean number of days of rain ≥ 10 mm	6.8

Table 1 - Climate Statistics for Australian Locations: Broken Hill Airport

Source: BOM

6.1 Temperature

The area will have a wide temperature range through the year. During mid-seasons the temperatures can be comfortable offering significant opportunities for natural ventilation and being outdoors in shoulder seasons. There are some hot periods during summer and some cold periods during winter.

High external air temperatures in summer advocate for ground sourced heat rejection were feasible and the need for effective solar control.

Swings in diurnal temperatures offer opportunities for night-time cooling/thermal storage strategies utilising the cooler temperatures overnight in summer and midseason, in offsetting AC consumption for the following day.

The following diagrams show the annual average variation (high and low) in outdoor temperatures and the comfort ranges for the site throughout the year.

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(Broken Hill Climate, Weather By Month, Average Temperature (Australia) - Weather Spark)

6.2 Climate change impacts on temperatures

Australia's climate has seen gradually increasing average temperatures over the past century, with an increase of just over 1°C since 1910. The majority of this increase has occurred since 1950 and 8 of Australia's top ten warmest years on record have occurred since 2005.

It has also seen an increase in the number of extreme temperature days (days where temperatures exceed the 99th percentile of each month from 1910-2017). The two graphs below show the average temperature anomalies (using 1961-1990 as the averaging point) and the frequency of extreme heat events between 1910 and 2019:



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This trend is predicted to continue, and the extent of the warming will be based on global emissions scenarios. The current projections for Broken Hill (source: Adapt NSW) are as follows:

Climate Projections for:	Near future (2020-39)	Far future (2090)		
	Annual:	Annual:		
Change in mean	+0.62%	+2 01%		
temperature	+0.03 C	+2.01 C		
Change in rainfall	-2.48%	+3.04%		
High fire danger days	+1.58	+3.57		
Hot days over 35°C	+9.33	+28.08		

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6.3 Humidity

Humidity can be high at certain points during the peak summer months, but otherwise, the air will feel fairly dry and comfortable.

The following diagram shows the humidity comfort levels throughout the year. The graph shows the percentage of time at different dew point temperatures (not Relative Humidity levels), which provides a good indication of how comfortable space feels. Lower dew points feel drier and higher dew points feel more humid.



 Jan.
 Feb.
 Mar.
 Apr.
 May
 Jun.
 Jul.
 Aug.
 Sep.
 Oct.
 Nov.
 Dec.

 Muggy days
 1.0d
 0.8d
 0.5d
 0.0d
 <

6.4 Wind

The diagrams below show the annual wind distribution as averages 10m above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

Prevailing winds shift between northerly and southerly directions, with summer winds predominantly from the south west, and in winter, when some level of shelter may be desired when temperatures are cooler, predominant winds are more commonly from the north west.

The acceptability of wind is dependent on the activity of the people in the outdoor space. For example, people walking will tolerate higher wind speeds than those seated. In the table below acceptable wind speeds for different activities are summarised.

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Classification	Activity	Mean wind speed (m/s)		
Acceptable for walking	Walking (fast) from A to B	8-10		
Acceptable for strolling	Slow walking, window shopping, etc.	6-8		
Acceptable for short exposure	Standing or sitting for a short time	4-6		
Acceptable for long exposure	Sitting for a long time	0-4		

Care must be taken to consider wind flows in forecourt area, where a mix of stationary and active uses will occur.

direction.

Summer Wind speed and direction.





Mid-Season Wind speed and

Winter Wind speed and direction.



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6.5 Thermal Comfort

As shown in the charts above, the climate is sub-tropical, with warm, humid summers and cool winters. Due to relatively comfortable year-round conditions, the climate should enable passive strategies to be used for most of the year.

The following psychrometric chart shows the distribution of wet and dry bulb fluctuations throughout the year, with possible passive building design strategies that could work for the new research centre:



Psychrometric chart for Broken Hill climate with passive design strategies overlaid

The chart shows the following key analysis:

- 1. **Summer strategies:** a combination of natural ventilation and thermal mass with night purge could help passively cool the building;
- 2. **Winter strategies:** thermal mass and passive solar heating could help warm the building.

It is important to note that while passive heating and cooling strategies can be adopted throughout the building, additional control of the hospital spaces will still be required throughout the year to maintain the stricter temperature and humidity set points.

6.6 External Noise Sources

Given the importance of acoustics within the work environment, potential external noise sources and levels that may impact the development will be assessed, such as surrounding roads, helicopters, possibly flights and ongoing construction to determine whether acoustic treatment is required and whether opening windows to allow natural ventilation will lead to significant noise issues.

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7.0 Sustainability Approach

Sustainability requires a holistic and integrated design approach, which builds on the awareness of climate, site, form, function, and a broad range of other initiatives.

7.1 Site & Building Strategy Considerations

The diagram below illustrates site-specific considerations and opportunities being discussed both at site/infrastructure level and at building level. The analysis takes into consideration the current design proposal.



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7.2 Resource Conservation – Route to Zero Carbon

Many strategies have been included to address resource conservation and reducing Greenhouse Gas Emissions, with an overview provided in the following sections. A key strategy is the removal of fossil fuel consumption and full electrification of the site. Through the design of a full electric building, the hospital could either purchase 100% Green Power or maximise the PV through the available roof and/or carpark areas which would enable net zero GHG emissions in operation.

A climate change workshop has been conducted with the project team with their responses noted in the risk registers. (See Appendix C for more details).

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7.3 Resource Conservation – Energy

The proposed approach to sustainability and energy related systems is based on applying an "energy hierarchy" methodology.

This methodology has the reduction of energy use as its priority, and then seeks to meet the remaining energy demand by the most efficient means available, before the inclusion of on-site generation and importation of green power.



The following energy conservation initiatives are being considered for the proposed design:

7.3.1 Passive Design Strategies:

High-performance building envelope

An orientation-specific façade design approach has been taken to ensure orientation climatic issues are effectively managed for BHHR.

Heat gain through the glazing during the summer will be managed through a combination of efficient shading and high-performance glazing where needed. External shading is proposed by way of perforated screens to the northern and western inpatient bedrooms. Internal sheer and blackout roller blinds will be provided throughout.

The external glazing should satisfy the provisions of NCC Section-J 2022 of the Building Code of Australia. Consideration should also be given to future climate conditions and the respective impact on the building energy demands.

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7.3.2 Active Measures / Building Systems Design

Mixed-mode ventilation - Mixed-mode ventilation can be considered for non-critical spaces. When outdoor and indoor conditions are favourable for natural ventilation, the air-conditioning could be switched off, therefore reducing energy consumption.

- Zoning of HVAC and lighting services Zoning of HVAC and lighting services should be incorporated to avoid energy wastage.
- High-efficiency plant and associated controls
- Free Cooling -
 - Run mechanical cooling plant in economy cycle when conditions are appropriate
 - Use evaporative cooling options
 - Night purge and other strategies
- Pre-temper outside air Use of heat recovery systems to lower outside air temperatures
- Relax internal set points (where appropriate) Allowing a greater range of thermal conditions can reduce heating and cooling plant loads
- Seasonal temperature and humidity set points Vary set-points throughout the year based on operational use and user demographics
- Enhanced commissioning Commissioning of building services, along with quarterly fine-tuning to ensure that the systems perform at their optimum capacity.

Renewable Energy

While roof space is limited, renewable energy opportunities can be considered, including:

- Solar Photovoltaics (PV) Rooftop, shading structures
- Solar Thermal for Domestic Hot Water System





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7.4 Resource Conservation – Water

The following hierarchy and strategies will be applied:



The following water initiatives have been proposed and their individual merits will be assessed further during future design stages:

- Water efficient fixtures / fittings have been specified. These include fittings such as taps, showerheads, toilets, zip taps, dishwashers etc certified under the WELS rating scheme.
- Rainwater Reuse Rainwater collection and reuse are included through 3 x 5kL tank included in the Hydraulic Services design. The harvested rainwater will be used to reduce potable water consumption for landscape irrigation.
- Fire Systems test water will be captured and storage for re-use using the rainwater tank will be further explored.
- Drip and demand-controlled irrigation to optimise irrigation supply

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7.5 Resource Conservation – Materials and Waste

Selection of environmentally preferable materials is a key priority for the project because building materials consume energy and natural resources during its manufacture and for their transportation to the construction site. Choices of materials and construction methods can significantly change the amount of energy embodied in the structure of a building.



Low-impact construction methods such as offsite prefabrication/preassembly shall be considered where applicable. Prefabricated structures built in purpose-built factories are less labour intensive, more time efficient, and produce less waste compared to traditional onsite construction methods. Raw materials and construction elements are not exposed to the elements, which ensures high quality in the final building, and the construction process is less weather dependant.

Preference will be given to materials that contain high-recycled content and/or are highly recyclable. The following water initiatives have been proposed and their individual merits will be assessed further during future design stages:

- Use sustainable timber Timber products used for concrete formwork, structure, wall linings, flooring and joinery will be sourced where possible from reused, post-consumer recycled or FSC-certified, or PEFC certified timber.
- Steel will be specified to meet specific strength grades, energy-reducing manufacturing technologies, and off-site fabrication. Steel will also be sourced with a proportion of the fabricated structural steelwork via a steel contractor accredited by the Environmental Sustainability Charter of the Australian Steel Institute if available within rural areas.
- Recycled concrete The project aims to reduce the use of Portland cement through substitutions. Fine and coarse aggregate inputs are to be sourced from manufactured sand or other alternative materials, and the amount of



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Portland cement will be reduced within the concrete mix when possible. It will depend on supply opportunities.

- High recycled content or recyclability Furniture items with high recycled or recyclability content to be considered.
- Materials with low VOC content VOC off-gassing from internal materials and finishes is very harmful to occupant health and productivity. The design team should ensure that flooring, paints, adhesives and sealants are specified to meet low VOC requirements (as per Green Star VOC targets).
- Formaldehyde Minimisation All engineered wood products should be specified to either have low formaldehyde emissions or contain no formaldehyde.
- Insulation ODP All thermal insulation products (used within both HVAC ductwork and building envelope) should be specified to be of zero ODP type. (i.e. avoid the use of ozone-depleting substances in both its manufacture and composition).
- Locally manufactured materials Preference should be given to locally manufactured products wherever feasible, in order to reduce their embodied energy and associated GHG emissions.

The following initiatives are being considered to minimise waste during construction and operation phases:

- Construction waste management This is to ensure that recycling of waste from demolition and construction is maximised and that the volume of demolition and construction waste ending up in landfill is minimised.
- Sub-contractors should be instructed to send the recyclable resources recovered from demolition and construction back to their manufacturers and suppliers for recycling/reuse where possible.
- Operational waste management To ensure recycling of operational waste, dedicated storage space should be provided for locating recycling bins. Hazardous and biological waste should be considered.

7.6 Health and Wellbeing

Indoor Environmental Quality

The following occupant comfort strategies are being considered for the proposed design for the project.



- Indoor Air Quality-Increased levels of fresh outdoor air above AS1668 should be provided.
- Daylight The façade glazing should provide high levels of natural light (where applicable. Where appropriate, the design should seek to maximise daylighting and reduce the reliance on artificial lighting, while controlling for unwanted solar heat gains. External shading and Internal blinds could be provided to manage instances of glare.
- External views should be provided to give views of nature, which help to improve patient and staff wellbeing.

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- Clare should be reduced using fixed shading devices, window tinting or operable devices such as shades or blinds to all external or perimeter windows and glazing.
- Thermal comfort should be a key focus of naturally (mixed mode spaces) and mechanically ventilated spaces.
- Building noise Both internal and external noise sources and levels should be considered and controlled in accordance with AS/NZS 2107.

7.7 Site & Environment

Proposed design aims to protect the project site and ensure the reduction of potential emissions, including air pollutants, watercourse pollutants, light pollution, refrigerant leakage, etc.

The following initiatives are being considered to preserve site quality and reduce pollution:

- Stormwater Reduction Manage the impacts of stormwater run-off from the development. This would include measures to prevent stormwater contamination, and control sedimentation and erosion during the construction and operation of the building, such as rainwater reuse etc.
- Pollution of the night sky should be minimised by ensuring that the electric lighting within the site should not cause any direct beam of light into the night sky. Light pollution can disturb the habitat of migratory birds and impacts the behaviour of nocturnal animals in the site vicinity.



Water Sensitive Urban Design example

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8.0 ESD Evaluation Tool Assessment

The HI ESD Evaluation tool has been used throughout the design process to assess and coordinate the targeted credits and define the overall score. The selection of the credits targeted has been based on the following:

- ESD target requirements
- Review of site, context, and proposed design
- Opportunities & constraints identified within the current design
- Key ESD healthcare specific considerations (As described in Section 5)
- Project team experience in other similar health care projects.

The risk categories are determined on the following basis:-

- Low already addressed in the design (Standard HI practise)
- Medium can be achieved but will have some potential cost implications
- High potential cost and spatial implications, require further investigation during detailed design.

The targeted credits require some further investigation to ensure they are adequately incorporated into the design and achieve the necessary performance. This work to confirm these credits will continue during the detailed design and construction stages.

8.1 Mental Health Unit (New)

At this stage, a rating of 4 Stars (**45 points + 5 buffer points)** is targeted through the HI ESD Evaluation tool for the Broken Hill Acute Mental Health Unit (MHIPU). The status of the assessment includes 52 low risk points and 12 higher risk points (totalling 64 points). A 19-point buffer above minimum threshold has been considered to mitigate any risks that may arise from supply chain limitations associated with contractors from Rural NSW to ensure that the minimum project sustainability requirement of 45 points is still achievable.

A breakdown of the targeted credits is shown in the table below, with the full scorecard provided in Appendix A. This also includes comments recording the outcomes of workshops and subsequent key communications. A summary of the score distribution is shown below:

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HI ESD Evaluation Tool Score Summary

Category	Available Points	Low / Med Risk	High Risk	Total Targeted
Management	14	12	1	13
Indoor environmental quality	17	10	1	11
Energy	22	6	3	9
Transport	10	1	-	1
Water	12	5	1	6
Materials	14	5	1	6
Land use & ecology	6	2	2	4
Emissions	5	2	2	4
Innovation	10	9	1	10
Total	110	52	12	64
4 star Target	45	Pass		Pass

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8.2 Emergency Department (ED) Expansion (Refurb)

The Broken Hill Emergency Department (ED) Expansion is a refurbishment of the existing ED and will be designed to address (where practically possible) the requirements of the HI ESD Framework. The status of the assessment includes 54 low risk points and 5 high risk points (totalling 59 points). There is a 14-point buffer above minimum threshold at this stage. This is to mitigate any risks that may arise from supply chain limitations associated with contractors from Rural NSW to ensure that the minimum project sustainability requirement of 45 points is still achievable.

A breakdown of the targeted credits is shown in the table below, with the full scorecard provided in Appendix B. This also includes comments recording the outcomes of workshops and subsequent key communications. A summary of the score distribution shown below:

Category	Available Points	Low / Med Risk	High Risk	Total Targeted
Management	14	11	2	13^
Indoor environmental quality	17	12	-	12^
Energy	22	7	-	7^
Transport	10	1	-	1^
Water	12	5	-	5^
Materials	14	5	3	8^
Land use & ecology	6	2	-	2^
Emissions	5	2	-	2^
Innovation	10	9	-	9^
Total	110	54	5	59^
4 star Target	45	Pass		Pass

HI ESD Evaluation Tool Score Summary

^Total points subjected to the finalisation of the refurbished (alteration) scope.

As the project progresses, if some credits are deemed unachievable, alternative credits and strategies will be continually explored.

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9.0 Next Steps

This report provides a list of recommended sustainability strategies for the BHHR project in line with the project brief and the proposed design. The following steps are recommended during the design development and contract documentation stages to consolidate a set of sustainability strategies and targets, embed these into the project and collate evidence to demonstrate achievement of performance for each targeted credit:

- Review of the targeted items to determine achievability and further coordination with design teams for strategy finalisation as design develops at the DD stage
- Teams to finalise calculations, modelling or analysis required to support strategies and achieve targeted points (e.g. JV3, daylight, views, water calculations, climate risk assessment and energy modelling, water calculations, climate risk assessment)
- Coordination with QS to ensure any cost impact from required strategies will be included within the final cost plan and the procurement requirements
- Finalise set of strategies is to be agreed upon by the design team, stakeholders and the LHD, and to be confirmed by HI to include in the design moving forward.

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10.0 Appendices

10.1 Appendix A – HI ESD Evaluation Tool (MHU)

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ESD Scorecard Detailed Design (R4)		Based on HI Sustainability Framework			For the Acute Mental Health IPU			
Project: Targeted Rating:	Broken Hill Hospital Redevelopment 4 Star (45 points + 19 buffer points)	Green StarNo Certification4 Stars5 Stars6 StarsPoints521246		Total Points Available	Points Targeted	Higher Risk Points	17 22 14 10 12 14	
Current points targeted:	64	0 10 20 30 40 50 60 70 80 90 100 110 ■ Targeted Points Stretch Points (High Risk) (TBC)		100	52	12	12 10 1 6 3 1 0 5 1 5 1 MAN IEQ ENE TRA WAT MAT	
Credit Name (As per Green Star)	Code (UL Coding inline with Green Star) Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Higher Risk Points Targeted	Comments <u>in reverse chronol</u> (Project's current status to meet cro	
MANAGEMENT			MAN	14	12	1		
Green Star Accredited Professional (GSAP)	1.1 Accredited Professional	GSAP 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. GSAP is required to undertake at least one Green Star workshop with the project team and meeting minutes must sufficiently demonstrate GSAP involvement.	Low	1	1		Date: 31/10/22 : Steensen Varming has been engaged as the GSAP	
Commissioning and Tuning	g 2.0 Environmental Performance Targets	Environmental performance targets must be set and documented for the project through the development of a Design Intent Report or an Owner's Project Requirements report. These documents must outline; a) Description of the basic functions/operations/maintenance of the nominated building systems; b) Targets for the project energy & water consumption, and budgets for all nominated systems; c) Description of how energy, water and aspects of indoor environment quality are metered and monitored.	Low	-	Complies		 Date: 24/10/22 : Gert H (HI) reiterated that there is an aspiration for a board of FWLHD are pushing for higher sustainability, where possible. W investigate the stretch target and see if it can be met within the current need to look at overall sustainability strategiers, and establish what is the Date: 24/10/22: Jeremy (Acorn) noted that we are already achieve 4 staframework and agree on what have been identified as the design requir Cost Manager to advise on cost Date: 24/10/22 : Aiming towards electrification of the site (MHU) which Date: 31/10/22: For the MH Unit, the following targets are applicable: * Energy - 10% improvement over NCC Section-J 2022. * Water - Reduction in potable water consumption, compared to a standard reduction is to be determined in consultation with HI). 	
	2.1 Services and Maintainability Review	A comprehensive 'Services and Maintainability Review' must be conducted during design stage and prior to construction. This can be conducted by the Head Contractor (where applicable), an Owner's Representative (e.g. FM sub-contractor) or the ICA (where applicable). The design review must address the following for all nominated building systems; commissionability, controllability, maintainability, operability (fitness for purpose) and safety.	Moderate	1	1		Date: 31/10/22: Services and Maintainability Review will be undertaken A comprehensive review must be undertaken, led by the Independent C Contractor (in case of Early Contractor Involvement). The review must b * During the Design Stage * Prior to construction	
	2.2 Building Commissioning	Pre-commissioning & commissioning must be undertaken to CIBSE, ASHRAE and/or AIRAH standards/guidelines. The commissioning process must generate key documents a) Commissioning Specification, b) Commissioning Plan and c) Commissioning Report. The Commissioning Specification must list the commissioning requirements for each system, not simply reference compliance "to the relevant standard". The Commissioning Report is a summary of the commissioning undertaken and that all documents were adhered to and the nominated systems have been commissioned. AIR TIGHTNESS (PERMEABILITY) IS NOW A REQUIREMENT OF THIS CREDIT	High	1	0	1	 Date: 24/10/22: Diksha advised that from 1st May 2023, the project need confirm). The follow requirements would apply: * Air tightness testing is a mandatory requirement. * Roof area to allow for 20% PV. Noting that PV doesn't need to be instelectrical infrastructure to support. * Electrical vehicle charging - there needs to be spatial allocation and all infrastructure to support EV charging facilities. Date: 31/10/22: For the MH Unit, commissioning of Building Services an includes air-permeability testing. 	
	2.3 Building Systems Tuning	A 12 month building tuning period is required to be implemented with a minimum of quarterly reviews and tuning, inclusive of analysis of data from the monitoring systems and assessment of feedback from occupants. Specific documentation/actions required are; a) O&M Manuals developed and provided to building owner; b) a Building Tuning Plan is developed; c) a Building Tuning Team is formed.	Low	1	1		Date: 31/10/22: Requires commitment to a 12-month Building Tuning p	
	2.4 Independent Commissioning Agent	An ICA must be appointed from design stage and one of the above points targeted. The ICA must advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning and tuning phases. ICA must satisfy Green Star qualifications & experience requirements.	High	1	1		Date: 31/10/2022: HI to confirm the engagement of an Independent Co phase onwards. Either an external ICA can be appointed, or a member f team can be appointed as the ICA.	
Adaptation and Resilience	3.0 Implementation of a Climate Adaptation Plan	Undertake the development of a Climate Adaptation Plan in accordance with recognised standards. A minimum of two risk items identified within the CAP are addressed by specific design responses.	Low	2	1		Date: 24/01/2023: A Lifecycle Workshop will be scheduled for the Scher Date: 31/10/2022: A project-specific Climate Adaptation Plan (CAP) wou as the ED. (NOTE: It can be a joint CAP).	
Building Information	4.1 Building Information	A Building User Information package must be developed for the building and its content must be appropriate for the occupants ("day to day users"). Specific Green Star content requirements must be satisfied. A key requirement is that the BUI is communicated digitally such as digital signage, interactive information kiosks, websites, apps or mobile devices etc written for the building tenants.	Low	1	1		Date: 31/10/2022: Operations and Maintenance (O&M) Manuals; and B requirements would need to be specified as Contractual requirements f	
Commitment to Performance	5.1 Environmental Building Performance	80% of the GFA must be covered by a performance agreement with at least 2 environmental metrics (emissions, energy, water, waste or IEQ).	Low	1	1		Date: 31/10/2022: For the MH Unit, the project team is required to set, following building performance metrics: * Greenhouse Gas Emissions (kg/CO2/m2) * Potable water consumption (kL/m2) * Indoor Environmental quality * Waste (kg/m2)	
	5.2 End of Life Waste Performance	80% of the GFA must be covered by a formal commitment to by the owner to extend the life of finishes to all common areas to at least 10 years (barring minor wear & tear).	Low	1	1		Date: 31/10/2022: At least 80% of the project's GFA must have a formal at the end of life of an interior fitout or basebuild component.	

18/10/2023
4 10 6 5 1 2 2 2 9 1 AT ECO EMI INN
<u>nological order</u> : credit requirement)
or a 5 star rating, but not for rural locations. The le. Whilst this project is 4 star rating, we need to rent budget. In the absence of an ESD strategy, we is the best value for this project within budget.
4 star rating target. Design team to review the quirement. Each consultant to confirm and then for
hich ties in with net zero by 2030. le:
tandard-practice reference case. (Exact percentage
ken. Int Commissioning Agent (ICA) or the Head Ist be conducted at the following times:
needs to comply with NCC 2022. (BCA Consultant to
installed as long there is an area allocated and
d allocation on distribution board for all
s and Envelope must be undertaken, and the scope
ng period, post occupation.
t Commissioning Agent, from the Schematic Design per from the HI / Hospital Facilities Management
chematic Design phase.
would need to be prepared for the MH Unit, as well nd Building User Guides, must be prepared. The nts for the Head Contractor.
set, measure and report on atleast two of the
mal commitment in place to reduce demolition waste

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Higher Risk Points Targeted	Comments <u>in reverse chrono</u> (Project's current status to meet c
Metering and Monitoring	6.0	Metering	MANDATORY CREDIT REQUIREMENT: Accessible metering to be provided to monitor building energy & water consumption, including all common & major uses (Base Building). Metering shall be provided to allow for monitoring of relevant areas or functional space types. In most cases, floor-by-floor metering will suffice, however if a floor comprises separate space types, each shall be metered separately. Each tenancy shall be provided with sub-metering (NB - Authority Meters will meet this as they are required per tenancy). All sub-meters shall meet NABERS requirements pertaining to accuracy and be located in areas that allow regular monitoring & maintenance	Low	-	Complies		Date: 31/10/2022: For the MH Unit, Energy and Water sub- metering r functional areas.
	6.1	Monitoring Systems	 Two key requirements must be met: a) A sub-meter monitoring strategy must be developed in accordance with a recognised standard (CIBSE TM 39), and shall provide a metering schedule which identifies location, type of meter & resource, end-use demand, and estimated energy consumption. b) Sub-meters must be connected to an automated system capable of capturing and processing sub-meter data, and shall have the functionality to produce reports, alter owner/FM to missing data or meter failures, alarms when use increases beyond defined thresholds, and other functionality to provide a useful monitoring system. c) MUST MEET THE METERING INTEGRITY REQUIREMENTS OF GREEN STAR d) PROVIDE A DETAILED PROCESS ON HOW TO DEAL WITH FAULTS LOCATED IN AN ACCESSIBLE LOCATION 	Low	1	1		Date: 31/10/2022: Automated monitoring system must be provided.
Responsible Construction Practices	7	Environmental Management Plan	MANDATORY CREDIT REQUIREMENT: A project specific Environmental Management Plan (EMP) is required to be prepared and must be compliant with best practice guidelines such as the NSW Environmental Management System Guidelines. All sub-contractors are required to adhere to the requirements of the EMP. Scope of EMP shall meet Green Star minimum requirements.	Low	-	Complies		Date: 31/10/2022: Requirements must be specified as a contractual re
	7.1	Formalised Environmental Management System	Formalised Environmental Management System must be implemented on site and must have been certified by a third- party organisation which provides independent verification of system compliance. EMS must be certified to ISO14001, BS 7750 or European Community EMAS. Certification to these standards must be valid before and throughout construction and all sub-contractors are required to adhere to the requirements of the EMP.	Low	1	1		Same as above.
	7.2	High Quality Staff Support	 1 point is available where high quality staff support practices are in place that: Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site. To comply with this requirement programs and policies beyond OH&S to promote health and Wellbeing on-site for both physical and mental health outcomes; and Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs. Training for at least three days on site provide through one or more of: On-site training, such as by including the items above as part of site induction practices. Off-site training, such as by providing sustainability training to site workers via a TAFE or similar program within the last 3 years . Online training, such as by a third party service that can provide training on sustainability topics and track personnel who have taken the relevant materials within the last three woare 	Moderate	1	1		Same as above.
Operational Waste	8A	Performance Pathway - Specialist Plan	An Operational Waste Management Plan (WMP) shall be developed by a qualified professional, in accordance with best practice guidelines (e.g. City of Sydney Policy for Waste Minimisation in New Developments). The WMP scope must meet minimum Green Star requirements. Waste Auditor professional shall meet Green Star minimum qualifications & experience requirements. RECYCLING TO BE COLLECTED BY BUILDING'S WASTE SERVICE. COMINGLED RECYCLING IS PERMISSIBLE TO THE EXTENT THAT IT IS ACCEPTED BY THE WASTE COLLECTION SERVICE	Low	1	1		Date: 31/10/2022: A Waste Professional must be engaged to prepare Management Plan
INDOOR ENVIRON	IMENT QUALIT	Y		IEQ	17	10	1	
Quality of Indoor Air	9.1	Ventilation System Attributes	Three requirements are to be met: a) Mechanical services to be designed in accordance with ASHRAE Standard 62.1:2013 with regards to separation distances between OA intakes and pollution sources) such that the entry of outdoor pollutants is mitigated; b) Mechanical services shall be designed for ease of maintenance and cleaning with adequate access provided to both sides of moisture or debris generating (i.e. coils & filters) components within the air distribution system; c) Prior to occupation, all new and existing ductwork is cleaned in accordance with recognised standards.	Low	1	1		Date: 31/10/2022
	9.3	Exhaust or Elimination of Pollutants	 Credit criteria is achieved where one or any combination of the following are achieved; a) Removing the source of the pollutants - Print/photocopy/ cooking equipment/vehicle exhausts are compliant with ECMA-328, RAL-UZ 171 or GGPS.003 emissions standards or are not present within the Nominated Area; b) Exhausting pollutants directly to outside where they exist in accordance with a recognised standards; c) Printing and photocopy equipment is enclosed in a dedicated area and exhausted directly to outside or to a dedicated exhaust riser. d) Cooking process and equipment - All kitchens are ventilated in accordance with AS1668.2-2012 and are separated from other areas. Kitchenettes with only simple reheat equipment are excluded from the scope. e) Vehicle exhausts - Spaces with vehicle exhausts are compliant with AS1668.2-2012. 	Low	1	1		
Acoustic Comfort	10.1	Internal Noise Levels	Internal ambient noise levels within the nominated area are no more than 5dB(A) above the satisfactory sound levels provided in Table 1 AS/NZS 2107:2016. Noise measurement must account for all internal and external noise sources . Noise measurement and documentation must be provided by a qualified acoustic consultant. Compliance demonstrated through measurement at commissioning/practical completion sampling 10% of spaces representative of the nominated area and space diversity. GFA<500sqm require 95% of spaces to be measured. Mixed mode building to be calculated as if Mechanical.	Low	1	1		
	10.3	Acoustic Separation	Noise transmission within enclosed spaces is addressed through the achievement of a weighted sound reduction index of at least Rw 45 fixed partitions without door or glazed without door and at least Rw 35 for all partitions containing a door, or suitable performance is achieved though measurement. Acoustic consultant can use their discretion on glazed partitions on whether 35 or 45 is used.	Moderate	1	1		
Lighting Comfort	11.0	Minimum Lighting Comfort	MANDATORY CREDIT REQUIREMENT: All lights within the nominated area are; a) Flicker-free through the application of Class A1 and/or A2 ballasts, high-frequency ballasts for fluorescent lamps or electronic ballasts in HID lamps; AND b) Accurately address the perception of colour in the space with a minimum CBL of 80	Low	-	Complies		

logical order redit requirement)
nust be provided for monitoring separate
avirament for the Used Contractor
and implement an Operational Waste

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Higher Risk Points Targeted	Comments <u>in reverse chrono</u> (Project's current status to meet c
	11.1	General Illuminance and Glare Reduction	a) Maintained illuminance levels comply with best practice guidelines and glare is eliminated as demonstrated in accordance with three options 11.1.2A, 11.1.2B & 11.1.2C.	Low	1	1		
	11.2	Surface Illuminance	 Within the nominated area, a combination of lighting and surfaces improve uniformity of lighting to give visual interest. Targeted compliance via 11.2.A. An additional compliance method 11.2.C is applicable to residential spaces (although they can also demonstrate compliance via 11.2.A) 11.2.A requires 95% of the spaces in the nominated area must have: An surface reflectance for ceilings of at least 0.75; and A direct/indirect lighting system present such that the ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane. The surface reflectance value of 0.75 corresponds to a matte flat white ceiling. The surface reflectance value for the final finish must be obtained from the manufacturer's data sheet. 11.2.C requires at least one wall in each living space, kitchen and bedrooms are provided with at least one specific wall-washing or a wall mounted fitting. 	Moderate	1	0	1	Date: 31/10/2022 As an alternative to the Green Star credit requirements, the project co Visual Balance requirements.
Visual Comfort	12.0	Glare Reduction	MANDATORY CREDIT REQUIREMENT: Within the nominated area glare from sunlight is reduced through a combination of blinds, screens, fixed devices or other means. Glare reduction is to be demonstrated through methods 12.0A Fixed Shading Devices, 12.0B Blinds or Screens and/or 12.0C Daylight Glare Model.	Low	-	Complies		
	12.1	Daylight	Up to 2 points are available where a percentage of the nominated area receives compliant levels of daylight during 80% of the nominated hours. Prescriptive methodology pursued, where the daylight access is determined using manual calculations for simple designs that determine the zone of compliance for each orientation. Calculations must comply with the GBCA's Green Star Daylight and Views Hand Calculation Guide, for the requirements of this pathway. 1 point - 40% of nominated area 2 points - 60% of nominated area	Low	2	1		
	12.2	Views	60% of the nominated area has a clear line of sight to a high-quality internal view or an external view. All floor areas within 8m from a compliant window, atrium or view can be considered to meet this criterion.	Low	1	1		
Indoor Pollutants	13.1	Paints, adhesives, sealants and carpets	95% of all internally applied paints, adhesives, sealants and carpets meet stipulated VOC limits. http://new.gbca.org.au/product-certificationschemes/.	Low	1	1		
	13.2	Engineered wood products	95% of all engineered wood products meet stipulated formaldehyde limits. http://new.gbca.org.au/product-certificationschemes/	Low	1	1		
Thermal Comfort	14.1	Thermal Comfort	For 95% of the nominated area and 98% of occupied hours a high degree of thermal comfort is achieved: Naturally Ventilated Spaces The internal temperatures in each space are within 80% (1 point) OR 90% (2 points) of Acceptability Limit 1 of ASHRAE Standard 55-2013 Mechanically Ventilated Spaces a) The space meets specified prescriptive criteria for Thermal Comfort of the PMV +/- 1 (1 point) OR +/- 0.5 (2 points) for >98% of occupied hours; OR b) Prescriptive DTS thermal comfort criteria are satisfied (DB 20-24DegC, RH 40-60%, terminal velocity < 0.2m/s, turndown ability, zone size limitations, SHGC <0.3 and U-Total <3.0W/m2K) no greater than 250 W/m2 through glass- 1 POINT ONLY. Residential Spaces (Class 2 NOT Class 3)	Low	1	1		
ENERGY			An average NatHERS rating of 7 Stars (1 point) OR 8 Stars (2 points) or greater is achieved	ENE	22	6	2	
Greenhouse Gas Emissions	15.0	Conditional Requirement: Performance Pathway (Reference Building Pathway)	GREEN STAR CONDITIONAL REQUIREMENT: All projects are required to comply with the conditional requirements. A 5 star rating may use a maximum of 1 point under prescriptive measures to meet the minimum point threshold (3 points). Project teams must demonstrate that the operational GHG from the proposed building are less than those of an equivalent Benchmark Building (10% improvement over NCC) and that the GHG emissions from the intermediate building are less than those of the reference building.	Moderate	-	Complies		
	15E.1	Performance Pathway: Improving on the Building Fabric	Up to 4 points are awarded on a continuous sliding scale based on the improvement of the Proposed Building façade compared to a DTS compliant façade. 0% improvement (0 points) to 8% improvement (4 points maximum);	Moderate	4	1		Date: 18.01.2023 Steensen Varming: To do Energy analysis, we need to agree on baselin compliance services to go to energy model.
	15E.2	Performance Pathway: GHG Emissions Reduction - Proposed building relative to Benchmark Building)	Up to 16 points are awarded based on the reduction of greenhouse gas emissions of the Proposed Building compared to the Benchmark Building. Conditional Requirement (15E.0): Better than 10% over NCC compliance (2 points) Additional Reductions: 10% emissions reduction (3.4 points) up to 100% emissions reduction (16 points maximum)	Moderate	16	2	2	18.01.2023: STH Architects: PV to be a high risk item, as it does not make sense as PV already exist
	15E.5.1	Performance Pathway: Prescriptive measures	Project teams aim to reduce their fossil fuel use and develop a transition plan to phase them out. It must show a commitment to make the transition by 2030.	Moderate	1	1		Date: 18.01.2023 HI: Prepare for transition plan for site to be completely electric. In Master new for ED to have ability to be fed from electric plant in future. In fut upgrade ED.
	15E.5.2	Performance Pathway: Prescriptive measures	No fossil fuels are burned on site to generate electricity, heating or cooling	Moderate	2	2		

<u>ological order</u> credit requirement)

uld consider the WELL Building Standard's Light-07
e. Section J DTS compliance facade and DTS
5.
plan, Mental Health will be all electric anything
ure, it site is electrified then we do not require to

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Higher Risk Points Targeted	Comments <u>in reverse chronolo</u> (Project's current status to meet crea
	16B	Modelled Performance Pathway: Reference Building Pathway	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: 20% : 1 point 30%: 2 points	Moderate (Design Evolution Required)	2	0	1	Date: 18.01.2023 Steensen Varming: Peak Demand Reduction – to be reviewed. Reference building have gas
TRANSPORT				TRA	10	1	0	
	Tra-17-B.3	Low Emission Vehicle Infrastructure	 1 point is awarded where parking spaces and/or dedicated infrastructure is provided to support the uptake of low-emission vehicles. One of the following must be satisfied; a) 15% of parking is for fuel efficient vehicles (with a maximum of 5% for motorcycle parking); b) 5% of parking is for electric vehicles and charging infrastructure is provided for each space; c) Dedicated car share space(s) AND vehicle(s) are provided at the rate of 1 per 70 building occupants (Residential Class 1a & Class 2 only) 	Medium	1	1		Date: 18.01.2023 HI: Low emission Vehicle Infrastructure (conduits only) to be considered as th
WATER				WAT	12	5	1	
	18B.1	Sanitary Fixture Efficiency	To ensure that all sanitary fixtures are within one star of the WELS rating as stated in Table 18B.1 of Green Star Taps / Urinals / Dishwashers=6 Stars Toilets / Clothes washing machines=5 Stars Showers=3 Star (>4.5 but <=6.0)	Low	1	1		High rating fittings/ fixtures to be considered. Minimal impact to cost
	18B.2	Rainwater Reuse	Rainwater tank must be installed to collect and reuse rainwater within the project's site boundary as deemed appropriate by the project team. The rainwater tank volume must meet the following criteria: GFA 2.500 (m2) 25 (kL) GFA 5.000 (m2) 50 (kL) GFA 10.000 (m2) 100 (kL) GFA 20.000 (m2) 200 (kL) Note that this table is an over-simplified sizing indication. Tanks should be sized based on the collection area, rainfall and the demands for rainwater use on the project	Moderate (Design Evolution Required)	1	1		Date: 18.01.2023 Steensen Varming: Rainwater harvesting is required and will only be used for landscape irrig flushing.
	18B.3	Heat Rejection	To comply, the project must be either naturally ventilated (allowing for use of ceiling fans or similar) or the HVAC system must not use water for heat rejection.	Low	2	2		VRV System is considered, and it will be a refrigerant based Heat rejection
	18B.4	Landscape Irrigation	Project must have either drip irrigation with moisture sensors override or where no potable water is used for irrigation.	Moderate (Design Evolution Required)	1	1		
	18B.5	Fire System Test Water	 point is awarded where one of the conditions are 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 calculated on the basis that any single zone is drained down annually. If sprinkler systems are installed each floor must be fitted with isolation valves or shut-off points for floor-by-floor testing. 	Low	1	0	1	
MATERIALS				MAT	14	5	1	
	19.B.2A/B	Steel	For steel framed buildings, 1 point is available for reducing the mass of steel framing compared to standard practice. For concrete framed buildings, 1 point is available when there is a reduction in the mass of steel reinforcement used when compared to standard practice.	Moderate	1	1		

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e irrigation, and not be connected to toilets for
jection system.

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Higher Risk Points Targeted	Comments <u>in reverse chronological order</u> (Project's current status to meet credit requirement)
Responsible Building Materials	20.1	Responsible Steel Maker and Fabricator	 1 point is awarded where; a) 95% of the building's steel is sourced from a Responsible Steel Maker (ISO14001 certified EMS for manufacturing facility AND the steelmaker is a member of the World Steel Association's Climate Action Programme); AND b1) For concrete framed building, at least 60% (by mass) of all reinforcing bar and mesh is produced using energy-reducing processes in its manufacture (measured by average mass by steel maker annually); OR b2) 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). 	Low	1	0	1	
	20.2	Timber	1 point is awarded where at least 95% (by cost) of all timber used in the building and construction works are certified by a forest certification scheme that meets the GBCA's 'Essential" criteria for forest certification or is from a reused source.	Moderate	1	1		Responsible Building Materials will award 1 point. Include specification during contractor procurement where possible
	20.3	Cables, pipes, floors and blinds	 1 point is awarded where 90% by cost of all cables, pipes, flooring and blinds in the project either; a) Do not contain PVC and have an Environmental Product Disclosure (EPD); OR b) Meet Best Practice Guidelines for PVC as per GBCA requirements. 	Low	1	1		
Sustainable Products	21.1	Sustainable Products	Up to 3 points are awarded when products meet transparency and sustainability requirements under any combination of the following categories; Reused Products, Recycled Content, Environmental Product Declarations, 3rd Party Certifications, or Stewardship Programs. Points are awarded on the basis of the Total Contract Value which is represented by product cost that satisfies the requirements. Awarded as follows; 1 point - 3.0% of contract value 2 points - 6.0% of contract value 3 points - 9.0% of contract value	High	3	1		Date: 18.01.2023 Steensen Varming Sustainable products is a high risk item. Steensen Varming is pursuing this point, however depend on the cost. This strategy requirement is at least 3% of contract value being spent on products that have environmental declaration or third party certification or recycle content. Calculation needs to be done. Big ticket items for considerations such as Structural steel and green concrete. Given that the site is at Broken this will be a challenge. Need to make enquiries if suppliers in the area could meet this requirement.
Construction and Demolition Waste	22	Reduction of Construction and Demolition Waste	The minimum requirement is met where the waste contractors and waste processing facilities servicing the project demonstrate compliance with the Green Star Construction and Demolition Waste Reporting Criteria. 1 point is available where the construction waste going to landfill is reduced by: 22A - Minimizing the total amount of waste sent to landfill when compared against a typical building (>15kg/sqm 0 points, 12.5-15kg/sqm 0.5 points, <10kg/sqm 1 point); OR 22B - IDiverting a significant proportion of waste (>90% of total) from going to landfill (1 point).	Moderate	1	1		Head contractor' responsibility
LAND USE AND EC	OLOGY			ECO	6	2	2	
Ecological Value	23.0	Endangered, Threatened or Vulnerable Species	MANDATORY REQUIREMENT: It must be demonstrated that no critically endangered, endangered or vulnerable species, or ecological communities were present on the site at the time of purchase.	Low	-	Complies		
Sustainable Sites	24.0	Conditional Requirement	GREEN STAR CONDITIONAL REQUIREMENT: It must be demonstrated that at the date of site purchase or date of 'option contract', the project site did not include old growth forest, prime agricultural land, wetlands of 'High National Importance', or did not impact on 'Matters of National Significance'.	Low	-	Complies		
	24.1	Reuse of Land	 1 point is awarded where at the date of site purchase, 75% of the site was previously developed; or If the project is a building extension and 75% of the extension (Including landscaping) falls within an area of the site that was previously developed land. Previously developed land: land that is or was occupied by a permanent structure, associated curtilage, road, car park or other hardstand. (Excluded: Land in built up areas which has not been previously developed, even if it contains certain urban features such as paths) 	Low	1	1	1	
	24.2	Best Practice Site Remediation	1 point is awarded where the site, or an existing building, was previously contaminated and the site has been remediated in accordance with best practice remediation strategies.	Medium	1	1		
Heat Island Effect	25.1	Heat Island Effect Reduction	1 point is available if at least 75% of the whole site area comprises building or landscaping elements that reduce the impact of heat island effect. Solar Hot Water and Photovoltaic Panels features are to be excluded from the calculation of site area percentages for both compliant and noncompliant areas	Medium	1	0	1	 18/01/2023 Moderate risk- Heat island effect reduction (based on site area)- 75% of site area need to have surface finish which support heat island reduction ie by way of landscape element or roof consist of PV or solar hot water system. NOTE: Site boundary - limited to the MH unit + new landscaping 31/10/2022: Landscape Architect to confirm extent of vegetation requirements, Architect to confirm low 3 years solar reflective index roof (>64) for roof pitch< 15° (reference materials surfmist or coolwhite)
EMISSIONS				EMI	5	2	2	
Stormwater	26.1	Peak Discharge To Stormwater	1 point is available where the post-development peak event discharge volume from the site does not exceed the pre- development peak event stormwater discharge using the Average Recurrence Interval (ARI) as defined by Green Star. NOTE - If Credit 3.1 Climate Adaptation & Resilience credit is targeted, the risk assessment will impact the ARI used for this credit (1 ARI for low risk and 5 ARI for medium-high risk). If this credit is not targeted, the ARI to be used should be consistent with local requirements/guidelines.	Low	1	0	1	
	26.2	Pollution Targets	PRE-REQUISITE CREDIT (PEAK DISCHARGE REQUIREMENT MUST BE MET): 1 point is awarded where it is demonstrated that all stormwater discharged from the site meets the Green Star stormwater "Pollution Reduction Targets A" or meet statutory requirements whichever is the higher level of filtration. INNOVATION points available for Table B/C adherence.	Low	1	0	1	

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Higher Risk Points Targeted	Comments <u>in reverse chrone</u> (Project's current status to meet c
Light Pollution	27.0	Light Pollution to Neighbouring Properties	MANDATORY CREDIT REQUIREMENT: It must be demonstrated that the project complies with AS 4282 'Control of the Obtrusive Effects of Outdoor Lighting'.	Low	-	Complies		
	27.1	Light Pollution to Night Sky	 1 point is awarded where it is demonstrated that a specified reduction in light pollution has been achieved by the project, where either; a) the Upward Light Output Ratio (ULOR) is controlled OR b) Direct luminance is controlled. 	Medium	1	1		Lighting pollution to night sky considered moderate risk due to extent potentially, but could be mitigated.
Microbial Control	28.1	Microbial Control	 point is awarded where one of the following is demonstrated; a) The project is naturally ventilated; b) The project is provided with waterless heat rejection; c) The project is provided with water-based heat rejection that is design and built in accordance with AS/NZS 3666.1:2011 and includes measures for Legionella control and Risk Management in accordance with Victorian Public Health & Wellbeing Act 2008. 	Low	1	1		The current mechanical design strategy includes a waterless heat reject based system is being considered.
INNOVATION				INN	10	9	1	
Innovation Challenge	30D	Carbon Neutral Buildings	An Innovation Challenge for projects seeking net zero emissions in scope 1, scope 2, and scope 3 is available for project teams. For more information, contact GBCA or check the Innovation section of our website.	Not Targeted	1	0	1	
	30D	Culture, Heritage and Identity	Site/area of heritage value is preserved and/or refurbished and made visible/celebrated.	Low	1	1		
	30D	Reconciliation Action Plan	Organisations that take formal steps to provide opportunities for Aboriginal & Torres Strait Islander peoples. Building must play a key role in the RAP targets	Low	1	1		
	30D	Community Benefits	Develop a stratey I provide social/community benefits and consult with the broader community on the proposed plan	Low	1	1		
	30D	Integrating Health Environments		Low	1	1		
	30D	Improving on Green Star Benchmarks Indoor Pollutants - Mattresses (health and hospital projects only)	One point awarded where 95% of all mattresses that are to be supplied to the building meet the GreenGuard emission criteria for bedding.	Moderate	1	1		Innovation - Consideration for mattresses to meet Greenguard certific be nominated.
	30D	Innovation Challenge Universal Design		Low	1	1		Potential for project team to consider using the NSW Health Diversity requirement
	30E	Circulation Network Part 1 Design aesthetic staircases	At least one staircase is open to regular occupants, services all floors of the project and is aesthetically designed through the inclusion of at least two independent strategies from the following list on each floor: (Music / Artwork / Light levels of at least 215 lux when in use / Daylight)	Low	1	1		
	30E	Part 1 Manage Pesticides	Pesticide minimization: One of the following requirements is met: a. Outdoor pesticide use is eliminated. b. Hazards associated with outdoor pesticide use are minimized through Pesticides Management plans and use of the least hazardous products.	low	1	1		
	30E	Digital Infrastructure	Providing high-speed broadband using fixed wireless connectivity of speeds of 25-50Mbps/5-20Mbps. (Green Star Communities)	Low	1	1		

ological order credit requirement)

nt of outdoor lighting that may be required ection system, and satisfies Option B. A refrigerant ication- LHD confirm Global GreenTag Mattress will y Inclusion Belonging Guide to achieve the credit

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STEENSEN VARMING

10.2 Appendix B – HI ESD Evaluation Tool (ED Expansion)

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ESD Scorecar	d	Feasibility (Rev-3)	Based on HI Sustainability Framework			For the Acute Mental Health IPU	14/04/2023
Project: Targeted Rating:	Broken Hill Ho 4 Star (45 poin	ospital Redevelopment its + 14 buffer points)	Green Star. No Certification 4 Stars 5 Stars 6 Stars Points 59 13 38		Total Points Available	Points Targeted	17 22 14 10 12 14 10
Current points targeted:	59		0 10 20 30 40 50 60 70 80 90 100 110 Targeted Points I Stretch Points I Not Targeted (High Risk) (TBC)		100	59	13 12 7 1 5 8 2 2 9 MAN IEQ ENE TRA WAT MAT ECO EMI INN
Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Comments <u>in reverse chronological order</u> (Project's current status to meet credit requirement)
MANAGEMENT				MAN	14	13	
Green Star Accredited Professional (GSAP)	1.1	Accredited Professional	GSAP 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. GSAP is required to undertake at least one Green Star workshop with the project team and meeting minutes must sufficiently demonstrate GSAP involvement.	Low	1	1	Date: 31/10/22 : Steensen Varming has been engaged as the GSAP
Commissioning and Tuning	2.0	Environmental Performance Targets	Environmental performance targets must be set and documented for the project through the development of a Design Intent Report or an Owner's Project Requirements report. These documents must outline; a) Description of the basic functions/operations/maintenance of the nominated building systems; b) Targets for the project energy & water consumption, and budgets for all nominated systems; c) Description of how energy, water and aspects of indoor environment quality are metered and monitored.	Low		Complies	Date: 24/10/22 : Gert H (HI) reiterated that there is an aspiration for a 5 star rating, but not for rural locations. The board of PVLHD are pushing for higher sustainability, where possible. Whilst this project is 4 star rating, we need to investigate the stretch larget and see if it can be met within the current budget. In the absence of an ESD strategy, we need to look at overall sustainability strategiers, and establish what is the best value for this project within budget. Date: 24/10/22: Jeremy (Acorn) noted that we are already achieve 4 star rating target. Design team to review the framework and agree on what have been identified as the design requirement. Each consultant to confirm and then for Cost Manager to advise on cost Date: 24/10/22: For the MH Unit, the following targets are applicable: * Energy - 10% improvement over NCC Section J 2022. * Mater - 2010 in probabe water consumption, compared to a standard-practice reference case. (Exact percentage reduction is to be determined in consultation with HI).
	2.1	Services and Maintainability Review	A comprehensive 'Services and Maintainability Review' must be conducted during design stage and prior to construction. This can be conducted by the Head Contractor (where applicable), an Owner's Representative (e.g. FM sub-contractor) or the ICA (where applicable). The design review must address the following for all nominated building systems; commissionability, controllability, maintainability, operability (fitness for purpose) and safety.	Moderate	1	1	Date: 31/10/22: Services and Maintainability Review will be undertaken. A comprehensive review must be undertaken, led by the Independent Commissioning Agent (ICA) or the Head Contractor (in case of Early Contractor Involvement). The review must be conducted at the following times: * During the Design Stage * Prior to construction
	2.2	Building Commissioning	Pre-commissioning & commissioning must be undertaken to CIBSE, ASHRAE and/or AIRAH standards/guidelines. The commissioning process must generate key documents a) Commissioning Specification, b) Commissioning Pana d C) Commissioning Report. The Commissioning Specification must list the commissioning requirements for each system, not simply reference compliance "to the relevant standard". The Commissioning Report is a summary of the commissioning undertaken and that all documents were adhered to and the nominated systems have been commissioned. AIR TIGHTNESS (PERMEABILITY) IS NOW A REQUIREMENT OF THIS CREDIT	High	1	1	Date: 24/10/22: Diksha advised that from 1st May 2023, the project needs to comply with NCC 2022. (BCA Consultant to confirm). The follow requirements would apply: * Ar tightness testing is a mandatory requirement. * Root area to allow for 20% FV. Noting that PV doesn't need to be installed as long there is an area allocated and electrical infrastructure to support. * Electrical vehicle charging: - there needs to be spatial allocation and allocation on distribution board for all infrastructure to support. * Electrical vehicle charging: - there needs to be spatial allocation and allocation on distribution board for all infrastructure to support. Date: 31/10/22: For the MH Unit, commissioning of Building Services and Envelope must be undertaken, and the scope includes air-permeability testing.
	2.3	Building Systems Tuning	A 12 month building tuning period is required to be implemented with a minimum of quarterly reviews and tuning, inclusive of analysis of data from the monitoring systems and assessment of feedback from occupants. Specific documentation/actions required are; a) Q&M Manuals developed and provided to building owner; b) a Building Tuning Plan is developed; c) a Building Tuning Team is formed.	Low	1	1	Date: 31/10/22: Requires commitment to a 12-month Building Tuning period, post occupation.
	2.4	Independent Commissioning Agent	An ICA must be appointed from design stage and one of the above points targeted. The ICA must advise, monitor, and verify the commissioning and tuning of the nominated building systems throughout the design, tender, construction, commissioning and tuning phases. ICA must satisfy Green Star qualifications & experience	High	1	1	Date: 31/10/2022: HI to confirm the engagement of an Independent Commissioning Agent, from the Schematic Design phase onwards. Either an external ICA can be appointed, or a member from the HI / Hospital Facilities Management team can be appointed as the ICA
Adaptation and Resilience	3.0	Implementation of a Climate Adaptation Plan	Undertake the development of a Climate Adaptation Plan in accordance with recognised standards. A minimum of two risk items identified within the CAP are addressed by specific design responses.	Low	2	1	Date: 24/01/2023: A Lifecycle Workshop will be scheduled for the Schematic Design phase. Date: 31/10/2022: A project-specific Climate Adaptation Plan (CAP) would need to be prepared for the MH Unit, as well as the ED. (NOTE: It can be a joint CAP).
Building Information	4.1	Building Information	A Building User Information package must be developed for the building and its content must be appropriate for the occupants ("day to day users"). Specific Green Star content requirements must be satisfied. A key requirement is that the BUI is communicated digitally such as digital signage, interactive information kiosks, websites, apps or mobile devices etc written for the building tenants.	Low	1	1	Date: 31/10/2022: Operations and Maintenance (Q&M) Manuals; and Building User Guides, must be prepared. The requirements would need to be specified as Contractual requirements for the Head Contractor.
Commitment to Performance	5.1	Environmental Building Performance	80% of the GFA must be covered by a performance agreement with at least 2 environmental metrics (emissions, energy, water, waste or IEQ).	Low	1	1	Date: 31/20/2022: For the MH Uinit, the project team is required to set, measure and report on atleast two of the following building performance metrics: * Greenhouse Cast Emissions (kg/CO2/m2) * Potable water consumption (kL/m2) * Indoor Environmental quality * Waste (kg/m2)
	5.2	End of Life Waste Performance	80% of the GFA must be covered by a formal commitment to by the owner to extend the life of finishes to all common areas to at least 10 years (barring minor wear & tear).	Low	1	1	Date: 31/10/2022: At least 80% of the project's GFA must have a formal commitment in place to reduce demolition waste at the end of life of an interior fitout or basebuild component.

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Comments in <u>reverse chronological order</u> (Project's current status to meet credit requirement)
Metering and Monitoring	6.0	Metering	MANDATORY CREDIT REQUIREMENT: Accessible metering to be provided to monitor building energy & water consumption, including all common & major uses (Base Building). Metering shall be provided to allow for monitoring of relevant areas or functional space types. In most cases, floor-by-floor metering will suffice, however if a floor comprises separate space types, each shall be metered separately. Each tenancy shall be provided with sub-metering (NB - Authority Meters will meet this as they are required per tenancy). All sub-meter shall meet NABERS requirements pertaining to accuracy and be located in areas that allow require monitoring & maintenance.	Low	-	Complies	Date: 31/10/2022: For the MH Unit, Energy and Water sub- metering must be provided for monitoring separate functional areas.
	6.1	Monitoring Systems	Two key requirements must be met: a) A sub-meter monitoring strategy must be developed in accordance with a recognised standard (CIBSE TM 39), and shall provide a metering schedule which identifies location, type of meter & resource, end-use demand, and estimated energy consumption. b) Sub-meters must be connected to an automated system capable of capturing and processing sub-meter data, and shall have the functionality to produce reports, alter owner/FM to missing data or meter failures, alarms when use increases beyond defined thresholds, and other functionality to provide a useful monitoring system. c) MUST MEET THE METERING INTEGRITY REQUIREMENTS OF GREEN STAR d) PROVIDE A DETAILED PROCESS ON HOW TO DEAL WITH FAULTS LOCATED IN AN ACCESSIBLE LOCATION	Low	1	1	Date: 31/10/2022: Automated monitoring system must be provided.
Responsible Construction Practices	7	Environmental Management Plan	MANDATORY CREDIT REQUIREMENT: A project specific Environmental Management Plan (EMP) is required to be prepared and must be compliant with best practice guidelines such as the NSW Environmental Management System Guidelines. All sub-contractors are required to adhere to the requirements of the EMP. Scope of EMP shall meet Green Star minimum requirements.	Low	-	Complies	Date: 31/10/2022: Requirements must be specified as a contractual requirement for the Head Contractor.
	7.1	Formalised Environmental Management System	Formalised Environmental Management System must be implemented on site and must have been certified by a third-party organisation which provides independent verification of system compliance. EMS must be certified to ISO14001, BS 7750 or European Community EMAS. Certification to these standards must be valid before and throughout construction and all sub-contractors are required to adhere to the requirements of the EMP.	Low	1	1	Same as above.
	7.2	High Quality Staff Support	1 point is available where high quality staff support practices are in place that: - Promote positive mental and physical health outcomes of site activities and culture of site workers, through programs and solutions on site. To comply with this requirement programs and policies beyond OH&S to promote health and Wellbeing on-site for both physical and mental health thouccomes; and - Enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs. Training for at least three days on site provide through one or more of: On-site training, such as by including the items above as part of site induction practices. - Off-site training, such as by providing sustainability training to site workers via a TAFE or similar program within the last 3 years. - Off-site training, such as by a third party service that can provide training on sustainability topics and track personnel who have taken the relevant materials within the last three vers.	Moderate	1	1	Same as above.
Operational Waste	8A	Performance Pathway - Specialist Plan	An Operational Waste Management Plan (WMP) shall be developed by a qualified professional, in accordance with best practice guidelines (e.g. City of Sydney Policy for Waste Minimisation in New Developments). The WMP scope must meet minimum Green Star requirements. Waste Auditor professional shall meet Green Star minimum qualifications & experience requirements. RecYCLING TO BE COLLECTED BY BUILDING'S WASTE SERVICE. COMINGLED RECYCLING IS PERMISSIBLE TO THE EXTENT THAT IT IS ACCEPTED BY THE WASTE COLLECTION SERVICE	Low	1	1	Date: 31/10/2022: A Waste Professional must be engaged to prepare and implement an Operational Waste Management Plan
	Man-8B	Prescriptive Pathway – Facilities	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-	Moderate- (Design Evolution Required)	1		
INDOOR ENVIRON	IMENT QUALIT	Y		IEQ	17	12	
Quality of Indoor Air	9.1	Ventilation System Attributes	Three requirements are to be met: a) Mechanical services to be designed in accordance with ASHRAE Standard 62.1:2013 with regards to separation distances between OA intakes and pollution sources) such that the entry of outdoor pollutants is mitigated; b) Mechanical services shall be designed for ease of maintenance and cleaning with adequate access provided to both sides of moisture or debris generating (i.e. coils & filters) components within the air distribution system; c) Prior to occupation, all new and existing ductwork is cleaned in accordance with recognised standards.	Low	1	1	Date: 31/10/2022
	9.2	Provision of Outside Air	For mechanically ventilated spaces 1 point is awarded where; a) Outdoor air is provided at a rate 50% greater that the minimum required by AS1668.2:2012 or ASHRAE 62.1:2003 OR b) CO2 concentrations are maintained below 800ppm with CO2 sensors located within each enclosed space or as regularly as temperature sensors, or monitor an area no greater than 500m2. 2 points awarded for Outdoor air provided at 100% above AS1668.2; OR CO2 concentrations are maintained below 7000m with CO2 sensors	Low	2	1	
	19.3	Exhaust or Elimination of Pollutants	Credit criteria is achieved where one or any combination of the following are achieved; a) Removing the source of the pollutants - Print/photocopy/ cooking equipment/vehicle exhausts are compliant with ECM-328, RAL-U2 171 or GGPS.003 emissions standards or are not present within the Nominated Area; b) Exhausting pollutants directly to outside where they exist in accordance with a recognised standards; c) Printing and photocopy equipment is enclosed in a dedicated area and exhausted directly to outside or to a dedicated exhaust riser. d) Cooking process and equipment - All kitchens are ventilated in accordance with AS1668.2-2012 and are separated from other areas. Kitchenettes with only simple reheat equipment are excluded from the scope. e) Vehicle exhausts - Spaces with vehicle exhausts are compliant with AS1668.2-2012.	Low	1	1	

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Comments <u>in reverse chronological order</u> (Project's current status to meet credit requirement)
Acoustic Comfort	10.1	Internal Noise Levels	Internal ambient noise levels within the nominated area are no more than 5dB(A) above the satisfactory sound levels provided in Table 1 AS/NZS 2107:2016. Noise measurement must account for all internal and external noise sources . Noise measurement and documentation must be provided by a qualified acoustic consultant. Compliance demonstrated through measurement at commissioning/practical completion sampling 10% of spaces representative of the nominated area and space diversity. GFA<500sqm require 95% of spaces to be measured. Mixed mode building to be calculated as if Mechanical.	Low	1	1	
	10.2	Reverberation	Reverberation time within dedicated teaching spaces must be in the lower range of 'Recommended Reverberation Time' provided in Table 1 of AS/NZ 2107:2016. 2016 VERSION OF STANDARD NOW REFERENCED	Moderate	1	1	
	10.3	Acoustic Separation	Noise transmission within enclosed spaces is addressed through the achievement of a weighted sound reduction index of at least Rw 45 fixed partitions without door or glazed without door and at least Rw 35 for all partitions containing a door, or suitable performance is achieved though measurement. Acoustic consultant can use their discretion on glazed partitions on whether 35 or 45 is used.	Moderate	1	1	
Lighting Comfort	11.0	Minimum Lighting Comfort	MANDATORY CREDIT REQUIREMENT: All lights within the nominated area are; a) Flicker-free through the application of Class A1 and/or A2 ballasts, high-frequency ballasts for fluorescent lamps or electronic ballasts in HID lamps; AND b) Assuration address the assessments of solary in the space with a minimum CRU of 20.	Low		Complies	
	11.1	General Illuminance and Glare	a) Maintained illuminance levels comply with best practice guidelines and glare is eliminated as demonstrated in	Low	1	1	
	11.2	Surface Illuminance	Within the nominated area, a combination of lighting and surfaces improve uniformity of lighting to give visual interest. Targeted compliance via 11.2.A. An additional compliance method 11.2.C is applicable to residential spaces (although they can also demonstrate compliance via 11.2.A) 11.2.A requires 95% of the spaces in the nominated area must have: - An surface reflectance for ceilings of at least 0.75; and - A direct/indirect lighting system present such that the ceiling area has an average surface illuminance of at least 30% of the lighting levels on the working plane. The surface reflectance value of 0.75 corresponds to a matte flat white ceiling. The surface reflectance value for the final finish must be obtained from the manufacturer's data sheet. 11.2.C requires at least one wall in each living space, kitchen and bedrooms are provided with at least one specific wall-washing or a wall mounted fittine.	Moderate	1	O	Date: 31/10/2022 As an alternative to the Green Star credit requirements, the project could consider the WELL Building Standard's Light- 07 Visual Balance requirements.
	11.3	Localised control	Occupants have the ability to control the lighting in their immediate environment. This includes turning the lights on and off and adjusting their light levels.	Moderate	1	0	
Visual Comfort	12.0	Glare Reduction	MANDATORY CREDIT REQUIREMENT: Within the nominated area glare from sunlight is reduced through a combination of blinds, screens, fixed devices or other means. Glare reduction is to be demonstrated through methods 12.0A Fixed Shading Devices, 12.0B Blinds or Screens and/or 12.0C Daylight Glare Model.	Low	-	Complies	
	12.1	Daylight	Up to 2 points are available where a percentage of the nominated area receives compliant levels of daylight during 80% of the nominated hours. Prescriptive methodology pursued, where the daylight access is determined using manual calculations for simple designs that determine the zone of compliance for each orientation. Calculations must comply with the GBCA's Green Star Daylight and Views Hand Calculation Guide, for the requirements of this pathway. 1 point - 40% of nominated area 2 points - 60% of nominated area	Low	2	1	
	12.2	Views	60% of the nominated area has a clear line of sight to a high-quality internal view or an external view. All floor areas within 8m from a compliant window, atrium or view can be considered to meet this criterion.	Low	1	1	
Indoor Pollutants	13.1	Paints, adhesives, sealants and carpets	95% of all internally applied paints, adhesives, sealants and carpets meet stipulated VOC limits. http://new.gbca.org.au/product-certificationschemes/.	Low	1	1	
	13.2	Engineered wood products	95% of all engineered wood products meet stipulated formaldehyde limits. http://new.gbca.org.au/product-certificationschemes/	Low	1	1	
Thermal Comfort	14.1	Thermal Comfort	For 95% of the nominated area and 98% of occupied hours a high degree of thermal comfort is achieved: Naturally Ventilated Spaces The internal temperatures in each space are within 80% (1 point) OR 90% (2 points) of Acceptability Limit 1 of ASHRAE Standard 55-2013 Mechanically Ventilated Spaces a) The space meets specified prescriptive criteria for Thermal Comfort of the PMV +/- 1 (1 point) OR +/- 0.5 (2 points) for >98% of occupied hours; OR b) Prescriptive DTS thermal comfort criteria are satisfied (DB 20-24DegC, RH 40-60%, terminal velocity < 0.2m/s, turndown ability, zone size limitations, SHGC <0.3 and U-Total <3.0W/m2K) no greater than 250 W/m2 through glass: 1 POINT ONLY. Residential Spaces (Class 3) An average MatHER stating of 7 Stars (1 point) OR 8. Stars (2 points) or greater is achieved.	Low	1	1	
	14.2	Advanced Thermal Comfort	Same as above	Low	1	0	
ENERGY				ENE	22	7	

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Comments in <u>reverse chronological order</u> (Project's current status to meet credit requirement)
Greenhouse Gas Emissions	15.0	Conditional Requirement: Performance Pathway (Reference Building Pathway)	GREEN STAR CONDITIONAL REQUIREMENT: All projects are required to comply with the conditional requirements. A S star rating may use a maximum of 1 point under prescriptive measures to meet the minimum point threshold (3 points). Project teams must demonstrate that the operational GHG from the proposed building are less than those of an equivalent Benchmark Building (10% improvement over NCC) and that the GHG emissions from the intermediate building are less than those of the reference building.	Moderate	-	Complies	
	15E.1	Performance Pathway: Improving on the Building Fabric	Up to 4 points are awarded on a continuous sliding scale based on the improvement of the Proposed Building façade compared to a DTS compliant façade. 0% improvement (0 points) to 8% improvement (4 points maximum);	Moderate	4	1	Date: 18.01.2023 Steensen Varming: To do Energy analysis, we need to agree on baseline. Section J DTS compliance façade and DTS compliance services to go to energy model.
	15 D	NABERS Commitment Agreement Pathway		Moderate- (Design Evolution Required)	9		
	15-8	NatHERS Pathway		Moderate- (Design Evolution Required)	0		
	15-C	BASIX Pathway		Moderate- (Design Evolution Required)	θ		
	15 A.1	Prescriptive: Building Envelope	Point is awarded where the installed roofs and ceilings, floors and roof lights comply with all the following: conditions:- -10% increase on the minimum required total R values specified for roofs and ceilings in Part J1.3, and floors in- Part J1.6, including compliance with J0.4 where applicable; and For roofs, have an upper surface solar absorptance of at least 0.05 less than the maximum allowable value in Part H.3; and for roofs in the minimum required total S values applicable; and For roof lights, achieve a total system U value of less than or equal to 3.3 W/m ² .K; and For roof lights, achieve a total system SHGC of less than or equal to 5.3 W/m ² .K; and For roof lights, achieve a total system SHGC of less than or equal to 5.5% of the maximum allowable value in Part H.4.1 point is awarded where the roof and ceiling, walls, and flooring construction achieves a 15% increase on the minimum required R values specified in 11.3, 11.5 and 11.6.	Moderate- (Design Evolution Required)	4		
	15 A.2	Prescriptive: Wall-Glazing Construction	L point is awarded where all installed wall-glazing constructions and retail display glazing comply with all the following conditions: - Wall-glazing constructions achieve an area-weighted total system U-value, across all facades (Specification 11.5a U- Value - Method 2), at Least 10% less than the maximum allowable total system U-value for wall-glazing constructions as per-the requirements of Part 11.5, including compliance with Part 10.5 where applicable; and - Wall-glazing constructions have a combination of solar-heat gain coefficients, across all facades (Specification 11.5a Solar-admittance - Method 2), that achieve a calculated proposed representative air-conditioning energy value of not more than 50% of the calculated reference representative air-conditioning energy value as per the requirements of Part 11.5; and - Where the wall component is 80% or more of the area of the wall-glazing construction, it achieves a 10% increase- on the minimum total A-value specified in Table 11.5a; and - For display glazing, have a total system U-value of not more than 50.0 W/m ² K and a total system SHGC of not more than 85% of the maximum allowable value in Part 11.5;	Moderate- (Design Evolution Required)	ŧ		
	15-A.3	Prescriptive: Lighting	Lpoint is awarded where the internal artificial lighting complies with the following conditions: -The actual installed aggregate illumination power is not more than 09% of the maximum illumination power-based- on the maximum allowable lighting power densities defined in Table J6.2a; and -Automated lighting control systems; such as occupant detection and daylight adjustment, are provided to 95% of the nominated area -for Class 5 and 9 a buildings only, the size of individually switched lighting zones does not exceed 100m2 for 95% of the nominated area.	Moderate- {Design Evolution Required}	4	θ	
	15 A.4	Prescriptive: HVAC	E point is swarded where all installed HVAC equipment complice with the following conditions: - Each installed fan must achieve a fan motor input power per unit of flow rate 15% lower than the reference fan motor input power per unit flow rate calculated from the deemed to satisfy requirements of Part 15.4 (b); (c), (d) and (c); and - Each installed pump must achieve a pump motor input power per unit of flow rate 10% lower than the reference pump motor input power per unit flow rate calculated from the deemed to satisfy requirements of Part 15.7 (b); (c), (d) and (c); and - Each installed pump must achieve a pump motor input power per unit of flow rate 10% lower than the reference pump motor input power per unit flow rate calculated from the deemed to satisfy requirements of Part 15.7 (b); (c) and (d); and - The thermal efficiency of all installed gas water heaters is at least 4 percentage points more than the minimum- vatue required by Part 3.5 (d); and - The minimum energy efficiency ratio (EER) (cooling) for all unitary air conditioning equipment is at least 5% higher- than the required minimum EER (cooling) as per Part 5.11; and - The minimum energy efficiency ratio (EER) (and integrated part load value (IPLY) for all refrigerant chillers are at- least 15% higher than the minimum values specified in Table 55.10a/b for the relevant chiller type and capacity. Naturally ventilated spaces (including naturally ventilated mode of mixed mode systems), must also comply with the requirements of Provision of Outdoor Alf criticition (0.2C).	Moderate - (Design Evolution Required)	ŧ	θ	

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	15 A.5	Prescriptive: DHW	point is awarded where domestic hot water systems are powered by one of the following heat sources: -Renewable Energy; -Renewable Energ	Moderate- (Design Evolution Required)	1	θ	
	15-A.6	Prescriptive: Transition Plan	L point is awarded where project teams reduce their fossil fuel use and develop a transition plan to phase them out- The following conditions apply: - A transition plan has been developed showing how the building will transition away from the use of fossil fuels by- 2030; - The commitment to this transition by 2030 is public; and - it is demonstrated the transition plan has been integrated into the design and operation of the building, including, considerations within to accommodate any replacements or changes required for delivery of new services during the operational phase. Refer to the Guidance section of this credit for further information on the requirements of the transition plan and its- interaction with other credits within the Submission Guidelines.	Moderate- (Design Evolution Required)	4	o	
	15 A.7	Prescriptive: Fuel Switching	Epoint is awarded where no fossil fuels are burned on site to generate electricity, heating, or cooling; and either- -at least 15% of energy required by the building annually is generated by on site renewable solutions; or Where a minor amount of fossil fuel (less than 1% of total energy consumption) is used on site for purposes where it can be demonstrated that there are no commercially viable alternatives available (e.g. cooking or emergency generators); Renewable Energy Certificates equal to these emissions for the period of ten years following practical completion must be purchased and retired upfron, or through a contractual agreement with the utility. The RECs purchased must be recognised as directly supporting renewable energy generation in Australia. Refer to the Renewables and Offsets in Green Star Guide for more details.	Moderate- (Design Evolution Required)	ŧ	θ	
	15-A.8	Prescriptive: On Site Storage	Epoint is awarded where the on-site energy storage complies with the following conditions: - A renewable energy storage procurement and use strategy has been developed and demonstrates that the storage is sized to match the requirements of the building and that value will be provided to the project; - The stored renewable energy is used to reduce the peak electricity demand; and - A project instalis and uses electricity storage such that on site or off site renewable energy not instantaneously- used by the building is able to be stored and used by the building at a later time Refer Guidance section of this credit for information on calculating building energy use.	Moderate (Design Evolution Required)	÷	θ	
	15 A.9	Prescriptive: Vertical Transportation	Epoint is awarded where the energy associated with lift machinery or other vertical transportation complies with the following conditions: — The minimum lift energy efficiency is class A or B in accordance with ISO 25745-2; and — The lift die and standby energy performance level is 1 in accordance with ISO 25745-2; — The minimum scalator energy performance is class A to A true in accordance with ISO 25745-3; Where projects have both lifts and escalators installed, all three criteria must be met. Where only one type of vertical transportation system is present, the associated criteria with the non-present system can be considered -not- applicable' and or tequired to be met.	Moderate- (Design Evolution Required)	÷	θ	
	15 A.10	Prescriptive: Off-Site Renewables	Projects which have committed to procure Off-site Renewable electricity are rewarded additional points for- supporting grid connected renewable energy supply infrastructure. - 2 points are awarded where at least three points in this pathway have been achieved, and a supply contract is in place to procure at least 50% of the building's electricity consumption through Off-site Renewable electricity- solutions. - 5 points are awarded where at least five points in this pathway have been achieved, and a supply contract is in- place to procure 100% of the building's electricity consumption through Off-site Renewable electricity solutions. The length of time of the commitment is for a minimum period of ten years immediately after Practical Completion. N1:15:02 Points awarded under this credit element cannot count towards meeting the Conditional Requirement for 5 and 6 star ratings R2:15:01 Refer to the Fact Sheet: Renewables and Offsets in Green Stor for additional details on acceptable Off-site renewable electricity procurement.		5	9	
	15E.2	Performance Pathway: GHG Emissions Reduction - Proposed building relative to Benchmark Building)	Up to 16 points are awarded based on the reduction of greenhouse gas emissions of the Proposed Building compared to the Benchmark Building. Conditional Requirement (15E.0): Better than 10% over NCC compliance (2 points) Additional Reductions: 10% emissions reduction (3.4 points) up to 100% emissions reduction (16 points maximum)	Moderate	16	2	18.01.2023: STH Architects: PV to be a high risk item, as it does not make sense as PV already exists. To be reviewed.
	15E.5.1	Performance Pathway: Prescriptive measures	Project teams aim to reduce their fossil fuel use and develop a transition plan to phase them out. It must show a commitment to make the transition by 2030.	Moderate	1	1	Date: 18.01.2023 HI: Prepare for transition plan for site to be completely electric. In Masterplan, Mental Health will be all electric anything new for ED to have ability to be fed from electric plant in future. In future, if site is electrified then we do not require to upgrade ED.
	15E.5.2	Performance Pathway: Prescriptive measures	No fossil fuels are burned on site to generate electricity, heating or cooling	Moderate	2	2	
Peak Electricity Demand Reduction	16A	Prescriptive Pathway: Onsite Energy Generation	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%	Not Targeted	1		

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	16B	Modelled Performance Pathway: Reference Building Pathway	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: (3 20% : 1 point (3 30% : 2 points	Moderate (Design Evolution Required)	2	1	Date: 18.01.2023 Steensen Varming: Peak Demand Reduction – to be reviewed. Reference building have gas
TRANSPORT				TRA	10		
Sustainable Transport	17A.1	Performance Pathway	Up to 10 points are available where the proposed transport solutions on the site decrease emissions from transport, decreases mental and social impacts of commuting and encourages healthier uptake of active transport options. Points are based on a holistic approach to reducing the impacts from transport where the Proposed Building performance is compared to Reference Building performance across the following indicators: - Emissions reduction; - Active mode encouragement; - Vehicke kilometres travelled reduction; - Walkable location Points are awarded by completing the Sustainability Impacts from Transport Calculator and required the development of a detailed Travel Plan. Any change between the Proposed and Reference scenarios must be supported with significant evidence base on building occupant surveys, evidence of staff form home. REQUIREMENT TO BE COMPLETED BY TRAFFIC CONSULTANT	Moderate	10		
	17B.1	Access by Public Transport	Up to 3 points are available based on the accessibility of the site by Public Transport. The score is calculated using the Access by Public Transport Calculator'.	Not Targeted	3		
	178.2	Reduced Car Parking Provision	0.5 points or 1 point is awarded where there is a reduction of car parking spaces for the proposed building when compared to the maximum rates allowed as determined by the Car Parking Accessibility Index (calculated automatically from the PT Accessibility Calculator). Where a building has multiple uses, a hybrid rate shall be determined based on the proportion attributable to each. Total building occupancy as defined by the Building Surveyor in accordance with the BCA. Projects in a campus style situation where multiple car parking facilities/spaces exist to service large number of buildings must demonstrate that the number of car parks within 800m of the site has not increased at a ratio higher than what is allowed by this credit to claim the point(s).	Not Targeted	1		
	Tra-17-8.3	Low Emission Vehicle Infrastructure	1 point is awarded where parking spaces and/or dedicated infrastructure is provided to support the uptake of low- emission vehicles. One of the following must be satisfied; a) 15% of parking is for fuel efficient vehicles (with a maximum of 5% for motorcycle parking); b) 5% of parking is for electric vehicles and charging infrastructure is provided for each space; c) Dedicated car share space(s) AND vehicle(s) are provided at the rate of 1 per 70 building occupants (Residential Class 1a & Class 2 only)	Medium	1	1	Date: 18.01.2023 HI: Low emission Vehicle Infrastructure (conduits only) to be considered as this will award
	17B.4	Active Transport Facilities	1 point is awarded where bicycle parking and associated facilities are provided to a proportion of regular occupants and visitors in accordance with the outlined Green Star requirements. Facilities can be provided within the building's boundary or outside. Secure bicycle parking is defined as that which is in accordance with AS280.3. End-of-Trip facilities are defined as showers, changing amenities with appropriate drying space and lockers. The design of EoT facilities are bapropriate to encourage their use. 7.5% of staff/regular occupants 5% Peak Visitors for Class 3 to 9, Class 9b tertiary education 10% of 75% of the total student capacity. 1.2 Locker Per Bicycle Space, Showers 8 Per first 500 + 2 per extra 250 occupants USE DESIGN OCCUPANCY	Not Targeted	1	0	
	178.5	Walkable Neighbourhood	I point is awarded where it is demonstrated that the building complies with one of the following requirements; a) The project is located so that at least four (4) amenities for industrial buildings, or at least eight (8) amenities for all other types of buildings, are within 400m of the project. OR b) The project achieves a "Walk Score" of at least 70 for industrial buildings, or at least 80 for all other types of buildings, as determined using the website www.walkscore.com, using the "Street Smart' method of calculation.	High	1	0	Walkable Neighbourhood not possible to achieve due to site attribute.
WATER				WAT	12	5	

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Potable Water	18A	Potable Water - Performance Pathway	Up to 12 points are available based the reduction in potable water consumption of the Proposed Building when compared to a Reference Building. This credit addresses potable water consumption from the use of sanitary fixtures, appliances, HVAC, irrigation systems and swimming pools. Compliance requirements and guidance for the modelled performance pathway is detailed in the Green Star Potable Water Calculator. WELS HAS BEEN ADJUSTED 4 STAR SHOWERS AND 6 STAR WC'S (VACUUM) ARE NOW AVAILABLE	Low	12	0	
	18B.1	Sanitary Fixture Efficiency	To ensure that all sanitary fixtures are within one star of the WELS rating as stated in Table 18B.1 of Green Star Taps / Urinals / Dishwashers=6 Stars Toilets / Clothes washing machines=5 Stars Showers=3 Star (>4.5 but <=6.0)	Low	1	1	High rating fittings/ fixtures to be considered. Minimal impact to cost
	188.2	Rainwater Reuse	Rainwater tank must be installed to collect and reuse rainwater within the project's site boundary as deemed appropriate by the project team. The rainwater tank volume must meet the following criteria: GFA 2.500 (m2) 20 (kL) GFA 5.000 (m2) 100 (kL) GFA 10.000 (m2) 100 (kL) GFA 20.000 (m2) 100 (kL) Note that this table is an over-simplified sizing indication. Tanks should be sized hased on the collection area. rainfall and the demands for rainwater use on the project	Moderate (Design Evolution Required)	1	1	Date: 18.01.2023 Steensen Varming: Rainwater harvesting is required and will only be used for landscape irrigation, and not be connected to toilets for flushing.
	18B.3	Heat Rejection	To comply, the project must be either naturally ventilated (allowing for use of ceiling fans or similar) or the HVAC system must not use water for heat rejection.	Low	2	2	VRV System is considered, and it will be a refrigerant based Heat rejection system.
	188.4	Landscape Irrigation	Project must have either drip irrigation with moisture sensors override or where no potable water is used for irrigation.	Moderate (Design Evolution Required)	1	1	
	18B.5	Fire System Test Water	1 point is awarded where one of the conditions are 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 calculated on the basis that any single zone is drained down annually. - If sprinkler systems are installed each floor must be fitted with isolation valves or shut-off points for floor-by-floor testing.	Low	1	0	
MATERIALS				МАТ	14	8	
Life Cycle Impacts	19.A.1	Comparative Life Cycle Assessment	Up to 6 points are available where Whole-of-Building (WoB) and Whole-of-Life (cradle to grave) Life Cycle Assessment (LCA) is conducted for the Proposed Building and a Reference Building. Points are awarded based on the extent of environmental impact reduction achieved against six environmental impact categories when compared to the Reference Building. ENRERY CONTRIBUTION IS CAPPED AT 3 POINTS OUT OF POSSIBLE 6	Moderate	6		
	19.A.2	Additional Life Cycle Impact Reporting	Up to 4 additional points are available where the LCA is used to inform the building's design process or as built outcome. Any combination of the below four initiatives may be targeted: B Additional life cycle impact reporting (Human Toxicity, Land Use, Resource Depletion - Water, Ionising Radiation, Particulate matter); B Material selection improvement; B Construction process improvement; B LCA Design Review - Continuous design review: First Consideration CD, First Iteration, Subsequent iterations changes made reported to the design team, Minutes of design review meetings reflecting the intent of incorporation of LCA considerations.	Moderate	4		
	19.B.1.1	Portland Cement Reduction	Reduced use of Portland cement (1 point for 30%, 2 points for 40%) by mass.	Low	2	1	
	19.B.1.2	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).	Low	0.5	0.5	
	1	1	Mill an example below to be an established				
	198.1.3	Aggregate Reduction	U.5 points available where entries: At least 40% 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 per cubic meter of concrete.	Moderate	0.5	0.5	
	198.1.3 19.8.2A/B	Aggregate Reduction Steel	0.5 points available where entire? At least 40% for 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 per cubic meter of concrete. For steel framed buildings, 1 point is available for reducing the mass of steel framing compared to standard practice.	Moderate Moderate	0.5	0.5	
	198.1.3 19.8.2A/B 19.8.3.1	Aggregate Reduction Steel Building Reuse - Façade Reuse	0.5 point's available where entries: At least 40% 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 per cubic meter of concrete. For steel framed buildings, 1 point is available for reducing the mass of steel framing compared to standard practice. For concrete framed buildings, 1 point is available when there is a reduction in the mass of steel reinforcement used when compared to standard practice. Reuse of the building façade (1 point for 50% by area, 2 points for 80%)	Moderate Moderate Moderate	0.5	0.5	

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	19.B.4	Structural Timber	The minimum requirement is met where all structural timber used in the building is responsibly sourced. If the structural timber used represents less than 30% of the building's GFA, then the 'Life Cycle Impacts – Structural Timber' pathway (198.4) cannot be targeted. FSC or PEFC certified. Up to 3 points are available where the building is constructed from the following proportion of structural timber: @ 1 point for 30% of the building's GFA; @ 2 points for 70% of the building's GFA, @ 3 points for 90% of the building's GFA.	Not Targeted	3	0	
Responsible Building Materials	20.1	Responsible Steel Maker and Fabricator	1 point is awarded where; a) 95% of the building's steel is sourced from a Responsible Steel Maker (ISO14001 certified EMS for manufacturing facility AND the steelmaker is a member of the World Steel Association's Climate Action Programme); AND b1) for concrete framed building, at least 60% (by mass) of all reinforcing bar and mesh is produced using energy- reducing processes in its manufacture (measured by average mass by steel maker annually); OR b2) for steel-framed buildings, at least 60% (the fabricated structural steelwork is supplied by a steel fabricator/steel contractor accredited to the Environmental Sustainability Charter of the Australian Steel Institute (ASI).	Low	1	1	
	20.2	Timber	1 point is awarded where at least 95% (by cost) of all timber used in the building and construction works are certified by a forest certification scheme that meets the GBCA's 'Essential'' criteria for forest certification or is from a reused source.	Moderate	1	1	Responsible Building Materials will award 1 point. Include specification during contractor procurement where possible
	20.3	Cables, pipes, floors and blinds	1 point is awarded where 90% by cost of all cables, pipes, flooring and blinds in the project either; a) Do not contain PVC and have an Environmental Product Disclosure (EPD); OR b) Meet Best Practice Guidelines for PVC as per GBCA requirements.	Low	1	1	
Sustainable Products	21.1	Sustainable Products	Up to 3 points are awarded when products meet transparency and sustainability requirements under any combination of the following categories; Reused Products, Recycled Content, Environmental Product Declarations, 3rd Party Certifications, or Stewardship Programs. Points are awarded on the basis of the Total Contract Value which is represented by product cost that satisfies the requirements. Awarded as follows; 1 point - 3.0% of contract value 2 points - 6.0% of contract value 3 points - 9.0% of contract value	High	3	1	Date: 18.0.2023 Secensen Varming Sustainable products is a high risk item. Steensen Varming is pursuing this point, however depend on the cost. This strategy requirement is at least 3% of contract value being spent on products that have environmental declaration or third party certification or recycle content. Calculation needs to be done. Big ticket items for considerations such as Structural steel and green concrete. Given that the site is at Broken this will be a challenge. Need to make enquiries if suppliers in the area could meet this requirement.
Construction and Demolition Waste	22	Reduction of Construction and Demolition Waste	The minimum requirement is met where the waste contractors and waste processing facilities servicing the project demonstrate compliance with the Green Star Construction and Demolition Waste Reporting Criteria. 1 joint is available where the construction waste going to landfill is reduced by: 22A - Minimizing the total amount of waste sent to landfill when compared against a typical building (>15kg/sqm 0 points, 12.5-15kg/sqm 0.5 points, <10kg/sqm 1 point); OR 22B - Diverting a significant proportion of waste (>90% of total) from going to landfill (1 point).	Moderate	1	1	
LAND USE AND EC	OLOGY			ECO	6	2	
Ecological Value	23.0	Endangered, Threatened or Vulnerable Species	MANDAIOKY REQUIREMENT: It must be demonstrated that no critically endangered, endangered or vulnerable species, or ecological communities were present on the site at the time of purchase.	Low	-	Complies	
	23.1	Ecological Value	Up to 2 points are awarded where the ecological value of the site is improved by the project. The number of points awarded is determined by the Green Star - Change of Ecological Value Calculator based on a comparison of the condition of the site before and after the project. (POINTS CHANGED IN V1.2) Improvement in Ecological Value 0.01 1 0.10 2 0.20 3	Moderate	3	0	
Sustainable Sites	24.0	Conditional Requirement	GREEN STAR CONDITIONAL REQUIREMENT: It must be demonstrated that at the date of site purchase or date of 'option contract', the project site did not include old growth forest, prime agricultural land, wetlands of 'High National Importance', or did not impact on 'Matters of National Significance'.	Low	-	Complies	
	24.1	Reuse of Land	1 point is awarded where at the date of site purchase, 75% of the site was previously developed; or If the project is a building extension and 75% of the extension (Including landscaping) falls within an area of the site that was previously developed land. Previously developed land. Previously developed land. In the previously developed la	Low	1	1	

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	24.2	Best Practice Site Remediation	1 point is awarded where the site, or an existing building, was previously contaminated and the site has been	Medium	1	1		
Heat Island Effect	25.1	Heat Island Effect Reduction	To point is available if at least 75% of the whole site area comprises building or landscaping elements that reduce the impact of heat island effect. Solar Hot Water and Photovoltaic Panels features are to be excluded from the calculation of site area percentages for both compliant and noncompliant areas	Medium	1	0	18/01/2023 Moderate risk- Heat Island effect reduction (based on site area)- 75% of site area need to have surface finish which support heat Island reduction ie by way of landscape element or roof consist of PV or solar hot water system. NOTE: Site boundary - limited to the MH unit + new landscaping 31/10/2022: Landscape Architect to confirm extent of vegetation requirements, Architect to confirm low 3 years solar reflective index roof (>64) for roof pitch< 15 [°] (reference materials surfmist or coolwhite)	
EMISSIONS				EMI	5	2		
Stormwater	26.1	Peak Discharge To Stormwater	1 point is available where the post-development peak event discharge volume from the site does not exceed the pre- development peak event stormwater discharge using the Average Recurrence Interval (ARI) as defined by Green Star. NOTE - If Credit 3.1 Climate Adaptation & Resilience credit is targeted, the risk assessment will impact the ARI used for this credit (1 ARI for low risk and 5 ARI for medium-high risk). If this credit is not targeted, the ARI to be used should be consistent with local requirement/guidelines.	Low	1			
	26.2	Pollution Targets	PRE-REQUISITE CREDIT (PEAK DISCHARGE REQUIREMENT MUST BE MET): 1 point is awarded where it is demonstrated that all stormwater discharged from the site meets the Green Star stormwater "Pollution Reduction Targets A" or meet statutory requirements whichever is the higher level of filtration. INNOVATION points available for Table B/C adherence.	Low	1			
Light Pollution	27.0	Light Pollution to Neighbouring Properties	MANDATORY CREDIT REQUIREMENT: It must be demonstrated that the project complies with AS 4282 'Control of the Obtrusive Effects of Outdoor Lighting'.	Low	-	Complies		
	27.1	Light Pollution to Night Sky	1 point is awarded where it is demonstrated that a specified reduction in light pollution has been achieved by the project, where either; a) the Upward Light Output Ratio (ULOR) is controlled OR b) Direct luminance is controlled.	Medium	1	1	Lighting pollution to night sky considered moderate risk due to extent of outdoor lighting that may be required potentially, but could be mitigated.	
Microbial Control	28.1	Microbial Control	1 point is awarded where one of the following is demonstrated; a) The project is naturally ventilated; b) The project is provided with waterless heat rejection; c) The project is provided with water-based heat rejection that is design and built in accordance with AS/NZS 3666.1:2011 and includes measures for Legionella control and Risk Management in accordance with Victorian Public Health & Wellbeing Act 2008.	Low	1	1	The current mechanical design strategy includes a waterless heat rejection system, and satisfies Option B. A refrigerant based system is being considered.	
Refrigerant Impacts	29.1	Refrigerant Impacts	point is awarded where one of the following requirements is satisfied: a) The combined Total System Direct Environmental Impact of systems containing refrigerants is less than 15; b) The Total System Direct Environmental Impact of systems containing refrigerants is between 15 and 35 AND a leak detection system is in place including an automated refrigerant recovery system capable of recovering over 95% (by weight) of refrigerant; () All refrigerants are used within the project The Total System Direct Environmental Impact is calculated using the Impacts from Refrigerant Sciculator. Specific information is releaved on the project to the set of the project o	Moderate	1			
					10	<u> </u>		
Innovative Technology or Process	30A	Innovative Technology or Process		Moderate	10	9		
	30A	Thermal Comfort	Individual Comfort Control (UFAD or similar)	Not Targeted	1			
	30A	INNOVATION: Innovative Technology or Process - Onsite Renewable Energy	Additional points are available on a continuous sliding scale for the installation of significant renewable energy generation systems which contribute 5% (1 point) to 10% (2 points maximum) of the Base Building energy demand.	Not Targeted	2			
	30A	Greenhouse Gas Emissions	One (1) point is available where Building Integrated Photovoltaic (BIPV) systems contribute to the reduction of greenhouse gas emissions by at least 15%. This point can be awarded in addition to the 'Onsite Renewable Energy' points highlighted above	Not Targeted	1			
	30A	INNOVATION: Innovation Challenge - Microbial Control in DHW	1 point is awarded where it is demonstrated that DHW systems have been designed to manage the risk of microbial contamination. Operational practices may be used, however the design of the system must also include features that facilitate the achievement of the credit.	Not Targeted	1			
	30A	INNOVATION: Innovative Technology or Process - Process Cooling Heat Rejection	An additional point is available where water use from process cooling in medical, iaboratory or industrial equipment is at least 10% of the building's total water demand and either; a) 95% of the water requirement for once-through cooling systems is sourced from non-potable water; OR b) Once through cooling systems are avoided.	Not Targeted	1			

Credit Name (As per Green Star)	Code (UL Coding inline with Green Star)	Sub-Criteria (As per Green Star)	Criteria Requirements (As per Green Star)	Credit Risk (Credit attainment)	Points Available (As per Green Star)	Points Targeted	Comments <u>in reverse chronological order</u> (Project's current status to meet credit requirement)
Market Transformation	30B	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. The GBCA is more likely to award innovation points for projects that: - Increase the knowledge and capacity of the building industry; - Increase the knowledge of sustainable building practices in regional areas; - Change the regulatory environment; - Use technologies or strategies which, if adopted widely, would likely result in a significant reduction of impacts in the built environment.	Not Targeted			
	30B	Greenhouse Gas Emissions - Passive Design	Projects that achieve more than 15 points through passive design or without energy generation or the purchase of offsets or Green Power in the 'Greenhouse Gas Emissions' credit can claim an innovation point.	Not Targeted	1		
	30B	Soft Landings Framework	Soft Landings Framework. An additional 1 point is available where commissioning & tuning is undertaken in accordance with the BSRIA "Soft Landings Framework". This framework provides the structure "for project teams to stay engaged after practical completion, hand-holding the client during the first months of operation to fine-tune and de-bug systems and ensure the occupiers understand how to control and best use their new work environment. The Soft Landings process is designed to extend up to three years post-completion. The Soft Landings Framework includes procedures and example checklists which act as signosts for design teams to help end-users get to grips with their often unfamiliar and complex buildings. It allows for a full programme of post-occupancy evaluation that the project team can use to improve a building's performance and make it sustainable over the long term."	Not Targeted	1		
Improving on Green Star Benchmarks	30C	Improving on Green Star Benchmarks	The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark (environment, social, economic). The following Innovation credits are specifically referenced in the Green Star DAB Submissions Guideline document;	Not Targeted			
	30C	Greenhouse Gas Emissions - Building Air Permeability Rates	Requires Air Permeability Rate to complies with a lower maximum rate and a larger test areas applies.	Not Targeted	2		
	30C	Greenhouse Gas Emissions - Reference Building Pathway	On-site energy renewable systems produce 5% more energy than what is required by the building. Energy must be exported or stored on site. One (1) point is available for a 5% improvement, with a maximum of two (2) points available for a 10% improvement.	Not Targeted	2		
	30C	Comparative Life Cycle Assessment	One (1) Innovation point is awarded where the cumulative impact reduction as defined within the credit is increased by 20% to a total of 150%. An additional 20% improvement is rewarded with a second point	Not Targeted	2		
	30C	Product Transparency and Sustainability	One (1) Innovation point is awarded where the percentage of compliant products is increased by 3% to 12%. A further 3% improvement is rewarded with a second point.	Not Targeted	2		
	30C	Supplementary or Tenancy Fitout Review	One (1) Innovation point is awarded where the project team and building owners carry out a comprehensive services and maintainability review on Tenancy systems	Not Targeted	1		
	30C	Improving on Green Star Benchmarks - Ultra Low VOC Paints	One additional point is awarded where over 50% of paints (by cost) specified in the building have a maximum TVOC content of 5g/L, verified by one of the approved test methods.	Low	1		nt
	30C	INNOVATION: Improving on Green Star Benchmarks -15%Fuel Efficient Vehicles	Credit 17 requires one of the following: a) 15% of parking is for fuel efficient vehicles (with a maximum of 5% for motorcycle parking); b) 5% of parking is for electric vehicles and charging infrastructure is provided for each space; c) Dedicated car share space(s) AND vehicle(s) are provided at the rate of 1 per 70 building occupants (Residential Class 1a & Class 2 only), or d) no parking spaces provided	Not Targeted	1		
	30C	INNOVATION: Improving Green Star Benchmarks - Discharge to Sewer	An additional point is available where it is demonstrated that no less than a 90% reduction in flow to sewer is achieved as calculated using the Green Star Potable Water Calculator.	Not Targeted	1		
	30C	Improving on Green Star Benchmarks - Reduction of	1 additional point is available where the construction and demolition waste which is not recycled and directed to landfill is no greater than 5kg/m2 GFA.	Moderate	1		
	30C	Improving on Green Star Benchmarks - Stormwater Pollution Targets	Exceeding Green Star Benchmarks – Stormwater Pollution Targets Up to two additional points may be awarded where projects can demonstrate achieving Pollution Reduction Targets from column B (1 point) or C (2 points) as stated in Table 26.2.	Low	2		
Innovation Challenge	30D	Carbon Neutral Buildings	An Innovation Challenge for projects seeking net zero emissions in scope 1, scope 2, and scope 3 is available for project teams. For more information, contact GBCA or check the Innovation section of our website.	Not Targeted	1		
	30D	Culture, Heritage and Identity	Site/area of heritage value is preserved and/or refurbished and made visible/celebrated.	Low	1	1	
	30D	Reconciliation Action Plan	Urganisations that take tormal steps to provide opportunities for Aboriginal & Torres Strait Islander peoples. Building must play a key role in the RAP targets	Low	1	1	
	30D	Affordable Housing	Project contains mix and diversity of affordable houses Inc. incentive program for appliances.	Not Applicable	1		
	30D	Environmental Product Declarations	A so the project contract value is represented by materials with EPUS for 1 point and 8% for 2	Low	1		
	30D	Local Procurement 1	A percentage of the products/materials were from/made in Australia	Low	1		
	30D	Community Benefits	Develop a stratey I provide social/community benefits and consult with the broader community on the proposed plan	Low	1	1	
	30D	Social Return on Investment	Analyse direct costs and benefits of project impact including productivity, health, crime etc.	Not targeted	1	_	
	30D	Design for Active Living	Assess activities of >80% of building users and develop solutions to increase activity.	Not targeted	1		
	30D	Marketing Excellence	Specific marketing drivers have been researched and a project specific strategy developed.	Not Targeted	1		
	30D	Market Intelligence	Pre and post occupancy survey of building users - BOSSA or other is suitable.	Not Targeted	1		
	30D	High performance site office	Site snea aesign complies with 75% of the requirements of the credit checklist.	Not Targeted	1		
	300	integrating Health Environments		Low	1	1	

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10.3 Appendix C – Climate Change Risk Register

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Broken hill Hospital redevelopment

Climate Change Risk Assessment and Climate Adaptation Strategies

Date 24/08/2023

Risk Reference	Potential impact on the project (environmental, social and economic)	Likelihood	Consequences	Risk Rating	Responsible Party	Recommended adaptation actions discussed with the project team	Mitigated Likelihood	Mitigated Consequences	Residual Risk Rating	Current Status
Increased Te	emperatures / Number of Hot Days									
1	Higher on-going cost for space and air conditioning. Higher cooling capacity of mechanical plant.	Almost Certain	Moderate	Medium	Mech /Arch (Medium - Mech) (High - Arch)	Passive Design Optimisation - Façade and building fabric to a min. NCC Section J requirements - Materials with a better thermal mass, appropriate shading devices internal and eternally, operable windows to allow for Natural ventilation Adaptive comfort and ceiling fans - will allow for some increase in temperatures during peak times. More spaces within the health care development will need to be conditioned as it's occupied throughout the year and is operational 24 hours. (Mech system longevityaround 10-15 yrs) Critical conditions - to be maintained	Possible	Minor	Low	NCC + 10% façade has been included.
2	Increase in hot days leading to increased outdoor temperatures and reduced themal comfort. Likely worst for hardscaping areas (car parks / roads / etc) through urban heat island effect.	Likely	Moderate	High	Landscape / Arch / Civil	Provision of trees and covered walkaways for shading Use of soft landscape to reduce heat island and improve outdoor thermal comfort. Additional planting around car parking and other areas adjacent to hardscaped areas to improve shading. Lighth-colored hardscape elements to avoid and reduce HIE.	Possible	Minor	Low	
3	Thermal expansion of the cladding, framing and building structure, leading to possible damage of buildings.	Unlikely	Moderate	Medium	Façade	There is likely to be minimal impact on building structures? Thermal bridging and insulation will be better than designed to NCC 2019 No major impacts on the structural steel likely based on likely increased temperature range. Façade team to confirm maximum temperatures from manufacturers specifications.				
4	Blackout / Brownout / Power interruptions impact to power and services, leading to loss of productivity and comfort and possibly impact on health of patients	Likely	Major	High	Elec	Consider back up generation or including an additional connection so that a temporary generator could be brought in. PV on the roof will not function in a blackout scenario, as there would be no power for the inverters. Consider battery storage? (TBC. Question to the SWG) Passive design for daylight and thermal comfort will support operating during the daytime with no power? Potential for space to be provided for battery storage or a future generator to be stored more permanently.	Possible	Minor	Low	Elec: Current design is to have to generator supply that is considered as Essential supply.
5	Reduced thermal comfort within the buildings (also linked to humidity rise) and reduced cooling plant efficiency.	Almost Certain	Moderate	High	Mechanical / Client	Relaxed set points Passive design measures to reduce impact? Management of facility to only condition certain areas in peak hot days?	Possible	Minor	Low	Increased design conditions calculated on recorded data above AIRAH09 allows for system to cope with increase max temperatures.
6	Passive cooling for the substations may not be sufficient, resulting in lower electrical loads and impacting equipment lifespan.	Possible	Minor	Medium	Elec	Likely high cost to include active cooling - need to confirm if it is necessary.	Possible	Minor	Medium	
7	Sustained heat stress to vegetation and landscaping leading to wiltering/death and reducing greenery and comfort to outdoor areas of respite, views to landscape and contributes to urban heat island effect.	Likely	Moderate	High	Landscape / Client	Selection of climate-responsive native species with low water demands Management plan to identify periods when heat stress occurs and water to be provided to supplement existing irrigation.				
8	Additional maintenance of sports fields / ovals due to extreme heat.	Likely	Minor	Medium	Landscape	Proper preparation of soils to support the resilience and strength of the soils. Landscape to confirm				
9	PV - Inverters can only operate in certain temperature ranges. Other mechanical plants might be impacted too.	Likely	Minor	Medium	Elec, Mechanical / Client	Avoid direct solar radiation to inverters and mech equipment. Locate in well- ventilated areas and shade	Possible	Minor	Medium	Existing PV inverter location is used.
10	Heat stress on staff patients and visitors due to extreme heat days could lead to dehydration and associated health impacts.	Likely	Moderate	High	Arch / Landscape	Easy access to drinking water & shaded areas Operational policies - management plans for operations during extreme heat days conerning the patients health conditions.				
1					1					

Risk Reference	Potential impact on the project (environmental, social and economic)	Likelihood	Consequences	Risk Rating	Responsible Party	Recommended adaptation actions discussed with the project team	Mitigated Likelihood	Mitigated Consequences	Residual Risk Rating	Current Status
Increased in	Extreme Heat Days									
12	Increase in extreme heat days resulting in higher energy bills.	Almost Certain	Minor	Medium	Mechanical	Passive Design Optimisation - Façade and building fabric to a min. NCC 2019 Section J requirements / Increasing insulation R-values / Clazing ratios and performance / Shading / Air tightness / Heat recovery / etc. PV to reduce peak demand	Possible	Minor	Medium	Increased design conditions calculated on recorded data above AIRAH09 allows for system to cope with increase max temperatures.
14	Loss of planting through irrigation failure.	Possible	Moderate	Medium	Landscape /Civil	Selection of planting of climate appropriate species. Potential to secure water from stormwater harvesting.				
Increased R	ainfall & Storm Events									
15	Increased surface water flood risk due to increased flows from surrounding areas causing damage to assets from water ingress and possible health risks.	Possible	Major	High	Civil	Civil to team to confirm strategies - Stormwater management features within the site / WSUD features / OSD tanks / Water treatment plant				
16	Roof flooding causing water ingress into the building causing damage to internal linings, furniture, equipment etc.	Possible	Major	High	Hydr / Arch	downpipes and gutter size. (ED : Oversized pit and pipes) Consider increased intensity events. External drainage design to flow off the site in the event of a blockage rather than into the building.	Possible	Minor	Medium	Hyd: Eaves gutters have been designed for overflow events at a 1:100 AEP. No box gutters have been designed. Specification to include maintenance plan to keep roofs and gutters clear of debris and blckage. Refer to DD risk register for
17	Roof drainage flooding into the drainage design to 1:200 year storm - damage to equipment and risk to health.	Possible	Major	High	Hydr / Arch	Assess surface water movements. (1:100 storm event)	Possible	Minor	Medium	Hyd: Eaves gutters have been designed for overflow events at a 1:100 AEP. No box gutters have been designed.
18	Impact of flooding and damage to internal ground level finishes / furniture / equipment.	Unlikely	Major	Medium	Civil / Arch	Ground level protection to PMF level to reduce the impact of flooding?				
19	Impact of flooding limiting access to the building	Possible	Major	High	Client / Civil	Risk of this happening? Civil team to confirm Alternative options?	Possible	Moderate	Medium	Arch to confirm floor levels are documented to required flood planning level. Flood management and evacuation plan to be developed in consultation with the LHD.
20	Increase rainfall intensity and frequency leading to a greater size rainwater tank and Stormwater infrastructure	Possible	Minor	Medium	Hydr / Civil	Consider large storm events in modelling?	Possible	Minor	Medium	Head contractor to review civil storm and coordinate civil/hydraulic work as par of design finalisation - noting ESC 2022 compliance.
21	Damage to façade materials and vehicles during hail storm events, leading to maintenance costs	Possible	Minor	Medium	Façade / Arch	Reinforced clad panels to resist impact and wind impacts? Selection of facade materials with greater impact resistance?				
22	Damage to buildings, vehicles, people and animals during hail storm events, leading to injury	Possible	Moderate	Medium	Client / Arch	Management plan in place for where to shelter in event of hail storm? Certain areas designed to provide necessary protection?	Possible	Minor	Medium	Arch to confirm covered walkway has been considered to mitigate risks.
23	Hail damage to Solar PV panels resulting in maintenance cost and reduced Energy production	Possible	Major	High	Elec	Hail loading - roof pitches over 2.5deg, so there is a easy fall off of hailstones Specify impact rated Solar PV panels?	Possible	Minor	Medium	Elec: Future PV installation to consider hail risks.
24	Hail events leading to blocking roof downpipes resulting in roof flooding, internal water ingress and damage to internal building / furniture / carpets / etc.	Possible	Moderate	Medium	Arch / Hydr / Client	Overflow system? Management plan in place for these extreme scenarios?	Possible	Minor	Medium	Hyd: Eaves gutters have been designed for overflow events at a 1:100 AEP. No box gutters have been designed.
1								1		

Risk Reference	Potential impact on the project (environmental, social and economic)	Likelihood	Consequences	Risk Rating	Responsible Party	Recommended adaptation actions discussed with the project team	Mitigated Likelihood	Mitigated Consequences	Residual Risk Rating	Current Status
Increased Drought Events									Runng	
25	Drought conditions leading to damage to landscape areas leading to reduced amenity and plants that potentially die off to water restrictions / limited watering.	Possible	Moderate	Medium	Landscape / Client	Selection of drought tolerant/climate appropriate species? Management plan in place to provide watering supplement exisitng irrigation when absolutely necessary?				
26	Cracking of pipes due to drought conditions	Possible	Moderate	Medium	Hydr / Civil	Pipe material to be specified to limit the risk. Use of material that is susceptible to shrinkage and swells based on water content should be avoided.	Possible	Minor	Medium	Civil: T <mark>BC</mark>
Increased D	ushing Conditions									
Increased B										
27	Bushfire smoke causes poor indoor air quality, and impact to staff, Patients and visitor health.	Likely	Major	High	Facade / Arch / Mech	Building to be designed so it can be sealed and air filtered as it enters the building. Install CO2 sensors Operational policy to close windows in times of poor air quality. Air quality monitoring (PM / VOCs) could be incorporated (Inside and outside) Ability to increase filtration media when air quality is very poor - require operational policy. Better than normal air tightness to be included in the design - air tightness testing to be considered.	Rare	Insignificant	Low	Mech: ACORN confirm the proposed building is not in the bushfire zone.
28	Bush fires causing fire damage to the building	Rare	Major	Low	Client / Arch	N/A	Rare	Insignificant	Low	Building not in bush fire zone.
29	More regular filter changes, higher filter maintenance and cost.	Almost Certain	Minor	Medium	Client	Management plan to ensure filters are monitored and replaced when necessary?				
30	Increased façade maintenance due to smoke and ash buildup.	Almost Certain	Minor	Medium	Arch / Façade / Client	Review façade treatments an options that may offer reduced maintenance?				
31	Ash buildup on façade panels will impact efficiency of the PV panels.	Almost Certain	Minor	Medium	Client	Cleaning plan? Specification of panels for improved ease of cleaning?				
32	Plant maintenance due to ashes	Possible	Minor	Medium	Client	Cleaning plan?				
Deserves in	the second s									
Decrease in	Humidify					Change in Relative Humidity (RH) in the near future is considered low				
33	Possible need for humidification for thermal comfort.	Unlikely	Minor	Low	Mech	Potentially no action required.	Unlikely	Minor	Low	Mech: No action required
Increase in A	Air Pollution									
34	Increase in air pollution causing poor indoor air quality, and impact to student health.	Possible	Major	High	Mech	Better than normal air tightness to be included in the design and best performing mechanical systems Higher level of outdoor air filtration for key spaces. Air quality monitoring				
35	Increased air pollution resulting in increased filter costs and replacement.	Possible	Moderate	Low	Mech / Client	FM team to replace filters as needed	Possible	Insignificant	Low	Mech: Filters with alarm feature installed and replaced when necessary
Increase in V	Vind Velocity					Consideration of trace located class to the buildings				
36	Intense wind causing some trees close to the façade to collapse and damage the property or cause harm to visitors	Possible	Moderate	Medium	Landscape / Arch	Soil condition to be reviewed to ensure strong root systems. Selection of species types will also be considered.				
37	Intense winds causing damage to roof structures, leading to increased maintenance and replacement costs.	Possible	Major	High	Structure	Review any gaps between current codes and climate change scenarios. Account for increased wind speed loads.	Possible	Minor	Medium	Stru: The building is to be designed for a wind event of 1:2000 of annual probability of exceedance in accordance with the building code for an Importance Level 4 building. Further mitigation strategies should not be required as the Wind Action Standard (AS1T70.2) considers climate change in Cl 3.4 (Climate Change Multiplication Events).