



Central Coast Quarter Stage 2

Ecologically Sustainable Design Assessment

UPG Waterfront Pty Ltd

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Revision Record

Revision	Date	Prepared By	Checked By	Authorised By
v1.0	18 December 2025	Anthony Marklund	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy

Basis of Report

This report has been prepared by SLR Consulting Australia (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with UPG Waterfront Pty Ltd (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.



Executive Summary

SLR Consulting Australia Pty Ltd (SLR) has been engaged by UPG Waterfront Pty Ltd (the Applicant) to provide a qualitative Ecologically Sustainable Design (ESD) assessment for the proposed mixed-use development located 26-30 Mann Street, Gosford, also known as 'Central Coast Quarter' (the site).

In accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs) and in support of the State Significant Development Application (SSD-90960208), this study has been prepared to respond to the SEARs requirements issued pertaining to Ecologically Sustainability Design (ESD).

The development includes many ecologically sustainable design features. This report provides an overview of these features.

The following ESD and energy efficiency features are proposed to be included in the design:

- The proposed development will incorporate passive and active energy-saving measures such as operable windows to enhance natural ventilation through the apartments, where appropriate to target;
 - 66% of residential apartments of the South Tower achieve natural cross ventilation, complying with ventilation controls. The East Tower is hotel for the first nine storeys and is therefore not considered in this calculation.
- The form dictated by the site has been designed to maximise the solar access of residential units to target;
 - 90% of apartments receive a minimum 2 hours of direct sunlight to private open space.
 - 28% of apartments receive a minimum of 2 hours of direct sunlight to both private open space and living spaces. These numbers are improved when hours of measurement are extended to 9am to 4pm, where 47% of apartments receive a minimum of 2 hours of direct sunlight to both private open space and living spaces.
- Thermal mass - Concrete slab construction is proposed for all floors throughout the development - concrete has amongst the highest thermal mass capacity of a range of common building products. The proposed development's external walls, structural internal walls, and slabs should be predominantly high thermal mass materials.
- LED energy-efficient lighting for all spaces;
- Light efficiency measures in the lobbies using time clock and motion sensors;
- Gearless traction with variable voltage variable frequency (VVVF) motor lifts;
- Centralised energy-efficient solar/ heat pump hot water systems;
- Air conditioning systems with a proposed Coefficient of Performance (COP) greater than 4 for cooling and 4 for heating.
- Air-conditioning control zoning is recommended where necessary to cater for varying occupancy rates, orientation to solar loads, etc. Also, a time clock is provided with provision for after-hours override;
- Energy efficient clothes dryers and energy and water efficient dishwasher units to be installed within each residential dwelling.



- Provision of electric cooktop and electric oven within each residential dwelling;
- Power sub-metering to enable continued review of power consumption;
- Selection of endemic and low-maintenance landscaping species;
- Low flow fixtures and fittings, including at least 4-star taps and shower heads;
- In addition, the project considers rainwater reuse for irrigation purposes;
- Low levels of volatile organic compounds (VOC) paints and floor coverings and low formaldehyde wood products where possible;
- Use of materials with high SRI values for roofing and terrace pavements.
- The project is committed to equip 10% of total car spaces with EV charging stations and allocating these charging stations to visitor as well as occupants to encourage maximum uptake. In addition, the project is committed to providing provision for future installation of EV chargers in 100% of charging spaces.
- The provision of bicycle storage spaces within the development is proposed to support the use of low emission transportation opportunities by the users and occupants;
- Proposed planting provides added cooling during the summer months through the leaf transpiration process and is also useful for wind amelioration;
- Plant species within the development would be predominantly indigenous species that can tolerate low water to reduce maintenance requirements;
- SLR recommends the installation of a roof-mounted solar PV system.
 - A 30 kW PV solar system is recommended to minimise greenhouse gas emission.
 - A 30 kW PV solar system will offset approximately 43 MWh/year of energy usage.
 - The estimated greenhouse gas CO2 emission saving is approximately 28.8 tCO2/annum.
- The proposed residential development is proposed to enjoy a high level of thermal comfort gaining an average 7 NatHERS star rating;
- The residential development also meets BASIX targets in Water and in Energy; and
- The development's hotel component is targeting to achieve 4 star NABERS Energy and 3 star NABERS Water ratings.
- The project is committed to achieve 4-Star Green Star or equivalent using the Green Building Council of Australia (GBCA) Building V1.0 Rating Tool. This is a later available version which supersedes the Green Star Design and As Built rating system.

The report body contains recommendations regarding other ESD features, such as a mechanical ventilation system, domestic hot water, other appliances, and operational waste. These features are proposed to help achieve significant reductions in energy and water required by the development both in building and operation, in addition to ensuring that the hotel and residential units are pleasant spaces to reside.

It is recommended that ESD initiatives continue to be developed and implemented, and the performance benchmarks be met during the detailed design phase, as the design of building services progresses and becomes more refined.



By implementing all energy efficiency measures described in Section 3 of this report and targeting a 4 star NABERS Energy rating, the proposed hotel building intends to achieve over 20% GHG emission reduction when compared with the NABERS Hotel market standard 3 Star Energy rating.

In addition, the development is targeting to achieve net-zero emissions compliance. Refer Appendix A for a Net Zero Statement.

A detailed response to associated SEARS requirements is summarised in the table below.

Table 1 SEARS ESD Requirements and Responses

Item for inclusion	Action and Report Location
1. 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.	Section 3 details how ESD principles as defined in clause 7 (4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (reproduced in Clause 193 of the 2022 revision of the regulation) and up to date legislation are being incorporated in the design, construction, and operation phases of the project. In terms of Precautionary Principle, the project does not present threat of serious or irreversible environmental damage. The project conducted all required environmental studies and incorporated adaptability and resilience measures in the design. Inter-generational equity, the health, diversity and productivity of the environment are enhanced for the benefit of future generations via a number of initiatives including large PV solar installation, sustainable materials, reduced waste, reduced heat islands, etc. Refer Section 5.1 for all other initiatives. From a conservation of biological diversity and ecological integrity perspective, the project satisfies all environmental and statutory provisions requirements and will maintain the existing ecological structures (species and ecosystems, etc) for the proposed site and provide additional native vegetation planting and reduced stormwater runoff the site. Environmental goals have been established and achieved using recognised rating tools. A Quantity Surveyor (QS) will be engaged to ensure that the project will remain on budget and all sustainability measures in the current study are implemented. The proposed ESD initiatives will help to achieve significant reductions in the energy, waste and water required by the development both in building and operation and will deliver improved valuation and beneficial outcome.



Item for inclusion	Action and Report Location
2. Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.	Section 3 details how the project exceeds relevant industry recognised building sustainability and environmental performance standards through the implementation of best practice design principles and a wide range of ESD initiatives including renewable energy to offset the site energy use and reduce peak demand on electricity supply infrastructure.
3. 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.	By implementing all energy efficiency measures described in Section 3 of this report and targeting 4 star NABERS Energy, the proposed hotel building intends to achieve over 20% GHG emission reduction when compared with NABERS Hotel market standard 3 Star Energy rating. The development is targeting to achieve net-zero emissions compliance. Refer Appendix A for a Net Zero Statement and to Section 3 of the report for further details of the energy, water and materials initiatives proposed.
4. If Chapter 3 of SEPP (Sustainable Buildings) 2022 applies: a. Demonstrate how the development has been designed to address the provisions set out in Chapter 3.2(1). b. In addition, if the development is State significant development specified in SEPP (Planning Systems) 2021, Schedule 1, Sections 13-15 and built within an identified site or precinct, provide a Net Zero Statement (as defined in Section 35C) of the EP&A Regulation) that includes: i. Evidence of how the development will either be fossil fuel-free after the occupation of the development commences or transition to be fossil	The following design considerations have been implemented to address Chapter 3.2.(1) of SEPP 2022: • More than 80% of the predicted construction waste arising from the development will be recycled. Refer Section 3.7. • The reliance on artificial lighting and mechanical ventilation has been reduced via passive design, daylight glazing, natural ventilation of apartments and control systems. • The peak demand for electricity is significantly reduced via a proposed active energy efficiency and 30 kW roof-mounted PV solar system. All on-site renewable energy generated will be consumed in the building, hence energy storage is inappropriate. • To enable effective review of energy usage by the project, sub-metering will be implemented for all major energy consuming processes or items of equipment including lighting, power and HVAC. The facility manager will ensure all monitoring and audit results are well documented and carried out as specified in the current Sustainability Management Plan (Refer Section 6). • The embodied emissions attributable to the development will be quantified by the QS. • The development is targeting to achieve net-zero emissions compliance. Refer Appendix A for a Net Zero Statement.



Item for inclusion	Action and Report Location
fuel-free by 1 January 2035. ii. Details of any renewable energy generation and storage infrastructure implemented and any passive and technical design features that minimise energy consumption. iii. Estimations of annual energy consumption for the building and amount of emissions relating to energy use in the building (if information is available).	• The buildings will be designed to have all electric building services with no mains natural gas connection to enable the development to be fossil fuel-free after the occupation of the development. • Details of the proposed minimum 30kW PV renewable energy generation and passive and technical design features that minimise energy consumption are detailed in Section 3. As mentioned above, all on-site renewable energy generated will be consumed in the building, hence energy storage is inappropriate. • Estimations of The proposed residential development is proposed to enjoy a high level of energy efficiency gaining an average 7 NatHERS star rating. • The residential development also meets BASIX targets in Water (Target 40) and in Energy (Target 60). • The proposed 30 kW PV solar system will offset approximately 43 MWh/year of energy usage. • The hotel component is proposed to achieve over 20% GHG emission reduction via the proposed passive design and active energy efficiency initiatives with PV solar system when compared with NABERS Hotel market standard 3 Star rating. • Annual energy consumption estimations of the commercial building components will be developed through energy modelling as design progresses and further detailed information becomes available.
5. In addition, if the development includes large commercial development types (offices with a net lettable area of at least 1,000m², hotel or motel with at least 100 rooms, or serviced apartments of at least 100 apartmets) provide: a. A NABERS Agreement to Rate that demonstrates the large commercial areas of the development are capable of achieving the standards for energy and water use specified in Schedule 3 of SEPP 2022.	The project is committed to entering a NABERS Agreement to Rate for the hotel component and targeting 4 star NABERS Energy and 3 star NABERS Water ratings. Building tuning is proposed to be conducted by the builder, and SLR recommends that quarterly reviews of actual building energy and water consumption be carried out once the buildings are operational to check the actual energy and water usage and savings and verify that all systems are performing at their optimum efficiency. This will provide an opportunity for the systems to be tuned to optimise time schedules to best match occupant needs and system performance while satisfying the sustainability target for the project.



Item for inclusion	Action and Report Location
6. Future development application(s) for new built form must address the National Construction Code of Australia 2019 and demonstrate how the principles of Ecologically Sustainable Development have been incorporated into the design, construction and on-going operation of the new buildings. The development must meet or exceed environmental standards including those equivalent to the following: 4-star Green Star Design and As Built rating 4-star NABERS Energy and Water rating - BASIX certification.	- The buildings are being designed to comply with Section J of the National Construction Code (NCC) 2022, which establishes the foundation for energy consumption savings. Section J of this later applicable version which supersedes the National Construction Code of Australia 2019 outlines the minimum standards for energy efficiency, serving as a benchmark for sustainable development. - The project is committed to achieve 4-Star Green Star or equivalent using the available Green Building Council of Australia (GBCA) Buildings V1.0 Rating Tool. This is the later applicable version which supersedes the Green Star Design and As Built rating system. - The development's hotel component is targeting to achieve 4 star NABERS Energy and 3 star NABERS Water ratings, in compliance with SEPP 2022 (Sustainable Buildings) 2022 requirements. - The residential apartments development components also meets BASIX targets in Water and in Energy



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Appendices

Appendix A	Net Zero Statement
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1.0 Introduction

SLR Consulting Australia Pty Ltd (SLR) has been engaged by UPG Waterfront Pty Ltd (the Applicant) to provide a qualitative Ecologically Sustainable Design (ESD) assessment for the proposed mixed-use development located 26-30 Mann Street, Gosford, also known as 'Central Coast Quarter' (the site).

The ESD report has been prepared in a standard form considering the following aspects of the development.

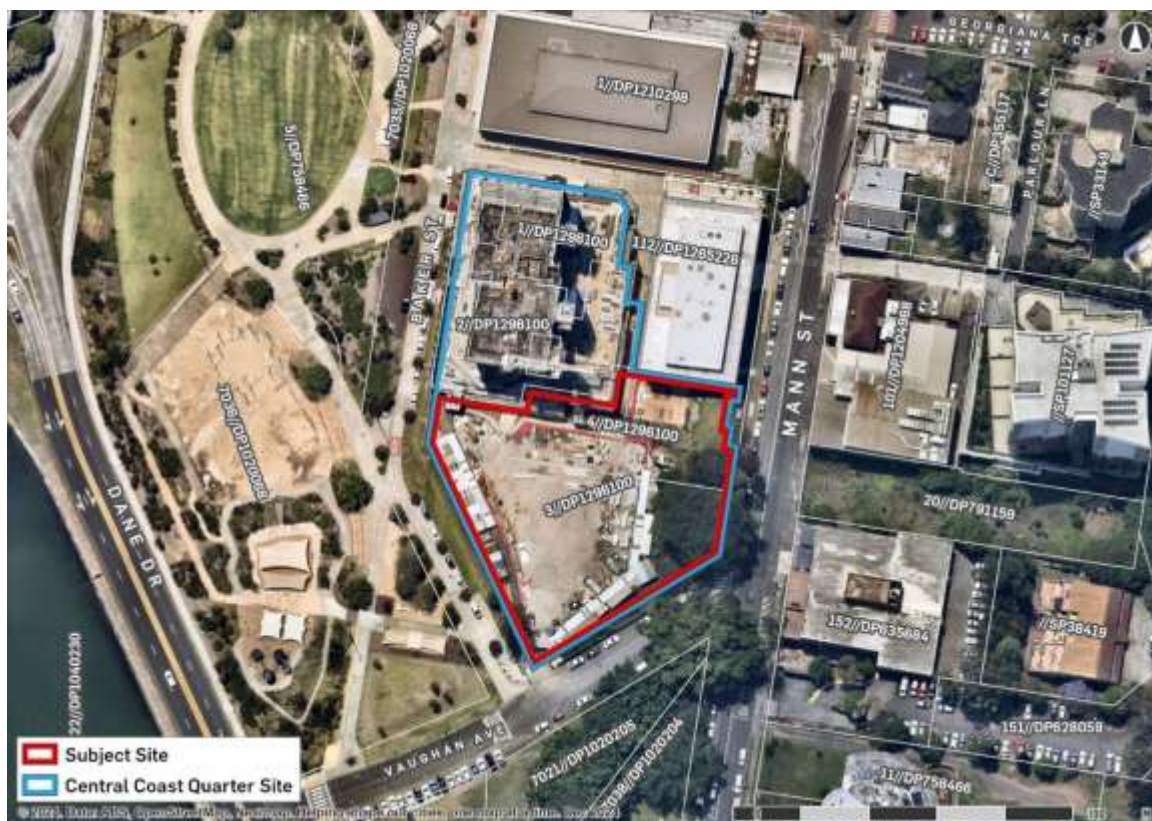
- Identify how ESD principles are incorporated in the design and ongoing operation of the development.
- Demonstrate how the development is proposed to meet or exceed the relevant industry-recognised building sustainability and environmental performance standards.

The initiatives suggested throughout this report have been included as opportunities for the project team to adopt ESD initiatives that provide both direct and indirect benefits to the proposed development.

1.1 Site Description

The site is located on the Stage 2 component of the Central Coast Quarter site in Gosford City Centre, within the Central Coast Local Government Area (LGA). The Stage 2 site is legally described as Lots 3 and 4 in Deposited Plan 1319239.

Figure 1 Aerial Photograph of Site



Source: Urbis



1.2 Development Description

SSD-90960208 seeks consent for the detailed design, construction and operation of a mixed-use development comprising:

- Construction of two towers (36 and 42 storeys in height) above a retail podium (including pavilion building), comprising:
 - Retail, residential and hotel gross floor area (GFA).
 - 394 apartments, comprising the following mix:
 - 296 market apartments.
 - 98 affordable housing apartments to be managed by a CHP for 15 years (equating to approximately 20% of the residential GFA).
 - 152 hotel keys (eastern tower).
- Five parking levels, with vehicular access from Vaughan Avenue.
- Storage areas and services.
- Communal open space and deep soil planting (including retention of the Port Jackson Fig).
- Publicly accessible through site links, including stairs, walkways public art and landscaping.
- Provision of utilities and services infrastructure, as required.

To facilitate the built form proposed under SSD-90960208, concurrent amendments are sought to the *State Environmental Planning Policy (Precincts – Regional) 2021* (Regional SEPP) pursuant to the concurrent SEPP Amendment process facilitated by the HDA planning pathway.

Figure 2 Level 1 Plan



Figure 3 Level 2 Upper Plan

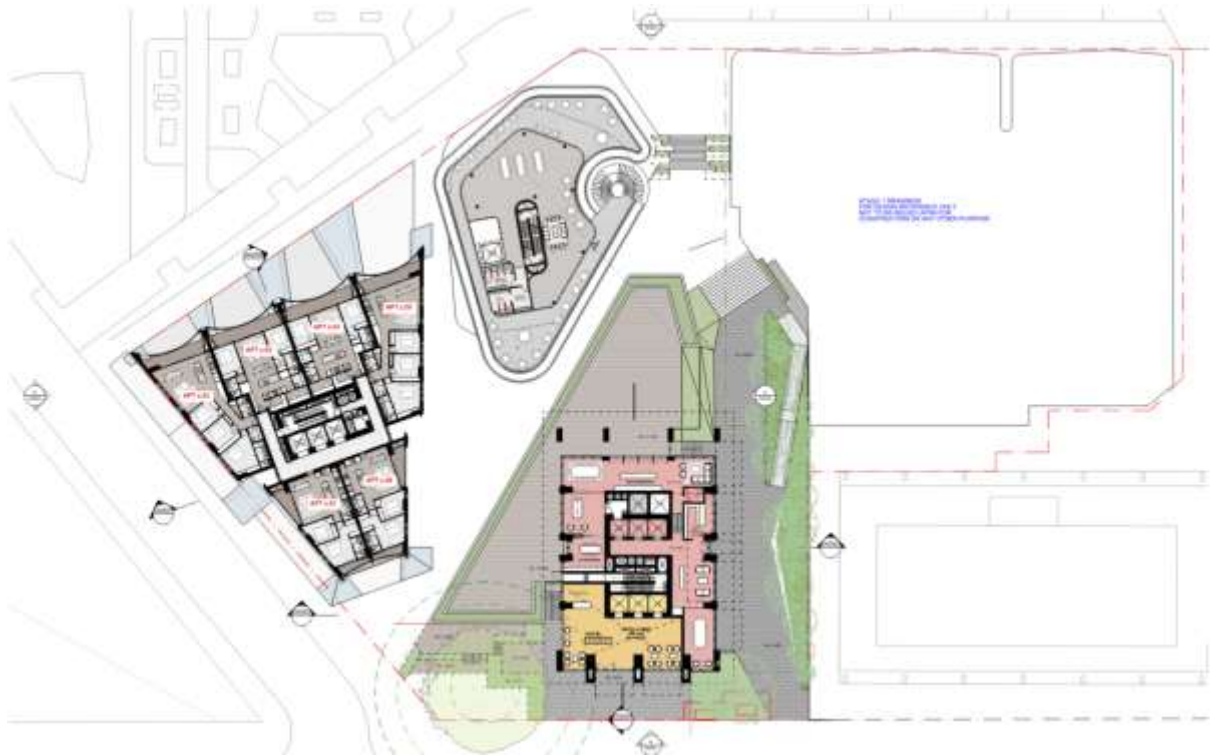


Figure 4 Level 4 Plan

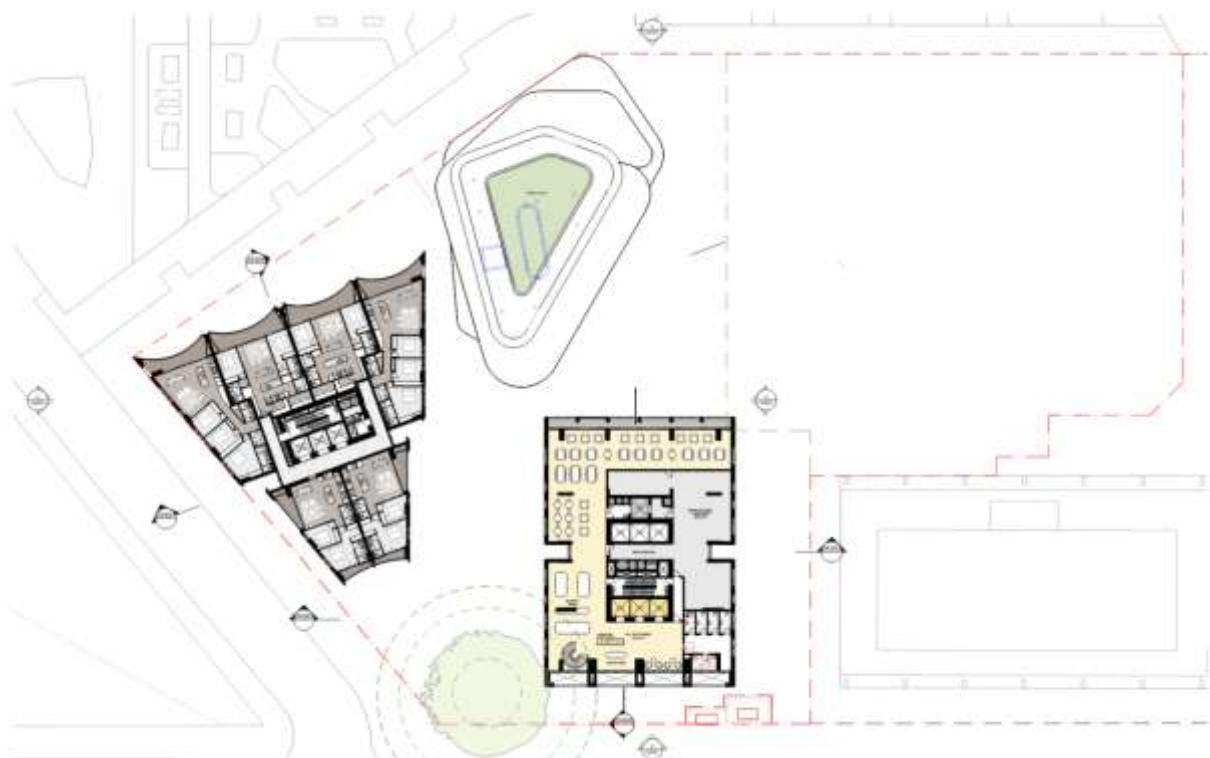


Figure 5 Level 6 Typical Hotel Plan

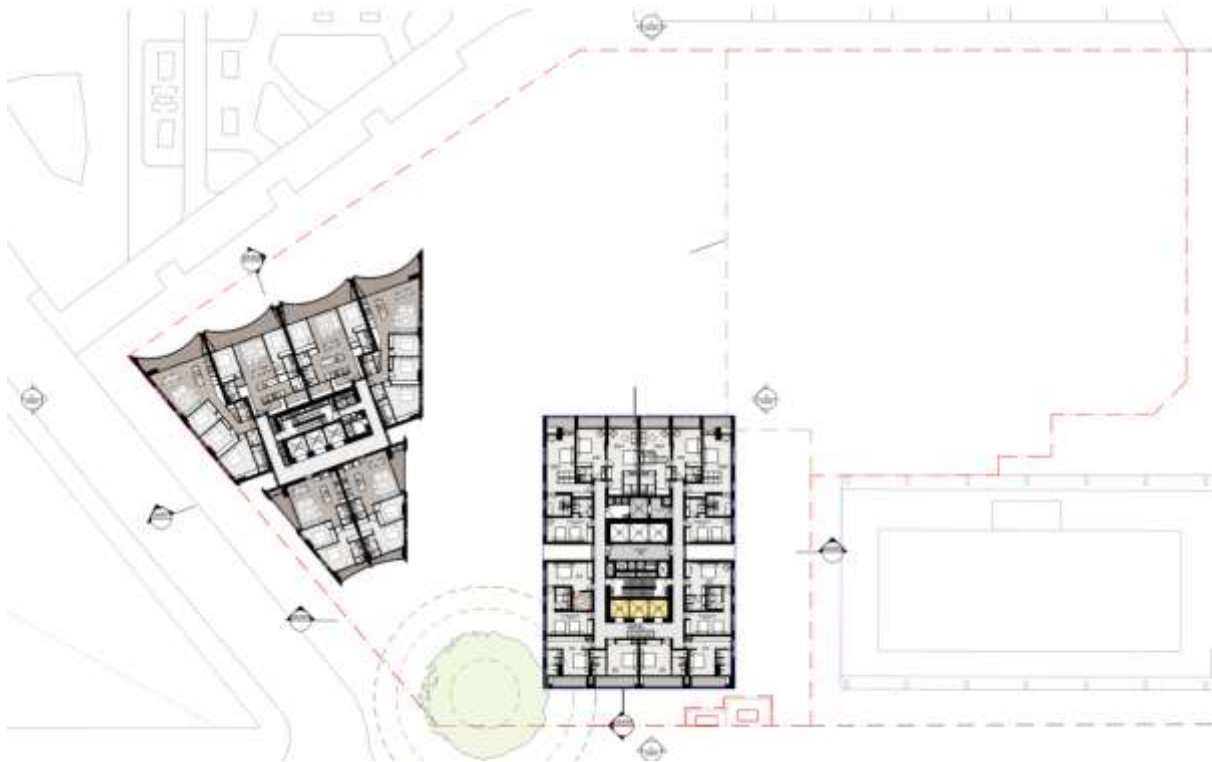


Figure 6 Level 18 Typical Residential Plan

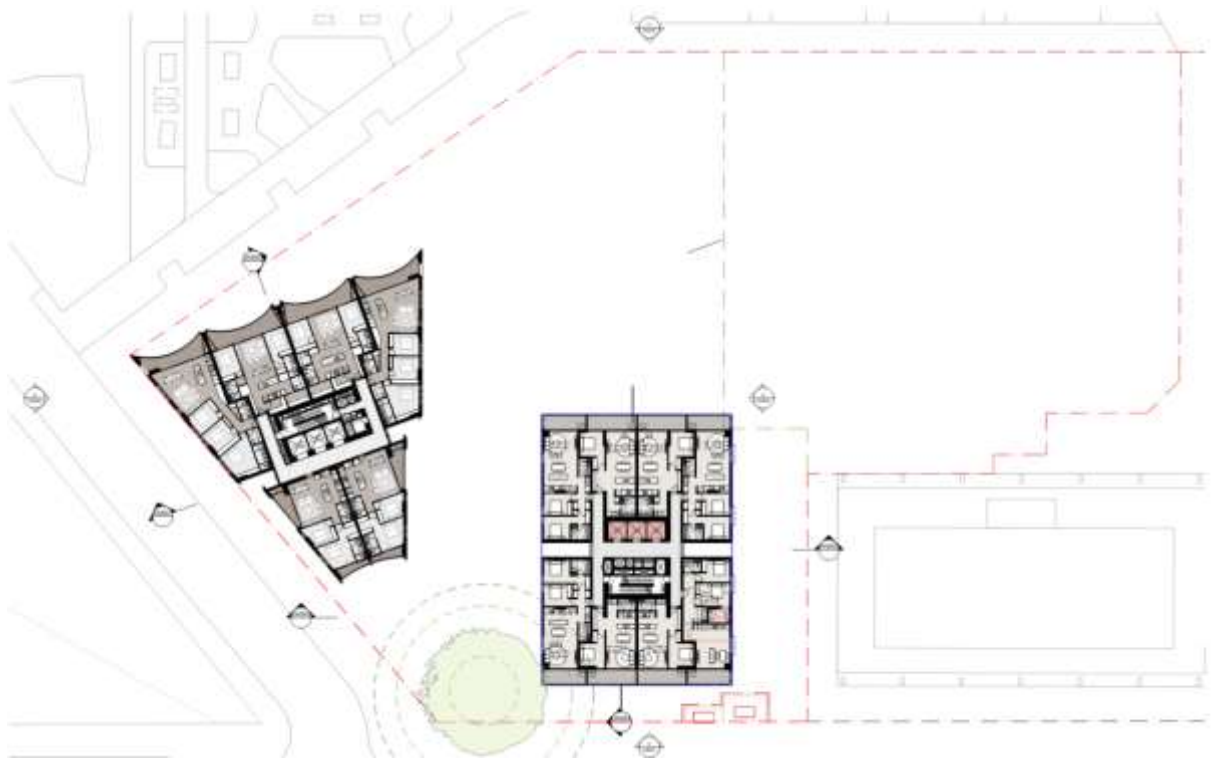


Figure 7 Level 37 Plan

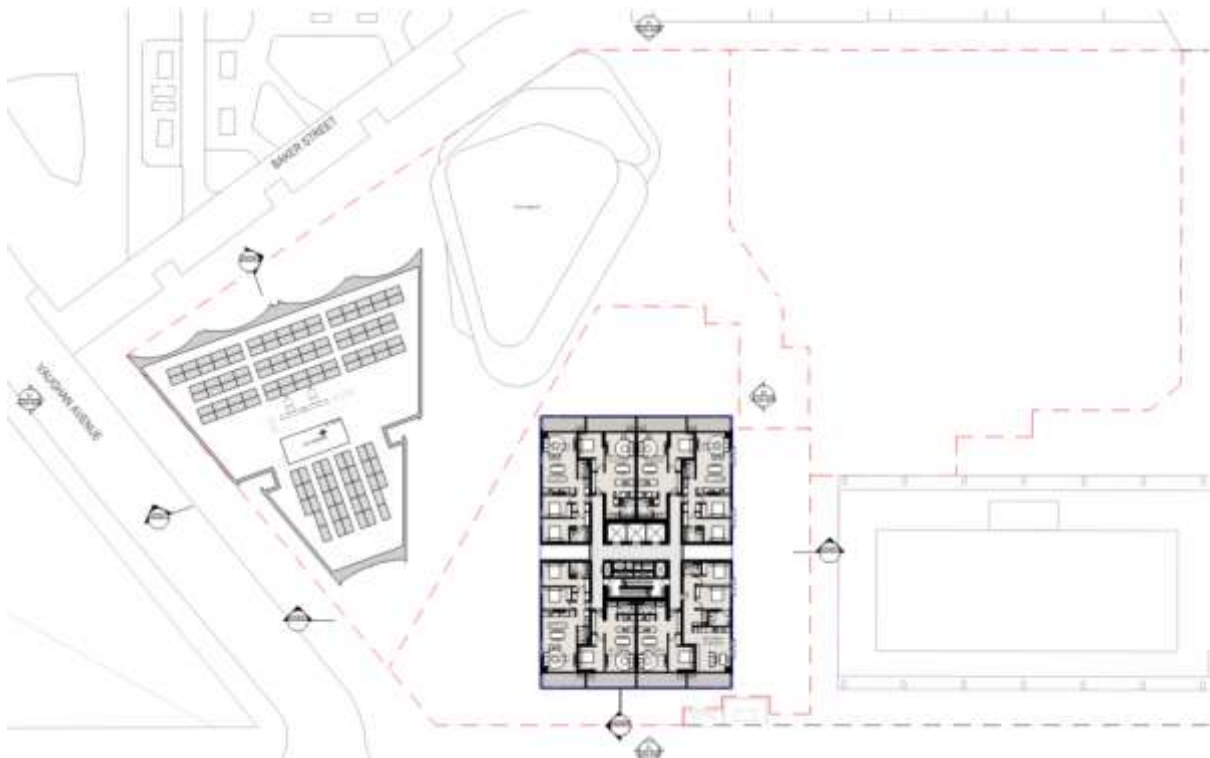
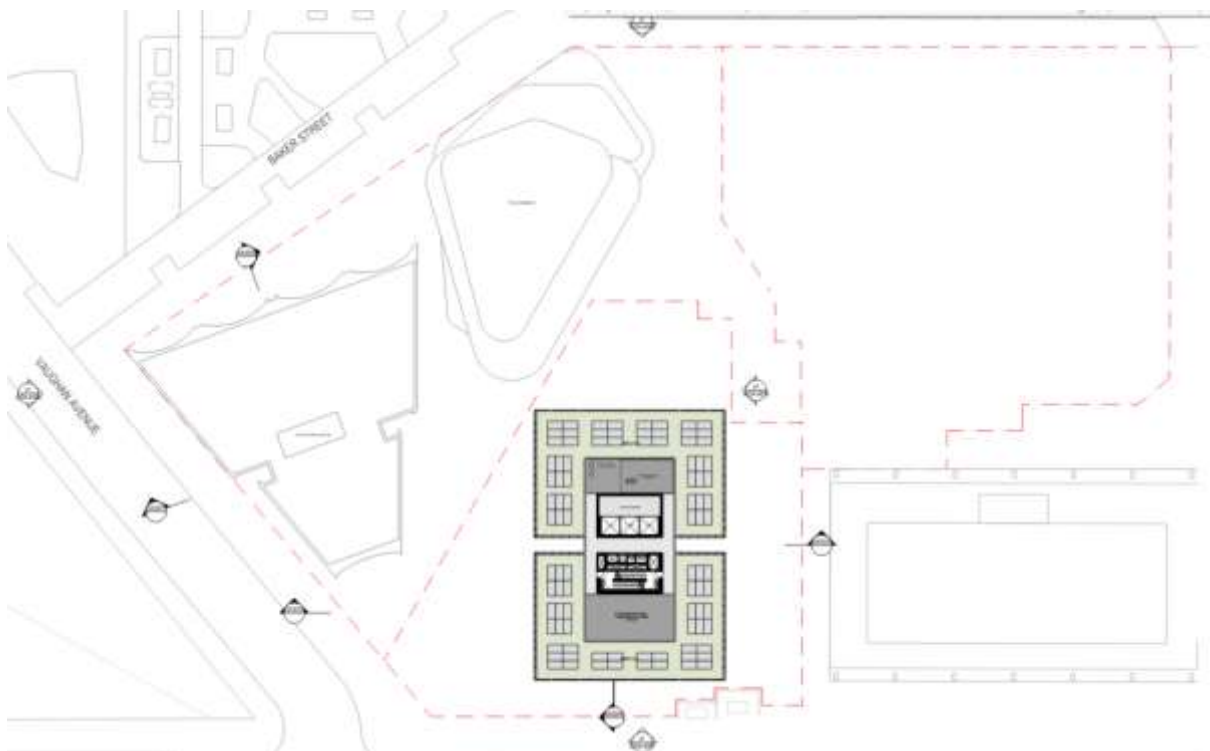


Figure 8 Level 43 Plan



2.0 Ecologically Sustainable Design

The concept of Ecologically Sustainable Development (ESD) was outlined in “Our Common Future”, the report of the 1987 United Nations World Commission on the Environment and Development (the Brundtland Commission). It defined Sustainable Development as,

“Development that meets the needs of the present without compromising the ability of future generation to meet their own needs”.

This concept was adopted within Australia in 1990 when the Council of Australian Governments endorsed a National Strategy for Ecologically Sustainable Development. The Commonwealth Government suggested the following definition for ESD in Australia:

“Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased”.

Put simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations. To do this, it is necessary to develop ways of using those environmental resources which form the basis of our economy in a way which maintains and, where possible, improves their range, variety and quality.

The National Strategy for Ecologically Sustainable Development notes that there is no identifiable point where it can be said that ESD has been achieved. The strategy further states that there are two main features which distinguish an ecologically sustainable approach to development:

- We need to consider, in an integrated way, the wider economic, social and environmental implications of our decisions and actions for Australia, the international community and the biosphere; and
- We need to take a long-term rather than short-term view when taking those decisions and actions.

Ultimately ESD should lead to changes in our patterns of resource use, including improvements in the quality of our air, land and water, and in the development of new, environmentally friendly products and processes.

National Strategy for ESD Objectives and Guiding Principles are elaborated below.

The National Strategy for ESD sets its core objectives as:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations.
- To provide for equity within and between generations.
- To protect biological diversity and maintain essential ecological processes and life-support systems.

The Guiding Principles of the National Strategy for ESD are documented as:

- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.
- Where there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.
- The global dimension of environmental impacts of actions and policies should be recognised and considered.



- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised.
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
- Decisions and actions should provide for broad community involvement on issues which affect them.

These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that considers all these objectives and principles to pursue the goal of ESD.

2.1 Specific Requirements for Compliance

Specifications for environmental design measures required for the proposed site are detailed below:

2.1.1 Mandatory ESD Measures for Consideration

- National Construction Code 2022 – Section J requirements
- BASIX Certification for the Residential Component.
- Central Coast Development Control Plan 2022
- Central Coast Local Environmental Plan 2022
- The Planning Secretary's Environmental Assessment Requirements (SEARS) for State Significant Development Application (SSDA) (SSD-90960208) ESD requirements:
 - 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.

The principles of ESD in accordance with Section 193 of the EP&A Regulation, are defined in this NSW legislation as follows:

- (a) *the precautionary principle,*
- (b) *inter-generational equity,*
- (c) *conservation of biological diversity and ecological integrity,*
- (d) *improved valuation, pricing and incentive mechanisms.*

These principles are further paraphrased and elaborated in Section 2.0 above.

- 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 materials resources.
- If Chapter 3 of SEPP (Sustainable Buildings) 2022 applies:
 - Demonstrate how the development has been designed to address the provisions set out in Chapter 3.2(1)



- In addition, if the development is State significant development specified in SEPP (Planning Systems) 2021, Schedule 1, Sections 13-15 and built within an identified site or precinct, provide a Net Zero Statement (as defined in Section 35C) of the EP&A Regulation) that includes:
 - Evidence of how the development will either be fossil fuel-free after the occupation of the development commences or transition to be fossil fuel-free by 1 January 2035.
 - Details of any renewable energy generation and storage infrastructure implemented and any passive and technical design features that minimise energy consumption.
 - Estimations of annual energy consumption for the building and amount of emissions relating to energy use in the building (if information is available).
- In addition, if the development includes large commercial development types (offices with a net lettable area of at least 1,000m², hotel or motel with at least 100 rooms, or serviced apartments of at least 100 apartments) provide:
 - A Net Zero Statement (as defined in Section 35C of the EP&A Regulation and outlined above).
- In addition, if the development includes large commercial development types (offices with a net lettable area of at least 1,000m², hotel or motel with at least 100 rooms, or serviced apartments of at least 100 apartments) provide:
 - A NABERS Agreement to Rate that demonstrates the large commercial areas of the development are capable of achieving the standards for water use specified in Schedule 3 of SEPP (Sustainable Buildings) 2022. A separate agreement is required for each large commercial use.
 - A NABERS Agreement to Rate or Commitment Agreement that demonstrates the large commercial areas of the development are capable of achieving the standards for energy use specified in Schedule 3 of SEPP (Sustainable Buildings) 2022. A separate agreement is required for each large commercial area.
- The State Environmental Planning Policy (SEPP) Sustainable Buildings:
 - Non-residential spaces should target the following:
 - the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,
 - a reduction in peak demand for electricity, including through the use of energy efficient technology,
 - a reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design,
 - the generation and storage of renewable energy,
 - the metering and monitoring of energy consumption,
 - the minimisation of the consumption of potable water.
 - the embodied emissions attributable to the development have been quantified.
 - the minimisation of the use of on-site fossil fuels.



- large commercial development (as defined below) is to be capable of achieving the following standards for energy and water use;
 - Hotel premises (>100 rooms) - 4 star NABERS energy and 3 star NABERS water ratings.
 - Residential spaces should satisfy the following-
 - the embodied emissions attributable to the development have been quantified.
- SSD-10114 ESD Condition C20:
 - Future development application(s) for new built form must address the National Construction Code of Australia 2019 and demonstrate how the principles of Ecologically Sustainable Development have been incorporated into the design, construction and on-going operation of the new buildings. The development must meet or exceed environmental standards including those equivalent to the following:
 - 4-star Green Star Design and As Built rating
 - 4-star NABERS Energy and Water rating
 - BASIX certification.
- Apartment Design Guidelines for residential areas
 - Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid-winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas.
 - In all other areas, living rooms and private open spaces of at least 70% of the apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid-winter.
 - A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid-winter.
 - The ADG acknowledges that achieving the above design criteria may not be possible on some sites. This includes:
 - Where greater residential amenity can be achieved along a busy road or rail line by orientating the living rooms away from the noise source.
 - On south facing sloping sites
 - Where significant views are orientated away from the desired aspect for direct sunlight.
 - At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.

Building depth, which support natural ventilation typically range from 10 to 18 meters.

The following section elaborates on how the above requirements are captured in the design and how the project responds to these controls.



3.0 ESD Initiatives Considered for the Proposed Development

In order to achieve a structured integrated approach to ESD, a series of indicators and strategic goals have been identified at the outset to be communicated to the design team. SLR Consulting, as the project's ESD consultant, has applied these principles to all aspects of the development ensuring a best possible ESD outcome.

ESD indicators identified for the proposed concept plan are:

- Passive design features
- Landscaping
- Building construction
- Active energy efficiency
- Water
- Transport
- Indoor environmental quality
- Operational waste management
- Renewable energy options

The following sections below outline the ESD initiatives to be committed for the proposed development.

3.1 Passive Design Features

Passive energy efficiency refers to the choice of building materials, the placement of external facades and fenestration to effectively utilise solar energy for heating when required, and minimise solar gains when appropriate, thus 'passively' reducing the artificial heating and cooling requirements of the building. While high cooling and heating loads are typical in summer and winter months respectively, a good balance of heating and cooling load reduction techniques is required to facilitate a development with efficient passive design.

3.1.1 Site Analysis and Layout

A key objective should be to optimise site conditions and minimise energy consumed for cooling and heating loads through proper selection of building orientation and internal layout. The following points are noted with respect to the siting of the proposed development.

- As opposed to new developments on the outer fringes of the city which require significant investment in new roads, sewerage, lighting and power the proposed development site will have immediate access to all of these;
- The proposed development provides a large number of units with access to daylighting;
- The proposed development provides good design to promote natural ventilation;

3.1.2 Solar Access

One of the objectives of energy conservation is to minimise the heating and cooling requirements of buildings. Sunlight should preferably be able to penetrate the building in



winter and be excluded from the building in summer. The form dictated by the site has been designed to maximise the solar access of residential units by:

- Maximising solar exposure of every residential apartment. The height and units' layouts will allow excellent solar exposure from at least 2 directions to the majority of the apartments throughout the day, year-round.
- Ensuring that primary facade glazing is attached to all "living zone" rooms for all apartments (i.e. living room, bedrooms etc). With proper attention to design details (e.g. glazing seals), these rooms can act as highly efficient solar collectors especially during winter months.
- Incorporating deep balconies to reduce summer thermal loads on the residential units.

The Apartment Design Guide - Part 04 is relevant to the assessment of the daylight access into residential components of the project. The above guide states that:

- Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid-winter in the Sydney Metropolitan Area and in the Newcastle and Wollongong local government areas.
- In all other areas, living rooms and private open spaces of at least 70% of the apartments in a building receive a minimum of 3 hours direct sunlight between 9 am and 3 pm at mid-winter.
- A maximum of 15% of apartments in a building receive no direct sunlight between 9 am and 3 pm at mid-winter.

The ADG acknowledges that achieving the above design criteria may not be possible on some sites. This includes:

- Where greater residential amenity can be achieved along a busy road or rail line by orientating the living rooms away from the noise source.
- On south facing sloping sites
- Where significant views are orientated away from the desired aspect for direct sunlight.

The justification as to why the solar access is lower than the design criteria for this development are that the buildings have been designed to be orientated to a south/south-west manner to front the water views along the Brisbane Waters.

The form dictated by the site has been designed to maximise the solar access of residential units to target;

- 90% of apartments receive a minimum 2 hours of direct sunlight to private open space.
- 28% of apartments receive a minimum of 2 hours of direct sunlight to both private open space and living spaces. These numbers are improved when hours of measurement are extended to 9am to 4pm, where 47% of apartments receive a minimum of 2 hours of direct sunlight to both private open space and living spaces.

3.1.3 Natural Ventilation

Wind-induced natural ventilation works on the straightforward principle of differential pressure. If a building envelope has multiple openings and there exists a pressure



difference between those openings, e.g. the wind pressure at one opening is greater than the pressure at the other openings; airflow will be pushed through the building in the direction positive to negative.

The resulting amount of airflow through the building envelope will be a function of the magnitude of the pressure differential, size of the various building openings and degree of “blockage” in between.

3.1.3.1 Residential Apartments

The most important role of natural ventilation in the context of the residential apartments is to remove accumulated heat gain during periods of overheating. In this case, ventilation is intended to achieve predicted rates of volumetric air change. Also important during the summer months is the role of ventilation in directly improving the perception of thermal comfort by occupants of a space. This is achieved when moving air aids the evaporation of perspiration by passing over the skin. If there is some air movement, most people will tolerate somewhat higher temperatures.

Heat build-up within apartments through daytime summer temperatures can be quickly purged with the availability of suitable breeze at the site.

The ADG encourages cross ventilation to be assisted by the building design. Building design should enable ventilation to be controlled, where comfort levels are maintained for the occupants during the summer and winter extremes. Locations of windows and openings within the apartment are to be suitably in line, where possible, with each other on opposite sides of the room. It is recommended that building openings be designed such that cross-ventilation is maximised, to minimise heat gain in summer.

Ventilation of building is achieved by permanent openings, windows, doors or other devices which have an aggregate opening or openable size of not less than 5% of the floor area of the ventilated room. The provision of ceiling fans for use in summer months is also encouraged.

In winter it is important to close off heated areas that need warming. The opportunity to open and close balcony doors will allow adequate control to moderate the impact of any higher than comfortable winds. It is recommended that the following initiatives are also incorporated to minimise heat leakage from the building:

- Design detailing of the glazing interface to the window framing system and the provision of adequate sealing in accordance with the National Construction Code (NCC).
- Doors leading to hallways, stairwells and non-common use areas provided with draught excluders to limit heat losses during winter months.
- Doors located throughout the development in general-use areas, such as access ways to/from the building, fitted with door closers where it is deemed that their opening will have an adverse effect on heat loss during winter.

ADG specifies the following rules of thumb:

- At least 60% of apartments are naturally cross ventilated in the first nine storeys of the building. Apartments at ten storeys or greater are deemed to be cross ventilated only if any enclosure of the balconies at these levels allows adequate natural ventilation and cannot be fully enclosed.
- Building depth, which support natural ventilation typically range from 10 to 18 meters.



- Developments, which seek to vary from the minimum standards, must demonstrate how natural ventilation can be satisfactorily achieved, particularly in relation to habitable rooms.

The proposed development will incorporate passive and active energy-saving measures such as operable windows to enhance natural ventilation through the apartments, where appropriate;

- 66% of residential apartments of the South Tower achieve natural cross ventilation, complying with ventilation controls. The East Tower is hotel for the first nine storeys and is therefore not considered in this calculation.

3.2 Building Construction

Materials with low embodied carbon are those that require minimal energy and resources during their extraction, manufacturing, transportation, and installation processes. By choosing these materials, mixed-use projects can significantly reduce their overall carbon footprint and contribute to more sustainable construction practices. Examples include recycled steel, sustainably sourced timber, low-carbon concrete, and innovative bio-based materials. Integrating these options not only supports climate goals but also aligns with evolving regulatory standards and green building certifications.

It is recommended that the development considers the use of low embodied carbon materials such as concrete and steel with recycled content.

3.2.1 Building Materials

3.2.1.1 Walls

It is recommended that external walls generally consider Concrete or Hebel Panel, internally lined constructions and with additional thermal insulation where required. The use of this wall system will reduce the insulation required due to the inherent R value of the wall system. The insulation required will be determined by the NCC and Section J calculations.

It is recommended intra-tenancy walls are to be lightweight, such as plasterboard on stud construction or Hebel Power Panel with plasterboard with acoustic insulation where required. This is advantageous from a building life-cycle perspective, as it maximises the adaptive reuse potential when a building reaches the end of its intended use.

3.2.1.2 Roof

It is proposed to maximise the use concrete roofs with plasterboard ceiling construction for all conditioned spaces throughout the new buildings. Metal deck roofs will be considered where appropriate, such as the new light industrial workshops. Insulation is to be provided to roof areas exposed to open air. The insulation required will be determined by the NCC and Section J calculations. Waterproofing membrane will also be provided as part of the roof. It is recommended that ceiling systems of a high thermal resistance are proposed.

3.2.1.3 Glazing

Performance Glazing such as single low-E and double-glazed low-E glazing is recommended, this will reduce the solar heat gain mostly on the western and eastern facades where low angle solar rays penetrate beneath shading devices. The glazing required will be determined by the NCC and Section J calculations. The Total System U-Value of display glazing must not be greater than U5.8. Other glazing U value and SHGC as per Section J requirements.



3.2.1.4 Floor and Thermal Mass

Concrete slab construction is to be used for all floors throughout the development in accordance with NCC Section J requirements. Concrete has amongst the highest thermal mass capacity among a range of common building products, as presented in the below table.

Generally, denser materials have higher mass which has the ability to store heat energy and then release it slowly to the room. This storage effectively smoothens out daily temperature variations within conditioned spaces, with corresponding reductions in both heating and cooling loads. Insulation is to be provided to floor areas exposed to open air.

It is recommended to use floor systems with a thermal resistance compliant with NCC Section J. The insulation required will be determined by the NCC and Section J calculations.

Table 2 Indicative Thermal Mass Values of Various Materials

Material	Thickness (mm)	Thermal Mass (kJ/m ² .K)
Dolerite (Rock / Stone)	200	433
10-31 Solid Brick	190	410
Concrete	100	221
Concrete block	90	194
10.01 regular brick	90	151
Clay brick (3.5 kg solid + 0.5 kg mortar)	110	142
Aerated concrete block	100	50
Fibre cement sheet (compressed)	18	32
Wood flooring (hardwood)	19	25
Weatherboard (softwood)	15	16
Fibre cement sheet	6	8
Plasterboard	10	8
Glass	3	6
Expanded polystyrene (EPS-class SL)	50	1.8
Cork	6	1.6
Rockwool (batts)	50	1.5
Fibreglass (batts)	50	0.5
Air	50	0.5

3.2.2 Building Sealing

The purpose of sealing is to ensure that additional heating and cooling loads will not be introduced through building leakage.

A seal to restrict air infiltration must be fitted to each edge of an external door, operable external window or the like when serving a conditioned space in the proposed development. The seal may be a foam or rubber compressible strip, fibrous seal or the like.

The bathroom/toilet and laundry exhaust fans in the proposed development must be fitted with a sealing device such as a self-closing damper or the like.



3.2.3 Heat Island Effect Mitigation

The urban heat island (UHI) effect refers to the phenomenon where urban areas experience significantly higher temperatures than their surrounding rural regions, primarily due to human activities and the concentration of heat-absorbing surfaces like concrete and asphalt.

As cities grow and natural landscapes are replaced with buildings and roads, the heat island effect intensifies, leading to increased energy consumption, elevated emissions, and heightened health risks during heatwaves.

To mitigate this, it is recommended that light coloured roofing and wall materials of Solar Reflective Index (SRI) of 50 or more is considered for the development.

Similarly, for unshaded hardscapes and pavements, it is recommended that materials with initial SRI value of at least 39 are considered.

Figure 9 Roof Terrace Pavements with High SRI Materials



3.3 Active Energy Efficiency

Active energy efficiency is achieved by putting in place energy efficient electrical items such as air-conditioning systems, artificial lighting to reduce the energy usage of the building.

Furthermore, the following State Environmental Planning Policy (SEPP) Sustainable Buildings requirements are applicable to prescribed new development components:

- large commercial development (as defined below) is to be capable of achieving the following standards for energy use;
 - hotel accommodation (>100 rooms) - a 4 star NABERS energy rating.

The new hotel component is to be designed to be capable of achieving the SEPP 2022 NABERS requirements, with agreements to rate to be met during the detailed design and operation as applicable.



3.3.1 Mechanical Ventilation and Air Conditioning

Where mechanical ventilation is required, the use of energy efficiency measures will be fully explored during detailed design.

- Air conditioning systems with a proposed Coefficient of Performance (COP) of greater than 4 for cooling and 4 for heating.
- Energy end use of more than 15kVA or more is recommended to be submetered. All electricity and water meters in the commercial buildings will be connected to a Building Management System (BMS) to allow data analysis. The monitoring system will be designed to have the capability to generate reports on a monthly and/or as required basis for energy and water meters.
- An air-conditioning unit or system must:
 - Be capable of being inactivated when the building served is not occupied; and
 - Thermostatically control the temperature of each zone or area when serving more than one zone
 - Provides the required mechanical ventilation, other than in climate zone 1 or where dehumidification control is needed, must have an outdoor air economy cycle if the total air flow rate of any airside component of an air-conditioning system is greater than or equal to the figures in Table J6D3 of NCC 2022.
 - When two or more air-conditioning systems serve the same space, they must use control sequences that prevent the systems from operating in opposing heating and cooling modes.
 - Contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and with an airflow of more than 1000 L/s, must have a variable speed fan when its supply air quantity is capable of being varied;
- A mechanical ventilation system must be capable of being deactivated when the building or part of the building served by that system is not occupied.

3.3.2 Hot Water

Centralised energy efficient solar/heat pump hot water system is recommended for water heating within the proposed development.

3.3.3 Lifts

Gearless traction with variable voltage variable frequency (VVVF) motor is recommended for lifts within the proposed development.

3.3.4 Lighting

3.3.4.1 Natural Lighting

The proposed development massing maximises daylighting opportunities in regularly occupied spaces, therefore minimising the use of artificial lighting.

3.3.4.2 Artificial Lighting

Lighting installations require a design that properly considers the conservation of scarce energy resources. Sustainable lighting design ensures that illuminance is not excessive,



that the switching arrangements are such that unnecessary illumination may be turned off and that the illumination is provided in an efficient manner.

Furthermore, household lighting energy use in Australia is increasing due to the construction of larger homes and the installation of more light fittings per home. It is estimated that most homes could readily reduce the amount of energy they use for lighting by 50% or more.

Lighting installations require a design that properly considers the conservation of scarce energy resources. Sustainable lighting design ensures that illuminance is not excessive, that the switching arrangements are such that unnecessary illumination may be turned off and that the illumination is provided in an efficient manner.

There are additional energy losses associated with inefficient lamps and lighting losses associated with luminaries. Consequently, a lighting design which uses the most efficient lamp types and the least number of luminaries for a given design illuminance will be more efficient and usually have a lower capital cost.

It is likely that the lighting to be used within the development will incorporate LED lamps generally. It is recommended that the following lighting features be incorporated into the development to minimise energy consumption due to lighting:

- Maximise use of LED and minimise or where possible eliminate the use of halogen down lights, as LED are much more efficient than halogen lighting.
- The external lights are operated on a combination of daylight sensors and time clock.
- Use of lighting systems incorporating appropriate switching zones, time clock control and motion sensors is also proposed to optimise energy efficiency for lighting.

Furthermore, the project will comply with the NCC requirements of maximum illumination power densities.

3.3.5 Appliances

For BASIX compliance, the below measures for energy performance in residential appliances have been included:

- Energy efficient dishwashers;
- Energy efficient clothes dryers;
- An electric cooktop and electric oven to be installed within each residential dwelling.

3.3.6 PV Solar Green Initiatives

As the worldwide demand for fuel increases, alternative and renewable energy sources are emerging as economical and sustainable. Alternative renewable energy sources are becoming more attractive options because of increased global demand for fuels, environmental responsibility, affordability and new local, state and federal government legislations.

- SLR recommends the installation of a roof-mounted solar PV system.
 - A 30 kW PV solar system is recommended to minimise greenhouse gas emission.
 - A 30 kW PV solar system will offset approximately 43 MWh/year of energy usage.
 - The estimated greenhouse gas CO₂ emission saving is approximately 28.8 tCO₂/annum.



Figure 10 PV Solar on Roof



This will be further evaluated as the design progresses.

3.3.7 Electrification and Green Power Initiative

Electrification of the proposed buildings will allow for a streamlined energy system powered increasingly by renewable sources and improves compatibility with future grid decarbonisation.

It is also recommended that a high percentage of “Greenpower” should be made available to occupants, providing the opportunity to contribute to a reduction in total greenhouse gas emissions produced by the proposed development. Greenpower is produced from environmentally friendly renewable energy sources such as solar, wind, water and biomass.

When a Greenpower product is selected by the owner, the energy supplier commits to buying a certain amount of electricity from approved new renewable energy sources. The financial accounts of Greenpower suppliers are audited independently. This makes a clear distinction between the services provided by standard energy suppliers and the more sustainable service offered through Greenpower options.

The National Greenpower website¹ states that “Australian households generate almost one-fifth of Australia's greenhouse pollution through everyday activities such as transport and household energy use”. The average household in Australia emits over seven to eight tonnes of greenhouse pollution each year through energy use alone. This is because most households source their electricity from burning coal and other fossil fuels. By choosing accredited Greenpower, up to 100% of a household's energy usage can be generated from renewable sources.

3.4 Water

Australians use more than one million litres of freshwater per person each year (source: Green Building Council of Australia 2006).

¹ <http://www.greenpower.gov.au>



In addition to increased water use efficiency, new developments can reduce potable water demand by residents, and visitors through the provision of an on-site alternative water supply. There are three principal forms of alternative water supply:

- Reticulation of reclaimed water to the site
- Rainwater/stormwater storage and reuse
- Grey water storage and reuse.

It is recommended that the above types of alternate water supply be explored for use in landscape irrigation and fire services, reducing the demand for potable water.

Appropriate rainwater/stormwater tanks are recommended to be considered in the design.

3.4.1 Water Efficiency

The minimum sustainable standard for water efficient fixtures and fittings is 3 star. To achieve greater than the standard level, following water efficient fixtures and fittings are recommended for the proposed site:

- All kitchen and bathroom taps are at least 4 star;
- All shower heads are 4 star (>4.5 but ≤6 L/min);
- All residential toilet flushing systems are 4 star;
- All residential dishwashers are 4 star;

Implementation of the above recommendations will assist in reducing the water consumption.

Furthermore, the following State Environmental Planning Policy (SEPP) Sustainable Buildings requirements are applicable to prescribed new development components:

- large commercial development (as defined below) is to be capable of achieving the following standards for energy use;
 - hotel accommodation (>100 rooms) - a 3 star NABERS water rating.

The new hotel component is to be designed to be capable of achieving the SEPP 2022 NABERS requirements, with agreements to rate to be met during the detailed design and operation as applicable.

3.4.2 Landscape Irrigation

Based on international best practice guidelines, it is generally recommended that either 90% of the water requirement for landscape irrigation is sourced from on-site rainwater collection or recycled water. Alternatively, best practice would also be achieved with the installation of a water efficient irrigation system comprising subsoil drip systems and automatic timers with rainwater or soil moisture sensor control override.

The landscape design should focus on using native coastal and other drought resistant species that rely primarily on rainwater for their water needs. The following is recommended to be incorporated into the development to minimise water consumption for landscape irrigation.

- Native coastal and other drought resistant species that rely primarily on rainwater for their water needs where appropriate and possible.
- Indigenous species are recommended to comprise over 30% of the provided landscaping.



3.5 Transport

When designing a sustainable development, it is important to minimise the use of individual motorised transport where possible and thus enhance energy savings and environmental impact through reduced fossil fuel consumption and improved regional air quality. This can be achieved by encouraging the use of energy efficient public transport that is immediately at hand, reducing car parking facilities, and providing adequate bike storage facilities to minimise the requirement for individual motorised transport.

The surrounding local context of the site is depicted below.

Figure 11 Public Transport Infrastructure around the Project Site



3.5.1 Commuting Using Public Transport

Developments that are within close proximity of good transport nodes with frequent service should be encouraged. The proposed building is located near mass transit and will allow more people to take public transportation to keep their automobiles off the road.

The proposed development is located near multiple mass transit options (Gosford Train Station). The proposed development will encourage occupants and users of the development to use public transportation and minimise automobile use.

3.5.2 Facilitation of Pedestrian and Non-motorised Transport

Bike storage facilities are proposed to be included in the development to help minimise the requirement for individual motorised transport.

Sufficient recreational opportunities are easily accessible to occupants, eliminating the requirement for long-distance motorised transport for most recreational activities. This would be a positive feature of the development with regards to sustainability as this clearly avoids greenhouse gas emissions that would otherwise have been produced if residents had to travel long distances for recreational activities.



3.5.3 Provision of Car Parking

Transport emissions are one of the largest contributors of greenhouse gas emissions in Australia.

The project is committed to equip 10% of total car spaces with EV charging stations and allocating these charging stations to visitor as well as occupants to encourage maximum uptake. In addition, the project is committed to providing provision for future installation of EV chargers in 100% of charging spaces.

Figure 12 EV Charging Infrastructure



3.6 Indoor Environmental Quality

Achieving enhanced Indoor Environment Quality (IEQ) ensures that the building and building services are designed and managed to benefit the health and well-being of building occupants and visitors.

3.6.1 Asbestos

It is recommended that Asbestos identification and removal procedures be included in the site Environmental Management Plan (EMP) where required.

3.6.2 Internal Noise Levels

Internal noise levels are a significant factor in determining occupant and customer satisfaction and well-being. The aim of controlling internal noise levels is to encourage and recognise buildings that are designed to maintain internal noise levels at an appropriate level. Further information can be found in the Acoustic Report developed for the project.

3.6.3 Carbon Monoxide Monitoring and Control

Elevated carbon monoxide (CO) levels are indicative of inadequate ventilation, affecting the quality of air within an enclosed occupied space, and the health of the occupants. CO monitoring systems can detect elevated concentrations of CO and automatically adjust ventilation supply rates before indoor air quality becomes problematic.



SLR Consulting recommends investigating a CO monitoring system to the internal carpark areas where appropriate to satisfy NCC requirements.

3.6.4 Paints and Floor Coverings

SLR recommends the use of paints and floor coverings with low levels of volatile organic compounds (VOC) and low formaldehyde wood products where possible.

3.7 Operational Waste Management

An Operational Waste and Recycling Management Plan is a minimum requirement to meet sustainable building design best practice. The Waste and Recycling Management Plan includes:

- Separate waste and recycling streams;
- Transfer of material to common storage area;
- Communal storage areas;
- Frequency of collection; and
- Signage and educational initiatives for occupants.

A Waste Management Plan is recommended to track all waste going offsite to show that at least 80% of all construction waste is re-used or recycled.

3.8 Green Star

The project is committed to achieve 4-Star Green Star or equivalent using the Green Building Council of Australia (GBCA) Building V1.0 Rating Tool. This is a later available version which supersedes the Green Star Design and As Built rating system.

It is recommended that this performance benchmark be met during the detailed design phase, as the design of building services progresses and becomes more refined.

3.9 Monitoring and Reporting

Once the project is completed, all committed sustainability-related measures need to be commissioned and tuned to ensure all services operate to their full potential and as designed.

For the hotel component, the building tuning is recommended to be provided by service contractors and overseen by an independent assessor, at least once a month within the Defects Liability Period (DLP) period to ensure that services are operating effectively and efficiently. Monthly reports to be provided to the tenant for DLP.

3.9.1 Energy & Water Review and Audit

Energy and water usage review and management plan should be undertaken and implemented within the first few months of operation to ensure energy and water management is sufficient for the development's needs. A breakdown of energy and water usage per month at the Project Site will help to measure the development's baseline energy and water use and assess what appliances, equipment, and processes are consuming energy and water.



An energy and water review is also necessary for the assessment of utilisation to further identify opportunities for improvement. Energy and water usage data obtained during the review process may be used to establish key performance indicators and annual energy and water targets for the Project.

An energy and water audit and management review should also be undertaken on a half-yearly basis to ensure employees are following energy savings procedures correctly. Where audits show that energy and water savings procedures are not carried out effectively, additional employee training should be undertaken, and signage and procedures re-examined.

The Energy and Water Management Plan should be progressively improved and updated on an annual basis, or as required, to reflect changes to the Energy Management System and to promote continual improvement of energy management at the Project Site.

It is the responsibility of the facility manager to routinely check energy and water savings procedures are undertaken correctly (i.e. lighting turned off while areas of the development are not in use). The facility manager should also ensure all monitoring and audit results are well documented and carried out as specified in the Energy and Water Management Plan.



4.0 Conclusion

SLR Consulting Australia Pty Ltd (SLR) has been engaged by UPG Waterfront Pty Ltd (the Applicant) to provide a qualitative Ecologically Sustainable Design (ESD) assessment for the proposed mixed-use development located 26-30 Mann Street, Gosford, also known as 'Central Coast Quarter' (the site).

In accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs) and in support of the State Significant Development Application (SSD-90960208), this study has been prepared to respond to the SEARs requirements issued pertaining to Ecologically Sustainability Design (ESD).

The development includes many ecologically sustainable design features. This report provides an overview of these features.

The following ESD and energy efficiency features are proposed to be included in the design:

- The proposed development will incorporate passive and active energy-saving measures such as operable windows to enhance natural ventilation through the apartments, where appropriate to target;
 - 66% of residential apartments of the South Tower achieve natural cross ventilation, complying with ventilation controls. The East Tower is hotel for the first nine storeys and is therefore not considered in this calculation.
- The form dictated by the site has been designed to maximise the solar access of residential units to target;
 - 90% of apartments receive a minimum 2 hours of direct sunlight to private open space.
 - 28% of apartments receive a minimum of 2 hours of direct sunlight to both private open space and living spaces. These numbers are improved when hours of measurement are extended to 9am to 4pm, where 47% of apartments receive a minimum of 2 hours of direct sunlight to both private open space and living spaces.
- Thermal mass - Concrete slab construction is proposed for all floors throughout the development - concrete has amongst the highest thermal mass capacity of a range of common building products. The proposed development's external walls, structural internal walls, and slabs should be predominantly high thermal mass materials.
- LED energy-efficient lighting for all spaces;
- Light efficiency measures in the lobbies using time clock and motion sensors;
- Gearless traction with variable voltage variable frequency (VVVF) motor lifts;
- Centralised energy-efficient solar/ heat pump hot water systems;
- Air conditioning systems with a proposed Coefficient of Performance (COP) greater than 4 for cooling and 4 for heating.
- Air-conditioning control zoning is recommended where necessary to cater for varying occupancy rates, orientation to solar loads, etc. Also, a time clock is provided with provision for after-hours override;
- Energy efficient clothes dryers and energy and water efficient dishwasher units to be installed within each residential dwelling.
- Provision of electric cooktop and electric oven within each residential dwelling;



- Power sub-metering to enable continued review of power consumption;
- Selection of endemic and low-maintenance landscaping species;
- Low flow fixtures and fittings, including at least 4-star taps and shower heads;
- In addition, the project considers rainwater reuse for irrigation purposes;
- Low levels of volatile organic compounds (VOC) paints and floor coverings and low formaldehyde wood products where possible;
- Use of materials with high SRI values for roofing and terrace pavements.
- The project is committed to equip 10% of total car spaces with EV charging stations and allocating these charging stations to visitor as well as occupants to encourage maximum uptake. In addition, the project is committed to providing provision for future installation of EV chargers in 100% of charging spaces.
- The provision of bicycle storage spaces within the development is proposed to support the use of low emission transportation opportunities by the users and occupants;
- Proposed planting provides added cooling during the summer months through the leaf transpiration process and is also useful for wind amelioration;
- Plant species within the development would be predominantly indigenous species that can tolerate low water to reduce maintenance requirements;
- SLR recommends the installation of a roof-mounted solar PV system.
 - A 30 kW PV solar system is recommended to minimise greenhouse gas emission.
 - A 30 kW PV solar system will offset approximately 43 MWh/year of energy usage.
 - The estimated greenhouse gas CO₂ emission saving is approximately 28.8 tCO₂/annum.
- The proposed residential development is proposed to enjoy a high level of thermal comfort gaining an average 7 NatHERS star rating.
- The residential development also meets BASIX targets in Water and in Energy.
- The development's hotel component is targeting to achieve 4 star NABERS Energy and 3 star NABERS Water ratings.
- The project is committed to achieve 4-Star Green Star or equivalent using the Green Building Council of Australia (GBCA) Building V1.0 Rating Tool. This is a later available version which supersedes the Green Star Design and As Built rating system.

The report body contains recommendations regarding other ESD features, such as a mechanical ventilation system, domestic hot water, other appliances, and operational waste. These features are proposed to help achieve significant reductions in energy and water required by the development both in building and operation, in addition to ensuring that the hotel and residential units are pleasant spaces to reside.

It is recommended that ESD initiatives continue to be developed and implemented, and the performance benchmarks be met during the detailed design phase, as the design of building services progresses and becomes more refined.



Appendix A

Net Zero Statement



5.0 Net Zero Statement

SLR Consulting has been engaged by UPG Waterfront Pty Ltd to prepare a Net Zero Statement for the development located in Gosford, NSW. This statement outlines the strategies and design measures aimed at achieving net zero operational emissions, aligning with the project's commitment to sustainability and carbon reduction to support the target of achieving net-zero emissions by 2050 as set by NSW Climate and Energy Action. By integrating high-performance building systems, renewable energy solutions, and energy-efficient practices, the project seeks to minimize greenhouse gas emissions, lower operational costs, and support a sustainable built environment for future generations.

5.1 Net Zero Compliance

Energy Efficiency is achieved through compliance to National Construction Code (NCC) 2022 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

In addition, for the hotel component, energy efficiency is also exemplified by targeting 4-star NABERS Energy rating.

5.2 Measures leading to Net Zero Outcome

Based on the above targets set, the following are the net zero efficiency measures proposed for the project:

SLR has assessed the potential for the installation of a Photo Voltaic (PV) Solar Power System for the Site.

- It is recommended that at least 30 kW PV solar system be installed on the roof to significantly reduce the carbon footprint for the proposed development.
 - The proposed 30 kW PV solar system will offset approximately 43 MWh/year of energy usage.
 - The estimated greenhouse gas CO₂ emission saving is approximately 28.8 tCO₂/annum.
- The following recommendations are made to minimise cooling and heating loads for the conditioned areas:
 - All external walls have a total R-value of R2.0.
 - All internal walls to unconditioned space have a total R-value of R2.0
 - Metal roof with insulation, Total R-value= R3.7 to all airconditioned areas.
 - High-performance glazing to NCC requirements for all air-conditioned areas.
- Use of materials with high SRI values for roofing and terrace pavements.
- Lighting control in accordance with NCC requirements.
- The air conditioning system with a proposed Coefficient of Performance (COP) of over 4 for cooling and over 4 for heating.
- HVAC Control – Space temperature indoor condition is 22.5±1.5°C DB
- Humidity 40% – 60% (uncontrolled).



5.2.1 NABERS

By targeting 4-Stars NABERS Energy, the hotel component is proposed to achieve over 20% GHG emission reduction via the proposed passive design and active energy efficiency initiatives with PV solar system when compared with NABERS Hotel market standard 3 Star rating.

Figure 13: NABERS Hotel Star Rating Guide Extract

NABERS STAR RATING GUIDE	
★☆☆☆☆	MAKING A START
★★☆☆☆	OPPORTUNITIES FOR UPGRADES
★★★☆☆	MARKET STANDARD
★★★★☆	HIGH PERFORMANCE

5.2.2 Green Energy

Green Power plays a crucial role in achieving net zero emissions goals by providing renewable electricity that offsets conventional grid energy, which often relies on fossil fuels. By sourcing Green Power, a project can effectively balance its energy consumption with clean energy inputs, significantly reducing its carbon footprint. Green Power typically includes energy from solar, wind, hydro, and biomass sources, all of which have minimal environmental impacts compared to traditional energy generation. Integrating Green Power into a development ensures that even when on-site renewable generation, such as solar panels, may not fully meet demand, the energy needed is still sourced from a renewable supply, supporting net zero objectives.

Moreover, Green Power aligns with broader sustainability commitments by encouraging the growth and expansion of renewable energy markets. As more organizations and developments invest in Green Power, the demand drives investment in renewable infrastructure, which in turn helps reduce the cost and increase the accessibility of renewable energy options. For this project, choosing Green Power as part of its energy strategy not only aids in achieving net zero emissions but also signals a commitment to climate-conscious development, contributing to a cleaner energy future.

5.3 Conclusion

In summary, this Net Zero Statement demonstrates a clear pathway for the development to achieve its target of achieving net-zero emissions by 2050 as set by NSW Climate and Energy Action operational energy goals. Through the adoption of targeted design strategies and recommended technologies, the project is well-positioned to significantly reduce its environmental impact and align with evolving sustainability standards. These efforts not only contribute to long-term cost savings and energy resilience but also underscore the project's role as a forward-thinking model for sustainable development in the region.



