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Central Coast Quarter

26-30 Mann Street Gosford

ESD Report

For

SH Gosford Residential Pty Ltd

Revision D | 3 May 2022

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Revision	Date	Description	Author	Reviewer
P1	05/08/19	Preliminary Issue	TRC / SNG	LV
P2	21/08/19	Preliminary Issue	TRC / SNG	LV
A	26/08/19	Final Issue	TRC / SNG	LV
B	04/09/19	Revised Final Issue	TRC / SNG	LV
C	29/04/22	Revised to incorporate commercial office	BJ / NB	LV
D	03/05/22	Revised to incorporate client comments	LV	LV

1. INTRODUCTION

1.1. Aim of Report

The Secretary's Environmental Assessment Requirements (SEARs) Application Number SSD-10114 issued for the Central Coast Quarter State Significant Development Application (SSDA) Item 7 - Ecologically Sustainable Development (ESD) requires that the environmental impact statement shall:

- Detail how ESD principles (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 (EP&A Regulation 2000) will be incorporated in the design, construction and ongoing operation of the development; and

  Demonstrate how future buildings would meet or exceed minimum building sustainability and environmental performance standards; and
- Demonstrate how the proposal meets the Water Sensitive Urban Design principles and incorporates Water Sensitive Urban Design practices

S4B has reviewed and identifies the design initiatives and features of the development that have the potential to reduce the environmental impact of the mixed use development located on the site of 26-30 Mann Street in Gosford NSW.

Consideration will be given to the following areas with regards to energy and water consumption and building amenity;

- Building Envelope
- Air Conditioning
- Lighting
- Water
- Noise
- Waste and Recycling

1.2. Limitations

The assessment of compliance is based on the current design approach for the building and its services which are subject to change.

Some compliance items relate to construction or items of detailed design. In these instances, the requirements for the builder, contractor or detailed design have been highlighted.

1.3. Sources of Information

- Architectural drawings;
- Workshops with St Hilliers, DKO and the master planning design consulting team;
- Building Services Concepts to suit the master planning outcomes

2. BUILDING DESCRIPTION

2.1. The Site

The proposal comprises the construction of a mixed use building which includes a 19 storey commercial office building, 24 storey residential building, 18 storey residential building, retail podium connecting each of the 3 buildings above and a common 3 level basement carpark below all of these elements.

The site is bounded by Mann Street to the East, Baker Street to the West, Vaughan Street to the South and the ATO building on Georgiana Terrace to the North.

The building is located in Gosford, NSW which is within climate zone 5 in accordance with the National Construction Code.

Figure 2.1 - Site of Central Coast Quarter at 26-30 Mann Street, Gosford

3. BUILDING ENVELOPE

3.1. Orientation

The winds experienced at the site are typical of a land breeze / sea breeze wind cycle.

The Central Coast Quarter development can expect predominately North Easterly winds from the Rumbalara Reserve foothills and Southerly and South Westerly winds from Brisbane Waters and the Broken Bay inlet from Hawksbury River. The East/West orientation of the buildings on the site provides the perfect opportunity to harness these breezes for natural ventilation. The details of how natural ventilation will be implemented in the building are presented later in this report.

Figure 3.1 – Southerly sea breeze

The air quality will be very high as a result as the winds delivered from Rumbalara Reserve will be oxygen rich from the large natural rainforest like habitat while the ocean breezes from the Brisbane Waters frontage of the development will offer a temperate sea breeze atmosphere.

3.2. Solar Control

The project team have strategically incorporated building planning to provide shading through overhanging balconies on the residential buildings which provide shading in peak solar conditions while the commercial office building orientation will be predominantly North-South with some strategically placed balconies on the West facade.

As the commercial office occupancy doesn't coincide with daytime peak cooling requirements, further solar control doesn't provide any tangible benefit to the comfort or greenhouse gas emissions as the air conditioning is required to be deactivated while there is no room occupancy.

During the detailed design of the residential buildings, façade treatment with combination of solar control glazing and shading elements will also be considered to provide both radiant and solar control. This will be undertaken during the BASIX modelling to optimise the design.

The culmination of these measures will result in buildings with reduced energy consumption and superior seasonal comfort control.

3.3. Construction Thermal Properties

The building façade is proposed to utilise a thermally efficient glazing system, reducing the thermal load in the occupied spaces and therefore reducing the capacity of the central cooling and heating systems.

The building envelope in the commercial office building will also be designed to minimise uncontrolled leakage into the building.

Portions of the residential / retail podiums are proposed to be landscaped to improve the occupant amenity of the space. The landscaping also maximises the thermal efficiency of the podium.

In addition to the thermal load reduction offered by the glazing system, operable portions will provide the option to naturally ventilate the spaces within the residential buildings.

4. BUILDING AMENITY

4.1. Natural Ventilation

The residential buildings form is designed to perform well when naturally ventilated. The operable façade windows in the rooms all encourage natural ventilation throughout each individual apartment based on the availability of natural breeze airflow surrounding the buildings. The floor plate provides reasonably shallow spaces between ventilation openings, promoting good airflow and has the potential to provide simple and good cross ventilation within each apartment.

The detailed design of each apartment will determine the percentage of the façade being operable and to optimise the effectiveness of the natural ventilation. Open doors will allow air to flow in the window, through the rooms and throughout the apartments.

This will be undertaken in the detailed design and Development Application process for each apartment but the massing of the building and locations of the residential facades on the site allow the natural ventilation of the apartments to occur with great effectiveness.

The commercial office building is not proposed to incorporate natural ventilation features as most commercial office tenants do not operate their buildings this way and commercial leases have strict internal environmental controls to adhere to.

4.2. Cooling

The extent of cooling in the residential buildings shall be reduced by operating the facility as a mixed mode system whereby thermal conditions are maintained with limited use of electrically driven systems. Where a mechanical system exists the unit will turn off when a window is opened.

For the commercial office building, a central mechanical cooling system will be provided which will be controlled by a BMS. The system will comprise of high efficiency chillers, fan coil units and water reticulation through the building. The proposed central chilled water plant has very high levels of efficiency when compared to a typical air conditioning system, particularly in low load situations which constitute the majority of annual operation of a commercial office building.

The BMS will monitor and control the systems to minimise energy consumption and deliver cooling to meet the varying occupancy demands.

4.3. Heating

Heating shall generally be provided via a heating hot water system utilising high efficiency condensing boilers with gas as a fuel source in lieu of electrically driven reverse cycle air conditioners. The use of a gas fuelled heating hot water system provides significant CO2 emission reduction.

4.4. Domestic Hot Water

Domestic hot water to the commercial office building will be provided through centralised gas boosted solar hot water system with a minimum 50% solar contribution.

Solar hot water is highly efficient because it harvests the suns free energy. Additional heating is provided from burning gas which is less carbon dioxide intensive than the use of an electric element.

The residential hot water services are likely to be centralised gas with a system dedicated to each tower, the detailed requirements will be developed as part of the BASIX requirement for each building.

The gas fired booster heating will have an energy rating greater than 3.5 stars.

4.5. Lighting

Controlled daylighting provides an opportunity to reduce energy consumption needed for artificial lighting and can improve occupant satisfaction.

Occupant comfort will be improved through the use of glare control measures such as operable shading and / or the selection of solar control glazing.

The use of natural lighting can reduce the operation of artificial lighting which can represent a significant proportion of the building's energy use. The atria and large amount of glazing promote the use of natural lighting.

Artificial lighting will consider appropriate colour perception and lighting levels, reduced glare from lamps and uniformity.

Luminaire selection will be based on minimising energy consumption and potential hazard associated with disposal of lamps.

Lighting control will be used throughout with daylight harvesting in the Atria.

Light fittings will be selected in coordination with the architect to complement the building.

Energy efficient sources such as LED will be predominantly used unless a more appropriate alternative exists.

Daylight and Façade

Daylight has been linked to higher levels of occupant comfort and productivity. It is a free source of lighting for the building, reducing the building's overall electrical load. It is important to maximise the availability of daylight for building occupants while ensuring good glare control through the internal and external shading devices.

High performance glazing can be specified to reduce solar loads reaching the internal space (improving thermal comfort and reducing the loads on the HVAC system) and to improve daylight levels transmitted to the space (increased natural light levels).

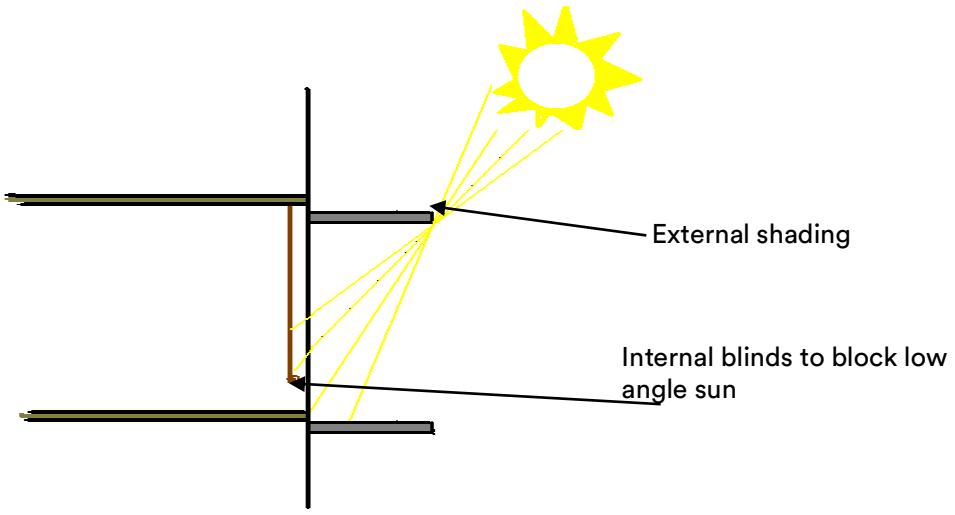

Figure 4.1 - Daylight and Shading

An efficient façade design can also maximize external views (improving the indoor environmental quality of the building).

The façade may be designed with high visual light transmittance (VLT) glazing to maximise daylight penetration. Engineered shading on all windows will reduce direct sunlight penetration thereby reducing solar gain and HVAC energy requirements. Blinds will be installed to prevent glare from low angle winter sun.

5. INDOOR ENVIRONMENT QUALITY

5.1. Outside Air

The commercial office is proposed to comprise ducted outside air connected to the air handling units and mixed with return air from the space.

By utilising plant where outside air can be mechanically delivered to the space, the indoor environment quality is significantly improved through dilution of odours, carbon dioxide and other chemical contaminants. This increases occupant amenity.

Similarly, the residential building will have ducted outside air to each apartment. While this is not typical or mandated by the NCC, it provides outside air to each unit at peak heating and cooling conditions rather than relying on opening of windows and doors for fresh air. This best practice approach delivers superior indoor air quality.

In addition, the apartments will be designed to operate with natural ventilation when external conditions permit and an occupant desires no air conditioning.

5.2. Thermal Comfort

Overall, people give off heat in three ways: convection from air movement over the skin (36%), evaporation of moisture from the skin (18%), and direct radiation to the surrounding environment (46%). For this reason, comfort in air conditioned spaces should be examined from a holistic thermal comfort perspective rather than dry-bulb temperature alone. Thermal comfort is defined by a number of parameters including;

- Dry-Bulb Temperature – the actual temperature of the space
- Relative Humidity – a measure of the moisture in the air
- Air Velocity – a measure of the draft experienced by occupants
- Mean Radiant Temperature – a measure of the amount of radiant heat an occupant experiences
- Metabolic Rate – a person's activity level has large impact on whether they feel hot or cold
- Clothing Level – the amount of clothing a person wears has a large impact on whether they feel hot or cold

Systems which aim to control the three forms of heat transfer are likely to provide a more comfortable environment than traditional systems that only control dry-bulb temperature.

Control of radiant temperature requires a system capable of radiant cooling which is not always a feasible solution. However, the design of the building also contributes to this parameter due to factors such as control of exposure to direct solar radiation on an occupant with the use of individually controllable blinds and consideration for the use of the thermal mass of the structure.

The thermal comfort performance of the residential dwellings is assessed by NaTHERS accredited software and input into a BASIX rating. The computer model of the dwelling incorporates the following passive features;

- Orientation
- Construction of walls, floor and roof
- Insulation
- Glazing
- Shading
- Openings for natural ventilation

The model is simulated with a weather file which provides a measure of the energy that will be required to heat and cool the home throughout the year. The energy required is converted into a star rating. The higher the star rating, the less energy required to provide thermal comfort to occupants.

The target minimum BASIX ratings will be 4 star ratings for the dwellings with a target of 5 star or greater. This would represent a circa 20% improvement over the minimum performance requirements.

The thermal comfort performance of the commercial office building occupants is assessed as part of the Green Star rating using software to determine the Predicted Mean Vote (PMV). PMV is a an empirical fit/measure of the human sensation of thermal comfort. It has been adopted as an ISO standard. It predicts the average vote of a large group of people on a thermal sensation scale.

6. CARBON OFFSET AND GREENHOUSE GAS EMISSIONS

6.1. Benchmarks

The design will be benchmarked to aim to achieve a 20% reduction in greenhouse gas use per person compared to the benchmark rate of 3,292 kgCO2 per annum. The benchmark rate is the average greenhouse gas emissions per capita for the current building stock. The benchmark is determined from utility consumption and ABS population density data.

Part of this will be through the design of the building with benchmarked to equivalence as follows:

- 5 star NABERS Energy for the commercial office building
- 4 star NABERS Water for the commercial office building
- 4 star Green Star for the commercial office building

6.2. Summary of features

The Central Coast Quarter development will target this improvement on the benchmark by incorporating the following features;

Retail and Common Areas

- High performance façade
- CO2 control of VSD fans for carpark ventilation
- BMS control of air conditioning and other systems
- Motion sensors and time clocks for control of air conditioning and lighting
- Use of zoned high efficiency, LED lighting
- Centralised instantaneous gas hot water units with potential solar contribution

Commercial Office

- High performance façade
- CO2 control of VSD fans for carpark ventilation
- BMS control of air conditioning and other building systems
- High efficiency LED lighting
- Daylight harvesting on all the perimeter zones also incorporating motion control
- Lighting zoning of 150m² or less with intelligent controls
- Air conditioning featuring
    - increase in base outside air rates
    - use of high induction swirl diffusers for occupant comfort
    - variable speed drives on all fans
    - zoning of 150m² or less
    - intelligent and adaptive BMS controls
- Rainwater harvesting and re-use
- Centralised instantaneous gas hot water units with potential solar contribution

Dwellings

- High performance façade
- Mixed mode air conditioning system utilise natural ventilation as well as air conditioning
- Individual ‘demand based’ ventilation for kitchens and bathrooms
- High efficiency individual DX air conditioning
- Centralised instantaneous gas hot water units
- Use of zoned high efficiency, LED and fluorescent lighting
- Natural lighting
- Provision of water efficient clothes dryers and dishwashers

7. WATER

Water and energy are the two primary resources used within buildings; as such, they both impact directly on comfort, health and achieving a sustainable development. By focusing on reducing water consumption in buildings, there are many benefits available such as lower water charges, reduced stress on current water infrastructure, reduced pressure to construct new reservoirs and water mains and reduced energy use in the treating and pumping of water supplies and sewerage.

7.1. Water Efficiency

The design will incorporate the most efficient WELS fixtures and fittings suitable for their specific application. These fixtures and fitting include basin taps, toilets, urinals & shower heads.

The air conditioning heat rejection is achieved through the use of air cooled plant rather than water cooled equipment such as cooling towers to mitigate water consumption.

7.2. Rainwater Harvesting

The Central Coast Council has advised that there is no on-site detention required for the project. As a sustainable water re-use initiative we propose to collect and retain a minimum of 50kL of rainwater on the project to be used for the two major water uses in the precinct. These are the cooling tower makeup water in the commercial office and the landscaping which is predominantly on the retail podium roof area of the project.

8. NOISE

An assessment of the existing acoustic environment, including roads and land uses has been conducted by Acoustic Logic and noise impacts have been assessed in accordance with:

+ State Environment Planning Policy SEPP (Infrastructure) 2007
+ Environment Protection Authority (EPA) Noise Policy for Industry
+ The EPA Interim Construction Noise Guidelines and the Assessing Vibration: A Technical Guideline document

In addition and as part of the acoustic analysis, traffic noise intrusion assessment has been conducted based off the requirements of the following acoustic noise criteria/standards:

+ Gosford City Council Development Control Plan (2013)
+ NSW Department of Planning and Environment's document – 'State Environmental Planning Policy (Infrastructure) 2007

An acoustic assessment of potential noise sources associated with the development (including building services, pedestrian noise and car/tram movements) has been conducted. The assessment details the relevant acoustic criteria for noise impacting on surrounding receivers based on the EPA and council requirements. Where required, suitable acoustic treatments have been specified such that noise levels at surrounding receivers will comply with the relevant noise level criteria.

Construction noise emission modelling and associated management is proposed in the report.

During the detailed Development Applications of each individual building, a detailed noise assessment of the building design and proposed construction will be undertaken to comply with all of the above master planning emissions requirements as well as internal noise emissions to ensure detailed internal and external noise criteria is adequately managed.

9. WASTE AND RECYCLING

Statistics indicate that construction and demolition waste accounts for up to 40% of the waste generated within Australia. The majority of this waste may be recycled or may have been minimised initially, without ever reaching the site. The major benefits of recycling are a reduction in the demand for new resources, reduced energy costs of production and transport and a reduction in the amount of waste going to landfill.

The waste management plan applies not only during construction but also whilst the buildings are operational. In this regard it is important that suitable facilities are provided to deal with the waste while the Commercial office and Residential towers are operational.

- Waste minimisation must be dealt with at both the design and construction stages of the project
- Materials specified are to have low wastage rates, using minimal packaging.
- Where possible, materials are to be re-used on the site.
- Materials with a recycled content are to be specified in preference to those from non-renewable sources.
- A waste management plan shall be developed prior to construction.
- A separated waste recycling facility shall be provided on the site.
- During the design and when specifying materials, full consideration must be given to products with a recycled content.
- Consideration must be given to the future recyclability of proposed materials.

10. TRANSPORT

Low-impact transport will be addressed by the design as well as the site. Bicycle and motorcycle facilities will be provided for residence and visitors, while access to existing public transport networks and pedestrian infrastructure is well established surrounding the site. Most streets have footpaths, particularly oriented towards Gosford town centre.

The site is located close to numerous amenities where most errands can be accomplished on foot with many nearby public transportation options. Nearby parks include Kibble Park, Waterview Park and Fagan Park.

Central Coast Quarter is being designed to optimise pedestrian links for enhanced walkability and access to nearby public transport to improve amenity, promote health and reduce transport related GHG emissions. The site will provide an attractive links from the CBD (Mann Street) through to Baker Street, the Gosford City Park and the waterfront.

The site is well-serviced by public transport. TfNSW's Future Transport Plan outlines that Gosford will continue to establish itself as a satellite city. Future connections to the Greater Sydney should be established through 'fast transit' and potentially high speed rail. Rail services are expected to operate at a 'turn up and go' frequency, indicating that customers can reasonably expect services without looking at timetables. Furthermore, the Gosford City Centre TMAP outlines the intent to improve the bus network east-west connectivity in Gosford and surrounding areas.

11. OTHER MARKET DRIVERS AND TRENDS

There are a number of market and industry drivers that will influence the building design and operation. Decisions can be made in the current pre-approval and future planning stages to pre-emptively neutralise perceived risks and turn them into opportunities to maximise sustainable outcomes for the Central Coast Quarter. These anticipated changes are listed below.

11.1. Electric Vehicle Uptake

Electric vehicles (EV) have rapidly developed from concept to market emergence, with prices declining every year. It is anticipated that the sale of electric vehicles will increase sharply in coming years as cost of production declines, along with the improvements in availability and range capacity of EVs, and developments in public charging infrastructure.

Provisions will be made for the provision of electric vehicle charging infrastructure in the development.

11.2. Community and Social Sustainability

With global urbanisation taking place at a rapid rate, governments and cities are starting to pay more attention to the sustainability attributes of the planning, design and construction of new projects. This involves the delivery of projects that offer diverse, affordable, inclusive, well connected and healthy places to live, work and play as well as encourage opportunities for business diversity, efficiency, innovation and economic development.

11.3. Social and Community Benefit

Ensure community and local stakeholder engagement and involvement in the development of the project and contribute to the delivery of legacy projects to benefit local communities. Increase opportunities for employment of local people, indigenous workers and businesses, female representation in non-traditional trades and participation of local businesses. Make a positive contribution to community health and well-being.

12. RESPONSE TO THE SEARS

The response to the SEARS detailed in Section 1.1 is as follows:

12.1. Precautionary Principle

The Central Coast Quarter and surrounds will be designed to avoid where practicable, damage to the environment. This report will guide the design, construction and ultimately the operation of the Central Coast Quarter by adopting strategies aimed to reduce energy and water consumption, limit carbon emissions, encourage use of responsible materials, reduce waste and limit other forms of emissions from the Central Coast Quarter including light pollution. In addition the Central Coast Quarter will also incorporate the requirements of a BASIX rating for the residential component.

12.2. Intergenerational Equity

The development will seek to benefit present and future generations through increased health and environmental benefits associated with reductions in road emissions and pollution, enhanced health through improved active transport networks and creating a space that can be utilised and accessed by all ages, cultures and abilities. The Central Coast Quarter will include a high standard of Indoor Environmental Quality (IEQ) provisions to improve indoor air quality and enhance the internal building environment for the occupants benefit.

12.3. Conservation of Biological Diversity and Ecological Integrity

The site is already developed with limited biological and ecological value. The design for the Central Coast Quarter will include strategies that aim to maintain the current level and where practical strategies will be implemented to enhance the ecological and biological value. An example of this is the landscaping of the retail podium with a green roof.

12.4. Improved valuation, pricing and incentive mechanisms

The Central Coast Quarter is targeting high levels of sustainability performance which will impose additional upfront costs to the development but will ultimately result in increased asset value with improved financial and environmental life cycle performance. Life cycle costing will form part of the overall integrated project decision making and assessment of major building components and systems to maximise sustainability benefits and create long term value both monetary and non-monetary to building owners, occupants and other stakeholders.