CUNDALL

# WA Prison Officers Union Office

## Sustainable Design Report

## Whitehaus Architects

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## Document Validation (latest issue)

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# Executive summary

This report outlines the Ecological Sustainable Design (ESD) strategy for the proposed WA Prison Officers Union Office development at 36 & 38 Summers Street, East Perth, Western Australia. The new 3-storey development is designed to include 1 level of integrated parking and 2 levels of office and multipurpose space.

The City of Vincent's *Built Form Policy No. 7.1.1* provides a guide to achieving good building design. Within this policy there are twenty (20) Objectives, three (3) of which relate to sustainability:

1. Respond to the changing needs of the community, environment and the economy over time in an efficient, functional and attractive manner;
2. Improve resource, energy and water efficiency throughout the development lifecycle including during construction, maintenance and ongoing use;
3. Incorporate sustainable and energy efficient design that befits the local climate and provides comfortable living conditions while reducing greenhouse gas emissions;

Furthermore, in *Part 2 – Policy Provisions, Volume 3 – Commercial, Section 1 – Town Centre, 1.18 Environmentally Sustainable Design* the Policy outlines specific criteria that the above proposed development must demonstrate.

This report outlines all considerations and mechanisms within the design of the proposed development that will effectively manage the resource, energy and water use associated with the building development and its operation. The development will aim to be designed to the equivalent standard of a 5-star under the Green Star Design & As-Built v1.3 rating system.

*Environmentally Sustainable Design objectives and acceptable outcomes relevant to Part 2, Volume 3, Commercial*

| Element Objectives | Acceptable Outcomes | Met |
|---|---|---|
| **O1.17.1** Development that considers the whole of life environmental impact of the building and incorporates measures to reduce this impact. | **A1.17.1** Development shall incorporate:<br>1. Site planning principles that maximise solar passive design opportunities for both summer and winter;<br>2. Natural ventilation and daylight penetration to reduce energy consumption;<br>3. Daytime areas with north-facing glazing to allow passive solar heating during winter;<br>4. Openable windows and/or ceiling fans to habitable rooms or occupied spaces that allow natural and cross ventilation;<br>5. Recovery and re-use of rainwater, storm water, grey water and/or black water for non-potable water applications;<br>6. Shading devices to reduce unwanted solar gain in summer and increase passive solar gain in winter; and<br>7. Integration of renewable energy and energy storage systems to optimise energy consumption. | ✓<br>✓<br>✓<br>✓<br>✓<br>✓<br>✓ |
| **O1.17.2** Development which reduces the impact of solar radiation in summer and increase passive solar gain in winter. | **A1.17.2** Development achieves one of the environmental performance standards shown in the below table, or their equivalent*.<br>▪ Green Building Council of Australia's Green Star Rating System; As-Built and Performance rating tool – 4-star Green Star rating | ✓ |

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## Appendices

# 1.0 Introduction

The proposed WA Prison Officers Union Office development is a commercial building within the City of Vincent in WA. The new 3-storey development is designed to include 1 level of integrated parking and 2 levels of office and multipurpose space. As the location of the development is within a residential built form area as designated by the *Planning and Development (Local Planning Schemes) Regulations 2015* the *Planning and Building Policy Manual Built Form Policy, Part 2, Volume 3 Section 5* of the City of Vincent, provisions apply.


*Figure 1.1 - Proposed Development Location*

This report outlines how the development will be designed to meet *Part 2, Volume 3, Section 5.7 Residential Area Development Requirements (and in turn Part 2, Volume 3, Section 1.17 Environmentally Sustainable Design) of the Built Form Policy No. 7.1.1*, for the purposes of the Development Application (DA) submission.

*Figure 1.2 - Visualisation of the Proposed WA Prison Officers Union Office Development*

## 1.1 City of Vincent Planning and Building Policy Manual Built Form Policy

The purpose of the Built Form Policy is to provide guidance on development in the City of Vincent. There are 20 objectives of the policy under context, design, sustainability, movement, and housing categories. The sustainability part of the policy includes three objectives namely:

14. Respond to the changing needs of the community, environment and the economy over time in an efficient, functional and attractive manner;
15. Improve resource, energy and water efficiency throughout the development lifecycle including during construction, maintenance and ongoing use;
16. Incorporate sustainable and energy efficient design that befits the local climate and provides comfortable living conditions while reducing greenhouse gas emissions;

Part 2, Volume 3, Section 5 of this Policy applies to co applications for commercial developments in the areas identified as residential areas on Figure 1.2 shown below, pursuant to Schedule 2, Part 7 of the Planning and Development (Local Planning Schemes) Regulations 2015.

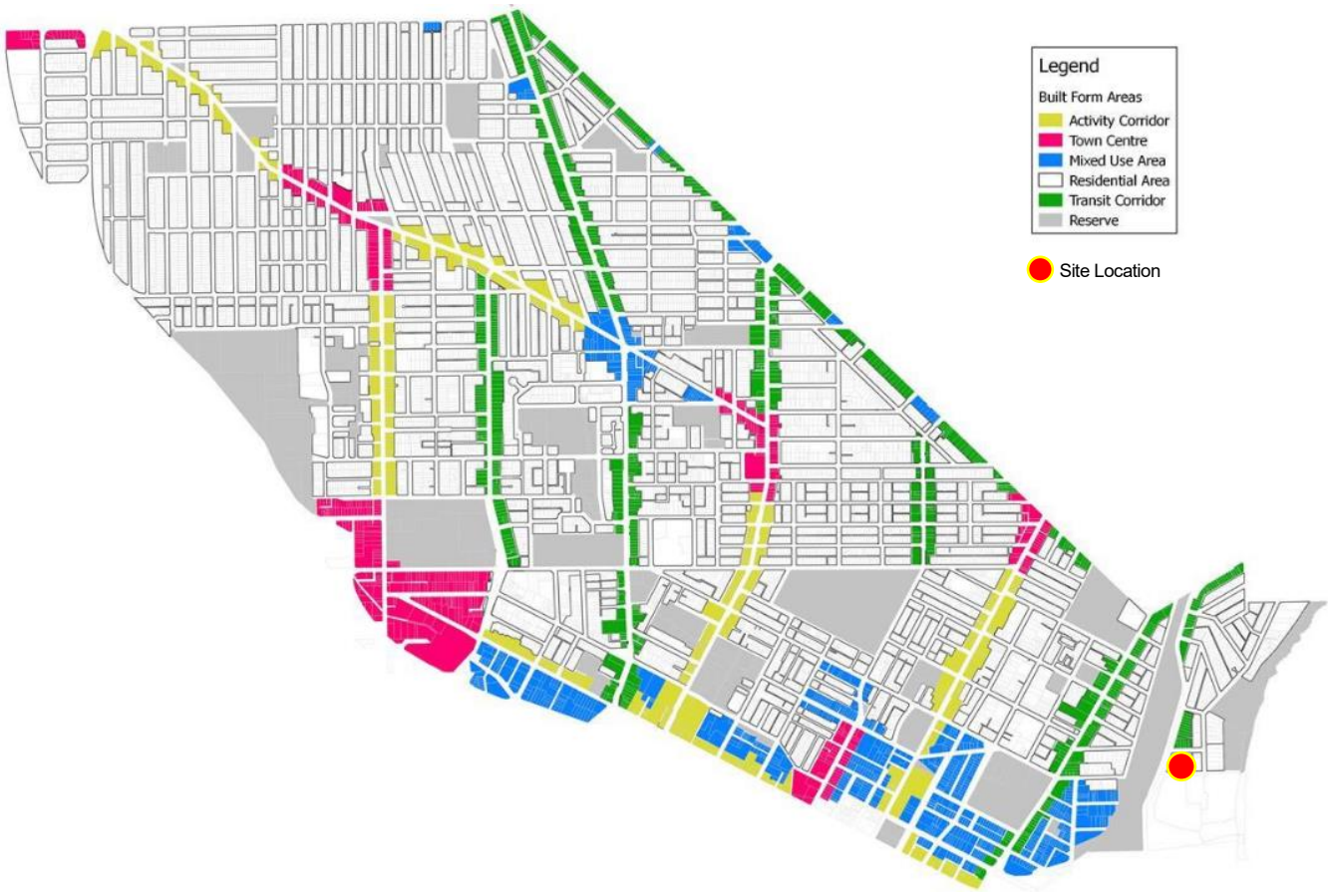


*Figure 1.3 – City of Vincent Built Form Areas – Residential (White)*

In addition, the policy also requires any Development Assessment applicants to provide comments to the City of Vincent regarding whether the development meets the relevant Design Principles contained with the Appendix 1 of the policy. The Sustainability Section of the Appendix 1 includes:

- Good design optimises the sustainability of the built environment, delivering positive environmental, social, and economic outcomes.

- Sustainable buildings incorporate effective environmental design measures that respond to local climate and site conditions by providing optimal orientation, shading, thermal performance, and natural ventilation. Reducing reliance on energy intensive systems for heating and cooling improves energy efficiency, minimises resource consumption and reduces operating costs over the whole life cycle of the building.
- Other sustainable design measures may also include the use of sustainable construction materials, recycling, material re-use, harnessing of renewable energy sources, appropriate water management and/or adaptive re-use of existing buildings. Good design considers the ease with which sustainability initiatives can be maintained and managed.
- Sustainable landscape and urban design adhere to established principles of water-sensitive urban design and minimises negative impacts on existing natural features and ecological processes, as well as facilitating green infrastructure at all project scales.

## 1.2 Sustainability targets

The development is being designed to fulfil the requirement in terms of sustainable design and the Built Form policy and is aiming to achieve the following equivalent green building rating standard:

- 4-star Green Star – Design & As-Built v1.3 (no formal rating).

The project is also required to comply with the National Construction Code (NCC) Section J for Energy Efficiency. These commitments are outlined in more detail in the following sections.

This report has been developed in four key sections as noted below. Each section will focus on a key concern for the development and provide an insight as to how these items will be addressed throughout the design process.

- Passive design;
- Water reuse and recovery;
- Climate responsive design; and
- Environmental performance rating.

# 2.0 Passive design

The construction industry is responsible for around 20% of Australia's carbon footprint. These emissions include embodied energy and water consumption that goes into the building during construction as well as operational energy and water usage of the completed building, maintenance during the life span and the demolition at the end of the building's life.

City of Vincent Planning and Building Policy Manual, Built Form Policy requires:

**A1.17.1** Development shall incorporate:

1. Site planning principles that maximise solar passive design opportunities for both summer and winter;
2. Natural ventilation and daylight penetration to reduce energy consumption;
3. Daytime areas with glazing to allow passive solar heating during winter;
4. Openable windows and/or ceiling fans to habitable rooms or occupied spaces that allow natural and cross ventilation;
6. Shading devices to reduce unwanted solar gain in summer and increase passive solar gain in winter;

The following sections set out passive design strategies utilized for this development to reduce the buildings energy demand and greenhouse gas emissions.

## 2.1 Building form

The development has incorporated passive comfort control measures into the design. As evident in the plans below (*Figure 2.1*), the wider façade of the building form is facing East to west, allowing for passive heat gain during colder months, whilst ensuring walls are not directly exposed for the whole day during the hot summer months. Placing the core of the building on the north of the building also adds thermal mass reducing the diurnal swings.

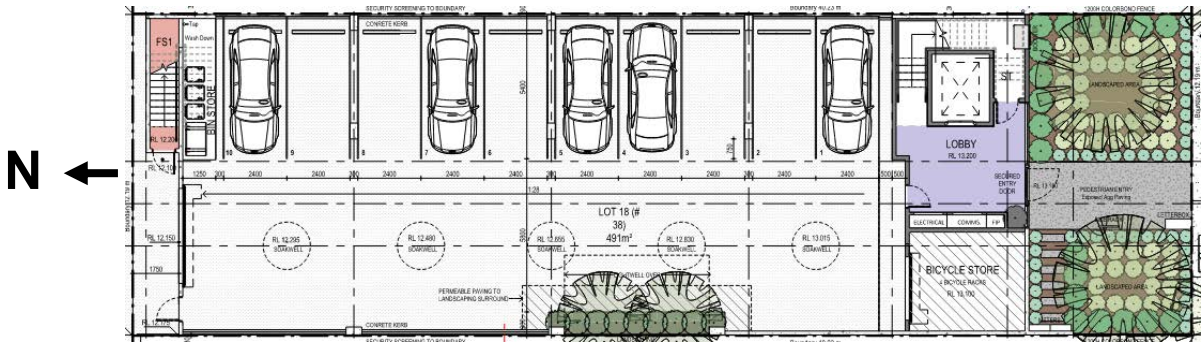


*Figure 2.1 - Ground floor plan of the development*

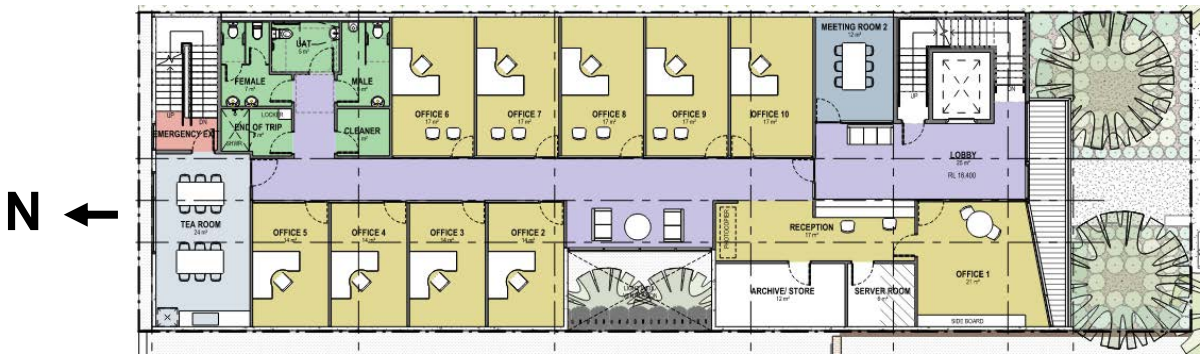


*Figure 2.2 - First floor plan of the development*

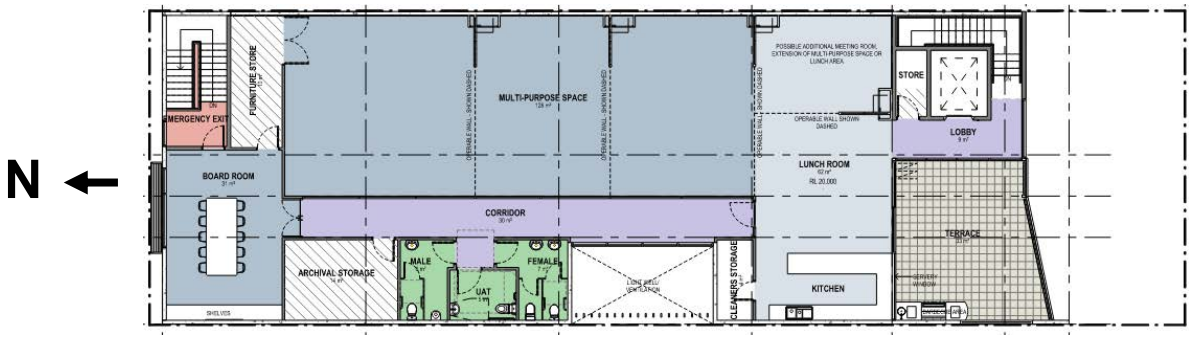


*Figure 2.3 - Second floor plan of the development*

## 2.2 Shading devices

Several of the glazed openings in the building have shading devices that provide additional vertical and horizontal shading from direct solar irradiation.

*Figure 2.4 - Proposed shading devices*

# 3.0 Water reuse and recovery

The water consumption of Western Australian is the second highest in Australia with an average of 241,000 litres per household per annum, well above the Australian average of 190,000 litres [1]. A reduction of water usage does not only alleviate pressure from the local water supply but also means reduced costs of living in WA.

City of Vincent Planning and Building Policy Manual, Built Form Policy requires:

**A1.17.1** Development shall incorporate:

5. Recovery and re-use of rainwater, storm water, grey water and/or black water for non-potable water applications.

The following measures to reduce water consumption are considered to be included in proposed development.

## 3.1 Water fixtures & fittings

Occupant consumption is a major contributor to potable water usage. The following water fixture WELS ratings will be considered to ensure the efficient use of potable water by building occupants.

*Table 3.1: Proposed water fitting WELS ratings*

| Fixture / Fitting Type | WELS Rating |
|---|---|
| Taps | 6 Star |
| Toilets | 5 Star |
| Showers | 3 Star |
| Dishwashers | 6 Star |
| Clothes Washing Machines | 5 Star |

## 3.2 Irrigation

A major amount of potable water usage goes back to landscape irrigation. To reduce the amount of water used for the landscape, a drip system with moisture sensor control may be installed for irrigation. Collected rainwater may also be used for irrigation to reduce water consumption, as mentioned below.

## 3.3 Water collection and storage

The development will collect, store and reuse rainwater for the purpose of irrigation of green, landscaped space within the development. Rainwater collection will occur on the roof topmost level of the development, with an approximate net collection area of 645 $m^2$. The water can be stored in a tank on the ground floor of the development. The final location and size of the rainwater collection system and storage tank is to be finalised. The rainwater collection surface and examples of the greenspaces where this captured water can be used are displayed below in Figure 3.1 and Figure 3.2. It should be recognised that during the winter, the green spaces will be watered by rainwater as they are not undercover. The pool will also capture some rainwater, reducing the volume required for refilling.

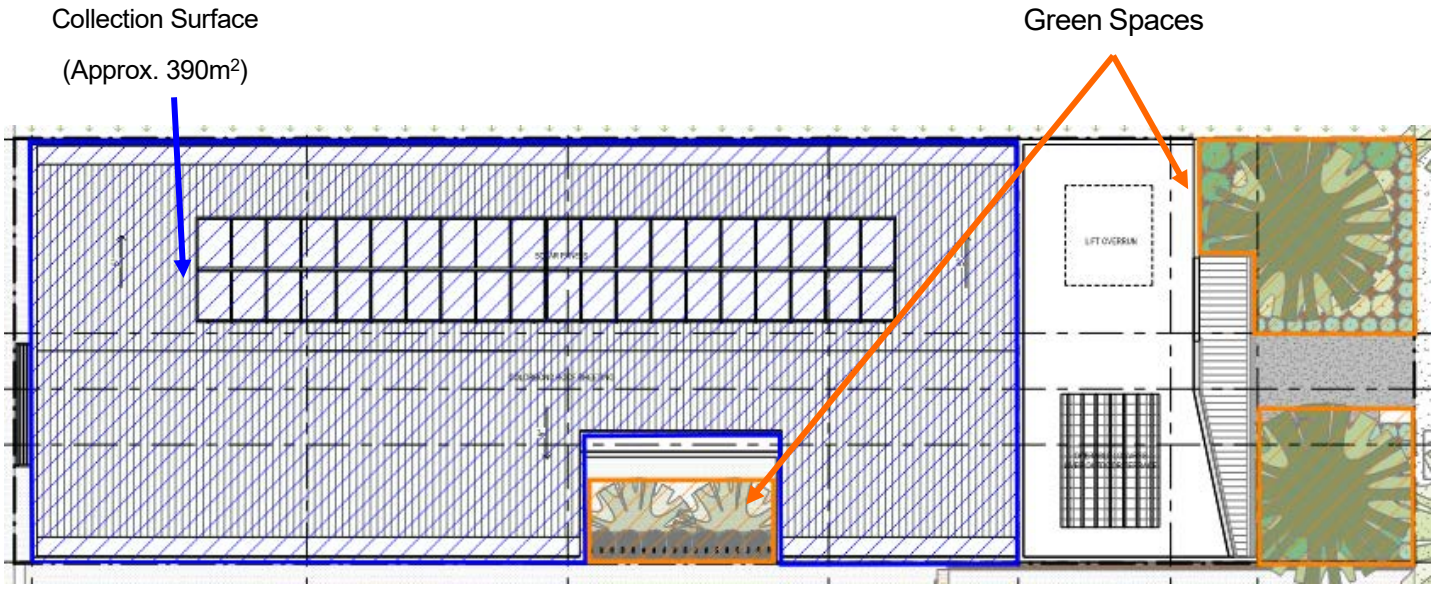


*Figure 3.1 - Rooftop view indicating water collection and reuse areas*

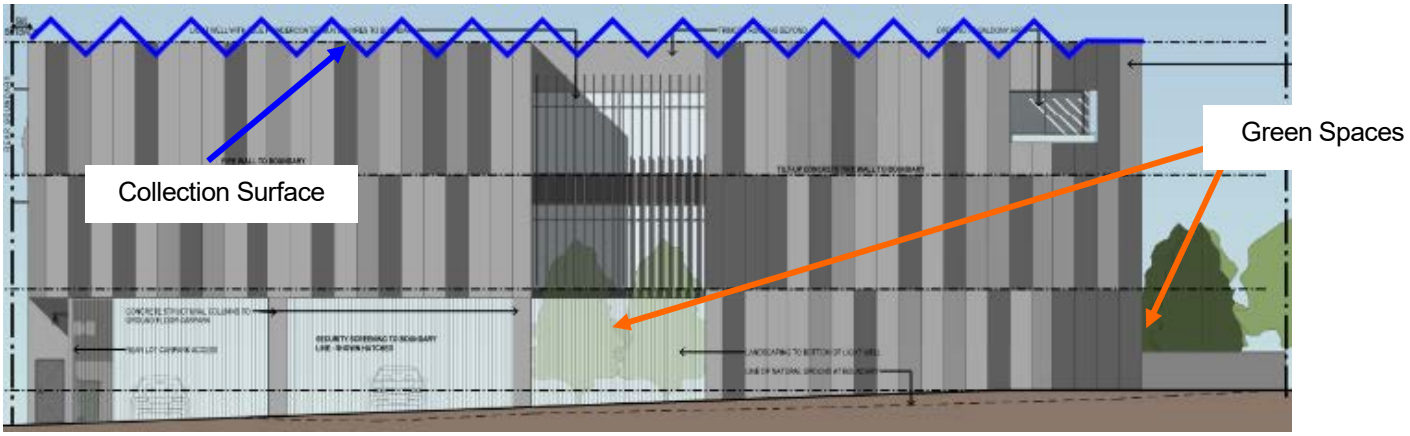


*Figure 3.2 - Development render indicating water collection and reuse areas*

## 3.4 Fire systems

Water from fire system testing procedures can be re-used within the building to offset water consumption. The fire sprinkler system is to be designed so that all test and drain down water is reduced and potentially captured.

## 3.5 Transparent consumption

### Water metering and leak detection

A system that both monitors and manages water consumption may be installed. Water metering may be provided to all major water uses within the building, with connections to the BMS ensuring immediate and effective monitoring of water consumption and leakages for simple rectification.


### Smart metering

Provision of smart metering for the energy and water usage recording, tracking with user interface would be a novel feature on this development. The software could also provide a snap shot view of how the building is performing. This provides a means to inform the building occupants well as engage them in a sustainable lifestyle.

# 4.0 Climate responsive design

City of Vincent Planning and Building Policy Manual, Built Form Policy requires:

**A1.17.1** Development shall incorporate:

7. Integration of renewable energy and energy storage systems to optimise energy consumption.

On all levels of the design, many glazed openings are set-back in the walls, in doing so, shading the majority of glazing on these levels. As these shading elements are positioned around the glazing of these areas, the greatest reduction of direct solar exposure will occur during summer months while the sun is high. During winter months the direct exposure is increased for the northern facing shaded areas as the sun path is much lower thus allowing passive heating during these months.

*Figure 4.1 - Wall setbacks, allowing for shading*

## 4.1 Solar photovoltaic panels

Solar Photovoltaic (PV) panels will be considered to be installed to the roof of the building supplying power for the of the common areas, including corridors, stairwells, gym, reception and parking. Approximately 60.4m$^2$ of roof area will be available to locate solar PV panels. This could equate to approximately 30kW of PV array for the building.

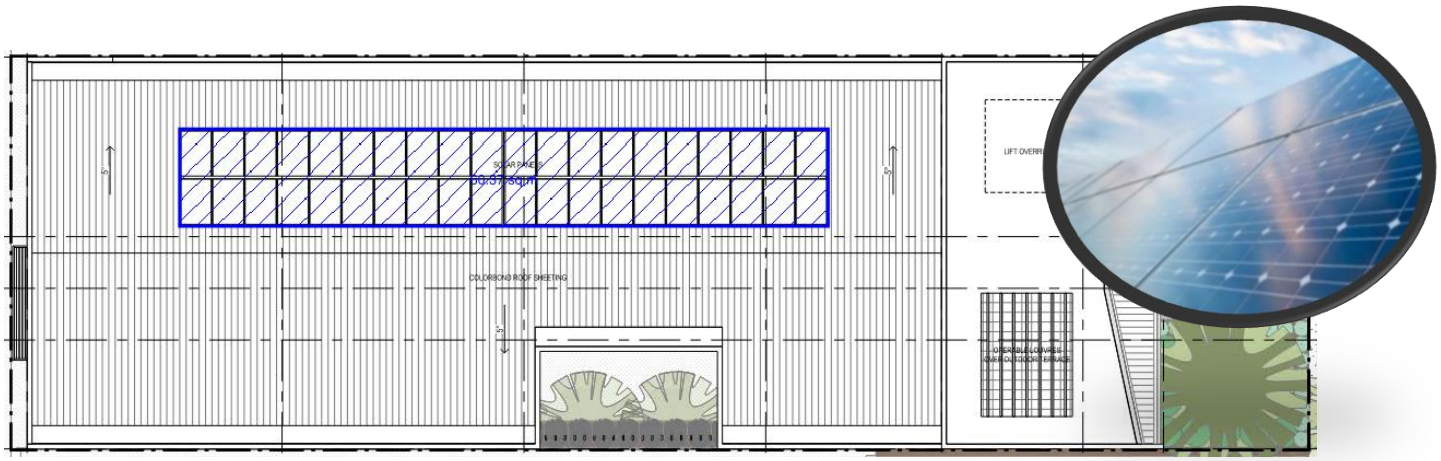

*Figure 4.2 - Proposed rooftop layout with indicative PV panel provisions*

## 4.2 Building Materials and Resource Minimisation

In 2014-15 Australia produced the equivalent of 565kg per capita of municipal waste and 831kg of construction and demolition waste. While around 60% of this waste is recycled, a large part still goes to landfill. A reduction of both construction and operational waste is therefore an important target of the proposed development.

The design team will actively target reduced carbon footprint during construction and embodied energy within building materials. The design team aims to specify at least 60% of the steel used for reinforcing bar and mesh having been produced using energy-reducing manufacturing methods. All timber used for construction works shall be either certified as responsibly sourced or recycled material.

A dedicated waste storage area will be provided for the separation and storage of recyclable waste during operation, allowing for the different waste streams to be separated to match the local recycling scheme.

Throughout project design, operation and construction, principles of resource recovery will be applied, so that materials and products are recovered and reused where possible, reducing landfill and saving money.

Some strategies that will be investigated include:

- Innovative waste separation and collection strategies to allow materials to be isolated for reuse;
- A purchasing policy which aims to minimise waste from products and packaging, encourage the use of products which have minimum environmental impact;
- Manufacturers and suppliers will be encouraged to take full responsibility for the life cycle impact of products including ownership at end of life.

## 4.3 Cyclist facilities

In Perth 48% of all car trips are less than 5km distance. Cars produce an average of 0.3kg of $CO_2$ per km travelled, whereas a cyclist emits negligible greenhouse or other pollution. For each kilometre, a person cycles instead of driving, approximately 0.3 kg of $CO_2$ are saved from being emitted to the environment.

Furthermore, cycling will encourage an active and healthy lifestyle for the building occupants. The proposed design includes 4 long term and 1 short term bike rack. There will also be 1 shower and 4 lockers provided.

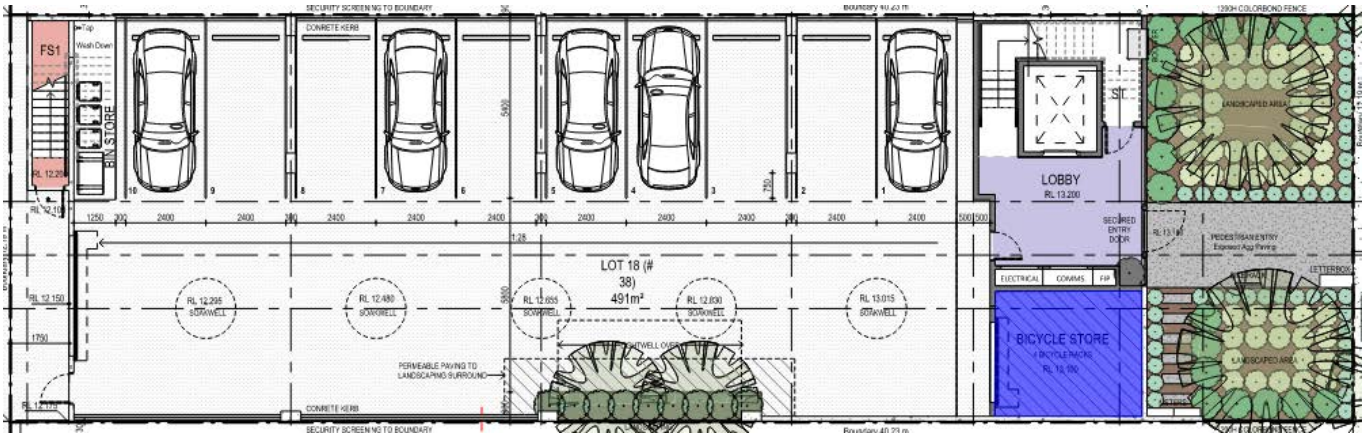


*Figure 4.3 - Cyclist Facilities on Ground Floor*

## 4.4 Embodied Carbon

Embodied carbon comprises a major proportion of the total carbon footprint of a building. An option to provide a life cycle analysis (LCA) of total carbon and environmental footprint will be considered at key design stages to ensure that design options are prioritised in terms of life-cycle impact and embodied energy/water rather than just day one impacts.

The following items will be considered throughout the design development:

- Sub-structure

  - Maximise recycled content of materials in structural components.

- Super-Structure
  - Maximise recycled content in concrete and formwork.
- Envelope
  - Adopt a low-carbon, lightweight approach;
  - Consider necessity of massing elements;
  - Consider composite materials or dual function elements.
- Internal Walls
  - Consider necessity of internal walls;
  - Consider recycled content or reused materials;
  - Consider low carbon steel framing.
- Internal Finishes
  - Consider setting a recycled content target for all finishes;
  - Consider long life and highly durable finished is areas of high foot traffic.

## 4.5 Artificial lighting and controls

It will be considered to specify all Light fitting as LED fittings including lighting for all spaces of the building including in carpark areas combined with occupancy detection for all common areas and lobbies. All common area lighting will incorporate light sensing such as occupancy sensing (PIRs) to reduce lighting consumption when lighting is not required. Daylight dimming to common areas and commercial tenancies to reduce power usage when daylight levels are high will be part of the design too.

## 4.6 Emissions & toxicity

Volatile organic compounds (VOCs) are emitted as gases from certain solids or liquids. VOCs include a variety of chemicals, some of which may have short and long-term adverse health effects. Concentrations of many VOCs are consistently higher indoors than outdoors. VOCs are emitted by a wide array of products numbering in the thousands (typically paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers).

The development will aim to specify materials with a low emissions content including low-VOC and low formaldehyde content to avoid contaminating the indoor air.

## 4.7 Thermal comfort

The human body regulates its core temperature via the hypothalamus within a narrow range of 36 to 38 degrees. An indoor environment that is too hot or too cold can affect mood, performance and productivity. However, at which temperature a resident feels comfortable varies significantly from person to person. To control internal comfort and minimise excessive heat loss in winter and heat gains in summer, several strategies will be investigated for the proposed development:

- Facade design and glass selection is very important; heat gains and losses must be moderated, and thermal bridging should be avoided.
- The facade should be well sealed to avoid draughts and air leakage.

## 4.8 Walkable neighbourhood & access to public transport

The proposed development is in the City of Vincent. As displayed below in Figure 4.4, there are a variety of shops, entertainment, and public transport in a convenient distance to the proposed development. Similarly, the location provides good public transport options for the building occupants.

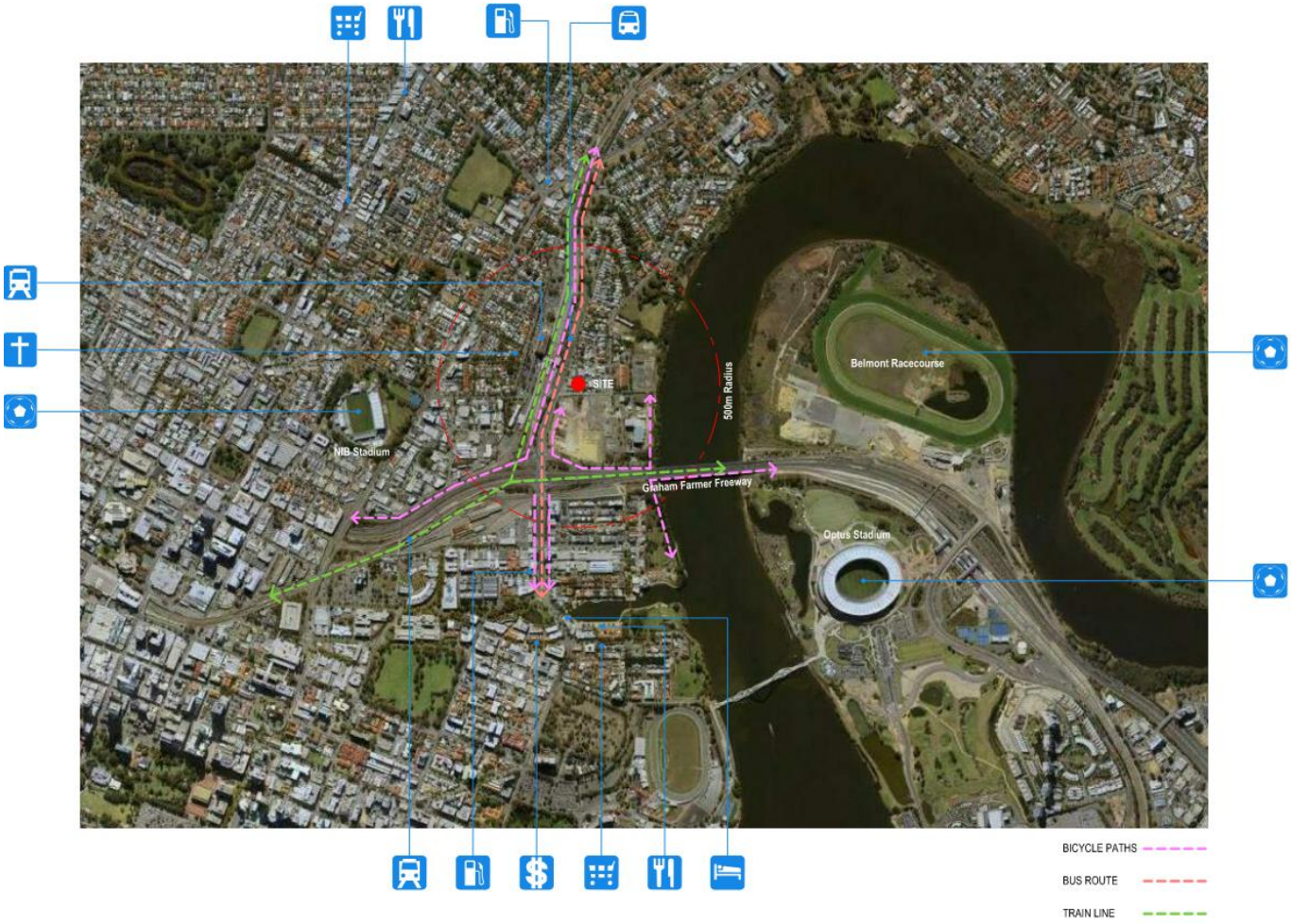


*Figure 4.4 - Walkable neighbourhood & access to public transport.*

# 5.0 Environmental performance rating

City of Vincent Planning and Building Policy Manual, Built Form Policy requires:

**A1.17.2** Development achieves one of the environmental performance standards shown in the below table, or their equivalent*.

- Green Building Council of Australia's Green Star Rating System; As-Built and Performance rating tool - 5 star Green Star rating

## 5.1 Green Star

The development is being designed to fulfil all requirements in terms of Ecologically Sustainable Design (ESD) and is aiming to achieve the equivalent standard of a 4-star Green Star – Design and As-Built v1.3 rating. Green Star is a comprehensive sustainability design tool which assesses the environmental impact of a building over a range of environmental indicators, from management and ecology to energy and water use, material selection and waste production.

A 4-star Green Star rating requires a total of 45 points to be achieved in the aforementioned categories. Sufficient weighted credits have been selected to achieve this rating, and further opportunities will be pursued during the design stages of the project.

Based on the proposed design response the predicted performance in each respective environmental category is tabulated in *Appendix A*. The Green Star strategy demonstrates how the development is capable of achieving a 4-star Green Star target standard.

*Table 5.1: Targeted Green Star points*

| Total Available Points | Minimum Points required for 5 Star Rating | Target for the Proposed Development |
|---|---|---|
| **110 Points** | 45 Points | 48 Points (4-star with approx. 7% buffer) |

# 6.0 References

[1] Australian Bureau of Statistics, “4610.0 - Water Account, Australia 2015-16,” 2017. [Online]. Available: http://www.abs.gov.au/ausstats/abs@.nsf/Latestproducts/4610.0Main%20Features32015-16?opendocument&tabname=Summary&prodno=4610.0&issue=2015-16&num=&view=. [Accessed 05 10 2018].

[2] J. Pickin and P. Randell , “Australian National Waste Report 2016,” Department of the Environment and Energy and Blue Environment Pty Ltd, Docklands, Vic 3008, 2017.

[3] GHD, Canning Bridge Structure Plan Project Working Group, “Canning Bridge Activity Centre Plan,” City of Melville, City of South Perth, Government of Western Australia, Booragoon/South Perth, 2016.

[4] International Energy Agency, “Global EV Outlook 2018,” International Energy Agency , 2018. [Online]. Available: https://www.iea.org/gevo2018/. [Accessed 05 10 2018].

# Appendix A Green Star Strategy

Please see overleaf.

# Green Star - Design & As Built Scorecard

| | | | | Core Points Available | 5 Star "Likely" | 5 Star "TBC" |
|---|---|---|---|---|---|---|
| **Project:** | WA Police Officers Union Office | **Round:** | 1 | | | |
| **Targeted Rating:** | 4 Star - Best Practice | | | 98 | 48 | 11 |

| CATEGORY / CREDIT | AIM OF THE CREDIT / SELECTION | CODE | CREDIT CRITERIA | POINTS AVAILABLE | POINTS LIKELY | POINTS TBC |
|---|---|---|---|---|---|---|
| **Management** | | | | 14 | | |
| **Green Star Accredited Professional** | To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended. | 1.1 | Accredited Professional | 1 | 1 | |
| **Commissioning and Tuning** | To encourage and recognise commissioning, handover and tuning initiatives that ensure all building services operate to their full potential. | 2.0 | Environmental Performance Targets | - | Complies | |
| | | 2.1 | Services and Maintainability Review | 1 | 1 | |
| | | 2.2 | Building Commissioning | 1 | 1 | |
| | | 2.3 | Building Systems Tuning | 1 | 1 | |
| | | 2.4 | Independent Commissioning Agent | 1 | | |
| **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 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Building Information** | To recognise the development and provision of building information that facilitates understanding of a building's systems, operation and maintenance requirements, and environmental targets to enable the optimised performance. | 4.1 | Building Information | 1 | 1 | |
| **Commitment to Performance** | To recognise practices that encourage building owners, building occupants and facilities management teams to set targets and monitor environmental performance in a collaborative way. | 5.1 | Environmental Building Performance | 1 | 1 | |
| | | 5.2 | End of Life Waste Performance | 1 | 1 | |
| **Metering and Monitoring** | To recognise the implementation of effective energy and water metering and monitoring systems. | 6.0 | Metering | - | Complies | |
| | | 6.1 | Monitoring Systems | 1 | 1 | |
| **Responsible Construction Practices** | To reward projects that use best practice formal environmental management procedures during construction. | 7.0 | Environmental Management Plan | - | Complies | |
| | | 7.1 | Environmental Management System | 1 | 1 | |
| | | 7.2 | High Quality Staff Support | 1 | | 1 |
| **Operational Waste** | B. Prescriptive Pathway | 8A | Performance Pathway: Specialist Plan | 0 | | |
| | | 8B | Prescriptive Pathway: Facilities | 1 | 1 | |
| **Total** | | | | **14** | **10** | **1** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Indoor Environment Quality** | | | | **16** | | |
| | | 9.1 | Ventilation System Attributes | 1 | 1 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Indoor Air Quality** | To recognise projects that provide high air quality to occupants. | 9.2 | Provision of Outdoor Air | ☑ ☐ ☐ | 2 | | 1 |
| | | 9.3 | Exhaust or Elimination of Pollutants | ☐ ☐ | 1 | 1 | |
| **Acoustic Comfort** | To reward projects that provide appropriate and comfortable acoustic conditions for occupants. | 10.1 | Internal Noise Levels | | 1 | 1 | |
| | | 10.2 | Reverberation | | 1 | 1 | |
| | | 10.3 | Acoustic Separation | | 0 | | |
| **Lighting Comfort** | To encourage and recognise well-lit spaces that provide a high degree of comfort to users. | 11.0 | Minimum Lighting Comfort | | - | Complies | |
| | | 11.1 General Illuminance and Glare Reduction | 11.1.1 General Illuminance | ☐ ☐ | 1 | 1 | |
| | | | 11.1.2 Glare Reduction | ☐ ☐ ☐ | | | |
| | | 11.2 | Surface Illuminance | ☐ ☐ ☐ | 1 | 1 | |
| | | 11.3 | Localised Lighting Control | | 1 | 1 | |
| **Visual Comfort** | To recognise the delivery of well-lit spaces that provide high levels of visual comfort to building occupants. | 12.0 | Glare Reduction | ☐ ☑ ☐ | - | Complies | |
| | | 12.1 | Daylight | ☐ ☐ ☐ | 2 | | |
| | | 12.2 | Views | | 1 | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Indoor Pollutants** | To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels. | 13.1 Paints, Adhesives, Sealants and Carpets | 13.1.1 Paints, Adhesives and Sealants | ☐ | 1 | 1 | |
| | | | 13.1.2 Carpets | ☐ | | | |
| | | 13.2 | Engineered Wood Products | ☐ | 1 | 1 | |
| **Thermal Comfort** | To encourage and recognise projects that achieve high levels of thermal comfort. | 14.1 | Thermal Comfort | ☐ | 1 | 1 | |
| | | 14.2 | Advanced Thermal Comfort | ☐ | 1 | | |
| **Total** | | | | | **16** | **10** | **1** |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Energy** | | | | | **22** | | |
| | | 15A.0 | Conditional Requirement: Prescriptive Pathway | | - | | |
| | | 15A.1 | Building Envelope | | 0 | | |
| | | 15A.2 | Wall-Glazing Construction and Retail Display Glazing | | 0 | | |
| | | 15A.3 | Lighting | | 0 | | |
| | | 15A.4 | Ventilation and Air Conditioning | | 0 | | |
| | | 15A.5 | Domestic Hot Water | | 0 | | |

| | | | | | |
|---|---|---|---|---|---|
| | 15A.6 | Transition Plan | 0 | | |
| | 15A.7 | Fuel Switching | 0 | | |
| | 15A.8 | On-Site Storage | 0 | | |
| | 15A.9 | Vertical Transportation | 0 | | |
| | 15A.10 | Off-Site Renewables | 0 | | |
| | 15B.0 | Conditional Requirement: NatHERS Pathway | - | | |
| | 15B.1 | Thermal and Energy Performance | 0 | | |
| | 15B.2 Building Services and Appliances | 15B.2.1 Lighting | 0 | | |
| | | 15B.2.2 Ventilation and Air Conditioning ☐ ☐ ☐ | 0 | | |
| | | 15B.2.3 Domestic Hot Water | 0 | | |
| | | 15B.2.4 Appliances & Equipment | 0 | | |
| | | 15B.2.5 Fuel Switching | 0 | | |
| | | 15B.2.6 On-Site Storage | 0 | | |
| | | 15B.2.7 Vertical Transportation | 0 | | |
| **Greenhouse Gas Emissions** | E. Reference Building Pathway | | | | |

| Emissions | | | | | |
|---|---|---|---|---|---|
| | 15 | 15B.2.8 Passive Laundry Facilities | 0 | | |
| | | 15B.2.9 Unoccupied Areas | 0 | | |
| | | 15B.2.10 Off-Site Renewables | 0 | | |
| | 15C.0 | Conditional Requirement: BASIX Pathway | - | | |
| | 15C.1 | BASIX Greenhouse Gas Reductions | 0 | | |
| | 15C.2 | Off-Site Renewables | 0 | | |
| | 15D.0 | Conditional Requirement: NABERS Pathway | - | | |
| | 15D.1 | NABERS Energy Greenhouse Gas Emissions Reduction | 0 | | |
| | 15D.2 | Off-Site Renewables | 0 | | |
| | 15D.3 Additional Prescriptive Measures | 15D.3.1 Transition Plan | 0 | | |
| | | 15D.3.2 Fuel Switching | 0 | | |
| | | 15D.3.3 On-Site Storage | 0 | | |
| | 15E.0 | Conditional Requirement: Reference Building Pathway | - | Complies | |
| | 15E.1 | GHG Emissions Reduction: Building Fabric | 4 | 1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 15E.2 | GHG Emissions Reduction | 16 | 2 | 4 |
| | | 15E.3 | Off-Site Renewables | 8 | | |
| | | 15E.4 | District Services | 7 | | |
| | | 15E.5 Additional Prescriptive Measures | 15E.5.1 Transition Plan | 1 | | |
| | | | 15E.5.2 Fuel Switching | 2 | | |
| | | | 15E.5.3 On-Site Storage | 1 | | |
| **Peak Electricity Demand Reduction** | B. Performance Pathway | 16A | Prescriptive Pathway: On-Site Energy Generation | 0 | | |
| | | 16B | Modelled Performance Pathway: Reference Building | 2 | 1 | 1 |
| **Total** | | | | **22** | **4** | **5** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Transport** | | | | **10** | | |
| | | 17A | Performance Pathway | 0 | | |
| | | 17B.1 | Access by Public Transport | 3 | 3 | |
| | | 17B.2 | Reduced Car Parking Provision | 1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Sustainable Transport** | B. Prescriptive Pathway | 17B.3 | Low Emission Vehicle Infrastucture | 1 | | |
| | | 17B.4 | Active Transport Facilities | 1 | 1 | |
| | | 17B.5 | Walkable Neighbourhoods | 1 | | |
| **Total** | | | | **7** | **4** | **0** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Water** | | | | **11** | | |
| **Potable Water** | B. Prescriptive Pathway | 18A | Potable Water - Performance Pathway | 0 | | |
| | | 18B.1 | Sanitary Fixture Efficiency | 1 | 1 | |
| | | 18B.2 | Rainwater Reuse | 1 | | 1 |
| | | 18B.3 | Heat Rejection | 2 | 2 | |
| | | 18B.4 | Landscape Irrigation | 1 | 1 | |
| | | 18B.5 | Fire Protection System Test Water | 0 | | |
| **Total** | | | | **5** | **4** | **1** |

| Materials | | | | | | |
|---|---|---|---|---|---|---|
| | | | | 14 | | |
| **Life Cycle Impacts** | A. Performance Pathway - Life Cycle Assessment | 19A.1 | Comparative Life Cycle Assessment | 6 | 3 | |
| | | 19A.2 | Additional Reporting | 4 | 1 | |
| | | 19B.1 Concrete | 19B.1.1 Portland Cement Reduction | 0 | | |
| | | | 19B.1.2 Water Reduction | 0 | | |
| | | | 19B.1.3 Aggregates Reduction | 0 | | |
| | | 19B.2 Steel | A. Reduced Mass of Steel Framing | 0 | | |
| | | 19B.3 | Building Reuse | 0 | | |
| | | | | 0 | | |
| | | 19B.4 | Structural Timber | - | | |
| | | | | 0 | | |
| **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 | - | Complies | |
| | | | | 1 | 1 | |
| | | 20.2 | Timber | 1 | 1 | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | | 20.3 | Permanent Formwork, Pipes, Flooring, Blinds and Cables | 1 | 1 | |
| **Sustainable Products** | To encourage sustainability and transparency in product specification. | 21.1 | Product Transparency and Sustainability | 3 | | |
| **Construction and Demolition Waste** | B. Percentage Benchmark | 22.0 | Reporting Accuracy | - | Complies | |
| | | 22A | Fixed Benchmark | 0 | | |
| | | 22B | Percentage Benchmark | 1 | | 1 |
| **Total** | | | | **14** | **7** | **1** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Land Use & Ecology** | | | | **6** | | |
| **Ecological Value** | To reward projects that improve the ecological value of their site. | 23.0 | Endangered, Threatened or Vulnerable Species | - | Complies | |
| | | 23.1 | Ecological Value | 3 | | |
| | To reward projects that choose to develop sites that have | 24.0 | Conditional Requirement | - | Complies | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Sustainable Sites** | To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land. | 24.1 | Reuse of Land | 1 | 1 | |
| | | 24.2 | Contamination and Hazardous Materials | 1 | 1 | |
| **Heat Island Effect** | To encourage and recognise projects that reduce the contribution of the project site to the heat island effect. | 25.1 | Heat Island Effect Reduction | 1 | 1 | |
| **Total** | | | | **6** | **3** | **0** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Emissions** | | | | **5** | | |
| **Stormwater** | To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure. | 26.1 | Stormwater Peak Discharge | 1 | 1 | |
| | | 26.2 | Stormwater Pollution Targets | 1 | | |
| **Light Pollution** | To reward projects that minimise light pollution. | 27.0 | Light Pollution to Neighbouring Bodies | - | Complies | |
| | | 27.1 | Light Pollution to Night Sky | 1 | | 1 |
| **Microbial Control** | To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems. | 28 | Legionella Impacts from Cooling Systems | 1 | 1 | |
| **Refrigerant Impacts** | To encourage operational practices that minimise the environmental impacts of refrigeration equipment. | 29.1 | Refrigerants Impacts | 1 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| **Total** | | | | **5** | **2** | **1** |

| | | | | | | |
|---|---|---|---|---|---|---|
| **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 | | | 1 |
| **Market Transformation** | The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world. | 30B | Market Transformation | | | |
| **Improving on Green Star Benchmarks** | The project has achieved full points in a Green Star credit and demonstrates a substantial improvement on the benchmark required to achieve full points. | 30C | Improving on Green Star Benchmarks | 10 | 1 | |
| **Innovation Challenge** | Where the project addresses an sustainability issue not included within any of the Credits in the existing Green Star rating tools. | 30D | Innovation Challenge | | 2 | |
| **Global Sustainability** | Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star | 30E | Global Sustainability | | | |
| **Total** | | | | **10** | **3** | **1** |

| AVAILABLE | TARGETED | |
|---|---|---|
| **98** | **44.0** | **10.0** |
| | **44.9** | **10.2** |
| **10** | **3.0** | **1.0** |


47.9
11.2