16-20 Old Castle Hill Road, Castle Hill

Ecologically Sustainable Development Report

Project No.	P02004
Revision	01
Issued	5th December 2025
Client	UPG Castle Corner Pty Ltd

E-LAB Consulting

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ISSUE AND REVISION RECORD

DESIGN FINALISATION

Revision	Date	Comments	Engineer	Reviewer
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02				
03				
04				

Authorised by:

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Director, Sustainability

E-LAB Consulting

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1 EXECUTIVE SUMMARY

This report supports a State Significant Development Application and Concurrent Rezoning (SSDA) being lodged with the Department of Planning, Housing and Infrastructure (DPHI) for a residential development including affordable housing at 16-20 Old Castle Hill Road, Castle Hill (the site). The proponent for the SSDA is UPG Castle Corner Pty Ltd (UPG).

State Environmental Planning Policy (Planning Systems) 2022 (Planning Systems SEPP) identifies development which is declared to be State Significant. The site was declared SSD pursuant to State Significant Declaration Order 2025 (No 7) (the Order) issued on 13 May 2025.

A separate 'Early Works' SSDA seeks approval for site establishment, tree removal, bulk excavation, infrastructure services augmentation and ancillary site works. This 'Main Works' SSDA and Concurrent Rezoning seeks approval for the built form aspects of the residential flat building.

The proposal aims to:

- Facilitate transport-oriented development within an area of high amenity, promoting increases to both market and affordable housing supply proximate to public transport, open space, and employment.
- Respond to the housing challenges facing NSW through boosting the delivery of housing in an area of growth.
- Align with the NSW Government's strategic ambitions to deliver 23,300 homes in The Hills by 2029.
- Deliver affordable housing in accordance with the in-fill affordable housing provisions of State Environmental Planning Policy (Housing) 2021.
- Deliver a built form that relates to the surrounding context and respects the character of its environs.

The sustainability elements to be considered include:

- Meeting the new legislated BASIX benchmarks in line with Sustainable Buildings SEPP 2022 requirements: for mid/high-rise residential building.
  - **BASIX Energy 61%**
  - **BASIX Water 40%**
  - High level of NatHERS thermal performance rating - minimum 7 NatHERS Star average rating for whole development and minimum 6 NatHERS star individual apartments
  - **Use of low impact materials and minimisation of resources to reduce embodied emission.**
- Fossil-fuel free design to allow for carbon neutrality by 2035
- Maximise on-site renewable energy
- Following a range of sustainability initiatives across the site spanning **energy efficiency, water efficiency, indoor environment quality, waste management and comfort**.
- Biophilic excellence through plants and embedding nature in the design.
- Provision of Heat Island Mitigation measures

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

2 INTRODUCTION

2.1 SITE OVERVIEW

The site is situated at 16-20 Old Castle Hill Road, Castle Hill, within The Hills Local Government Area (LGA). It is well located, being approximately 250m from Castle Hill Metro Station which provides services to Rouse Hill, Macquarie Park, Chatswood and the Sydney CBD. It is equally proximate to Castle Towers shopping centre, a major regional retail hub. The site has ready access to public open space being less than 100m from Arthur Whitling Park and Eric Fenton Reserve.

The site is located at the corner of Old Castle Hill Road and McMullen Avenue comprising an area of 3,180.4m2. It comprises 4 lots in an irregular configuration, legally described as:

- Lot 10 in DP 881332
- Lot 11 in DP 881332
- Lot 20 in DP 222257
- Lot 1 in DP 204335

A Site Aerial is provided in Figure 1 below.

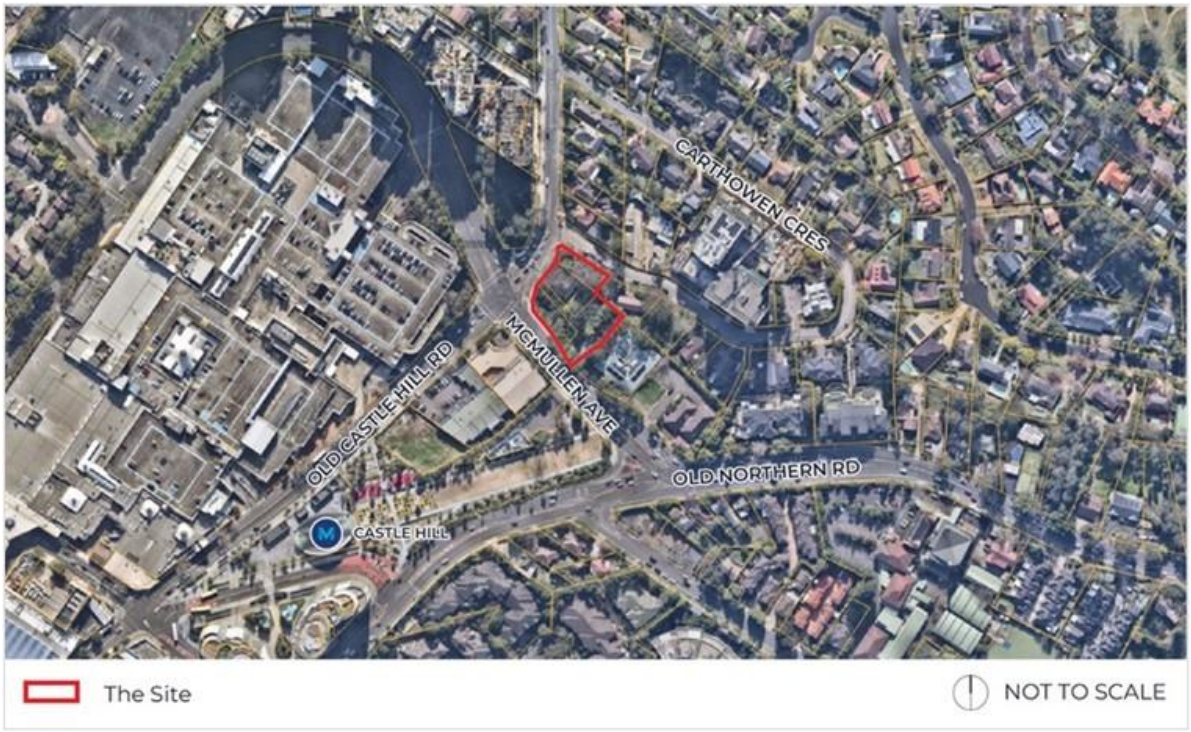


Figure 1. Site Aerial Map

Source: Nearmap, edits by Colliers Urban Planning

2.2 DEVELOPMENT OVERVIEW

A high-level summary of the proposed development is described below, with further details provided within the Environmental Impact Assessment and Rezoning Report (EIS).

The SSDA seeks approval for:

- The construction and operation of a 40-storey residential flat building, comprising the following:
    - Market and affordable housing units.
    - Basement parking; and
    - Communal open space.
- Associated landscaping and public domain works.

Figure 2. Site Plan (Studio.SC)

3 SUSTAINABILITY FRAMEWORKS

The Old Castle Hill Rd residential development's sustainability outcomes are influenced by the following key frameworks:

- Hills Shire Development Control Plan 2012 – Sustainability
- Sustainability Buildings SEPP 2023
- Compliance with NCC/BCA Section J 2022

3.1 HILLS SHIRE DEVELOPMENT CONTROL PLAN (DCP) 2012

Ecologically sustainable development is defined in The Hills Local Environmental Plan 2012 Dictionary. In order to fulfil Council's statutory responsibilities as required by Schedule 2 of the EP&A Regulation; the Local Government Act 1993, development is required to meet Council's ESD objectives. Following is the list of objective accordance with council's ESD requirement:

- Promote integrated, visually harmonious and attractive buildings with respects the established character of the existing residential areas.
- Encourage the use of renewable, energy efficient materials that are durable and cost effective
- Reduce waste generation and wastage
- Encourage consideration of the long-term impact of the production and use of materials used in construction of the development.
- Maximise the use of natural lighting and to minimise the energy consumption of multi dwelling housing developments.
- Reduce the greenhouse gas emissions and use of renewable and low carbon energy
- Minimise the use of potable water

3.2 STATE ENVIRONMENTAL PLANNING POLICY - SUSTAINABLE BUILDINGS (SEPP) 2022

NSW has whole-of-economy targets to reduce greenhouse gas emissions by 50 per cent by 2030 compared to 2005 levels, and net zero emissions by 2050. Achieving these targets will require all new and existing buildings in NSW to be operating at net zero well before 2050. Energy efficiency, conserving potable water and improving thermal performance are also high priorities.

The NSW Government has introduced the State Environmental Planning Policy (Sustainable Buildings) 2022 to ensure new and renovated buildings are sustainable and resilient for future climate and bring NSW towards net zero emissions. This policy covers each component of the proposed development.

3.2.1 NSW Residential Buildings

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 the embodied carbon emissions that are attributable to building materials.

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

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

BENCHMARK	REQUIREMENT
Thermal Performance Benchmark	Required to achieve: • Individual dwellings: Heating: 34.4, Cooling: 21.4, Total: 38.0 • Average all dwellings: Heating: 28.1, Cooling: 20.0, Total: 30.0
Energy Benchmark	Required to achieve 61% 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 Benchmark	Required to achieve 40% reduction in water consumption of whole development through water efficient design.

3.3 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS (SEARS)

This report outlines how the development will address the SEARs as part of the Environmental Impact Statement. These are:

- Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.
- Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.
- Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.

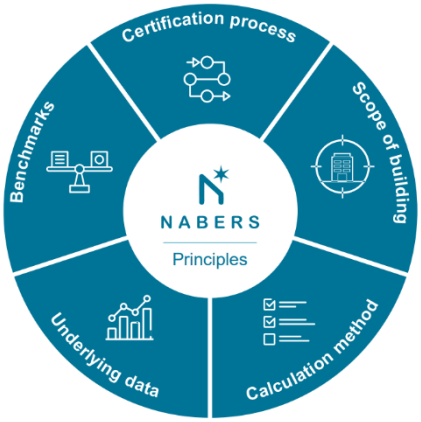
SEARS	Project Response
Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.	See section 2.1
Demonstrate how the development will meet or exceed the relevant industry building sustainability and environmental performance standards.	See section 4
Demonstrate how the development minimises greenhouse has emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.	See sections 4.1, 4.2, 4.3 and the BASIX Report

3.4 NABERS Embodied Emissions Reporting

For compliance with the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022, reporting of the embodied emissions of non-residential components are required. Disclosure of embodied emissions will be via the NABERS Embodied Emissions Material Form.

In alignment with best practice, we've identified the key initiatives to help reduce the embodied emissions of the development:

- Use salvaged and/or recycled materials
- Optimise systems for material efficiency
- Specify low carbon concrete
- Specify materials that naturally sequester carbon
- Specify materials manufactured with renewable energy
- Design for durability
- Get to know the supply chain for your specified project.



3.5 Performance Standards for Net Zero Ready Energy Buildings

In alignment with best practice, the development's commitment to sustainability, the project proposes to be ready for net zero carbon emissions.

A Net Zero Statement has been prepared to address the relevant requirements under the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022, Section 3.4, and as defined under Section 35C of the Environmental Planning and Assessment Regulation 2021 (EP&A). It is intended to address the SEPP requirement of achieving net zero operational greenhouse gas emissions by 2035.

In addition, the following strategies are proposed:

- Reducing energy loads and usage;
- On-site renewable energy through a large photovoltaic array; and
- Eliminating gas to remove fossil fuel consumption and prepare for a decarbonised grid.
- Committing to become Carbon Neutral in operation by 2035 under ESR's sustainability strategy

4 SUSTAINABLE DESIGN RESPONSE

4.1 EPA PRINCIPLES

The proposed development will follow the industry best-practice sustainability principals throughout the development. This includes the design, construction, and operational elements of the project. The key overarching principals are aligned with the definition of Ecologically Sustainable Development as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2021. These include:

The Precautionary Principle:

Philosophy: Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.

Project Response: The project is committed to incorporating elements to minimise impacts on the environment, as outlined below in this section of this report. A commitment to improvement on minimum benchmarks demonstrates the development's commitment to sustainability.

The Principle of Inter-generational Equity:

Philosophy: The present generation should ensure that the health, diversity, and productivity of the environment is maintained or enhanced for the benefit of future generations.

Project Response: The project is committed to making careful and thoughtful selections throughout the design process to enhance sustainability, reduce environmental impact, and promote long-term resilience. The design team will address key elements such as energy (including spatial provision for solar panels on the roof level of the tower form), potable water, and material consumption to do what is within the project's control to achieve an equitable design outcome at the site that supports the environmental aspirations of generations to come.

The Principle of the conservation of biological diversity and ecological integrity:

Philosophy: Conservation of biological diversity and ecological integrity should be a fundamental consideration

Project Response: The project is committed to incorporating biophilic design elements that reflect the natural profile of the local area. Further reference should be made to the Landscape Design Plans that have been prepared by Studio.SC. Rainwater and stormwater will be managed in line with industry best practice. As outlined in the Stormwater Management Plan Report, an on-site detention (OSD) tank is not required in relation to this project.

Principles relating to improved valuation, pricing, and incentive mechanisms:

Philosophy: Environmental factors should be included in the valuation of assets and services. The users of goods and services should pay prices based on the full life cycle costs of providing goods and service.

Project Response: The project will target a construction waste diversion target of 75%, as outlined within the accompanying Construction Waste Management Plan that has been prepared by Elephants Foot, as well as developed specific project waste management strategies. These combine to ensure the project pays for the waste and damage it creates. Further, it is designed to be low-energy, including dedicated space on the tower roof for solar and incorporates low-water consumption measures, which provides an incentive for residents through lower utility bills.

Please note that the Construction Waste Management Plan that has been prepared to accompany this SSDA is preliminary and has been prepared to support the assessment of the project. A detailed CWMP will be provided prior to CC.

The Principle of Waste Minimisation:

Philosophy: All reasonable and practicable measures should be taken to minimise the generation of waste and its discharge into the environment.

Project Response: The project will target a construction waste diversion target of 75%, as well as developed specific project waste management strategies. Construction materials are chosen to be low impact in their manufacture, including best practice PVC and FSC/PeFC timber throughout where possible. This impacts waste both created by the site, as well as upstream and downstream waste categories.

The above principles are addressed by 5 key themes, being **Sea, Land, Water, Air and People**. These 5 key themes are centred around reducing harm as far as practicable across the practice of buildings and infrastructure, both in their construction and operation.

4.2 ENERGY CONSUMPTION

The energy efficiency strategy generally follows the energy efficiency pyramid of the design below. In the first instance demand for Greenhouse Gasses should be reduced. Consideration should be to remove the need for energy to be consumed where possible. Beyond this, energy can be more efficient, through efficient lighting, mechanical systems and appropriate services.

Once the system has reduced all available energy-consuming elements and made the remaining systems as efficient as possible, renewable energy sources will be considered. If space allows on the roof, PV will be installed. Only after all the above major steps have been completed should offsets be used to close the gap and achieve neutrality.

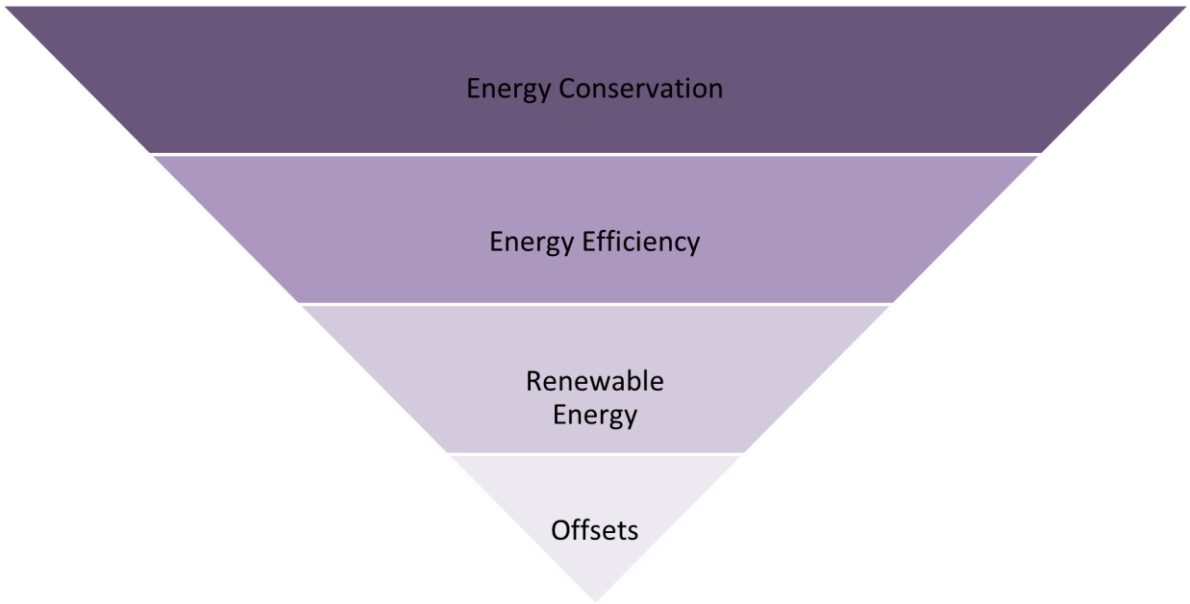
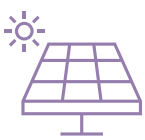


Figure 3 Hierarchy of Design - Energy Efficiency

To achieve the above, the following initiatives are proposed:



Renewable Energy – The roof area provides an excellent opportunity for installation of a solar photovoltaic system. The sizeable system will generate renewable electricity to offset grid use and minimise stress on the grid at peak times. PV will be installed at a rate that maximises the coverage of the non-trafficable roof area. The detailed design specifications and final placement of the photovoltaic panels will be confirmed prior to the commencement of construction. This approach is considered standard and acceptable at this stage of the project lifecycle, particularly for developments of this scale and complexity.

Full Electrification – The building has been designed to omit the use of fossil fuel derived energy sources on-site such as gas for DHW and heating to enable operational net zero carbon emissions.

Efficient Lighting Systems – High efficiency LED lighting throughout, including in common areas and with efficiency controls. Controls will include motion sensors, time clocks and zoned switching which will help reduce consumption of energy. Lighting power density to be at least 10% below Section J of the NCC.

Controls, Energy Metering and Monitoring – – Energy meters and monitoring systems will be provided to comply with NCC 2022 Section J Part J8 and NABERS sub-metering, validation and coverage requirements.

Facade – **Envelope** – The balance between daylight access and solar heat gains will be a priority of the design team to ensure occupant comfort and energy performance are maximized. The proposed performance of glazed elements will subject to ongoing design considerations and BASIX & J1V3 modelling. Proper sealing of the envelope through leading construction practices and verification methods will also be considered to ensure undesirable bulk-air flow is minimized.

Hot Water – Hot water should be provided by energy efficient heat pump systems. These systems are highly efficient which will allow occupants to utilise systems often with reduced energy consumption.

Appliances & Equipment – Apartment appliances and equipment will be selected with high energy rating to ensure reduced consumption which will be in line with BASIX energy targets requirements.

For the hotel, appliances in rooms such as TV's and fridges and centralised equipment within kitchens, bars and staff areas will be specified with a high energy performance label.

Additionally, site will be fully electric with no gas combustion for ovens and cooktops allowing for operational net zero.

Low Emission Transportation – To encourage low-emission transport alternatives bicycle parking and ancillary end-of-trip facilities as applicable shall be provided. Pedestrian access to nearby public transport networks such as bus and rail will be maximised. A preliminary Green Travel Plan has been provided within the Transport Impact Assessment for this SSDA.

4.3 WATER CONSUMPTION

To achieve responsible water consumption and water sensitive urban design, best-practice water-saving initiatives will need to be implemented throughout the project. The development's design is deliberately working to reduce potable water consumption in the first instance by reducing water use.

The following initiatives will be explored to achieve the potable water targets:

Sanitary Fixtures – By implementing low-flow water fixtures throughout the development, the consumption will be significantly reduced. All sanitary fixtures are to be provided with the minimum WELS ratings identified below:

Taps – 6 Star WELS

Toilets – 4 Star WELS

Showers – 4 Star WELS (<=6 L/min)

Refer to the BASIX report for further details on residential water consumption measures.

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. 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. Native vegetation also stores a significant amount of carbon, helping to mitigate climate change. The project is targeting a 70% native planting palette.

WSUD & Stormwater Management – A Stormwater Management Report has been developed for the site considering the impacts of future flood predictions under climate projects and in-line with council planning requirements. Stormwater quality (pollutant loading) and volume discharged from site are key considerations in future design stages to ensure the development has minimal environmental impact on local waterways and ecology compared to the pre-development baseline.

4.4 MATERIALS

In line with the principals of sustainability outlined in the EPA, the project will have a significant focus on materiality. The scope of consideration includes the following action items within the project response:

- **Construction Waste** – 75% of construction and demolition waste is to be diverted from landfill. This diverts and ensures reuse or recycling of a high portion of site waste.
- **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. Additionally, the project will aim to utilise ultra-low VOC paints.
- **Best-Practice PVC** – cables, pipes, flooring, and blinds will be selected and specified to be Best Practice PVC. This ensures upstream performance will be met and has significant benefit for the overall environment during the construction process.
- **Best Practice Steel** – Where possible, steel will come from a sustainable steel manufacturer, who has an action plan. Steel supplied will aim to have energy reducing processes in manufacturing and recycled content.
- **Sustainable Products** – Where possible, products selected for the project will be sustainable which are verified through recycled content, re-use, environmental product declarations, certifications and more. This will ensure reduced toxicity and improve environmental quality while reducing waste.

4.5 WASTE MANAGEMENT

4.5.1 CONSTRUCTION WASTE

Construction and demolition waste are becoming much easier to recycle as the traditional landfill evolves into waste recovery centres, which are able to recycle the majority of all construction and demolition waste. A Draft Construction & Demolition Waste Management Plan has been developed for the project. The development will achieve a minimum of 75% recycling for the construction and demolition waste produced. Construction waste will be managed through contractual requirements outlining the target recycling rate.

4.5.2 OPERATIONAL WASTE

Operational waste which involves the waste produced in the day-to-day operations can also be minimised through effective sorting methods. A Draft Operational Waste Management Plan has been developed for the project. The two bins likely to receive the most use will be the garbage and paper recycling. It is important to provide accessible bins in many areas and locate the types of bins in the areas where the particular waste stream is likely to arise. A waste management plan has been developed to appropriately size and allocate resources for recycling and general waste. General waste comingled and at least one other waste stream will be collected.

4.6 COMFORT AND QUALITY

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

- **Visual Comfort** – Maximising high-quality light into the living spaces, with high amenity views.
- **Indoor Air Quality** – Ventilation to be easily cleaned and elimination of pollutants to improve air quality within internal spaces.
- **Acoustic Excellence** – Designing the building layout to be protected from noise from external sources. The residential component is positioned above the podium to enhance acoustic separation. Delicate material selection, acoustic attenuation, and designing the shape of the building and openings accordingly achieves the performance. High-performance glazing specifications will be implemented to further manage street-level noise emissions.
- **Thermal Comfort** – Appropriate mix of vernacular design, overhangs, adaptive comfort and high levels of insulation in the roof and facades.
- **Lighting Comfort** – Use of high colour rendering index (CRI > 80) LED lighting throughout the entire development. Low-glare lighting with baffles or louvres to limit UGR.
- **Biophilic Design –** Natural elements that reflect the context of the site as an indoor link between Walker Street and Doris Fitton Park.
- **Accessibility –** Ensure that the building is accessible to people of all abilities, in accordance with AS 1428, with features such as ramps.
- **Safety and Security –** Prioritise building safety and security measures to provide a sense of comfort and protection for occupants.
- **Natural Materials –** Where practical, use natural and sustainable building materials that are non-toxic and promote a healthy indoor environment.
- **User-Friendly Technology –** Integrate user-friendly technology that enhances occupant comfort and convenience, such as smart lighting and temperature control systems.

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

4.7 SUSTAINABLE TRANSPORT

The adoption of sustainable transport methods is encouraged by building designs which provide appropriate facilities for occupants and visitors. Site proximity to major transport infrastructure also lends itself to building occupants adopting and utilising sustainable methods of transport.

The development is located within Castle Hill and benefits from immediate proximity to Castle Hill Metro Station and high-frequency bus services routed through the area.

The development is located within close proximity to amenities such as:

- Grocery stores including Woolworths and Coles
- Abundant dining and café options
- Banks
- Newsagents and post office
- Existing Childcare facility to the immediate south of the site
- Local Schools
- Medical centres, chemists and hospitals
- Local parks and green spaces

The proximity to essential amenities will significantly reduce residents, guests and staff reliance on private vehicle use.

A preliminary Green Travel Plan has been provided within the Transport Impact Assessment for this SSDA. The building design supports sustainable transport and reduced car dependency, in line with the Green Travel Plan (GTP), through the following measures:

- **Publicly Accessible Car Share Spaces:** Designated car share parking spaces are provided within the building's basement, facilitating access to shared vehicles for residents and the wider community.
- **Bicycle Parking Facilities:** Secure bicycle parking is available for residents, staff and visitors, meeting the minimum requirements specified in Council's development controls.
- **End-of-Trip Facilities:** The building includes amenities such as showers, lockers and change rooms for staff, supporting cycling and walking as viable commuting options.
- **Enhanced Pedestrian Access:** The design ensures pedestrian connectivity from Old Castle Hill Road and the surrounding neighbourhood, encouraging walking as a primary mode of transport.

4.8 RENEWABLE ENERGY

Photovoltaic (PV) renewable energy enables the development to have production of emissions-free electricity directly at the location of usage and reduce energy and environmental impacts of project.

4.9 BIOPHILIC DESIGN

Until relatively recently in human history, people had constant interaction with living things and their natural surroundings. Biophilia, or the idea that humans have an affinity towards the natural world, is an emerging field that aims to address our psychological need to be around life and life-like processes. Exposure to views and images of nature can help to speed up healing and recovery time, boost positive feelings and reduce negative ones. Interior environments that are cold, sterile and devoid of life, on the other hand, can diminish our experience, mood and happiness.

4.10 SECTION J

The proposed retail/commercial area of the development will be subject to compliance with Section J under the NCC 2022 code. This code places strict environmental performance requirements on the building envelope and services within the building.

The project will demonstrate compliance via verification method J1V3 – verification using a reference building (energy modelling). The design of the building fabric will need to demonstrate compliance with this clause through dynamic modelling of the building against a reference case.

4.11 HEAT ISLAND MITIGATION

The proposed development should undertake a risk assessment of the potential impacts of climate change (such as flooding, extended periods of high temperature, rising utility infrastructure costs etc.) and include adaptive design responses which specifically address identified risks deemed to be of high or extreme significance. Doing so will improve the development's ability to respond to the impacts of climate change and improve operational resiliency.

The site is identified as experiencing a moderate level of urban heat island impact compared to its surroundings. The site's baseline heatwave temperature experiences peaks approximately **5.11°C** above the baseline, as defined by the NSW government for Urban Heat Island Effect (https://www.seed.nsw.gov.au/).

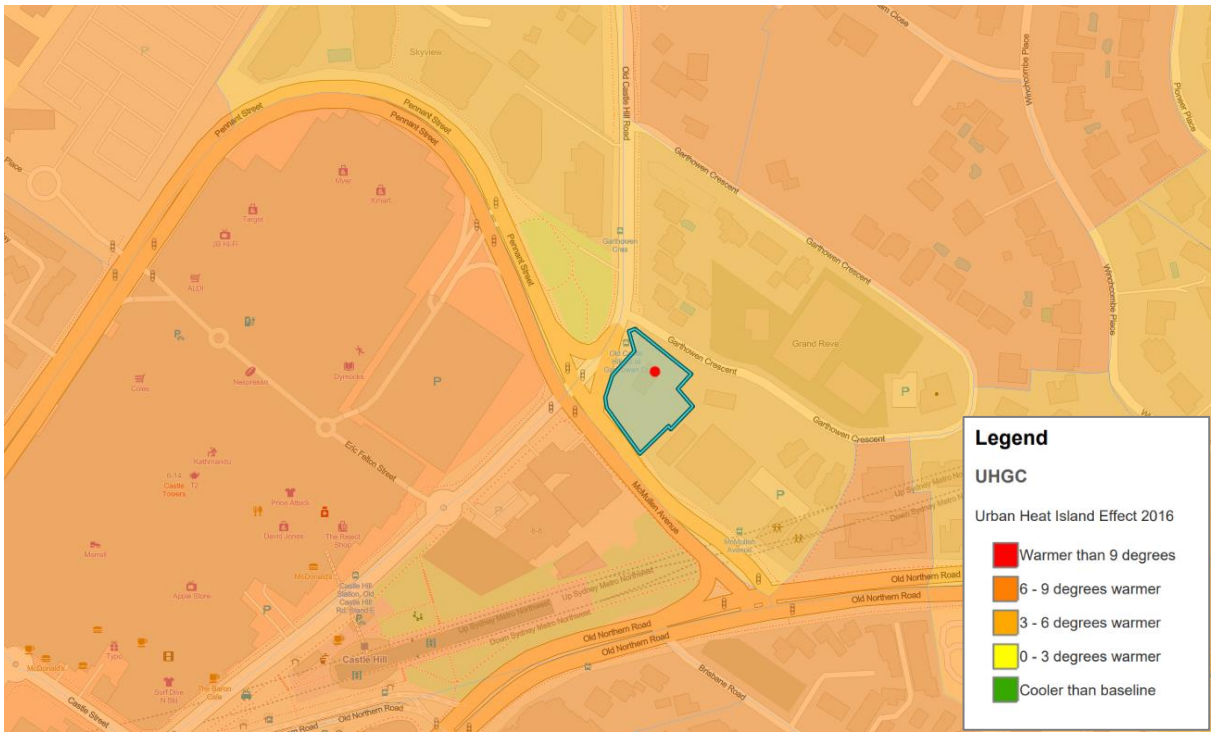


Figure 4: Urban Heat Island Effect at the site (Source: SEED Database, 2016)

To minimise the urban heat island effect and provide a more comfortable environment for occupants, the development can implement the following initiatives:

- Retention and additional planting of trees providing tree canopy.
- Outdoor communal spaces with landscaping, gardens and lawns to provide additional vegetation.
- Light coloured materials selected for roofs and facades where possible.
- Introduction of architectural elements and shading where possible.

4.12 NSW NET ZERO GOAL

The development is actively aiming to adhere to the Government's goal of net zero emissions by 2050 through a range of strategies discussed above. The approach to minimising greenhouse gas emissions should always follow a reduction first – outcomes-based approach to decarbonisation which in turn will provide an approach to net zero emissions. This approach generally involves:

- Avoid: Identify carbon intensive activities and sources that can be avoided or eliminated from the development.
- Reduce: Reduce the carbon intensity of activities and sources through improved technology or process.
- Transition: Transition to renewable electricity.

Following this structure the development will incorporate a range of strategies to minimise greenhouse gas emissions which involves:

- Elimination of gas combustion on site allowing the development to be fully electric. This will allow the development to be net zero ready for when the grid transitions or potential to run fully on renewable energy in the near future.
- HVAC systems to be considered with low impact refrigerant plants and equipment to reduce emissions to the atmosphere.
- Energy consumption reduction through passive design elements. These include architectural shading and projection elements allowing shading and reduced heat transfer through glazing, cross-ventilation introduced for natural cooling and additionally, naturally ventilated corridors and circulation spaces to reduce the need for mechanical ventilation and air-conditioning.
- High performing façade designs involving bespoke glazing and insulation selection allowing for apartments to be 7 Star NatHERS rated which in turn reduces energy consumed for heating and cooling of spaces.
- Efficient lighting systems and selections will reduce the consumption of energy through time clocks, zone switching, occupant sensor and more. Additional BMS controls for metering and monitoring will allow for active consumption monitoring allowing the development to adapt and implement strategies to reduce energy consumption during operation.

Renewable energy systems will be provided where feasible and will be coordinated with services design

5 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.

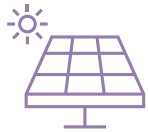
The project is committed to meet requirements in line with the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 at the time of delivery:

- **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% 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.

5.1.1 BASIX ENERGY TARGET

The project aims to achieve the minimum **BASIX Energy target of 60%,** 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 Building Sustainability Index	**BASIX Energy Target of 60% -** In line with council targets and new the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 the development is targeting an Energy target of 61% reduction compared to an equivalent development.
NATIONWIDE HOUSE ENERGY RATING SCHEME	**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.
	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 J8 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.

5.1.2 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 – 6 Star WELS ▪ Toilets – 4 Star WELS ▪ Showers – 4 Star WELS (<=6 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.

5.1.3 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 principles 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.

6 SUMMARY

This report summarises the sustainability targets and commitments for the proposed residential development, including affordable housing, at 16–20 Old Castle Hill Road, Castle Hill. The requirements for sustainability have been coordinated with the design team to allow the development to achieve a high level of sustainable practice across the entire development.

As part of its commitment to sustainability, the development has committed to the following:

- Achieving the BASIX benchmarks in line with the State Environmental Planning Policy – Sustainable Buildings (SEPP) 2022 requirements for mid/high-rise residential building:
  - **BASIX Energy 61%**
  - **BASIX Water 40%**
- Minimum 7-Star NatHERS average rating (6-Star minimum per apartment)
- Use of low-impact materials to reduce embodied emissions
- Exceeding compliance requirements for NCC/BCA Section J 2022 (or NCC 2025 as appropriate), including a performance façade and shading devices
- Fossil-fuel free design to allow for carbon neutrality by 2035.
- Maximise on-site renewable energy
- Following a range of sustainability initiatives across the site spanning **energy efficiency, water efficiency, indoor environment quality, waste management and comfort**.
- Provision of Heat Island Mitigation measures

The strategies and initiatives presented in this report demonstrate the project's commitment to sustainability in line with industry best-practice and are to be further developed during subsequent stages of the project and confirmed before a Construction Certificate is issued.

APPENDIX A – BASIX REPORT