



**7 CITY VIEW ROAD
PENNANT HILLS, NSW**

**PRE-DA REPORT
FOR
ESD SERVICES**

**EG GROUP
Client**

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SECTION 1.0 INTRODUCTION

7 City View Road is located at City View Road and Wongala Crescent, Pennant Hills which is within the Hornsby Shire, New South Wales. EMF Griffiths are engaged as the project's Sustainability Consultants in order to ensure that a best practice outcome is attained. This report outlines the project's commitment to sustainable development principles with respect to Ecologically Sustainable Development (ESD).

The principles of Environmentally Sustainable Design (ESD) are an essential consideration in the design of today's buildings. By working with the Architect from project inception, EMF Griffiths are able to provide valuable input into optimising the passive performance of the building, approaching the design process with a full appreciation how buildings perform.

Hornsby Shire Council outlines its aspirations, guidelines and strategies regarding ESD. The Client, EG Group are committed to achieving best practice ESD outcomes. This report identifies the project's response and commitment to these principles, and how they will be achieved through its design. These targeted ESD initiatives include: -

- Energy efficiency.
- Water conservation.
- Waste management.
- Material flows.
- Renewable energy.
- Passive design.
- Enhanced building fabric.

These initiatives have been adopted from tools such as BASIX and Green Star, thereby demonstrating a "best practice" ESD framework.

1.1 PROJECT OVERVIEW

7 City View Road, Pennant Hills comprises: -

- Twelve (12) storeys mixed-use building consisting of one hundred and six (106) apartments and approximately 6,000m² of commercial and community space across three (3) floors.
- Three (3) carpark levels.

1.2 DESCRIPTION OF ESD RATING SCHEMES

Green Star

Green Star is administered by the Green Building Council of Australia (GBCA) and is an environmental rating tool that assesses a range of sustainability outcomes in either the design stage and/or of the finished building. Green Star branding can be used when a certification agreement between Building Owner and GBCA has been executed. The Green Star process entails documenting the selected sustainability initiatives, constructing the building and its services to incorporate those initiatives, and providing evidence to GBCA that the design and construction has met the requirements.

It is proposed that this project addresses the principles of "Green Star – Design & As Built v1.3". It is understood that the project will not be registered for formal certification. This means that processes will be implemented to ensure that the design is in line with the targeted principles of Green Star.

BASIX

As part of the Environmental Planning and Assessment Act, BASIX (Building Integrated Sustainability Index) applies to all residential dwelling types. This assessment is part of the Development Application process across New South Wales. Each zone has minimum ESD targets for energy, thermal comfort and water. Above and beyond these ESD targets, EG Group is also committed to furthering ESD enhancements to the building.



Figure 1: Master Plan



Figure 2: Level 3



Figure 3: Level 4

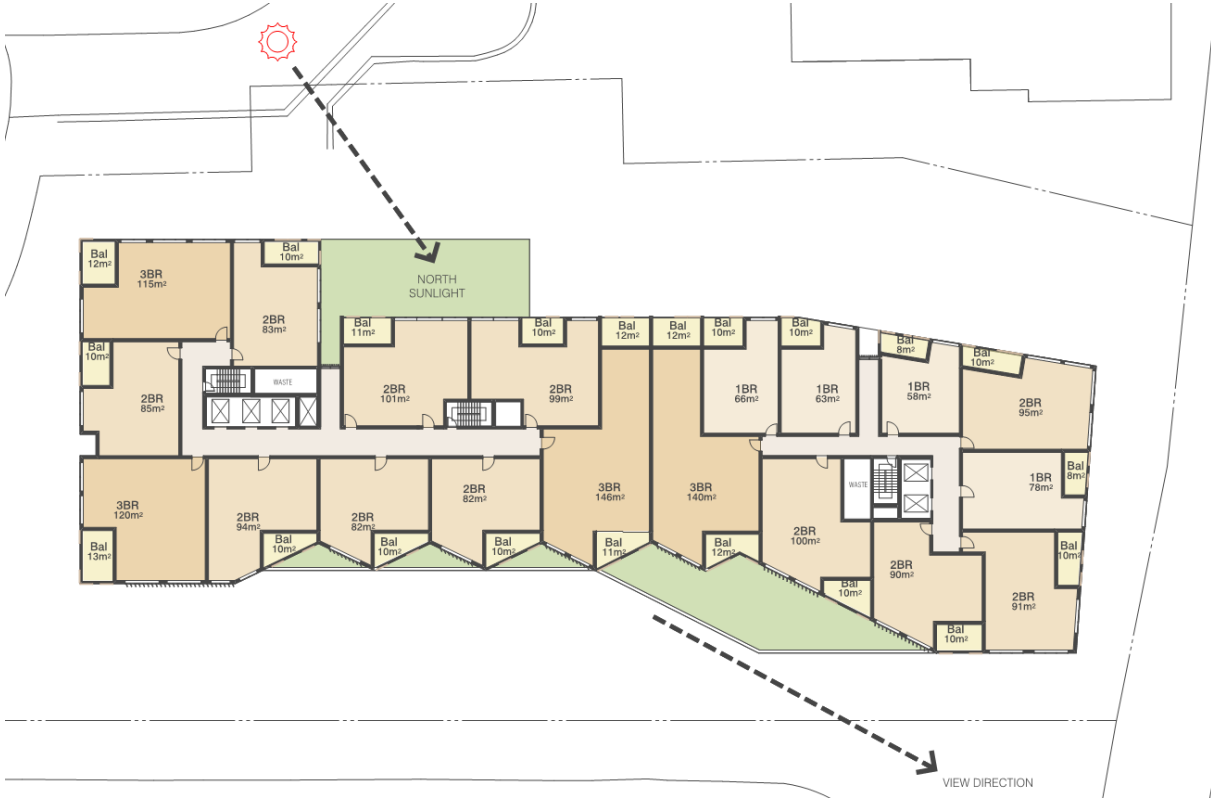


Figure 4: Level 5

SECTION 2.0 SUSTAINABLE DEVELOPMENT PRINCIPLES

Significant measures have been undertaken to ensure that this development responsibly responds to the local environment and gives consideration to the environmental, social and economic sustainability aspects for the buildings' occupants, users and the wider community.

The ESD principles, goals and strategies for 7 City View Road, Pennant Hills are described as follows: -

Vision	To create a sustainable urban community			
Principles	Providing Community Benefits.	Providing economic benefit.	Protecting ecological values and incorporating sustainability initiatives.	Promoting planning and design excellence.
Goals	A community that is diverse, safe, and healthy, has access to services, jobs and learning, that fosters active local participation and is a pleasant place to live, work and visit while integrating with and enhancing the value of existing neighbourhoods.	Economic benefit is maximised by facilitating the release of urban land, incorporating lifecycle costs including operational savings, long term employment opportunities, and creating partnering opportunities and long-term value.	Protect, manage, and enhance natural systems, habitats and biodiversity, and promote the innovative and efficient use and management of materials, water and energy to minimise impacts on the climate.	Develop a modern resilient and adaptable urban form that promotes connectivity, safety and accessibility whilst recognising existing local values and aspirations.
Strategies	<ul style="list-style-type: none"> • Improve the quality of life for residents of Pennant Hills. • Community participation. • Healthy and safe communities. • Respect existing communities. • Prioritising accessible landscapes. • Public benefits. • Deliver civic improvements – park, community space, connections, amenity improvements. • Improved pedestrian connections for safety and amenity. 	<ul style="list-style-type: none"> • Public benefit. • Land supply. • Partnerships. • Sustainability champion. • Maintain local employment and business opportunities. • Local business incubator start-up space. 	<ul style="list-style-type: none"> • Climate impact. • Water. • Energy and transport. • Materials and waste. • Habitats and biodiversity. • Regenerated landscape. • Passive design. • Solar access. • Tree retention. • Retain blue gum high forest edge. 	<ul style="list-style-type: none"> • Community and place. • Responsive urban form. • Quality public realm. • Infrastructure. • Connectivity, safety and accessibility. • Engagement and partnerships. • Quality building design and development. • Alignment with council and government planning policies. • Respond to local character- built form, landscape, and heritage.



Figure 5: Proposed Render

2.1 APPLY PRINCIPLES AND PROCESSES THAT CONTRIBUTE TO ECOLOGICALLY SUSTAINABLE DEVELOPMENT (ESD) IN DEVELOPMENT AND OVER ITS EFFECTIVE LIFE

This report sets clear sustainable outcomes and priorities to demonstrate how the proposal gives consideration to the management and enhancement of natural systems and promotes the efficient use of materials, water and energy to minimise impacts on the environment. It will illustrate the project's compliance with the criteria noted and will focus on the specific measures that contribute to sustainable development principles.

2.2 REDUCE THE CAUSE AND IMPACTS OF THE URBAN HEAT ISLAND EFFECT

The Design Team has actively incorporated design principles that mitigate the occurrence and therefore impact of urban heat island effect. Such strategies include the provision of additional planting around the perimeter of the development, thus providing vegetation which allows for evaporation of moisture into the air during high temperature events. Trees also provide additional shading during summer months which reduce the amount of solar radiation contacting streets and pavements, thus alleviating the urban heat island effect.

The green roofs also reduce the heat island effect, whilst also reducing site run-off.

Finishes with low solar absorptance (SA) will be specified, thus reducing the materials ability to absorb and subsequently transmit heat.

2.3 INCREASE THE RESILIENCE AND ADAPTABILITY OF THE DEVELOPMENT TO THE EFFECT OF CLIMATE CHANGE

The Design Team will proactively incorporate robust design solutions to ensure and maintain a resilient development with respect to climate change. The following provisions will be considered: -

- All plant rooms, switchboards / substations, auxiliary power/fuel supply, communications and fire services are to be flood and storm event proof, located on levels significantly above site flood levels.
- Building cabling entry points to be constructed to prevent flood ingress.
- Provide water ingress detection (via BMS and local alarm) for lift pits and provide for automatic stopping at ground level and isolation of all lifts prior to water reaching lift equipment.
- Native and resilient / low water flora to be selected within the landscape design.
- Rainwater capture and collection, to be used for irrigation and where possible other non-potable sources.
- Passive design principles incorporated to reduce internal loads for projected warmer climates.

2.4 ENSURE THAT GREENHOUSE GAS EMISSIONS WILL BE REDUCED

Faced with ever increasing fuel costs, be it gas or electricity, the importance of reducing a building's annual energy consumption from the outset is ever present. A potentially minimal increase to the building's capital cost can be compensated by the building's reduced ongoing operational costs. Reduced annual energy consumption also aligns with reduced annual greenhouse gas emissions, specifically in the form of tonnes of carbon dioxide. There are various means by which a building's annual energy consumption can be reduced, be it via passive improvements to the development's building fabric, or via the installation of highly efficient mechanical plant.

The Design Team actively seeks to minimise the developments greenhouse gas emissions through the passive design hierarchy, in line with the following: -

- Passive design techniques to reduce internal plant loads (optimising building fabric, glazing, natural ventilation, thermal mass, insulation, and shading).
- Energy efficient lighting design.
- Specifying highly energy efficient building services, such as: -
 - High COP air conditioning equipment.
 - Efficient fans, pumps.
 - Efficient water heaters.
 - VSDs to fans and pumps.
 - Efficient lighting.
- Investigate the viability of renewable energy sources, such as photovoltaics.

In order to test and therefore quantify each variation to the building's envelope or mechanical system the Design Team will engage an energy Simulation Specialist who is able to iteratively and incrementally update a model of the Proposed Building as the design progresses. This ensures that the final design provides an optimal balance of insulation, glazing performance, energy efficient lighting and mechanically enhanced design solution.

In regard to the residential component, the Design Team seeks to achieve a maximum heating load of 45.4MJ/m² and a cooling load of 29.5MJ/m², in Climate Zone 56 for an individual dwelling in a multi-dwelling development. This will ensure compliance with the BASIX thermal comfort section. To ensure compliance with BASIX Water and Energy, as a minimum the project will be meeting the targets of forty (40) for water and twenty-five (25) for energy.

2.5 REPLACE INTENSIVE CARBON POWER SOURCES WITH LOW CARBON AND RENEWABLE ENERGY

Reductions in grid supplied electricity consumption and demand has an impact upon greenhouse gas emissions and energy production capacity as well as other emissions associated with energy generation. In order to minimise the load on New South Wales's electricity demand and dependence on diminishing non-renewable energy sources, the following sustainable development principles will be considered: -

- Energy sub meters to all substantial energy (greater than 10,000kWh/a), light and general power consumption for common areas, along with an effective mechanism in place for monitoring energy consumption data will be used within the building.
- Energy efficient lighting will be specified for streets, parks and other public domain spaces.
- Car parking areas are to be designed and constructed for potential electric vehicle charging points.
- Electrical sub-metering is to be provided for lighting, air-conditioning and power within each tenancy or strata unit.
- Metering will be provided to each apartment and studio to inform the users on their use and management of electricity.
- A comprehensive pre-commissioning, commissioning, and quality monitoring will be performed for all building services (BMS, mechanical, electrical and hydraulic). In order to ensure that the building is set up in an energy efficient manner.
- Provision for the incorporation of photovoltaic panels and solar hot water panels will be investigated to determine its viability due to site constraints, electrical demand profile and cost effectiveness.

2.6 REDUCE THE USE OF POTABLE WATER

Reducing the demand for water, through the use of low flow fittings, and the efficient design of water in building systems can additionally reduce Building Owners' operational costs. In seeking to minimise the load on New South Wales's water, sewer and stormwater infrastructure, the following sustainable development principles will be considered: -

- Water meters for all major water uses, with an effective mechanism in place for monitoring water consumption data will be used in the building.
- Consideration for rainwater collected from the roof to a rainwater tank and used for irrigation.
- 5-star WELS rated taps, 5-star WELS rated toilets and 3-star WELS rated shower roses will be used in residential units.
- Dishwasher and clothes washers installed as part of the base building works will be at or within one (1) star of the highest available rating under the Australian Government's WELS rating system.
- Gross pollutant trap in the basement area for treatment of stormwater prior to discharge, will allow for interception of pollutants and provide treatment to the stormwater runoff from the podium areas.
- Separate meters are to be installed for the make-up lines to major water consumption facilities.

2.7 ENSURE THAT WASTE WILL BE REDUCED

New South Wales is working to minimise waste by decoupling material consumption from building construction, demolition, refurbishment, and operations. Minimising and recycling this waste can have significant social, economic and environmental benefits. In relieving the pressure on New South Wales's landfills and natural resources, the following sustainable development principles will be considered: -

- Re-use or recycle 80% (by mass) of all demolition and construction waste.
- Dedicated storage area for the separation, collection and recycling of waste will be provided, to accommodate cardboard, glass, and plastics.
- General waste chutes will be provided on each floor with accompanying recycling bins.

2.8 IMPROVE INDOOR ENVIRONMENTAL QUALITY

Implementation of a healthy indoor environment enhances the comfort and well-being of building occupants. Visually appealing outdoor landscapes provides residents with access to highly stimulant external views as well as the opportunity to relax thus improving health, quality of life and productivity. Ensuring healthy indoor environments, the following sustainable development principles will be considered: -

- Volatile Organic Compounds levels in interior finishes and products.
- Products low in formaldehyde emission levels.
- Where practical, window openings to bedrooms and common areas for natural ventilation whilst complying with the BCA operability restrictions and acoustic constraints. Bedrooms and common areas restricted by stringent acoustic constraints may be fixed.
- Adaptive comfort control shall be investigated, allowing for internal set-points that adjust depending on outdoor environmental conditions, thus saving energy and better conditioning internal spaces for a fluid transition with the outdoor environment.

2.9 REDUCE THE ENVIRONMENTAL IMPACT FROM BUILDING MATERIALS THROUGH REDUCTION, RE-USE AND RECYCLING OF MATERIALS, RESOURCES AND BUILDING COMPONENTS

The production and use of building materials has placed pressure on natural resources as they are exploited by the production industry. Energy is used to extract, produce and transport building materials, which causes pollution and if poorly selected the material ends up as waste, to become landfill or incinerated. In minimising the use of these material, the following sustainable development principles will be considered: -

- Timber and composite timber products used in the building and construction works sourced from either/or a combination of post-consumer re-used timber; or Forest Stewardship Council (FSC) certified Timber as appropriate for the project.
- PVC products or products containing PVC to meet the Best Practice Guidelines for PVC in the built environment.
- Thermal insulants and refrigerants to avoid the use of ozone-depleting substances in both manufacture and composition.
- Wall, ceiling, carpet and floor finishes, and adhesives and sealants to have low Volatile Organic Compounds emissions.

- Composite wood products used to have low formaldehyde emission levels (rated E0).
- Non-allergenic materials to be selected for furnishings.

2.10 IMPROVE THE BIODIVERSITY

Development has caused the displacement and degradation of flora and fauna within New South Wales unique natural landscape. Protecting and restoring the natural ecosystems will ensure the long-term ecological sustainability of New South Wales. The following sustainable development principles will be considered: -

- Landscaping design to be low water use and predominately consist of native planting.
- Additional planting for street trees and new planting in residential gardens to encourage biodiversity.
- Rainwater with drip irrigation/moisture control to be considered for landscape irrigation.
- Minimise pesticides, herbicides, and chemical fertilisers.
- Suitable systems to be implemented to improve runoff water quality.
- Retain native vegetation areas of ecological importance to facilitate the safe movement of native fauna.

2.11 SUPPORT GREEN TRANSPORT

Due to New South Wales growing population, alternative transport options have been investigated to assist in reducing air pollution and road congestions, whilst promoting an active and healthy lifestyle. In relieving the pressure on New South Wales motor vehicle transport sector, the following sustainable development principles will be considered: -

- Secure bicycle parking spaces nominated for residents in a central bicycle centre, and additional bicycle parking spaces nominated for visitors and retail staff to be distributed around the landscape.
- Nominate parking bays for carpool / car share, located adjacent to a public road and readily accessible by car share participants who are not Residents of the development.
- Achieve a Walk Score of 98%

2.12 DEVELOP ADAPTABLE BUILDINGS AND SPACES

The development has carefully allowed for community engagement in a broad range of outdoor activities in common areas to address the increasingly importance of New South Wales growing population. In addressing people's and community's longevity, the following sustainable development principles will be considered: -

- Communal garden planting to common areas to provide solar access and encourage interaction / connection with the outdoors.
- Open landscaped areas to encourage active play.
- Sun-shaded areas from trees, buildings, pergolas, or other sun-shading devices.
- Outdoor dining/seating areas and associated facilities.
- Barbeque facilities to communal areas.
- Connected, safe & secure, attractive, well-lit, and efficient walking and cycling pathway spaces (including streets and open spaces) both internally and externally.

2.13 BUILD A SAFE AND DIVERSE COMMUNITY

Significant measures have been undertaken to ensure that this development minimises its impact upon the local environment and addresses environmental, social and economic sustainability aspects for the buildings' occupants, users and the wider community. Ensuring a positive community and providing people with a sense of identity, the following sustainable development principles will be considered: -

- Integrated public spaces that will be highly activated by retail and outdoor seating and transitional spaces
- Achieve a Walk Score of 98%
- Provide a community communication system (e.g. intranet, newsletter, community notice board).

2.14 INFORM THE END OWNER AND USER

To ensure the original design intentions and operational savings are delivered, the development will provide the End Owner and User with a guide. This includes information relevant for the building's Residents and management in regard to reducing greenhouse gas emissions, the monitoring and metering of energy and water consumption, local transport facilities and other sustainable development principles.

SECTION 3.0 EXCEEDING SECTION J

To establish a design that exceeds the National Construction Code’s Section J, a number of passive design principles (such as optimised building fabric, thermal mass, insulation, glazing and solar shading) are being investigated to reduce internal plant loads.

Wherever possible, Section J minimum insulation requirements will be increased, and enhanced glazing will be implemented to ensure optimal building performance as well as occupant comfort.

The non-residential components will be compliant with Section J using the JV3 Verification Methodology. This offers greater flexibility to ensure the building fabric exceeds Section J Deemed-To-Satisfy requirements. Furthermore, building services will be designed to be efficient and mechanical ventilation, will be pursued as a matter of course to meet the development’s major ESD targets, e.g. Green Star Principles and BASIX.

Optimal window-to-wall ratios across the building will enable better thermal comfort as well as reduce energy used by the HVAC system. The interplay of North versus South building fabric will translate into the proposed facade. High performance glazing will reduce the penetration of radiant heat, limit excessive sunlight into the building as well as help moderate internal temperatures. In addition to the exposed thermal mass afforded, the demand for air-conditioning (heating and cooling) will be effectively minimised and thus enhance Occupant comfort. Internal blinds will also be incorporated as a means of daylight glare control.

The Design Team has actively incorporated design principles that mitigate the occurrence and therefore impact of urban heat island effect. These include the multiple green roofs, new planting and retained vegetation.



Figure 6: Proposed Render

SECTION 4.0 PRELIMINARY DESIGN REVIEW

EMF Griffiths have performed a preliminary design review and analysis of the proposed development of 7 City View Road, Pennant Hills. The building form, shading from surrounding buildings, solar exposure, potential for passive design and enhanced building fabric have been examined.

4.1 SITE WEATHER

Located in the National Construction Code zone of Zone 5, this area is characterised as a warm temperate. For NatHERS / BASIX, it is a Climate Zone of 56.

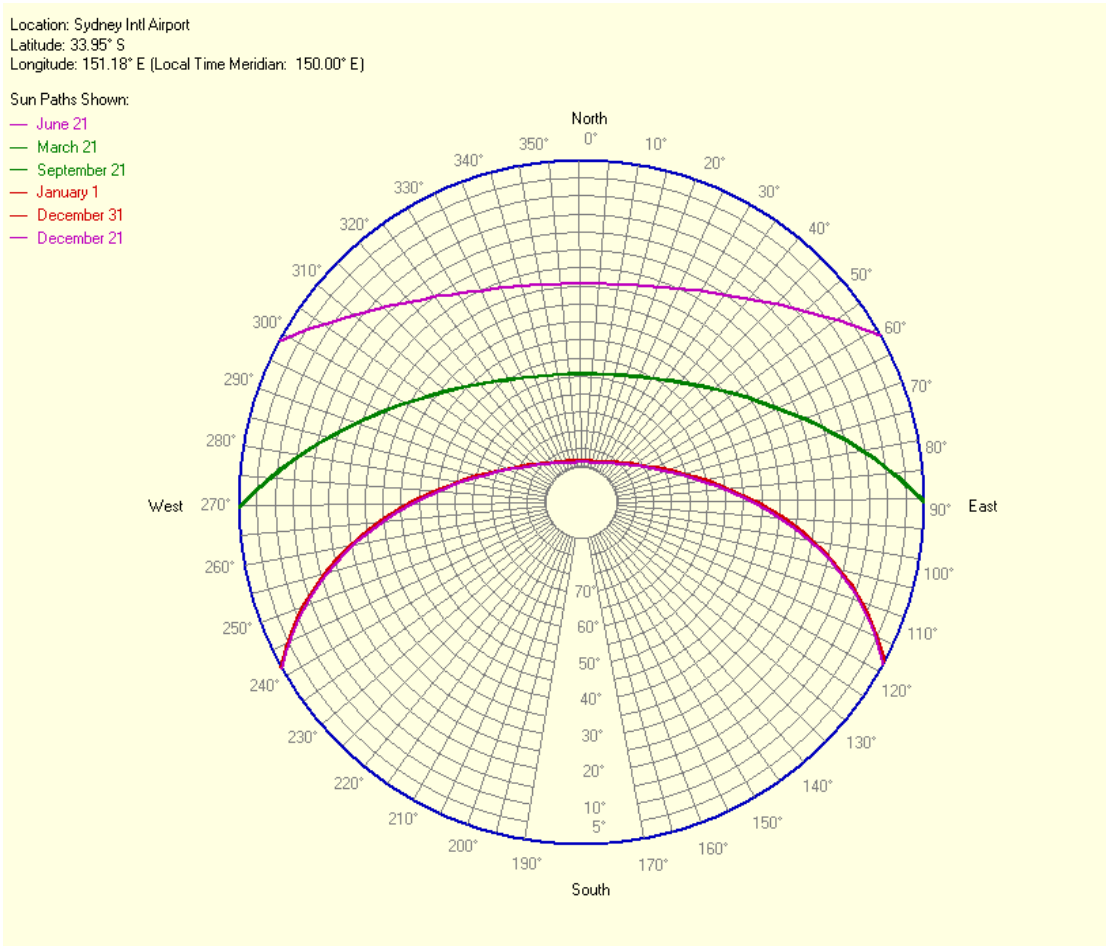


Figure 7: Weather Data

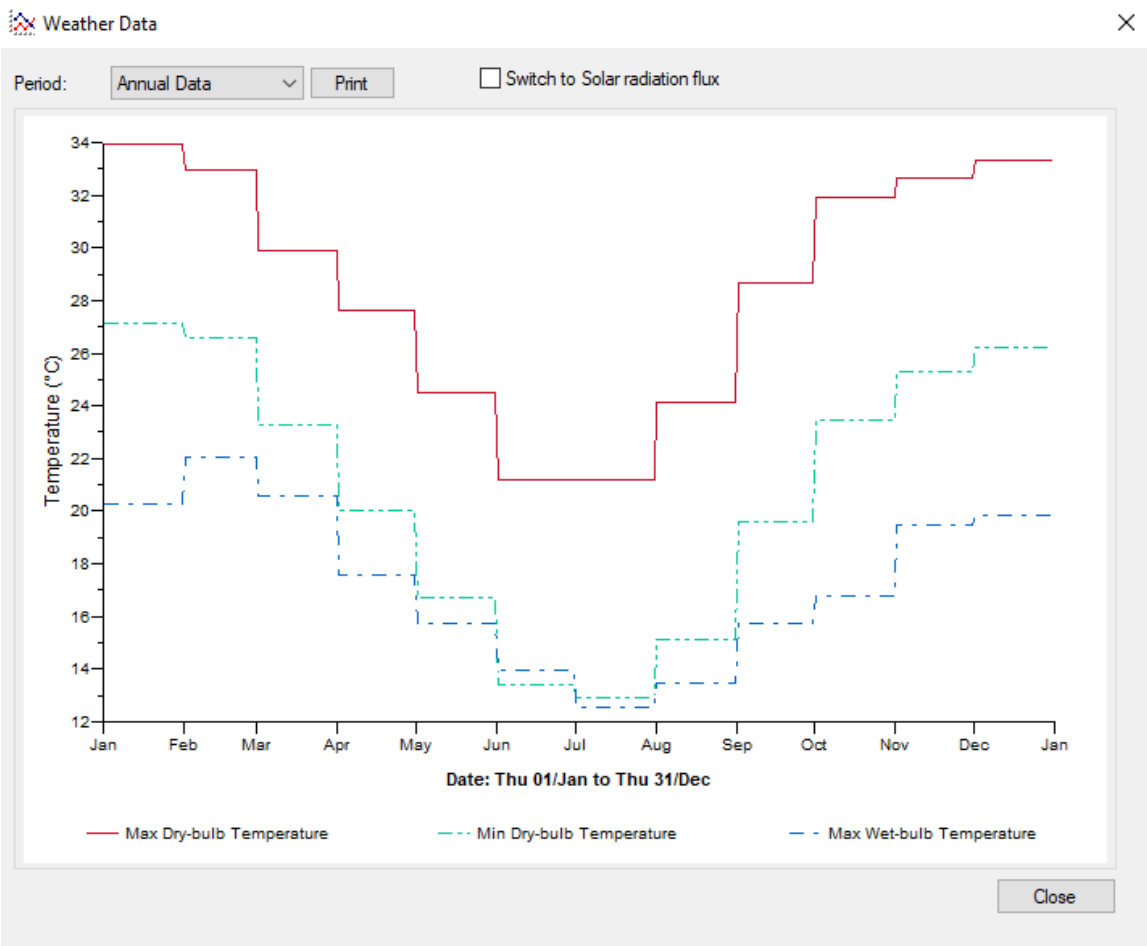


Figure 8: Weather Data

4.2 PHOTOVOLTAIC (PV) POTENTIAL

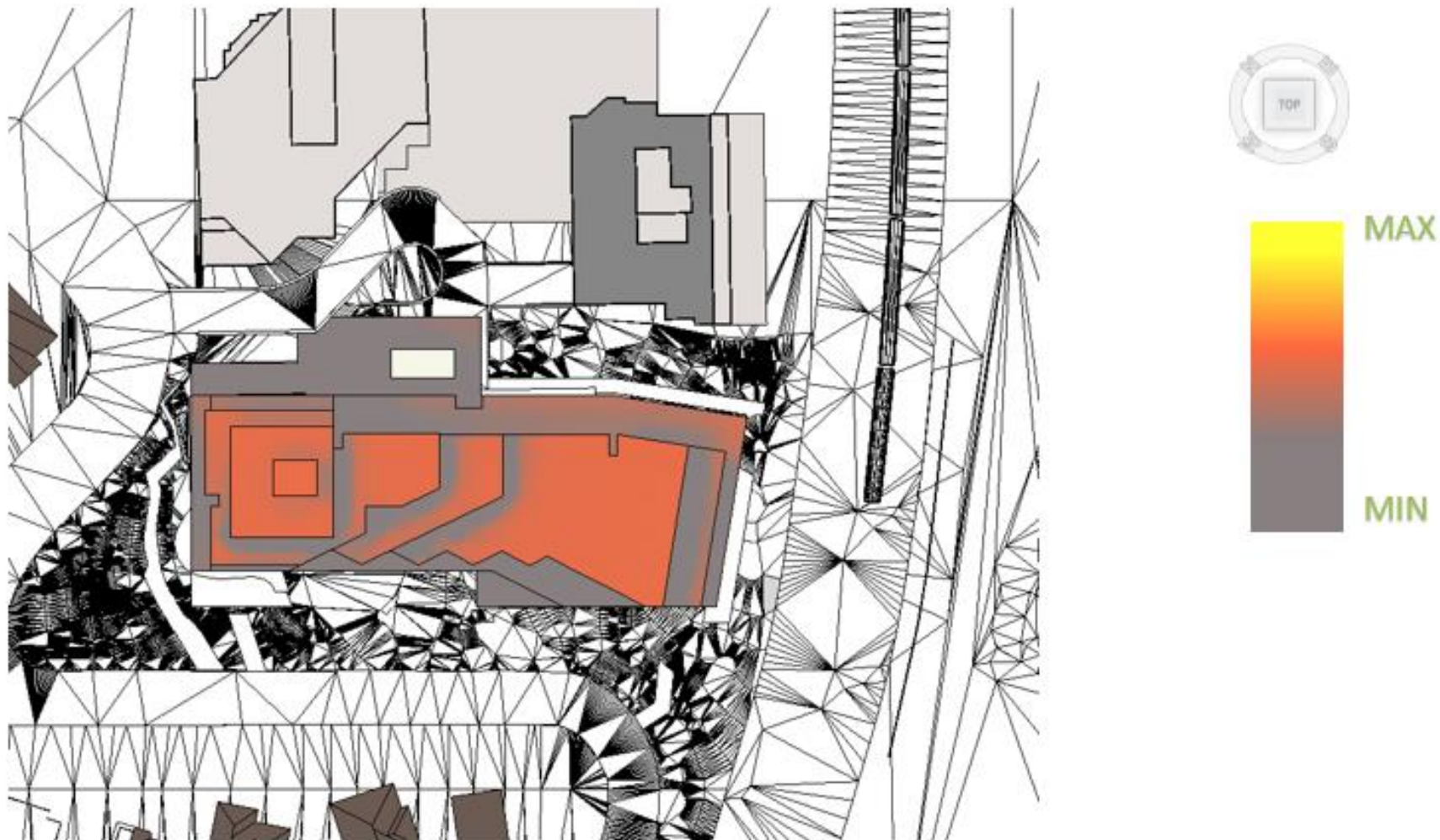


Figure 9: PV Potential

4.3 SOLAR ANALYSIS – HOURS OF EXPOSURE

A preliminary solar analysis study has been carried out on the proposed form for 7 City View Road, Pennant Hills. The orientation, design and mass contribute to the overall passive design of the proposed development. Further recommendations to be considered as the design progresses includes increased shading to the western façade.

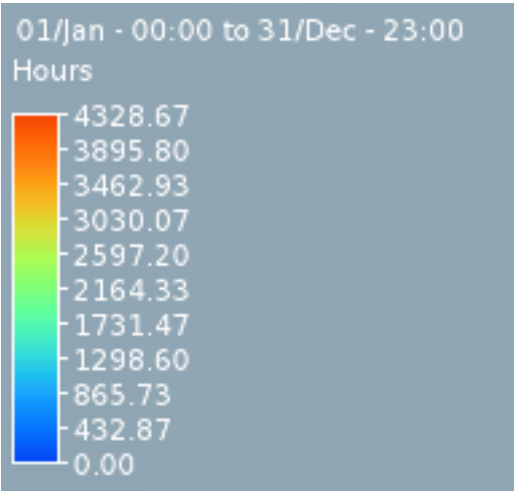


Figure 10: Hours of Exposure Graph

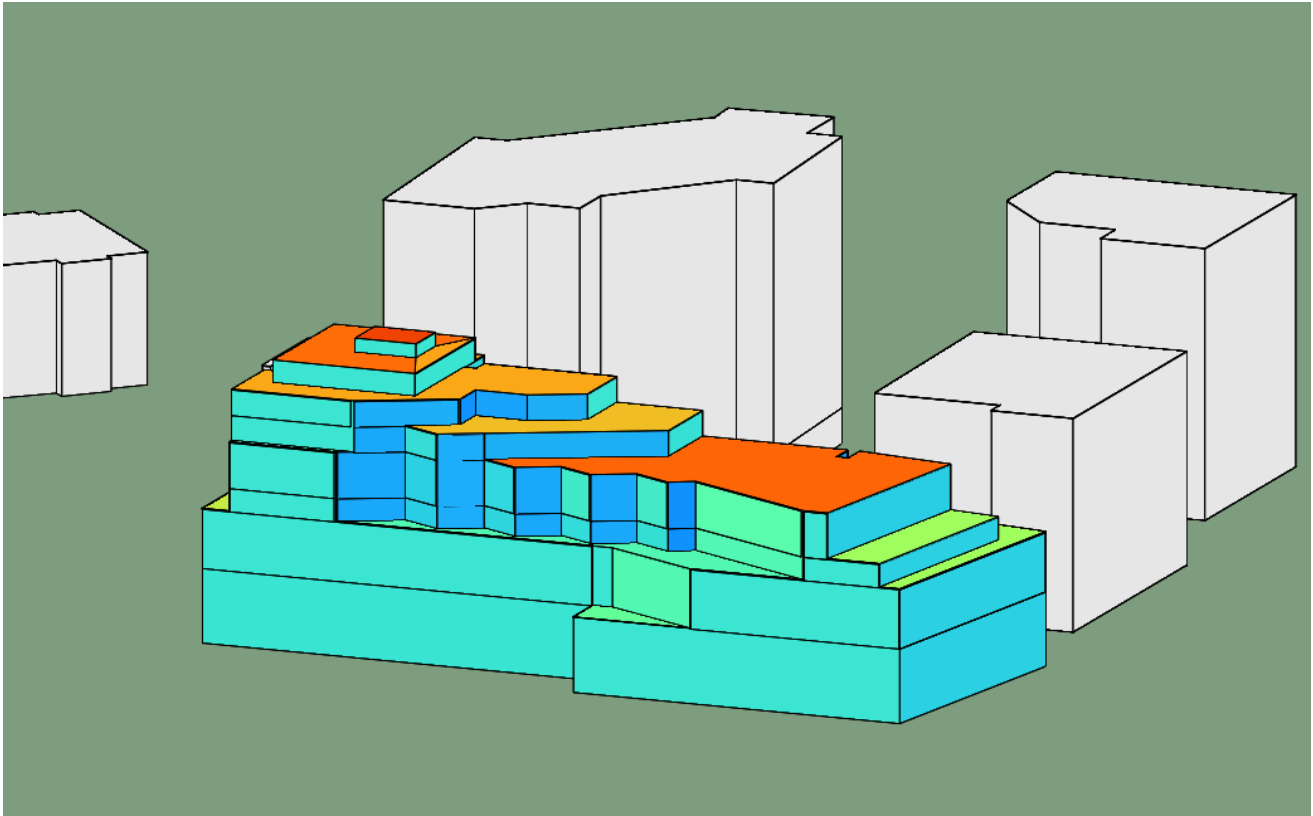


Figure 11: Solar Analysis

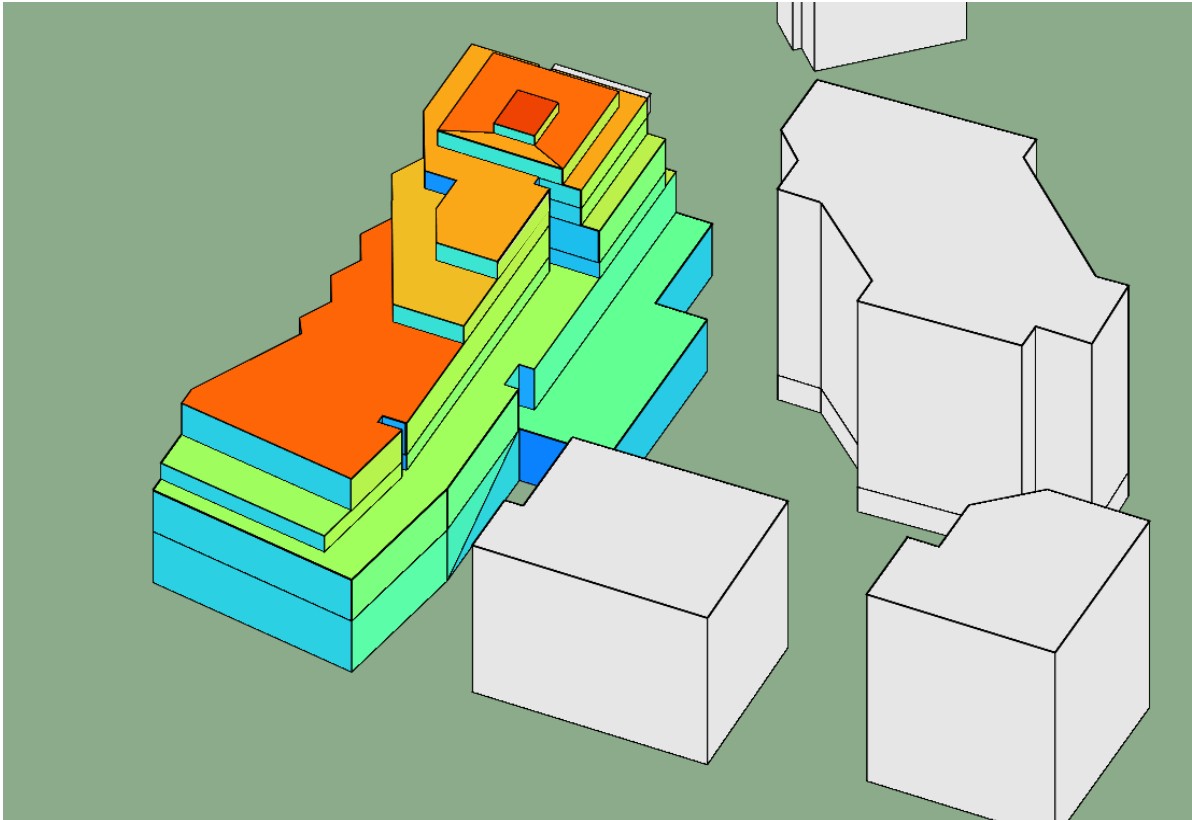


Figure 12: Solar Analysis

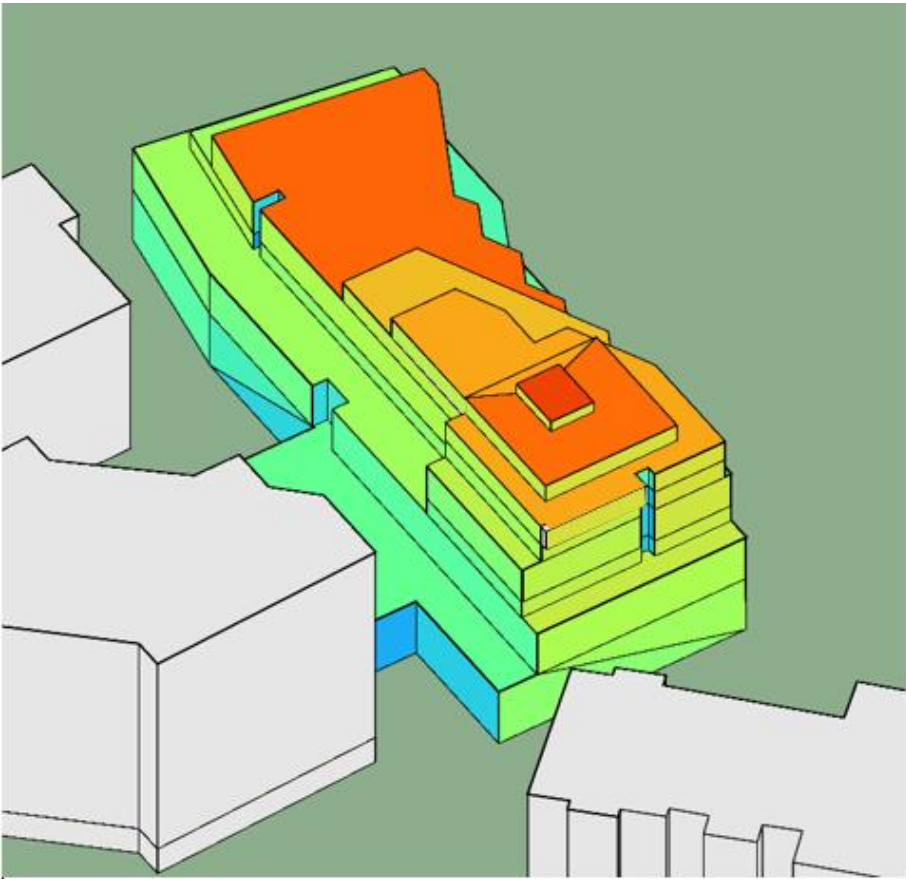


Figure 13: Solar Analysis

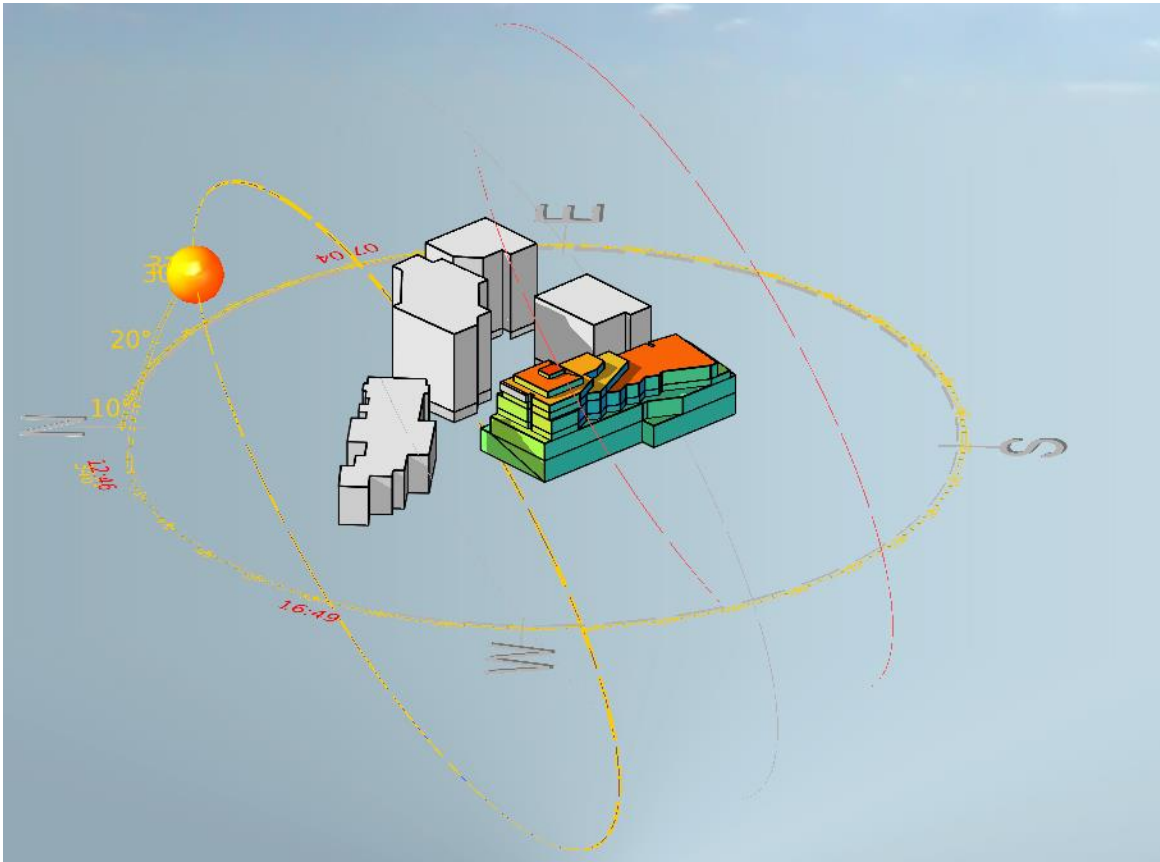


Figure 14: Sun Paths

4.4 SUMMARY AND RECOMMENDATIONS

The Design Team has actively incorporated design principles that enhance the passive design and sustainability of the proposed development whilst mitigating the occurrence and therefore impact of urban heat island effect.

Solar Power

The rooftops have significant potential for PV. Installation of photovoltaics would reduce the cost of electricity supply and reduce the reliance on the grid. Solar façade panels BIPV (Building-Integrated Photovoltaics) were considered ineffective. Solar power via a PV system as well as solar hot water are being investigated to further the sustainability of the development.

Rainwater Harvesting

Incorporating rainwater catchment and storage would decrease the reliance on the water network and assist with the irrigation of flora. Water harvesting and water recycling are being investigated to further the sustainability of the development.

Cross Flow Ventilation

The design of the building incorporates cross ventilation. Including significant operable windows will further assist all units with cross flow ventilation.

Lighting

It is recommended all lighting to be LED.

Passive Design

Shading

Shading has been incorporated into the design of the development. The development will receive shading from the proposed screens, balcony's / overhangs surrounding vegetation and surrounding buildings. Solar analysis studies have been carried out for optimal shading design. Further recommendations for shading include incorporating more shading via overhands or screens to the Western façade.



Figure 15: Proposed Render



Figure 16: Proposed Render

Solar Access

The proposed design and development of the building maximises orientation and solar access. With the proposed windows and glazing, natural lighting will reduce the need for electricity demand.

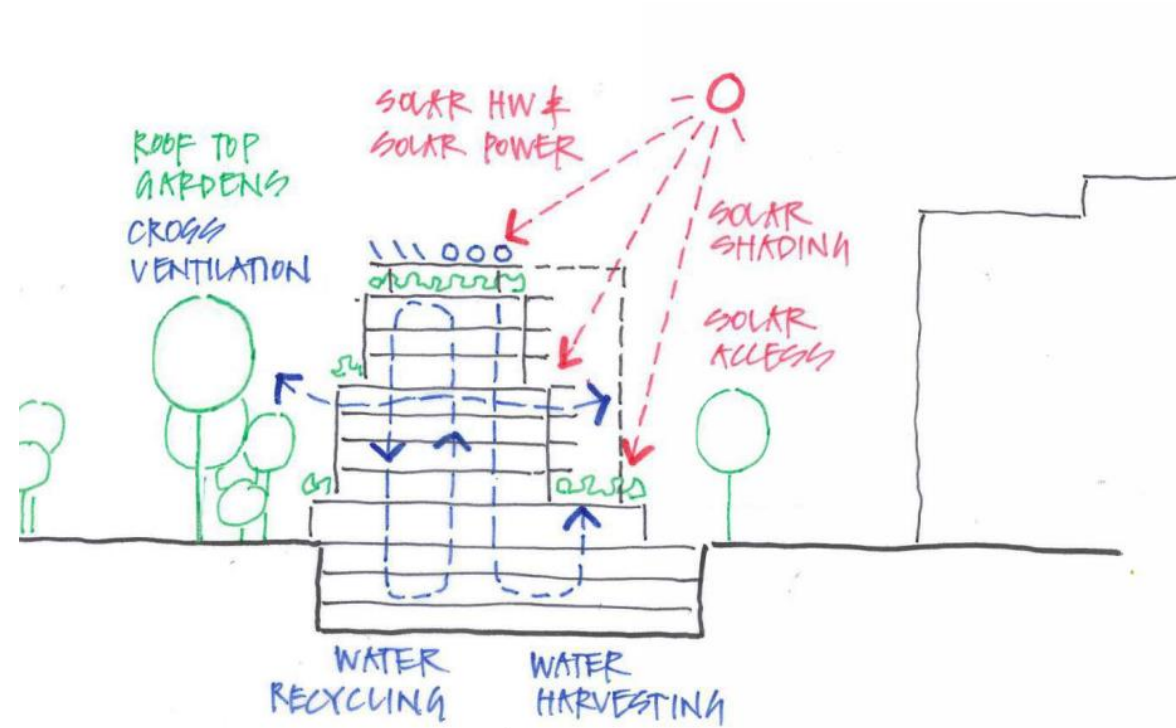


Figure 17: Sustainability Initiatives

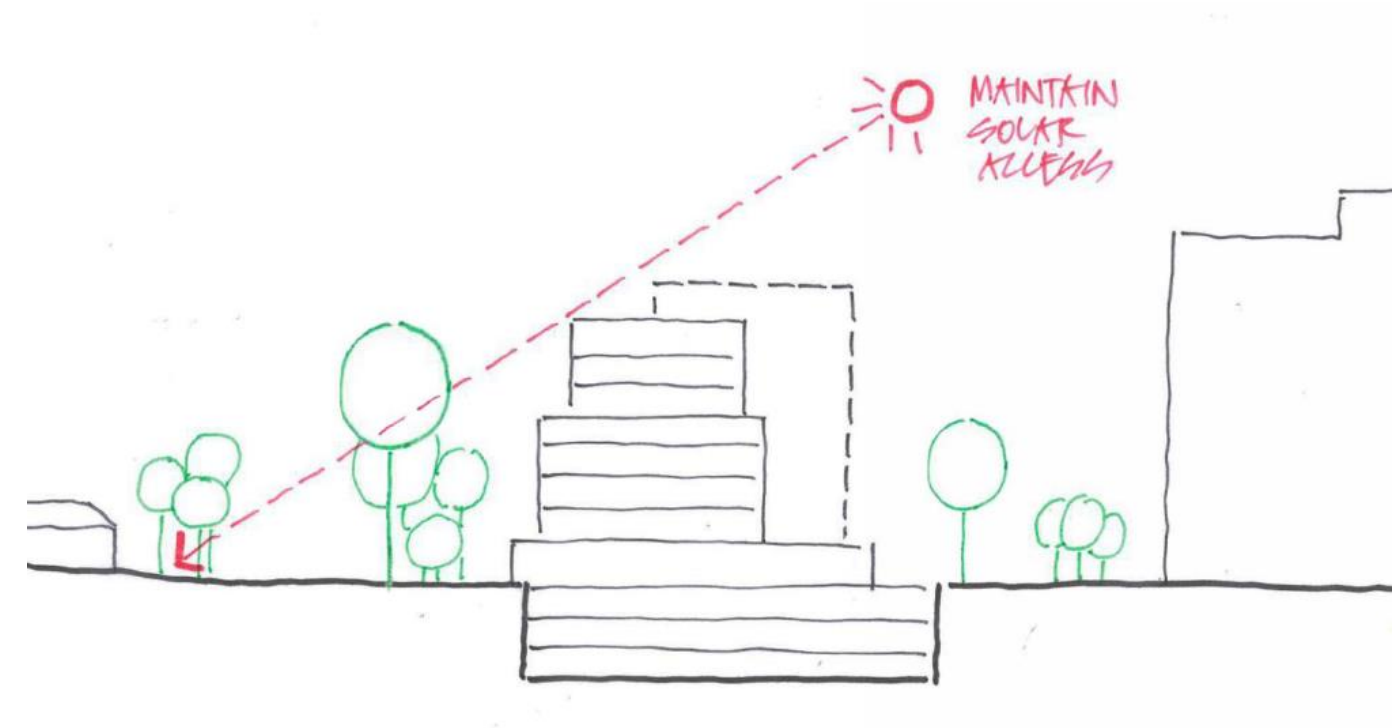


Figure 18: Sustainability Initiatives

Green Roofs

Green roofs have been incorporated into the design of 7 City View Road, Pennant Hills. Green Roofs have significant benefits including reducing the heat island effect, rainwater buffer, reduces the ambient temperature, assists to regulate the indoor temperature, saves energy, improves air quality, and provides sound insulation benefits.

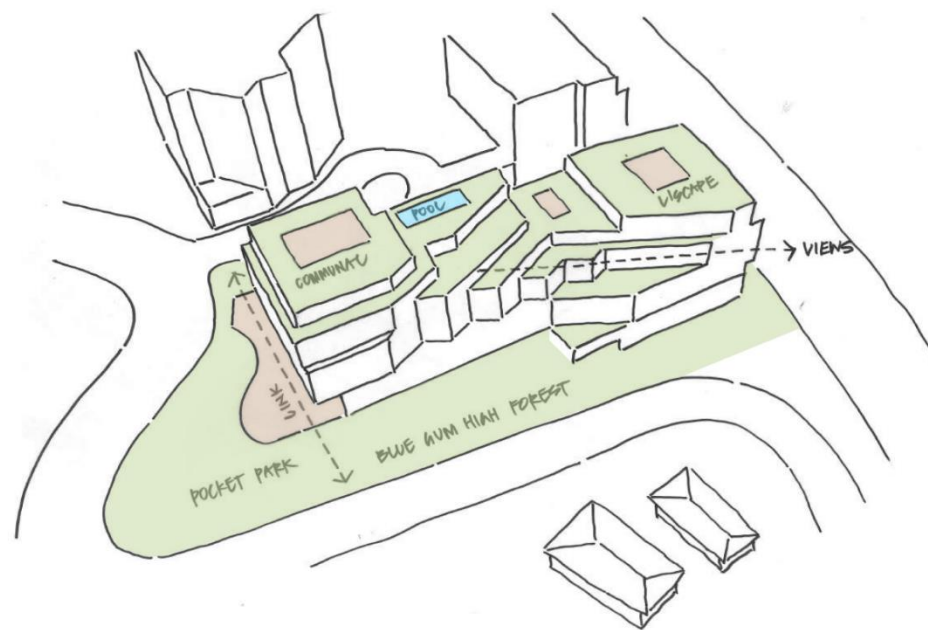


Figure 19: Communal Landscaping



Figure 20: Green Roofs

Fans

To assist with lower energy use compared to air conditioning, fans are recommended for units.

Insulation

It is recommended all exposed roofs and all suspended slabs are insulated where conditioned areas meet the outside air. External wall insulation as well as internal party wall insulation is also recommended, as insulation acts as a thermal envelop barrier, helping to keep the temperature more consistent year-round. Insulation should form a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier.

Glazing

Glazing can be a huge source of heat gain and heat loss. High performance glazing is recommended to improve the thermal performance of all residential and non-residential spaces.

Building Sealing

Air leakage can account for significant heat gain and heat loss. Building sealing must be as per part J3 of the NCC. Any exhaust fans installed, for example for toilet ventilation, require a sealing device such as a self-closing damper.

Landscaping

For new planting it is recommended native and low water species are selected. Significant landscaping is proposed for the site as well as the blue gum high forest edge being retained. With the proposed landscape concept, the protection of ecology is paramount, with bee hotels proposed, with the design drawing upon the existing vegetation of the surrounding areas, aiming to connect the native vegetation corridors whilst providing habitat for local wildlife.



Figure 21: Proposed Landscape Concept