

# WCEoLP Westmead

## Ecologically Sustainable Development Report

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# Revision

Revision	Date	Comment	Prepared By	Approved By
1	01/07/2024	SD Issue	RD	IS

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# 1. Executive Summary

This Ecological Sustainable Development (ESD) Report has been prepared on behalf of Health Infrastructure c/- Capital Insight for the proposed World Class End of Life Program (WCEoLP), Westmead facility. This report provides an overview of the ESD principles including greenhouse gas emission reduction strategies (reflecting the Government's goal of net zero by 2050), water sensitive urban design and sustainable material procurement, use and management, which will be implemented across the development.

ESD strategies and opportunities provided within this report intend to directly respond to relevant regulatory and project specific sustainability drivers. This report has been prepared in direct response to:

- NSW Environmental Planning and Assessment Regulation 2021
- NSW Government Resource Efficiency Policy
- National Construction Code (NCC) 2022 Vol.1
- State Environmental Planning Policy (Sustainable Buildings) 2022
- Health Infrastructure, Design Guidance Note No.058 – Environmentally Sustainable Development
- Health Infrastructure, World Class End of Life Program - Sustainability Principles (June 2023, Rev 1.0)

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:

- The development is currently targeting 66 points in accordance with HI's ESD Evaluation Tool;
- The development will demonstrate a 10% improvement in energy performance on NCC Section J.
- **Building Management** – including reviews of commissioning and tuning, building information and other operational processes.
- **Indoor Environment Quality** – including high air quality, acoustic/lighting comfort and reduction of indoor pollutants.
- **Energy & Carbon** – including improved energy efficiency of the building operations through design and technology and consideration to Embodied Carbon.
- **Water Efficiency** – reduce potable water demand and utilizing the use of rainwater.
- **Materiality & Waste** – Considering the whole of life of materials and their selection to minimise harm to the environment, including efficiency and construction while minimising resources sent to landfill from construction and demolition works.



## 2. Introduction

This report outlines a series of schematic design elements which will allow the proposed Westmead facility to align with the required sustainable development outcomes while ensuring potentially harmful ecological & environmental impacts of the project are mitigated.

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

- A minimum of 60 points (+5 point buffer) \* to be achieved by the design in accordance with HI's ESD Evaluation Tool;
- A mandatory requirement of demonstrating a 10% improvement in energy performance on NCC Section J.

### 2.1 General Overview

The WCEoLP Westmead facility intends to improve the palliative care services and support capability of the Westmead CASB hospital. The facility will increase access to end-of-life care locally, deliver purpose-built facilities that support contemporary models of care, improve patient safety and quality of care and improve environments for patients, carers and staff.

The facility will be located on the rooftop of the recently constructed Westmead CASB hospital. The facility will be a new extension to an existing space and intends to maximise the reuse of existing services and building elements.

### 2.2 Site Location

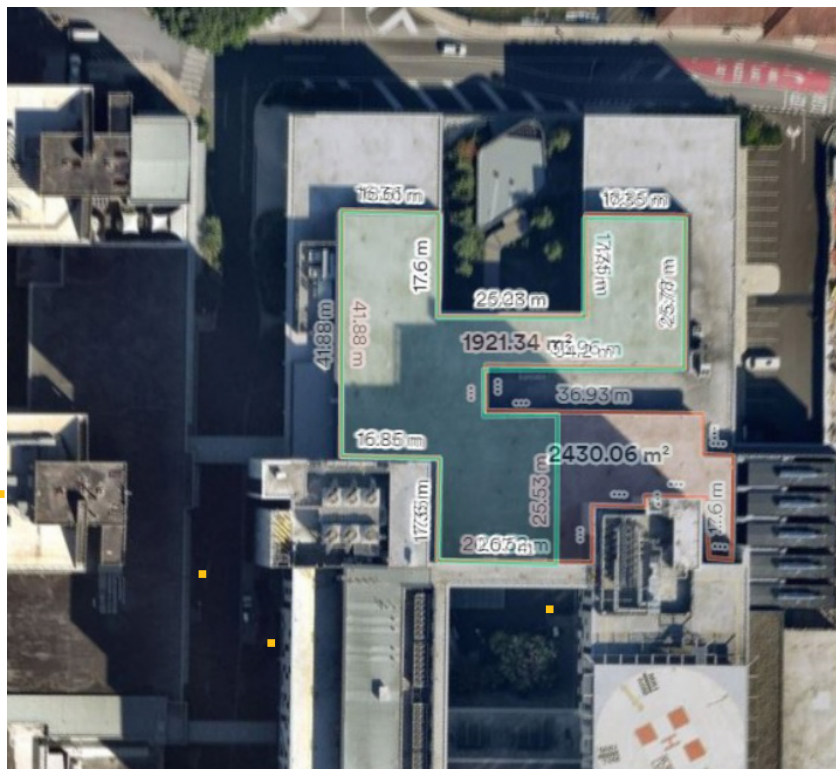


Figure 1 Location of the site. Source: BVN Master Planning Binder

## 2.3 Sustainable Design Framework & Project Response

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
- State Environmental Planning Policy (Sustainable Buildings) 2022 National Construction Code (NCC) 2022 Vol.1
- Health Infrastructure, Design Guidance Note No.058 – Environmentally Sustainable Development
- Health Infrastructure, World Class End of Life Program - Sustainability Principles (June 2023, Rev 1.0)

### 2.3.1 NSW Environmental Planning and Assessment Regulation 2021

Section 193 “Principles of ecologically sustainable development” under division 5 “Environmental impact statements” of the Environmental Planning and Assessment Regulation 2021 states the following:

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

The following provides a direct response to the specific principles of ecologically sustainable development, as documented within the Schedule 193 of Division 5 of Part 8 of the Environmental Planning and Assessment Regulation 2021.

#### **The Precautionary Principle:**

An appropriately qualified professional shall undertake investigations to determine if the natural features of this site are habitat to local and native wide-life, and or threatened and endangered species. The proposed facility will be located within



an existing building on previously developed land within an established urban area. The risk of creating environmental damage to aspects such as waterways, water table, native habitat, and other biological features is considered low.

If the ESD principles set out in the applicable regulatory policies, plans, controls and Australian best-practice guidelines are considered, supported and acted upon to satisfy their objective, serious or irreversible environmental damage is not foreseen.

#### **Inter-generational equity:**

The proposed development approaches inter-generational equity with respect to ecological sustainability by minimising the consumption of resources whilst upholding the health and well-being of its occupants into the future. The project has objectives that place lower demand on resources (energy, water, materials) in construction and operation, when compared to standard practice, by introducing Australian best-practice energy, water and materials conservation measures. These objectives and corresponding initiatives set-out to use today's resources in a manner that enables future generations to meet their own needs using equivalent resources.

#### **Conservation of biological diversity and ecological integrity:**

Because the proposed development is situated on previously developed land it can be assumed there is limited biological diversity impact. However, the sustainability targets set for the project will aim to improve conservation of resources. As such, the proposed development is likely to have a smaller gross biological and ecological footprint than equivalent projects in standard practice.

#### **Improved valuation, pricing, and incentive mechanisms:**

This project will integrate several initiatives which aim to internalise pollution and other undesirable environmental outcomes. Contractors will be requested to provide and abide by an Environmental Management Plan and Environmental Management System which are in accordance with NSW Environmental Management Systems Guidelines or a similar standard. This places a value on environmentally responsible building practices and places a form of "polluter pays" onto the contractors to ensure they are held responsible for the environmental management of the building site as they complete their work.

The costs associated with the construction waste will be borne by the project team. They shall be required to target 90% recycling of construction waste. This may have a greater financial cost to the project; however, it provides a more accurate reflection of the full life cycle costs of the materials which were on the site, and the waste from the new materials as a result of the construction.

The costs of producing the following pollution: sewage, landfill waste, and CO<sub>2</sub> emissions are partially borne by the project team and accounted for in the project's sustainability initiatives. The project has voluntarily elected to:

- improve water consumption efficiency, thereby paying to reduce production of sewage;
- reduce energy consumption, which means solutions to reducing CO<sub>2</sub> emissions will be paid to be investigated during the design phase;

### **2.3.2 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:

- E1 - Target to save energy across all government sites.
- E3 - Minimum standards for new electrical appliances and equipment
- E5 - Whole-of-government solar target





- W1 - Report on water use
- W3 - Minimum standard for new water-using appliances
- P1 - Report on top three waste streams
- A2 - Low VOC materials
- R1 - Agencies will publicly report on their progress on the GREP annually

These are addressed in their relevant sections throughout this report.

### 2.3.3 State Environmental Planning Policy (Sustainable Buildings) 2022

The State Environmental Planning Policy (Sustainable Buildings) 2022 states:

#### 3.1 Application of Chapter

*(1) This Chapter applies to development, other than development for the purposes of residential accommodation, that involves—*

- (a) the erection of a new building, if the development has an estimated development cost of \$5 million or more, or*
- (b) alterations, enlargement or extension of an existing building, if the development has an estimated development cost of \$10 million or more.*

#### 3.2 Development consent for non-residential development

*(1) In deciding whether to grant development consent to non-residential development, the consent authority must consider whether the development is designed to enable the following—*

- (a) the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials, - refer to Section 3.6, Materials & Waste.*
- (b) a reduction in peak demand for electricity, including through the use of energy efficient technology, - refer to Section 3.3, Energy & Carbon.*
- (c) a reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design, - refer to Section 3 Ecological Sustainable Development Initiatives.*
- (d) the generation and storage of renewable energy, - refer to Section 3.3, Energy & Carbon.*
- (e) the metering and monitoring of energy consumption, - refer to Section 3.1, Building Management.*
- (f) the minimisation of the consumption of potable water. - refer to Section 3.5, Water.*

### 2.3.4 NCC Section J – Energy Efficiency

The project will be required to demonstrate compliance with the NCC (2022 Vol.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 (2022 Vol.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. Where feasible, the development will need to optimise energy efficiency & thermal performance through optimized envelope elements which improve the building façade performance including façade design, thermal envelope, HVAC system selection and lighting design.

### 2.3.5 Health Infrastructure, Design Guidance Note No.058 – Environmentally Sustainable Development

Being a development under Health Infrastructure, this WCEoLP facility will be required to demonstrate adherence to the ESD initiatives dictated by the Design Guidance Note No.58 (DGN.058) prepared by HI. DGN.058 outlines the roles and responsibilities of relevant parties and establishes guidelines to implement ESD initiatives in HI projects.

The DGN.058 provides an ESD Evaluation Tool which has been developed to recognize sustainability initiatives and reflects best-practice industry rating tools such as Green Star. The ESD Evaluation Tool uses a points-based scoring system and requires, pending project applicability and HI approval, a minimum of 60 points to be achieved. It is recommended that an additional 5-point buffer is targeted. The scores used in the ESD Evaluation Tool reflect the merit of various initiatives applicable to health facilities and were developed by specialists to meet the needs of Health Infrastructure. In using the tool, emphasis should be given to meeting the intent of each initiative, with sufficient evidence to support the claim that the initiatives have been achieved.

The ESD Evaluation Tool covers the following ESD initiative categories;

- |                                |                                  |
|--------------------------------|----------------------------------|
| 1) Management,                 | 6) Water                         |
| 2) Indoor Environment          | 7) Materials & Waste,            |
| 3) Energy & Carbon             | 8) Land Use & Ecology            |
| 4) Climate risk and resilience | 9) Discharge to Environment, and |
| 5) Transport                   | 10) Innovation                   |

The ESD Evaluation Tool has been developed for the WCEoLP Westmead facility and has been included as 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.

### 2.3.6 Health Infrastructure, World Class End of Life Program - Sustainability Principles (June 2023, Rev 1.0)

Building upon the mandatory requirements established within the DGN.058, WCEoLP facilities are strongly encouraged to prioritize and embed further sustainability initiatives. The document responds to relevant policies and targets including the; Future Health Strategy, NSW Health Resource Efficiency Plan, NSW Government targets for Net Zero, NSW GREP, HI Corporate Strategy 2021-2025 & The United Nations Sustainable Development Goals. The document outlines thirteen key sustainability priorities for the WCEoLP facilities which are;

- |                                 |  |
|---------------------------------|--|
| 1) Wellbeing and Healthy Living | 8) Climate Risk Ready & Net Zero Ready |
|---------------------------------|--|



- |  |   |
|--|---|
| 2) Celebrate Culture and Cultural Practice | 9) Materials & Waste                              |
| 3) Connected and Inclusive                 | 10) Governance and Reporting                      |
| 4) Connecting to Country                   | 11) Sustainable Choices and Procurement Practices |
| 5) Greener Places and Places for Nature    | 12) Empowering people and partnerships            |
| 6) Healthy and Connected Built Environment | 13) Embedding sustainability                      |
| 7) Sustainable Buildings and Precincts     |   |

### 2.3.7 Project Response

The project team have proposed a number of energy efficiency measures that will reduce the greenhouse gas emissions and carbon footprint of the project. An array of best practice sustainable initiatives will be incorporated so that potential environmental impacts are mitigated. These are outlined in further detail within section 3 of this report.

There are no perceived threats of serious or irreversible environmental damage as a result of the proposed redevelopment. The facility is within an existing site and will therefore have minimal localised environmental impact. The proposed development will have predominantly the same uses as the existing Westmead hospital whilst providing high quality spaces and amenities for users.

The development will give strong consideration to potential environmental impacts through the application of best practice design initiatives and operational processes such those listed in section 3. The documented initiatives to be implemented – which are the basis for the response to the relevant Sustainable Design Frameworks include:

- On-site renewable energy generation;
- Rainwater harvesting and reuse for irrigation;
- Energy Efficient lighting systems (internal and external) and lighting controls;
- Best Practice Façade Thermal Performance;
- High Efficiency HVAC Equipment;
- Explore opportunities to reduce embodied emissions associated to the proposed material selections;
- Explore opportunities to design for disassembly and reuse;
- Ample access to natural daylight and fresh air where possible;
- Water efficient fixtures and fittings (WELS rating);
- Selection of native & low water plants / trees;
- Increased indoor & outdoor environmental quality, through the use of low emission materials and finishes;

A Construction Environmental Management Plan that incorporates mitigation measures to ensure that environmental impacts to the site are minimised during construction. All sub-contractors will also be requested to provide and abide by an Environmental Management System to be in accordance with NSW Environmental Management Systems Guidelines or a similar standard. This places a value on environmentally responsible building practices to ensure they are held responsible for the environmental management of the building site as they complete their work.

Once the facility is under activity, operational guidelines and appropriate monitoring and control measures shall be set in place in accordance with the sustainable strategies adopted by the development and will be distributed to the tenants to ensure environmental impacts associated with operational processes are minimised wherever possible.



## 3. Ecological Sustainable Development Initiatives

### 3.1 Building Management

In line with industry recognised best practice frameworks, the project design and built form will seek to respond to the ongoing environmental challenges of urban development and ensure the project implements a range of ESD initiatives aimed at improving ongoing building management.

Through specific contractual commitments and documented design intent the project proposes to address environmental management & building operational performance through the following initiatives.

- **Building Commissioning & Tuning Procedures** are to be undertaken prior to and 12-months post practical completion. By implementing this via project contract documents the project ensures operational efficiency & optimised building operation in accordance with the intended building design.
- **Commitment to Environmental Performance Targets** such as energy, water, operational waste and end-of-life waste streams will ensure building owners/occupants are aware and considerate of the efficient consumption and management of resources during the operation of the building.
- **Smart Metering** will provide relevant data to ensure the efficient use of systems & management by building staff. This will provide detailed information about the project energy & water usage profile on a regular basis through an accessible platform. This information will aid in the understanding of how the development consumes energy and water so that adjustments can be made to guarantee optimal performance and manage supply and demand trends, reducing operational costs. This ensures operational efficiency is maintained and allows for the detection of systems failures or losses, thus improving maintenance and tuning processes.

### 3.2 Indoor Environment

Indoor Environment Quality (IEQ) has been defined as a key sustainable building category to improve indoor environments for building occupants, which in turn improves their overall wellbeing. Consideration to improving indoor environmental quality will be a vital step within the development's design process.

The proposed development seeks to improve the overall IEQ for building occupants by addressing the following elements:

- **Improved Ventilation** to ensure occupants have sufficient access to fresh air and indoor pollutants sources are effectively eliminated or exhausted from habitable spaces.
- **Improved Acoustic Performance** to ensure occupants can enjoy private, quiet spaces with family and visitors.
- Glazing to wall ratio should be selected to **maximise access to daylight** while prioritising the thermal performance necessary to achieve the targeted energy consumption outcomes. Artificial lighting fixtures shall be selected to ensure comfortable lighting levels are maintained throughout the facility.
- **Low Volatile Organic Compound (VOC)** – Selection of all internally applied paints, carpets, adhesives and sealants used on site with low volatile organic compound (VOC) content.
- **Low Formaldehyde Emission Wood** – Selection of all internally applied engineered wood products from low formaldehyde emission products.



### 3.3 Energy & Carbon

The Westmead facility is required to demonstrate compliance with the Energy Efficiency provisions of the BCA outlined within the NCC, Section J, 2022 - Vol.1. In response to the DGN.058 and the WCEoLP Sustainability Principles, the project must meet a mandatory 10% improvement beyond the National Construction Code (NCC) Section J – Energy Efficiency standards.

The current energy efficiency strategy has generally followed the hierarchy pyramid demonstrated below in Figure 2. Best practice energy conservation dictates that in the first instance, energy demand is reduced, which has a much greater benefit to the overall long-term energy performance of the facility compared to retrospective efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest return on investment.

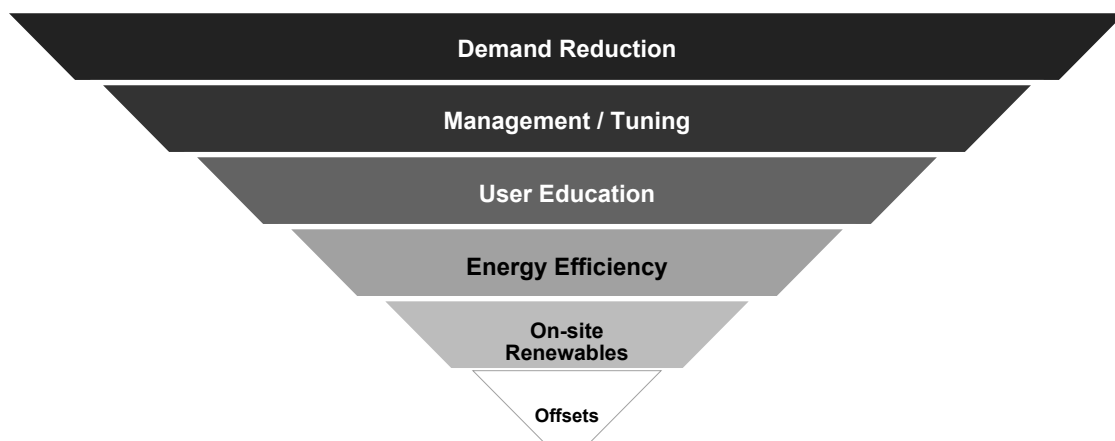


Figure 2 - Energy Saving Hierarchy

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

- **Architecture** - 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** – Focusing on the wellbeing of the occupant to delivering daylight comfort.
- **Shading and Blinds** – Design of external shading and use of internal devices such as 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 external colours and finishes to reduce solar heat absorption.
- **Efficient HVAC System** – Use of HVAC systems with high COPs which are appropriately designed to meet internal loads. HVAC systems will require adequate efficiency, with economy cycle options to promote energy efficiency in operation.
- **On-site Renewable Energy Generation System** – Incorporating a roof-mounted PV system to reduce the energy consumption and carbon impact of the development. This will contribute to *E3: Whole-of-government solar target* as required by the GREP.



- **Water Efficient Fixtures and Fittings** - Selection the 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.
- **Embodied Carbon** - A measurement of the Embodied Carbon of materials used across the development should be undertaken using the NABERS Embodied Emissions Materials Form. Refer to Section 3.6 of this report for initiatives to reduce the Embodied Carbon of the facility.

### 3.3.1 Energy Compliance – NSW HI ESG (7.4) & NCC 2022 Section J

The NCC 2022 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. 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, undertaken by the Mechanical design consultant. A Performance Solution involves detailed simulation modelling of the proposed building 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.

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 passive strategies which limit the amount of undesirable energy flows entering or leaving a thermally controlled space.
- Mechanical equipment to comply with or improve upon 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 minimize and reduce energy output for peak and non-peak demands.
- Efficient insulation of hot and warm water distribution pipework to minimize heat losses.
- Consideration of heat recovery from mechanical plant heating and ventilation systems.
- 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.

A detailed NCC Section JV3 report is to be provided in association with the project tender documentation demonstrating compliance with the provisions outlined above.

### 3.4 Climate Risk & Resilience

As part of the provisional design response for the project, an assessment of project risks associated with the predicted impacts of Climate Change has been provided.

Key risks identified for the project site include:

- Elevated peak temperatures, extended duration of heat waves.
- Reduction in annual rainfall, but more intense rainfall events

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 future conditions due to climate change for Westmead.

\*Representative Conservation 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
Mean temperature change (°C)	0.9 (0.6 to 1.2)	1 (0.6 to 1.3)	1.9 (1.3 to 2.5)	3.7 (2.7 to 4.7)
Maximum temperature change (°C)	0.9 (0.6 to 1.3)	1.1 (0.5 to 1.4)	1.9 (1.3 to 2.7)	3.6 (2.9 to 4.8)
Minimum temperature change (°C)	0.9 (0.6 to 1.1)	1 (0.7 to 1.3)	1.8 (1.3 to 2.4)	3.7 (2.7 to 4.7)
Extreme temperature (days per year over 35°C)	+4.3 (4.0 to 5.0)		+6.0 (4.9 to 8.2)	+11 (8.2 to 15)
	Substantial increase in intensity and frequency of extreme temperature days			
Mean annual rainfall change (%)	-3 (-14 to +3)	-4 (-16 to +7)	-8 (-18 to +9)	-13 (-25 to +14)
Extreme rainfall	Extreme rainfall events to increase in intensity			
Drought	Time spent in drought conditions to increase			



Climate Variable	Climate Projections (change relative to 1986 – 2005 baseline)			
	2030		2090	
	RCP4.5	RCP8.5	RCP4.5	RCP8.5
Bushfire weather (Number of severe fire danger days; FFDA > 50)	Severity of fire-weather climate to increase			
Solar radiation (%)	0.6 (-0.6 to 1.6)	0.8 (-0.7 to 1.9)	1 (-0.2 to 2.9)	0.7 (-1.9 to 3.5)
Relative humidity (% absolute)	-0.5 (-1.9 to 1.1)	-0.7 (-1.8 to 1)	-1.1 (-3.5 to 0.5)	-1 (-3.5 to 1.9)
Wind Speed (%)	-0.5 (-2 to 1.2)	0.6 (-0.8 to 2)	0 (-2.1 to 1.6)	1.3 (-1.9 to 6)
Sea level rise (m)	0.13 (0.09-0.18)	0.14 (0.1-0.19)	0.47 (0.3-0.65)	0.66 (0.45-0.88)

**Table 1: Summary of 'East Coast Cluster Report: Climate Change in Australia- Projections for Australia's NRM Regions' (Source: Climate Change in Australia, CSIRO 2015)**

#### Summary of major impacts assessment:

##### Mean & Average Temperature

With very high confidence, for the near future (2030), air temperatures are projected to increase due to continued substantial warming from a mean warming of around 0.6°C to 1.2°C above the climate of 1986-2005 with only minor difference between RCPs. Because of rising temperatures, peak temperature events will become more frequent whereby the number of days above 35°C are expected to rise 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 performance, HVAC and natural ventilation shall all be fundamentally proven to ensure the proposed project design responds appropriately to the projected risks of climate change.

### 3.4.1 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 2022 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.





## 3.5 Water

A variety of water efficiency measures can be applied to the proposed development. Best practice water efficiency measures implemented to reduce water consumption may include:

- **Water efficient fixtures and fittings (WELS rating):** By implementing low-flow water fixtures, the consumption associated with amenities can be reduced. This includes taps, wash basins, WCs, Urinals, showers and supplementary water uses.
- **Water use metering and monitoring:** Which can identify leaks and amend losses before greater loss occurs.
- **Rainwater Reuse:** A tank is proposed to capture and store rainwater for use in landscaping irrigation across site.
- **Selection of native & low water plants / trees:** Native plants which have adapted to thrive in the Australian environment and are typically more resilient than their exotic counterparts. Low water species will reduce further irrigation demand.
- **Irrigation:** sub-soil irrigation systems should be favoured with a time clock to water planter beds/substrate at night. Doing so can significantly reduce water lost to evaporation and hence overall water demand.

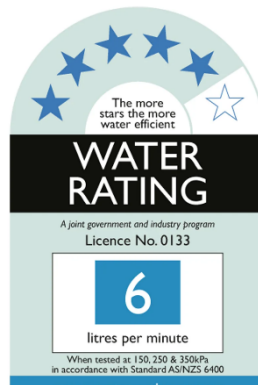


Figure 3 - Example WELS Rated Product Label

## 3.6 Materials & Waste

In accordance with the project's sustainability principles, the development should prioritize the use of responsibly procured materials with respect to the following initiatives:

- **Low Embodied Carbon:** Potential initiatives include; cementitious supplementation of Portland cement and use of recycled products (steel, crushed aggregate, etc.). Materials which hold a third-party verified Environmental Product Declaration (EPD) should be of preference to allow for life cycle accounting. Timber and other biogenic materials should be considered where feasible such as internal finishes and fixtures. The project has inherently reduced the total Embodied Carbon when compared to a standard practice, new-build due to significant portions of the existing structure and façade being retained and reused.
- **Circularity Principles:** Such as prioritizing the local procurement of materials which have been manufactured using sustainable, low carbon practices. Through reusing significant portions of the existing structure and façade the facility has inherently extended the useful life of these building elements and reduced the number of resources sent to landfill compared to typical demolition works. The development should aim to prolong and maintain the useful life of the materials and structures used. A detailed end-of-life or decommissioning strategy should also be prepared and included in handover which outlines opportunities for reuse and details best-practice recycling options which divert resources from entering landfill.



- **Steel** sourced from manufacturers who are members of the Australian Steel Institute Sustainability Charter for sustainable and energy reducing steel manufacture. Steel used should contain a high portion of recycled material.
- **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 and hence should be limited where possible. Alternatively, products with Best Environmental Practices (BEP) certification should be selected.
- **Timber** products used must come from sustainable forestry practices and hold a forest stewardship council (FSC) or Program for the Endorsement of Forest Certification (PEFC) certification.
- **Construction & Demolition Waste** should be diverted from landfill and reported by the waste contractor in kg. The development is targeting a diversion rate of 90% from landfill.

## 4. Summary

The proposed WCEoLP Westmead Facility 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) 2022 Vol.1
- State Environmental Planning Policy (Sustainable Buildings) 2022
- Health Infrastructure, Design Guidance Note No.058 – Environmentally Sustainable Development
- Health Infrastructure, World Class End of Life Program - Sustainability Principles (June 2023, Rev 1.0)

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 development is currently targeting 59 points in accordance with HI's ESD Evaluation Tool and will demonstrate a 10% improvement in energy performance against NCC Section J.

The specific initiatives that will be implemented 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:

- |                        |                             |
|------------------------|-----------------------------|
| • Building Management, | • Climate Risk & Resilience |
| • Indoor Environment   | • Water                     |
| • Energy & Carbon      | • Materials & Waste,        |



# Appendix A DGN.058 ESD Evaluation Pathway



Project Name:	Westmead WCEoLP
HI Delivery Part:	3

<b>PROJECT SCORE</b>	<b>66</b>
60 point target + 5 point buffer	

Update by Name:	Jerrin Poovely - ESD Stantec
Date Last Updated:	28/05/2024

Total Points	105
Total - Minimum requirements	18
Total - Recommended	32

## HI Environmentally Sustainable Development (ESD) Evaluation Tool

Category/Credit	Aim of the Credit / Selection	Code	Credit Criteria	Points available	Points Targeted	Risk Level	Cost Estimate	Type	Input	Stakeholders	Overlaps HI ESG, AusHFG, NCC, SSDA, Design Guide	Notes: (including Healthcare relevant initiatives which are primarily for IPU type spaces)	Discipline Design Requirements	Stantec ESD Consultant Comment
<b>Management</b>														
<b>ESD Consultant (Accredited Professional)</b>	To recognise the appointment and active involvement of an Accredited Professional in order to ensure that the ESD tool is applied effectively and as intended.	1.0	Accredited Professional	1	1	Low	\$ -	Minimum requirement	ESD	HI / LHD, ESD, Head Contractor				Included in ESD consultancy scope & head contract
<b>Commissioning and Tuning</b>	To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential.	2	Environmental Performance Targets	-	C	Low	\$ -	Minimum requirement	HI	HI / LHD, Mechanical, Electrical, Lighting, V. Transport, ESD, Fire, Hydraulics, Acoustics, Civil, Landscape				WCEoLP principle (Table 4, 10c,d) - to establish post construction SU targets and track, measure and report on targets.  Requires DIR or OPR including a general overview, energy, IEQ and water targets for nominated systems/spaces and detail into how these targets will be monitored.
		2.1	Services and Maintainability Review	1	1	Low	\$ -	Recommended	ICA	HI / LHD, Façade, Mechanical, Electrical, Lighting, V. Transport, Fire, Hydraulics, Civil, Head Contractor, ICA			Provide document records (e.g. meeting minutes) demonstrating the project design has considered: • Commissionability; • Controllability; • Operability, including 'Fitness for Purpose'; and • Safety.	Requires documented coordination between design and construction teams (main services). Stantec can provide template for review.
		2.2	Building Commissioning	1	1	Low	\$ -	Recommended	ICA	Mechanical, Electrical, V. Transport, Fire, Hydraulics, ICA			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.  CONTR: Air Permeability Performance Testing	ARCH, MECH, ELEC, STERILE, HYD, FIRE: Include specification clauses as per cell to the left.
		2.3	Building Systems Tuning	1	1	Low	\$ -	Recommended	ICA	Mechanical, Electrical, V. Transport, Fire, Hydraulics, Head Contractor, ICA			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.	CONTR to provide 12-months tuning
		2.4	Independent Commissioning Agent	1	1	Medium	\$ -	Optional	ICA	HI / LHD, Project Manager, ICA		May require additional consultant HI may support and undertake a similar role to ICA. Contact HI Sustainability team	HI: Provide confirmation that HI or a facility manager will be reviewing the commissioning plan and commissioning results.	NOT CURRENTLY TARGETED. Requires an additional consultant. HI may undertake a similar role to ICA.

<b>Building Information</b>	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 and sustainable outcomes.	4.1	Building Information	1	1	Low	\$	-	Recommended	CONTR	Façade, Mechanical, Electrical, V. Transport, Fire, Hydraulics, Landscape, Structural, Head Contractor			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.	CONTR to prepare comprehensive O&M manual, a Log book and a Building User Guide.
<b>Commitment to Performance</b>	To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way.	5.1	Environmental Building Performance	1	1	Low	\$	-	Recommended	HI	HI / LHD			HI: Energy target is 10% improvement on J1V3 compliance. Water target is set via the potable water calculator results and points target.	WCEoLP principle (Table 4, 10c,d) - to establish post construction SU targets and track, measure and report on targets.  ESD setting performance targets through energy and water modelling.
		5.2	End of Life Waste Performance	1	0	Medium	\$	-	Recommended	WASTE	HI / LHD				NOT CURRENTLY TARGETED.  WCEoLP principle (Table 4, 10c,d) - to establish post construction SU targets and track, measure and report on targets.
<b>Metering and Monitoring</b>	To recognise the implementation of effective energy and water metering and monitoring systems.	6	Metering	-	C	Medium	\$	-	Minimum requirement	MECH	Mechanical, Electrical, Hydraulics, Landscape			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.	WCEoLP principle (Table 4, 7m) - BMS and associated metering to be implemented.  Northrop Concept services report (4.8) indicates inclusion of smart, multifunction metering.
		6.1	Monitoring Systems	1	1	Medium	\$	-	Minimum requirement	MECH	Mechanical, Electrical			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.	WCEoLP principle (Table 4, 7m) - BMS and associated metering to be implemented.  Northrop Concept services report suggests inclusion of BMCS. Connecting to the existing BMCS.
<b>Construction Environmental Management</b>	To reward projects that use best practice formal environmental management procedures during construction and support staff sustainability awareness and education.	7	Environmental Management Plan	-	C	Low	\$	-	Minimum requirement	CONTR	Head Contractor			CONTR: Provide Environmental Management Plan.	Typical practice for contractors
		7.1	Formalised Environmental Management System	1	1	Low	\$	-	Recommended	CONTR	Head Contractor			CONTR: Provide Environmental Management System.	Pending contractor scope. WCEoLP principle (Table 4, 9g)
		7.2	High Quality Staff Support	1	1	Low	\$	-	Optional	CONTR	Head Contractor		Construction related credit for contractor to consider.	CONTR: Provide mental health and physical wellbeing programs and initiatives to sub-contractors. Provide sustainability education in site inductions.	Pending contractor scope. WCEoLP principle (Table 4, 9g)
<b>Operational Waste</b>	Performance Pathway To encourage project to apply waste hierarchy through the design	8A	Performance Pathway - Specialist Plan	1	1	Medium	\$	-	Optional	WASTE	HI / LHD, ARCH, Waste Consultant			PM: Engage a waste consultant to prepare/update Operational Waste Management Plan for new facility	ARCH: Review Section 8.3, 9.1.1, 9.2.1, 9.16 of the Waste WSLHD Waste Management Policy and provide sufficiently sized waste storage areas to allow for waste segregation.
		8A(i)	Operational Waste Management Plan	-		Low	\$	-	Minimum requirement	WASTE	HI / LHD, ARCH, Waste Consultant				

		8B	Prescriptive Pathway - Facilities	-		Low	\$	-	Optional	WASTE					NOT CURRENTLY TARGETED - alternative pathway to 8A  ARCH concept drawings don't seem to include waste facilities for the WCEoLP - assume tie in with existing OWMP if available.											
Total																	12	11	\$	-						
Indoor Environment																	17	14		\$	50,000.00					
Indoor Air Quality	To recognise projects that provide high air quality to occupants and safeguard occupant health through the reduction in internal air pollutant levels.	9.1	Ventilation System Attributes		1	1	Low	\$	-	Recommended	MECH	Mechanical		Healthcare relevant initiative	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.	Pending coordination with MECH. May be some limitations/restrictions for separation distances with other existing MECH exhausts/ intake.  MECH: Yes										
		9.2	Provision of Outdoor Air		2	1	Medium	\$	-	Optional	MECH	Mechanical	ESG requirements request 2.0 ACH to IPU spaces.	Healthcare relevant initiative	MECH: Provide outdoor air at a rate 50% greater than the minimum required by AS 1668.2:2012.	WCEoLP principle (Table 4, 7h). Include mixed mode/Nat vent to improve access to fresh air.  > Co2 sensors? > Details regarding Nat Vent - if pursuing? > Potential to increase OA rate TBC with MECH consultant.										
		9.3	Exhaust or Elimination of Pollutants		1	1	Low	\$	-	Recommended	MECH	ARCH, Mechanical		Healthcare relevant initiative	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	> No Kitchen, beverage bay only. Kitchenettes with appliance power input of <0.5kW/sqm excluded. > No vehicle exhaust or printing pollutants to manage. > Photocopier will be included. Group 3 item selected by LHD. Stantec & PM to brief requirements.										
		9.4	Paints, Adhesives, Sealants and Carpets		1	1	Low	\$	-	Recommended	ARCH	ARCH, Façade, Mechanical, Electrical, V, Transport, Fire, Hydraulics, Acoustics, Head		Healthcare relevant initiative	ARCH: Specify low VOC paints and carpets.	WCEoLP principle (Table 4, 7k) - Low VOC products to be specified.										
		9.5	Engineered Wood Products		1	1	Low	\$	-	Optional	STRUC	ARCH, Structural, Head Contractor		Healthcare relevant initiative	ARCH: Specify low formaldehyde engineered wood products: particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels	Recommend this be implemented to provide high levels of indoor comfort for patients.										
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants.	10.1	Internal Noise Levels		1	1	Medium	\$	20,000.00	Recommended	ACOUS	ARCH, Façade, Mechanical, Acoustics		Healthcare relevant initiative	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.	WCEoLP principle (Table 4, 7j) - an acoustic comfort strategy is to be prepared.  Cost uplift for required acoustic testing to demonstrate compliance with credit. ACOUS: Wall markups complete. Reverb in-progress. Credit based on DAB v1.3. Confirmation received that all points are targeted.										
		10.2	Reverberation		1	1	Medium	\$	10,000.00	Optional	ACOUS	ARCH, Acoustics, Structural		Healthcare relevant initiative	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.											
		10.3	Acoustic Separation		1	1	Medium	\$	20,000.00	Optional	ACOUS	ARCH, Mechanical, Acoustics, Structural		Healthcare relevant initiative	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.											
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11	Minimum Lighting Comfort		-	C	Low	\$	-	Minimum requirement	LIGHT	Electrical, Lighting	Artificial lighting initiatives can also utilise typical spaces.	Healthcare relevant initiative	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.	BAU - flicker free and high CRI lighting (>80)  As specified within Northrop Concept services report (4.12.3) CRI>80 w/ DALI Dimmable driver.										
		11.1	General Illuminance and Glare Reduction		1	1	Low	\$	-	Recommended	LIGHT	Electrical, Lighting		Healthcare relevant initiative	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.	Appropriate illuminance levels to be designed to.  Lux plots for all the rooms will be provided by elec consultant.										

		11.2	Surface Illuminance	1	0	High	\$	-	Optional	ARCH	ARCH, Electrical, Lighting		Healthcare relevant initiative	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.	NOT CURRENTLY TARGETED.
		11.3	Localised Lighting Control	1	1	Medium	\$	-	Optional	LIGHT	Electrical, Lighting		Healthcare relevant initiative	ELEC: Provide direct lighting control for patients and staff.	Some localised lighting control assumed to be provided (bed side, desks, etc) Extent TBC  Common areas and corridors lighting control may be difficult to implement.  Bedside lights connected to the patient system including multiple ambiances for palliative care rooms. ELEC: Lighting schedule to include inbuilt bedside lighting.
Visual Comfort	To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants.	12	Glare Reduction	-	C	Low	\$	-	Minimum requirement	ESD	ARCH, Façade		Healthcare relevant initiative	ARCH: Provide blinds with a visual light transmittance of <10%.	Blinds or screens likely to be provided to offices.  Shear blind and blackout blinds being provided to bedrooms.
		12.1	Daylight	2	2	Medium	\$	-	Optional	ESD	ARCH, Façade, ESD	Modelling of typical spaces for the daylighting initiative is acceptable, provided a sensible coverage of spaces is accounted for. Issues such as elevation, shading/overshadowing	Healthcare relevant initiative	ESD: Prescriptive methodology assessment.	Pending preliminary calculations.  With concept design window extent and zone depth, daylighting and access to views likely achievable.
		12.2	Views	1	1	Low	\$	-	Optional	ARCH	ARCH	Views can also be assessed using typical spaces.	Healthcare relevant initiative	ESD: Prescriptive methodology assessment.	
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1	Thermal Comfort	1	1	High			Optional	MECH	Mechanical	NCC 2022 JV3 requires a PMV assessment to be undertaken	Healthcare relevant initiative	MECH / ESD: Provide thermal comfort modelling results to achieve PMV +1.	Pending coordination with MECH.
		14.2	Advanced Thermal Comfort	1	0	High	\$	-	Optional	MECH	Mechanical		Healthcare relevant initiative	MECH: Provide thermal comfort modelling results to achieve PMV +0.5.	NOT CURRENTLY TARGETED.
Total Line		17	14	\$ 50,000.00											

Energy & Carbon		17	7	\$ 75,000.00											
Greenhouse Gas Emissions	To encourage and recognise projects to reduce their carbon footprint through design and construction and to ensure projects are net	15E.0	Conditional Requirement: Reference Building Pathway	-	C	Low	\$	-	Minimum requirement	MECH	Façade, Mechanical, Electrical, Hydraulics				TBC w/ MECH undertaking Section J compliance scope.  20% improvement to be targeted as per WCEoLP principles. 10% improvement minimum requirement for HINSW to be met.
		15E.1	Comparison to a Reference Building Pathway.	10	4	Medium	\$	-	Minimum requirement	MECH	Façade, Mechanical, Electrical, Hydraulics			MECH: Provide energy modelling results. ERV. Heat recovery for domestic hot water. Water-based heat rejection Economy cycle 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. Include rooftop PV system. HYD: Heat pump domestic hot water	WCEoLP principle (Table 4, 7d) - Energy use to be 20% less than reference.  Pending coordination/development of Section J performance requirements +10%.  MECH: Existing chilled/cold & heating hot water loops will be used. ELEC: Confirm size of solar PV system
		15E.1	Conditional Requirement: Net zero plan	-	C	Medium	\$	-	Minimum requirement						Cost uplift for ESD consultant to prepare Net zero Plan.
		15E.1(i)	100% electric in operation	1	1	Low	\$	-	Minimum requirement	ELEC	Mechanical, Electrical	Aligns with Sustainable Buildings SEPP - A Net Zero Statement describes how a project will avoid dependence on fossil			No new gas systems.  Note: Connecting to the existing systems which are likely to be electric.
		15E.1(ii)	10% energy performance beyond NCC requirement, or GREP	1	1	Low	\$	-	Minimum requirement	ELEC	Mechanical, Electrical				Mech to confirm strategy for 10% improvement/options for further improvement.
		15E.1(iii)	Measurement of Embodied Carbon	1	0	Medium	\$	-	Minimum requirement	STRUC	ARCH, Structural, Head Contractor, Façade	Aligns with Sustainable Buildings SEPP - use the Embodied Emissions Materials Form in line with the Embodied Emissions Technical Note		QS: Measurement only - using NABERS Embodied Emissions Materials Form.	HI have elected not to target this Credit. Refer Aconex CI-GCOR-001483
		15E.1(iv)	Target reduction in upfront carbon emissions	1	0	Medium	\$	-	Minimum requirement	ELEC	Mechanical, Electrical			QS to confirm cost of 10% reduction in upfront carbon	HI have elected not to target this Credit. Refer Aconex CI-GCOR-001483

Peak Electricity Demand Reduction	To encourage projects to consider Peak electricity reduction through energy efficiency or on-site energy generation	16A(i)	Solar or Renewable energy assessment	-	C	Low	\$	-	Minimum requirement	ELEC	Mechanical, Electrical			ELEC: provide solar or Renewable energy assessment.	On-site energy generation to reduce peak demand by 15%
		16A(ii)	Solar or Renewable energy generation	1	1	Medium	\$	75,000.00	Recommended	ELEC	Mechanical, Electrical			ELEC: Provide a PV system designed to reduce peak electricity demand by 15%.	WCEoLP potential for roof solar generation. Pending glare/reflectivity assessment on surrounding CASB spaces and helicopter flight paths.  Coordinate with ELEC re estimated peak demand of WCEoLP.
		16B	Performance Pathway - Reference Building	2	User Input	Medium	\$	-	Optional	ELEC	Mechanical, Electrical		Healthcare relevant initiative		Cost indicative. Pending size of proposed PV system and target peak demand reduction.
		Total Line		17	7		\$	75,000.00							
Climate risk and resilience															
Adaptation and Resilience	To encourage and recognise projects that are resilient to the impacts of a changing climate and natural disasters.	3.1	Climate risk assessment	1	1	Low	\$	-	Minimum requirement	ESD	ARCH, Façade, Mechanical, Electrical, Fire, Hydraulics, Civil, Landscape, Structural, CAP Consultant, LHD			PM: Engage an ESD consultant to undertake a Climate Change Risk Assessment and Adaptation Plan. Allow for implementation of adaptive measures.	High-level Climate Risk Assessment provided in the ESD Report.  WCEoLP principle (Table 4, 8a-f) - CCAP to be developed and strategies implemented across design elements.
		3.2	Implementation of a Climate Adaptation Plan	1	1	Medium	\$	-	Recommended	ENV	ARCH, Façade, Mechanical, Electrical, Fire, Hydraulics, Civil, Landscape, Structural, CAP Consultant	SEARS condition: Credit can be used to demonstrate CSIRO project climate impacts			Confirm if the WCEoLP facility is included in the CCAP prepared for the Westmead hospital. (If CCAP prepared). If not, a CCAP for this new facility should be produced.
Total Line		2	2		\$	-									
Transport															
Sustainable Transport	To encourage projects to consider sustainable transport options through design	17A.1	Performance Pathway	9	9	Medium	\$	-	Optional	TRANS	HI / LHD, Project Manager, ARCH, Electrical, ESD, Travel Planner			Hospitals are usually well connected to public transport nodes. Large percentage of patients require access to hospitals via vehicles. Expansion of existing hospital also require additional carparking.	PM: Engage a transport consultant TRANS: Complete the Sustainable Transport Calculator; Green Travel Plan  CASB base building has undertaken extensive transport assessment, including Green Travel Plan strategies. Refer Aconex CI-GCOR-000765
		17B.1	Access by Public Transport	0	User Input	Medium	\$	-	Optional		ESD				
		17B.2	Reduced Car Parking Provision	0	User Input	Medium	\$	-	Optional		ARCH, Travel Planner				POINT NOT APPLICABLE No changes to the existing transport facilities proposed under project scope.
		17B.3	Low Emission Vehicle Infrastructure	1		Medium	\$	-	Minimum requirement		ARCH, Electrical	Consistent with DGN 46 and NSW Government Fleet Strategy requirements		ARCH: Provide electric vehicle chargers for 5% of all parking spaces i.e. 2 EV chargers.	POINT NOT APPLICABLE No changes to the existing transport facilities proposed under project scope.
		17B.4	Active Transport Facilities	0	User Input	Medium	\$	-	Optional		Project Manager, ARCH			ARCH: Provide end-of-trip facilities and protected bike parking for 7.5% of building occupants & 5% of visitors. 1.2 lockers per occupant bicycle space.	POINT NOT APPLICABLE No changes to the existing transport facilities proposed under project scope.
		17B.5	Walkable Neighbourhoods	0		Low	\$	-	Optional		ESD			8 amenities provided within 400m.	POINT NOT APPLICABLE No changes to the existing transport facilities proposed under project scope.
		Total Line		10	9		\$	-							
Water															
Potable Water	Potable Water - Performance Pathway	18A.1	Potable Water - Performance Pathway	0	0	Medium	\$	-	Optional	HYDR	ESD, Fire, Hydraulics, Civil, Landscape			Hospitals require extensive use of potable water and typically lower use for recycled water. AusHFG requirements limit use of rainwater systems, limiting the use to primarily landscaping.	
		18B.1	Sanitary Fixture Efficiency	1	1	Low	\$	-	Recommended	HYDR	Hydraulics	AusHFG Requirements limit use of RW systems (maintenance / Payback / health risks)	Healthcare relevant initiative	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.	High efficiency water fixtures to be implemented. Alignment with GREP and HI guidelines. Fixtures should be within 1 WELS star rating of: > Taps: 6 star > Urinals: 6 star > Toilets: 5 star > Showers: 3 star (>4.5 but <=6.0L/min) > Clothes Washers: 5 star > Dishwashers: 6 star



		18B.2	Rainwater Reuse		1	1	Medium	\$	10,000.00	Optional	HYDR	Hydraulics, Landscape	AusHFG Requirements limit use of RW systems		HYDR: Provide rainwater capture and reuse infrastructure for irrigation and other end uses. Confirm if project will be integrating into an existing rainwater system.	Tank size target is 10L/sqm GFA. RW demand assessment to determine best size of RWT. RW for use in irrigation only, no internal use. HYD: Check if the existing hospital/RW capture system has capacity allowance for required landscaping irrigation.  WCEoLP principle (Table 4, 6d), RWT harvest and WSUD design principles.  TBC if RWT proposed in WCEoLP (spatial restraint? - priority to green space and amenity). Cost uplift for small RWT and connection to proposed irrigation system if existing system is not available.
		18B.3	Heat Rejection		2	0	Medium	\$	-	Optional	MECH			Healthcare relevant initiative	MECH: Provide waterless heat rejection systems.	NOT CURRENTLY TARGETED.  TBC with MECH consultant.  Existing CASB Mech system sufficient capacity to support WCEoLP - noted as water based in Northrop concept report (3.3.1).
		18B.4	Landscape Irrigation		1	1	Low	\$	-	Recommended	LAND	Hydraulics, Landscape			LAND: Drip irrigation with moisture sensor override or no potable water is used for irrigation.	High efficiency sub-soil drip irrigation with time clock/moisture sensor recommended. No potable water use if possible.
		18B.5	Fire System Test Water		1	0	High	\$	-	Recommended	FIRE	Fire			FIRE: Reuse of 80% of the sprinkler system test water for application on landscaping. Recirculation closed-loop system can be considered too.	Not targeted by the base building. Refer Aconex CI-GCOR-000765
Total Line					6	3		\$	10,000.00							

Materials & Waste					14	10		\$	10,000.00							
Life Cycle Impacts	Prescriptive Pathway - Life Cycle Impacts	19A.1	Comparative Life Cycle Assessment		6	0	Medium	\$	-	Optional	ESD	ARCH, Façade, Mechanical, Electrical, Lighting, V, Transport, Hydraulics, Civil, Structural, LCA Consultant, Head Contractor		Life Cycle Assessor (additional consultant) required		LCA recommended. WCEoLP principle (Table 4, 7e) - upfront carbon emissions to be 20% below reference.  Design team should work towards <b>at least</b> 50% cumulative impact reduction (2 point).  New build so responsible materials and low-impact construction practices should be prioritized.  Cost uplift representing LCA scope and specification of low-embodied carbon materials.
		19A.2	Additional Life Cycle Impact Reporting		4	0	Medium	\$	-	Optional	ESD	LCA Consultant		Life Cycle Assessor (additional consultant) required		If LCA undertaken. Additional reporting recommended > LCA Design review > Impact Reporting
		19B.1	Concrete		3	3	Medium	\$	-	Optional	ARCH	Civil, Structural		Healthcare relevant initiative	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.  STRUC: Specify that 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).  STRUC: Specify that at least 40% of coarse aggregate in the concrete is crushed slag aggregate or another alternative material (measured by mass across all concrete mixes in the project), provided that the use of such materials does not increase the use of Portland cement by over five kilograms per cubic metre 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 metre of concrete.	Bondek slab with 30% reduction.

		19B.2	Steel		1	1	Medium	\$	-	Optional	ARCH	Civil, Structural			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.	
		19B.3	Building Reuse		4		High	\$	-	Optional	ARCH	ARCH, Civil, Structural		Healthcare relevant initiative	19B.3.1 Façade Reuse (2points): ARCH/STRUCT to provide evidence (before and for construction) drawings/markups demonstrating at least 50% of the façade (by area) is retained (1 point) <b>OR</b> 80% retained for 2 points.  19B.3.2 Structure Reuse (2points): ARCH/STRUCT to provide evidence (before and for construction) drawings/markups demonstrating at least 30% of the structure (floors, columns, beams, load-bearing walls & foundations) is retained (1 point) measured by gross building volume. <b>OR</b> 60% retention for 2 points.  <b>*Note. Refurbishment works</b> (where less than 20% of the existing element is replaced) can be counted as a retained element.	NOT CURRENTLY TARGETED.  New extension on existing building.
		19B.4	Structural Timber		4		High	\$	-	Optional	STRUC	ARCH, Structural			19B.4.0 responsible Sourcing (Min requirement): ARCH/STRUCT to ensure all structural timber used in the building is FSC or PEFC certified.  19B.4.1 Reducing Embodied Impacts (3 points): Points are awarded depending on the % of GFA constructed and/or supported by structural timber - 1 point for 30% GFA - 2 points for 70% GFA - 3 points for 90% GFA.	NOT CURRENTLY TARGETED.  Alternative pathway - if LCA not pursued.  Reduction in material cost expected through use of timber structure.
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	1	Medium	\$	-	Recommended	STRUC				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.	Coordination with STRUC consultant to specify compliant steel and reo.
		20.2	Timber Products		1	1	Low	\$	-	Recommended	ARCH				ARCH, STRUC: 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.	Ensure 95% by cost of timber specified is certified by a forest certification scheme (fsc or PEFC).  EWP included.
		20.3	Permanent Formwork, Pipes, Flooring, Blinds and Cables		1	1	Low	\$	-	Recommended	HYDR MECH ELEC ARCH STRUC				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.	Ensure 90% by cost of all PVC products hold Best Environmental Practice Certifications. OR provide evidence that cables, pipes etc are PVC free.
Sustainable Products	To encourage sustainability and transparency in product specification.	21.1	Product Transparency and Sustainability		3	2	Medium	\$	10,000.00	Optional					ARCH: Specify approximately 30% of all products to have Environmental Product Declarations (EPDs) or third party certifications e.g. GECA or Green Tag. STRUC: Specify any precast concrete and all steel to have Environmental Product Declaration (EPDs)	Targeting a total of 6% of the cost of all products to have sustainability credentials.  Specify products with either a high recycled content, EPD or GECA/Green Tag/Green Rate.  Cost uplift for portion of materials holding relevant SU certifications.
Construction and Demolition Waste	Fixed Benchmark	22A	Fixed Benchmark	1			Low	\$	-	Optional						
		22B	Percentage Benchmark	-	1		Medium	\$	-	Recommended	CONTR				WASTE/CONTRACTOR: Provide cumulative waste reports demonstrating at least 90% of construction and demolition waste has been diverted from landfill. Waste shall be reported in kg.	WCEoLP principle (Table 4, 9g) 90% diversion of waste - meeting credit criteria. C&D waste to be reported in kg.

Total Line		14	10	\$	10,000.00											
Land Use & Ecology						6	5		\$	-						
Ecological Value	To reward projects that improve the ecological value of their site.	23	Endangered, Threatened or Vulnerable Species	-	C	Low	\$	-	Minimum requirement	ECO	Project Manager, ESD		Hospitals usually built on brown field sites		Inherent (previously developed land)	
		23.1	Ecological Value	3	2	Medium	\$	-			ARCH, Landscape		Hospital sites are usually mainly buildings with minimal landscape area.		Pending preliminary calculations and 'pre development' details. Due to extent of landscape expecting overall improvement in ecological value.  Recommend primarily native planting over exotic to support credit intent and maximise points.	
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	Conditional Requirement	-	C	Low	\$	-	Minimum requirement	LAND	Project Manager, ESD		Healthcare relevant initiative		Inherent (previously developed land)	
		24.1	Reuse of Land	1	1	Low	\$	-			HI / LHD		Most hospital and healthcare projects are located within existing hospital sites. For most projects, this credit would be considered achieved.		Inherent (previously developed land)	
		24.2	Contamination and Hazardous Materials	1	1	Low	\$	-		CONTR	Project Manager, Head Contractor		Healthcare relevant initiative  ENV: Provide a Contamination and Hazardous Materials Survey CONT: Remove or stabilise contaminants and hazardous materials in accordance with best practice.		Inherent - assuming HAZMAT and decontamination works undertaken. Extension to existing building.	
Heat Island Effect	To encourage and recognise projects that reduce the contribution of the project site to the heat island effect.	25.0	Heat Island Effect Reduction	1	1	Medium	\$	-	Recommended	ARCH	ARCH, Landscape		ARCH: Specify roof materials to have a minimum Solar Reflectance Index of 82.		Extent of landscaping in concept plan supports credit intent. TBC External finishes (roof SRI > 64 pending pitch). May have issue with reflectivity on surrounding CASB building.  Solar PV excluded from area calc.  No cost uplift as new roof is assumed included in base budget.  To be reviewed against the other roof colours in the area.	
Total Line		6	5	\$	-											
Discharge to Environment						5	4		\$	15,000.00						
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	1	Medium	\$	-	Recommended	CIVIL	Hydraulics, Civil, Landscape		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.		TBC with existing stormwater strategy and management system. WCEoLP to tie into CASB WSUD/stormwater as mentioned in Wsce Concept report (4.4 / 5.2)	
		26.2	Stormwater Pollution Targets	1	1	Medium	\$	-		CIVIL	Civil, Landscape		CIVIL: Achieve pollution reduction in accordance with column A from "Table Emi-5.1: Pollution Reduction Targets"		TBC extent of stormwater design principles applicable for WCEoLP.  HYD: Will be connecting to the existing system. HI: Confirm approval of these points based on use of existing systems as project scope doesn't include upgrade of the existing stormwater systems.	
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	C	Low	\$	-	Recommended	ELEC	Electrical, Lighting		Neighbouring buildings are usually the hospital buildings. Consider impacts to surrounding residential if any.		TBC as design progresses. Currently assuming the emission of external lighting to be appropriately managed.	
		27.1	Light Pollution to Night Sky	1	1	Low	\$	-	Recommended	ELEC	Electrical, Lighting		LANDSCAPE, ARCH, ELEC: No external luminaire may have an upward light output ratio greater than 5% i.e. no up lights.			
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	0	Medium	\$	-	Recommended	MECH			Healthcare relevant initiative MECH: Water-based heat rejection system is to be installed 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 inspections and 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		NOT CURRENTLY TARGETED.  CASB Mech system water-based. TBC with MECH consultant.	
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	1	Medium	\$	15,000.00		MECH			MECH: Specify a leak detection system and complete the Total System Direct Environmental Impact using the Green Star Refrigerant Impacts Calculator to achieve an impact <35		Cost for the the leak detection system	
Total Line		5	4	\$	15,000.00											

<b>Project Score</b>	<b>66</b>
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