CUNDALL

2 Hawthorne Place, Burswood

Sustainability Report

SKS Group

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Executive summary

This report outlines the Ecological Sustainable Design (ESD) strategy for the proposed development at 2 Hawthorne Place, Burswood, WA. The project features a new 19-storey building comprising a diverse mix of dwellings, including studio, 1-bedroom, 2-bedroom, 3-bedroom, and 4-bedroom townhouses, totalling 170 private apartments. Additionally, the development includes provisions for office space.

This report outlines how the proposed development aligns with the relevant sustainability credentials in the Town of Victoria Park. The following documents are referred to:

- Local Planning Policy 36 – Climate Control (Energy Efficiency), and
- sections of the Residential Design Codes, Volume 2, 2024 (R-codes).

In addition to meeting these requirements, this development aims to demonstrate its achievement of positive sustainability outcomes to the equivalent standard of a minimum 4-Star Green Star Buildings v1 rated building.

Table 1 below demonstrates how the proposed development responds to these requirements and outlines which sections of this report are relevant for each requirement.

Table 1 Town of Victoria Park's ESD requirements

Requirement will be met	Development must demonstrate that:	Comments
Climate Control (Energy Efficiency) (LPP36)		
✓	c) Dwellings should be sited to gain the maximum benefit from the climate by; ▪ Locating openings to take advantage of cooling summer breezes from the south-west. ▪ Protect west and east facing glazing from direct summer sunlight. ▪ Provide wide eaves, balconies, and adequate foliage. ▪ Pointing internal and external living spaces to the north	Residential openings take advantage of cooling summer breezes through single sided or double-sided natural ventilation. Apartments faces north to gain solar access and are also protected from direct sun from the east and west in the hot summer months. Wide eave and deep balconies are also used to minimise total heat gain during the warmer months of the year. Refer to Section 3.0
✓	e) Developers should limit the extent of paved areas, which can lead to problems of excessive glare and heat rejection.	The project has limited the extent of paved areas. Refer to Section 8.2
✓	f) Permeable ground treatments (e.g. to driveways) should be used wherever possible to minimise rainwater runoff to the street.	The project has included several landscaped and porous areas. Refer to Section 8.1
Residential Design Codes, Volume 2, 2024		
✓	**3.9 Car and bicycle parking**	Bicycle parking will be provided in accordance with recommended rates. Refer Section 6.3.
✓	**4.1 Solar and daylight access**	The development has considered occupant access to natural daylight. Refer Section 2.6

Requirement will be met	Development must demonstrate that:	Comments
✓	**4.2 Natural ventilation**	The development has considered glazing selections to enable natural cross ventilation. Refer Section 2.8
✓	**4.15 Energy efficiency**	Energy efficiency principles are embedded in the design. Refer Section 3.0
✓	**4.16 Water management and conservation**	Potable water conservation has been considered with regards to landscaping and internal water use. Refer Section 4.0
✓	**4.17 Waste management.**	Both construction and operational waste will be managed responsibly during the project. Refer Section 8.0.

Contents

1.0 Introduction 5

1.1 Design Guidelines 5
1.2 Sustainability targets 6

2.0 Indoor environmental quality 7

2.1 Design initiatives 7
2.2 Thermal comfort 8
2.3 Shading devices 8
2.4 Glazing performance 8
2.5 Emissions & toxicity 9
2.6 Natural lighting 9
2.7 Airtightness and thermal bridging 10
2.8 Cross ventilation 11

3.0 Energy efficiency 13

3.1 Design initiatives 13
3.2 NatHERS 13
3.3 Domestic Hot Water 15
3.4 Artificial lighting and controls 15
3.5 Solar photovoltaic (PV) panels 15

4.0 Water Efficiency 17

4.1 Design Initiatives 17
4.2 Water fixtures & fittings 17
4.3 Water-wise landscaping 17
4.4 Drip irrigation 18
4.5 Stormwater management 18

5.0 Building Materials 19

5.1 Design initiatives 19
5.2 Embodied carbon 19
5.3 Ultra-Low VOCs 20

6.0 Transport 21

6.1 Design initiatives 21
6.2 Walkable neighbourhood 21
6.3 Cyclist facilities 21
6.4 Access to public transport 22
6.5 Electric vehicles 24

7.0 Waste management 25

7.1 Design initiatives 25
7.2 Construction and demolition waste 25
7.3 Operational waste management 25
7.4 Composting organic waste strategy 26
7.5 Design for off-site construction 26

8.0 Urban ecology 27

8.1 Enhancing ecological value 27
8.2 Minimising heat island effect 28
8.3 Light Pollution 29

9.0 People 30

9.1 Livable Housing Design 30

10.0 Codes and Ratings 31

10.1 Residential Design Codes (R-Codes) 31
10.2 Livable Housing Guidelines 31
10.3 NatHERS 31
10.4 Green Star 32

11.0 References 33

Appendices

Appendix A Green Star Strategy

Figures

Figure 1.1 3D Render of 2 Hawthorne Place development 5

Figure 2.1 Building design showing shaded glazed facades 8

Figure 2.2 High performance glazing options are considered for the development 8

Figure 2.3 VOCs that result in sick building syndrome 9

Figure 2.4 Tower apartments designed for daylight provisions 10

Figure 2.5 Exemplar continuous airtightness line of building details 11

Figure 2.6 Thermal bridging principle 11

Figure 2.7: Example Podium apartment single-sided and cross-ventilation strategies (Ground Floor and Level 2) 12

Figure 2.8: Typical tower apartment cross ventilation strategy 12

Figure 3.1: NCC 2022 Energy Efficiency Requirements (source: AGWA) 14

Figure 3.2 Comparison of LED lighting with other conventional lighting system 15

Figure 3.3 Rooftop PV system 16

Figure 4.1 Use of hardy natives and drip irrigation system for landscaping 18

Figure 6.1 Project location (highlighted pink), public transport (highlighted red) and nearby amenities (highlighted in blue). 23

Figure 6.2 Global Electric Vehicle Deployment by 2030 24

Figure 7.1 Sample composting scheme 26

Figure 8.1 Aerial photograph of the Hawthorne Place site 2021 27

Figure 8.2 Illustration of the proposed vegetation coverage on Level 03 podium outdoor amenities 28

Figure 8.3 Light and energy usage of external lighting 29

Figure 9.1 Livable Housing (c) Architecture About People 30

Tables

Table 1 Town of Victoria Park's ESD requirements 1

Table 2 Indoor Environment Quality initiatives 7

Table 3 Indoor Environment Quality initiatives 10

Table 4 Energy efficiency initiatives 13

Table 5 Water efficiency initiatives 17

Table 6 Proposed water fittings WELS rating 17

Table 7 Building materials initiatives 19

Table 8 Transport initiatives 21

Table 9 Transport initiatives 21

Table 10 Waste initiatives 25

Table 11: R-Code Livable Housing Design Response 30

Table 12: R-Code Livable Housing Design Target 31

1.0 Introduction

This report outlines the Ecological Sustainable Design (ESD) strategy for the proposed development at 2 Hawthorne Place, Burswood, WA. The project features a new 19-storey building comprising a diverse mix of dwellings, including studio, 1-bedroom, 2-bedroom, 3-bedroom, and 4-bedroom townhouses, totalling 170 private apartments. Additionally, the development includes provisions for office space.

The design has allocated secure storage space for 180 residential bike parks to promote active transport. There are 193 residential parking bays from ground level to level 2 with provision of EV charging infrastructure to be included for a minimum of 20% of all dwellings and visitors bays, as indicated on the architectural layouts. Several apartments are north facing to take full advantage of daytime penetration, while offering large balconies with wide eaves for shading. The proposed development contains 30% Livable Housing “Silver” Level dwellings.

The development landscaping is predominately native vegetation at ground level, a rooftop outdoor garden amenity for residents on Level 03 of the podium, and planters along the façade and vertical planting to help to regulate the building’s microclimate, provide visual comfort, and increase the occupant’s connection to the natural environment.

Figure 1.1 3D Render of 2 Hawthorne Place development

1.1 Design Guidelines

1.1.1 Town of Victoria Park

The purpose of the Town of Victoria Park’s Local Planning Policy 36 – Climate Control (Energy Efficiency) is to ensure that new developments achieve a high degree of sustainability through energy conscious site design.

Strategies such as climate responsive design and water-sensitive design are mentioned in the pursuit of a more sustainable community.

Whilst there isn’t a Green Star certification or equivalency requirement by the council, this development is targeting a design that meets the conditions for a 4-Star Green Star Buildings v1 equivalent standard to exemplify the sustainable strategies they have employed in the development process.

1.1.2 Residential Guidelines

The following codes apply to this development:

- Residential Design Codes Volume 2 2024 (R-codes)
- National Construction Code 2022 (NCC 2022)
- Nationwide House Energy Rating Scheme (NatHERS)
- Livable Housing Guidelines

1.2 Sustainability targets

The development is designed to fulfil the following sustainability targets:

- 4-Star Green Star equivalent standard, against the Buildings v1 rating tool; and
- Minimum 6 Star and average 7.0-Star NatHERS rating or higher for the residential components of the development.
- NatHERS Whole of Home 50 out of 100 (Apartment)
- 20% Livable Housing “Silver” Level

Refer to Section 10.0 Codes and Ratings for further information.

2.0 Indoor environmental quality

The Indoor Environment Quality (IEQ) of a building aims to improve occupants' experience of the space. Sustainable buildings are designed for people and reductions in energy use should never be made at the expense of the occupants' health and wellbeing.

A holistic approach to sustainability will result in multiple benefits both in energy efficiency and encouraging occupant wellbeing.

This can be achieved by improvements to air quality through appropriate ventilation, the provision of high levels of thermal, visual, and acoustic comfort, reduction to occupant stress and the creation of a low-toxicity environment through the reduction of pollutants.

2.1 Design initiatives

The following table summarises the specific initiatives included in the design in relation to Indoor Environment Quality:

Table 2 Indoor Environment Quality initiatives

Design Issue	Design initiative included in the 2 Hawthorne Place design
Thermal comfort	Efficient HVAC design. High-performance building fabric and façade. 2 Apartments per floor (floors 5-18) are south facing, all others are north facing.
Natural ventilation	Natural cross ventilation for at least 67% of the proposed dwellings for the first nine storeys of the building. The open corridor assists air flow to each floor plate. All apartments are capable of cross-ventilation with high- and low-level openings including sliding doors. Individual dwellings maximised to optimise natural ventilation. Natural light and ventilation to lobbies + corridors.
Daylight	Large windows with moderate Visual Light Transmittance (VLT) optimised for sufficient natural daylight. No apartments have a room depth greater than 3 x the ceiling height. 2 Apartments per floor (floors 5-18) are south facing, all others are north facing.
External Views	Good orientation with views to the on-site landscaped gardens/vegetation. Large windows with moderate Visual Light Transmittance (VLT).
Hazardous materials and VOCs	Specification of low VOCs in paints adhesives and sealants. Low formaldehyde in engineered woods. At least 95% of relevant products to comply.
Internal lighting levels	Electrical lighting will have a high colour-rendering index (CRI) (minimum of 80), flicker free. Baffles, translucent diffusers or blinds to minimize glare. Comply with AS1680.1/2 by providing well-lit spaces.
Acoustics	The façade, mechanical design, internal walls and surfaces is going to be designed to achieve compliant internal ambient noise levels, reverberation and acoustic separation between spaces.

2.2 Thermal comfort

An indoor environment that is too hot or too cold can affect mood, performance, and productivity.

To control internal comfort and minimise excessive heat loss in winter and heat gains in summer, several strategies will be investigated for the proposed development:

- Façade design and glass selection are very important; heat gains and losses must be moderated, and thermal bridging should be avoided. Double glazing systems are considered for this development to improve the thermal performance of the building envelope.
- The high-performance glazing will additionally help to manage acoustic aspects of the building. Separated party walls between apartments will also reduce noise impacts from neighbouring flats.
- External shading and operable windows prevent excessive heat gains in summer.
- As most apartments receive direct sunlight between 9am & 3pm, excessive heat loss in winter is avoided.
- South facing apartments are reduced (target of only 2 per floor for floors 5-20).

2.3 Shading devices

Shading is a critical component of the building design. Large overhangs, both vertical and horizontal, should be incorporated, and the north facing glazing should aim to reduce the amount of direct solar radiation for all times during the year. The development provides shading to the glazed facades by means of extended floor plates, shading, operable windows, and semi-enclosed balconies.

Figure 2.1 Building design showing shaded glazed facades

2.4 Glazing performance

The proposed high-performance glazing provides solar control to prevent summer heating while allowing useful passive solar heating in winter. The low U-value of the glazing would minimise the conductive loss or gain. These result in an improved thermal comfort, improved energy rating of apartments as well as a reduced overall carbon footprint of the development.

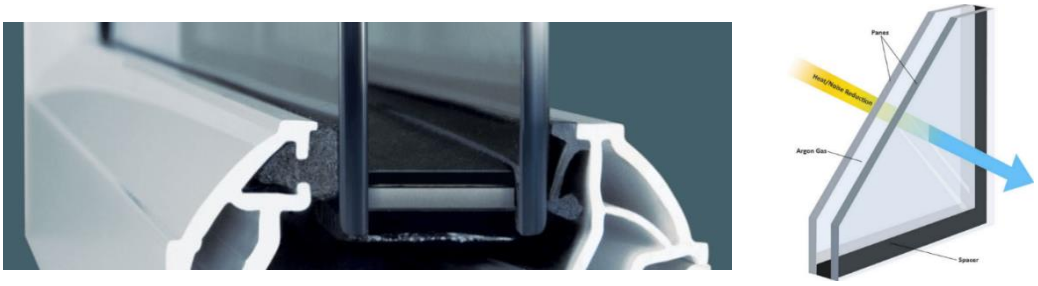

Figure 2.2 High performance glazing options are considered for the development

2.5 Emissions & toxicity

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

The development will aim to specify materials with low emissions content including low-VOC and low formaldehyde content to avoid contaminating the indoor air. 50% of internal paints will be specified as ultra-low VOC.

Figure 2.3 VOCs that result in sick building syndrome

2.6 Natural lighting

The R-codes highlight the importance of daylight for occupants. Regular and adequate daylight is essential for users' wellbeing, connection to the outdoors, and for energy efficiency. However, excessive daylight can cause glare which is a major IEQ concern and must be avoided. The development is designed to maximise daylight in every living space by incorporating large sliding doors leading to balconies and full-height windows. Additionally, shading devices are proposed to minimise glare and enhance comfort.

The following design opportunities are considered throughout the detailed design process to maximise the daylighting potential:

- Given the extent of proposed glazing, glass with a moderate visual light transmittance (VLT) will allow sufficient daylight to penetrate the space.
- Light internal colours improve indoor lighting levels.

Additionally, all lighting in external areas of the development will comply with AS 4282:1997 as to reduce the obtrusive effects of external lighting.

A solar access assessment has been undertaken to check for full, partial or no sun penetration for levels GF-3 (podium), 4-10 (tower lower), 11-14 (tower mid) and 15-19 (tower top) at 9am, 12noon and 3pm intervals on 21st June. The results

for the tower are indicated in figure below. The assessment calculated the compliance for solar access as per the table below.

Table 3 Indoor Environment Quality initiatives

Level of Solar Access	Definition	Number of Dwellings	Percent
Full Solar Access	Living and private open space receives 2hrs direct sunlight between 9am and 3pm on 21 June	125	74%
Partial Solar Access	Dwelling receives direct sunlight between 9am and 3pm on 21 June	29	17%
No Solar Access	Dwelling receives no direct sunlight between 9am and 3pm on 21 June	16	9%

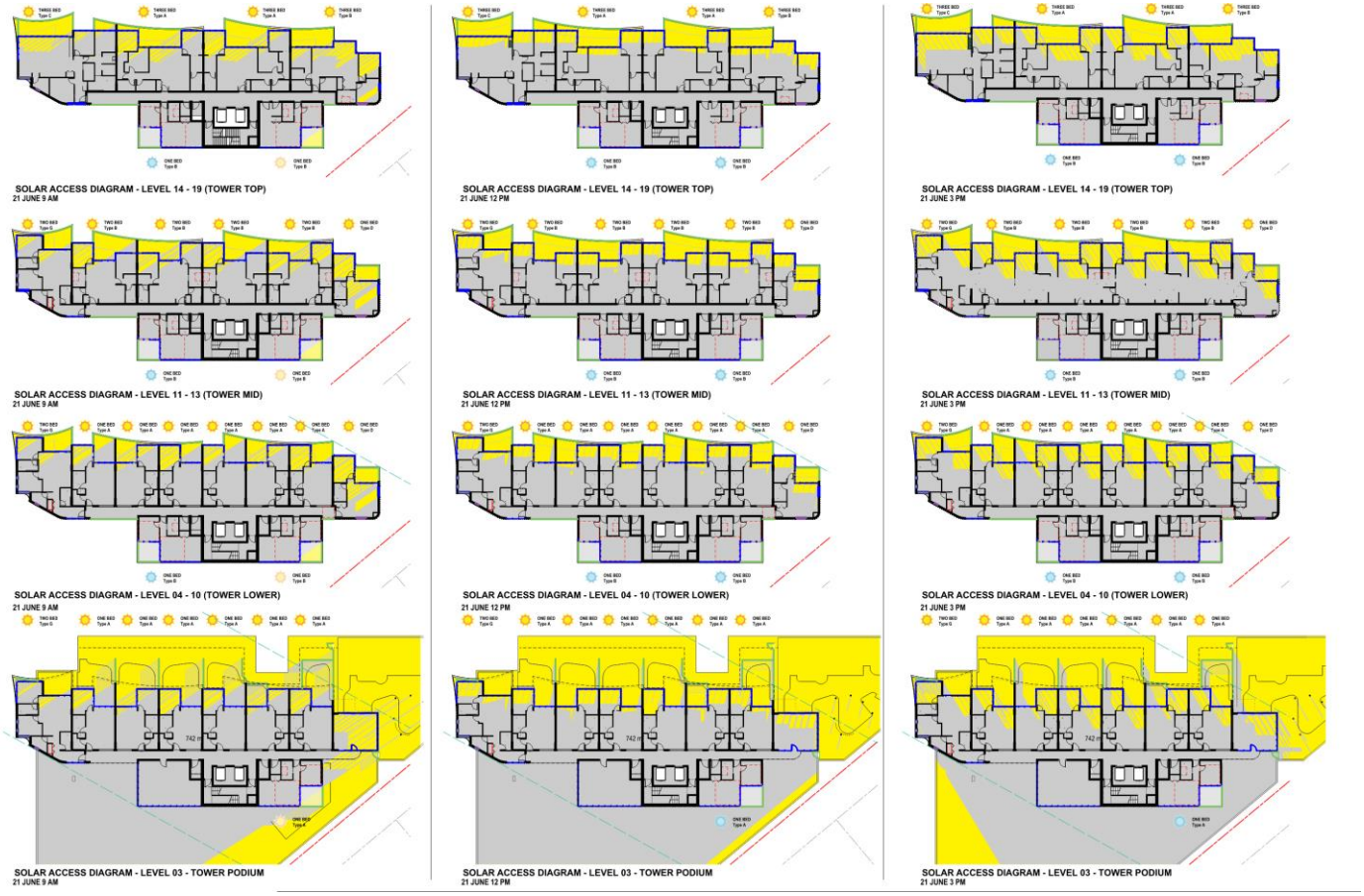

Figure 2.4 Tower apartments designed for daylight provisions

2.7 Airtightness and thermal bridging

Airtightness is the fundamental building property that impacts infiltration and exfiltration - the uncontrolled inward and outward leakage of outdoor air through cracks, interstices, or other unintentional openings of a building, caused by pressure effects of the wind and/or stack effect.

The development will be designed with airtightness in mind for architectural detailing and specification to limit air leakage from the building envelope elements such as glazing systems and external walls.

Similarly, thermal bridging is the transference of heat through a wall at a point through which it can bypass the insulating layers of the structure. It is through these points in a building's envelope that they can experience unwanted heat gains and/or losses and as such will be considered when designing for sustainability and energy efficiency.

The architectural and structural detailing on the project will consider the issue of thermal bridging and will apply design principles to avoid unwanted heat losses or gains wherever possible through thermal breaks and other measures.

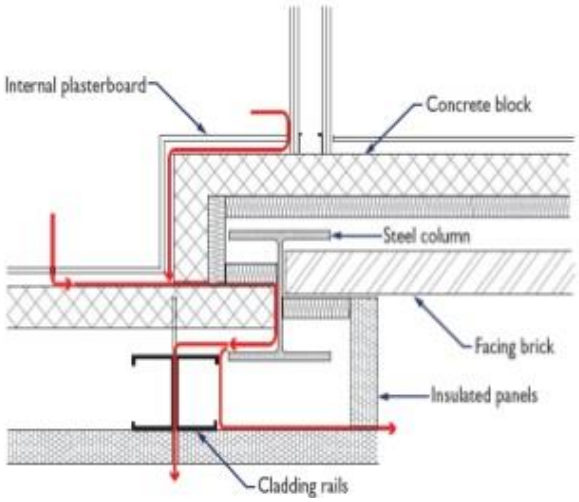

Figure 2.5 Exemplar continuous airtightness line of building details

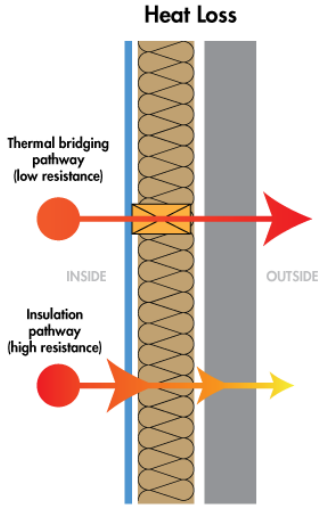

Figure 2.6 Thermal bridging principle

2.8 Cross ventilation

The R-codes note that natural ventilation is the movement of a sufficient volume of fresh air through a dwelling to refresh indoor air. It is best achieved by apartments that have more than one aspect with direct exposure to the prevailing winds, or with windows located in significantly different pressure regions.

The development has considered methods to maximise the number of apartments with natural ventilation. This has been achieved by including operable glazing units in distinct locations throughout apartments to enable signification fresh air to enter select apartments.

All living rooms and bedrooms in the apartments are designed with operable glazing to enable natural ventilation. Additionally, all apartments do not exceed a room width greater than 3 x the ceiling height in accordance with best practice ventilation guidelines. The figures below illustrate the cross and single-sided natural ventilation strategies for typical apartment layouts.

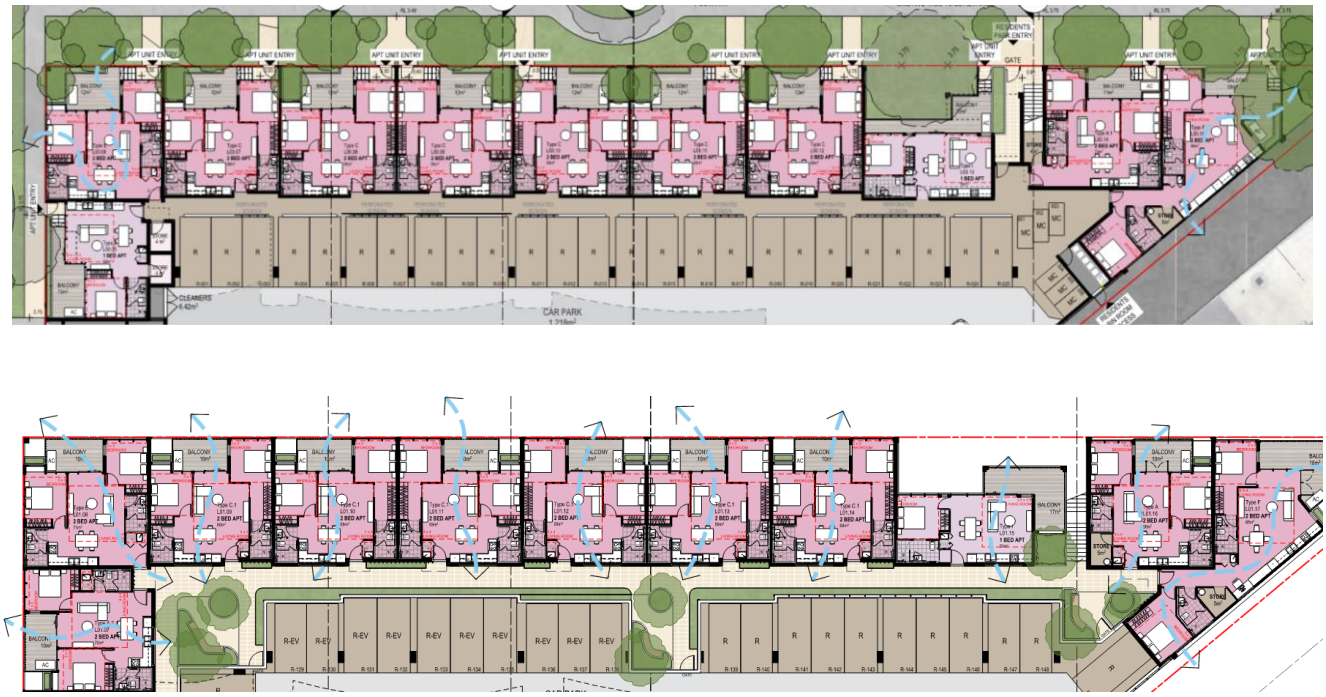

Figure 2.7: Example Podium apartment single-sided and cross-ventilation strategies (Ground Floor and Level 2)

Figure 2.8: Typical tower apartment cross ventilation strategy

3.0 Energy efficiency

The R-codes highlight that air-conditioning, water heating and lighting account for the majority of energy use in a typical apartment. Early design decisions to improve thermal performance and select energy efficient fixtures can therefore have a significant impact on energy use.

The following sections set out design strategies utilised for this development to reduce the building's energy demand and greenhouse gas emissions. Several of these initiatives are significant energy efficiency initiatives that exceed minimum practice, as recommended in the R-codes.

3.1 Design initiatives

The following table summarises the specific initiatives included in the design in relation to energy efficiency:

Table 4 Energy efficiency initiatives

Design Issue	Design initiative included in the 2 Hawthorne Place design
Building fabric enhanced over NCC requirements	High-performance fabric and insulation. Minimum NatHERS of 6 stars and average NatHERS of 7.0 stars or above. Whole of Home NatHERS 50 out of 100.
Operating energy and peak demand reduction	High efficiency building services. High-performance building fabric and glazing.
On-site energy generation	Installation of solar PV array for common energy use.
Energy sub-metering	Separate sub-metering for each tenant for energy and water. Smart metering installed.
Air leakage	The building will be designed and built with airtightness in mind.
Lighting efficiency	All lighting will be LED, low energy lighting with high CRI. Target lighting power density reduction by at least 10%.
Ventilation and air-conditioning	Natural ventilation is achieved in >65% of apartments Energy-efficient HVAC will be installed. Air conditioning equipment will be at least 3-star as per AS 3823.2-2011.
Appliances and equipment	All appliances installed will be energy and water efficient. Appliances to have a minimum Energy Star rating of 1-star below the maximum.
Hot Water System	Electricity-based hot water systems (centralised or individual to be confirmed).

3.2 NatHERS

The Nationwide House Energy Rating Scheme (NatHERS) is a tool to assess the energy usage of residential dwellings. For a multi-residential development, every apartment is investigated as a separate unit with its own rating before an overall average rating is calculated. The NatHERS tool considers a wide range of parameters like orientation, glazing, insulation, size of rooms and door openings, shading and awnings and ceiling fans.

Under NCC 2022 new apartments will have to meet an average rating of 7 stars for all apartments (with no apartment under 6 stars), and a Whole of Home rating of 50 (out of 100).

3.2.1 Whole of Home Assessment

Whole of Home assessment is a new concept introduced in NCC 2022. It considers the energy used by heating, cooling, cooking and plug-in appliances as well as hot water systems, lighting and pool and spa equipment, alongside the existing thermal star rating. NCC 2022 requires all apartments to meet a Whole of Home rating of 50 (out of 100) each. For context, a poor energy performing dwelling would be under 40, while a score of 100 is a net zero energy value home.

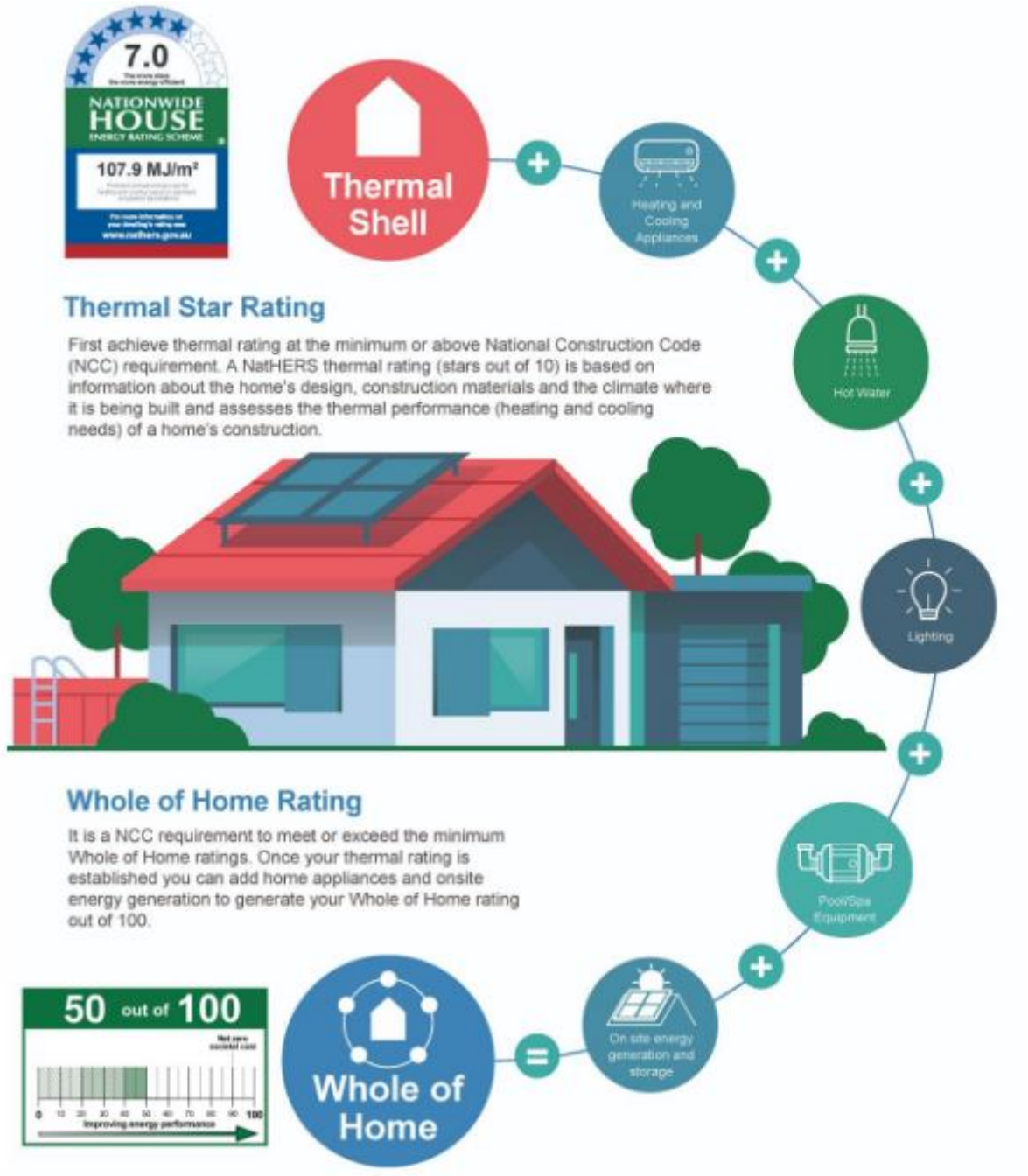

Figure 3.1: NCC 2022 Energy Efficiency Requirements (source: AGWA)

3.3 Domestic Hot Water

Domestic hot water is one of the highest energy use within the home. There are a few efficiency measures that will be considered as part of the design:

- Maximum water flow rates on showers (7.5L/min), kitchen taps (7.5L/min) and hand basing taps (6L/min)
- All hot water pipes outside of the sole-occupancy units are insulated with a minimum R-value of 2.0
- All hot water pipes inside sole-occupancy units are insulated with a minimum R-value of 0.5
- Electric heat pumps with a minimum COP of 3.0 at 20°C ambient and 65°C leaving temperature

To achieve the NatHERS Whole of Home assessment, the development will consider electric heat pump hot water options. Instantaneous hot water will cannot be considered, as this will not achieve the energy efficiency performance requirements.

3.4 Artificial lighting and controls

It will be considered to specify all light fittings as LED fittings including lighting in the 'communal' corridors, stairwells, garage, and external lighting. All common area lighting will incorporate light controls such as occupancy sensing (PIRs) and time switch to reduce lighting consumption when lighting is not required. The development will target a lighting power density reduction by at least 10%.

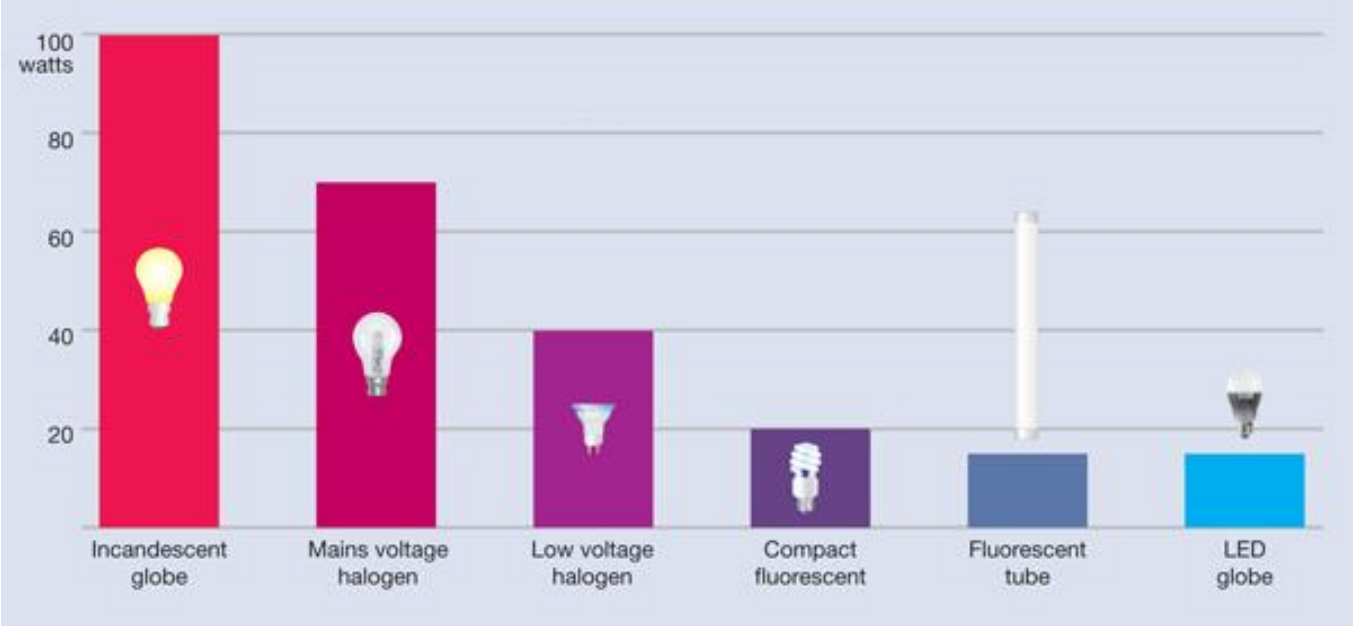

Figure 3.2 Comparison of LED lighting with other conventional lighting system

3.5 Solar photovoltaic (PV) panels

Solar Photovoltaic (PV) panels will be installed on site to supply power for the common area lighting and services, including corridors, stairwells, and parking. The roof will be installed with an initial array of 25kWp, with allowance for future expansion of the array. This should reduce the peak electricity demand of the building and help reduce energy consumption.

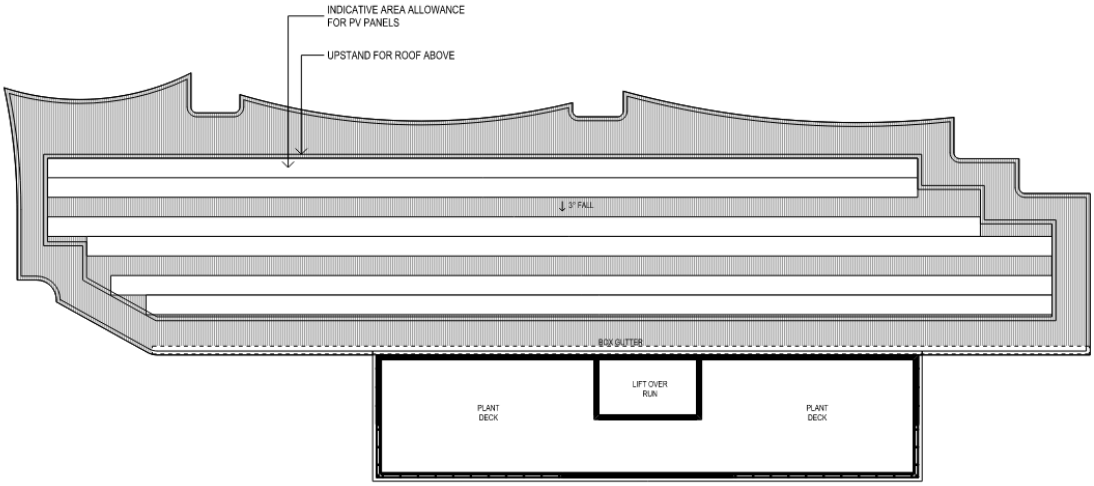

Figure 3.3 Rooftop PV system

4.0 Water Efficiency

The R-codes highlight planning and design of multiple dwelling development should consider the water cycle and incorporate effective water management techniques.

A reduction of water usage does not only alleviate pressure from the local water supply but also means reduced costs of living in WA. The following sections set out design strategies utilised for this development to reduce the building's water consumption.

4.1 Design Initiatives

The following table summarises the specific initiatives included in the design in relation to water efficiency:

Table 5 Water efficiency initiatives

Design Issue	Design initiative included in the 2 Hawthorne Place design
Potable water consumption	All water fittings and fixtures to be water efficient. All fixtures are to be at least within one star of the maximum WELS rating.
Landscape irrigation	All landscape irrigation will be subsoil drip irrigation with moisture sensing override.

4.2 Water fixtures & fittings

Occupant consumption is a major contributor to potable water usage. The following water fixture WELS ratings will be considered to ensure the efficient use of potable water by building occupants (must be within 1-star).

Table 6 Proposed water fittings WELS rating

Fixture / Fitting Type	WELS Rating	Maximum Flow Rates
Taps	5-star	
Kitchen[+]		7.5L/min
Hand basins[+]		6L/min
Urinals (where applicable)	6-star	-
Toilets	4-star	-
Showers[+]	4-star	7.5L/min
Clothes Washing Machine	4-star	-
Dishwasher	5-star	-

[+] To meet energy efficiency requirements for domestic hot water

4.3 Water-wise landscaping

This development should consider creating a water-wise landscape, made up of hardy natives and other low-water vegetation. The proposed plans feature over 2,000 m² of landscaped area, incorporating low-water and native plantings. Reintroducing native species can enhance local biodiversity, while the reduced water usage can significantly lower costs for residents.

4.4 Drip irrigation

A major amount of potable water usage goes back to landscape irrigation. To reduce the amount of water used for the landscaped areas on the ground floor, promenade and podium level terrace, a drip system with moisture sensor control will be installed for irrigation in lieu of sprinklers.

Figure 4.1 Use of hardy natives and drip irrigation system for landscaping

4.5 Stormwater management

Stormwater is precipitation runoff over ground-level surfaces that does not soak into the ground but has not entered a waterway such as a stream or a lake. Best practice urban design calls for the natural infiltration of stormwater in the built environment. This helps to restore the natural water cycle, whilst reducing damage associated with excessive runoff.

The use of vegetated and porous areas also algins with LLP36, which recommends inclusion of porous areas.

The development includes landscaped areas at the ground plane, level 3 podium rooftop amenities and other landscaped pockets within the podium design which will assist with the overall stormwater management on the site.

5.0 Building Materials

Buildings consume considerable natural resources in their construction, operation, and demolition. This section of the report will provide details about the potential impacts caused by the building and how these impacts have been reduced when compared to typical buildings of this nature. The building will aim to reduce the total embodied energy and carbon considered in the construction and then aim to maximise the operational efficiency of the buildings services to provide and enhance tenant provisions for the minimum amount of energy and water. Furthermore, methods for maintaining operational efficiency over the life of the building will be investigated to ensure that the benefits are maximised over the life of the building.

5.1 Design initiatives

The following table summarises the specific initiatives included in the design in relation to building materials:

Table 7 Building materials initiatives

Design Issue	Design initiatives
Embodied carbon in the building materials	The building design and material selection will reduce the extent of environmental impact as much as possible.
Sustainable timber	The target is for most of the timber used in the building and construction to come from sustainable sources or be reused.
Permanent formwork, pipes, ducts, cables	PVC products will meet Best Practice Guidelines for PVC. Target is at least 90% of all PVC products are to meet Best Practice Guidelines for PVC.

The design team will actively target a reduced carbon footprint during construction and embodied energy within building materials. Timber used for construction works is targeted to be either certified as responsibly sourced or recycled material.

5.2 Embodied carbon

In addition to greenhouse gas emissions from building operations like electricity and water usage, carbon and carbon equivalent gases are also released during the production and delivery of construction products and materials.

For example, to produce Portland cement, a main ingredient in concrete, raw materials are crushed and then heated to over 1400 degrees Celsius. This requires a significant amount of energy and emits large amounts of greenhouse gases during this production process. These gases are accounted as carbon equivalents in form of 'embodied carbon' in a building.

The following measures will be considered throughout the design development to reduce the amount of embodied carbon:

Sub-structure

- Maximise recycled content of materials in structural components.

Super-Structure

- Maximise recycled content in concrete and formwork;
- Use of lightweight and reusable materials where possible.

Envelope

- Adopt a low-carbon, lightweight approach;
- Consider necessity of massing elements;
- Consider composite materials or dual function elements;

- Considering the use of recycled materials

Internal Walls

- Consider necessity of internal walls;
- Consider recycled content or reused materials;
- Consider low carbon steel framing;
- Designing for flexibility and future-proofing to reduce renovation efforts.

Internal Finishes

- Consider setting a recycled content target for all finishes;
- Consider long life and highly durable finished is areas of high foot traffic;
- Considering Carbon Neutral certified products.

5.3 Ultra-Low VOCs

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

The development will aim to specify materials with a low emissions content including ultra-low-VOC paints. At least 50% of paints used will achieve the ultra-low VOC requirements.

6.0 Transport

Sustainable projects facilitate a reduction of the dependency of occupants on private car use as an important means of reducing overall greenhouse gas emissions. The use of motor vehicles directly contributes to climate change in two ways; through the high amounts of energy required to produce cars and build and maintain supporting road transport infrastructure and services; and the direct emissions that result from car operations.

If reliance on individual motor vehicle transportation is to be reduced, it is necessary to maximise alternative transportation options. This may include initiatives that encourage and make possible the use of mass transport options, cycling or walking, and the selection of sites that are close to a large number of amenities.

6.1 Design initiatives

The following table summarises the specific initiatives included in the design in relation to transport:

Table 8 Transport initiatives

Design Issue	Design initiative
Providing bike storage	1 bicycle parking bay per apartment and 1 additional bicycle parking bay for visitors.
Low emission vehicle infrastructure	Car parking bays and infrastructure for Electric Vehicles (EV) will be provided. Provision for EV charging infrastructure for a minimum 20% of all dwellings and all visitors bays. Charging bays for electric bicycles provided.
Improving pedestrian spaces	The building provides excellent access to amenities such as, cafes and bars. Many other amenities are less than 500m away from the site.

6.2 Walkable neighbourhood

The proposed development is located at a convenient walking distance to Woolworths, cafes, a seafood market, a gym, the swan river, several parks, and multiple public transport bus stops. The development will also include private amenities for the residents such as a community garden and gym, and retail on the ground floor.

The proximity to these amenities would help the residents to avoid using private vehicles. The location of these nearby attractions is detailed in the figure below, in which the pink box represents the proposed development site, blue boxes indicate nearby attractions/amenities and red highlights nearby bus stops.

6.3 Cyclist facilities

The bicycle parking R-code requirements and proposed quantity are outlined in the below table for residents and visitors.

The development includes cycle storage facilities for the residents. Visitors bike racks will be provided in an accessible location. Furthermore, cycling will encourage an active and healthy lifestyle for the residents.

Table 9 Transport initiatives

Parking types	Occupant Type	R-Code Requirement	Proposed Design
Bicycle parking	Resident	0.5 spaces per dwelling	1 space per dwelling
	Visitor	1 space per 10 dwellings	1 space per 10 dwellings

6.4 Access to public transport

With its location in Burswood, the proposed development is in close proximity to several public bus routes as detailed in the figure below. The closest bus stop is just 300m away which can be easily accessed by foot or bicycle. This bus then takes 2 minutes to reach Burswood station, where a train can be taken to get to Perth Underground. Another bus stop, 550 m away, takes 18 minutes by bus to reach Elizabeth Quay Train station.

Figure 6.1 Project location (highlighted pink), public transport (highlighted red) and nearby amenities (highlighted in blue).

6.5 Electric vehicles

The proposed development intends to support the uptake of low-emissions and electric vehicles. Provisions are provided for EV charging infrastructure for a minimum 20% of all dwellings and all visitors bays.

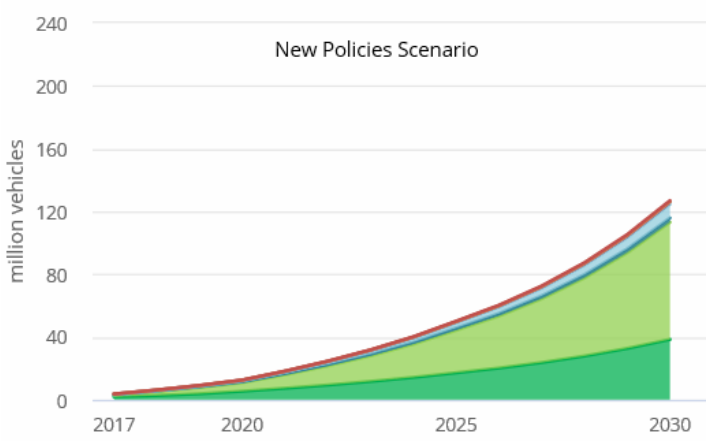

Figure 6.2 Global Electric Vehicle Deployment by 2030

7.0 Waste management

The main objectives for the waste management strategies for construction and operational waste are to ensure that waste is avoided and recycled during design, construction, and operation.

Waste within a building construction context can be avoided by encouraging the selection of lower-impact and long-term materials. Operational waste to landfill can be reduced by providing relevant and easily accessible facilities for recyclable waste and other waste that can be diverted from landfill such as organic waste, batteries or e-waste.

7.1 Design initiatives

The following table summarises the specific initiatives included in the design in relation to waste management:

Table 10 Waste initiatives

Design Issue	Design initiative
Construction waste	Provisions for the separation of waste streams will be provided on site for the development.
Operational waste management	An Operation Waste Management Plan will be prepared during detailed design. Requirements will be synchronised with architectural documents. Waste compactor will be considered to reduce the number of bins from the site and reduce overall area of bin storage.

7.2 Construction and demolition waste

Provisions for the separation of waste streams will be provided on site for the development. The project will also target an 80% diversion from landfill during the construction phase, in accordance with the Green Star strategy.

7.3 Operational waste management

A dedicated waste storage area will be provided for the separation and storage of recyclable waste during operation, allowing for the different waste streams to be separated to match the local recycling scheme. At least three streams will be covered including landfill, recycling and a third stream which may be organic/food waste.

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

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

7.4 Composting organic waste strategy

The development should explore the possibility of recycling all forms of food and organic waste by identifying waste streams and incorporate a strategy that reduces food or organic waste going to landfills. Supporting schemes such as Kooda provides composting bins in a central location and then pick up the waste to produce compost.

Figure 7.1 Sample composting scheme

7.5 Design for off-site construction

Prefabricated construction methods considered to be more energy and waste efficient because production processes can be better controlled and made more efficient in the factory than on site, for example; better machinery, less cut-offs, better reuse of materials, material cycles, etc.

8.0 Urban ecology

The Residential Design Codes (2024) note that trees and gardens make a significant contribution to the ecology, character and amenity of neighbourhoods. They provide habitat for fauna, shade, stormwater management and micro-climate benefits, as well as improve apartment outlook and privacy.

The development will ensure landscaped areas are included where possible, and contribute to the local ecology, character, and amenity.

8.1 Enhancing ecological value

The site was previously undeveloped. The aerial photo from 2021 below (Figure 8.1 Aerial photograph of the Hawthorne Place site 2021) illustrates the previous condition of the site.

The previous state of the site will be greatly improved upon as a result of the landscaping proposed in the project at the ground plane, level 3 podium rooftop amenities and other landscaped pockets within the podium design. Before and after images are provided below as an indication of the potential enhancement of the site's environmental values.

Figure 8.1 Aerial photograph of the Hawthorne Place site 2021

Figure 8.2 Illustration of the proposed vegetation coverage on Level 03 podium outdoor amenities

8.2 Minimising heat island effect

The heat island effect describes the condition where urban areas have a higher average temperature than its rural surroundings owing to the make-up of the built environment.

The use of light roof materials combined with shaded and landscaped areas at the ground plane, level 3 podium rooftop amenities and other landscaped pockets within the podium design, can reduce the heat island effect significantly and contributes to further energy savings.

The reduction of paved areas is a key recommendation in both LPP36 and the R-codes.

Figure 8.3 Design ideas included in the development – gardens, lighter coloured paving and landscaping

8.3 Light Pollution

Light pollution is an environmental issue that is becoming more of a problem every year as cities continue to grow in size and density.

Excessive amounts of light being projected upwards is not only a waste of energy and resources but has also been proven to make a negative impact on the local wildlife.

The project targets to have at least 95% of all external light fittings pointing downwards, mitigating the effects of light pollution.

Figure 8.3 Light and energy usage of external lighting

9.0 People

9.1 Livable Housing Design

Figure 9.1 Livable Housing (c) Architecture About

A livable home is designed and built to meet the changing needs of occupants across their lifetime. Livable homes include key easy living features that make them easier and safer to use for all occupants including people with disability, ageing Australians, people with temporary injuries, and families with young children. All Australians benefit from homes designed with comfort, safety and ease of access as core design features. These features make the home easier for parents to manoeuvre prams, easier to carry the shopping into the house, easier for people with disability or temporary injury to get around and easier to move furniture. These same features enable key living spaces to be more easily, and cost effectively adapted to meet the changing needs and abilities of home occupants such as ageing baby boomers and people who have or acquire disability.

Table 11: R-Code Livable Housing Design Response

	Total Dwellings	R-Code Target	Proposed Design
Silver Level Compliant Dwellings	170	20% (34 Dwellings)	30% (51 Dwellings)

10.0 Codes and Ratings

The building will be subject to voluntary and mandatory building codes and metrics to measure the performance of the rating. This section of the report outlines the main codes and ratings and identifies the project's response.

10.1 Residential Design Codes (R-Codes)

The purpose of the R-codes are to provide a comprehensive basis for the control of residential development throughout Western Australia.

The Volume relevant for this project is Volume 2, which provides planning and design standards for residential apartments (multiple dwellings) in high density coded areas (R80 and above and R-AC). There are specific requirements for daylight, ventilation, car parks, bicycle storage, universal and electrical vehicle (EV) charging infrastructure that are relevant to this project.

10.2 Livable Housing Guidelines

The Livable Housing Design Guidelines provide useful information for consumers seeking to introduce livable design features into a new home or could be readily applied within an existing home during renovation or refurbishment. The Guidelines describe livable design elements. Each element provides guidance on what performance is expected to achieve LHA's Silver, Gold or Platinum level accreditation.

The project is committed to 20% of dwellings to 'Silver' level as defined by the Livable Housing Guidelines. The project will meet or exceed this requirement.

Table 12: R-Code Livable Housing Design Target

	R-Code Target
Silver Level Compliant Dwellings	20%

10.3 NatHERS

Residential building compliance is achieved through a thermal modelling process defined as the Nationwide House Energy Rating Scheme (NatHERS). This process requires a minimum star rating to be achieved for the building's thermal comfort, which informs the energy efficiency of the building.

The NatHERS tool considers a wide range of parameters like orientation, glazing, insulation, size of rooms and door openings, shading and awnings and ceiling fans. The recent change to NCC 2022 includes a Whole of Home assessment that will also consider heating, cooling, domestic hot water and other high energy demands within the home.

Under NCC 2022 new apartments will have to meet an average rating of 7 stars for all apartments (with no apartment under 6 stars), and a Whole of Home rating of 50 (out of 100). This exceeds the current R-code requirements and will therefore be proposed as the minimum performance energy performance for the development.

Table 10 NatHERS targets

	Minimum NCC Requirement	R-Codes Requirement	Target for the proposed development
Worst case NatHERS rating	6 Stars	5.5 Stars	6 Stars
Overall average NatHERS rating	7 Stars	6.5 Stars	7 Stars
Whole of Home	50 out of 100	-	50 out of 100

10.4 Green Star

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

A 4-star Green Star equivalent standard requires a total of 15 points to be achieved in total. Sufficient weighted credits have been selected to achieve this requirement rating, and further opportunities will be pursued during the design stages of the project.

Based on the proposed design response, the predicted performance in each respective environmental category is tabulated in the Scorecard in ***Appendix A***. The sustainability strategy of this development demonstrates how the development is proposing to achieve the 4-star Green Star benchmark.

Table 10 Green Star target

Total available points	Minimum points required for 4-star rating	Points target for the proposed development
100 Points	15 points	**17 points (4-star with a 13% buffer)**

11.0 References

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Appendix A Green Star Strategy

Please see overleaf.

Please note the Green Star strategy is a live document, and that Credit substitutions may occur provided the overall requirement of 15 points is still met.

greenstar Buildings

Submission planner

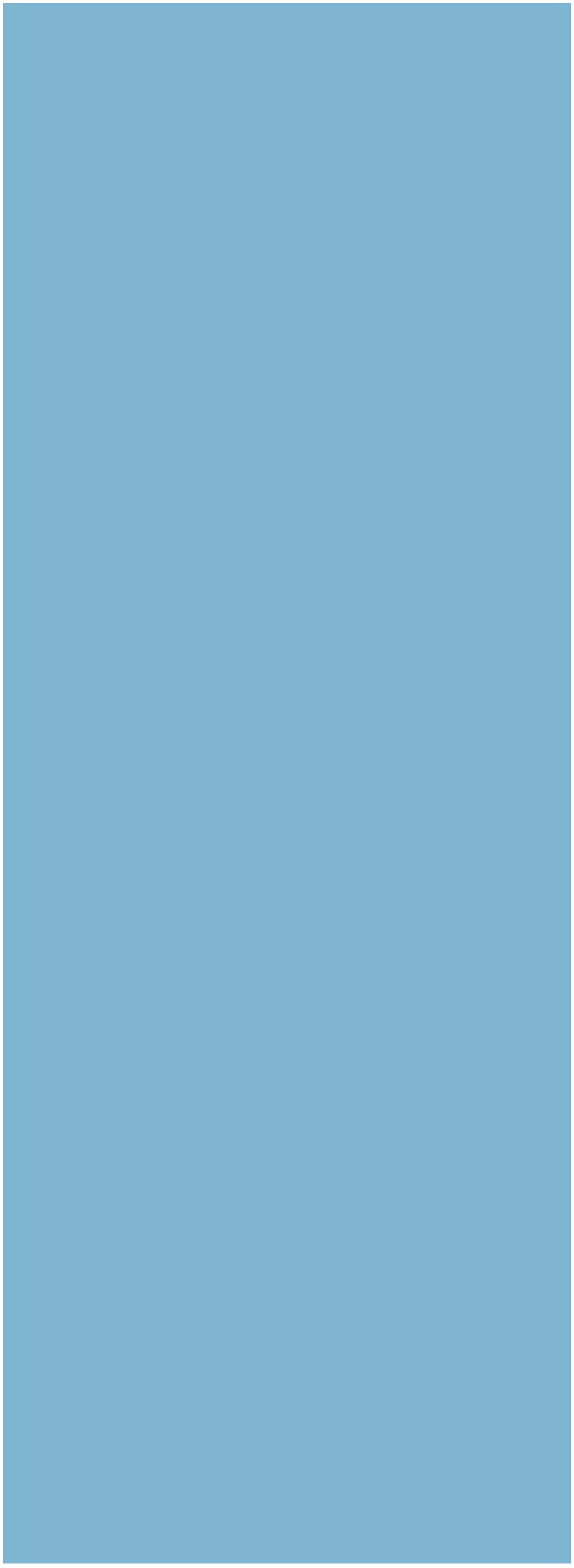
Minimum points required
4 Star: 15 points
5 Star: 35 points
6 Star: 70 points

Summary

Registering from	2023 onwards		
Net zero carbon in operations targeted	No	**Targeted Green Star rating**	4 Star
Minimum expectations met	Yes	**Core points targeted**	17
Credit Achievement points targeted	17	**Leadership points targeted**	0
Exceptional Performance points targeted	0	**Total points targeted**	17

	Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted	Comments
	Responsible				**17**			
1	Industry Development	-	1	-	**1**	Credit Achievement	**1**	**Credit:** The building owner or developer appoints a Green Star Accredited Professional, discloses the cost of sustainable building practices to the GBCA, and markets the building's sustainability achievements.
2	Responsible Construction	•	1	-	**1**	Credit Achievement	**1**	**Min:** The Contractor has an EMS & EMP in place to manage impacts on site. Divert at least 80% of construction & demolition waste from landfill. The Contractor provides training on the sustainability targets of the building. **Credit:** 90% of construction and demolition waste is diverted from landfill, and waste contractors and facilities comply with the Green Star Construction and Demolition Waste Reporting Criteria.
3	Verification and Handover	•	1	-	**1**	Minimum Expectation	•	**Min:** The building has been commissioned and will be tuned, set up for optimum ongoing management (metering and monitoring). The project team create and deliver O&M information to the FM team at the time of handover. Information is available to building users on how to best use the building. **Credit:** Independent verification for commissioning and tuning through ICA or soft landings approach that involves the future FM team. For large projects both must occur.
4	Operational Waste	•	-	-	**0**	Minimum Expectation	•	**Min:** Demonstrate the building is designed to allow effective management of operational waste by: separating waste streams; dedicated and adequately sized waste storage area; and ensuring easy and safe access to waste storage areas for both occupants and waste collection contractors.
5	Responsible Procurement	-	1	-	**1**			**Credit:** The building's design and construction procurement process follows ISO 20400 Sustainable Procurement - Guidance and at least one identified supply chain risk and opportunity is addressed.
6	Responsible Structure	-	3	2	**5**			**Credit:** 80% of all structural components (by cost) meet a Responsible Products Value (RPV) score of at least 10. **Exceptional:** Credit plus either: 10% of all products in the structure (by cost) meet a RPV score of at least 15, OR 30% of all products in the structure (by cost) have an average RPV score of at least 12.
7	Responsible Envelope	-	2	2	**4**			**Credit:** 60% of all building envelope components (by cost) meet a Responsible Products Value (RPV) score of at least 10. **Exceptional:** Credit plus either: 10% of all products in building envelope (by cost) meet a RPV score of at least 15, OR 25% of all products in the building envelope (by cost) have an average RPV score of at least 12.
8	Responsible Systems	-	1	1	**2**			**Credit:** 20% of all active building systems (by cost) meet a Responsible Products Value (RPV) score of at least 6. **Exceptional:** Credit plus either: 5% of all active building systems (by cost) meet a RPV score of at least 11, OR 15% of all active building systems (by cost) have an average RPV score of at least 8.
9	Responsible Finishes	-	1	1	**2**			**Credit:** 60% of all internal building finishes (by area) meet a Responsible Products Value (RPV) score of at least 7. **Exceptional:** Credit plus either: 10% of all internal building finishes (by area) meet a RPV score of at least 12, OR 20% of all internal building finishes (by area) have an average RPV score of at least 9.
						Total	**2**	
	Healthy				**14**			
10	Clean Air	•	2	-	**2**	Credit Achievement	**2**	**Min:** Levels of indoor pollutants are maintained at acceptable levels, a high level of fresh air is provided and Pollutants entering the building are minimised. **Credit:** The building's ventilation systems allow for easy maintenance and high levels of outdoor air are provided.
11	Light Quality	•	2	2	**4**	Credit Achievement	**2**	**Min:** Lighting within the building meets minimum comfort requirements, good lighting levels suitable for the typical tasks in each space are available, and the building provides adequate levels of daylight. **Credit:** The building provides either best practice Artificial Lighting or best practice access to daylight. **Exceptional:** The building provides both best practice Artificial Lighting and best practice access to daylight.
12	Acoustic Comfort	•	2	-	**2**	Minimum Expectation	•	**Min:** An Acoustic Comfort Strategy is prepared to describe how the building and acoustic design aims to deliver acoustic comfort to the building occupants. **Credit:** Depending on the building typology achieve 2 to 4 of the acoustic critera: maximum internal noise levels; minimum internal noise levels; provides acoustic separation; minimises impact noise transfer; and/or is designed with reverberation control.
13	Exposure to Toxins	•	2	-	**2**	Minimum Expectation	•	**Min:** The building's paints adhesives, sealants, carpets, and engineered wood products are low in TVOC and formaldehyde or non-toxic. Occupants are not exposed to banned or highly toxic materials in the building. **Credit:** On-site tests verify the building has low Volatile Organic Compounds (VOC) and formaldehyde levels.
14	Amenity and Comfort	-	2	-	**2**	Credit Achievement	**2**	**Credit:** The building has dedicated amenity rooms to act as parent room, a relaxation room, or an exercise room.
15	Connection to Nature	-	1	1	**2**	Credit Achievement	**1**	**Credit:** The building provides views, includes indoor plants, and incorporates nature-inspired design OR 5% of the building's floor area or site area (whichever is greater) is allocated to nature in which occupants can directly engage with. **Exceptional:** The building provides both credits options.
						Total	**7**	
	Resilient				**8**			
16	Climate Change Resilience	•	1	-	**1**	Minimum Expectation	•	**Min:** The project team completes the climate change pre-screening checklist and communicates the building's exposure to climate change risks to the applicant. **Credit:** The project team develops a project-specific climate change risk and adaptation assessment for the building. Extreme and high risks are addressed.
17	Operations Resilience	-	2	-	**2**			**Credit:** A comprehensive review of future building operational shocks and stresses are undertaken. Building design and future operational plan addresses high or extreme system-level interdependency risks and level of survivability in a blackout.
18	Community Resilience	-	1	-	**1**			**Credit:** The project team undertakes a needs analysis of the community, identifies shocks and stresses that impact the building's ability to service the community, and develops responses to manage these.
19	Heat Resilience	-	1	-	**1**	Credit Achievement	**1**	**Credit:** At least 75% of the whole site area comprises of one or a combination of strategies that reduce the heat island effect.

20	Grid Resilience	-	3	-	**3**			**Credit:** The project meets one or several of: (1) active generation and storage systems, (2) demand response strategy, or (3) reduced electricity consumption through passive design.
						Total	**1**	
Positive					**30**			
21	Upfront Carbon Emissions	•	3	3	**6**	Credit Achievement	**3**	**Min:** The building's upfront carbon emissions are at least 10% less than those of a reference building. **Credit:** The building's upfront carbon emissions are at least 20% less than those of a reference building. [Climate Positive Pathway] **Exceptional:** The building's upfront carbon emissions are at least 40% less than those of a reference building.
22	Energy Use	•	3	3	**6**	Credit Achievement	**3**	**Min:** The building's energy use is at least 10% less than a reference building. **Credit:** The building's energy use is at least 20% less than a reference building. [Climate Positive Pathway] **Exceptional:** The building's energy use is at least 30% less than a reference building.
23	Energy Source	•	3	3	**6**	Minimum Expectation	•	**Min:** The building provides a Zero Carbon Action Plan. **Credit:** 100% of the building's electricity comes from renewable electricity. **Exceptional:** 100% of the building's energy comes from renewables. No gas is used for space heating, domestic hot water or cooking. [Climate Positive Pathway]
24	Other Carbon Emissions	-	2	2	**4**			**Credit:** The building owner eliminates or offsets emissions from refrigerants. [Climate Positive Pathway] **Exceptional:** All other emissions not captured in the Positive category are eliminated or offset including all Upfront Carbon Emssions (embodied carbon).
25	Water Use	•	3	3	**6**	Minimum Expectation	•	**Min:** The building installs efficient water fixtures or uses 15% less potable water compared to a reference building. Multi-unit residential buildings use 10% less potable water compared to a reference building. **Credit:** The building uses 45% less potable water compared to a reference building (40% for reseidential). The building has infrastructure for recycled water connection. **Exceptional:** The building uses 75% less potable water compared to a reference building (60% for residential).
26	Life Cycle Impacts	-	2	-	**2**			**Credit:** The project demonstrates a 30% reduction in life cycle impacts when compared to standard practice.
						Total	**6**	
Places					**8**			
27	Movement and Place	•	3	-	**3**	Minimum Expectation	•	**Min:** The building includes showers and changing facilities for building occupants that are accessible, inclusive and located in a safe and protected space. **Credit:** The building's access prioritises cycling and includes bicycle parking facilities, a Sustainable Transport Plan has been prepared and implemented, the building has EV charging capabilities, transport options that reduce the need for private fossil fuel vehicles are prioritised, and the building's design and location encourage walking.
28	Enjoyable Places	-	2	-	**2**			**Credit:** The building delivers memorable, beautiful, vibrant communal or public places where people want to gather and participate in the community. The spaces are inclusive, safe, flexible and enjoyable.
29	Contribution to Place	-	2	-	**2**			**Credit:** The building's design contributes to the liveability of the wider urban context and enhances the public realm.
30	Culture, Heritage and Identity	-	1	-	**1**			**Credit:** The building's design reflects and celebrates local demographics and identities, the history of the place, and any hidden or minority entities. This celebration was arrived through meaningful engagement with community groups early in the design process.
						Total		
People					**9**			
31	Inclusive Construction Practices	•	1	-	**1**	Credit Achievement	**1**	**Min:** During construction, the head contractor provides gender inclusive facilities and protective equipment. Policies are implemented on-site to increase awareness and reduces instances of discrimination, racism and bullying. **Credit:** The head contractor provides and monitors high quality staff support on-site to reduce at least five key physical and mental health impacts relevant to construction workers. They must also evaluate the effectivenss of their interventions.
32	Indigenous Inclusion	-	2	-	**2**			**Credit:** The building's design and construction celebrates Aboriginal and Torres Strait Islander people, culture and heritage through playing an active role in the organisational RAP and/or incorporating Indigenous Design and Planning principles.
33	Procurement and Workforce Inclusion	-	2	1	**3**			**Credit:** At least 2% of the building's total contract value has been directed to generate employment opportunities for disadvantaged and under-represented groups through a social procurement strategy **Exceptional:** At least 4% of the building's total contract value has been directed to generate employment opportunities for disadvantaged and under-represented groups thorugh a social procurement strategy.
34	Design for Inclusion	-	2	1	**3**			**Credit:** The building is designed and constructed to be inclusive to a diverse range of people with different needs. **Exceptional:** Engagement with target groups has informed the inclusive design.
						Total	**1**	
Nature					**14**			
35	Impacts to Nature	•	2	-	**2**	Minimum Expectation	•	**Min:** The building was not built on, or significantly impacted, a site with a high ecological value. **Credit:** The building's design and construction conserves existing natural elements, and (if deemed necessary by an Ecologist) at least 50% of existing site with high biodiversity value is retained
36	Biodiversity Enhancement	-	2	2	**4**			**Credit:** The site includes an appropriate landscape area with a diversity of species and prioritises the use of climate-resilient and indigenous plants, AND a site-specific Biodiversity Management Plan is provided to the building owner or building owner representative. **Exceptional:** A greater area of landscaping is provided and the landscaping includes critically endangered and/or endangered plant species native to the bioregion.
37	Nature Connectivity	-	2	-	**2**			**Credit:** The site must be built to encourage species connectivity through the site, and to adjacent sites. If the project sits within a blue or green grid strategy it must contribute to the goals of the strategy.
38	Nature Stewardship	-	2	-	**2**			**Credit:** The building owner, as part of the project's development, undertakes activities that protects or restores biodiversity at scale beyond the development's boundary.
39	Waterway Protection	-	2	2	**4**			**Credit:** The building demonstrates an annual average flow reduction (ML/yr) of 40% and meets specified pollutants targets. **Exceptional:** The building demonstrates an annual average flow reduction (ML/yr) of 80% and meets specified pollutants targets.
						Total		
Leadership					**0**			
40	Market Transformation	-		-	**0**			
41	Leadership Challenges	-		-	**0**			**Credit:** The project team identifies and implements circular economy principles and initiatives. The project team demonstrates an increased circularity of 10% (weighted by cost) **Exceptional:** The project team demonstrates an increased circularity of 20% (weighted by cost)
						Total		



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