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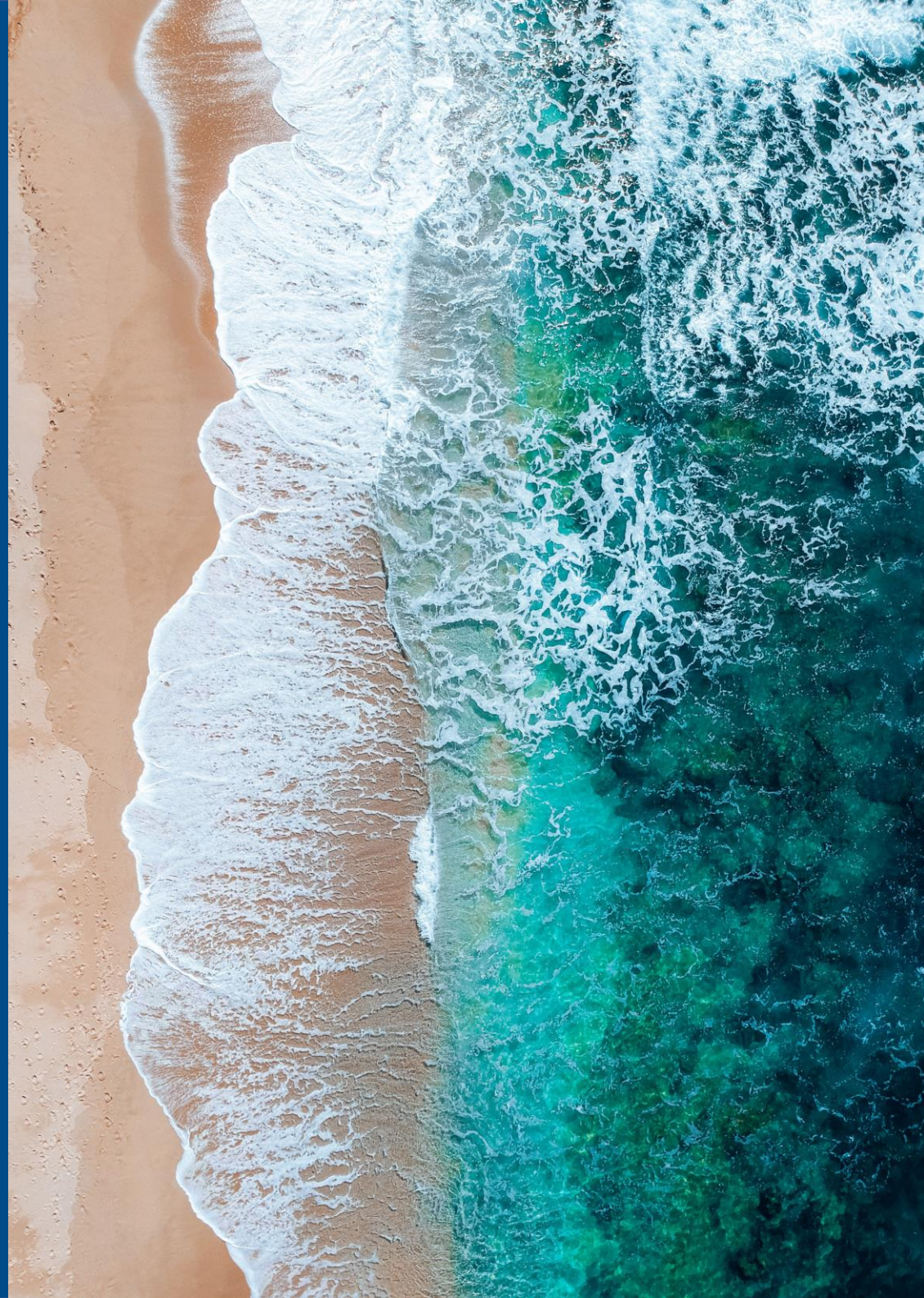
6-10 Bowral Street Kensington

Sustainability Strategy Review Report

9th February 2023



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1 Contents

2 Executive Summary

The proposed mixed-use development at 6-10 Bowral Street, Kensington will be designed according to best practice Green Building design principles and environmental rating tools. This will be supported by commitment to meet the Kensington and Kingsford Development Control Plan (DCP - 2020), which are as follows:

- 5 Star Green Star rating – certified by the Green Building Council of Australia (GBCA)

The proposed detailed DA stage design – mainly to consider built form, passive design strategies and regulatory compliance and local climate review to understand the local climate and site resources such as local temperatures, solar radiation, rainfall and its site constraint given the location of the proposed development.

The building has been carefully assessed to improve building envelope performance, adapt to future climate change by applying façade optimisation principles for energy, daylight, glare, views, shading strategies according to mass and orientation.

Employing the vision, we recommend the project team to seeks and maximise opportunities for on-site energy supply and reduce CO_2 emissions for their vision toward carbon neutral future. Following renewable energy strategies are recommended to be implemented on site subject to further assessment:

- Solar PV system – total system size to be advised as the design progress in conjunction with electrical engineer.

Anticipated benefit as a result of energy efficiency based on the benchmark and best practice data, and with the implementation of appropriate technologies the buildings will have minimum 10 to 15% of energy reduction compared to standard practice (Code compliant building). This is significant first step in a process that will involve driving down the carbon footprint of the business through detailed design, construction and occupation.

Other aspects of sustainable design that are not discussed within this report but will follow once detailed DA is progressed into later design stages. A Green star score card for 5 Stars target is proposed, which will be further developed with the design team as the project progresses through design development stages. Most of these requirements will be driven by 5 Stars Green Star target.

This report presents concept review of the current architectural scheme and through site and façade review. Other aspects of energy efficiency are not covered in this initial review as this is intended to assist architect to make key design decisions on façade, layout and overall building envelope. A separate basis of design will be issued Post DA to facilitate the building and its services design to meet minimum sustainability aspirations for the project.

3 Introduction

3.1 Building Description

The proposed mixed-use development at 6-10 Bowral Street, Kensington comprises of 39 units with a mix of studio, 1 bed, 2 bed and 3 bed apartments spread over 9 levels including ground floor.

- Basement – carparking level.
- Ground floor – residential unit and commercial space.
- Residential Apartments – Levels Ground to 8.

The development has following approximate Gross Floor Area (GFA) split:

- Commercial – 100 m^2; and
- Residential – 3,578 m^2.

ESD strategy review presented in this report is based on the DA documentation produced by PBD Architects.

3.2 Sustainability Outcome

Sustainability strategy assessment applies to the whole development which covers both residential and non-residential part of the development. The sustainability objective is to meet followings for the development.

- 5 Star Green Star certified rating

The residential part of the development is also required to meet the minimum regulatory compliance of NatHERS and BASIX which is covered in a separate assessment.

3.3 Site Context and Local Climate

The proposed development is in Climate Zone 5 as per NCC 2022. The Climate Zone 5 is warm temperature and generally has warm summer and cold winter with four distinct seasons. The site is located within Randwick city council boundary and is only few kilometres from the Sydney CBD. The site's location context with surrounding buildings is shown in Figure 1.

The building form and location provides several opportunities and constraint which will influence the building envelope, façade and other aspect of sustainable design.

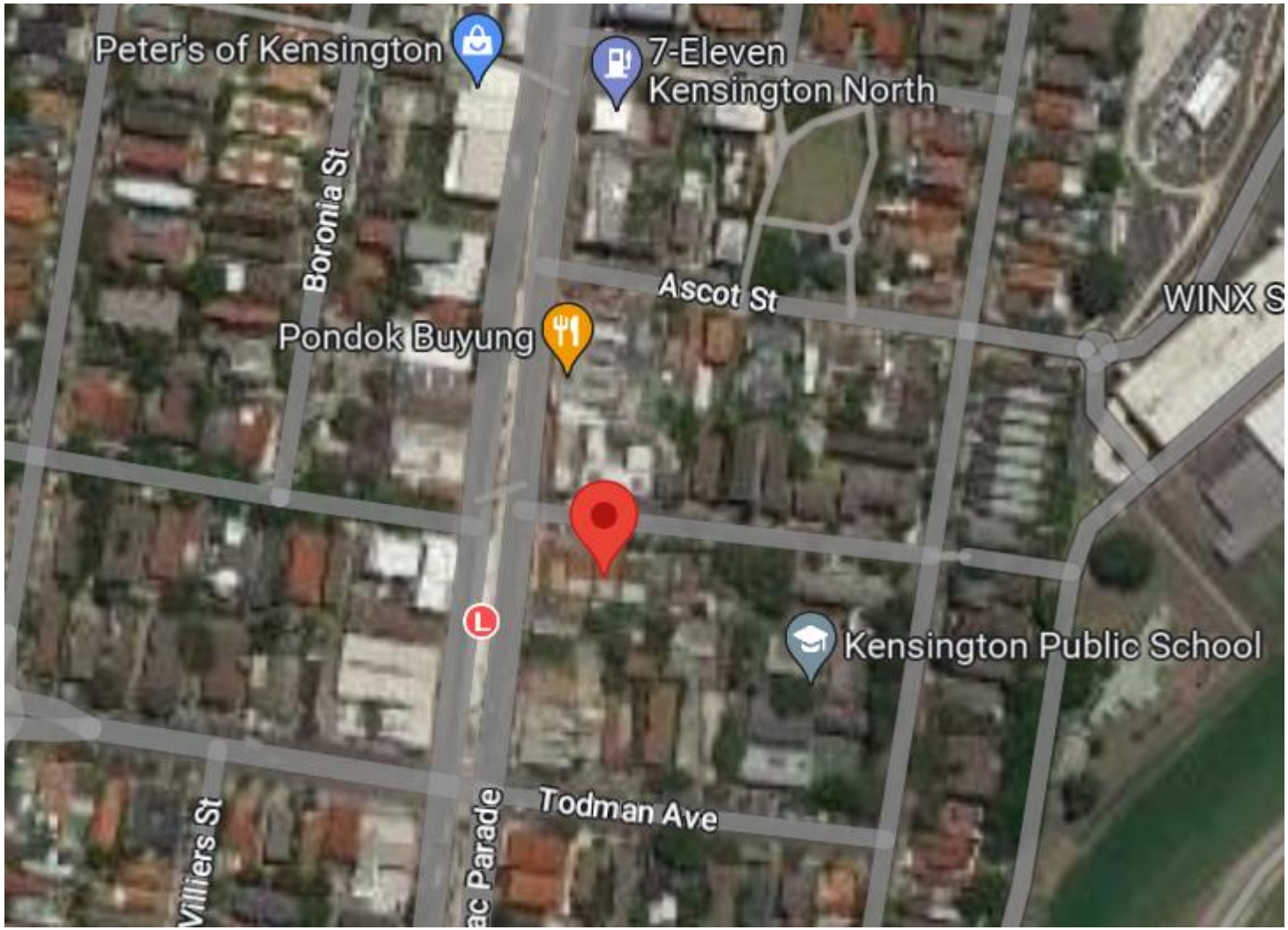


Figure 1: Site Context and Surrounding

4 Sustainable Design

This section provides an overview of key mandatory requirements relating to the development and a summary of regulatory, local planning policy, voluntary sustainability tools targeted to enhance the overall development performance.

4.1 Regulatory Requirements

4.1.1 National Construction Code (NCC)

National Construction Code (NCC 2022) Section J sets out a range of measures that requires buildings to be constructed to improve energy efficiency. This requires improved building energy performance and ensures the installed services are operated in an efficient manner. In the new NCC 2022 in addition to efficient building envelope and services all commercial buildings are required to allow at least 20% of roof area of a building must be left clear or an equivalent generation capacity elsewhere onsite for installation of solar photovoltaic panels.

Energy efficiency provisions are outlined for building envelope, construction detailing and building services, energy monitoring and on site distributed energy resources. At Development Application (DA) stage of the project Section J assessment has not been carried out will soon follow after DA approval of the project.

4.1.2 BASIX

The Building Sustainability Index (BASIX) was released in 2004 by the NSW Department of Planning to set standards for reductions in greenhouse gas and potable water use associated with new residential development in NSW. This now includes greenhouse reduction standards for all new multi-unit residential housing and renovations over $50,000. BASIX analyses data on size, buildings materials, location etc of the intended development and determines a score benchmarked against thermal, energy and water targets.

The DCP requires residential component of mixed-use development by legislation to pass BASIX to ensure BASIX water and energy commitments are met. For compliance with the specific targets for residential component of the development please refer to the BASIX report produced by ESD Synergy.

4.2 Kensington and Kingsford Town Centre DCP (K&K DCP)

K&K draft DCP 2020 (Part C – section 22) sets out long term vision and how city will grow in the future and how the DCP addresses the key challenges in terms of sustainable development. Following are the key objectives of the DCP in relation to:

- To establish Kensington and Kingsford as a best-practice environmentally sustainable district with a net zero carbon footprint

- To encourage the design of buildings that go beyond current minimum sustainability standards
- To adopt sustainable design techniques in the lighting, stormwater collection, and landscaping of the public realm
- To provide innovative best practice waste solutions capable of reducing litter and increasing reuse, recycling and recovery of waste

There are specific controls within the DCP that applies to the development:

- All buildings must achieve a minimum 5 Star – Green Star certified rating.
- DAs for strategic node site must be designed to achieve a GBCA exceeding 5 Star Green Star rating with a sustainability strategy giving priority to the following innovations:
- Waste collection
- Renewable energy opportunities
- Water harvesting and re-use.
- Vertical and Roof greening
- Incorporate passive deign features.
- Reduction in embodied energy and operational energy
- Health and wellbeing of occupants
- All development must address the requirements of Ecologically Sustainable Development of the DCP
- New development must include EV charging points.
- All new development to incorporate a localised automated waste collection system in accordance with Council's automated collection system guidelines.

4.3 Green Star – Buildings

Green Star is a holistic rating tool developed by the Green Building Council of Australia (GBCA). Green Star Design buildings is considered the most appropriate tool for the project to rate the development. Achieving Green Star buildings V1 (GSBv1) rating would also set a strong foundation for the sustainability credentials that:

- Assist projects to achieve and rate their sustainability goals

- Encourages a new approach by rewarding healthy, resilient and positive, best practice outcome and excellence.
- Provide consistent and clear advice in an easy-to-use manner.
- Restore ecological value, protect biodiversity and land use.
- Contribute to transform buildings and a sustainable economy; and
- Drive innovation.

Green Star rating is scaled from zero to 6 Stars, where ratings of 4 Stars or higher are able to submit for certification. The percentage score for 4 Stars and beyond is summarised in Table 1.

Table 1: Rating Score and Credits Points

Star Rating	Percentage Points Score and Star Rating
4 Stars	15 – 34 Score – Australian Best Practice
5 Stars	35 – 74 Score –Australian Excellence
6 Stars	75 – 100 Score – World Leadership

4.3.1 Green Star Benchmarking

Green Star benchmarking of the current concept design targeting possible potential points and score is summarised below to demonstrate sustainability credentials of the development.

A 5 star green star rating and the score is summarised in Table 2 and Figure 2 below.

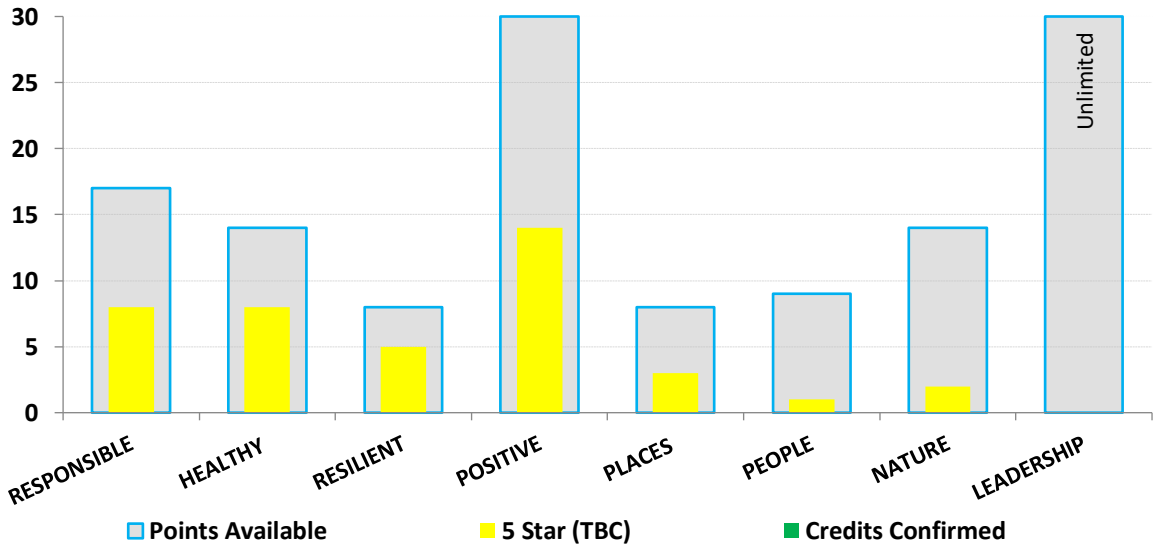


Figure 2: Green Star Sore Summary

Table 2: Green Star Points Tally

Environmental Category	Points Available	5 Star (TBC)
Responsible	17	8
Healthy	14	8
Resilient	8	5
Positive	30	14
Places	8	3
People	9	1
Nature	14	2
TOTALPOINTS	**100**	**41**
LEADERSHIP	Unlimited	**0**
TOTAL POINTS		**41**
Combined Total		***41***

Full score card targeting 5-star Green Star strategy is provided in Appendix A of this report. The targeted score / points only represent initial assessment of possible points subject to further investigation with the design team as the project progresses through design stages. The strategy in place demonstrates a commitment to meet the sustainability aspirations of meeting a certified rating of 5-star Green Star set for the project.

5 Sustainable Design Strategies

There are a number of initiatives that could be considered to achieve and respond to the intent of K&K DCP. The following sections provide an overview of some of the possible design responses currently being considered. These will be further refined through the detailed design stages. In summary, passive measures and efficient services are to be used to minimise energy use and reduce the carbon footprint of the building whilst maintaining high levels of indoor environmental quality to maximise occupant comfort. Materials used in the building will, where practical, be from environmentally accredited suppliers and of low toxicity to provide good indoor air quality.

5.1 Building Envelope

The building envelope will be designed in accordance with the BCA Section Party J1 thermal performance requirements and BCA Building Sealing – Part J3 requirements to minimise air infiltration. The building envelope is critical to managing external heat gains and losses from the building.

Solar shading is used for screening direct sunlight in order to either reduce the heat load or to avoid glare from the windows. External solar shading is the most efficient way to reduce heat radiation, as the rays of the sun will not pass through the windows.

Table 3 shows a qualitative relative comparison of various solar shading devices. Variations may occur depending on the strategy and climatic conditions. For the proposed mixed use building we recommend a combination of the above shading strategy to be employed to address heat, glare, access to daylight and visual amenity.

Table 3: Qualitative Comparison of Shading Strategies

Type	Heat Screening	Glare Issues	Daylight Access	Field of Vision	Wind Sensitive
Awnings	Good	Average	Good	Good	Yes
Projections	Good	Average	Good	Good	No
External Blinds / Screens	Good	Average	Depends	Good	Yes
Internal Blinds / Screens	Poor	Average	Depends	Good	No
Solar Shading Glass	Poor	Poor	Good	Good	No

5.2 Natural Ventilation

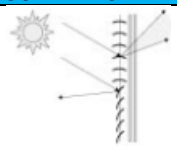
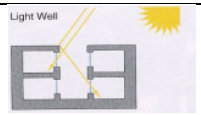
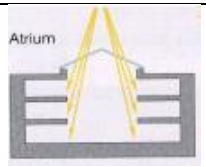
When the weather and air quality are at acceptable levels, natural ventilation via opening of windows would allow potential reduction in mechanical cooling and when appropriate, this would be encouraged. The limitations to natural ventilation and thus it's effectiveness in reducing energy consumption is affected by the following considerations:

- Air pollution and vehicular emissions which requires filtration therefore would require a fan forced ventilation;
- Poor weather conditions such as rain and excessive wind and storms;
- Noise consideration from Pacific highway and other minor adjacent streets;
- Safety and security consideration; and
- Operational and controls issues.

5.3 Daylighting and Artificial Lighting

Lighting is one of the main focuses in reducing the overall electrical energy use of the building. The building to make use of available daylight to reduce the reliance on electric lighting. To reduce the need for cooling, direct solar gain also needs to be reduced, but this needs to be balanced against the requirements to get sufficient light into the building to make electric light redundant most of the working day. The proposed shading strategy minimises most of the direct solar radiation and at the same time allows the diffuse light through the glazed elements.

Table 4: Daylighting Concepts and Strategies

Name	Type of system	Location	Design Criteria
Louvers and Blinds		Vertical Windows	- Glare protection - External views depends
Light Well		Vertical windows and Roof	- Increasing the depth of light penetration - Light guiding into the depth of room
Skylight		Roof	- Light guiding into the depth of room

It will be preferable that where practical, spaces and fenestrations are designed to get daylight factors around 2% in as many occupied areas as possible. Daylight factors of around 2% are at a level at which day lighting can be assumed to replace some electric lighting for most of the day. Experience has shown that it is very difficult to achieve high daylight factors in deep plan rooms and rooms that are day lit from a single side only. Single sided spaces should be limited to 4 – 5 meters in depth and double sided to around 8 – 10 meters. The plan depth of spaces can be increased by a number of features such as positioning windows high in the façade, the inclusion of light reflecting shelves, light wells and where possible clerestory windows. Some of these strategies are presented in Table 4.

Utilising daylight as a passive strategy to minimise energy consumption requires active lighting controls and careful thought of space configuration. Effective control through active switching and or dimming needs a thorough and robust design and should only be engaged after all aspects of the proposed solution have been considered.

All internal lighting will be designed to achieve BCA Section J part J7. We recommend lighting design to includes LED

For residential apartments, BASIX commitment requires LEDs or Fluorescent artificial lighting to be used. We recommend LEDs throughout the development. Energy efficient lighting to be specified by lighting design engineer for retail areas appropriately zoned with controls to ensure switching off when not is use or not required.

The control system for lighting consists of a combination of some or all of the followings:

- Automatic sensing and control components
- Timers
- Manual overrides
- Dimmable luminaires to perimeter areas (minimum 2.5meter depth) for the daylighting control of luminaries in common areas where feasible.
- Motion sensors within plant rooms, storage area, office, kitchen, and amenities
- On/off control
- Mechanical HVAC System

The mechanical services will be specified to achieve the requirements of BCA Section J Parts J6. We recommend the mechanical design to feature a number of innovative energy efficient measures, such as:

- Efficient air source heat pumps for cooling and heating of apartment spaces
- An efficient heating and cooling plant

- Building management and control system (BMCS) to automate all plants, monitor faults, optimum start/stop, alarms and reporting of energy consumption.

The air conditioning system also comprises economy cycle where feasible and reasonable and also to have the ability and functionality for night purge operation. It is recommended the economy cycle is activated when air temperature is between 14°C and 22°C and the outdoor air temperature is less than the return air temperature.

Night purge operation to be enables after midnight to 4 AM the following morning to allow for building to be cooled using 100% outdoor air when the room temperature is above 24.5°C and the outside air is 2°C below the room temperature.

The BMS system can vary the starting time of the night purge cycle such that the plant will start at the latest possible time that will allow comfort conditions to be achieved by occupancy time. The operation of night purge should be continuously updated based on the conditions and on actual performance.

The supply air fan, return air fan and pumps all have variable speed drives installed which are to be automatically controlled the BMS. The air conditioning unit compressors also have variable speed drives which are controlled by its integrated control system.

5.4 Indoor Environment

IEQ initiatives are targeted to deliver a healthier built environment with improved thermal, acoustic, minimise glare and visual comfort for occupants. IEQ is proposed to be addressed through the performance glazing, building fabric, mechanical system, ventilation rates, thermal and daylight and glare control.

External heat gains and noise ingress will be mitigated through the building fabric and glazing. Direct solar heat gains and glare will be managed by the use of external shading devices whilst providing visual access to the outdoors. The visual amenity is further enhanced by the use full height glass with appropriate shading strategy.

IEQ also aims to reduce indoor pollutants as these pollutants can have a detrimental impact on occupants' health. These pollutants are mainly volatile organic compounds (VOCs) and formaldehyde from the building and construction materials. During the design and construction process choosing building products, construction materials and interior finish products with zero or low emissions of VOC, formaldehyde and other toxic gases will improve the IEQ.

In order to maintain satisfactory thermal comfort and at the same time reduce energy wastage it is recommended to have an adaptive thermal comfort band for the zone set points with +/-1.5 °C dead band. these set points to be dynamically adjusted for each month as shown in Figure 4 below.

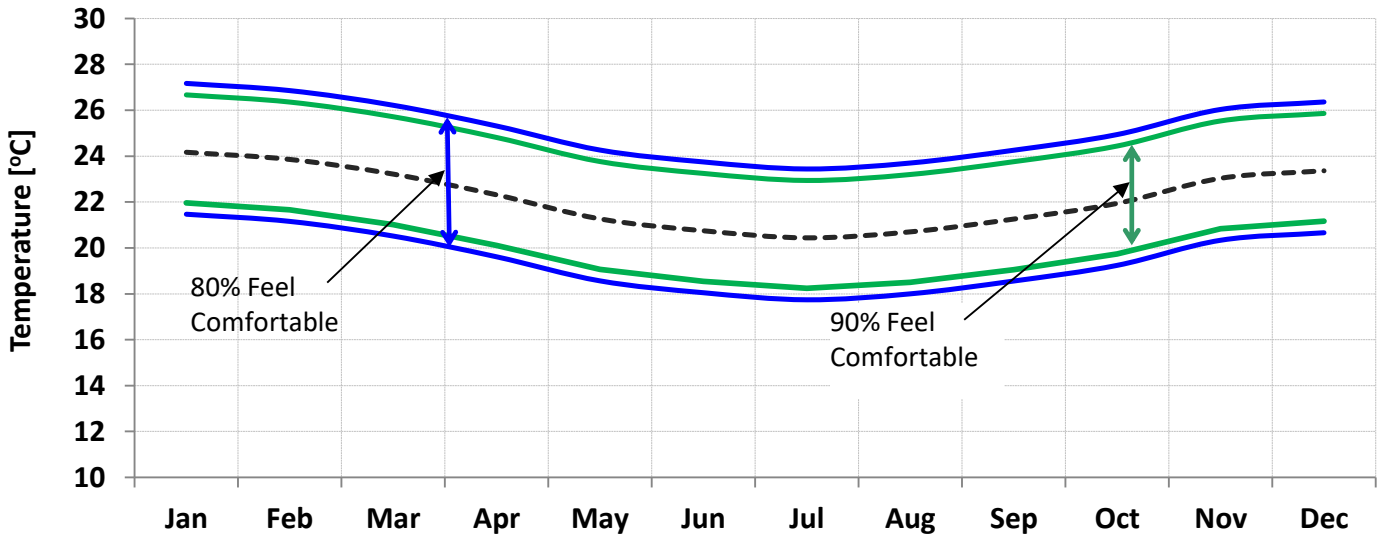


Figure 4: Adjustable Set point for Heating and Cooling

Thermal comfort can be provided indicating hours within and outside the adaptive comfort bands for the entire year by running hourly simulations, for the designed building. This study may help to provide information relating to the impact of glazing, building fabric, shading on occupant comfort as well as overall impact in energy consumption.

Further detailed assessment on all aspect of IEQ (lighting, daylighting, views, glare, comfort, acoustics, exposure to toxins etc) will be investigated with the design team in meeting minimum expectations and Green Star credit achievement for the project.

5.5 Water Strategy

Water consumption is always a key focus of sustainable developments. To ensure potable water consumption is minimised within the building, water efficient appliances through the selection and design of fixtures, fittings and through using xeriscaping to reduce need for irrigation. To minimise use of potable water measures rainwater harvesting and re-use to be considered by the design team. Given the catchment area (roof) of the subject site and potable water usage requirements Hydraulic engineer to conduct water balance study and advise on the viability of using rainwater for landscape irrigation.

The most feasible option for water efficiency for the subject development is in the use of water saving fixtures and fittings, to be included as part of the Fixtures and Fittings Schedules in the future Construction Certificate (CC) Stage. The City of Sydney DCP requirements for water efficient

taps and fixtures suggest to use highest WELS rating available at the time of the development. We recommend the use of sanitary fixtures and appliances with the following WELS rating:

- Taps – 5 Star
- Urinals – 6 star
- Toilet – 4 Star (with dual flush)
- Showers – 3 Star (>4.5 L but Less than 6.0L)

Landscaping - planting type using a mix of local and indigenous species low water use species as suitable for the micro climatic conditions and not otherwise defined by the DCP.

Rainwater harvesting system will be implemented. Rainwater will be used to supply such as landscape irrigation and potentially for non-potable use within the building.

5.6 Transport

The development includes provisions for parking as per the DCP requirements. Provisions are also allocated for:

- Carparking,
- Motor bike parking,
- Bicycle parking, and
- Visitor and accessible parking spaces.

The development needs to allow for following provisions with current level of parking and design occupancy:

- For Class 2 Part of the development
    - There are no requirements for allocating changing facilities.
- For Class 5 Part of the development (expected occupants <50)
    - Showers – 1 unisex, and
    - Lockers – 2. Lockers must be secure and located in the changing rooms. Lockers within tenancies are not considered.
- Bicycle parking facilities – the building's access must prioritise walking and cycling options. Secure bicycle parking facilities must be signposted access to the changing rooms amenities as per minimum expectation. In residential part of the development the access points

must connect to the relevant bicycle storage facilities. The number of bicycle parking facilities to be informed by the Sustainable transport plan. The transport plant must be prepared by a suitably qualified Transport planner or Engineer.

- Electric vehicle (EV) charging – as a minimum the building must provide:
    - Ready to charge EV to at least 5% of all car parking spaces – also subject to regulatory compliance under NCC 2022.
    - Connection for car sharing parking spaces, regardless of weather the vehicles are electric at the time of practical completion in addition to the 5% provided
    - Electrical infrastructure and a load management plan prepared to allow for future installation of EV charging to 25% of all car parking spaces. The mix of EV chargers assumed must be stated.
    - A dedicated, safe, unobstructed route from the electrical supply point which allows for the future provision of all necessary electrical cabling without the need for substantial builders work in connection to the electrical cabling installation.
- Reducing private vehicle use – using the inputs from the Sustainable Transport Plan, the building's design and location must be shown to reduce emission from transport, encourage public transport use and reduce vehicle kilometres travelled compared to a reference building. The changes must be at least as follows:
    - Emission reduction 40%
    - Active mode encouragement – 90%
    - Vehicle kilometres travelled reduction – 20%
- Encourage Walkability- the building's design and location must encourage walking to and from a number of amenities. This means designing roads within the site boundary or priorities pedestrians and either providing within or being located close to a number of amenities.

5.7 Materials Selection and Whole of Life Considerations

Major elements of the project such as structure, fabric, services and landscape elements will be selected during detailed design stage with consideration to whole of life principles. These principles will consider aspects such as:

- Capital costs, ongoing costs and total life-cycle-cost;
- The operability and maintainability of the facility;
- The reliability, availability and flexibility of the facility and its useful life;

Where practical material selected will be low environmental in impact in-terms of embodied energy, toxicity and ozone depletion. The design will also seek to reduce indoor pollutants, such as volatile organic compounds (VOC) and formaldehyde through appropriate material selection.

5.7.1 Construction Waste Management

During the construction phase, a project specific construction waste management plan (WMP) will be developed and implemented by the Head contractor. This is to divert construction and demolition waste disposal away from landfills. The sub-contractors will be instructed to send the recyclable resources recovered from the debris, back to manufacturing processes for recycling / reuse.

5.7.2 Operational Waste management

To ensure recycling of operational waste, a dedicated storage space will be provided for locating recycling bins. The waste generation rates, sizing, separation of waste streams and access requirements as per the best practice guidelines reviewed by the waste consultant. For further information please refer to Operation Waste Management Plan produced by Elephants Foot (*Report no 2597 Revision E*).

5.8 Waste

Construction and demolition waste including safe removal and disposal of hazardous wastes will be dealt with in accordance with statutory requirements. Building occupant waste management procedures and opportunities for recycling will be considered including provision for recycling waste storage.

5.9 Renewable Energy Options

The most suitable renewable energy options for the development would be solar PV, a brief commentary is provided in Table 5.

Table 5: Renewable Energy Options

Renewable Energy	Technology/System Description	Requirements
Solar PV/ Onsite Renewable Energy Generation	PV systems convert energy from the sun into electricity through semiconductor cells. Generally the size of the PV system are varied to match the carbon savings required. In the case of this building further analysis will be required to understand the cost effectiveness of this technology.	Minimum 20% space allocation for PV required under NCC 2022. More PV allocation subject to site constraint and review by electrical discipline.

6 Conclusion

Thermal Environmental has reviewed the applicable ESD regulatory requirements, Green Star strategy and policies relevant to the development at 6-10 Bowral Street, Kensington NSW.

A series of initiatives are being considered and targeted to achieve regulatory compliance, aspirational sustainability targets (5 Star Green Star – certified rating) and to ensure the design responds to the K&K DCP 2020 requirements. These strategies seek to minimise energy use, maximise energy efficiency, minimise the carbon footprint and reduce potable water use whilst maintaining high levels of occupant comfort.

This report demonstrates general requirements with the objectives of these strategies and is considered sufficient to address ESD requirements for the Development Application.

The project is still to progress through detailed design stages, which may result in changes and modifications to ESD initiatives however the project is committed to meeting 5 Star Green Star target.

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7 Appendices

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7.1 Green Star Score Card

Credit	Minimum Expectation	Credit Achievement	Exceptional Performance	Total points available	Targeted performance level	Total points targeted
Responsible				**17**		
Industry Development		1		**1**	Credit Achievement	**1**
Responsible Construction	•	1		**1**	Credit Achievement	**1**
Verification and Handover	•	1		**1**	Credit Achievement	**1**
Operational Waste	•			**0**	Minimum Expectation	•
Responsible Procurement		1		**1**	Credit Achievement	**1**
Responsible Structure		3	2	**5**	Credit Achievement	**3**
Responsible Envelope		2	2	**4**		**0**
Responsible Systems		1	1	**2**		**0**
Responsible Finishes		1	1	**2**	Credit Achievement	**1**
					Total	**8**
Healthy				**14**		
Clean Air	•	2		**2**	Credit Achievement	**2**
Light Quality	•	2	2	**4**	Credit Achievement	**2**
Acoustic Comfort	•	2		**2**	Credit Achievement	**2**

Exposure to Toxins	•	2		**2**	Credit Achievement	**2**
Amenity and Comfort		2		**2**		**0**
Connection to Nature		1	1	**2**		**0**
					Total	**8**

Resilient — 8

Climate Change Resilience	•	1		**1**	Credit Achievement	**1**
Operations Resilience		2		**2**		**0**
Community Resilience		1		**1**		**0**
Heat Resilience		1		**1**	Credit Achievement	**1**
Grid Resilience		3		**3**	Credit Achievement	**3**
					Total	**5**

Positive — 30

Upfront Carbon Emissions	•	3	3	**6**	Credit Achievement	**3**
Energy Use	•	3	3	**6**	Credit Achievement	**3**
Energy Source	•	3	3	**6**	Credit Achievement	**3**
Other Carbon Emissions		2	2	**4**		**0**
Water Use	•	3	3	**6**	Credit Achievement	**3**
Life Cycle Impacts		2		**2**	Credit Achievement	**2**

Total	**14**

Places				**8**		
Movement and Place	•	3		**3**	Credit Achievement	**3**
Enjoyable Places		2		**2**		**0**
Contribution to Place		2		**2**		**0**
Culture, Heritage and Identity		1		**1**		**0**
					Total	**3**

People				**9**		
Inclusive Construction Practices	•	1		**1**	Credit Achievement	**1**
Indigenous Inclusion		2		**2**		**0**
Procurement and Workforce Inclusion		2	1	**3**		**0**
Design for Inclusion		2	1	**3**		**0**
					Total	**1**

Nature				**14**		
Impacts to Nature	•	2		**2**	Minimum Expectation	•
Biodiversity Enhancement		2	2	**4**		**0**
Nature Connectivity		2		**2**		**0**

Nature Stewardship		2		**2**		**0**
Waterway Protection		2	2	**4**	Credit Achievement	**2**
					Total	**2**

Leadership				**0**		
Market Transformation				**0**	Credit Achievement	**0**
Leadership Challenges				**0**	Credit Achievement	**0**
					Total	**0**

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