

Ecologically Sustainable Development (ESD) Report

2-4 Giffnock Avenue, Macquarie Park
State Significant Development Application

Project No.	P01697
Revision	02
Issued	8 th October 2025
Client	Holdmark



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Issue And Revision Record

Revision	Date	Comments	Engineer	Reviewer
01	05.09.2025	SSDA Issue	JJ	AK
02	08.10.2025	Update for SSDA	JJ	AK
03				
04				

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We recognise the Traditional Custodians of the land on which the proposed development will be constructed. We respect their enduring cultural and spiritual connections to the land and waters, and celebrate their knowledge, kinship, and values. We acknowledge that these connections to the land and waters have existed for millennia and will continue into the future. We respect the Elders who have gone before, together with those of today for their guidance on our shared journey. We recognise that we are, and always will be, on Aboriginal land.

EXECUTIVE SUMMARY

This Ecologically Sustainable Development (ESD) Report prepared for 2-4 Giffnock Avenue, Macquarie Park 2113 in support of a State Significant Development Application (SSDA) for the construction and operation of the proposed mixed use development.

The development's governing ESD principles and performance requirements are in alignment with the following planning frameworks, legislative policy, guidelines and the like:

- NSW Environmental Planning and Assessment (EPA) Regulation 2021
- State Environmental Planning Policy (SEPP), Sustainable Buildings, 2022
- City of Ryde Development Control Plan (DCP) Part 7: Environment 2014

In response to the above, the ESD initiatives and commitments which have been implemented for the development include the following:

- Targeting a **5 Star Green Star Certified – Green Star Buildings v1**
- Meeting the minimum legislated BASIX benchmarks, please refer to BASIX Reports for Buildings A1 & A2 and Building B1 that accompany this submission for further details:
 - **BASIX Energy 63%**
 - **BASIX Water 40%**
- Delivering a high level of thermal performance, demonstrated through a **7 star average and 6 Star minimum NatHERS rating** across the development
- Compliance with requirements for Section J for building performance for conditioned non-residential components.
- Following a range of sustainability initiatives across the site spanning **energy efficiency, water efficiency, indoor environment quality, waste management and comfort**.
- Fossil-fuel free design to allow for carbon neutrality by 2035.
- Maximise on-site renewable energy
- Provision of Heat Island Mitigation measures

The strategies and initiatives presented in this report demonstrate a strong commitment to sustainability in line with the City of Ryde's development guidelines and are to be further developed during subsequent stages of the project.

1 INTRODUCTION

This report supports the state significant development application to the City of Ryde (Council) for the detailed design and construction of a new mixed use development located at 2-4 Giffnock Avenue, Macquarie Park 2113. The content of this report is based on the architectural documentation developed by Studio.SC.

1.1 PROJECT OVERVIEW

The proposal that is subject of this SSDA is described below:

- Demolition of existing building and structures;
- Construction of a 3 residential buildings
 - Towers A1 and A2; consisting of 388 units
 - Tower B1; consisting of 302 units
- Ground floor retail spaces
- Childcare centre on Level 01 of building B2
- Communal spaces on the ground floor and roof top terrace
- Six floors of underground carparking

1.2 SITE DESCRIPTION

The Site is located at 2-4 Giffnock Avenue, Macquarie Park 2113 within the City of Ryde Local Government Area (LGA), and is also boarded by Hyundai Drive, Kittys Street, Drake Avenue, and Lane Cove Road.

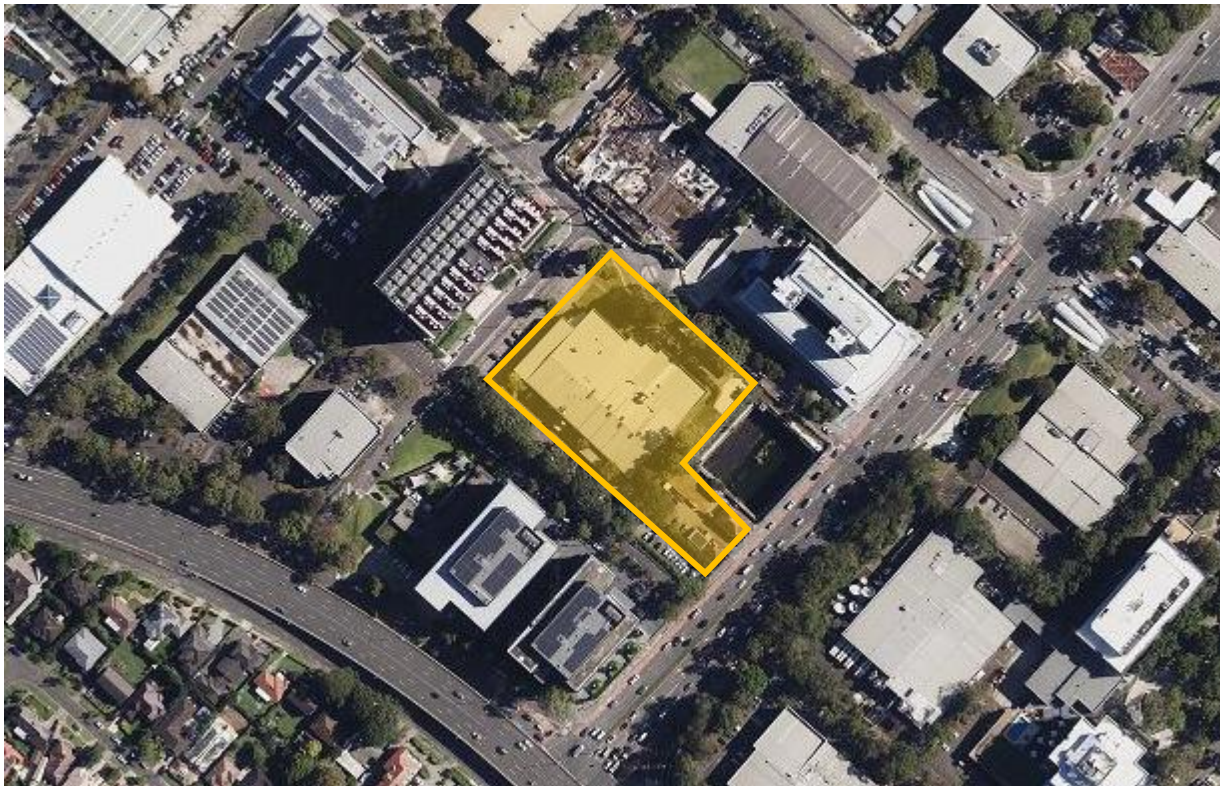


Figure 1 Site Aerial (Source: SixMaps)

2 GOVERNING ESD FRAMEWORKS & POLICIES

The development's guiding principles and overall performance has been designed in alignment with the following planning frameworks, legislative policy, guidelines and the like:

- State Environmental Planning Policy (SEPP), Sustainable Buildings, 2022 – Section 2.1
- NSW Environmental Planning and Assessment (EPA) Regulation 2021 – Section 2.2
- City of Ryde Development Control Plan (DCP) Part 7: Environment 2014 – Section 2.3
- NCC 2022 Section J Part J4 compliance – Section 2.4
- Green Building Council of Australia (GBCA) Green Star Buildings v1 – Section 3.4
- Macquarie Park Transport Oriented Development (TOD) Guidelines

2.1 STATE ENVIRONMENTAL PLANNING POLICY (SEPP) SUSTAINABLE BUILDINGS 2022

The Sustainable Buildings 2022 SEPP was introduced by the NSW Department of Planning, Housing and Infrastructure to consolidate the approach to sustainable building design and to move closer to a net zero emission future.

All **Residential Spaces** of the development must respond to the following:

The Building Sustainability Index (BASIX) is a legislative requirement for all residential dwelling types within NSW to assess the potential performance of certain residential buildings against a range of sustainability indices including thermal comfort, water, embodied emission and energy.

BASIX sets water and greenhouse gas reduction targets relative to the NSW average benchmark for per person potable water consumption & greenhouse gas emissions within the residential sector. It also sets the minimum performance levels for thermal comfort of the dwelling and embodied emission of materials.

The new targets are sets into place from October 2023 that increased the standards according to SEPP 2022.

The project is committed to meet requirements in line with Sustainable Buildings SEPP 2022 at the time of delivery, including:

- BASIX Energy: 63%
- BASIX Water: 40%
- Meet Thermal Comfort requirements
- Material reporting through the BASIX Materials Index

All **Non-Residential Development** components of the project must:

Table 1 Sustainable Buildings SEPP Non-Residential Response

Part	Requirement	Response
1(a)	Minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,	Refer to Section 3.2.3 highlighting a 90% diversion rate of construction and demolition waste from landfill, aligning with the Green Star Buildings <i>Responsible Construction Credit Achievement</i> .
1(b)	Reduction in peak demand for electricity, including through the use of energy efficient technology,	Refer to Section 3.2.1 which discusses reduction in electricity and energy through efficient systems and monitoring.
1(c)	Reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design,	Refer to Section 3.2.1 for energy efficiency.
1(d)	Generation and storage of renewable energy,	Solar PV generation potential to be investigated and incorporated into the design.
1(e)	Metering and monitoring of energy consumption,	Refer to Section 3.2.1 discussing energy metering and monitoring requirements for the development.
1(f)	Minimisation of the consumption of potable water.	Refer to Section 3.2.2 which discusses the efficient systems in place to minimise water use and the strategies in place to recycle and re-use water throughout the development.
2	Quantification of the embodied emissions attributable to the development using the NABERS tool disclosed at development application and construction certificate stages.	The development will declare materials for embodied emissions reporting through the NABERS Embodied Emissions Reporting form.

2.2 EPA PRINCIPLES

The 140 Elizabeth Street development will follow the golden standard in sustainability principals throughout the development. This includes the design, construction and operational elements of the project. The principles of Ecologically Sustainable Development to which the development should generally adhere to are defined within Part 8, Division 5, clause 193 of the NSW EPA Regulation 2021 as.

(2) ***The Precautionary Principle** is that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*

(3) *In applying the **Precautionary Principle**, public and private decisions should be guided by—*

(a) *careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*

(b) *an assessment of the risk-weighted consequences of various options.*

Development Response: The project will employ proactive environmental protection measures and undertake risk assessments to ensure no irreversible environmental harm is acted as a result of the construction or operation of the development.

During construction, it is intended the main contractor will implement an independently certified Environmental Management System (EMS) to a recognised standard such as AS/NZS ISO 14001, that will demonstrate a formalised systematic and methodical approach to planning, implementing and auditing for environmental management. During operation, adherence to procedures that account for environmental risk and mitigation measures will be met.

(4) ***Inter-generational Equity** is that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*

Development Response: The project will ensure no irreversible environmental harm is acted as a result of the construction or operation of the development. The design team will address key elements such as energy, potable water and resource/material consumption to do all which is within the project's control to ensure future generations have equal opportunity and access to the environment.

(5) ***Conservation of Biological Diversity and Ecological Integrity** is that the conservation of biological diversity and ecological integrity should be a fundamental consideration.*

Development Response: The pre-developed site can be considered to have low-ecological value and biodiversity significance. The project is committed to planting native vegetation and using integrated landscaping to enhance the overall ecological and biodiversity of the site. Rainwater and stormwater will be carefully managed and controlled to minimise impacts on surroundings.

(6) ***Improved Valuation, Pricing and Incentive Mechanisms** is that environmental factors should be included in the valuation of assets and services, such as—*

(a) *polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*

(b) *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*

(c) *established environmental goals should be pursued in the most cost-effective way, by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

Development Response: The project is committed to maximising construction and demolition waste diversion from landfill through the implementation of a well as project specific demolition and construction waste management strategy. The development shall ensure that the full life cycle impacts of goods and services employed throughout the construction and operation of the project have been considered. Further, it will be designed to minimise operational energy and water consumption, which provides benefit for users through lower utility bills.

2.3 CITY OF RYDE DEVELOPMENT CONTROL PLAN (DCP) 2014

The City of Ryde DCP outlines the sustainable development objectives new developments in the Ryde City Council LGA must consider. Part 7.1 – Energy Smart, Water Wise of the DCP is addressed within the following tables.

Table 2 Residential Response to Ryde DCP

Residential Flat Buildings (RFBs)

Reference	Control	Project Response
2.3 (a)	Any hot water system(s) installed as part of a development or as a replacement must consider the most efficient option available to minimise greenhouse gas emissions	The development will implement the most suitable and energy efficient option for DHW to support the target BASIX rating. Refer to the BASIX report for further detail.
2.3 (b)	Any products installed as part of a development or as a replacement that are regulated for energy efficiency under the Australian Standards for Products and/or Minimum Energy Performance Standards (MEPS) must achieve a minimum energy rating of 4.5 stars.	The development will implement the most suitable and energy efficient option for HVAC and other equipment to support the target BASIX rating. Refer to the BASIX report for further detail.
2.3 (c)	Ceiling/roof and walls must be fitted with insulation. Ceiling/roof insulation must be rated R3.0 or equivalent and wall insulation must have an R1.5 or equivalent rating. Insulation of cavity brick walls is not required,	The development will instal insulation in excess of the DCP requirement to achieve the target NatHERS rating. Refer to the BASIX report for further detail.
2.3 (d)	Water Efficient Fixtures: where new or replacement fittings are required shower heads shall be at least 3 star rated water efficient 4 star dual flush toilets and 4 star taps (for all taps other than bath outlets and garden taps), bathroom and kitchen taps shall be fitted with aerators; and water closets shall have a dual flush cistern.	The development will implement the most suitable and water efficient fixtures to support the target BASIX rating. Refer to the BASIX report for further detail.
2.3 (e)	An external yard space or sheltered well-ventilated space for clothes drying must be provided and be suitably screened from view from any street, public place or adjoining property.	Each residential dwelling has a sheltered & well-ventilated balcony.
2.3 (f)	Any products installed as part of a development or as a replacement that are regulated for water efficiency under Water Efficiency Labelling and Standards (WELS) Scheme must obtain a Minimum WELS rating of 4.5 stars. Products that carry a star water label and are regulated under WELS include clothes washing machines and dishwashers. The water star rating as well as date of purchase of the product should be visible on the product at all times. The Federal Governments WELS website has a comprehensive list of efficient appliances based on star ratings. http://www.waterrating.gov.au	The development will implement the most suitable and water efficient appliances to support the target BASIX rating. Refer to the BASIX report for further detail.
2.3 (g)	Wherever practicable, orient the development to reduce the need for artificial lighting by maximizing daylight in habitable areas, whilst minimizing heat and glare. Ways to achieve this includes skylights, atriums or light shafts and adjustable shading.	The orientation and massing of the development has considered solar access and passive design to achieve the target NatHERS rating.

Table 3 Non-Residential Response to Ryde DCP

New Shops, Industrial and Commercial Premises (including those contained in a Mixed-use Development).

Reference	Control	Project Response
2.4 (a)	The total anticipated energy consumption for the base building is no greater than 450 Mega Joules/annum/metre square [MJ/am2] (commercial) and 900 Mega Joules/annum/metre square [MJ/am2] (retail).	The project will implement energy efficient base-building services and equipment to meet this target.
2.4 (b)	Any hot water system/s installed as part of a development or as a replacement must consider the most efficient option available to minimise greenhouse gas emissions	The project will consider high energy efficiency hot water systems to achieve the target energy consumption.
2.4 (c)	Any products installed as part of a development or as a replacement that are regulated for energy efficiency under the Australian Standards for Products and/or Minimum Energy Performance Standards (MEPS) must achieve a Minimum energy rating of 4.5 stars.	The project will implement high energy efficiency HVAC and central systems (>4.5 MEPS) to support the target energy consumption.
2.4 (d)	Water Efficient Fixtures: where new or replacement fittings are required, Shower heads shall be at least 3 star rated water efficient 4 star dual flush toilets, 4 star taps (for all taps other than bath outlets and garden taps) and 3 star urinals, bathroom and kitchen taps shall be fitted with aerators; and water closets shall have a dual flush cistern.	The project will implement the most suitable and water efficient fixtures to minimise potable water consumption.
2.4 (e)	The installation of energy efficient lighting, motion detectors and dimmers where appropriate are encouraged.	The project will implement smart lighting controls to support the target energy consumption.
2.4 (f)	Any products installed as part of a development or as a replacement that are regulated for water efficiency under Water Efficiency Labelling and Standards (WELS) Scheme must obtain a Minimum WELS rating of 4.5 stars. Products that carry a star water label and are regulated under WELS include clothes washing machines and dishwashers. The water star rating as well as date of purchase of the product should be visible on the product at all times. The Federal Governments WELS website has a comprehensive list of efficient appliances based on star ratings. http://www.waterrating.gov.au	The development will implement the most suitable and water efficient appliances to reduce potable water consumption.

2.4 NATIONAL CONSTRUCTION CODE (NCC) 2022, VOLUME ONE, SECTION J (ENERGY EFFICIENCY)

The development will ensure the energy use of proposed building adheres to the relevant minimum performance requirements as set out within Section J of the NCC, 2022. The development will manage energy use whilst maintaining a high degree of human comfort through the use of high-performance thermal fabric elements and efficient building service equipment.

3 SUSTAINABLE DESIGN RESPONSE

3.1 OVERVIEW

2-4 Giffnock Avenue aims to effectively implement sustainable practices and principles to reduce the project's overall environmental footprint, demonstrate industry leadership and comply with statutory requirements in accordance with the council DCP guidelines.

In pursuit of environmental design excellence, the proposed development will pursue several external sustainability guidelines and rating schemes, these include:

- Targeting a Minimum **5 Star Green Star Certified – Green Star Buildings v1**
- Compliance with **NCC/BCA Section J 2022** through an optimised façade design
- Compliance with **BASIX requirement inline with SEPP 2022**

3.2 SUSTAINABLE DESIGN INITIATIVES

The only path to a low carbon economy and achieving a “2°C world” where the average global temperature is kept to less than 2°C above pre-industrial levels is through comprehensive and complete consideration of how the development consumes resources. The proposed strategy focusses on energy, water, and materiality to ensure resource use is appropriate and to address the requirements identified by the governing ESD frameworks and policies outlined in Section 2.

3.2.1 ENERGY & GREENHOUSE GAS EMISSIONS

The energy efficiency strategy generally follows the energy efficiency hierarchy strategy in Figure 2 below. The development will prioritize in the first instance to reduce the demand for energy consumption through the optimization and sizing of active systems in tandem with implementing passive design principles. The use of energy can then be made more efficient through integrating efficiencies into high demand systems such as heating, cooling, hot water, ventilation, lighting and other appropriate building services.

Once the development has reduced the demand of energy-consuming elements as much as feasible and introduced efficiency measures, renewable energy sources (both on and off site) shall be considered to supply the development with the required remaining energy. Only after all the above major steps have been completed should offsets be investigated to close the gap in order to achieve operational carbon neutrality.

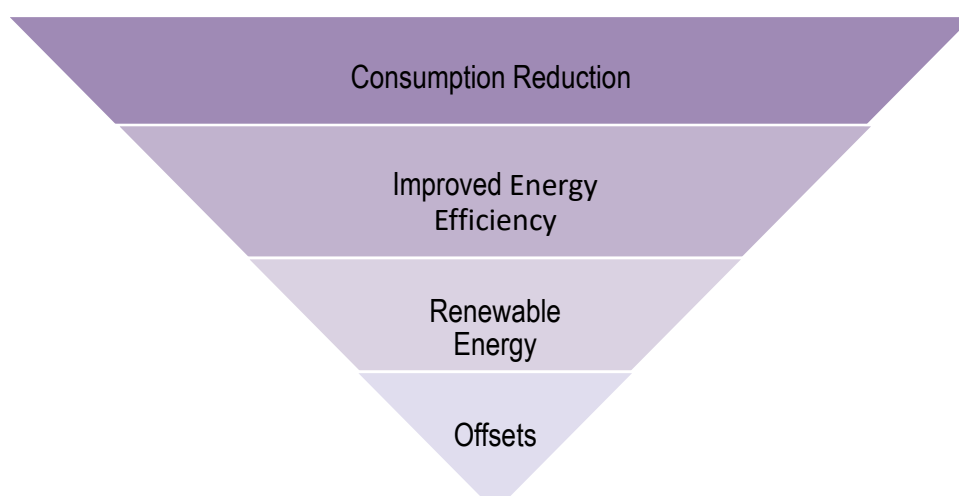


Figure 2: Energy Hierarchy

To achieve the above, the following initiatives are being sought to be implemented:



Renewable Energy – Exposed roof area across site provides an excellent opportunity for the installation of a solar photovoltaic system(s). An appropriately sized system will allow the development to generate renewable electricity to offset demand and minimise stress on the grid. PV will be installed at a rate that maximises the coverage of the non-trafficable roof area. This system size will be confirmed during subsequent stages of development and coordinated with the services strategy.



Fully Electrified – The building has been designed to be fully electrified, to enable operational net zero through the procurement of renewable electricity.



Efficient Lighting Systems – High efficiency LED lighting throughout, including common areas with efficiency controls. Controls will include motion and daylight sensors, timers and zoned switching which will help reduce the unnecessary consumption of energy.



Energy Metering and Monitoring – Energy meters and monitoring systems will be provided to assist in reducing unnecessary energy consumption and allow energy demands to be better managed across the development.



Passive Design – The balance between daylight access and thermal exchange will be a priority of the design team to ensure occupant comfort and energy performance is maximized. Building massing, form, orientation, shading analysis and high-performance building fabric elements should all be considered to achieve the required energy performance targets. Proper sealing of the envelope through construction practices and verification will also be considered to ensure undesirable energy flows are minimized.



Hot Water – Domestic hot water is a major source of energy demand, especially in residential context and therefore the efficiency of these systems will be prioritized. These systems are highly efficient which will allow occupants utilise systems often with reduced energy consumption. Showers and taps with a high WELS rating should be used to reduce water demand from hot water fixtures across the development.



Appliances & Equipment – Appliances and centralised equipment will be selected with a high energy efficiency/performance to ensure reduced energy consumption.



Low emission Transportation – To encourage low-emission transport alternatives bicycle parking shall be provided. Pedestrian access to nearby public transport networks such as bus and rail will be maximised.

3.2.2 WATER

To achieve responsible water consumption and water sensitive urban design, best practice water-saving initiatives will need to be implemented across the project. The following initiatives will be explored to achieve the potable water targets:

Sanitary Fixtures – By implementing low-flow water fixtures, the consumption will be significantly reduced. All sanitary fixtures are to be provided with the minimum Water Efficiency Labelling Scheme (WELS) star rating identified below.

- Toilets: 4 Star
- Kitchen Taps: 5 Star
- Bathroom Taps: 5 Star
- Showers: 4 Star (> 6 but ≤ 7.5 L/min)
- Dishwashers: 4 Star



Landscape Irrigation – Efficient irrigation systems should be implemented, including sub-surface drip systems, moisture sensors, and the prioritization of native plants. Native plants have evolved to thrive in the Australian environment and are typically more resilient than their exotic counterparts, they typically require less water and are more likely to survive the predicted increase in extreme drought conditions due to climate change.



Rainwater – The development will provide a rainwater storage tank to reduce reliance on mains supply water. Final sizing of the tank and detail regarding collection considering the catchment area, expected demand and pumping infrastructure is to be refined during detailed design stages.



3.2.3 MATERIALS

In line with the principals of sustainability outlined in the EPA and the DCP, the project will have a significant focus on the life cycle impacts of material use and responsible procurement. At a high level and subject to further design stages, the use of materials for the development will consider:

Waste Management – 90% of construction and demolition waste is to be diverted from landfill, aligning with the Green Star Buildings Responsible Construction Credit Achievement. This diverts and ensures reuse or recycling of a high portion of site waste.

Development of an Operational Waste Management Plan to ensure waste can be appropriately sorted, separated, and recycled will also be prioritized assisting the ongoing diversion from landfill for the development. Inclusion of sufficient bins and appropriate separation systems to ensure waste is minimised and effective recycling is enabled.



Low VOC and Low Formaldehyde Materials – paints, adhesives, sealants, floor coverings, carpets and engineered wood will be selected appropriately to provide a healthier and low-impact environment. Such efforts provide a cleaner and better environment for all.



Sustainable Certifications & Credentials – Products and materials selected for the project should hold third-party verified environmental declarations (or equivalent certification) to allow for life cycle reporting and quantification of embodied impacts. Products with high recycled content, opportunities for re-use and low embodied emissions will support the sustainable delivery of the development.

Materials such as steel and concrete which inherently have higher embodied carbon, and environmental impact should be the main priority for the development to considerably reduce total impact. Substitutions such as fly-ash and blast-furnace slag should be considered to reduce the embodied carbon of concrete.



FSC/PeFC Timber – Where possible timber, including virgin and engineered timber used during construction (i.e. formwork) and as part of finished elements shall be sourced from certified sustainable forestry or reused. This ensures the timber provided to site is of the highest standard and sourced from renewable suppliers.



3.2.4 CLIMATE RESILIENCE

Resiliency planning with respect to science-based climate projections is a crucial tool in decision making for any proposed development to ensure the investment in social and community infrastructure is secure and assets can operate effectively for years to come. The 2-4 Giffnock Avenue project will develop a climate change risk and adaption plan to identify and respond to the potential impacts of climate change, such as flooding, drought, extended periods of high temperature, rising utility infrastructure costs, etc. The project will implement design responses that specifically address identified risks deemed to be of high or extreme significance, meeting the Green Star Buildings' Climate Change Resilience credit requirements.

Undertaking a climate risk assessment during early design stages will improve the development's ability to respond to the threats imposed by climate change and improve operational resiliency whilst also addressing the requirements for the EPA such as Inter-generational Equity and the Precautionary Principle.

3.2.5 URBAN HEAT ISLAND

The Urban Heat Island Effect must also be addressed to reduce the excessive retention of solar heat within the built form. Currently, the site is identified as experiencing a high level of urban heat island impact compared to its surroundings. The figure below shows that the site experiences temperatures in excess of **7.05°C** above the local baseline surface air temperatures due to the urban heat island effect. To ensure that the project is effective in reducing impact on the urban heat island effect, compliance with the Green Star Buildings' Heat Resilience credit will be demonstrated through the following mitigation strategies:

- Site greening through on-grade canopy cover and terrace landscaping,
- High solar reflectance (SRI) finishes,
- Passive shading.

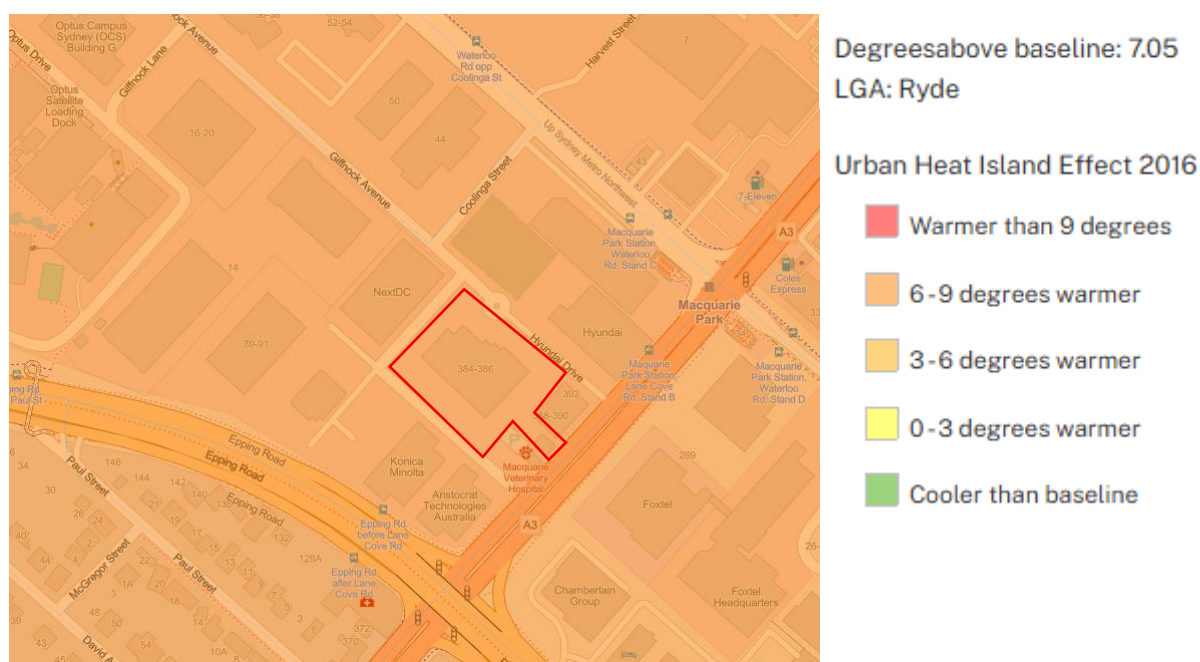


Figure 3 Urban Heat Island Effect (Source: SEED Database)

3.2.6 COMFORT & QUALITY

To ensure the best quality for users and visitors inside the space, the following key initiatives will be committed to:

- **Visual Comfort** – Maximising high-quality light into the living spaces, with views to the sky and movement where possible.
- **Acoustic Excellence** – Designing the layouts of the apartments to be protected from noise from external sources. Delicate material selection, acoustic attenuation and designing the shape of the building and openings accordingly achieves the performance. Further, separation of spaces ensures acoustic privacy between dwellings.
- **Thermal Comfort** – Appropriate mix of vernacular design, overhangs, high-performance windows and mechanical systems to deliver the users optimised thermal
- **Lighting Comfort** – Use of LED lighting throughout the entire development. Low-glare lighting with baffles or louvres to limit UGR.
- **Generous natural planting** – Greenery through natural planting throughout the development assists in a connection to nature for users and passersby. It also has a cooling effect, reducing the Urban Heat Island Burden on the project.

The above combine to ensure the development is responsible, efficient, beautiful and in the best interest of not just the developers, but the residents, the community and society.

3.3 BASIX COMPLIANCE

The Building Sustainability Index (BASIX) is a legislative requirement for all residential dwelling types within NSW to assess the potential performance of certain residential buildings against a range of sustainability indices including thermal comfort, water, embodied emission and energy.

BASIX sets water and greenhouse gas reduction targets relative to the NSW average benchmark for per person potable water consumption & greenhouse gas emissions within the residential sector. It also sets the minimum performance levels for thermal comfort of the dwelling and embodied emission of materials.

The new targets are sets into place from October 2023 that increased the standards according to State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022.

The project is committed to meet requirements in line with the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 at the time of delivery:

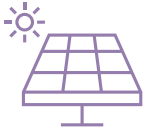
- **Thermal Performance Standards:** Required to achieve minimum 7 NatHERS Star average rating for whole development and minimum 6 NatHERS star individual apartments.
- **Energy Standards:** Required to achieve minimum 60% - 63% reduction in energy consumption of whole development through energy efficient design.
- **Materials Index:** Required to estimate the volume of different materials used in the construction and applying the emissions factors for the materials.
- **Water Standards:** Required to achieve 40% reduction in water consumption of whole development through water efficient design.

Please refer to BASIX Reports for Buildings A1 & A2 and Building B1 that accompany this submission for further details.

3.3.1 BASX ENERGY TARGET

The project aims to achieve the minimum **BASIX Energy target of 63%**, which fulfills the minimum legislative requirement. To ensure prudent energy consumption, the project will incorporate top-tier energy-saving practices. The following strategies will be considered to attain energy targets:

	BASIX Energy Target of 63% - In line with council targets and new the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 the development is targeting an Energy target of 63% reduction compared to an equivalent development.
	Thermally-Efficient Construction – Insulation through the roof, walls and floor, with proper sealing to reduce bulk airflow. Light-coloured materials will be used to reflect solar heat gains. Delicate consideration will be given to the height of the windows, shading and overall window-to-wall ratio. Provide air movement through ceiling fans in bedrooms where required.
	Electrification – no gas will be used on site, enabling the development to be 'net zero ready' and allow the benefits of decarbonisation of the grid to be realised.
	Energy Efficient Appliances – energy efficient appliances such as electric cooktops and dryers will be provided to reduce operational energy consumption.
	Efficient Lighting Systems – high efficiency LED and fluorescent lighting in common areas with efficiency controls to meet the stringent requirements of NCC 2022 Section J. Controls will include motion sensors, time clocks and zoned switching.

	Renewable Energy – The roof area provides a good opportunity for installation of a solar photovoltaic system. This will generate renewable electricity to offset grid use and minimise stress on the grid at peak times. Design team will maximise the PV system size, however the exact size of the system will be further developed, taking into consideration roof design, spatial allowance and building demand.
	Lift – Lifts to be provided with regenerative braking.
	Controls, energy metering and monitoring – energy meters and monitoring systems will be provided to comply with NCC 2022 Section J Part J9 requirements. Exhaust fans will be connected to light switches to ensure they do not run when not required.
	Hot water is to be provided by energy efficient heat pump systems. These systems provide an output three times their input energy and can be run off the solar PV system to reduce the operational carbon of the development.

3.3.2 BASIX WATER TARGET

The project will target minimum **BASIX Water target of 40%**, meeting the minimum legislative requirement. To achieve responsible water consumption, the best practice water-saving initiatives will need to be implemented throughout the project. The following initiatives will be explored to achieve the potable water targets:

	Sanitary Fixtures - By implementing low-flow water fixtures, the consumption associated with apartments will be significantly reduced. All sanitary fixtures are to be provided to the WELS ratings identified below: ▪ Taps – 5 Star WELS ▪ Toilets – 4 Star WELS ▪ Showers – 4 Star WELS (> 6 but <= 7.5 L/min)
	Landscape Irrigation - Efficient irrigation systems will be considered, including underground surface drip systems, moisture sensors, and the use of native plants in the landscaping plan. Natives have evolved to thrive in the Australian environment and are typically more resilient than their exotic counterparts. Native vegetation also stores a significant amount of carbon, mitigating the impacts of climate change.
	Water Efficient Appliances – water efficient appliances with low-flow and High WELS ratings will be provided to reduce potable water consumption.

3.3.3 MATERIALS INDEX

Material Index commitment involves sourcing and utilizing construction materials that have a lower environmental impact, thereby reducing the carbon footprint associated with the project's construction and operation. This approach aligns seamlessly with the principles of the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 SEPP 2022, demonstrating the development's dedication to sustainable construction practices. In line with the principals of the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 for BASIX, the project will have a significant focus on materiality to reduce the embodied emission.

3.4 GREEN STAR BUILDINGS

3.4.1 OVERVIEW

Green Star Buildings is a holistic credit-based star rating system administered by the Green Building Council of Australia (GBCA) that evaluates a development's design and operation against a range of environmental categories, aligning with broader sustainable development goals. A project that achieves a Green Star Buildings certification may achieve the following ratings:

- **4 Star** Best Practice. (All Minimum Expectations + 15 points)
- **5 Star** Australian Excellence. (All Minimum Expectations + 35 points)
- **6 Star** World Leadership. (All Minimum Expectations + 70 points)

Green Star uses a robust, transparent, and independent assessment process, ensuring consistent performance across the categories listed in Figure 4 below.



Figure 4 Green Star Buildings Categories

3.4.2 MINIMUM EXPECTATIONS

There is a set of Minimum Expectations that must be targeted by all projects looking to achieve a Green Star rating. Minimum Expectations are not awarded points, therefore, to achieve a rating the project must accumulate points in addition to the Minimum Expectations.

The Minimum Expectations aim to ensure all Green Star rated buildings meet a basic definition of a green building (energy efficient, water efficient, good healthy spaces, built responsibly, and on sites that are not highly sensitive areas).

3.4.3 GREEN STAR STRATEGY

E-LAB have developed a specific project pathway that includes all Minimum Expectations and the required points to achieve a 5 Star rated building. Any additional credits selected are conducive to the development type, location, environmental and social context, as well co-existing sustainability initiatives and targets. Further, the pathway is considerate of cost and resource constraints associated with the achievement of certain Green Star Buildings credits. Projects pursuing a 5 Star rating must be awarded a minimum of 35 points. E-LAB recommend approximately a 10% buffer above the minimum requirements to alleviate any risk of the desired rating not being achieved.

A comparison between the points required and current pathways for the 5 Star outcome is displayed in Figure 5.

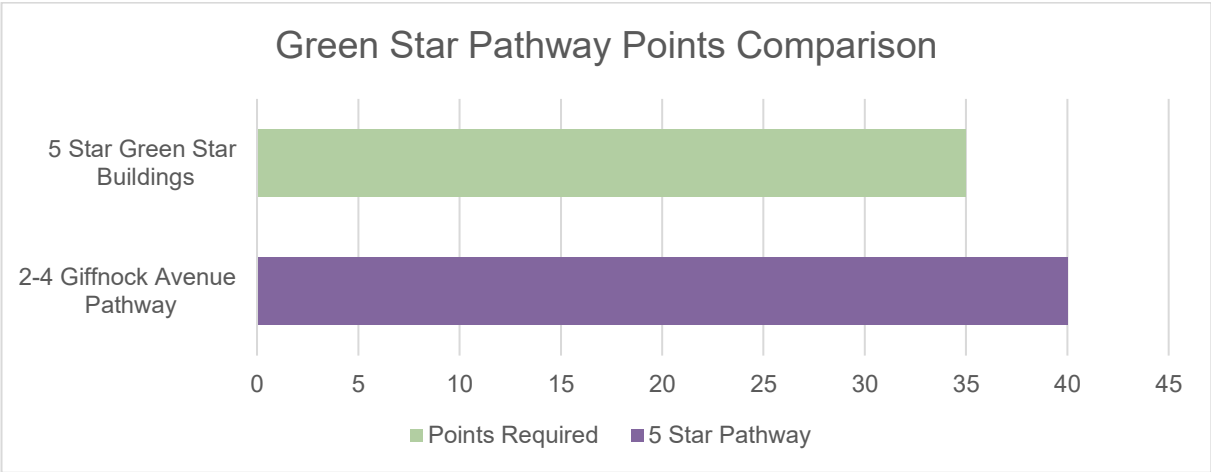


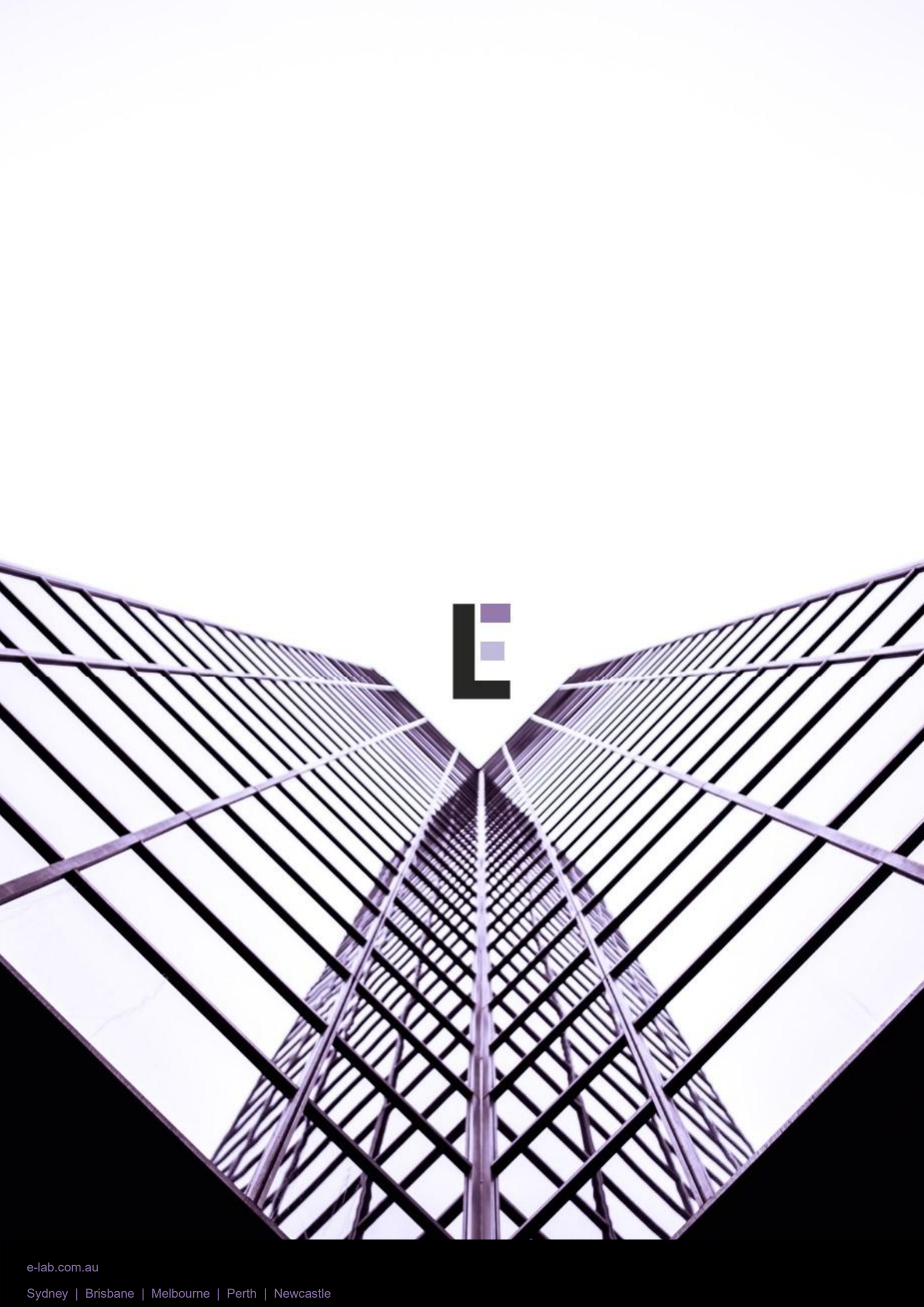
Figure 5 Green Star Pathway Points Comparison

4 CONCLUSION

This report provides an outline of the 2-4 Giffnock Avenue development's ESD initiatives which aim to reduce the project's overall environmental footprint, demonstrate industry leadership and comply with statutory requirements in accordance with the SSDA requirements and council DCP guidelines.

In pursuit of environmental design excellence, the ESD strategies proposed will assist the development to achieve high levels of sustainability and environmental performance. These include:

- Targeting a **5 Star Green Star Certified – Green Star Buildings v1**
- Meeting the minimum legislated BASIX benchmarks:
 - **BASIX Energy 63%**
 - **BASIX Water 40%**
- Delivering a high level of thermal performance, demonstrated through a **7 star average and 6 Star minimum NatHERS rating** across the development
- Following a range of sustainability initiatives across the site spanning **energy efficiency, water efficiency, indoor environment quality, waste management and comfort**
- Fossil-fuel free design to allow for carbon neutrality by 2035.
- Maximise on-site renewable energy
- Provision of Heat Island Mitigation measures



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