Muswellbrook Hospital Stage 3 Redevelopment

Ecologically Sustainable Development Report

Prepared for: Health Infrastructure

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Revision

Revision	Date	Comment	Prepared By	Approved By
1	28/07/2022	Preliminary Issue for SD	RD	RD
2	25/08/2022	SD Issue	RD	RD
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1. Executive Summary

This Ecological Sustainable Development Report has been prepared on behalf of Health Infrastructure for the Muswellbrook Hospital Stage 3 Redevelopment located at 36 Brentwood Street, Muswellbrook NSW 2022. The report aims to identify the ESD concepts and initiatives that are proposed to be included within the project & ensure the development delivers a sustainable project outcome.

Information contained within Ecologically Sustainable Development (ESD) Report has been prepared in direct response to:

- NSW Environmental Planning and Assessment Regulation 2021
- NSW Government Resource Efficiency Policy
- National Construction Code (NCC) 2019 Amendment 1
- Health Infrastructure (HI) Design Guidance Note (DGN) No.058 – Environmentally Sustainable Development
- Health Infrastructure (HI) ESD Evaluation Tool
- Muswellbrook Development Control Plan (DCP) 2009

This report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers).
- An assessment of the energy and water uses and proposed measures to ensure energy and water efficiency.
- Detail regarding specific ESD initiatives which are to be targeted throughout all phases of the project.
- A comparison of the project's ESD principles and how they have been considered in line with the NSW Health Infrastructure position on ecological sustainable development.

In accordance with the above, the project will implement several sustainable design principles which include initiatives designed to mitigate the development's environmental impact across the following areas:

- **Management –** including reviews of commissioning & tuning, building information and other operational processes.
- **Indoor Environment Quality** – including high air quality, acoustic/lighting comfort, and reduction of indoor pollutants.
- **Energy** – including improved energy efficiency of the building operations through design and technology.
- **Sustainable Transport** – access to public transport and sustainable transport options
- **Water Efficiency** – reduce potable water demand and potentially utilizing the rainwater.
- **Materiality** – Considering the whole of life materials and their selection to minimise harm to the environment, including efficiency and construction.
- **Ecology** - Maintaining ecology through landscaping & on-site environmental management processes during both construction & operation.
- **Emissions** – minimisation of pollution to the environment.

As per HI DGN No.058- Environmentally Sustainable Development, the Muswellbrook Hospital Redevelopment- Stage 3 will achieve a minimum 4-star Green Star equivalency. Opportunities for improving on this has been explored separately as part of this development and determined as unachievable, however should practical opportunities arise in the future to further the development's ESD initiatives, these will be investigated where possible.

2. Introduction

This report contains a series of design elements to assist the project design team to deliver a sustainable development outcome, while ensuring the on-going ecological and environmental impact of the project is minimised.

According to the Principles outlined within the NSW HI Engineering Service Guidelines (DGN 058), the project is to demonstrate the following outcomes, specific to sustainable development:

- A minimum of 45 points + 5 points buffer (4 star equivalent) to be achieved by the design in accordance with HI's ESD Evaluation Tool;
- All new buildings will have a mandatory requirement of delivering a 10% improvement in energy on NCC Section J.

This report has been prepared having regard to the above & provides further detail on the project specific response within the following pages.

2.1 General Overview

The scope of the Muswellbrook Hospital Stage 3 Redevelopment project, part of the Hunter New England Local Health District, will incorporate:

- New operating suite (fitout on level 1)
- New CSSD (refurbishment on level 1)
- Community Health within the lower ground floor under croft.

The project site will be at 36 Brentwood Street, Muswellbrook NSW 2022.

2.2 Site Location

Figure 1 Location of the site. Source: Nearmaps

2.3 Sustainable Design Framework

In pursuit of ESD design principles across the development, the Project will pursue Ecological Sustainable Development (ESD) excellence benchmarks to deliver a sustainable project outcome.

These include best practice design initiatives from:

- NSW Environmental Planning and Assessment Regulation 2021;
- NSW Government Resource Efficiency Policy
- National Construction Code (NCC) 2019 Amendment 1
- Health Infrastructure Design Guidance Note No.058 – Environmentally Sustainable Development
- Health Infrastructure (HI) ESD Evaluation Tool
- Muswellbrook Development Control Plan (DCP) 2009

This report addresses the proposed developments approach to ESD in response to the Environmental Planning and Assessment Regulation 2021.

2.3.1 NSW Government Resource Efficiency Policy

The project will be required to demonstrate compliance with all applicable policy measures of the NSW Government Resource Efficiency Policy (GREP).

The relevant policy measures include:

- E3 – Minimum Standards for New Electrical Appliances and Equipment
- E5 – Whole-of-Government Solar Target
- W3 – Minimum Standard for New Water-Using Appliances
- A2 – Low VOC Materials

These are addressed in their relevant sections throughout this report.

2.3.2 NCC Section J – Energy Efficiency

The project will be required to demonstrate compliance with the NCC (2019 Amendment 1) Section J – energy efficiency provisions.

Section J outlines minimum performance requirements including,

- Maximum greenhouse gas emissions (GHG) levels;
- Minimum thermal envelope performance for building elements such as walls, floors, roof and external glazing;
- Minimum performance requirements for building sealing;
- Maximum lighting power densities for internal lighting design;
- Minimum performance levels for building air-conditioning and ventilation systems;
- Minimum requirements for energy and water metering;
- Minimum requirements for energy and water data collection; and

- Minimum access for maintenance requirements.

The proposed performance standards for Section J (2019 amendment 1) will outline the thermal performance requirements for code compliant façade designs, meaning consideration must be shown for the amount of exposed glazing included within the façade design.

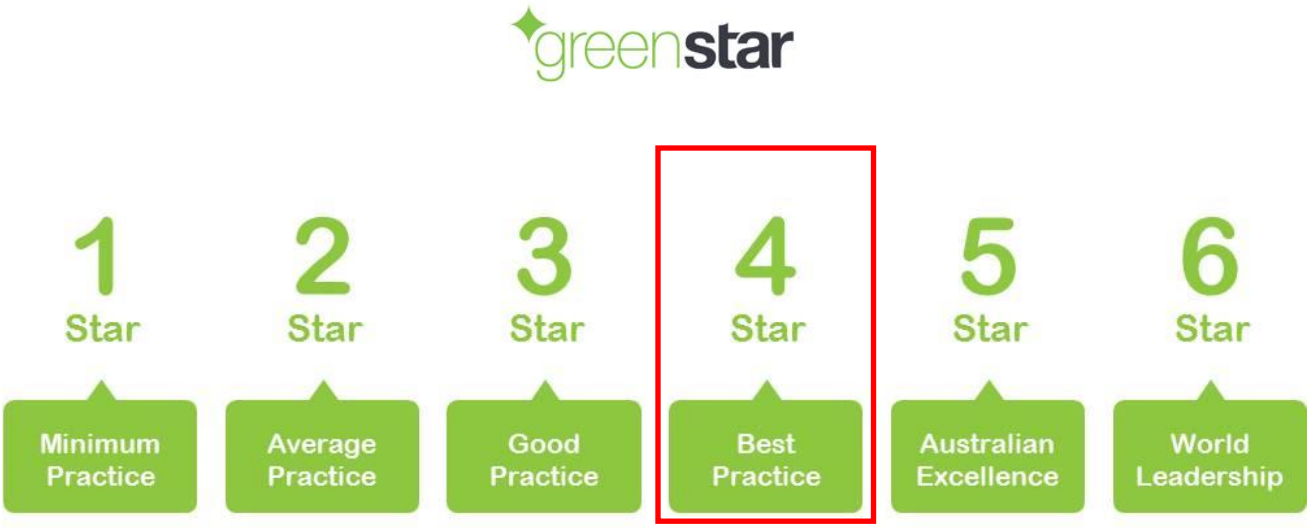
The development will need to seek to optimise energy efficiency & thermal performance via design elements which improve the building façade performance including façade design, thermal envelope, HVAC system selection and lighting design.

2.3.3 Best Practice Sustainable Development Framework

The Project has to benchmark itself against a sustainability framework which reflects 'national best practice sustainable building principles' as a minimum performance requirement. Historically, project team teams have responded to this requirement by benchmarking their performance against *Green Star Design & As Built*, published by the Green Building Council of Australia.

This development is proposing to use HI's ESD Evaluation Tool equivalency pathway, developed by HI NSW to ensure the facility meet the standards with a targeted point requirement of 45 + 5 buffer points. HI's ESD Evaluation Tool uses some of the key ESD initiatives included in the GBCA rating tools however does not produce a "Green Star" rating, but instead prescribes a minimum number of "points" to be achieved. During the design phase of works HI requires a 5-point buffer within the ESD evaluation tool be maintained.

2.3.4 Green Star Equivalency



Green Star is widely considered as the benchmark environmental assessment tool within the Australian property industry, Green Star is an independent accreditation framework which delivers sustainable built outcomes throughout the project lifecycle. Green Star is a credits-based star rating system ranging from one through to six stars.

Green Star assesses the environmental performance of projects in design, construction and operation via the following category frameworks:

- Management
- Indoor Environment Quality
- Energy

- Transport
- Water
- Materials
- Land use & Ecology
- Emissions; and
- Innovation

Muswellbrook Hospital Stage 3 Redevelopment is pursuing a 45 (+5 buffer) points pathway assessed under the HI ESD Framework which is benchmarked to the Green Star Design and As Built v1.3 Submission Guidelines. This benchmark demonstrates “Best Practice” Sustainability through the design, construction and operation.

2.3.5 HI’s ESD Evaluation Pathway

HI’s ESD Evaluation Tool lists the initiatives demonstrating the project’s ability to achieve sustainable performance.

A list of ESD and environmental initiatives in accordance with the Green Star framework and HI’s ESD Evaluation has been identified below.

- Green Star accredited professionals will be engaged throughout the project to guide the design team and ensure a high level of environmental performance is achieved;
- Services and maintainability reviews of commissionability, controllability, operability and safety;
- High WELS rated water fittings ensuring lower building water demand;
- LED lights, which have longer lives, consume less energy and produce a higher quality light than their counterparts, reducing overall energy demand;
- Energy & water metering for effective monitoring & demand reduction;
- Low-VOC paints, sealants, adhesives, carpets (where applicable), which do not emit dangerous volatile components, risking the health of users;
- Steel sourced from manufacturers who are members of the Australian Steel Institute Sustainability Charter for sustainable and energy reducing steel manufacture;
- Best practice PVC plastics in formwork, piping, cables and conduits. These materials have a reputation for damaging the environment in their production, both upstream and downstream of the manufacturing process;
- Operational waste procedures including defined streams for effective material recycling;
- A target of 90% of construction and demolition waste will be diverted from landfill;
- Contractors will be requested to provide and abide by an Environmental Management Plan and Environmental Management System that is in accordance with NSW Environmental Management Systems Guidelines;
- Consideration of additional material specifications which select & prefer materials and products which include reused content, environmental product declarations, third party sustainability certifications or product stewardship programs;
- Acoustic performance in accordance with both Green Star and health guidelines;
- Dedicated site-specific transport plan including suitable provision for sustainable modes of transport to be utilised by students, staff and visitors;

- Any identified hazardous materials to be removed and disposed of in accordance with relevant EPA and NSW best practice legislation;
- Light pollution shall be managed via effective external lighting design;
- Legionella risks shall be managed via air-cooled HVAC systems;
- Efficiency, high performance HVAC systems with a focus on energy efficiency to be installed. Consideration of mixed-mode natural ventilation shall be considered further during detailed design phase; and
- Additional Green Star innovation challenges in line with HI NSW standards for pre-awarded credits.

HI's ESD Evaluation Tool lists of initiatives demonstrating the project's ability to achieve the 4 Star Green Star equivalent performance (plus a 4-point buffer as per DGN 058 requirements) outcome has been included within Appendix A of this report. Note, the provisional list of initiatives will be subject to further amendment during project detailed design phase following development approval.

3. Ecological Sustainable Development Initiatives

3.1 Greenhouse Gas Emissions & Energy Efficiency

The proposal will require compliance with the Energy Efficiency provisions of the BCA outlined within NCC Section J 2019. The Project is targeting a mandatory 10% improvement on National Construction Code (NCC) Section J – Energy Efficiency standards.

The energy efficiency strategy generally follows the hierarchy pyramid showed in Figure 2. Best practice energy conservation dictates that in the first instance, demand for Greenhouse Gasses are reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest return on investment.

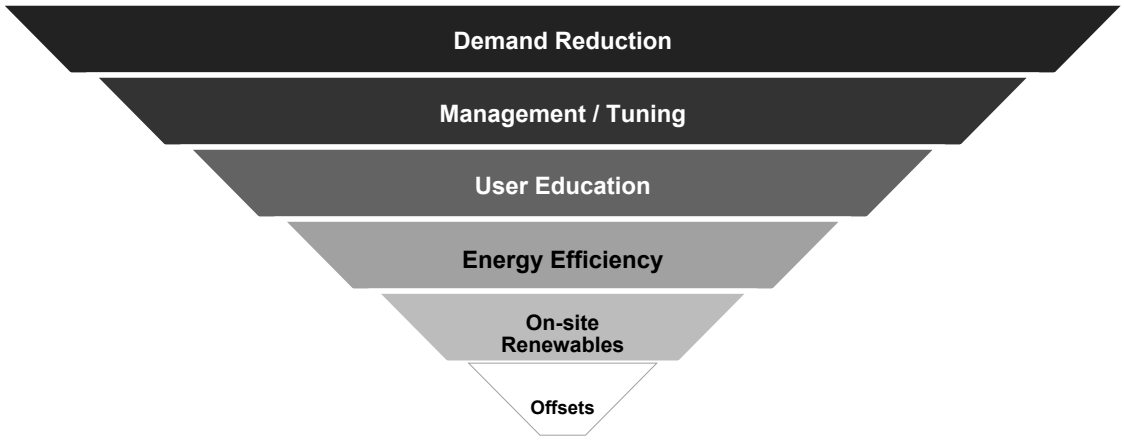


Figure 2 - Energy Saving Hierarchy

Energy efficiency measures which will be applied across the development to reduce its energy consumption include:

- **Architecture -** Vernacular architecture principals, designed to maximise the specific needs of all occupants and users of the building. The building is designed to deliver comfort, practicality, daylight, connection to the outside through views and energy conservation with its architectural design intent. The development will also offer fresh air and daylight access to occupants in many forms to indoor spaces.
- **High quality light and Views** – Focusing on the wellbeing of the occupant to delivering daylight comfort and healthy indoors spaces with high quality views towards the exterior.
- **Shading and Blinds** – Design of external shading and use of internal blinds will reduce direct solar gains, control radiant heat and increase comfort without compromising the connection to the outside.
- **Glazing** – Considering high performance glazing, to exceed the thermal requirements of the Building Code of Australia.
- **Thermally Efficient Construction** – Consideration of thermal mass, insulation where required and the lack of insulation where beneficial. Airtightness in the façade design to reduce bulk airflow, a pragmatic approach to wrapping the entire building to exceed code requirements and using the appropriate colours and finishes.
- **Efficient HVAC System** – Selection of efficient HVAC systems with high COPs, appropriately designed to meet the needs of the internal loads. HVAC systems will require adequate efficiency, with economy cycle to promote energy

efficiency in the design. It is recommended to use floor diffuser for air conditioning of common room to reduce the volume of conditioned area in space.

- **Photovoltaic System** – Incorporating at least a 99kW roof-mounted PV system to reduce the energy consumption and Carbon Impact. This will contribute to *E3: Whole-of-government solar target* as required by the GREP.
- **Water Efficient Fixtures and Fittings** - Selection of low-flow showers and taps, which will reduce the hot water demand across the development associated with showering, sinks and hand basins.
- **Efficient Lighting Systems** – Providing high efficiency LED and fluorescent lighting with lighting controls including timers and occupancy sensors to reduce the demand on the lighting system.
- **Energy Efficient Appliances** – Specifying high energy star rated refrigerators/freezers and dishwashers to improve general building energy use, minimum ratings (as per *E3: Minimum Standards for New Electrical Appliances and equipment* of the GREP) include:
    - **Refrigerators -** 2.5 Stars
    - **Dishwashers** – 4 stars
    - **Fridge/freezers** – 3.5 Stars
    - **Freezers** – 3 Stars
    - **Televisions** – 5 stars

  Computers, printers, photocopiers and DVD players will have an Energy Star label recognising high efficiency.
- **Smart Energy Metering and Monitoring** - Metering shall be designed to meet metering guidelines under the weights and measurement legislation, as outlined under the current National Measurement Regulations. A detailed monitoring system will be installed to help with early identification of excessive energy users. Metering to be provided to each floor and for any single loads exceeding 5% of the total energy use, or 10% of the total water use.

3.1.1 NCC Section J - Building fabric requirements

NCC 2019 Section J – energy efficiency provisions will apply to the design & construction of the development with the intent to ensure the build form and associated building services demonstrate a minimum level of energy efficiency performance.

All conditioned (heated or cooled) areas of the project are required to comply with the thermal performance requirements of Section J 2019. In order to demonstrate section J compliance, the conditioned areas will be assessed in accordance with the energy modelling provisions of an Alternative Solution, known as a JV3 Performance Solution assessment.

A Performance Solution is based on assessing the energy performance of a proposed building against that of a reference building. This involves detailed simulation modelling of the proposed buildings to provide a holistic assessment of the building's energy efficiency in accordance with the requirements of Section J of the BCA. This method of compliance provides much higher levels of flexibility in the design of a building's envelope.

The proposed building fabric will likely exceed prescriptive values in order to work with the architecture and mechanical performance of the building, including:

- **Windows:** As required to exceed compliance. Options include:
    - Double glazed systems
    - Low E coatings
    - Shading structures as documented

- Operable windows for efficiencies

A detailed NCC Section JV3 report is to be provided in association with the project tender design demonstrating compliance with the provisions of the NCC Section J – energy efficiency.

3.1.2 Energy Target Compliance – NSW HI ESG (7.4)

As part of the project's sustainability drivers & under the mechanical consultant services scope of works, the project design team is required to demonstrate the 10% improvement on NCC Section J via JV3 energy modelling protocols. Detailed computer simulation in accordance with Specification JV3 is to demonstrate compliance via a full year energy demand assessment. A number of different design elements and configurations are to be considered to reduce impacts on energy consumption, including:

- Consideration of gravity systems and inherently low energy demand designs and techniques, all mechanical equipment to comply with minimum energy performance (MEPS)
- Energy management systems integrated with a direct digitally controlled BMCS allows monitoring, targeting and load-shedding capability of selected plant
- The incorporation of modular variable speed pumps to minimise and reduce energy output for peak and non-peak demands
- Efficient insulation of hot and warm water distribution pipework to minimise heat losses
- Consideration of energy input for hot water systems including energy and heat recovery from mechanical plant heating systems including tri-generation where applicable
- System zoning and time control of reticulated services to enable maximum turn down during night and weekend off peak parameters
- Intelligent design of maintenance and duty-cycle parameters to ensure availability and maintenance cycles encourage energy efficiency, noting that tariff efficiency may also be impacted in terms of load-factor issues for example.

3.2 Water Efficiency

Reduced potable water demand is a key ESD initiative identified within industry best practice standards. The development is targeting a reduction in potable water demand via the inclusion of the following initiatives:

- **Sanitary Fixtures** - By implementing low-flow water fixtures, the consumption associated with the bathrooms will be significantly reduced. As per *W3: Minimum Standards for New Water-using Appliances* of the GREP, all sanitary fixtures are to be at least the WELS ratings identified below:

Fixture / Equipment Type	WELS Rating (minimum)
Taps	5 Star
Toilet	4 Star
Showers	3.5 Star (<= 9 L/min)
Dishwashers	5 Star

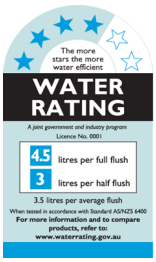


Figure 4: Example of a WELS water efficiency rating label.

- **Utility Meters and Water Consumption Monitoring** - Metering will be designed to meet metering guidelines under the weights and measurement legislation, as outlined under the current National Measurement Regulations. A water monitoring system will be installed to help with early identification of leaks.
- **Rainwater Capture and Reuse** – A 20kL rainwater tank will optimize the potential for rainwater reuse on the site.
- **Fire System Test Water Reuse –** Fire sprinkler system test water from the main works will be directed into the rainwater tank for reuse on the landscaping.

3.3 Environmentally Friendly Materials

In accordance with the Project's principles, it is essential to ensure the materials that are consumed or utilised in health areas are organic and non-toxic, since they are all equally exposed to the composition of the materials. To meet the requirements of *A2: Low-VOC materials* of the GREP, The Muswellbrook Stage 3 Redevelopment is targeting to use environment-friendly via the inclusion of the following initiatives:

- **Low Volatile Organic Compound (VOC) -** Selection of all paints, carpets, adhesives and sealants used on site from low volatile organic compound (VOC) content.
- **Low Formaldehyde Emission Wood -** Selection of engineered wood products from low formaldehyde emission products.

3.4 Material Waste Management

Construction Waste

Construction and demolition waste is becoming much easier to recycle as the traditional landfill evolves into waste recovery centres. Construction waste will be managed through contractual requirements outlining the target recycling rate within the main works contract with an indicative target of 90% recycling for the construction and demolition waste produced on this project.

Operational Waste

Operational waste which involves the waste produced in the day-to-day operations of the project can also be minimised through effective sorting methods. A dedicated on-site waste management plan has been prepared, for further information refer dedicated waste management plan report.

3.5 Projected Impacts of Climate Change

As part of the provisional design response for the project, an assessment of project risks associated with the predicted impacts of Climate Change must be undertaken for the proposed development. The assessment has been undertaken to ensure the project design allows for suitable provisions for the predicted impact of climate change scenarios.

To do so, risk assessment of the potential environmental impacts and provide responsive design solutions in collaboration with technical consultants for the following challenge are essential:

- Climate Adaptation for extreme weather conditions
- Heat island effect mitigation
- On site renewable energy generation
- High quality practices for longevity in building design and construction

The table below summarises the projected impacts of climate change across two scenarios (RCP4.5 and RCP8.5*): the near future 2020-2039 (referred to 2030) and far future 2080-2099 (referred to 2090). These projections are generalised for the 'East Coast Cluster' region as defined by the CSIRO and BOM and is taken as the most representative of the proposed site's future climate-change enhanced conditions in Sydney. *Representative Concentration Pathway – 4.5 represents normalised emission levels. 8.5 represents worst case scenario based upon 2005 emissions trends.

Climate Variable	Climate Projections (change relative to 1986 – 2005 baseline)			
	2030		2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5
Maximum temperature change (°C)	0.9 (0.6 to 1.2)	1.0 (0.6 to 1.2)	1.9 (1.4 to 2.4)	2.3 (1.8 to 2.8)
Minimum temperature change (°C)	0.9 (0.7 to 1.1)	1.0 (0.7 to 1.1)	1.8 (1.3 to 2.3)	2.3 (1.8 to 2.8)
Extreme temperature (days per year over 35°C)	4.7	7.82	14.0	19.84
	Substantial increase in intensity and frequency of extreme temperature days			
Mean annual rainfall change (%)	-2.7 (-9.8 to 4.4)	-3.9 (-9.8 to 4.4)	-4.7 (-14.4 to 5)	-2 (-13.6 to 9.6)
Extreme rainfall	Extreme rainfall events to increase in intensity			
Drought	Time spent in drought conditions to increase			
Bushfire weather (Number of severe fire danger days; FFDA > 50)	Severity of fire-weather climate to increase			
Solar radiation (%)	0.8 (-0.2 to 1.8)	0.8 (-0.2 to 1.8)	1.1 (-0.1 to 2.3)	1.4 (-1.4 to 2.2)
Relative humidity (%, absolute)	-0.7 (-2.2 to 1.8)	-0.9 (-2.2 to 0.8)	-1.7 (-3.6 to 0.2)	-0.7 (-3.3 to 1.9)
Wind Speed (%)	0.5 (-5.6 to 6.6)	2.3 (-5.6 to 6.6)	0.2 (-6.3 to 6.7)	2.3 (-6.4 to 11)
Sea level rise (m)	0.13 (0.09 to 0.18)	0.14 (0.10 to 0.19)	0.47 (0.30 to 0.65)	0.66 (0.45 to 0.88)

Table 1: Summary of Climate Change Projections Source: Climate Change in Australia, CSIRO

Summary of major impacts assessment:

Mean & Average Temperature

With very high confidence, air temperatures are projected to increase due to continued substantial warming from a mean warming of around 0.7°C by 2030 and continue to rise by 2°C by 2070 relative to the climate of 1986-2005. Because of rising temperatures, peak temperature events will become more frequent whereby the number of days above 35°C are expected to more than double by 2030 and triple by 2080 (CSIRO, 2022).

In response to the above, the project design seeks to ensure the passive thermal design elements are fundamentally sound ensuring that average daily temperature and peak extreme temperature days are managed as best as possible. External shading, glazing design, HVAC and natural ventilation shall all be fundamentally proven to ensure the proposed project design responds appropriately to the projected risks of climate change.

3.5.1 Responses to Impact Assessment

The Project aims to implement the following initiatives to combat the following climate related challenges described above:

Climate Adaptation for extreme weather conditions/Resilience of the development against climate change

The development is targeting a 10% over-and-above improvement on the NCC 2019 energy efficiency requirements. This will improve the ability of the building to maintain comfortable indoor temperatures in response to the expected external ambient temperature rises.

Furthermore, the use of water efficient fixtures can reduce the consumption of potable water, mitigating the projected reduction in rainfall levels and alleviate pressure on available potable water.

On site renewable energy generation

A solar photovoltaic system is being proposed for the development. Through the ability to generate renewable energy onsite, the reliance on fossil fuelled power generation is reduced.

High quality practices for longevity in building design and construction

By reviewing the services and maintainability of the building design and ensuring a detailed commissioning process occurs, longevity of the design and construction can be ensured.

4. Summary

The proposed Muswellbrook Stage 3 Redevelopment will incorporate several ecologically sustainable initiatives and energy efficiency measures. These have been developed as a specific response to:

- NSW Environmental Planning and Assessment Regulation 2021;
- NSW Government Resource Efficiency Policy
- National Construction Code (NCC) 2019 Amendment 1
- Health Infrastructure Design Guidance Note No.058 – Environmentally Sustainable Development
- Health Infrastructure (HI) ESD Evaluation Tool
- Muswellbrook Development Control Plan (DCP) 2009

Through the following initiatives presented in this report:

- Energy Efficiency initiatives (10% NCC improvement, energy ratings of appliances, led light fixtures, PV system)
- Water Efficiency Initiatives (WELS ratings on fixtures/appliances)
- Sustainable Material selection (Low VOC materials)

The proposed development will comply with 2012 Sydney Development Control Plan ESD requirements.

The ESD initiatives outlined in this report reflect the Project's design development to date and a summary of the proposed response to the drivers nominated above & the expectations of NSW HI. The specific initiatives that will be installed across the development will be determined throughout the design finalisation process and will be subject to feasibility analysis, including that of the final use and layout provided by the main works contractor.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of concepts including:

- Energy and greenhouse gas emissions
- Potable water reduction
- Minimising waste to landfill
- Occupant amenity and comfort
- Environmentally-friendly materials
- Building management practices

Appendix A HI ESD Evaluation Pathway

CATEGORY / CREDIT	AIM OF THE CREDIT / SELECTION	CODE	CREDIT CRITERIA	POINTS AVAILABLE	INPUT	Standard Practice (1) Minimum requirement (C)	4 Star Targeted Points (min 45 + 5 buffer)	Community Health - NA Credits	Discipline Design Requirements	Risk Level	Comments
Management				14			49				
Accredited Professional	To recognise the appointment and active involvement of an Accredited Professional (under an Environmental Rating System) in order to ensure that the rating tool is applied effectively and as intended.	1.0	Accredited Professional	1	ESD	1	1			Low	
Commissioning and Tuning	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2.0	Environmental Performance Targets	-	HI	C	C			Low	
		2.1	Services and Maintainability Review	1	PM	1	1		Provide document records (e.g. meeting minutes) demonstrating the project design has considered: - Commissionability; - Controllability; - Maintainability; - Operability, including 'Fitness for Purpose'; and - Safety.	Low	
		2.2	Building Commissioning	1	PM ARCH MECH ELEC STERILE HYD FIRE CONTR	1	1		PM: Provide extract from construction tender documents that will require "a Commissioning Plan that includes the following: - Objectives, or basis, of the design; - Scope of the commissioning plan; - Commissioning team list, the individual responsibilities and interface matrix; - General sequence of commissioning; - Proposed commissioning procedures; - Witnessing requirements; - Commissioning program; and - Requirements for subcontractor commissioning manuals." ARCH, MECH, ELEC, STERILE, HYD, FIRE: Provide extracts for tender documents that list the commissioning requirements, including the following: - List the design parameters for each system; - List the required commissioning activities; - Define how each system is intended to operate; and - List the acceptable tolerances during commissioning.	Low	
		2.3	Building Systems Tuning	1	HI	1	1		HI: Provide confirmation that HI is committed to a 12-month tuning period, including engagement of building services contractors to make quarterly adjustments, and oversight from the building's facility management team.	Low	
		2.4	Independent Commissioning Agent	1	HI HNE	1	1		HI: Provide confirmation that HI or a facility manager will be reviewing the commissioning plan and commissioning results. HI do provide commissioning support to the LHD.	Low	
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Implementation of a Climate Adaptation Plan	2	PM ESD		0	N/A	PM: Engage an ESD consultant to undertake a climate change risk assessment and adaptation plan. Allow for implementation of adaptive measures.	Low	**STN (ESD)**- Opportunity to target this credit.
Building Information	To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance.	4.1	Building Information	1	PM	1	1		PM: Provide extract from construction tender documents that requires the provision of "operations and maintenance information, including operating parameters and procedures, and preventive maintenance requirements, including procedures and schedules".	Low	
Commitment to Performance	To recognise practices that encourage	5.1	Environmental Building Performance	1	HI	1	1		Performance targets are outlined in DGN 058	Low	

	building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.2	End of Life Waste Performance	1	PM		0		PM: HNE to sign End of Life Waste Performance Letter	Med	
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems.	6.0	Metering	-	MECH ELEC HYD	C	C	N/A	MECH, ELEC: Provide floor-by-floor metering if the entire floor has a single use. If a floor has multiple uses, the different uses shall be metered. Therefore, should a floor be composed of office space and a seminar room, both spaces shall be separately sub-metered. If a floor has multiple tenants, each tenancy shall also be separately sub-metered. Where an energy load for a single item exceeds 5% of the total energy use for the building, or 100kW, it must be independently metered. HYD: Provide floor-by-floor water & gas (if relevant) metering if the entire floor has a single use. If a floor has multiple uses, the different uses shall be metered. Where a common water use consumes 10% of the project's water use, these must be independently metered e.g. cooling towers.	Low	
		6.1	Monitoring Systems	1	MECH	1	1	N/A	MECH: Specify a monitoring system which is capable of: • Collecting data from all meters; • Alerting to missing data due to failures; • Recording energy use and water consumption, and providing a reporting capability at user adjustable intervals; • Raising an alarm when the energy or water use increase beyond certain parameters and automatically and instantly issue an alert the facilities manager. • Providing a breakdown of the information by building system (mechanical, electrical, etc.), or by space (or by tenanted floor); • Including the consumption water or energy, the load versus time (load profile), and the power factor (in the case of energy); and • Producing, as a minimum, a quarterly report that is automatically emailed to the facilities manager responsible for the building.	High	**STN (ESD)**- Electrical have confirmed that separate meters for lighting, power & mechanical - NCC 2022. Water Metering community health ring main and supply to the CSSD. Operating theatres have existing metering.
Responsible Building Practices	To reward projects that use best practice formal environmental management procedures during construction.	7.0	Environmental Management Plan	-	CONTR	C	C		CONTR: Provide EMP	Low	
		7.1	Formalised Environmental Management System	1	CONTR	1	1		CONTR: Provide EMS	Low	
		7.2	High Quality Staff Support	1	CONTR		1		CONTR: Provide mental health and physical wellbeing programs and initiatives to sub-contractors. Provide sustainability education in site-inductions.	Med	
Operational Waste	Performance Pathway	8A	Performance Pathway - Specialist Plan	1	HNE	1	1		HNE/HI: Provide Operational Waste Management Plan. StantecA-GCOR-000071	Low	
		8B	Prescriptive Pathway - Facilities	-	WASTE						
Total				**14**		**10**	**11**				

Indoor Environment Quality				17							
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9.1	Ventilation System Attributes	1	MECH ARCH		1	N/A	MECH: Design minimum separation distances in accordance with ASHRAE Standard 62.1:2013. Provide access to both sides of all moisture and debris-catching components, within the air distribution system. ARCH: Coordinate locations of access panels or a tiled ceiling with mech.	Med	
		9.2	Provision of Outdoor Air	2	MECH				MECH: Provide outdoor air at a rate 50% greater than the minimum required by AS 1668.2:2012.		
		9.3	Exhaust or Elimination of Pollutants	1	HI HNE		1	N/A	MECH: All kitchens must be ventilated in accordance with AS 1668.2:2012. A separate exhaust system must be provided for the kitchen exhaust. ARCH: All kitchens must be physically separated from adjacent spaces or have an opening no larger than an area of 2.5m2. HI: printing and/or photocopying equipment must be certified in accordance with one of the following test standards: - ECMA-328; - RAL-UZ 171; or - GGPS.003	Low	
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels	1	HI ACOUS		1	N/A	HI: Engage an acoustic consultant ACOUS: Design internal ambient noise levels in the nominated area to be no more than 5dB(A) above the lower figure in the range recommended in Table 1 of AS/NZS2107:2016.	High	R45 acoustically treated doors may be quite heavy.
		10.2	Reverberation	1	HI ACOUS		1		HI: Engage an acoustic consultant ACOUS: reverberation time in the nominated area to be below the maximum stated in the 'Recommended Reverberation Time' provided in Table 1 of AS/NZ 2107:2016.	Low	
		10.3	Acoustic Separation	1	HI ACOUS		1	N/A	HI: Engage an acoustic consultant ACOUS: The partitions between spaces to be constructed to achieve a weighted sound reduction index (Rw) of: - At least 45; for all partitions which are: - Fixed without a door; and/or - Glazed partitions without a door. - At least 35; for all partition types that contain a door.	Med	

Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.0	Minimum Lighting Comfort	-	ELEC		C			Low	
		11.1	General Illuminance and Glare Reduction	1	ELEC		1		ELEC: Specify electronic drivers that feature 12-bit or greater resolution for all Light emitting Diode (LED) lighting. Specify lighting with a minimum CRI of 80. Lighting levels comply with Table F1 of AS/NZS 1680.2.2. All bare light sources are specified to be fitted with baffles, louvers, translucent diffusers, ceiling design, or other means that obscures the direct light source from all viewing angles of occupants, including occupants looking directly upwards.	Low	
		11.2	Surface Illuminance	1	ARCH ELEC				ARCH: Surface reflectance for ceilings to be at least 0.75. ELEC: Design 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. Provide an estimate of the % achieved with the current design.	High	
		11.3	Localised Lighting Control	1	ELEC		0		ELEC: Provide direct lighting control for patients and staff.	Low	**STN (ESD)-** HI have confirmed that there are no overnight patients.
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12.0	Glare Reduction	-	ARCH		C		ARCH: Provide blinds with a visual light transmittance of <10%.	Low	
		12.1	Daylight	2	ESD		0		ESD: Prescriptive methodology assessment.		**STN (ESD):** Credit being dropped following revised scope of works.
		12.2	Views	1	ARCH		0	N/A	ESD: Prescriptive methodology assessment.		**STN (ESD):** Credit being dropped following revised scope of works.
Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1	Paints, Adhesives, Sealants and Carpets	1	ARCH		1		ARCH: Specify low VOC paints and carpets.	Low	
		13.2	Engineered Wood Products	1	ARCH		1		ARCH: Specify low formaldehyde engineered wood produts: particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels	Low	
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	MECH		1	N/A	MECH: Provide thermal comfort modelling results.	Low	
		14.2	Advanced Thermal Comfort	1	MECH				MECH: Provide thermal comfort modelling results.	High	
Total				**17**		**0**	**9**				

Energy				22							
Greenhouse Gas Emissions	A. Prescriptive Pathway	15A.0	Conditional Requirement: Prescriptive Pathway	-							
		15A.1	Building Envelope	1							
		15A.2	Glazing	1							
		15A.3	Lighting	1							
		15A.4	Ventilation and Air-conditioning	1							
		15A.5	Domestic Hot Water Systems	1							
		15A.6	Accredited GreenPower	5							
		15B.0	Conditional Requirement: NatHERS Pathway	-							
		15B.1	NatHERS Pathway	-							
		15C.0	Conditional Requirement: BASIX Pathway	-							
		15C.1	BASIX Pathway	-							
		15D.0	Conditional Requirement: NABERS Pathway	-							
		15D.1	NABERS Energy Commitment Agreement Pathway	-							
Greenhouse Gas Emissions		15E.0	Conditional Requirement: Reference Building Pathway	-	MECH ELEC	C	C	N/A			
		15E.1	Comparison to a Reference Building Pathway	20		1	10	N/A	MECH: Provide energy modelling results. CO2 sensors or timers for demand control ventilation. ARCH: Provide a 15% increase in insulation and glazing thermal performance compared to minimum compliance. ELEC: Provide illumination power density 15% lower than maximum allowance under J6. Provide a 99kW solar PV system.	Med	**STN (ESD)**- HI have confirmed that solar PV will remain on the project.
Peak Electricity Demand Reduction	Prescriptive Pathway	16A	Prescriptive Pathway - On-site Energy Generation	-	ELEC						
		16B	Performance Pathway - Reference Building	2	ELEC MECH		1	N/A	ELEC: Provide solar PV to reduce peak electricity demand by 30%. 50kW system proposed 22/04/2022. 99kW system requested to meet the points target for Credit 15. MECH: Provide peak energy modelling results.	Med	
Total				**11**		**1**	**11**				

Transport				**10**							
Sustainable Transport	Performance Pathway	17A.1	Performance Pathway	10	PM TRANS	1			Unlikely to achieve any points. No mode share change. There is a bike rack available near the building entrance. PM: Engage a green travel transport consultant if this credit is to be pursued. TRANS: Complete the Sustainable Transport Calculator; Green Travel Plan		
		17B.1	Access by Public Transport								
		17B.2	Reduced Car Parking Provision								
		17B.3	Low Emission Vehicle Infrastructure						ARCH: Provide electric vehicle chargers for 5% of all parking spaces. Capacity for EV fleet.		**STN (ESD)-** Opportunity to target this credit. HI and HNE LHD to investigate opportunities. JHA (electrical) to confirm.
		17B.4	Active Transport Facilities						ARCH: Provide end-of-trip facilities and protected bike parking		**STN (ESD)-** Opportunity to target this credit if end-of-trip facilities (bike racks, showers) are provided. HI and HNE LHD to investigate opportunities. Architects to confirm.
		17B.5	Walkable Neighbourhoods						Walk score of 80 required. Site achieves score of 43.		
Total				**10**		**1**	**0**				
Water				**12**							
Potable Water	Prescriptive Pathway	18A.1	Potable Water - Performance Pathway	12	HYDR		0		Pathway uses the below design requirements, plus RO water reuse on the landscaping. 5 Star targeted points includes rainwater use on toilets		**STN (ESD):** Credit is dropped following revised scope of works.
		18B.1	Sanitary Fixture Efficiency	-	HYDR	1	1		HYDR: Specify minimum WELS ratings - Taps 5 Star, Urinals 4 Star, Toilets 4 Star, Showers 3 Star (6.0 but <=7.5L/min), Clothes Washing Machines 4 Star, Dishwashers 5 Star.	Low	
		18B.2	Rainwater Reuse	-	HYDR	-			HYDR: Provide rainwater capture and reuse infrastructure for irrigation and other end uses as possible. Murrurundi & Tamworth Hospitals have used rainwater reuse for toilet flushing. LHD would like it considered to patient & staff bathrooms.		
		18B.3	Heat Rejection	-	MECH		2		No cooling towers	Low	
		18B.4	Landscape Irrigation	-	LAND	1			LAND: Drip irrigation with moisture sensor override or no potable water is used for irrigation.		**STN (ESD)-** Opportunity to target this credit if landscape is included in scope of works. HI and HNE LHD to investigate opportunities. Architects to confirm.
		18B.5	Fire System Test Water	-	FIRE	1			FIRE: Reuse of 80% of the sprinkler system test water for application on landscaping. Recirculation closed-loop system can be considered too.		
Total				**12**		**3**	**3**				

Materials				**14**							
Life Cycle Impacts	Prescriptive Pathway - Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment	0							
		19A.2	Additional Life Cycle Impact Reporting	4							
		19B.1	Concrete	3	STRUC	1	1	N/A	STRUC: Specify that a 30% reduction of the absolute quantity by mass of Portland cement across all concrete used in the project shall be achieved by substitution with fly-ash and/or blast furnace slag.	Med	**TTW (STRUC):** We believe this is possible across the project providing the sturctural performance specifiation can be met.
		19B.2	Steel	1	STRUC	1	1	N/A	STRUC: For a steel framed building, achieve a reduction in the mass of steel framing through the use of high strength steel. A minimum of 95% of category A products and 25% of category B products must meet the strength grades specified in Table 19B.2.1 and Table 19B.2.2 of the Green Star Design & As Built Steel Credit. For a concrete framed building, a 5% reduction in mass of reinforcing steel used in the building shall be achieved by optimal fabrication or by innovative structural design. STRUC to provide a paragraph demonstrating how this has been achieved in accordance with Section 19.B.2B of the Green Star Design & As Built Steel Credit.	Low	**TTW (STRUC):** Requirement for high strength steel for 95% of category A – the light-steel framing (stud and truss) will be minimum G450 which should meet this requirement.Requirement for high strength steel for 25% of category B - the steel columns will need to be specified as SHS sections to achieve this requirement (G450)
		19B.3	Building Reuse	4							
		19B.4	Structural Timber	4	STRUC						
Responsible Building Materials	To reward projects that include materials that are responsibly sourced or have a sustainable supply chain.	20.1	Structural and Reinforcing Steel	1	STRUC	1	1	N/A	STRUC: Specify that 95% of the building's steel (by mass) is to be sourced from a Responsible Steel Maker. For a steel framed building, 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. For a concrete framed building at least 60% of all reinforcing bar and mesh is produced using energy-reducing processes in its manufacture.	Low	**TTW (STRUC):** We believe this is possible to achieve.
		20.2	Timber Products	1	ARCH STRUC	1	1		ARCH, SRUC: Specify that all timber used in the building and construction works is FSC or PEFC certified. Timber products include: formwork, hoardings, structural timber, internal walls, cladding, flooring, wall and ceiling finishes, furniture items, plywood.	Low	**TTW (STRUC):** Noted. This will be added to the concrete spec with respect to formwork only. All other applications are non structural.
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	HYDR MECH ELEC ARCH	1	1		HYDR, MECH, ARCH, STRUC: All products containing PVC are to hold a Best Practice PVC Certificate, a JAS-ANZ audit verification certificate stating the GBCA's Best Practice Guidelines for PVC, or a product accreditation certificate from a GBCA accredited scheme.	Low	**TTW (STRUC):** Non structural.

Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability	3	ARCH STRUC		3		Targeting a total of 3% of the cost of all products to have sustainability credentials. ARCH: Specify approximately 30% of all products to have Environmental Product Declarations (EPDs) or third party certifications e.g. GECA or GreenTag. STRUC: Specify any precast concrete and all steel to have Environmental Product Declaration (EPDs)	Med	**STN (ESD)-** Use of sustainable products suggested by HNE LHD such as: - **SaveBoard:** Roof boards, ceiling tiles, internal lining - **Resourceful Living**: Recycled interior furniture - i**Q Renew**: Glass sand produced from recycled glass can be used in construction - **Kandui Technologies:** Green ceramics made from recycled glass and textiles that can be used for wall/floor tiles, slabs for bench tops, tabletops and other products.
Construction and Demolition Waste	Fixed Benchmark	22A	Fixed Benchmark	-	CONTR						
		22B	Percentage Benchmark	1	CONTR	1	1		CONTR: Divert 90% of C&D waste from landfill.	Med	
Total				**12**		**6**	**9**				
Land Use & Ecology				**6**							
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	ECO	C	C	N/A	Upgrade of an existing building.		
		23.1	Ecological Value	3					Limited landscaping		
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	LAND	C	C	N/A			
		24.1	Reuse of Land	1		1	1		Upgrade of an existing building.	Low	
		24.2	Contamination and Hazardous Materials	1	ENV CONT	1	1		ENV: Provide a Contamintation and Hazardous Materials Survey CONT: Remove or stabilise contamintants and hazardous materials in accordance with best practice.	Low	
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	ARCH	1	0	N/A	ARCH: Specify roof materials to have a minimum Solar Reflectance Index of 82.	Med	**STN (ESD):** Credit is dropped following revised scope of works.
Total				**6**		**3**	**2**				
Emissions				**5**							
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	CIVIL	1	0	N/A	CIVIL: Ensure the post-development peak event stormwater discharge from the site does not exceed the pre-development peak event stormwater discharge, using a 5 year ARI.		**STN (ESD):** Credit is dropped following revised scope of works.
		26.2	Stormwater Pollution Targets	1	CIVIL	1	0	N/A	CIVIL: Achieve pollution reduction in accordance with column A from "Table Emi-5.1: Pollution Reduction Targets".		**STN (ESD):** Credit is dropped following revised scope of works.
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	ELEC		C		ELEC: Confirm compliance with AS 4282 Control of the obtrusive effects of outdoor lighting	Low	
		27.1	Light Pollution to Night Sky	1	ARCH ELEC		1		ARCH, ELEC: No external luminaire may have an upward light output ratio greate than 5% i.e. no uplights.	Low	

Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1		1	1		MECH: Water-based heat rejection system is to be built in accordance with AS/NZS 3666.1:2011. The system is to be designed and built to maintain constant movement to prevent water stagnation in the system; ? The water contained in the system is never to be at a temperature between 20°C and 50°C while not moving. CONT: Provide a Legionella Risk Management Plan including: Monthly inspectionsand maintenance of the system(s) as per AS/NZS 3666.2:2011 or as per a performance based maintenance program developed in accordance with AS/NZS 3666.3:2011; ? Flushing of the system(s) where the system(s) is not in operation for more than three days; and ? Inspection, cleaning and flushing of the system(s) prior to reactivation.	Low	
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	MECH						
Total				**5**		**3**	**2**				
Innovation				**10**							
Innovative Technology or Process	The project meets the aims of an existing credit using a technology or process that is considered innovative in Australia or the world.	30A	Innovative Technology or Process	10							
Market Transformation	The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world.	30B	Market Transformation - Emotional Design Brief		ARCH ESD		1		ARCH, ESD: Design in accordance with the Emotional Design Brief. Provide responses to the brief in SD Reports. Approach approved by HI & HNE on 11/10/2022	Low	
Improving on Benchmarks	The project has achieved full points in a credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Benchmarks - Ultra Low VOC		ARCH		1		ARCH: Specify ultra low VOC (<5g/L) paints.	Low	
Improving on Benchmarks	The project has achieved full points in a credit and demonstrates a substantial improvement on the benchmark required to achieve full points.	30C	Improving on Benchmarks - Tenancy Fitout Systems Review		PM				PM: Facilitate a services and maintainability review of tenancy fitout systems to ensure they are properly integrated with the base building systems.		
	Supplementary or tenancy fitout systems review	30C	Commissioning and Tuning		ICA						
	Daylight See credit	30C	Visual Comfort		ESD						
Innovation Challenge	Where the project addresses an sustainability issue not included within any of the above Credits.	30D	Innovation Challenge		HI		0		HI/Contractor: Reconciliation Action Plan and action/activity. Connection to Country.		
	Where the project addresses an sustainability issue not included within any of the above Credits.	30B	Market Transformation - Soft Landings Framework		PM				PM: Soft Landings: Facilitate at least 3 workshops between design/constructions teams and facility managers. Maintain a register with design gateways.		
	Where the project addresses an sustainability issue not included within any of the above Credits.	30D	Innovation Challenge		HNE				HNE: Provide a Green Cleaning policy including HEPA filters on vacuum cleaners, procurement guidelines & methods of use for all cleaning products that employ best environmental practice, and adhere to the Australian National Health and Medical Research Council's Guidelines for routine environmental cleaning.		

Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this rating tools.	30E	Global Sustainability - LEED - Places of Respite		ARCH		0		ARCH: Wheelchair seating spaces will be indicated on the plans (min 1 space per 5 seating spaces). Staff rooms have direct line of sight to nature. Outdoor signage indicating 'No Smoking' areas will be included in the design and these will be placed least 7.6m away from respite areas. Outdoor wayfinding signage will meet AusHFG and HI NSW Guidelines instead of the 2010 FGI Guidelines for Design and Construction of Health Care Facilities. A departure will be requested from HI for this criteria. Provision of spaces of respite for staff are slightly larger than the minimum AusHFG Schedules of Accommodation staff rooms i.e. 17m2 instead of 15m2 for the IPU. Strictly-speaking, it is less than required under the LEED Credit (24.12m2). Approach approved by HI & HNE at a meeting on 11/20/2022.		**STN (ESD)**- Opportunity to target this credit if landscape is included in scope of works. HI and HNE LHD to investigate opportunities. Architects to confirm.
Total				**10**		**0**	**2**				
TOTAL						**27**	**49**				
LEED BD+C: New Construction | v4.1 - LEED v4.1											
Open Space	To create exterior open space that encourages interaction with the environment, social interaction, passive recreation, and physical activities.				LAND		TBC				**STN (ESD):** Addition of new landscaped courtyard between new and existing building increases area of open space.
Places of Respite	To provide patients, staff, and visitors with the health benefits of the natural environment by creating outdoor places of respite on the healthcare campus.				ARCH		TBC		Lounges look out on to landscaped spaces. From the patient lounge the intention is to look over the landscape.		**STN (ESD):** Addition of new landscaped courtyard between new and existing building increases area of outdoor spaces of respite.
Direct exterior access	To provide patients and staff with the health benefits associated with direct access to the natural environment.				ARCH		TBC		There are steps out to a landscaped area.		**STN (ESD):** Design of birthing suites which can potentially open to a landscaped space increases the benefits associated with access to the natural environment. Current design has landscape views from the birthing suites but they do not have access into the landscape area.
Furniture and Medical Furnishings	To enhance the environmental and human health performance attributes associated with freestanding furniture and medical furnishings.		Minimal Chemical Content		ARCH		TBC				
			Testing and Modelling of Chemical Content		CONTR		TBC				
			Multi-Attribute Assessment of Products		CONTR		TBC				
Optimize Energy Performance	To achieve increasing levels of energy performance beyond the prerequisite standard to reduce environmental and economic harms associated with excessive energy use		% improvement in energy performance – % Cost PCI below PCIt		MECH		TBC				
			% improvement in energy performance – % Greenhouse Gas Emissions PCI below PCIt		MECH		TBC				
Storage and Collection of Recyclables	To reduce the waste that is generated by building occupants and hauled to and disposed of in landfills.				WASTE		TBC				
LEED Total											

WELL											
Microbe and mold control											
Mold often grows on cooling coils in HVAC systems due to moisture condensation and can be introduced into the building's indoor air. It can also occur on or within wall assemblies due to water damage or improper detailing in humid locations, for example kitchens and bathrooms. Mold spores can trigger asthma, headaches, allergies and other respiratory system disorders.	a.Ultraviolet lamps (using a wavelength of 254 nm so as not to generate ozone) are employed on the cooling coils and drain pans of the mechanical system supplies. Irradiance reaching the cooling coil and drain pan, including the plenum corners, is modelled. b.Building policy states that all cooling coils are inspected on a quarterly basis for mold growth and cleaned if necessary. Dated photos demonstrating adherence are provided to the IWBI on an annual basis. Documents MEP Drawing or Operations Schedule		Cooling Coil Mold Reduction		MECH		TBC				
	The following are not present: a.Signs of discoloration and mold on ceilings, walls or floors. b.Signs of water damage or pooling		Mold Inspections		HI		TBC				
Moisture management											
Good design principles and strategies to mitigate water damage help to preserve good indoor air quality. Moisture can enter buildings and building assemblies in four ways: bulk water, capillary water, air-transported moisture and vapor diffusion. In addition to preventing wetting from all four channels, managing moisture is also about promoting drying potential.	A point-by-point narrative describes how liquid water from outside the building is addressed, responding to the nature and intensity of wetting based on the project's site and climate, and includes the following leading concerns: a.Site drainage, including the impact of any site irrigation. b.The local water table. c.Building penetrations (especially windows and plumbing/electrical/mechanical penetrations). d.Porous building materials connected to exterior sources of liquid water.		Exterior Liquid Water Management		ARCH		TBC				
	A point-by-point narrative describes how liquid water from interior sources is addressed, including these leading concerns: a.Plumbing leaks. b."Hard-piped" plumbing appliances (appliances such as clothes washers exposed to building water pressure even when not in use). c.Porous building materials connected to interior sources of liquid water. d.New building materials with "built-in" high moisture content or building materials wetted during construction but now on the inside of the building.		Interior Liquid Water Management		HYDR		TBC				
	A point-by-point narrative describes how condensation is addressed, including these leading concerns: a.High interior relative humidity levels, particularly in susceptible areas like bath and laundry rooms and below-grade spaces. b.Air leakage which could wet either exposed interior materials or interstitially "hidden" materials. c.Cooler surfaces, such as basement or slab-on-grade floors, or closets/cabinets on exterior walls. d.Oversized air conditioning units.		Condensation Management		MECH		TBC				

	A point-by-point narrative describes how moisture-tolerant materials have been selected and/or moisture-sensitive materials (MSP) are being protected, considering these leading concerns: a.Exposed entryways and glazing. b.Porous cladding materials. c.Finished floors in potentially damp or wet rooms such as basements, bathrooms and kitchens. d.Interior sheathing in damp or wet rooms. e.Sealing and storing of absorptive materials during construction.		Material Selection and Protection		ARCH		TBC				
Air flush											
An air flush or building flush is a technique whereby air is forced through a building after construction and prior to occupancy in order to remove or reduce pollutants, such as VOCs and particulate matter, inadvertently introduced indoors during construction. Air flushing improves indoor air quality by limiting the exposure to an intense contamination period.	A building air flush is performed while maintaining an indoor temperature of at least 15 °C and relative humidity below 60%, at one of the following volumes: a.A total air volume of 4,266 m^3 of outdoor air per m^2 of floor area prior to occupancy. b.A total air volume of 1,066 m^3 of outdoor air per m^2 of floor area prior to occupancy, followed by a second flush of 3,200 m^3 of outdoor air per m^2 of floor area post-occupancy. While the post-occupancy flush is taking place, the ventilation system must provide at least 0.1 m^3 per minute of outdoor air per m^2 of floor area at all times.		Air Flush		CONTR		TBC				
Air infiltration management											
Indoor air quality and thermal comfort can be compromised by leaks and gaps that break the building's air barrier. These weak points are not only wasteful but can also lead to conditions conducive to growth of molds and the infiltration of pests or polluted air.	The following is performed after substantial completion and prior to occupancy to ensure the structure is airtight: a.Envelope commissioning in accordance with ASHRAE Guideline 0-2005 and the National Institute of Building Sciences (NIBS) Guideline 3-2012 (for new construction or structural renovation). b.Detailed plan for action and remediation of unacceptable conditions.		Air Leakage Testing		CONTR		TBC				
	One of the following methods is used to evaluate the building envelope: a.Blower door testing. b.Infrared thermography. c.Hot-wire anemometer.		Leak Tests for Residences		CONTR		TBC				
Increased ventilation											
The guidelines put forth by ASHRAE provide the basis for acceptable indoor air quality, but not necessarily for best-in-class air quality for buildings. Unusually high building occupancy, a high risk of accidents that might degrade air quality or space capacity to install filtration make exceeding ASHRAE requirements a worthwhile strategy.	One of the following is required in all regularly occupied spaces: a.Exceed outdoor air supply rates met in Feature 03, Part 1a by 30%. b.Follow CIBSE AM10, Section 4, Design Calculations, to predict that room-by-room airflows will provide effective natural ventilation.		Increased Outdoor Air Supply		MECH		TBC				

Humidity control											
Extremely low humidity can lead to dryness and irritation of the skin, eyes, throat and mucous membranes. Conversely, high humidity may promote the accumulation and growth of microbial pathogens, including bacteria, dust mites and mold, which can lead to odours and cause respiratory irritation and allergies in sensitive individuals. Additionally, higher humidity levels can lead to increased off-gassing: an increase in relative humidity of 35% can increase the emissions of formaldehyde by a factor of 1.8–2.6.	At least one of the following is required: a.A ventilation system with the capability to maintain relative humidity between 30% to 50% at all times by adding or removing moisture from the air. b.Modeled humidity levels in the space are within 30% to 50% for at least 95% of all business hours of the year. Buildings in climates with narrow humidity ranges are encouraged to pursue this option.		Relative Humidity		MECH		TBC				
	The following is required between showers and changing rooms, if present: a.An airlock or ventilation barrier		Shower Moisture Barrier		MECH		TBC				
Operable windows											
Achieving natural ventilation through open windows, doors and louvers can provide a positive occupant experience, but challenges the ability to maintain strict control over interior air quality. When weather and local ambient parameters indicate high quality outdoor air, WELL encourages the use of natural ventilation strategies. Open windows can then provide a supply of outdoor air and lower the levels of carbon dioxide and VOCs, such as formaldehyde, without compromising indoor air quality.	Every regularly occupied space has operable windows that provide access to outdoor air and daylight.		Full Control		ARCH		For individual ward spaces May not be possible for shared wards				
	Outdoor levels of ozone, PM_{10}, temperature and humidity are monitored based on the following requirement, and data collected is made available to the building occupants: A data-gathering station located within 1.6 km of the building.		Outdoor Air Measurement		MECH		TBC				
	If the outdoor air measurement system indicates that outdoor air either (i) exceeds ozone levels of 51 ppb or PM_{10} levels of 50 $\mu g/m^3$; (ii) has a temperature of 8 °C above or below set indoor temperature; or (iii) has a relative humidity above 60%, then one of the following is used to discourage occupants from opening windows: a.Software on occupants' computers or smartphones. b.Indicator lights at all operable windows		Window Operation Management		ARCH		TBC				
Antimicrobial activity for surfaces											
Antimicrobial activity on surfaces can accelerate the natural rate of microbial cell death. Non-leaching antimicrobial surfaces are capable of killing microorganisms upon contact without leaching significant amounts of antimicrobial materials into the surrounding environment. Alternatively, cleaning processes and equipment that use short wavelength ultraviolet light (UV-C) effectively can reduce the bacterial load on surfaces, so long as they are used with sufficient frequency to prevent the bioload from being re-established.	All countertops and fixtures in bathrooms and kitchens, and all handles, doorknobs, lightswitches and elevator buttons are one of the following: a.Coated with or comprised of a material that is abrasion-resistant, non-leaching and meets EPA testing requirements for antimicrobial activity. b.Cleaned with a UV cleaning device, used as recommended by the manufacturer.		High-Touch Surfaces		ARCH		TBC		Could be specified. For consideration later in the design.		
	All lockers, benches, and floors in the changing rooms, if present, are coated with or comprised of a material which meets the following: a.Abrasion-resistant and non-leaching. b.EPA testing requirements for antimicrobial activity.		Changing Room Coating		ARCH		TBC		No changing rooms.		

Cleanable environment											
Surfaces exposed to frequent human touch can harbor microbes and toxins for extended periods of time. However, these surfaces can be kept sanitary if they are designed with suitable materials that facilitate easy cleaning. This reduces the need for cleaning products that contain potentially toxic chemicals and may also reduce the frequency of cleaning.	High-touch and non-porous surfaces (refer to Table A1 in Appendix C) meet the following requirements: a.Smooth and free of defects visible to the unaided eye. b.Finished to maintain smooth welds and joints. c.Free of crevices and other hard-to-reach places.		Material Properties		ARCH		TBC				
	a.No permanent wall-to-wall carpeting is used; only removable rugs, removable carpet tiles or hard surfaces are allowed. b.The building provides adequate flexible storage space for all permanent, movable items to allow high-touch surfaces to be completely cleared during cleaning. c.Right angles between walls and windows/floors are sealed.		Cleanability		ARCH		TBC				
	The following types of storage facilities must be in place in any changing rooms present: a.All lockers are open grid- or mesh-style. b.All shelves are open grid- or slat-style.		Cleanable Changing Rooms		ARCH		TBC				
Advanced cleaning											
In areas where heavy contamination is expected, advanced cleaning techniques provide an extra layer of protection that can improve environmental hygiene and reduce the risk of cross-contamination. These periodic, high-impact processes are often performed by professionals.	One of the following is required, at frequencies determined after consultation with a professional accredited service: a.Full-room UVGI sterilization treatment, performed by a professional service. b.Vaporized hydrogen peroxide treatment, performed by a professional service.		Advanced Cleaning Protocols		HI		TBC				
Drinking water promotion											
Access to clear, good-tasting water helps to promote proper hydration throughout the day. Many otherwise healthy people unknowingly suffer from mild dehydration, a condition where there is less water and fluids in the body than there should be, which results in avoidable symptoms such as muscle cramps, dry skin and headaches. Drinking plenty of water, especially when exercising and at higher temperatures is essential to ensure good hydration. Improving the taste and appearance of tap water encourages increased water consumption and reduces reliance on bottled water.	All water being delivered to the project area for human consumption: a.Aluminum less than 0.2 mg/L. b.Chloride less than 250 mg/L. c.Manganese less than 0.05 mg/L. d.Sodium less than 270 mg/L. e.Sulfate less than 250 mg/L. f.Iron less than 0.3 mg/L. g.Zinc less than 5 mg/L. h.Total Dissolved Solids less than 500 mg/L.		Drinking Water Taste Properties		HYDR		TBC				
	At least one dispenser is located within 30 m of all parts of regularly occupied floor space (minimum one per floor)		Drinking Water Access		ARCH		TBC				
	The components of dispensers that provide water for human consumption are cleaned with at least the following regularity: a.Daily, for mouthpieces, protective guards and collective basins, to prevent lime and calcium build-up. b.Quarterly, for outlet screens and aerators, to remove debris and sediment		Water Dispenser Maintenance		HI		TBC				
	At least one dispenser with free, potable water is provided per 30 students in outdoor activity areas, if present, based on average outdoor occupancy.		Outdoor Drinking Water Access		ARCH		TBC				

Hand washing											
Hand washing is one of the most important and effective means of reducing the transmission of pathogens through food. Responsible for approximately 48 million illnesses, 128,000 hospitalizations and 3,000 deaths occurring in the U.S. each year, foodborne illness is a major cause of preventable illness and death, personal distress and avoidable economic burden. Regular rinsing with soap and water helps to reduce the spread of unwanted and potentially dangerous germs. In addition, using paper towels to dry hands is more effective in removing bacteria than using air dryers. Since liquid soap in bulk refillable dispensers is prone to bacterial contamination, utilizing sealed liquid soap cartridges reduces the possibility for bacterial contamination and significantly reduces bacteria on hands whereas contaminated refillable dispensers increase bacteria on hands after hand-washing. Hand washing sinks should also provide sufficient room for washing one's hands without touching the sink sides, to prevent possible recontamination.	The following are provided, at a minimum, at all sink locations: a.Fragrance-free hand soap in accordance with the Cleaning, Disinfection and Hand Hygiene Product section in Table A4 in Appendix C. b.Disposable paper towels (air dryers are not forbidden, but are supplemented).		Hand Washing Supplies		HI		TBC				
	One of the following is provided, at a minimum, at all sink locations: a.Liquid soap in dispensers with disposable and sealed soap cartridges. b.Bar soap with a soap rack that allows for drainage.		Contamination Reduction		HI		TBC				
	Bathroom and kitchen sinks meet the following requirements: a.The sink column of water is at least 25 cm in length. b.The handwashing basin is at least 23 cm in width and length.		Sink Dimensions		ARCH		TBC		Could be specified. For consideration later in the design.		
	Bathroom and kitchen sinks meet the following requirement: a.Where applicable, a handwashing station or a clear sign pointing to the nearest handwashing station, is located at the entryway to areas intended for food consumption.		Hand Washing Station Location		ARCH		TBC		Could potentially place on in a staff room		
Interior fitness circulation											
The integration of interior pathways and stairs within the built environment can provide a convenient way to incorporate short periods of physical activity into the workday, thus reducing sedentary tendencies. Stair climbing is a low-impact, moderate-to-vigorous intensity physical activity that burns calories and has been associated with improved cardiorespiratory fitness and a lower risk of stroke. To encourage greater use, pathways and stairs should be aesthetically pleasing and easily accessible from high-traffic routes.	In projects of 2 to 4 floors, at least one common staircase meets the following requirements: a.Stairs are accessible to regular building occupants during all regular business hours. b.Throughout the space wayfinding signage and point-of-decision prompts are present to encourage stair use (at least one sign per elevator bank).		Stair Accessibility and Promotion		ARCH		TBC		External staircase could potentially be used.		
	In projects of 2 to 4 floors, at least one common staircase meets the following requirements: a.Located within 7.5 m of the main project entrance, main entry check-point (e.g., welcome/reception desk), the edge of its main lobby, or edge of its main welcome area. b.Clearly visible from the main project entrance, main entry check-point (e.g., welcome/reception desk), the edge of its main lobby, or edge of its main welcome area, or are located visually before any elevators present upon entering from the main entrance. c.Stair width set at a minimum of 1.4 m between handrails, or the width allowable by local code.		Staircase Design		ARCH		TBC				

	In projects of 2 to 4 floors, both common stairs and paths of frequent travel display elements of aesthetic appeal by incorporating at least 2 of the following throughout: a.Artwork. b.Music. c.Daylighting using windows or skylights of at least 1 m² in size. d.View windows to the outdoors or building interior. e.Light levels of at least 215 lux when in use. f.Biophilic elements.		Facilitative Aesthetics		ARCH		TBC				
Healthy sleep policy											
High quality sleep is essential to good health. Adequate sleep improves mental health, is necessary for maintaining sustained mental and physical performance throughout the day and can help prevent unhealthy weight gain. Insufficient sleep, on the other hand, has been associated with a higher risk of depression, diabetes, heart attack, hypertension and stroke. Adopting this feature demonstrates that the organization values sleep quality and understands its impact on overall worker productivity and well-being.	a.For non-shift work, introduce organizational cap at midnight for late night work and communications. b.Provide employees with a 50% subsidy on software and/or applications that monitor daytime sleep-related behavior patterns such as activity levels, caffeine and alcohol intake, and eating habits.		Non-Workplace Sleep Support		HI		TBC				
Stress and addiction treatment											
Chronic stress adversely impacts the body, from the nervous to the cardiovascular system. Substance addiction is one of the most damaging manifestations of stress, combining the toxicity of the substance itself with the mental distress associated with the social stigma of the disease. In recent years, refinements in addiction treatment and stress reduction therapies, as well as pharmacological interventions have been successful in helping to mitigate these debilitating conditions.	A program that addresses psychological and behavioural distress is made available to workplace occupants through: a.Employee Assistance Programs (EAPs) offering short-term treatment and referrals to qualified professionals for depression, anxiety, substance use, addiction and co-occurring mental health issues.		Mind and Behaviour Support		HI		TBC				
	A stress management program is made available to occupants through: a.A qualified counsellor offering group or private workshops and referrals.		Stress Management		HI		TBC				
	A program that addresses psychological and behavioural distress must be made available to students through the provision of one of the following: a.Access to short term treatment and referrals to qualified professionals for depression, anxiety, substance use, smoking cessation, addiction and co-occurring mental health issues. b.Qualified professionals such as nurses or guidance counsellors available on-site for consultations on depression, anxiety, substance use, smoking cessation, addiction and co-occurring mental health issues.		Mind and Behaviour Support for Staff		HI		TBC				

Self-monitoring											
Self-monitoring devices that accurately observe and quantify changes to the body over time show promise in promoting awareness of one's health status. These technologies can provide a powerful tool for gaining personal insight into the physiological states of the body, thereby encouraging positive behavioural and lifestyle changes. Monitoring food intake, weight and physical activity is a proven behaviour therapy technique that can aid in weight loss and weight maintenance programs, promoting improved health and well-being.	A sensor capable of measuring at least 2 of the following parameters is made available to each employee for his/her personal use and is subsidized by at least 50%: a.Body weight/mass. b.Activity and steps. c.Heart rate variability. d.Sleep duration, quality and regularity.		Sensors and Wearables		HI		TBC				
WELL Total											

Design with
community in mind

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