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Environmentally Sustainable Design (ESD) Report

Hamilton St Residential Project

99-101+ 103-105 Hamilton St Redland Bay

Prepared for: Glenn Bliesner Design

Project No.: BR210376

Revision No.: A

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REVISIONS

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1 List of Abbreviations, Definitions and Units of Measurements

- NCC - National Construction Code, Building Code of Australia 2019
- GBCA – Green Building Council of Australia
- EDQ – Economic Development Queensland
- HVAC - Heating, ventilation, and air conditioning
- VOCs - Volatile Organic Compounds
- NatHERS – Nationwide House Energy Rating Scheme
- Conditioned Space means a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning
- DTS means Deemed-to-Satisfy in regards to provisions as specified in the National Construction Code
- Envelope means the parts of a building's fabric that separates a conditioned space or habitable room from-
 - (a) the exterior of the building; or
 - (b) a non-conditioned space including-
 - (i) the floor of a rooftop plant room, lift-machine room or the like; and
 - (ii) the floor above a carpark or warehouse; and
 - (iii) the common wall with a carpark, warehouse or the like.
- External Wall means an outer wall of a building which is not a common wall
- Glazing means a transparent or translucent element and its supporting frame located in the envelope, and includes a window other than a roof light
- R-Value ($\text{m}^2\text{K/W}$) means the thermal resistance of a component calculated by dividing its thickness by its thermal conductivity
- Total R-Value ($\text{m}^2\text{K/W}$) means the sum of the R-Values of the individual component layers in a composite element including any building material, insulating material, airspace, thermal bridging and associated surface resistances.
- Total System Solar Heat Gain Coefficient (SHGC) means the fraction of incident irradiance on a wall-glazing construction or a roof light that adds heat to a building's space
- Total System U-Value ($\text{W/m}^2\text{K}$) means the thermal transmittance of the composite element allowing for the effect of any airspaces, thermal bridging, and associated surface resistances.
- VLT means Visual Light Transmission and is the proportion of visible light that passes through a window.

2 Executive Summary

2.1 Introduction

The report provides a foundation for addressing initiatives for the Hamilton Street Redland Bay multiple residential development, which is situated within the municipal boundaries of the Redland City Council.

2.2 Scope of Works

The scope of works for the project includes demolishing two existing sites in order to create a larger site to accommodate the new residential building development.

The development consists of residential apartments, common areas and basement / ground floor car parking. An overview of the development is provided in Table 1.

Table 1: Overview of Development

Building Element	Details
Site Area	2026m ²
Basement Floor	46 car spaces, 24 Wall Mounted Resident, Bin Room, Pump Room, Switch Room, Fire Stairs
Ground Floor	3 Visitor Parking, Entry, Lift, Stairs, Pool, 6 Visitor Bicycle Parking, Waste Chutes 1x 2 Bed apartment, 1 x 4 Bed apartment, 2 x 4 Bed SDA apartment
Level 1 – Level 4	Lift, Stairs, Waste Chutes 1x 2 Bed apartment, 1 x 3 Bed apartment, 3 x 4 Bed apartment

2.3 ESD Strategic Requirements

EDQ in conjunction with Redland City Council are committed to the sustainable use of natural resources and reducing its impact on the natural environment and recognises key benefits of environmentally sustainable design in all their developments through:

- An overall reduction of the environmental impact of a development
- Lower annual operating costs for all of their buildings
- Highest comfort level for all building occupants
- Healthy indoor environments
- Environmental awareness

2.4 Green Star Rating Scheme

In order to meet the strategic ESD deliverables, the Green Star rating tool has been nominated, as an industry ESD rating scheme, to provide adequate benchmarking of sustainability initiatives for this new residential development.

Green Star is a national voluntary holistic sustainability environmental rating scheme for building, fitouts and communities. Green Star is managed by the Green Building Council of Australia (GBCA), a non-profit industry organisation. Green Star aims to transform the built environment by:

- Reducing the impact of climate change.

- Enhancing our health and quality of life.
- Restoring and protecting our planet's biodiversity and ecosystems.
- Driving resilient outcomes for buildings, fitouts, and communities.
- Contributing to market transformation and a sustainable economy.

Green Star certification identifies projects that have demonstrated the achievement of a specific level of sustainability. The rating describes the sustainability attributes of the project in terms that are widely understood and accepted. The Green Star rating system adopts star ratings from 1 to 5, where each respective rating indicates the following:

- 1 Star – Minimum Practice.
- 2 Star – Average Practice.
- 3 Star – Good Practice.
- 4 Star – Best Practice.
- 5 Star – Australian Excellence.
- 6 Star – World Leadership.

Certification is not proposed for the project. Benchmarking to the Green Star Design & As Built V1.3 Rating Tool is proposed and will demonstrate equivalency to the following star rating:

- 5 Star – Australian Excellence.

2.5 Green Star Targets & ESD Initiatives

The objective of the report is to demonstrate how environmentally sustainable design features are being included in the Hamilton Street Redland Bay residential project.

In order to incorporate sustainability measures within this project through all phases of design, construction and operation, Green Star Design and As-Built V1.3 Submission Guidelines have been selected as the basis to deliver on selected elements over key ESD categories including:

- Construction & Building Management
- Indoor Environment Quality
- Energy performance and Greenhouse Gas Emissions
- Water Resources
- Stormwater Management
- Transport
- Waste Management
- Materials
- Land Use & Ecology
- Innovation

To achieve a minimum 5 Star rating a total of 60 credit points or higher is required. Targeting a higher overall score will provide a buffer to accommodate for any non-compliances that may occur during construction.

Table 2 provides a summary of available Green Star credits in each category and targeted points selected for this project. A further breakdown of each credit is detailed in the Green Star Pathway provided in Appendix A.

Table 2: Summary Green Star Credits

Green Star Design & As Built v1.3 Categories	Credits Available	Points Targeted
Management	14	13
Indoor Environment Quality	17	11
Energy	22	12
Transport	10	3
Water	12	5
Materials	14	8
Land Use and Ecology	6	2
Emissions	5	3
Innovation	10	4
Total	110	61

2.6 Summary of ESD Initiatives

This project will incorporate a key number ESD initiatives across key categories such as Management, Indoor Environment Quality, Energy, Water, Materials, Land Use & Ecology and Emissions by incorporating, in summary:

- Management
 - Building commissioning and tuning
 - Smart metering of energy and water
 - Building users' guide to assist occupants in correct, optimum building operation
 - Builder to be ISO 14001 certified and to implement environmental management plan
 - Waste management plans and targets for construction and operation phases
- Indoor Environment Quality
 - Good daylight potential through glazing
 - Access to external views
 - Well ventilated spaces
 - Use of low toxicity material for adhesives, sealants, carpets and engineered wood products
 - Ultra-low VOCs for paints (innovation)
 - Acoustic comfort to building
- Energy
 - Substantial renewable energy in the form of a 59kW rooftop solar photovoltaic system
 - High performance building façade and glazing

- Minimum average NatHERS rating of 7 stars
- Energy efficient building services, lighting, appliances, and fixtures
- Water
 - High WELS water efficiency ratings for fixtures and fittings
 - Installation of rainwater tanks for irrigation and pool top up.
 - Dishwashers (where provided) with water rating within one star of best available
 - No water used in heat rejection
 - Drought tolerant and native planting, where possible
- Materials
 - Dedicated bin room space provided for recycling separation and storage for collection
 - Convenient waste and recycling chutes
 - Sustainable material selection for concrete, steel and PVC
 - Use of low toxicity material for paints, adhesives, sealants, carpets and engineered wood products
- Land Use & Ecology
 - Reuse of existing land
 - Incorporating landscape
 - Communal outdoor spaces and food production
- Emissions
 - Reduction in outflows to sewer
 - Improved stormwater quality
 - No upward facing lights causing light pollution

2.7 Report Outcomes

The aim of this report is to highlight specifically the ESD objectives for the development and to report on project outcomes. This includes detailing what Green Star credits have been targeted as well as NCC requirements and calculations etc employed as part of this assessment, where applicable, to demonstrate compliance where required.

2.8 Sources of Information

The following sources of information were used in the generation of this report:

- Architectural drawings provided by Glenn Bliesner Design, Coordination Issue, dated 15/10/20221
- Economic Development Queensland, Pre-Application Discussion #2, date 11/08/2021
- Green Star Design & As Built v1.3 Submission Guidelines, dated September 2020

2.9 Limitations

Computer building simulations, daylight analysis and other calculations, when provided for a project, deliver an estimate of building performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all of the intricacies of the building once built. As a result, simulation and calculation results only represent an interpretation of the potential

performance of the building. No guarantee or warranty of building performance in practice can be based on these results alone.

2.10 Green Star Disclaimer

This Green Star report and performance pathway have been provided as guidance and for bench-marking purposes only. ACOR Consultants does not endorse the use as a performance pathway for benchmarking purposes per Green Building Council of Australia (GBCA) direction. The performance pathway has been prepared as directed by the client. The performance pathway is not a certified rating, nor is it adopted for a certified rating. ACOR Consultants notes that the credits may not ultimately be achieved and accepts no liability should the benchmarking rating not be achieved.

3 Management & Construction Practices

3.1 ESD Consultant

Greenstar Point(s): 1 of 1

A Green Star Accredited Professional (GSAP) has been appointed to provide advice, support and information related to Green Star principles for this project with the engagement of ACOR Consultants Engineers.

3.2 Commissioning and Tuning

3.2.1 Environmental Performance Targets

Greenstar Point(s): Conditional Requirement

Minimum target to be set targets for energy, water and aspects of indoor environment quality.

Design intent report or owner's project requirements document to include performance metrics is required in conjunction with a description of how energy, water and aspects of indoor environment quality are metered and monitored.

3.2.2 Services and Maintainability Review

Greenstar Point(s): 1 of 1

Perform a services and maintainability review during Design Development and produce a report which details the building systems in terms of their commissionability, controllability, maintainability, operability and safety.

A comprehensive services and maintainability review will be conducted by the head contractor prior to construction which will address these aspects for all nominated building systems. The review and its outcomes will be summarised in a Service and Maintainability Report.

3.2.3 Building Commissioning

Greenstar Point(s): 1 of 1

Building services and operational features must be commissioned correctly in order for them to operate as designed and achieve the intended environmental benefits. Attention to commissioning is imperative as this process is commonly performed and/or documented poorly. Accordingly, the following measures are to be taken:

- Commissioning of engineered systems according to relevant standards (AIRAH, ASHRAE and/or CIBSE).

3.2.4 Building Tuning

Greenstar Point(s): 1 of 1

Extended tuning period providing review and follow-up 12 months after the conclusion of the defects liability period including quarterly adjustments – this will apply to the following services:

- Heating, ventilation and air conditioning systems
- Lighting and controls
- Central hot water systems
- BMS for base building services

3.2.5 Independent Commissioning Agent

Greenstar Point(s): 0 of 1

Independent oversight of the commissioning process through the engagement of an Independent Commissioning Agent (ICA).

An ICA will not be engaged as part of this project.

3.3 Adaptation & Resilience

Greenstar Point(s): 2 of 2

Points are achieved when a project specific Climate Adaptation Plan has been developed in accordance a recognised standard and solutions have been included into the building design and construction that specifically address the risk assessment component of the plan.

The project will engage a suitably qualified professional, during the design phase, to develop a project-specific Climate Adaptation Plan to Green Star requirements.

3.4 Building Information

Greenstar Point(s): 1 of 1

3.4.1 Operation & Maintenance (O&M) Manuals

Comprehensive building operation and maintenance information will be made available to the facilities management team in the form of O&M manuals.

3.4.2 Building Users Guide (BUG)

A simple, hard copy Building Users Guide is to be produced which includes information relevant to building owners, managers and occupants including information such as:

- Operating appliances and building services for energy and water efficiency
- Minimising energy and water consumption
- Local transport including trams, buses, trains and pedestrian and bike routes
- Waste and recycling options
- Building wide features such as renewable energy and rainwater harvesting
- Selection of sustainable and low toxicity materials

3.5 Commitment to Performance

3.5.1 Environmental Building Performance

Greenstar Point(s): 1 of 1

At least 80% of the projects gross floor area (excluding carparks) is to be covered with a commitment to set performance targets for, measure and report on the following building performance metrics:

- Energy & Greenhouse gas emissions
- Potable water usage

The building owner will commit to environmental performance targets through an internal policy, guideline or environmental management plan.

3.5.2 End of Life Waste Performance

Greenstar Point(s): 1 of 1

The building owner will commit to extending the life of the interior fitout or finishes to at least 10 years (barring minor wear and tear or minor repairs).

This may include one or more of the following:

- Provisions for Furniture, Fittings and Equipment (FFE) to be donated to charity or sold on for reuse.
- Requirements for reuse of materials/furniture and setting targets for recycling.
- The provision of a building / equipment lifecycle and condition report (by the building owner or manager) that demonstrates a forecast of 10 years (or greater) on capital improvement costs towards new fit-out or refurbishment projects.
- Furniture, Fittings and Equipment (FFE) Quality standards policy (by either building owner or operator) covers targeting the optimum useful life of the asset or material.
- Strategic asset management plan, incorporating whole-of-life management (disposal, reuse, condition standard, green procurement policy, material cost analysis etc).

3.6 Metering & Monitoring

Greenstar Point(s): 1 of 1

Under Green Star, it is a conditional requirement of this credit that project teams must provide accessible metering to all energy and water common uses and major uses, and to energy and water sources provided by the base building as follows:

Metering distinct uses:

- Metering shall be provided to allow for monitoring of the relevant base building services within the development including but not limited to – communal power, communal lighting, dry fire detection and alarm services, lift supplies, pool supplies, communal HVAC, communal water supplies.

In residential buildings an effective mechanism to monitor energy and water consumption data must allow for the reporting of daily usage data. 'Smart Metering' systems supplied to all units for metering and monitoring distinct uses.

Monitoring Systems

One point is awarded where a monitoring system is provided capable of capturing and processing the data produced by the installed energy and water meters. The monitoring system must accurately and clearly present the metered data and include reports on consumption trends, in accordance with the following requirements.

The monitoring strategy must be developed in accordance with a recognised standard, such as CIBSE TM39 Building Energy Metering. The same principles described in the standard shall be used for developing water metering and monitoring strategies.

The monitoring strategy must include a metering schedule. This schedule shall address the estimated loads for energy and water and must list:

- The incoming input (electricity, gas, water, etc.)
- The end use (lighting, HVAC, fans)
- The estimated energy consumption for the end use
- Which meter(s) provide the required information and
- The individual estimated end consumption.

The project team must provide automatic monitoring systems that record both consumption and demand of energy or water, and are capable of producing reports on quarter hourly, hourly, daily, monthly, and annual energy use for all meters.

The installed meters must be capable of producing an output that can be transmitted to a central location (either onsite or offsite). This central location must provide data retrieval and reporting mechanisms.

3.6.1 Project Metering

Electrical supply and metering shall be provided in compliance with the Queensland Electricity Connection Manual (QECM), Queensland Electricity Metering Manual, Supply Authority Network Standards, AS/NZS 3000 and AS/NZS 3008.

The development shall be connected to a new main switchboard (MSB) within a dedicated electrical switch room in the basement carpark in accordance with Supply Authority (Energex) requirements and AS/NZS 3000.

3.6.2 Project Monitoring

Digital check metering shall be provided where required and shall be connected to the BMS for monitoring in accordance with the NCC Part J8.

Sub metering will be provided to monitor energy usage in various areas within the buildings in accordance with NCC Part 8 energy monitoring. The sub-metering will be logged by the BMS for base building services.

3.7 Responsible Construction Practices

3.7.1 Environmental Management Plan (EMP)

Greenstar Point(s): 1 of 1

A site specific EMP to be prepared for the project and to cover environmental impacts that may occur during all stages of building works including any excavation, demolition and construction works.

Clauses to be specified in Head Contractor documentation.

3.7.2 Environmental Management System

Greenstar Point(s): 1 of 1

Head contractor to have formal Management System that has been independently certified to a recognised standard such as AS/NNZ ISO 14001.

Clauses to be specified in Head Contractor documentation.

3.7.3 High Quality Staff Support

Greenstar Point(s): 1 of 1

High quality staff support practices shall be established to promote positive mental and physical health outcomes and site activities and culture of site works, through programs and solutions on site, and, to enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs.

Clauses to be specified in Head Contractor documentation.

3.8 Operational Waste

Greenstar Point(s): 1 of 1

3.8.1 Prescriptive Pathway – Facilities

Where project teams meet all of the following prescriptive requirements. In combination, these requirements are considered a prescriptive approach for achieving best practice outcomes in operational waste management. The three requirements are:

- 8B.1 Separation of Waste Streams
- 8B.2 Dedicated Waste Storage Area and
- 8B.3 Access to Waste Storage Area.

The project will meet Green Star requirements for Operational Waste as detailed below. Guidance on correct waste management practices to be included in the building users' guide.

8B.1 Separation of Waste Streams

Collection bins or storage containers shall be provided for building occupant use to allow for separation of all applicable waste streams. The following waste streams must be provided with separate bins or containers:

- General waste going to landfill.
- Recycling streams to be collected by the building's waste collection service, including paper and cardboard, glass, and plastic. These streams may be collected in separate bins or in the same bin where commingled recycling is available.

Commingled recycling is permissible to the extent that is accepted by the waste collection service. For example, if glass and plastic are collected as commingled recycling, then paper and cardboard are still required to have a separate recycling bin or container.
- At least one other waste stream. This waste stream should further reduce waste being sent to landfill. This may include collecting any of the following waste types: organics, e-waste, batteries etc.

These bins or containers must be clearly marked for each stream, to allow for separation of the applicable waste streams. Bins or containers must be evenly distributed throughout the building.

8B.2 Dedicated Waste Storage Area

A dedicated area for the storage and collection of the applicable waste streams shall be provided. The storage area must be sized to accommodate all bins or containers, for all applicable waste streams, for at least one collection cycle. The calculations used to demonstrate that the area provided is adequately sized to handle the recyclable waste streams specified must be based on:

- Waste generated by project.
- Collection frequency for each waste stream.

The calculations for waste generation rates must be based on figures outlined within third-party best practice guidelines.

It is acceptable to provide more than one dedicated storage area when providing the appropriate waste storage space for the project. However, all storage areas dedicated to recycling must meet all the applicable requirements.

8B.3 Access to Waste Storage Area

Access to waste collection areas must adhere to best practices, as outlined within third-party best practice guidelines, in order for this requirement to be met.

4 Indoor Environment Quality

Indoor Environment Quality is based on providing a comfortable space for occupants with adequate daylight, acoustic comfort and good air quality and ventilation.

4.1 Indoor Air Quality

For Indoor Air Quality, points are awarded for each of the following initiatives implemented:

- Ventilation System Attributes - separation of outdoor air intakes to AS1668 standards, air handling systems designed for ease of cleaning and system is cleaned prior to use.
- Provision of Outdoor Air - additional outside air will provided, over and above the minimum required to meet AS1668 to provide excellent indoor air quality.
- Exhaust or Elimination of Pollutants such as those arising from printing equipment, cooking processes and equipment and vehicle exhaust, where applicable

4.1.1 Ventilation System Attributes

Greenstar Point(s): 0 of 1

Building ventilation systems designed shall comply with AS1668.2 in regards to minimum separation distance between pollution sources and outdoor air intakes. Exhaust systems shall be exhausted to façade discharge locations to ensure suitable indoor air quality and remove the risks recirculating exhaust systems present to occupants from cooking by products and protect building materials from condensation, grease and mould exposure.

4.1.2 Provision of Outdoor Air

Greenstar Point(s): 0 of 2

Outside air shall be provided to spaces via ventilation to occupied spaces in accordance with Part F4 of the NCC-BCA.

4.1.3 Exhaust or Elimination of Pollutants

Greenstar Point(s): 1 of 1

Building exhaust systems shall be installed as follows:

- Ducted mechanical exhaust systems to apartment kitchen rangehoods.
 - Kitchen rangehood complete with booster fan subject to testing and confirmation of performance of rangehood is adequate to address ducted discharge pressure drop to the façade louvre.
- Ducted mechanical exhaust systems to apartment amenities areas.
- Façade makeup shall be provided through openable windows in accordance with Part F4 of the NCC-BCA.
- The carpark is complete with a carpark exhaust system compliance with the requirements of AS1668.2.
- Above ground visitor carparking shall be naturally ventilated

4.2 Acoustic Comfort

The building shall include design measures to minimise environmental and building services noise to Australian Standards levels, ensuring that indoor spaces are comfortable and amenable.

4.2.1 Internal Noise Levels

Greenstar Point(s): 1 of 1

Internal ambient noise levels in the nominated areas of the building will be no more than 5 dB(A) above the satisfactory sound levels provided in Table 1 AS2170:2016.

Acoustic Consultant report to be provided during the design phase.

4.2.2 Reverberation

Greenstar Point(s): 1 of 1

The reverberation time in the habitable areas of the building will be below the maximum stated in the 'Recommended Reverberation Time' provided in AS 2107:2016.

Acoustic Consultant report to be provided during the design phase.

4.2.3 Acoustic Separation

Greenstar Point(s): 1 of 1

Acoustic separation through partitions between the defined spaces will be constructed to achieve a weighted sound reduction index (Rw) of at least 45.

Acoustic Consultant report to be provided during the design phase.

4.3 Lighting Comfort

All spaces within the building will be well-lit using lighting that complies with best practice guidelines to ensure a high degree of comfort is provided to users and glare is eliminated.

4.3.1 Minimum Lighting Comfort

The lighting shall be uniform throughout and flicker free and accurately address the perception of colour in the space.

4.3.2 General Illuminance and Glare Reduction

Greenstar Point(s): 1 of 1

4.3.2.1 General Illuminance

Demonstrate 95% of the nominated areas lighting levels and quality comply with best practice guidelines and glare is eliminated. Artificial lighting levels greater than recommended levels in AS 1680 and lighting fitted with baffles, louvres or opaque diffusers.

Residential Spaces

Living spaces, kitchens, bathrooms and bedrooms the lighting design includes or permits general fixed lighting that provides good maintained illuminance levels for the entire room, and the installed fittings have a rated colour variation not exceeding 3 MacAdam Ellipses (decorative fittings being exempt).

4.3.2.2 Glare Reduction

Glare from lamps must be limited within nominated areas. Three options are provided for demonstrating compliance:

- A. Prescriptive Method 1.
 - Bare light sources fitted with baffles, louvres, translucent diffusers, ceiling design or other means that obscures the direct light source from all viewing angles of occupants, including occupants looking directly upwards.

- B. Prescriptive Method 2.
 - The lighting system must comply with the luminaire selection system as detailed in Clause 8.3.4 of AS/NZS 1680.1:2006.
- C. Performance Method.
 - Unified Glare Rating (UGR) calculated for the lighting on a representative floor must not exceed the maximum values listed in Table 8.2 of AS/NZS 1680.1:2006. UGR Rating must be calculated in accordance with the procedure outlined in Clause 8.3.3 of AS/NZS 1680.1:2006.

Project to meet Prescriptive Method 1. Communal spaces and base building operated task areas within the development will be designed with lighting levels greater than the minimum illumination levels within AS1680 due to the efficiency of selected fittings. All light fittings to be selected contain opaque diffusers or similar that dissipate the light source as it exits the fitting, downlights have LED chips on board recessed up in the ceiling with a diffusing reflector provided.

4.3.3 Localised Lighting Control

Greenstar Point(s): 1 of 1

Occupants can control the lighting levels in their immediate environment. In residential spaces, this can be achieved through the provision of sufficient power outlets for future task lights / lamps around the predicted furniture layouts used in the space. In addition, appropriate task lighting shall be provided for kitchens, bathrooms, and service areas.

4.4 Visual Comfort

Visual comfort is characterised through sufficient access to natural light, good glare control, and access to views of the outdoors or sky.

4.4.1 Glare Reduction

Greenstar Point(s): 1 of 1

External glare is reduced either through external shading devices or internal blinds with a VLT <10%.

In addition to external shading, internal shading will be provided to all residential apartments to meet Green Star requirements through the installation of internal blinds.

4.4.2 Daylight

Greenstar Point(s): 1 of 2

To maximise the indoor environment quality and reduce artificial lighting energy use it is recommended that all occupied spaces achieve a high level of natural lighting.

With the exception of Type C apartment living space, daylight access is provided to apartments through the following measures:

- Glazing to all living areas and bedrooms
- Living areas have a full height glazing of at least 2.7m and 100% wall to window ratio
- All glazing to living areas achieve at least 60% Visible Light Transmittance (VLT)
- All living areas have unobstructed views to outside.

4.5 Views

Greenstar Point(s): 1 of 1

Compliance is achieved when it can be demonstrated that at least 60% of the nominated area of the fitout has a clear line of sight to high quality views.

This project has good access to views through an extensively glazed façade providing excellent access to high quality external views both towards the sky, external outlooks and to frequent movement of people and vehicles around the project site.

4.6 Indoor Pollutants

4.6.1 Low-Toxicity Materials (VOC Reduction)

Greenstar Point(s): 1 of 1

Materials containing Volatile Organic Compounds (VOCs) emit fumes at room temperatures and have been linked to a variety of health problems including respiratory disorders and eye, nose and throat irritation. They are commonly found in products such as paints, sealants, adhesives, and wall, ceiling and floor coverings.

Points are achieved in this credit where at least 95% of all internally applied paints, sealants, adhesives, and carpet meet stipulated 'Total VOC Limits' (TVOC).

The project will only use paints, adhesives and sealants, wall and ceiling coverings, and flooring materials that have low TVOC levels by following Table 3 through Table 6 when selecting these items and be certified under a recognised Product Certification Scheme (listed on the GBCA website (<http://new.gbca.org.au/product-certification-schemes/>) or other recognised standards.

Table 3: Total VOC Limits for Paints and Varnishes

Product Type	Max TVOC Content (g/l of ready-to-use product)
Walls and ceilings – interior semi gloss	16
Walls and ceilings – interior low sheen	16
Walls and ceilings – interior flat washable	16
Ceilings – interior flat	14
Trim – gloss, semi gloss, satin, varnishes and woodstains	75
Timber and binding primers	30
Latex primer for galvanized iron and zincalume	60
Interior latex undercoat	65
Interior sealer	65
One and two pack performance coatings for floors	140
Any solvent-based coatings whose purpose is not covered in table	200

Table 4: Max TVOC Content Limits for Adhesives and Sealants

Product Type	Max TVOC Content (g/l of product)
Indoor carpet adhesive	50
Carpet pad adhesive	50
Wood flooring and Laminate adhesive	100
Rubber flooring adhesive	60

Product Type	Max TVOC Content (g/l of product)
Sub-floor adhesive	50
Ceramic tile adhesive	65
Cove base adhesive	50
Dry Wall and Panel adhesive	50
Multipurpose construction adhesive	70
Structural glazing adhesive	100
Architectural sealants	250

Table 5: Carpet TVIC Emissions Limits

Carpet	Max TVOC Emission Limit (mg/m ² per hour)
Total VOC Limit	0.5
4-PC (4-Phenylcyclohexene)	0.05

Table 6: Wall, Floor and Ceiling Covering TVOC Emissions Limits

Coverings other than carpets	Max TVOC Emission Limit (mg/m ² per hour)
TVOC at 3 days	5
TVOC at 28 days	0.5

The project will specify materials accordingly as detailed under Green Star guidelines for this credit.

4.6.2 Engineered Wood Products (Formaldehyde Minimisation)

Greenstar Point(s): 1 of 1

Where at least 95% of any engineered timber products used within the project will have low or no formaldehyde content. Products containing formaldehyde must comply with E0 or E1 standards, or equivalent.

The project will specify engineered wood products as detailed under Green Star guidelines for this credit.

4.7 Thermal Comfort and Control

Thermally comfortable indoor environments depend on two over-arching design strategies:

- Moderation of outdoor extremes using passive design
- Control of the indoor environment via manually controlled adaptive devices, such as air conditioners, heaters and fans

These are both provided by the design. A high performing façade will assist in moderating the external environment and help to reduce reliance on active heating and cooling.

However, where required thermal comfort will also be provided to residents through active heating and cooling mechanical systems as well as ceiling fans to living spaces and bedrooms.

4.7.1 Thermal Comfort

Greenstar Point(s): 1 of 2

Thermal comfort is important for health and well-being as well as productivity.

A point is achieved in this credit where a high degree of thermal comfort is provided to occupants in the space equivalent to 80% of all occupants satisfied in the space and a second is achieved when thermal comfort is provided to occupants in the space equivalent to 90% of all occupants satisfied in the space.

For residential spaces the following applies:

- Thermal Comfort – An average NatHERS rating of 7 star or greater is achieved, where modelling is completed in accordance with NCC Section J requirements.
- Advanced Thermal Comfort - An average NatHERS rating of 8 star or greater is achieved, where modelling is completed in accordance with NCC Section J requirements.

The project will demonstrate an average NatHERS rating of 7 stars or greater as per Green Star requirements.

5 Energy

Incorporating energy efficiency and passive design features into a building assists in reducing the load on the mechanical and electrical systems within the building and is the first step in maximising the sustainable design potential of a building. Passive design features incorporated in the project include:

- High levels of thermal insulation
- High performance glazing
- Daylighting
- External shading
- Natural ventilation
- Thermal mass

In the Green Star Energy category, points are awarded where the proposed fitout can demonstrate a reduction in energy usage and hence greenhouse gas emissions as well as deliver energy savings compared with a benchmark standard-practice fitout. This benchmark fitout is based on minimum provisions as specified within the National Construction Code (NCC).

5.1 Green Star Conditional Energy Requirements

This project will demonstrate compliance using the Green Star 15B NatHERS Rating Pathway.

The conditional requirement is demonstration that the project achieves a minimum NatHERS 0.5 star rating improvement on the minimum legislated area-weighted average. Each unit must also achieve a minimum NatHERS 0.5 star rating over the individual rating requirement as specified in Section J0.2a of the NCC.

In addition to the meeting the conditional requirements as listed above, the project must also achieve at least a minimum 3 points within the NatHERS Rating Pathway as required by projects targeting a 5 Star rating.

5.2 Thermal & Energy Performance

Greenstar Point(s): 3 of 6

This project falls under building classification Class 2 of the National Construction Code (NCC) 2019. The project will meet NCC Section J Energy Efficiency as well as Green Star requirements as detailed below.

5.2.1 Thermal Performance Rating – Residential

The project is aiming to achieve an average NatHERS rating of 7 stars or greater for the development. NatHERS assessments, using FirstRate5 software, will be undertaken during the design phase.

5.2.1.1 Building Envelope

The building will be designed to incorporate bulk insulation within the floor, roof and walls to minimise the heat loss in winter and heat gain in summer. The proposed insulation levels are detailed in Table 7.

Table 7: Insulation Values

Building Element	Added Insulation R-Value
Metal Roof (Level 4)	≥ R5.0
External walls	≥ R2.7

Building Element	Added Insulation R-Value
Internal walls to corridors, lifts & stairs	$\geq R2.7$
Internal party walls to neighbour	$\geq R2.7$
Floor above carpark or exposed	$\geq R2.0$

5.2.1.2 Glazing Construction

High-performance glazing will be used to control solar gain from direct sunlight and minimise heat gain, heat loss, radiant discomfort, and noise incursion.

To ensure good daylight potential, the percentage VLT of the selected glazing system is to be 60% or higher, where practical.

Glazing systems will be selected for the achieve the minimum 7-star NatHERS rating in conjunction with specified building fabric requirements.

5.2.1.3 Thermal Mass

The thermal mass effect is the ability of materials to store and release energy over time. Thermal mass can lower indoor temperatures during the day and raise night time temperatures, utilising direct sunlight and diurnal temperature and ventilation patterns.

The thermally massive concrete structure of the development will help maintain comfortable conditions and reduce energy use by stabilising indoor temperatures. This complements the insulation and glazing, which protect the apartments from external weather extremes

5.2.1.4 External Shade

For this project the methods of external shading include eaves and projecting shading elements will cover the majority of new glazing. Other shade element such as side shade fins as well as movable and operable shade screens have been incorporated in the design as shown in Figure 1. These shading elements will assist in reducing cooling loads to the apartments over the summer period.

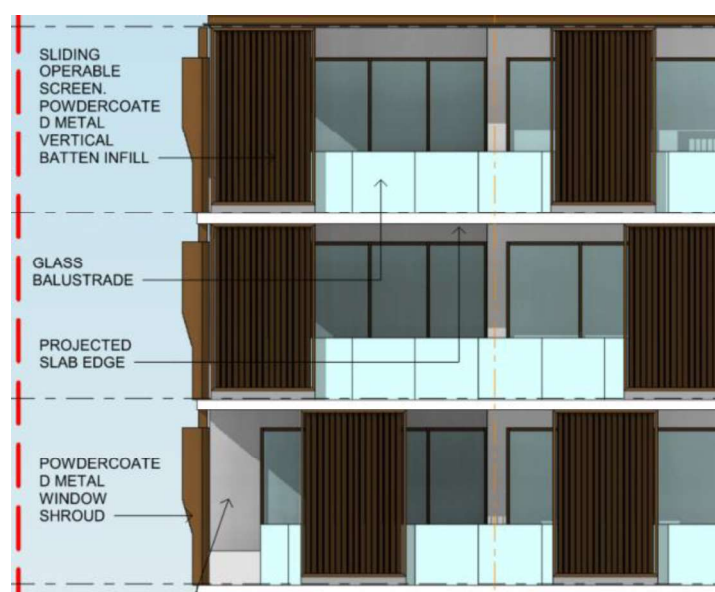


Figure 1: Building Shade Elements

5.3 Mechanical & Ventilations Systems

Greenstar Point(s): 2 of 2

The requirements for heating and air-conditioning have been minimised through passive design; however, active systems may still be desired by occupants to provide a suitable level of comfort during weather extremes.

The following Green Star requirements to be achieved.

- Mechanically Conditioned Spaces
 - The minimum cooling system energy star rating for the air conditioning equipment is at least 4-star as per AS3823.2-2013, and
 - The rated cooling or heating capacity of the unit does not exceed the design cooling or heating load, whichever is greater, by more than 15%, or the project team can demonstrate they have selected the unit with closet capacity available on the market.
- Spaces with Mechanical Heating only
 - The minimum energy star rating for the heating equipment is at least 3 - Star (per AS3823.2-2013, AS4552-2005 or AS4556-2011 as appropriate); and
 - The rated capacity of heating equipment does not exceed the design heating load by more than 20%.
- Naturally Ventilated Spaces
 - Compliance is achieved with the provision of outdoor air in accordance with Part F4 of the NCC-BCA.
 - Effective cross ventilation is provided in the apartments, where possible; and
 - Ceiling fans installed in apartments (2 per living spaces and 1 per bedroom)

5.3.1 Heating / Air Conditioning Systems

Cross ventilation will not be achievable for all apartments due to layout of apartments.

5.3.1.1 Natural Ventilation - Residential

Buildings with effective natural ventilation allow air conditioning systems to be switched off and also have the advantage of improved indoor environment quality. This development supports the use of natural ventilation by providing large sliding doors to balconies and private open spaces, as well as openable windows to other areas such as bedrooms.

In addition to natural ventilation exhaust fans to kitchens and bathrooms/toilets will be installed to assist with removing indoor air pollutants and excess moisture, as well as providing an additional air path for fresh air passing through the open facade which will help in reducing mould growth.

Window openable areas will be provided in compliance with AS1668.4: Natural Ventilation of Buildings. Opening areas must be at least 5% of the area of the room they are serving in order to provide sufficient fresh air for health.

The natural ventilation zones and openings for typical apartments are shown in Figures 2 – 4 below.



Figure 2: Natural Ventilation – Typical 2 Bed

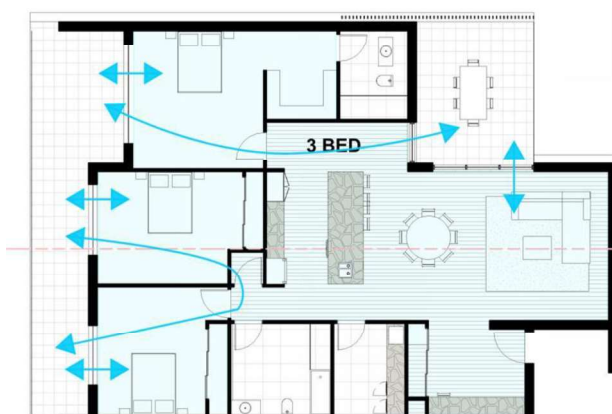


Figure 3: Natural Ventilation - Typical 3 Bed

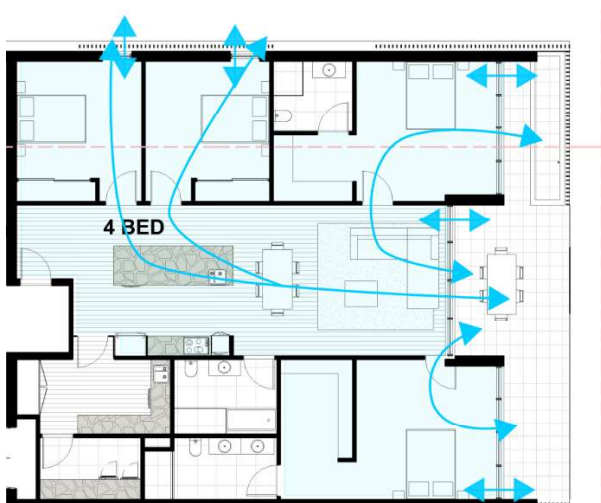


Figure 4: Natural Ventilation - Typical 3 Bed

5.4 Unoccupied Areas

Greenstar Point(s): 0 of 1

Where unoccupied areas are naturally ventilated and meet the following conditions:

- Common Areas
 - 95% of the net floor area of the common lobbies meet the requirements of 'Provision of Outdoor Air' criterion (9.2C); and
 - The openable size of windows must be 5% or more of the net floor area on a floor by floor basis.
- Enclosed Car Parking
 - Vehicle exhaust criterion of the *'Exhausting the Pollutants Directly to the Outside'* criterion (9.3C) must be achieved through natural ventilation
 - Where enclosed car parking is not provided, this requirement is considered 'not applicable.'

The project will not be able to comply with the natural ventilation requirements to common areas nor the natural ventilation strategies for carparks. In order to meet the above criteria substantial changes would be required to the architectural design of the building.

5.5 Lighting

Greenstar Point(s): 1 of 1

In terms of lighting, the largest energy and greenhouse gas emissions savings can be made through the installation of efficient lighting fixtures and intelligent automated control systems which allow the artificial lighting to perform for optimal use.

The following Green Star requirements shall be achieved:

- The lighting power density is reduced by at least 10% below the maximum lighting power density allowable in Table J6.2a. This requirement applies to both sole-occupancy units (SOU) and all common areas accessible by residents. Allowances will not be traded between SOU's and other parts of the buildings.
- Independent light switching shall be provided to each room of each SOU. Where open plan living, dining and kitchen areas are provided, each functional area must be separately switched; and
- All common areas accessible by residents shall be provided with automated lighting control systems such as occupant detection and daylight adjustment.

5.5.1 Internal Artificial Lighting

Internal lighting within the development shall generally be recessed/surface mounted/suspended to suit the area and architectural design intent.

Internal lighting shall be LED energy efficient lights, meeting minimum lighting levels in accordance with AS/NZS 1680 recommendations for internal areas.

Illumination power density and lighting control strategy shall be in accordance with NCC Section J6 requirements.

Light fitting colour temperatures shall be suitable for the area of installation and the visual environment to which the artificial lighting is contributing to.

Lighting control strategy shall be as follows:

- Private apartments shall be controlled via a local light multi-function switch for local lighting control.

- Base building and public areas shall be controlled via timeclock and motion/photocell sensors for occupancy detection and light level detection. Internal amenities areas will be controlled via motion sensor only
- Dimming function shall be provided to specific communal spaces only, with dimming capable from a lighting control panel via either push to dim mechanism or set scenes.

The levels of artificial lighting will be designed in accordance with the recommendations of AS1680 for the various tasks to be undertaken in the development. Lighting layouts and switching patterns are to be arranged to make best use of the available daylight.

The internal lighting power density for the development will be designed to meet the requirements of both the NCC 2019 Table J6.2a and Green Star (10% below maximum allowable in Table J6.2a), relative to SOU's, all common areas and the design measures documented in the design accordingly.

5.5.2 Lighting Control Systems

Lighting controls within the development shall be provided in accordance with NCC-BCA J6 requirements as required.

Whilst efficient artificial lighting fixtures will be used throughout the project, further significant energy and greenhouse gas emissions savings can be made by implementing a lighting control system that allows the artificial lighting system optimal functionality. To minimise the energy consumed by artificial lighting when not required, the following control strategies shall be implemented:

- All internal rooms accessible to the public or facilities and asset teams, shall be controlled via timeclocks and motion/photocell sensors for occupancy detection and light level detection.
- All internal rooms within private residences shall be individually switched.
- External security lighting shall be controlled by timeclocks and motion/photocell sensors for occupancy detection and light level detection.

5.6 Domestic Hot Water

The following Green Star requirements to be achieved:

When the domestic hot water systems are powered by one of the following heat sources:

- Renewable Energy;
- Electric heat pump (minimum COP of 3.5 under design conditions); or
- Heat recovered from another process.

5.6.1 Domestic Hot Water Services

New hot and cold services will be provided to kitchens, bathrooms and all amenities areas.

5.6.2 Domestic Hot Water Systems

Greenstar Point(s): 0 of 1

The development will incorporate electric domestic hot water systems to serve sinks and appliances to meet the hot water demands of the residence.

5.7 Vertical Transportation

Greenstar Point(s): 1 of 1

The project consists of a vertical transportation system only and as such, the energy associated with lift machinery is to comply with the following two conditions:

- The minimum lift energy efficiency is class A or B in accordance with ISO 25745-2; and
- The lift idle and standby energy performance level is 1 in accordance with ISO 25745-2.

The Vertical Transportation systems will meet Green Star requirement for the project.

5.8 Appliances & Equipment

Greenstar Point(s): 1 of 1

When appliances are present in all units, and all appliances installed have a minimum Energy Star rating of 1-star below the maximum Energy Star rating available for that appliance type and capacity. Appliances included in this credit are:

- Refrigerators/freezers
- Dishwashers
- Clothes washers
- Clothes dryers.

Note: This credit only applies to installed appliances; it does not require their installation. If no appliances are installed, this credit point cannot be claimed.

The project will provide Appliance and Equipment to apartments to meet Green Star requirements.

5.9 Passive Laundry Facilities

Greenstar Point(s): 1 of 1

Where 95% of all dwellings contain laundry facilities which meet one of the following conditions:

- Have been provided with external drying balconies; or
- Contain an internal, or external clothesline or hoists as follows:
 - 4m total line length minimum for studios, 1 and 2 bedroom units and;
 - 6m total line length minimum for 3 or more bedroom units

The project will provide passive laundry facilities to meet Green Star requirements.

5.10 Fuel Switching

Greenstar Point(s): 1 of 1

Where no fossil fuels are burned on site to generate electricity, heating, or cooling and either:

- At least 15% of energy required by the building is generated by on site renewable solutions; or
- Three points have been achieved under Green Star 15B.1 Thermal and Energy Performance

Where a minor amount of fossil fuel (less than 1% of total energy consumption) is used on site for purposes where it can be demonstrated that there are no commercially viable alternatives available (e.g. cooking or emergency generators), Renewable Energy Certificates equal to these emissions for the period of ten years following practical completion must be purchased and retired upfront, or through a contractual agreement with the utility. The RECs purchased must be recognised as directly supporting renewable energy generation in Australia.

The project currently achieves 4 points under Green Star 15B.1 Thermal and Energy Performance.

5.11 Renewable Energy

The development will include renewable energy in the form of a 59kW photovoltaic system subject to final layout of roof, plant, and a study of roof structure overshadowing.

The photovoltaic system will consist of approximately 148 by 400W panels with a typical panel size of 1.1m x 1.8m and is estimated to produce 90,000kWh of renewable electrical per year. The electricity generated may offset the base building's electrical energy and power usage including lighting and power. Figure 5 below is an indicative layout for proposed PV arrangement on the roof.

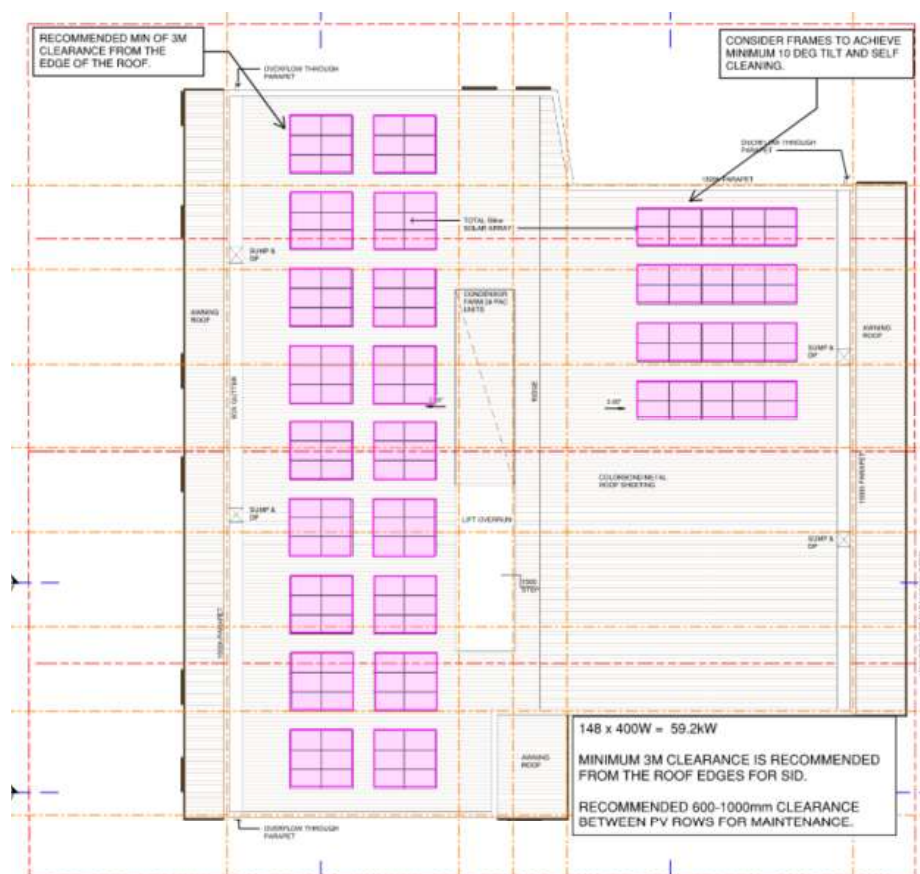


Figure 5: Indicative PV Arrangement

5.11.1 Peak Demand

Greenstar Point(s): 1 of 1

This project will use an increased level of insulation, improved glazing and shading as well as generated PV solar power to assist in reducing peak-hour cooling loads.

Building calculated maximum electricity demand as per AS/NZS 3000: **382kVA**

Always on, on-site power generation supply: **65.8Kva**

5.12 On-Site Renewable Energy Storage

Greenstar Point(s): 1 of 1

This project will include the installation of a renewable energy storage strategy sized to match the requirements of the development.

The following Green Star requirements are rewarded where the on-site storage complies with the following conditions:

- A renewable energy storage procurement and use strategy has been developed to demonstrate that the storage is correctly sized to match the specific requirements of the building and that value will be provided the project.
- The stored renewable energy is used to reduce the peak electricity demand; and
- The project installs and uses electricity storage such that on-site or off-site renewable energy not instantaneously used by the building is able to be stored and used by the building later. The length of time of the commitment is for a minimum period of ten years after practical completion.

Battery storage will be installed on-site and used to reduce the peak energy demand and will be sized in the next phase of the project.

6 Transport

In an aim to reduce emissions through the use of cars it is important to consider other alternatives in the design of a project such as walking, cycling, public transport car sharing and lower emissions vehicles.

6.1 Access by Public Transport

Greenstar Point(s): 1 of 1

The building is located at 99 – 105 Hamilton Street Redland Bay and as such is a site quite accessible by public transport due to its location as shown in Figure 6. The building is approximately 300m from the Hamilton and Pitt Street Bus Stop which connects to wider Brisbane region via the Victoria Point bus terminal.

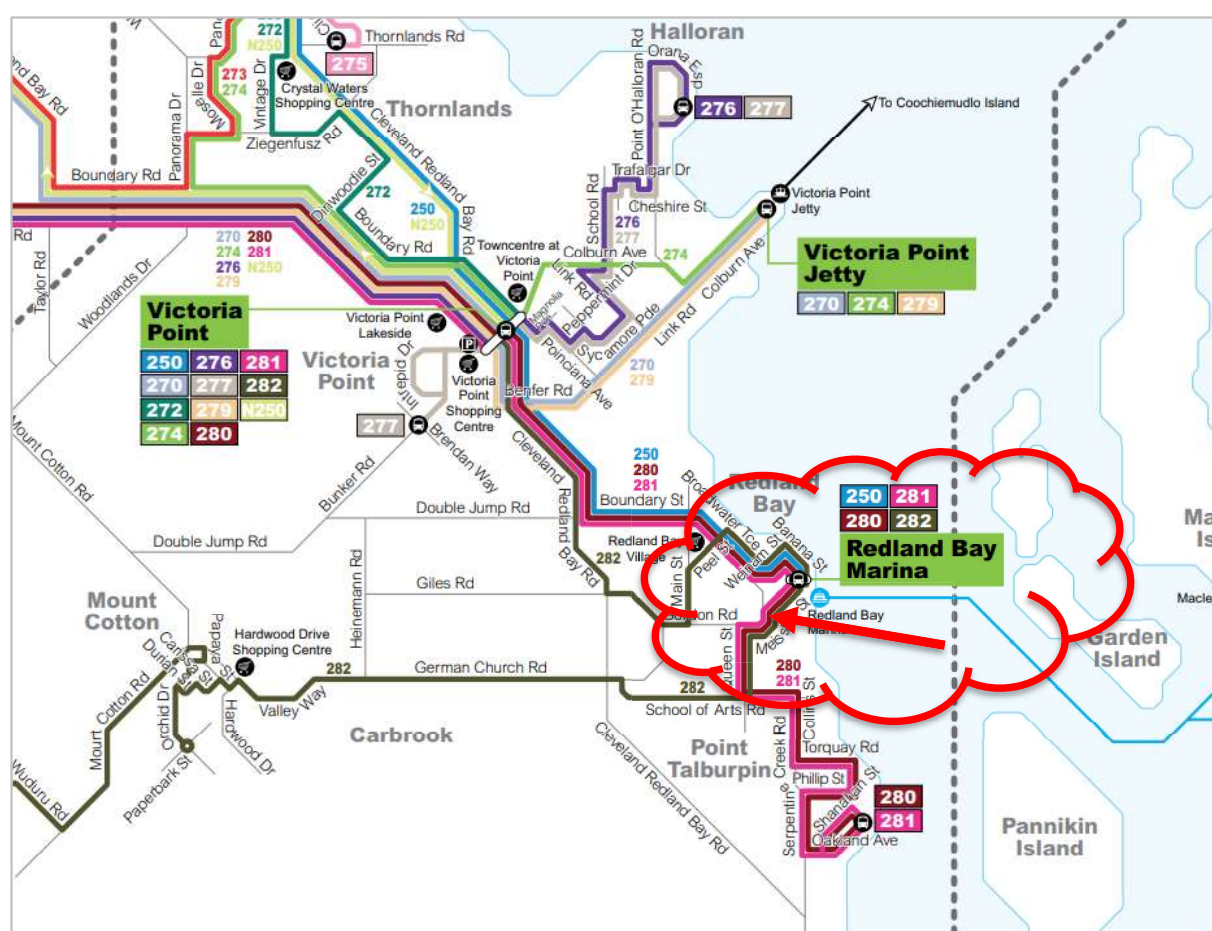


Figure 6: Public Transport Routes

The Green Star 'Access by Public Transport Calculator' is not available for non-registered projects and point(s) would require be available if the project registers for certification with the GBCA.

6.2 Reduced Car Parking Provision

Greenstar Point(s): 0 of 1

Where there is a reduction of the car parking spaces for the proposed building, when compared to the maximum local planning allowance. The points are based on the level of the reduction and the site's access to public transport.

The project is not targeting this credit.

6.3 Low Emission Vehicle Infrastructure

Greenstar Point(s): 1 of 1

Where parking spaces and/or dedicated infrastructure is provided to support the uptake of low-emission vehicles and where low-emission vehicle infrastructure meets one of the following benchmarks:

- 15% of parking is dedicated to fuel-efficient vehicles (see Definitions), with a maximum of 5% for motorcycle parking in accordance with 178.3A; or
- 5% of parking is dedicated to electric vehicles and charging infrastructure is provided for each space in accordance with 178.3B; or
- For residential projects (at least 80% GFA Class 1a or 2), dedicated car share spaces and vehicles are provided at the rate of 1 per 70 project occupants in accordance with 178.3C; or
- No parking spaces have been provided, in accordance with 178.3D

178.3B Parking for Electric Vehicles

Appropriate electric vehicle charging infrastructure must be easily accessed by the users of dedicated electric vehicle charging spaces. It must comply with all relevant Standards and health and safety legislation.

The project will provide parking for electric vehicles and charging infrastructure that will meet project requirements as well as exceed Green Star requirement 178.3B.

6.4 Active Transport Facilities

Greenstar Point(s): 1 of 1

Where bicycle parking and associated facilities are provided to a proportion of the building's regular occupants and visitors. The specific proportion that must be met for regular occupants and visitors are outlined in Table 8 for Class 2 Multi Unit Residential projects.

Table 8: Cycle Facilities Occupants & Visitors

Class 2: Multi Unit Residential	Cycle facilities	
Residential Occupants	Secure bicycle parking for occupants is provided at a rate as follows:	
	Number of Units	Requirement
	0-50	1 bicycle park for every 1 unit
	51-75	50 bicycle parking spaces PLUS 1 bicycle park for every 1.5 units (over 51 units)
	76-100	67 bicycle parking spaces PLUS 1 bicycle park for every 2 units (over 76 units)
	>100	79 bicycle parking spaces PLUS 1 bicycle park for every 2.5 units (over 100 units)
Residential Visitors	Secure bicycle parking is provided for 5% of dwellings.	

The project will provide 24 wall mounted bicycle storage spaces for residents in the basement carpark and 6 bicycle parking spaces for visitors located on the ground floor near the Visitor's Entry as shown in Figure 7 and Figure 8 below.

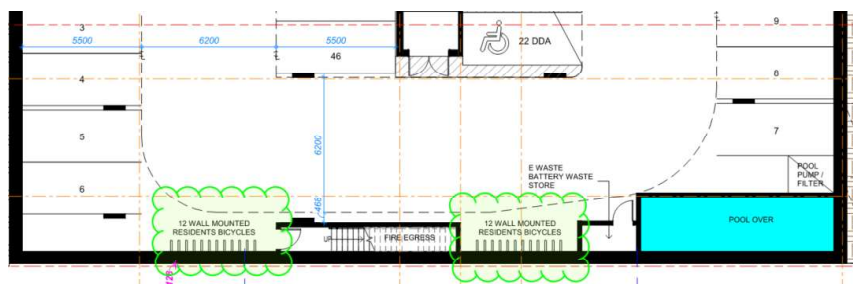


Figure 7: Basement Residents Bike Storage

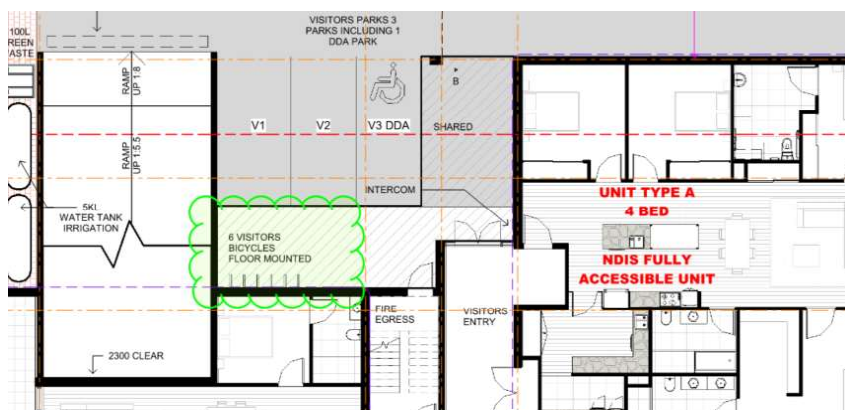


Figure 8: Ground Floor Visitor Bicycle Parking

6.5 Walkable Neighbours

Greenstar Point(s): 0 of 1

Walkscore.com measures the walkability of any address worldwide by assessing proximity to nearby amenities such as schools, groceries, shopping, parks, errands and entertainment. Amenities within a 5 minute walk are given maximum points, decreasing to a maximum walk distance of 30 minutes. The score out of 100 corresponds with a rating as shown in Figure 8 below.

Walk Score measures the walkability of any address based on the distance to nearby places and pedestrian friendliness.

90-100	Walker's Paradise Daily errands do not require a car
70-89	Very Walkable Most errands can be accomplished on foot
50-69	Somewhat Walkable Some errands can be accomplished on foot
25-49	Car-Dependent Most errands require a car
0-24	Car-Dependent Almost all errands require a car

Figure 9: Walk Score Rating System

The development is rated as a 'Car-Dependent' with a walk score of 38, meaning most daily errands will require a car. The average walk score for Redland Bay area is 63, which is 'Somewhat Walkable'.

7 Water

Potable water consumption may be minimised through a range of measures including efficient fixtures and fittings, and appliances.

7.1 Water Efficient Fixtures

Greenstar Point(s): 1 of 1

To minimise the water consumed by the development, water fittings and fixtures will be selected to achieve high water efficiency ratings that are to be within 1 star of WELS ratings for the following items:

- Kitchen taps: 6 Star WELS rating
- Basins taps: 6 Star WELS rating
- Toilets: 5 Star WELS rating
- Urinals: 6 Star WELS rating or waterless
- Showers: 3 Star WELS rating ($>4.5 \leq 6.0$ L/min)
- Dishwasher 6 Star WELS rating
- Clothes Washing Machines 5 Star WELS rating

7.2 Rainwater Collection & Reuse

Greenstar Point(s): 1 of 1

The collection and storage of rainwater from roof areas for non-potable water uses is the most economic and practically manageable water efficiency approach; following demand management strategies.

To achieve the best outcome for the project, the sizing of the rainwater tank is based on roof collection areas, site specific rainfall and rainwater re-use requirements.

An assessment has been completed and rainwater runoff will be collected from a total 650m² of overall roof area (Figure 10) and stored in two 5,000 litre stormwater tanks (Figure 11). Captured rainwater in these tanks will be used for topping up pool water and irrigation.

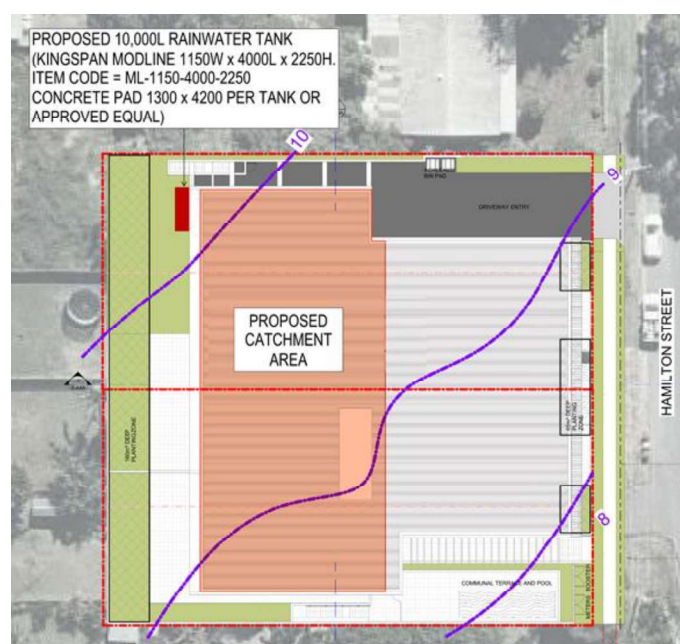


Figure 10: Rainwater Collection Area

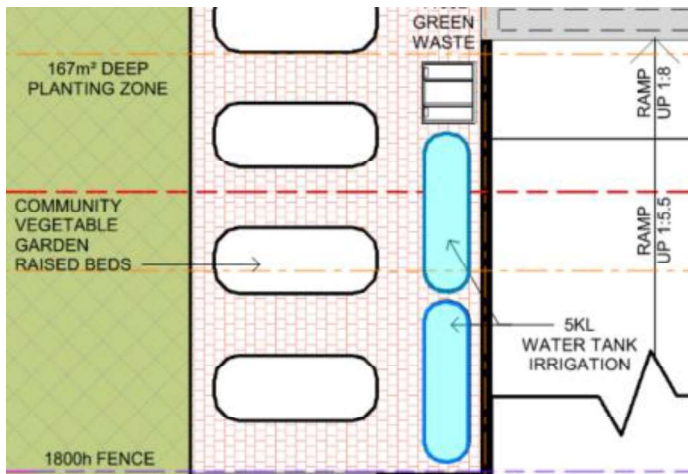


Figure 11: Rainwater Tank Location

7.3 Minimise Dead Legs

Water wastage will be reduced through careful design by reducing heated water outlet piping length (dead leg) to reduce water consumption before full temperature water delivery.

7.4 Water Based Heat Rejection

Greenstar Point(s): 2 of 2

No water based heat rejection is being used in this development, helping to reduce potable water consumption.

7.5 Landscape Irrigation

Greenstar Point(s): 1 of 1

No potable water used for irrigation.

8 Materials

8.1 Life Cycle Impacts – Prescriptive Pathway

The project has selected the prescriptive pathway 19B Life Cycle Impacts to demonstrate reductions in environmental impact of building materials.

8.1.1 Concrete

Greenstar Point(s): 3 of 3

One point is awarded when at least 30% of coarse aggregate when compared with a reference case and 25% of fine aggregate (sand) inputs in the concrete are to be manufactured sand or alternative materials (measured by mass across all concrete mixes in the project).

Half a point (0.5) is awarded where project teams can demonstrate 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).

or

Half a point (0.5) is awarded where project teams can demonstrate that either:

- 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.

8.1.2 Steel

Greenstar Point(s): 0 of 1

Not less than 80% of steel for the development will be sourced from a Responsible Steel Maker and all reinforcing steel used within the building shall be produced using energy-reducing processes in its manufacture.

A responsible Steel Maker must have facilities with a currently valid and certified ISO 14001 Environmental Management System (EMS) in place and be a member of the World Steel Association's (WSA) Climate Action Program (CAP).

Not targeted for this project.

8.2 Responsible Building Materials

The building primarily consists of a concrete structure which signifies a considerable initial investment of embodied energy but also means the structure will have a long life span. This structure will provide significant thermal mass to reduce the fluctuation of temperature in the spaces thereby improving the thermal performance of the building.

The following performance criteria will be considered for specified materials:

- Materials that reduce material use (e.g. recycled materials) and which have low impact disposal;
- Low embodied energy materials (to be assessed on a life cycle basis);
- Materials that are durable and fit for purpose;

- Materials from sustainable sources;
- Materials will be selected with a preference given to local over imported materials, due to the transportation emissions associated with imported materials.

Resources to assist in environmentally friendly material selections and certifications include:

- Ecospecifier (<http://www.ecospecifier.com.au>)
- Good Environment Choice Australia GECA (<http://www.geca.eco>)
- Third Party Certification <http://new.gbca.org.au/product-certification-schemes/>

8.2.1 Structural and Reinforcing Steel

Greenstar Point(s): 1 of 1

Where 95% of steel for the development will be sourced from a Responsible Steel Maker and at least 60% of the fabricated structural steelwork used within the building shall be produced using energy-reducing processes in its manufacture.

A responsible Steel Maker must have facilities with a currently valid and certified ISO 14001 Environmental Management System (EMS) in place and be a member of the World Steel Association's (WSA) Climate Action Program (CAP).

8.2.2 Timber

Greenstar Point(s): 0 of 1

At least 95% (by cost) of the timber used in the construction of the building will be certified by a forest certification scheme or will be a reused material.

Acceptable certification schemes include Forest Stewardship Council (FSC), Australian Forestry Standard (AFS) and the Program for Endorsement of Forest Certification (PEFC).

Not targeted for this project.

8.2.3 Cables, pipes, floors and blinds

Greenstar Point(s): 1 of 1

Cables, pipes, flooring and blinds sourced for the development will either contain no PVC or be sourced from an ISO 14001 certified supplier.

The project will source products that do not contain PVC or PVC that meets best practice guidelines, as per Green Star guidelines.

8.3 Sustainable Products

Greenstar Point(s): 2 of 3

The prescriptive approach has been selected for this fitout project under Green Star credit 21.1 Product Transparency and Sustainability.

Under the 'prescriptive' approach the project must demonstrate sustainability and transparency in product specification when products (Loose furniture, Fixed furniture, Internal Partitions, Ceilings, Joinery, Flooring, Wall coverings, Ceilings, Cladding, Masonry, Glazing Timber, Steel, Concrete and all other products / materials used in the project which could potentially have a 'Transparency or Sustainability Initiative') meet requirements under one of the following initiatives:

- A. Reused Products
- B. Recycled Content Products

- C. Environmental Product Declarations
- D. Third-Party Certification
- E. Stewardship Programs

Project is currently targeting points based on 6% compliant products.

8.4 Construction and Demolition Waste

8.4.1 Reporting Accuracy

Waste contractors and waste processing facilities servicing the project demonstrate compliance with the Green Star Construction and Demolition Waste Reporting Criteria.

8.4.2 Percentage Benchmark

Greenstar Point(s): 1 of 1

The project has selected the Green Star pathway of 22B Percentage Benchmark criteria for this project whereby it can be demonstrated that at least 90% of the waste generated during construction and demolition has been diverted from landfill.

A waste reduction strategy and management plan will be developed during construction to reduce on-site waste to landfill. The builder is to allocate an on-site waste management areas for sorting and segregating waste. The contractor will implement a Waste Management Plan for the site and will reuse or recycle at least 90% (by mass) of the site demolition and construction waste.

Hazardous substances, pollutants and contaminants are to managed and disposed of in accordance with all state regulatory requirements.

The project will document requirements in Head Contractor clauses.

8.5 General Waste Management/Recycling

Recyclable materials entering the general waste stream may be minimised from the development by providing dedicated waste and recycling facilities located within and close to the residential area.

To encourage recycling, is it recommended that recycling bins together with general waste bins are provided at all points of waste disposal.

The project has provided a dedicated bin room provided for recycling separation and storage for collection in the basement carpark (Figure 12) as well as convenient waste and recycling chutes for resident use.

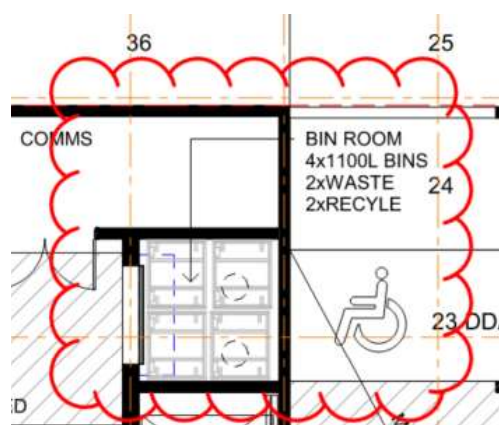


Figure 12: Bin Room located in Basement Carpark

9 Land Use & Ecology

In design of project it is important to consider green spaces which allow for access to open spaces, outside air, flora and fauna in order to maintain a connection with the environment.

9.1 Sustainable Sites

Green Star conditional requirements is that the site does not contain old growth forest, prime agricultural land, wetland, high national importance, or impact on 'Matters of National Significance'.

9.1.1 Reuse of Developed Land

Greenstar Point(s): 1 of 1

The project is to be located on previously developed land as shown in Figure 13. (Imagery of location from Google 2021, Map data, Satellite).

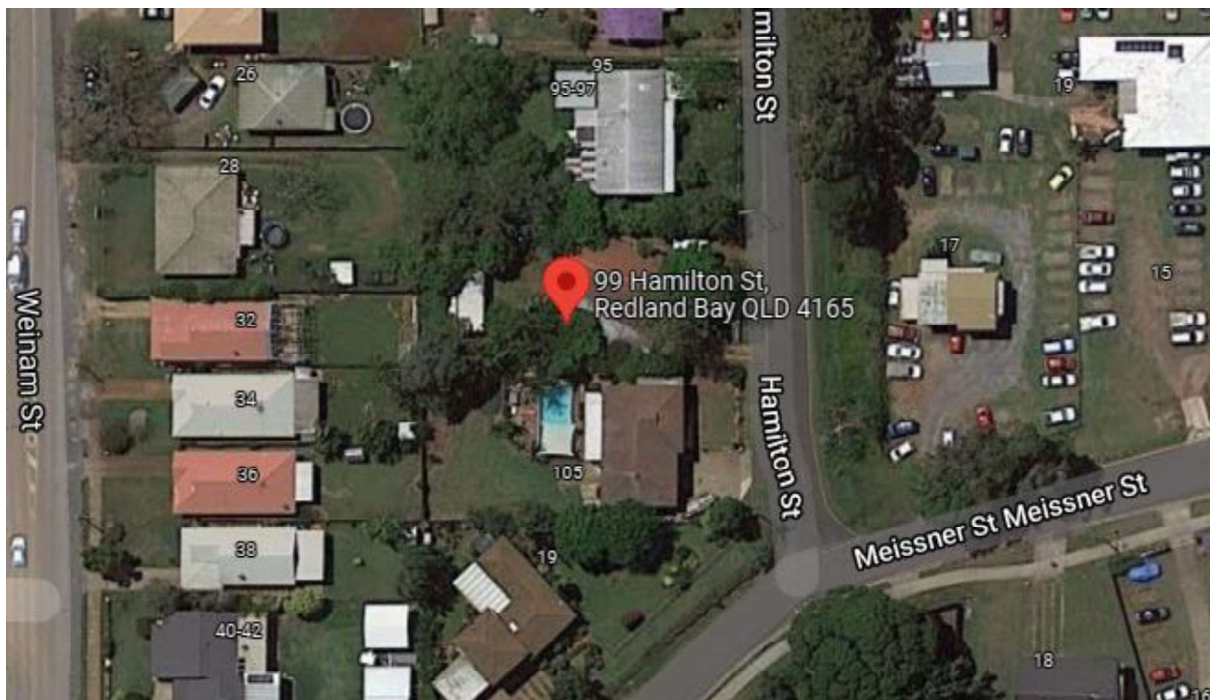


Figure 13: Aerial Photo of Site

9.2 Heat Island Effect

Greenstar Point(s): 1 of 1

Urban heat island effect is a phenomenon where temperatures in urban areas are warmer than the surrounding rural areas, most obviously during evening and night, due to differences in rate of cooling. This is caused by the layout of urban areas, urban canyons, thermally massive building materials such as concrete, lack of vegetation, removal of water and generation of heat by vehicles and buildings.

The development includes measures which will limit impact on urban heat island effect, as follows:

- Vegetation through landscaped areas and new trees.
- Retention of existing street trees during construction where possible.
- Roof materials including shading structures for roof pitch < 15° having a three year SRI>64.
- Unshaded hard-scaping elements with a three year SRI>34 or an initial SRI>39.

- Hardscaping elements shaded by photovoltaic panels.

Under Green Star, one point is awarded where, when assessed in plan view, at least 75% of the whole site area comprises of one or combination of the proposed strategies above.

9.3 Communal Spaces & Food Production

This building provides communal spaces and food production potential in the form of a shared swimming pool, common garden spaces and community vegetable garden area as shown in Figure 14 and Figure 15 below.

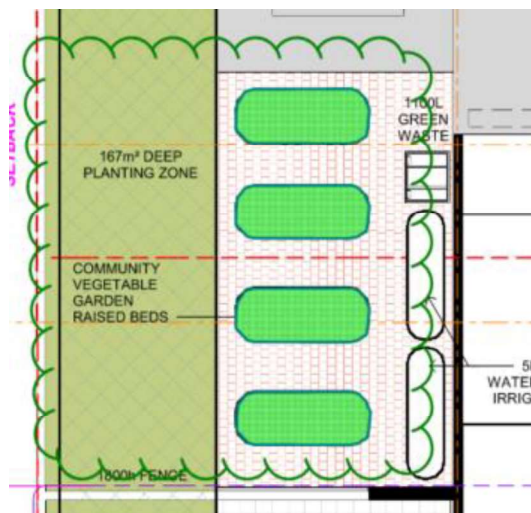


Figure 14: Food Production Area

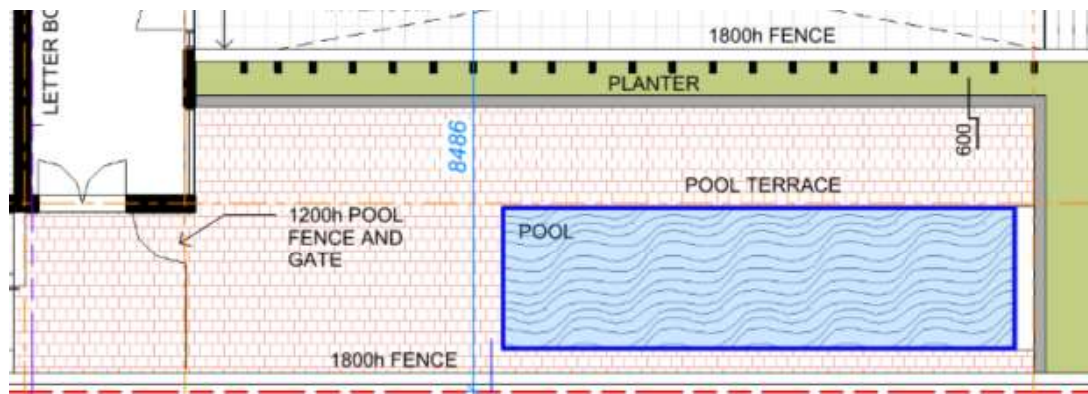


Figure 15: Communal Swimming Pool

10 Emissions

The Green Star - Design & As Built 'Emissions' category aims to assess the environmental impacts of 'point source' pollution generated by projects. Negative impacts commonly associated with buildings include damage to the environment through refrigerant leaks or disturbances to native animals and their migratory patterns as a result of light pollution.

10.1 Stormwater

To reward projects that minimise peak storm water outflows from the site and reduce pollutants entering the public sewer infrastructure or other water bodies.

10.1.1 Stormwater Peak Discharge

Greenstar Point(s): 1 of 1

Where the post-development peak event discharge from the site does not exceed the pre-development peak event discharge using the design Average Recurrence Interval (ARI) that corresponds to the associated flooding risk identified in the Climate Change and Adaption Assessment undertaken as part of the Adaption and Resilience credit.

10.1.2 Stormwater Pollution Targets

Greenstar Point(s): 0 of 1

Where the Reduced Peak Discharge criterion is achieved and if it can be demonstrated that all stormwater discharged from the site meets the pollution reduction targets in Table 9.

Table 9: Minimum Pollution Reduction Targets

Pollutant	Reduction Target (% of the Typical Urban Annual Load)
Total Suspended Solids (TSS)	80%
Gross Pollutants	85%
Total Nitrogen (TN)	30%
Total Phosphorus (TP)	30%
Total Petroleum Hydrocarbons	60%
Free Oils	90%

10.2 Light Pollution

This credit rewards projects that minimise light pollution.

10.2.1 Light Pollution to Neighbouring Bodies

To qualify for points under this credit project teams must demonstrate that all outdoor lighting on the project complies with AS 4282:1997. The conditions shall be applied to all inhabited boundaries, apart from boundaries with roads.

10.2.2 Light Pollution to Night Sky

Greenstar Point(s): 1 of 1

Where it can be demonstrated that one of the following specified reductions in light pollution has been achieved by the project:

- Control of upward light output ratio (ULOR) by demonstrating that no external luminaire on the project has a ULOR that exceeds 5%, relative to its actual mounted orientation or
- Control of direct luminance- demonstrate that direct illuminance from external luminaires on the project produces a maximum initial point illuminance value no greater than:
 - 0.5 Lux to the site boundary, and
 - 0.1 Lux to 4.5 meters beyond the site into the night sky

Calculations shall be in accordance with AS4282:1997. The calculation plane must cover the area between the site boundary and building façade or vertical service to be illuminated. The horizontal calculation plane shall be set at the top of the building fabric, excluding spires. Calculation plane points shall have a 0.5m spacing. All illumination results shall be reported to within 2 decimal places.

This project will deploy external light fixtures with a ULOR which do not exceed 5%, relative to its actual mounting location.

10.3 Microbial Control (Legionella)

Greenstar Point(s): 1 of 1

For this credit no water based heat rejection will be used and as such avoiding any risk of legionella infection.

For this project no water based air-conditioning systems will be installed.

10.4 Ozone Depleting Substances (Refrigerants)

Greenstar Point(s): 0 of 1

All refrigerants in the project have an ozone depletion potential of zero.

11 Innovation

To encourage design features and technologies that go well beyond the best practice standard in the broader market or in the boarder sense within the project itself.

11.1 Innovative Technology or Process

11.1.1 On-site Renewable Energy

Greenstar Point(s): 1 of 2

On-site energy renewable systems produce 5% more energy than what is required by the building. Energy must be exported on site. 1pt for 15% improvement, 2pt for 30% improvement.

11.2 Improving on Green Star Benchmarks

11.2.1 Indoor Pollutants - Ultra Low VOC paints

Greenstar Point(s): 1 of 1

50% of paints (by volume) max 5g/L VOC

11.2.2 EV charging Stations

Greenstar Point(s): 1 of 1

Accommodating future EV charging points for every car space with 22-33 EV charging parking spaces installed at time of construction, which is greater than the 5% minimum Green Star requirement as detailed in Section 6.3 of this report.

11.3 Innovation Challenge

11.3.1 Universal Design

Greenstar Point(s): 1 of 1

Projects will only be rewarded for going beyond compliance with access standards and legislation. Project teams are required to understand the accessibility issues specific to their project ('needs analysis') prior to developing design solutions in order to address these ('accessibility plan'). This process ensures that project initiatives are specific and practicable, rather than generic and 'tokenistic'.

Project teams must:

- Review the Design for Dignity Guidelines, or similar guidelines for inclusive design and dignified access.
- Perform a 'needs analysis' identifying the project's accessibility issues. See the Guidance section for additional detail.
- Develop an 'accessibility plan' (or similar) that provides strategies to address the needs determined and identifies actions for how the project will incorporate inclusive design.
- Implement the 'accessibility plan' and demonstrate that accessibility initiatives have been carried out for the project.

Appendix A – Green Star Design & As Built Pathway

GSD&AB Version 1.3	
Project	Hamilton Street Residential
Project Number	BR210376
Date	13/09/2021

Revision History			
Author	Issue	Description	Date
ML	A	For Town Planning	29/10/2021

				5 Star Points	Points Targeted											Implementation							
				60 - 74	61																		
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant								
Management																							
Green Star Accredited Professional	To recognise the appointment and active involvement of a Green Star Accredited Professional in order to ensure that the rating tool is applied effectively and as intended,	1,0 Accredited Professional	1	1	GSAP appointed throughout design and construction phases. GSAP has been contractually engaged to provide advice, support and information related to Green Star principles, structure, timing and process, at all stages of the project, leading to certification,	GSAP required throughout the project	GSAP certificate								✓								
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	Set targets for energy, water and indoor environment quality,	Set targets based on energy estimates	Building Users Guide to include performance metrics			✓					✓								
		2,1 Services and Maintainability Review	1	1	Comprehensive review performed by maintenance staff,		Maintenance staff review documentation and provide comments, design team provides response to comments,	✓	✓	✓	✓	✓	✓										
		2,2 Building Commissioning	1	1	Comprehensive commissioning of all building systems is performed, Commissioning Specifications, Commissioning Plan and Air Permeability Testing,		Clauses included within specifications,	✓		✓													
		2,3 Building Systems Tuning	1	1	Establish tuning process that addresses all nominated building services, Following practical completion and prior to occupation, there is a commitment to tuning all nominated building systems, This includes quarterly adjustments and measurement for the first 12 months after occupation,		Clauses included within specifications,			✓													
		2,4 Independent Commissioning Agent	1	0	ICA appointed to review and verify commissioning performed in accordance with the guidelines set,	ICA required to be appointed	ICA to be appointed and review documentation,	✓															
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	2	Project specific climate adaptation plan prepared and its recommendations included within the design,	Climate plan required	Climate specialist appointed and climate adaptation plan prepared and recommendations implemented	✓							✓								
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 Operations and Maintenance Information	1	1	Detailed Operation and Maintenance manuals are provided & Building Users Guides to be prepared,		Clauses included within specifications & Building Users Guide prepared		✓	✓													
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	Commitment to setting performance metrics for at least 2 of the following: GHG Emissions, potable water, operational waste and IEQ,	On selected 2 items - Energy and Water,	Building Users Guide to include performance metrics			✓					✓								
		5,2 End of Life Waste Performance	1	1	Commitment to minimise end-of-life waste,	TBC	Clauses included within specifications	✓	✓	✓	✓												
Metering and Monitoring	To recognise the implementation of effective energy and water metering and monitoring systems,	6,0 Metering	-	Complies	Energy and water sub metering systems to be provided,	Smart Metering' systems supplied to all units for metering and monitoring district uses,	Metering included within design			✓													
		6,1 Monitoring Systems	1	1	Energy and water monitoring systems to be provided,	Smart Metering' systems supplied to all units for metering and monitoring district uses,	Energy and water monitoring systems included in design			✓													
Responsible Construction Practices	To reward projects that use best practice formal environmental management procedures during construction,	7,0 Environmental Management Plan	-	Complies	An EMP to be prepared for the project,		Head contract clauses	✓															
		7,1 Environmental Management System	1	1	Head contractor to have formal EMS (such as ISO14001). - For project values < \$10M the environmental management system (EMS) must comply with either NSW Environmental Management System Guidelines or a recognised standard. - For all other projects the formalised Management System must have been independent certified to a recognised standard - AS/NZS ISO 14001,	Project value > \$10M	Head contract clauses	✓															
		7,2 High Quality Staff Support	1	1	High quality staff support practices shall be established to promote positive mental and physical health outcomes and site activities and culture of site works, through programs and solutions on site, and, to enhance site workers' knowledge on sustainable practices through on-site, off-site, or online education programs,		Head contract clauses	✓															
Operational Waste	Performance Pathway	8A Performance Pathway - Specialist Plan	1	0	Waste Professional prepares and implements an Operational Waste Management Plan (OWMP)	Waste Professional required to be																	
		8B Prescriptive Pathway - Facilities	1	1	Separate waste streams provided for general waste, paper/cardboard, glass, plastic & one other stream, Dedicated waste storage areas and access to these areas meet best practice standards,	Plus Green Waste on site	Waste facilities to be provided in design documentation	✓	✓														
Management Subtotal			14	13																			

			5 Star Points	Points Targeted												
			60 –74	61												
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant	
Indoor Environment Quality																
Indoor Air Quality	To recognise projects that provide high air quality to occupants.	9,1 Ventilation System Attributes	1	0	The entry of outdoor pollutants is mitigated. The system is designed for ease of maintenance and cleaning. The system has been cleaned prior to occupation and use. Separation of outdoor air intakes to ASHRAE standards, air handling systems designed for ease of cleaning and system is cleaned prior to use.	Concept is for Natural Ventilation for outside air for Apartments – so mitigation of outdoor pollutants would not be achieved, although due to the location, it is not anticipated that the air is very polluted. Exhausts can be separated the required distances from air intakes or openable windows.	Design documentation			✓						
		9,2 Provision of Outdoor Air	2	0	A. Comparison to Industry Standards 1 point awarded for additional outside air provided >50% or CO ₂ maintained < 800ppm 2 points awarded for additional outside air provided >100% or CO ₂ maintained < 700ppm B. Performance Based Approach. 1 point awarded for additional outside air beyond requirements of AS1668,2 is provided >50% or CO ₂ maintained < 800ppm 2 points awarded for additional outside air beyond requirements of AS1668,2 is >100% or CO ₂ maintained < 700ppm C. Natural Ventilation. 2 points awarded where the requirements of AS1668,4 are met.	Outside air shall be provided to spaces via ventilation to occupied spaces in accordance with Part F4 of the NCC-BCA.	Design documentation and specification			✓						
		9,3 Exhaust or Elimination of Pollutants	1	1	All exhaust systems discharged outside and kitchens enclosed. A. Removing the Source of Pollutants. Printing, photocopy equipment, kitchen stoves, vehicles must be compliant with minimum emissions standards or not be present within the nominated area. Printing and photocopying equipment must be certified to ECMA-328, RAL-UZ 171 or GGPS,003. B. Exhausting the Pollutants Directly to the Outside. Printing and Photocopying specific exhaust requirements, Cooking Process and Equipment specific exhaust requirements, Vehicle Exhaust specific exhaust requirements.	Kitchen range hoods to discharge outside the apartments, Car park will be mechanically ventilated to AS1668,2.	Design documentation and specification		✓	✓						
Acoustic Comfort	To reward projects that provide appropriate and comfortable acoustic conditions for occupants,	10,1 Internal Noise Levels	1	1	Internal ambient noise levels in the nominated area are suitable and relevant to the activity type in the room. Including sound generated by the building systems and any external noise ingress. Noise levels no greater than 5dB(A) above AS/NZS 2107:2016 levels (with any natural ventilation openings open). Occupancy noise is excluded.		Acoustic consultant to address in report		✓						✓	
		10,2 Reverberation	1	1	Reverberation times are below that recommended in AS/NZS 2107:2016.		Acoustic consultant to address in report		✓						✓	
		10,3 Acoustic Separation	1	1	Address noise transmission within enclosed spaces within the nominated area. A. Sound Reduction. Partition constructed to achieve a weighted sound reduction index (R _w) of at least 45 for all partitions which are fixed without a door and/or glazed without a door (discretionary) and at least 35 for all partitions that contain a door. B. Sound Insulation. The sound insulation between enclosed spaces complies with D _{n,w} + LA _{eq,T} > 75 D _{n,w} = Weighted sound level difference measured between two spaces. LA _{eq,T} = Indoor ambient noise level in the space adjacent to the enclosed space. C. Residential Projects. Inter-tenancy apartment construction to habitable areas results in airborne noise isolation standard of R _w +Ctr > 55, and all inter-tenancy walls should include Discontinuous Construction as defined by the NCC. Walls between apartments and public corridors results in airborne noise isolation standard of RW>55 Apartment entry doors include acoustic seals and achieve laboratory acoustic rating of R _w 30.		Acoustic consultant to address in report		✓					✓		
		11,0 Minimum Lighting Comfort	-	Complies	Lighting ballasts to be flicker free.		Lighting schedule			✓						
		11,1,1 General Illuminance			95% of the nominated areas lighting levels and quality comply with best practice guidelines and glare is eliminated. Artificial lighting levels greater than recommended levels in AS 1680 and lighting fitted with baffles, louvres or opaque diffusers. A. Non Residential Spaces. Space type guidance per Table 11.1.1 and relevant table of AS/NZS 1680 Compliance assessed through modelling or area calculations. B. Residential Spaces. Living spaces, kitchens, bathrooms and bedrooms the lighting design includes or permits general fixed lighting that provides good maintained illuminance levels for the entire room, and the installed fittings have a rated colour variation not exceeding 3 MacAdam Ellipses (decorative fittings being exempt).	Electrical/Lighting Consultant	Lighting schedule			✓						

			5 Star Points	Points Targeted											
			60 - 74	61											
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant
Lighting Comfort	To encourage and recognise well-lit spaces that provide a high degree of comfort to users.	11.1 General Illuminance	1	1	A. Prescriptive Method 1. Bare light sources fitted with baffles, louvres, translucent diffusers, ceiling design or other means that obscures the direct light source from all viewing angles of occupants, including occupants looking directly upwards. B. Prescriptive Method 2. The lighting system must comply with the luminaire selection system as detailed in Clause 8.3.4 of AS/NZS 1680.1:2006. C. Performance Method. Unified Glare Rating (UGR) calculated for the lighting on a representative floor must not exceed the maximum values listed in Table 8.2 of AS/NZS 1680.1:2006. UGR Rating must be calculated in accordance with the procedure outlined in Clause 8.3.3 of AS/NZS 1680.1:2006.	Electrical/Lighting Consultant	Lighting schedule			✓					
		11.2 Surface Illuminance	1	0	A. Prescriptive Method. Spaces in the nominated area must have a surface reflectance for ceilings of at least 0.75, and a direct / indirect lighting system present such that the ceiling areas have an average surface illuminance of at least 30% of the lighting levels on the working plane. Surface reflectance of 0.75 typically corresponds to a matt white ceiling. B. Performance Method. 95% of the spaces in the nominated areas must be modelled to illustrate average ceiling illuminance exceeding 0.5 kcd/m² and the maximum luminance at any point on the ceiling does not exceed 1.5 kcd/m²; the ceiling areas have an average surface illuminance of at least 30% of the lighting levels on the working plane and in rooms less than 100m², or in rooms where more than 20% of workstations are located within 3m of walls, the wall area above the working plane has an average surface illuminance of at least 50% of the lighting levels on the working plane. Illuminance must be calculated in accordance with Appendix B of AS/NZS 1680.1:2006 C. Residential Spaces (Prescriptive Method). At least one wall in each living space, kitchen and bedrooms are provided with at least one specific wall-washing or a wall mounted fitting. Alternatively, residential spaces may address through A and B.	Electrical/Lighting Consultant	Design documentation			✓					
		11.3 Localised Lighting Control	1	1	Occupants can control the lighting levels in their immediate environment. In residential spaces, this can be achieved through the provision of sufficient power outlets for future task lights / lamps around the predicted furniture layouts used in the space. In addition, appropriate task lighting must be provided for kitchens, bathrooms, and service areas.	Electrical/Lighting Consultant	Design documentation			✓					
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	External glare is reduced either through external shading devices or internal blinds with a VLT <10%. A. Fixed Shading Devices. Viewing facades - the nominated plane is at ground level and is a narrow band along the entire length of viewing facade, 1.5m in from the viewing facade. B. Blinds or Screens. The blinds must provide glare reductions to at least 95% of the area of viewing facade and skylights. Blinds must be controlled by all affected occupants within each individual. Blinds must have a visual light transmittance (VLT) of ≤ 10%. Manual or automated internal, in-glazing, or external blinds may be used. C. Daylight Glare Model. Modelling used to demonstrate that any combination of tinted glazing, fixed shading devices and other solutions will meet the minimum requirement, provided that the model shows that the combined solution results in a reduction of glare equivalent to that achieved by option 12.0A.	Block out internal blinds	Design documentation		✓						
		12.1 Daylight	2	1	Daylight factor of >2% achieved for 40% (1pt) or 80% (2pts) of nominated areas. A. Prescriptive Methodology. Simple calculation to comply with Green Star Daylight and Views Hand Calculation Guide. B. Compliance Using Daylight Factor. Modelling Daylight Factor (DF). High levels of daylight are deemed to have daylight factors above 2.0% for all spaces, except living rooms and dining rooms in residential primary spaces, where the threshold is a 1.5% DF. C. Compliance Using Daylight Autonomy. Daylight access is determined through modelling Daylight Illuminance (DI) across the Nominated Area. High Levels of daylight are deemed to have at least 160 lux due to daylight during 80% of the nominated hours.	Daylight assessment required - TBC	Daylight modelling report or hand calculations provided		✓				✓		
		12.2 Views	1	1	60% of nominated area within 8m of a compliant view with clear line of sight to either a high quality internal or external view.		To be documented by the architect.		✓						

			5 Star Points	Points Targeted											
			60 – 74	61											
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant
Indoor Pollutants	To recognise projects that safeguard occupant health through the reduction in internal air pollutant levels.	13.1 Paints, Adhesives, Sealants and Carpets	1	1	95% of all internal paints, adhesives, sealants and carpets to be low VOC. A. Product Certification. Product registered under a recognised Product Certification Scheme – Carpet Institute of Australia Limited – Environmental Certification Scheme Ecospecifier – GreenTag GreenRate Australasian Furnishing Research and Development Institute – Green Tick Good Environmental Choice Australia (GECA) The Institute for Market Transformation to Sustainability – Sustainable Materials Rating Technology Environmental Choice New Zealand B. Laboratory Testing. Tested to confirm TVOC limits per Table 13.1.1B. C. No Paints, Adhesives or Sealants. Not included in the nominated areas of the project.		Clauses included within specifications		✓	✓	✓	✓			
		Carpets			A. Product Certification. Product registered under a recognised Product Certification Scheme – Carpet Institute of Australia Limited – Environmental Certification Scheme Ecospecifier – GreenTag GreenRate Australasian Furnishing Research and Development Institute – Green Tick Good Environmental Choice Australia (GECA) The Institute for Market Transformation to Sustainability – Sustainable Materials Rating Technology Environmental Choice New Zealand B. Laboratory Testing. Tested to confirm TVOC limits per Table 13.1.2B. C. No Carpets. Not included in the nominated areas of the project.		Clauses included within specifications		✓						
		13.2 Engineered Wood Products	1	1	95% of all engineered wood products to be low emission formaldehyde per Table 13.2 A. Product Certification. Product registered under a recognised Product Certification Scheme – Carpet Institute of Australia Limited – Environmental Certification Scheme Ecospecifier – GreenTag GreenRate Australasian Furnishing Research and Development Institute – Green Tick Good Environmental Choice Australia (GECA) The Institute for Market Transformation to Sustainability – Sustainable Materials Rating Technology Environmental Choice New Zealand B. Laboratory Testing. Tested to confirm TVOC limits per Table 13.2B.	TBC	Clauses included within specifications		✓		✓				
Thermal Comfort	To encourage and recognise projects that achieve high levels of thermal comfort.	14.1 Thermal Comfort	1	1	95% of the spaces for 98% of the year achieve A. Naturally Ventilated Spaces. Internal temperatures in each space are within 80% of the Acceptability Limit 1 of ASHRAE Standard 55-2013. B. Mechanically Ventilated Spaces. A PMV between -1 and +1. C. Residential Spaces. An average NatHERS rating of 7 stars or greater is achieved.	An average NatHERS rating of 7 stars or greater is achieved.	ESD Consultant		✓	✓				✓	
		14.2 Advanced Thermal Comfort	1	0	95% of the spaces for 98% of the year achieve A. Naturally Ventilated Spaces. Internal temperatures in each space are within 90% of the Acceptability Limit 1 of ASHRAE Standard 55-2013. B. Mechanically Ventilated Spaces. A PMV between -0.5 and +0.5. C. Residential Spaces. An average NatHERS rating of 8 stars or greater is achieved.	Not targeted	ESD Consultant		✓	✓				✓	
Indoor Environment Quality Subtotal			17	11											

			5 Star Points	Points Targeted												
			60 - 74	61												
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant	
Energy																
Greenhouse Gas Emissions	Prescriptive Pathway															
	NatHERS Rating Pathway	15B,0	Conditional Requirement: NatHERS Pathway	-	Complies	Projects targeting 5 and 6 star ratings must meet minimum GHG emission reductions. Minimum points thresholds 5 Star = 3 points and 6 star = 6 points,	Minimum 0.5-Star rating improvement on the minimum legislated area-weighted average. Each unit must also achieve a minimum NatHERS 0.5-Star rating over the individual rating requirement as specified in Section JQ,2a of the NCC.	ESD Report		✓	✓				✓	
		15B,1	Thermal and Energy Performance	6	3	Up to six points are awarded when NatHERS is used to predict the project's thermal and energy performance. Points are awarded on the calculated reduction of energy intensity in MJ/m2. Design checks for HVAC and natural ventilation are included within these points,	To be confirmed during the design development phase	ESD Report			✓				✓	
		15B,2,1 Lighting	1	1	- The lighting power density is reduced by at least 10% below the maximum lighting power density allowable in Table J6,2a. This requirement applies to both sole-occupancy units and all common areas accessible by residents. Allowances may NOT be traded between sole-occupancy units and other parts of the buildings; - Independent light switching must be provided to each room of each sole-occupancy unit. Where open-plan living, dining and kitchen areas are provided, each functional area must be separately switched; and - All common areas accessible by residents must be provided with automated lighting control systems such as occupant detection and daylight adjustment,	1 point is available if all the conditions are met	Electrical Consultant			✓						
		15B,2,2 Ventilation and Air Conditioning	2	2	Mechanically Conditioned Spaces - The minimum cooling system energy star rating for the air conditioning equipment is at least 3-star as per AS3823.2-2013, and - The rated cooling or heating capacity of the unit does not exceed the design cooling or heating load, whichever is greater, by more than 15%, or the project team can demonstrate they have selected the unit with closest capacity available on the market. Spaces with Mechanical Heating only - The minimum energy star rating for the heating equipment is at least 3 – Star (per AS3823.2-2013, AS4552-2005 or AS4556-2011 as appropriate); and - The rated capacity of heating equipment does not exceed the design heating load by more than 20%. Naturally Ventilated Spaces - Compliance is achieved with the provision of Outdoor Air (AS1668,2) criterion; - Effective cross ventilation is provided in all apartments; and - Ceiling fans are installed in apartments,	2 points are available if all the conditions are met for the relevant space types. Mech comments - AC units specified 3 star or higher. Mech concept is operable windows for Natural Ventilation for outside air. Cross ventilation will not be achievable for all apartments due to layout of apartments.	Mechanical Consultant			✓						
		15B,2,3 Domestic Hot Water	2	0	Compliance with the following: - A solar thermal heating system is provided which contributes at least 30% of the annual thermal energy requirement for water heating; - The primary non-renewable heat source for domestic hot water is either an electric heat pump with a minimum of COP of 3,5, or heat recovered for another process.	- 1.5 points when first condition is met - 0.5 points when second condition is met	Hydraulic Consultant			✓						
		15B,2,4 Appliances & Equipment	1	1	Points are awarded when appliances are present in all units, and all appliances installed have a minimum Energy Star rating of 1-star below the maximum Energy Star rating available for that appliance type and capacity. <u>Appliances included in this credit are:</u> - Refrigerators/freezers; - Dishwashers - Clothes washers; and - Clothes dryers It is noted that this item only applies to installed appliances; it does not require their installation. If no appliances are installed, this point cannot be claimed.	1 point is available if all the conditions are met	Architect	✓	✓							
		15B,2,5 Fuel Switching	1	1	The project is rewarded when no fossil fuels are burned in site to generate electricity, heating or cooling and either: - at least 15% of energy required by the building is generated by on site renewable solutions; or - three points have been achieved from 15B,1	1 point is available if all the conditions are met	Architect/Client/Services Consultants	✓	✓	✓						

				5 Star Points	Points Targeted											
				60 - 74	61											
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria		Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Implementation							
									Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant
		15B,2,6 On-Site Storage	1	1	Projects are rewarded where the on-site storage complies with the following conditions: - A renewable energy storage procurement and use strategy has been developed to demonstrate the storage is sized to match the requirements of the building and that value will be provided the project. - The stored renewable energy is used to reduce the peak electricity demand; and - The project installs and uses electricity storage such that on-site or off-site renewable energy not used by the building is able to be stored and used by the building.	1 point is available if all the conditions are met	Architect/Client/Electrical Consultant	✓	✓	✓						
		15B,2,7 Vertical Transportation	1	1	Projects are rewarded where the on-site storage complies with the following conditions: - The minimum lift energy efficiency is Class A or B in accordance with ISO 25745-2; and - The lift idle and standby energy performance level1 in accordance with ISO 25745-2	1 point is available if all the conditions are met	VT Consultant			✓						
		15B,2,8 Passive Laundry Facilities	1	1	Projects are rewarded where 95% of all dwellings contain laundry facilities which meet one of the following conditions; - Have been provided with external drying balconies; or - Contain an internal or external clothesline or hoists as follows: - 4m total line length minimum for studios, 1 and 2 bedroom units and; - 6m total line length minimum for 3 or more bedroom units;	1 point is available if all the conditions are met	Architect		✓							
		15B,2,9 Unoccupied Areas	1	0	Natural ventilation to occupied areas: Common Areas -95% of the net floor area of the common lobbies meet the requirements of AS1668,42012 - The operable size of windows must be 5% or more of the net floor area on a floor by floor basis. Enclosed Car Parking - Compliance with AS 1668,2-2012 Where enclosed car parking is not provide, this requirement is considered 'not applicable'	1 point is available if all the conditions are met	Mechanical Consultant			✓						
		15B,2,10 Off-Site Renewables	2 or 5	0	Projects are rewarded for committing to procure off-site renewable electricity are rewarded additional points for supporting grid-connecting renewable energy supply infrastructure - 2 points are awarded where at least six points in this pathway have been achieved and a supply contract is in place to procure at least 50% of the building's electricity consumption through Off-site renewable electricity solutions - 5 points are awarded where at least 10 points in this pathway have been achieved, and a supply contract is in place to procure 100% of the building's electricity consumption through Off-site renewable electricity solutions. The length of time of the commitment is for a minimum period of ten years after practical completion.	TBC	Client/Electrical Consultant	✓		✓						
		Prescriptive Pathway														
		Reference Pathway														
Peak Electricity Demand Reduction	Prescriptive Pathway	16A	Prescriptive Pathway - On-site Energy Generation	2	1	Onsite generation systems are provided to reduce peak energy by 15% (1pt).		Based on peak load			✓				✓	
	Performance Pathway	16B	Performance Pathway - Reference Building	2	0	Peak energy demand is 20% (1pt) or 30% (2pts) less than reference building.										
Energy Subtotal				22	12											

				5 Star Points	Points Targeted												
				60 - 74	61												
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria		Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant	
Transport																	
Sustainable Transport	Performance Pathway	17A,1	Performance Pathway	0	0												
	Prescriptive Pathway	17B,1	Access by Public Transport	3	1	Assessed through proximity and frequency of bus, tram and train services,	Access to buses 280,281,250,282	Green star calculator not available for non-registered projects								✓	
		17B,2	Reduced Car Parking Provision	1	0	Reduction in car parking provided based on access to public transport,	No reduced parking	Design documentation		✓							
		17B,3	Low Emission Vehicle Infrastructure	1	1	A. Parking for Fuel-Efficient Vehicles. Parking spaces for fuel-efficient and electric vehicles must be clearly designated, for example through use of different coloured line markings and highly visible signage. Spaces designated for small cars are not considered to be equivalent to spaces for fuel efficient vehicles. B. Parking for Electric Vehicles. Appropriate electric vehicle charging infrastructure must be easily accessed by the users of dedicated electric vehicle charging spaces. It must comply with all relevant Standards and health and safety legislation C. Parking for Car Share Vehicles. Parking spaces for car share vehicles must be clearly designated, for example through use of different coloured line markings and highly visible signage. The car share parking spaces must be accessible to all car share scheme members. D. No Parking Spaces Provided. Where no parking spaces are to be provided, there is no opportunity to apply any of the above initiatives. In this instance, the 'Low Emission Vehicle Infrastructure' point is made 'Not Applicable'. Please see the Introduction section of the Submission Guidelines for additional information.	>5%		✓		✓						
		17B,4	Active Transport Facilities	1	1	Cyclist facilities to Table 17B,4,1.	Secure bike parking for multi-resi is provided for 5% of dwellings	Architectural documentation		✓							
		17B,5	Walkable Neighbourhoods	1	0	Eight amenities are within 400m of the development or a walk score of at least 80 is achieved. A. Proximity to Amenities. The project is located so that at least four (4) amenities for industrial buildings, or at least eight (8) amenities for all other types of buildings, are within 400m of the project. The distance is to be measured from the centre of the project's site; or B. Walk Score. The project achieves a Walk Score of at least 70 for industrial buildings, or at least 80 for all other types of buildings, as determined by the website www.walkscore.com, using the 'street smart' method of calculation.	Walk score = 38	Documentation to be provided to ESD Consultant	✓							✓	
Transport Subtotal				7	3												
Water																	
Potable Water	Performance Pathway	18A,1	Potable Water - Performance Pathway	12													
	Prescriptive Pathway	18B,1	Sanitary Fixture Efficiency	1	1	Fittings achieve the following Taps: 6 star, urinals: 6 star, toilets: 5 star, showers: 4,5-6L/min, washing machines: 5 star, dishwashers: 6 star.		Clauses within specifications		✓							
		18B,2	Rainwater Reuse	1	1	Rainwater tank and reuse system provided at 10L/sqm,		Design documentation			✓						
		18B,3	Heat Rejection	2	2	No water based heat rejection systems to be provided,	No water based systems	Design documentation			✓						
		18B,4	Landscape Irrigation	1	1	Drip based irrigation system with moisture sensors or no potable water used for irrigation,		Landscape Design documentation							✓		
		18B,5	Fire Protection System Test Water	1	0	80% of fire test water is reused,		Design documentation									
Water Subtotal				6	5	Performance - Maximum of 12 Points Prescriptive - Maximum of 6 Points											

				5 Star Points	Points Targeted											Implementation							
				60 - 74	61																		
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria		Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant							
Materials																							
Life Cycle Impacts	Performance Pathway	19A,1	Comparative Life Cycle Assessment	6	0	Only 7 points may be awarded overall in this pathway																	
		19A,2	Additional Life Cycle Impact Reporting	4	0	A. Additional Life Cycle Impact Reporting. B. Material Selection Improvement.																	
	Prescriptive Pathway - Life Cycle Impacts	19B,1 Concrete	19B,1,1 Portland Cement Reduction	2	2	Portland cement content is reduced by mass by 30% (1pt) or 40% (2pt) a	To be reviewed by structural engineer	Clauses included within specifications				✓											
			19B,1,2 Water Reduction	0,5	0,5	50% of mix water used is captured or reclaimed (0,5pt),		Clauses included within specifications				✓											
			19B,1,3 Aggregates Reduction	0,5	0,5	Either of the following options. A. Coarse Aggregate Reduction. 40% of coarse aggregate is crushed slag. B. Fine Aggregate Reduction. 25% of fine aggregate is fine aggregates are manufactured sand.		Clauses included within specifications				✓											
		19B,2 Steel	Steel	1	0	Either of the following options. 19B,2A Reduced Mass of Steel Framing A. High Strength Steel 95% of Cat A products and 25% Cat B products meet the strength grades specified in Tables 19B,2A,1 and 19B,2A,2 B. Reduction in Mass For this option, project teams must demonstrate that the project results in a 5% or more reduction in mass of steel framing, when compared to a suitable reference case building. Assessment must be completed by a qualified Structural Engineer. 19B,2B Reduced Use of Steel Reinforcement Demonstrate a 5% reduction in the mass of reinforcing steel used in the building when compared to standard practice. Assessment must be completed by a qualified Structural Engineer.		Clauses included within specifications				✓											
		19B,3 Building Reuse	19B,3,1 Façade Reuse	2	0	Where at least 50% (by area) of the building façade is retained = 1 point Where at least 80% (by area) of the building façade is retained = 2 points	Not targeted																
			19B,3,2 Structure Reuse	2	0	Where at least 30% (by mass) of the existing major structure is retained = 1 point. Where at least 60% (by mass) of the existing major structure is retained = 2 points.																	
		19B,4 Structural Timber	19B,4,0 Responsible Sourcing	-	-	Structural timber shall be responsibly sourced.																	
			19B,4,1 Reduced Embodied Impacts	3	0	Where the building is constructed from the following proportion of structural timber: 1 point for 30% of the building's GFA, 2 points for 70% of the building's GFA, 3 points for 90% of the building's GFA.	Not targeted																
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	95% of steel is sourced from a responsible steel maker, 20,1,0 Responsible Steel Maker, and A. Responsible Steel Fabricator At least 60% is from a fabricator accredited by the Environmental Sustainability Charter of the Australian Steel Institute (ASI), or B. Energy Reducing Processes in Steel Reinforcement Production At least 60% of all concrete reinforcing bar and mesh is produced using energy-reducing processes in its manufacture		Clauses included within specifications		✓		✓											
		20,2	Timber Products	1	0	95% of timber is either reused or from a GBCA approved forest certification scheme.		Clauses included within specifications		✓		✓		✓									
		20,3	Permanent Formwork, Pipes, Flooring, Blinds and Cables	1	1	90% of all cables, pipes, flooring and blinds either do not contain PVC or meet the best practice guidelines for PVC. Either of the following options shall apply. A. Products that do not contain PVC. B. Best Practice Guidelines for PVC.		Clauses included within specifications		✓	✓		✓										
Sustainable Products	To encourage sustainability and transparency in product specification.	21,1	Product Transparency and Sustainability	3	2	Building and fitout products are either reused, contain recycled content, have an environmental product declaration, are 3rd party certified or have a stewardship program, 3% (1pt), 6% (2pts), 9% (3pts) of project contract value. A proportion of all materials used in the project meet transparency and sustainability requirements under one of the following initiatives: A. Reused Products, B. Recycled Content Products, C. Environmental Product Declarations (EPDs) D. Third Party Certification, E. Stewardship Programs.		Clauses included within specifications	✓	✓													
Construction and Demolition Waste	Fixed Benchmark	22,0	Reporting Accuracy	-	-	A. Compliance Verification Summary, B. Disclosure Statement.																	
		22A	Fixed Benchmark	1	0	Minimizing the total amount of waste sent to landfill when compared against a typical building.		Head contract clauses															
	Percentage Benchmark	22,0	Reporting Accuracy	-	-	A. Compliance Verification Summary, B. Disclosure Statement.																	
		22B	Percentage Benchmark	1	1	90% of waste generated during demolition and construction is recycled.		Head contract clauses	✓														
Materials Subtotal				12	8																		

				5 Star Points	Points Targeted										
				60 – 74	61										
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details	Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant
Land Use & Ecology															
Ecological Value	To reward projects that improve the ecological value of their site.	23.0	Endangered, Threatened or Vulnerable Species	-	Complies	No endangered or vulnerable species present on site. It is a minimum requirement of this credit that a check is carried out to ensure that the site does not contain 'critically endangered, endangered, or vulnerable species or ecological communities' as Assessment on the ecological value of the site prior to and post development.									
		23.1	Ecological Value	3	0	Ecological Calculator to reflect,		Ecological Calculator							
Sustainable Sites	To reward projects that choose to develop sites that have limited ecological value, re-use previously developed land and remediate contaminate land.	24.0	Conditional Requirement	-	Complies	Site does not contain old growth forest, prime agricultural land, wetland, high national importance, or impact on 'Matters of National Significance',									
		24.1	Reuse of Land	1	1	75% of the site has been previously built on, A, Previously Developed Land, B, Building Extension,				✓					
		24.2	Contamination and Hazardous Materials	1	0	Site is contaminated and remediation in accordance with best practice to be undertaken, A, Site Contamination, B, Hazardous Materials,			✓						
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	75% of site area contains either vegetation, roof with a SRI >82 (white), hard scaping elements with SRI>39, Vegetation; Green roofs Roofing materials, including shading structures, having the following: For roof pitched <15° – a three year SRI of minimum 64; or for roof pitched >15° – a three year SRI of minimum 34, Only where the three year Solar Reflectance Index (SRI) for products is not available, use the following: For roof pitched <15° – an initial SRI of minimum 82; or for roof pitched >15° – an initial SRI of minimum 39, Unshaded hard-scaping elements with a three year SRI of minimum 34 or an initial SRI of minimum 39; Hardscaping elements shaded by overhanging vegetation or roof structures, including solar hot water panels and photovoltaic panels; Water bodies and/or water courses; or Areas directly to the south of vertical building elements, including green walls and areas shaded by these elements at the summer solstice,		Architectural Documentation and specifications		✓		✓			
Land Use & Ecology Subtotal				6	2										
Emissions															
Stormwater	To reward projects that minimise peak stormwater flows and reduce pollutants entering public sewer infrastructure.	26.1	Stormwater Peak Discharge	1	1	Post development peak stormwater flow is less than pre development.	Subject to rainwater retention and detention options,	Design documentation			✓		✓		
		26.2	Stormwater Pollution Targets	1	0	Stormwater is treated prior to leaving site (raingardens, swales, etc.),	Can not be achieved				✓		✓		
Light Pollution	To reward projects that minimise light pollution.	27.0	Light Pollution to Neighbouring Bodies	-	Complies	Outdoor lighting to comply with AS 4282:1997		Lighting schedule			✓				
		27.1	Light Pollution to Night Sky	1	1	A, Control of Upward Light Output Ratio (ULOR). All external lighting to have an upward light output ratio of less than 5%. B, Control of Direct Illuminance. Demonstrate that direct illuminance from external luminaries on the project produces a maximum initial point illuminance value no greater than: 0,5 Lux to the site boundary; and 0,1 Lux to 4,5 metres beyond the site into the night sky, when modelled using a calculation plane set at the highest point of the building.		Lighting schedule			✓				
Microbial Control	To recognise projects that implement systems to minimise the impacts associated with harmful microbes in building systems.	28.0	Legionella Impacts from Cooling Systems	1	1	Air cooled heat rejection equipment, A, Natural Ventilation, B, Waterless Heat Rejection Systems, C, Water-Based Heat Rejection Systems,	Mech Comments – All AC systems will be air-cooled.	Design documentation			✓				
Refrigerant Impacts	To encourage operational practices that minimise the environmental impacts of refrigeration equipment.	29.0	Refrigerants Impacts	1	0	A, Calculating TSDEI. The calculated Total System Direct Environmental Impact (TSDEI) of the refrigerant systems in the building is less than 15. B, Leak Detection System. The calculated TSDEI of the refrigerant systems is between 15 and 35, AND a leak detection system with automated refrigerant recovery is in place. C, Low Impact Refrigerants. All refrigerants in the project have an ozone depletion potential of zero, and a global warming potential of 10 or less. D, No Refrigeration Equipment. Where there are no refrigerants employed within the building systems, this point is awarded.	Mech Comments – Difficult to achieve with commercially available AC systems that also meet the building restrictions including the height limitations (equipment to be less than 1,0m high).	Design documentation			✓				
Emissions Subtotal				5	3										

				5 Star Points	Points Targeted											Implementation							
				60 –74	61																		
Green Star Design & As Built V1.3	Credit Summary	Credit Criteria	Credits Available	Recommended Credits	Details		Assessment Comment	Design Deliverable	Client / Project Manager	Architect	Building Services	Structural Engineer	Civil Engineer	Landscape Architect	ESD Consultant	Acoustic Consultant							
Innovation																							
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	1	PV on-site	Energy modelling - During Design Phase				✓				✓								
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	1	1	Ultra low - 50% of paints (by volume) max 5g/L VOC.		Material Specification		✓													
				1	0	On-site energy renewable systems produce 5% more energy than what is required by the building. Energy must be exported on site, 1pt for 15% improvement, 2pt for 30% improvement.	GHG Reference Pathway modelling only																
				1	1	EV charging stations			✓	✓	✓												
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					Design documentation															
				1	0	Development and implementation of a marketing strategy that addresses the main investment drivers of building end-users with regards to environmental sustainability.																	
				1	1	Universal Design	Designer to confirm	Design documentation	✓	✓													
				1	0	Green cleaning policy to Green Star performance,	TBC																
				1	0	Pre and post occupancy surveys are performed,																	
				1	0	Training is provided to >80% of contractors that are present on site for more than two days on global warming, climate change, health impacts of minimum building practices, sustainable solutions included in the project, certification and what role they have in certification.																	
Global Sustainability	Project teams may adopt an approved credit from a Global Green Building Rating tool that addresses a sustainability issue that is currently outside the scope of this Green Star rating tools,	30E	Global Sustainability	1																			
Innovation Subtotal				10	4																		
Total				-	61																		

Summary		
Star Rating Option	Points	Stars
Recommended Safety Factor	0	-
4 Star (incl safety factor)	45	4
5 Star (incl safety factor)	60	5
6 Star (incl safety factor)	75	6
Total Credits	61	5

Disclaimer:
This performance pathway has been provided as guidance and for benchmarking purposes only, ACOR Consultants does not endorse the use as a performance pathway for benchmarking purposes per Green Building Council of Australia (GBCA) direction. The performance pathway has been prepared as directed by the client. The performance pathway is not a certified rating, nor is it adopted for a certified rating. ACOR Consultants notes that the credits may not ultimately be achieved and accepts no liability should the benchmarking rating not be achieved.