



46 – 50 Nicholson Street and 57 – 67 Christie Street, St Leonards

Ecologically Sustainable Development Report for SSDA SSD-88113706

Issue	File Ref.	Description	Author	Review	Date
A	2401344	ESD Report for SSDA (Draft)	TD		24/9/2025
B	2401344	ESD Report for SSDA Final	TD	RB	15/10/2025

Limitations of this report: The report is prepared using design and systems assumptions at a development application level of resolution (before tender and detailed construction level of design and specification). It should be recognized that final detailed design (for construction certificate) will be refined and adjusted after procurement of the building contractor and after final specification and construction details are resolved. Analysis at this stage relies on comparisons of proposed activities against averages (often at different rated performance levels) as complete bottom up data is not yet available.

Report author: Troy Daly is a GBCA Green Star Accredited Professional (in Buildings and Communities rating schemes); has over 15 years experience in development projects with strong sustainability goals; holds a Master of Urban And Regional Planning and Bachelor of Economics.



ESD vision and summary of initiatives

The proposal will support the supply of efficient and diverse rental housing for the northern district of Sydney.

All electric building services supporting the ability to operate the building with net zero carbon emissions

PV array of 70kW on the available roof space for onsite renewable energy

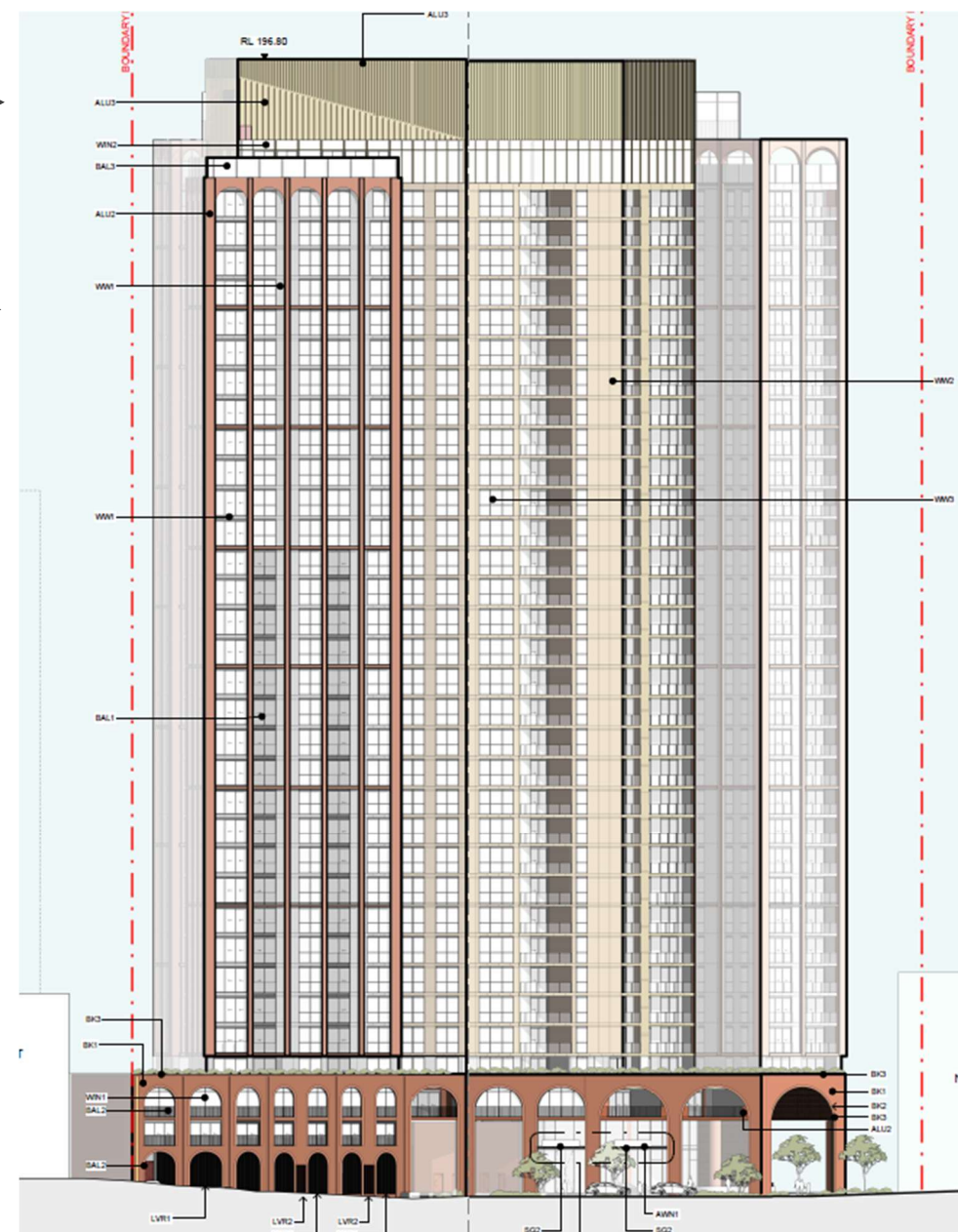
Strong passive design leading to a min 7 star NatHERS average rating for apartments—BASIX Energy outcome of 63

Provision for future uptake of 100% EVs and provision considered for electric bikes

Energy efficient VRV air conditioning system to target COP /EER > 3.5

Climate change risk review to be undertaken to ensure extreme rainfall and heat events are managed through building design and mechanical service selection

Steps to mitigate urban heating incorporated in design



Potable water savings achieving BASIX 42 (versus 40 compliance) achieved through efficient water fixture and appliance selection and rainwater storage

High levels of construction and demolition material recycling (targeting >90% land fill avoidance for key materials); additional waste streams to be set up in operation

Options for reduced embodied emissions concrete and other materials required in procurement

Environmental management plan to be established for construction; seeking key material options with certified Environmental Product Disclosures

Healthy indoor environments supported by procurement of low toxicity materials

Ecologically Sustainable Development Report



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1. SEARS declaration and summary of responses

Declaration		
Qualified Professional	Troy Daly	
Qualified Professional Qualifications	GBCA Green Star Accredited professional; Master of Urban and Regional Planning (USYD); Bachelor of Economics (UNE); Over 15 years practicing sustainable development management The undersigned declares that this ESD Report has been prepared in response to the following SEARs requirements issued for the Project for SSD 88113706	
SEARs item no.	SEARs issue and assessment requirement	Relevant section of this report that addresses SEARs requirement
15. Ecologically Sustainable Development (ESD)	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.	Sections 4-8
15. Ecologically Sustainable Development (ESD)	Where relevant, provide an assessment of the development against the standards for non-residential development set out in Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022.	n/a
Signed: Troy Daly 		

1. SEARS declaration and summary of responses

SEARs REQUIREMENTS	Project response (and reference to relevant report section)
1. Statutory Context - Address all relevant legislation, environmental planning instruments (EPIs) (including drafts), plans, policies, guidelines and planning circulars. - Identify compliance with applicable development standards and provide a detailed justification for any non-compliances.	The report primarily considers the EP&A Act ESD principles and required ESD measures for CII5 of the project specific and in-fill affordable housing SEARS provided for the proposal. In addition the report also considers ESD principles or objectives from the following State strategies and policies: - Greater Sydney Region Plan - Northern District Plan - Sustainable Buildings SEPP - NSW Government Net Zero Plan The report also considers compliance with National Construction Code (NCC) Section J Energy Efficiency requirements as is mandatory for components of this project type. These considerations are summarised in Section 3 of the report but noting a separate detailed Section J report will be prepared. The project response to Housing SEPP Apartment Design Guide requirements is provided in a separate report by Cox Architecture.
15. Ecologically Sustainable Development (ESD) - 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. Principle 1—the precautionary principle (Section 193, EP&A Regulation 1a) The precautionary principle is that if 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. In applying the precautionary principle, public and private decisions should be guided by— - careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and - an assessment of the risk-weighted consequences of various options.	- The project is not considered to create any threat of serious environmental damage given it's location on an existing developed site in a highly urbanised area. The development process and practices are established with any potential impacts understood with a high level of certainty. - The project demonstrates a commitment to minimising environmental impact, implementing climate change resilience measures, implementing resource conservation measures and implementing human health and wellbeing measures. - In combination these initiatives deliver the concept behind a precautionary approach to approving development based on avoidance of potential future or uncertain impacts. - On balance the project presents very low risk to the environment and supports sustainable outcomes. - Please refer to Sections 4-8 in this report.

1. SEARS declaration and summary of responses

SEARs REQUIREMENTS	Project response (and reference to relevant report section)
Principle 2—Inter generational equity (Section 193, EP&A Regulation 1b) The principle of inter-generational equity is that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	Achieving inter generational equity requires that the proposal takes steps to avoid, mitigate and support processes that preserve the environment and sustainability of communities over the long term. Core responses to deliver these long term sustainability outcomes include: • Avoiding resource depletion— through resource efficiency, steps towards waste recycling and a circular economy, with a focus on the longer term and full life cycle impacts for the environment and community. • Helping to mitigate climate risk—through measures to reduce CO2 emissions from the proposal (operational and embodied). • Helping to adapt to climate risk—through including measures in the proposal that allow future communities to better manage climate change impacts. • Creating places that will support ongoing human health over the long term. The proposal includes environmental performance initiatives and outcomes to deliver inter generational equity. Sections 4-8 of this report set out these categories an) have been determined based on meeting or exceeding industry benchmarks. The proposed ESD initiatives incorporate measures that reduce GHG emissions and consumption of energy, incorporate onsite renewable electricity supply, conserve water and minimise resource consumption and embodied energy in materials. The primary performance benchmarks for these categories include: Minimising carbon emissions and energy (Section 4) - meeting or exceeding requirements • Scope 1 and 2 CO2 emissions for the building c.63% savings against a BASIX benchmark for Class 2 dwellings; options included to reduce significant Scope 3 CO2 emissions • NatHERS thermal performance rating of c. 7.0 stars for Class 2 dwellings • 'All electric' building operation • Compliance with all NCC Section J energy efficiency requirements for common areas/facilities • Provision for a 70kW PV array included for onsite renewable electricity and option sought from building operator for 100% renewable electricity to mechanical services • Options sought to reduce upfront carbon emissions in materials by 10-20% with a focus on reduced embodied carbon concrete and reduced carbon steel reinforcement and beams • Provision for 100% EV parking spaces (NCC 2022) allows transition away from ICE vehicles Water conservation (Section 5) - meeting or exceeding requirements • Reduce potable water demand to meet the Sustainable Building SEPP BASIX requirements for Class 2 dwellings through water efficient appliances and fixtures—achieves BASIX score of 42% exceeding the 40% requirement • Alternative water source (10,000L rainwater tank) used for landscape and car wash, landscape to utilise a palette of low water use species and efficient irrigation where required

1. SEARS declaration and summary of responses

SEARs REQUIREMENTS	Project response (and reference to relevant report section)
Principle 2—Inter generational equity (Section 193, EP&A Regulation 1b) The principle of inter-generational equity is that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.	Climate change resilience (Section 6) - Final building systems and site drainage detailed design to be reviewed to consider increased extreme rainfall events, storm events and heat wave events for operational performance in extremes - Heat island mitigation steps including high reflection horizontal hard surfaces, planned canopy and green cover Responsible materials and waste management (Section 7) - Target to recycle or reuse at least 90% of key demolition and construction waste (weighted average by mass); implement waste streaming to support operational phase recycling outcomes - Procurement strategy to seek options for key materials with Environmental Product Disclosures and reduced environmental impact Human health and wellbeing (Section 8) - Procurement strategy to target low VOC and low/no formaldehyde products to improve air quality - Acoustic and lighting (and daylighting) outcomes and products tailored for healthy and comfortable living environments - High levels of daylight access to all dwellings
Principle 3- conservation of biological diversity and ecological integrity (Section 193, EP&A Regulation 1c) The principle of the conservation of biological diversity and ecological integrity is that the conservation of biological diversity and ecological integrity should be a fundamental consideration.	The urban renewal strategy for the site seeks to maximise the use of local native species in landscape and minimise environmental impacts (such as carbon emissions, stormwater volume and quality) such that the post development outcome retains biodiversity values consistent with local flora and fauna. A stormwater management plan will be developed for the site seeking to minimise any impacts of stormwater (quantity and quality) leaving the site and entering the local water system (consistent with Land Cove Council stormwater management controls).

1. SEARS declaration and summary of responses

SEARs REQUIREMENTS	Project response (and reference to relevant report section)
Principle 4—improved valuation, pricing and incentive mechanisms. The principle of improved valuation, pricing and incentive mechanisms is that environmental factors should be included in the valuation of assets and services, such as— • polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, and • the users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and • established environmental goals should be pursued in the most cost effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.	• The sustainability and environmental measures for the project are being incorporated in the early design and cost plan for the project to ensure the most economic pathways are identified through design and construction. • Further, the specification of materials and equipment will strongly consider the most cost efficient operations and maintenance outcomes which are anticipated to also match the most efficient environmental outcomes for the apartment complex operation (for example use of PV arrays to minimise the long term financial and environmental cost of electricity, choice of robust building materials with a long useful life). • Future building facility managers will be able to choose their preferred pathway and retailer to access renewable electricity for private occupancy uses, communal uses and for electric vehicle charging

2. Introduction and project information

Introduction and purpose of report

This ESD report has been prepared by Efficient Living Pty Ltd to support State Significant Development SSD-88113706 to develop an apartment building complex at 46-52 Nicholson Street and 59-67 Christie Street, St Leonards within the Lane Cove LGA.

The ESD report has been structured considering the requirements of Planning Secretary Environmental Assessment Requirements ('SEARs') issued for the proposal.

In response to the overarching SEARs (Clause 1) the report considers relevant ESD related regulations and controls (as noted in Section 2 of the report).

In response to SEARs (Clause 15) the ESD report considers key ESD factors required to address the ESD principles in section 193 of the EP&A Regulation including:

- Reduced carbon emissions, energy efficiency and energy sources—including options to reduce embodied carbon emissions in materials
- Water efficiency and alternative water sources to potable water where available
- Environmentally responsible material selection and waste management/recycling
- Climate change resilience
- Human health and wellbeing in the building environment

These factors primarily address the requirements of SEARs (Clause 15) together with other key ESD factors important to industry and the community.

Structure of this report

The report has been structured into key ESD categories to address SEARs CI 15. Each category details the ESD measures included in the proposal and an assessment of the performance of this measure against regulatory requirements and industry benchmarks where applicable. The categories include:

- Energy efficiency and low carbon emissions
- Water efficient design
- Climate change resilience
- Responsible materials and waste management
- Human wellbeing and indoor environmental quality

Methodology to identify ESD measures and outcomes

Efficient Living uses a combination of industry benchmarks, reference projects and comparative project data, together with industry recognised modelling tools, to propose ESD measures in design and recommended for ongoing operation.

It should be noted that a wide cross section of ESD factors are considered with both qualitative and quantitative measures.

The committed and proposed ESD measures in this report are considered against the performance and detail required under key planning policy requirements at a State level (primarily responses to SEARs and the Sustainable Building SEPP), and as relevant at a Local level.

Where relevant, comment and reference to published Australian standards and sustainability rating schemes (such as GBCA Green Star) is made. Efficient Living also relies on its experience across multiple NSW proposals to provide opinion on whether the proposed ESD measure meets 'industry benchmarks' which can be subjective.

The ESD report also recommends further detail and specification outcomes as the project moves into detailed design and building tender processes. This includes certain recommendations for the developer to seek options from the building contractor (and future building operator) to investigate if improved ESD outcomes are commercially viable. For example for lower upfront carbon emissions materials and renewable electricity services for the base building.

Final ESD outcomes can not be fully determined until the detailed level of design and final construction package of works is agreed.

2. Introduction and project information

The site

The Site is bounded by Christie Street and Nicholson Street and is formed by the intersection of these roads. In its current state, the Site generally contains three to six storey mixed office/commercial buildings.

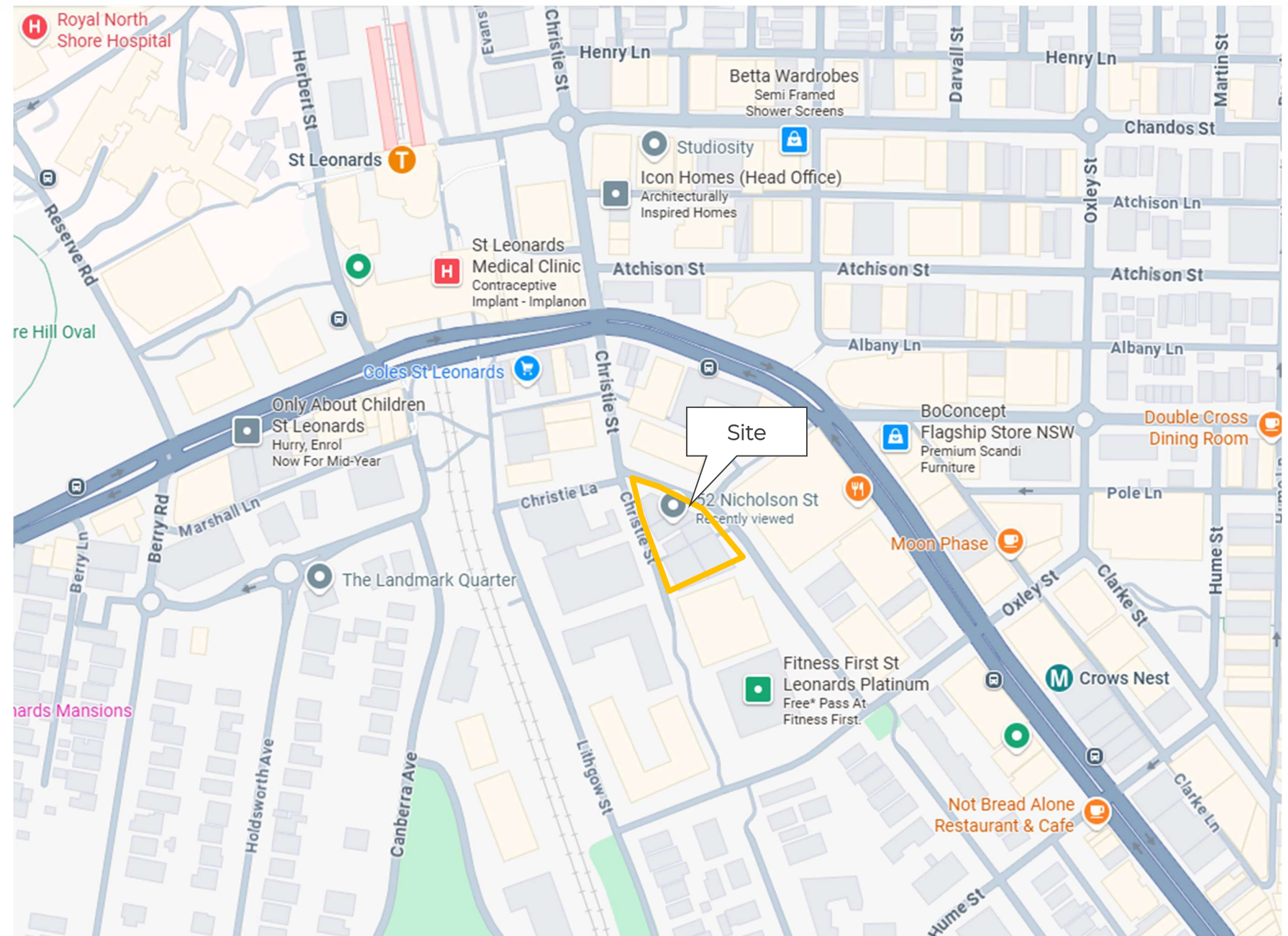
The site is well located to mass transit and services being located approximately 200m southeast of the St Leonards centre and heavy rail station, and approximately 300m northwest of the Crows Nest Metro station.

Proposal description

The proposed development seeks approval for the rezoning of the site and construction of a BTR development.

The SSDA specifically involves the following works:

- A single 34 level tower including a 4-storey podium comprising approximately 541 units,
- Basement parking for c.163 parking spaces
- BTR amenity provided in lower ground, upper ground, podium, tower and rooftop levels,
- Vehicular access from Christie Street and loading access from Nicholson Street,
- Site landscaping and public domain improvements, and
- Utility and services augmentation as required.



Local context of Site (from Google Maps 25/8/25)

3. State and Local strategies and policies

Key State ESD related strategies and policies

The proposal includes 'residential dwellings' as defined in the Housing SEPP. Compact floor space studios, noted as 'City Starter' homes at c.30 sqm, are provided together with a range of studio, one and two bedroom apartments.

Sustainable Buildings SEPP 2022

For residential Class 2 development the proposal will need to at least meet the requirements of the BASIX conditions for thermal performance, energy/carbon reductions and potable water reductions.

- BASIX thermal performance average NatHERS 7 star
- BASIX Energy outcome of at least 63%
- BASIX Water outcome of at least 40%

Housing SEPP—NSW Apartment Design Guide

The objectives, design criteria and design guidance will need to be considered for Class 2 apartments including:

- Sunlight to habitable rooms
- Natural cross ventilation
- Apartment and room sizes, window requirements, room depths for habitable rooms, balcony provision and size

Please refer to the Cox Architecture assessment of the proposal against these guidelines.

Greater Sydney Region Plan

Various objectives of this plan require targeted ESD outcomes including Objective 27 Biodiversity is protected, urban bushland and remnant vegetation in enhanced; 30 Increased tree canopy; 33 Low carbon city; 34 Energy and water flows are captured, used and reused; 35 More waste is recycled; 36 People and places adapt to climate change; 37 Exposure to natural and urban hazards is reduced; 38 Heatwaves are managed.

North Sydney District Plan

Various objectives of this plan require targeted ESD outcomes including Planning priority N21 with Reducing carbon emissions and



managing energy, water and waste efficiently, Planning Priority N20; Delivering high quality open space, Planning Priority N19; Increasing urban tree canopy cover and delivering Green Grid connections, Planning Priority N17; Protecting and enhancing scenic and cultural landscapes, Planning Priority N16; Protecting and enhancing bushland and biodiversity, Planning Priority N15; Protecting and improving the health and enjoyment of Sydney Harbour and the District's waterways, Planning Priority N5; Providing housing supply, choice and affordability, with access to jobs, services and public transport.

NSW Government Net Zero Plan

The NSW Government targets (NSW Climate Change Policy Framework—Net Zero Plan) for 70% reduced emissions by 2035 and net zero by 2050 should also shape the ESD initiatives for the proposal. Ideally the proposed building should be able to operate at net zero carbon emissions.

National Construction Code (NCC) Section J Energy Efficiency

Section-J of the National Construction Code 2019 focuses on "energy efficiency of buildings". Section J is a minimum performance target for standard buildings and specifies minimum performance targets known as deemed-to-satisfy (DTS) requirements, for building fabric and services.

Section J performance requirements are relevant for the common areas proposed in a residential, Class 2 apartment development.

NCC 2022 Section J also requires provision of space and electrical infrastructure planning to allow future uptake of electric vehicle chargers, battery systems and PV arrays (if not already provided).

Lane Cove Council DCP

Lane Cove Council DCP Part B, 6.3 Energy and Water Efficiency for Buildings, includes energy efficiency, carbon emission reduction and water conservation guidelines. The content and objectives of these guidelines are met through the BASIX controls, Apartment Design Guide objectives and guidelines and other ESD measures noted in this report.

Net Zero Plan

The Net Zero Plan Stage 1: 2020-2030 is the foundation for NSW's action on climate change and goal to reach net zero emissions by 2050.



4. Energy efficiency and low carbon emissions

Passive design and service and appliance initiatives to reduce energy use and carbon emissions

Proposed outcome meeting or exceeding industry standards

- Thermal performance averaging at least NatHERS 7 stars
- BASIX Energy outcome of 63%
- Onsite PV array of 70 kW
- A/C average > 3.5 COP/EER efficiency
- Provision for future EV charging to 100% of spots and E bike charging

Strong passive thermal performance

The proposed apartments achieve an average NatHERS thermal performance score of at least 7 stars consistent with Sustainable Building SEPP BASIX requirements. This outcome is expected to reduce energy demand for heating and cooling to below 10% of total energy within apartments.

An all electric building supporting net zero carbon emissions in operation

The building will be serviced with all electric services making net zero carbon emission operational immediately achievable.

To operate as net zero three core sources of renewable electricity will be required, including:

- An onsite solar/PV array supplying energy primarily to common area and service demands
- A renewable electricity purchase agreement by the building operator/embedded network operator—an option for this outcome will be investigated to test commercial viability

Domestic Hot Water System

Domestic hot water systems can be responsible for 10-15% of total apartment building CO2 emissions.

A centralised electric heat pump system will be utilised for hot water with a high level of insulation for the hot water ring main throughout the building.

The coefficient of performance (COP) for this system should be greater than 3.5 compared to a traditional gas boiler system with coefficient of performance less than 1.

Air conditioning services

A centralised VRV air conditioning system will be utilised for heating and cooling with the final system to be determined in detailed design. This system will target energy efficiency levels of greater than COP and EER of 3.5.

Appliances

Appliances and related other electrical demand average approximately 35% of total CO2 emissions in a modern apartment building.

The following star ratings are targeted for key domestic appliances when provided subject to final clarification of BASIX requirements.

- Dishwashers—4. star
- Washing machine—4 star
- Clothes Dryers - 9 star

Lighting

Lighting can use up to 10% of an apartment building's electricity consumption, therefore efficient luminaires and lighting control systems are critical in order to optimise the building's energy efficiency. The following measures will be implemented:

- LED lighting to be specified throughout with a target of 10% reduction on NCC minimum compliance.

- Common area lighting to have motion and daylight sensors with further zoned lighting controls for car park areas.

Pool heating

Pool heating will be with electric heat pump systems with typically high COPs of over 5.

Lifts

Lift use can be responsible for over 10% of total apartment building CO2 emissions.

The lifts will incorporate PMS motor and regenerative drive technology.

Car park ventilation

Common area ventilation can be responsible for over 10% of apartment building CO2 emissions.

Car park mechanical ventilation will be CO monitored/controlled and utilise energy efficient variable speed fans.

Other ventilation, such as to switch rooms, plant rooms and communal bathrooms, will be either interlocked to light switching or controlled through a building management system.

Common area services

The proposal includes significant common area floor space and services including swimming pool, spa, sauna, steam rooms etc. Management of the mechanical systems in these areas will benefit from future NCC Section J compliance. Ultimately the energy consumption from ventilation, air conditioning and swimming pool and wellness rooms should be monitored and managed to reduce unnecessary consumption when not in use.

4. Energy efficiency and low carbon emissions

Electric transport services

Electric transport

Electric vehicles are anticipated to experience high adoption over the coming decades (Electric Vehicle Council target 50-60% of new vehicle sales by 2030). When serviced with renewable electricity this mode of transport provides an effective net zero in operation outcome for travel.

Provision for electric cars is the major item to consider followed by power access and storage for the fast growing use of e-bikes and e-scooters.

The fire safety standards for locating EVs in the basement areas of the proposed building will need to comply with current standards.

Electric car provisions

Final detailed electrical system design will cater for a high uptake of electric cars and bikes.

Consistent with NCC 2022, dedicated distribution boards to support EV charging on each basement level will be provisioned together with an active load management system that allows future connection of all parking spots within an achievable total electrical demand level for the project.

Consideration of a charger provision and tariff system/model, so that individual apartments are provided with an accurate electricity bill for their usage, is also recommended. This service is most often provided by specialist EV charging entities.

Any shared car service parking spots and service provider procurement should also plan for shared EVs to further provide zero net carbon outcomes for car based transport.

E-bike and e-scooter provisions

Provision of standard GPOs with access from bike storage racks and other storage areas (potentially for e-scooters) will be considered in detail design to facilitate charging of these mobility devices.

No modified e-bikes or e-scooters should be permitted in the building.

The future of Electric Vehicle batteries integrated with building electricity demand

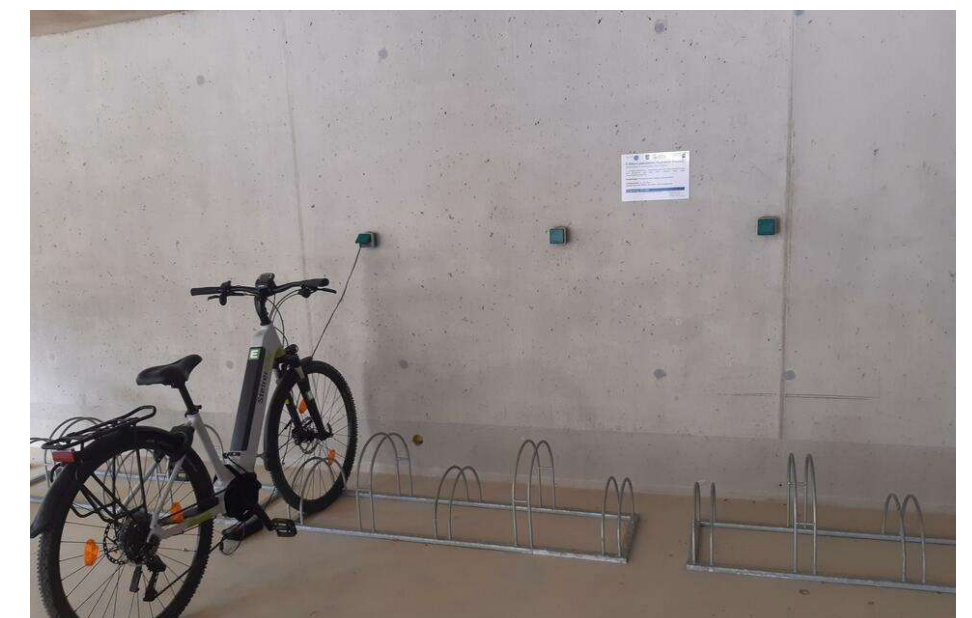
Batteries in EVs theoretically store enough energy to run a typical apartment for 5-7 days. Technology is under development to allow the energy in EV batteries to be accessed by homes, and potentially apartment buildings, to help reduce peak demand and otherwise supplement demand throughout the day as required.

The software controlling the management of the car battery, through a 'two way' charging connection, would allow for a proportion of the battery power (say 50%) to be utilised for building energy management. The owner of the EV would be compensated for this service.

When fully developed this energy management system may be able to greatly reduce the buildings peak demand and therefore help reduce the required substation size requirements for 'all electric' buildings.



Example of EV charging provision image from <https://evse.com.au/blog/apartmentevcharger/>



Modern buildings are providing charging options for e-bikes and e-scooters

4. Energy efficiency and low carbon emissions

Renewable energy sources and energy management

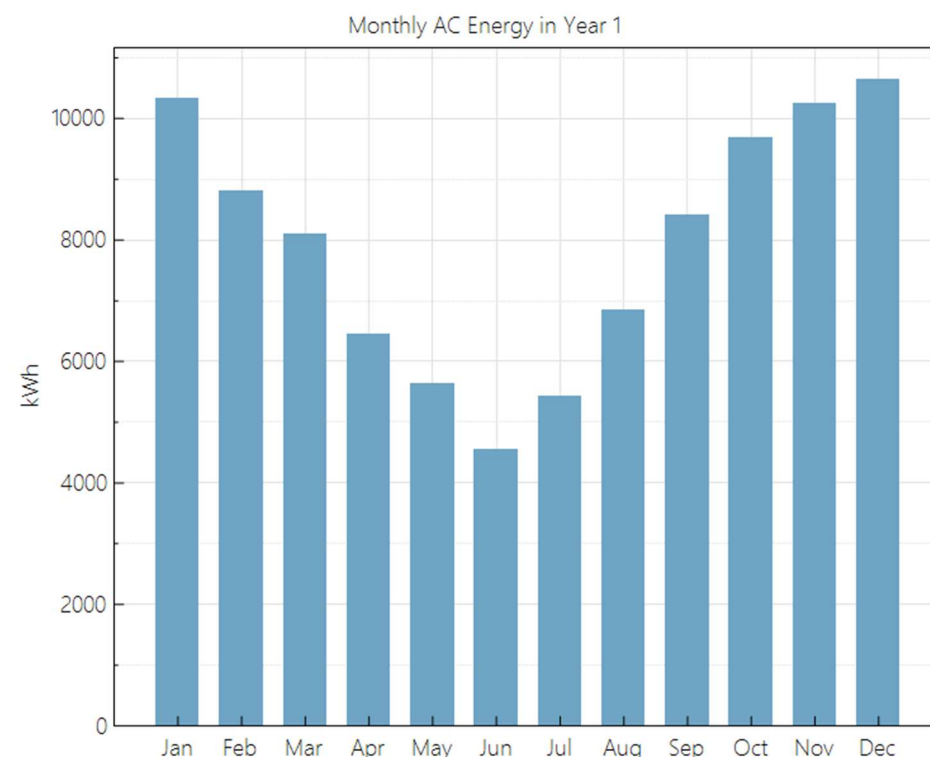
Proposed outcome meeting compliance and meeting or exceeding industry standards

- A solar/PV array of minimum 70kW capacity will be provided (BASIX commitment)
- Option for a renewable electricity contract for whole building and EV charging power
- Provision for future battery system integration (NCC 2022)

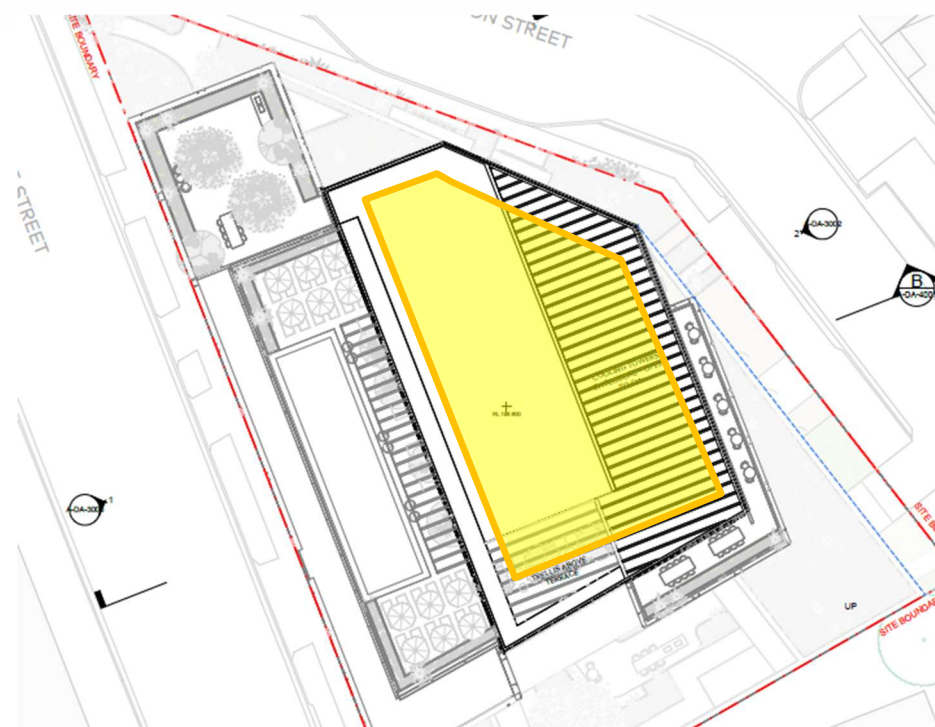
Incorporation of solar/PV arrays

A 70kW PV array will be provided in line with the BASIX commitment for the proposal with roof space available for this installation.

The expected output of this system is indicated below together with the preferred roof space to locate this system.



Indicative monthly output from 70kW PV array on rooftop



Yellow area targeted for 70kW PV array—c. 155 panels

Opportunity to purchase of renewable electricity

The developer of the proposal will request that any planned embedded network operator for the building provide an option to purchase 100% renewable electricity through a longer term power purchase agreement.

If the cost of this agreement is comparative with standard grid sourced electricity (which is most often the case) then renewable electricity will be locked in for all common electrical services.

This approach can prove beneficial for Build to Rent operators where the long term cost of renewable electricity can often be less than standard grid based electricity contracts (when 5 year and longer terms are negotiated).

Building energy management

Building systems will be set up with sufficient sub meters to allow detailed monitoring of consumption patterns and equipment performance.

Investigation of a centralised battery system

In the next stage of detailed design, an area will be identified in the basement in close proximity to the main switchboard to allow potential installation of multiple batteries in the future—as now required in NCC 2022.

The building operator/embedded network operator will ultimately determine if a shared community battery is worthwhile given the specific demand profile, and PV production profile,

4. Energy efficiency and low carbon emissions

Summary of carbon emission reduction measures

Boundary and Scope of carbon emissions considered

- The most relevant boundary for considering CO₂ reduction measures are the activities carried out in building operations—predominantly residential activities
- Scope 1 CO₂ emissions for the proposal include those from onsite gas used for the centralised hot water plant and apartment cooktops
- Scope 2 CO₂ emissions, the major source of emissions, come from electricity sourced to power building systems and appliances
- Significant Scope 3 CO₂ emissions, embodied carbon in key buildings materials and carbon emissions related to cars stored in the building for transport are also considered.

Operational carbon emissions—energy use

Passive design

- NatHERS average rating of at least 7 stars for Class 2 apartments
- Future compliance with NCC 2022 Section J for communal areas

Energy efficient, all electric systems and appliances

- Electric heat pump for domestic HW and pool heating,
- Air conditioning with COP/EER min 3.5
- Energy efficient appliances—ratings as indicated

Provisions for electric transport—EVs and other options

- NCC 2022—100% of car spaces will be provisioned for Type 2 EV charging capability with additional provisions considered for e bike charging

Operational carbon emissions—energy source

On-site renewable electricity

- PV array system of minimum 70kW capacity (BASIX requirement)

Offsite renewable electricity

- Developer will request an option for the building operator/ embedded network operator to purchase electricity from a verified renewable electricity source for at least the first 5 years (including to service EV chargers)

Operational carbon emissions—energy management

- Energy metering in place to allow monitoring and optimisation of core systems
- Provision for future battery storage if feasible to manage peak and also consideration of how future EV battery integration may occur

Reduced upfront embodied carbon emissions

The project will target savings of 10-20% in upfront carbon emissions in the key materials responsible for Scope 3 emissions in apartment buildings.

Work by the GBCA (GBCA Think Step ANZ Embodied Carbon and Embodied Energy in Australia's Buildings 2021) can be used to identify the key building materials responsible, on average, for embodied carbon emissions:

- Steel 46%
- Concrete 44%

Concrete embodied emissions could be reduced by targeting certified low carbon concrete mixes. For example from suppliers Holcim, Boral and Hymix. A combination of recycled materials, reduced concrete and other additives allow concrete across strength grades with reduced carbon emissions of 20-50%.

It is recommended that options are sought for steel reinforcement and beams from suppliers with evidenced carbon emissions reduction initiatives (through use of recycled components or production in more efficient steel making facilities).

It is proposed that the tender phase for building contractors

include a requirement for submissions to provide concrete, steel and aluminium options that would achieve this outcome and clarify differences in relation to increased cost, technical performance or uncertainty of supply. Based on this analysis the project proponent will be able to make an informed decision on the feasibility to implement a reduced embodied emission strategy.

Provide for EVs to replace fossil fuel vehicles

As a minimum the developer will meet NCC 2022 requirements to include future provision for 100% of residential car spots to be EV charger capable in the future (Type 2 charger @ min 7kW).

Annual CO₂ emissions amount to on average 2.22 tCO₂pa per car (for a car driven 15,000 km/pa) so the potential for saved Scope 3 emissions by providing for low or no emission EVs is substantial.

5. Water efficient design

Integrated water management plan

Water resources will be managed to deliver three clear objectives for the redeveloped site as an integrated water management plan.

- Reduce the demand for potable water through water efficient fixtures and an alternative water supply
- Reduce negative stormwater volume impacts within and leaving the site (please refer to the project Stormwater Management Plan (SMP))
- Reduce negative stormwater quality impacts within and adjacent to the site (please refer to the SMP)

Proposed outcome meeting compliance and meeting or exceeding industry standards

- A BASIX outcome of 42 has been achieved exceeding BASIX 40 compliance
- Strong WELS ratings for key fixtures and appliances

Water efficient fixtures and fittings

Water efficiency in the project will be underpinned by efficient fixtures and fittings in apartments and common areas.

The following WELS water ratings will be achieved in the top quartile of efficiency:

- Shower heads—4 star flow rates of 6-7.5L/min
- Toilets 4 star
- Taps 6 star
- Dishwashers 4 star
- Washing machines 4 star (levels 18-32)
- Shaded pool surface area (external pool)

Rainwater tanks

The project will incorporate rainwater storage. Total storage capacity of at least 10,000L, and catchment of 200 sqm, will be targeted for application to landscape irrigation and car wash bays consistent with BASIX requirements.

Water sensitive urban design

Stormwater flow and quality will be managed according to Lane Cove Council policies as set out in the proposals Stormwater Management Plan.

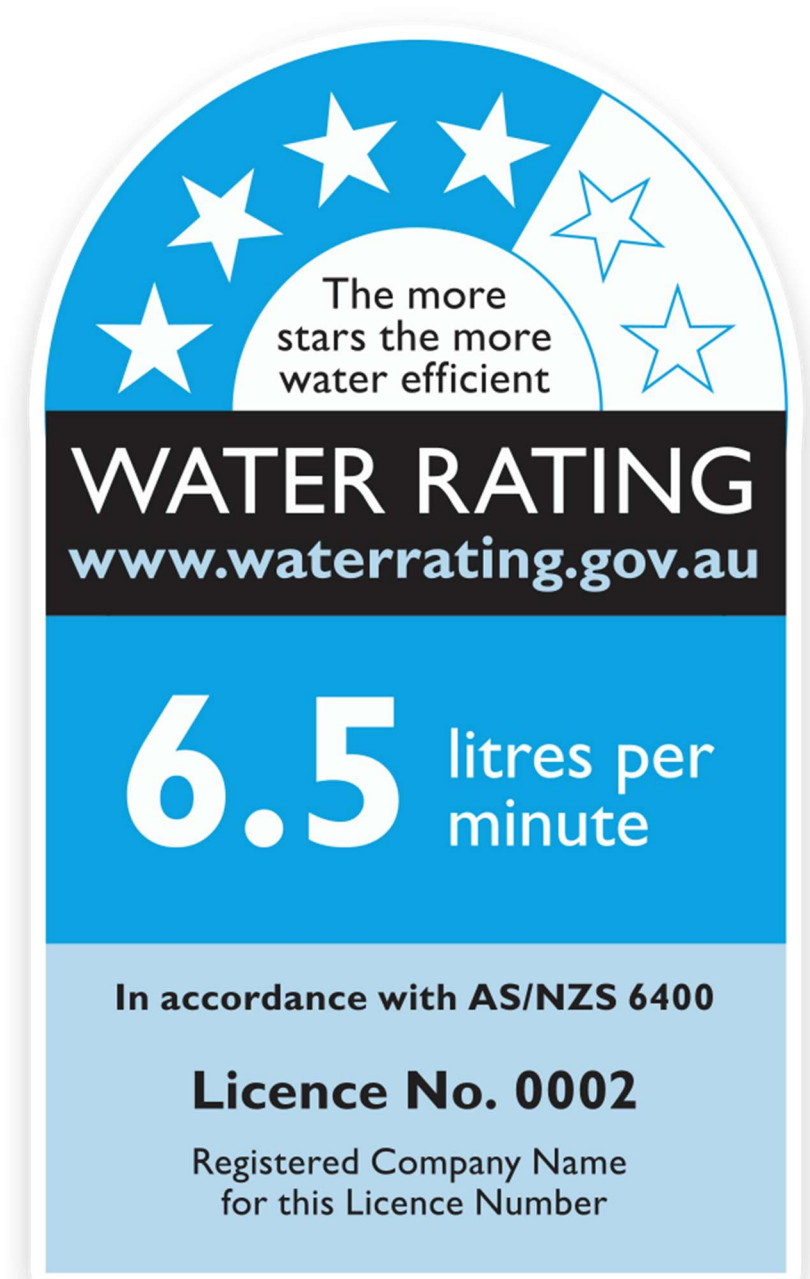
Water efficient irrigation methods

Over 90% of trees proposed in the landscape strategy are native trees that should thrive in the long term with minimal irrigation (assuming efficient planter structures to capture rainfall).

Shrubs and groundcovers are a combination of native and exotic species matched to the local microclimate created through the proposal and consistent with the desired landscape character.

Please refer to the Landscape Report by 360 Degrees.

Irrigation over the lower level landscape areas will be primarily from the rainwater storage system using a combination of spray and undersurface irrigation to be determined in detailed design.



WELS shower label certifying 6.5 L flow rate—consistent with this proposal

6. Climate change resilience

Future proofing

Proposed outcome meeting compliance and meeting or exceeding industry standards

- Future detailed design of building drainage and systems to be reviewed for performance in extreme weather events (rainfall, storm, heat)
- Over 75% of horizontal surfaces to minimise urban heating effects

Climate Change Resilience

Relevant climate change impacts over the next 50 years include higher average temperatures and lower average rainfalls (mainly in winter) together with greater extreme events particularly in relation to rainfall, storms and heat waves. Impacts can be direct, for example rainfall ingress to the building, or indirect, for example expected higher maximum temperatures, longer and hotter heat events, increased rainfall intensity leading to increased flooding during rainfall events.

The following design measures will be implemented in the next stage of detailed design to improve climate change resilience:

- Equipment and building drainage design assessed to ensure effective operation and protection in increased storm, hail and rainfall events
- Landscape design and plant selection to survive an increased number of heat wave days, and dryer winter periods
- HVAC design thresholds to function properly with higher average temperatures and a higher number of heat wave days

Heat Resilience

Over 75% of total site horizontal surfaces (excluding the area of proposed PV arrays) have been targeted for low urban heating outcomes (consistent with Green Building Council recommendations) including:

- Green softscape outcomes at ground level, podium and upper levels —c. 750 sqm of site area will be landscaped

- Tree canopy, and naturalised shade structures provide shade to hard surfaces helping to mitigate absorption of solar radiation/ urban heating effect
- Final colours for the roof, podium hard surfaces and ground level hardscape surfaces will be specified to achieve low solar absorptance/high solar reflectivity.
 - Roof initial SRI target of minimum 80
 - Unshaded hardscapes initial SRI of target minimum 35 (default for standard grey concrete—avoiding darker charcoal grey colour finishes)



Draft landscape masterplan (by 360) - indicates that the site will benefit from landscaped areas (green shades in plan) able to absorb and/or reflect solar radiation responsible for urban heating

7. Responsible materials, construction and waste management

Lower impact materials and 'circular' waste management

Together with supporting lower upfront carbon emissions, the project will investigate the inclusion of responsible materials and include space for splitting and recycling of waste 'resources' during project construction and ongoing operation.

Proposed outcome meeting compliance and meeting or exceeding industry standards

- Greater than 80% of construction and demolition waste (mass) to be recycled with a target of 90%
- Environmental Product Disclosures (EPDs) sought for key materials
- EMS preferred, and EMP required for head building contractor (ISO 14001)

Supporting responsible materials in the building structure and envelope

The detailed design and tender phases for the project will target procurement of products that follow good practice in respect to measuring environmental impacts and reducing these impacts. Products with a certified EPD will be sought where available.

Building contractor tender responses will be required to provide material options aligned to recognised responsible materials ratings schemes such as GECA, FSC and Global GreenTag. If commercially competitive (by cost and supply risk) then these improved materials should be specified.

Key building processes to be considered in detailed design would include:

- Design allowing sub structure and super structure to investigate options for EPD certified concrete, steel and other major components
- Façade design also considered to investigate use of responsible aluminium, glazing, panel/spandrel and shade structures etc

Responsible building finishes

The tender requirements for internal finish fitouts will also require options for key materials that have achieved certification for environmental responsibility (paints, carpet flooring etc).

Examples of certification schemes also include GECA and Global GreenTag for a wide cross section of finishing materials and the FSC for timber.

Responsible construction

The tender requirements for building contractors will prefer that the head contractor has an environmental management system consistent with AS/NZS ISO 14001 and will develop and Environmental Management Plan for the project to be advised to all sub contractors.

Construction waste recycling

Please refer to the proposal Waste Management Plan. It is recommended that construction waste management targets a combined recycling outcome of 90% by mass (minimum 80%) consistent with better practice for current major Sydney located projects. This would need to be accomplished through additional recycling potential for timber and plasterboard waste.

Designing in Waste Sorting and Storage Facilities

The project will provide adequately sized waste storage areas in the basement with separation of major waste streams aligned to Lane Cove Council services.

A separate waste streaming area for e-waste should also be considered for occasional removal as required.

A Waste Management Plan will be developed for the project guiding the final sizing and location of facilities and providing a guide to future building operators.



8. Human wellbeing and indoor environmental quality

Human wellbeing initiatives

Proposed outcomes meeting or exceeding industry standards

- All NCC and Australian Standards for air quality, light and acoustic comfort will be met
- Internal materials and fixings will be selected based on certification of low toxicity as measured by VOC off gassing and formaldehyde content
- Multi activity community spaces provided and universal design elements in a proportion of apartments

Air quality

Adequate ventilation of outdoor air will be provided meeting all NCC Part 6 requirements for Class 2 apartments.

Acoustic Comfort

An acoustic study will be undertaken to establish requirements for satisfactory acoustic outcomes for building occupants according to the activity they are undertaking.

For residential apartments the strategy and design and inclusions will ensure that:

- Maximum acceptable internal noise levels are achieved in bedroom and living room areas through protection from external and internal (mechanical services) noise sources
- Acoustic separation insulation levels between apartments will be targeted to meet or exceed NCC minimum requirements

Lighting Comfort

To further enhance the health and wellbeing of residents the project has considered daylighting outcomes through design and will consider future lighting fixture selection that exceeds basic compliance.

- Daylighting outcomes are enhanced by the ADG guidelines for window sizing and room depths.
- LED lighting colour outputs should be accurate, and reflect

natural colour outcomes, as measured by a CRI greater than 85 (luminaires should quantify the CRI level)

- LED temperature should target lower levels (2700k-3000k) in bedrooms with brighter (4500K-6500K) in living and kitchen areas

Low exposure to toxins

Procurement of paints, adhesives, sealants, carpets and other large surface area materials for internal finishes will target products with a recognised certification of Total Volatile Organic Compounds measured in the lower quartile. The GBCA published limits from December 2021 can be reviewed for this purpose.

The tender issued for this stage of work will include clear guidelines on the requirements for products and materials to be used.

Any engineered wood products selected for the building will also have to be confirmed as having low or no formaldehyde content generally recognised as below 1mg/L.

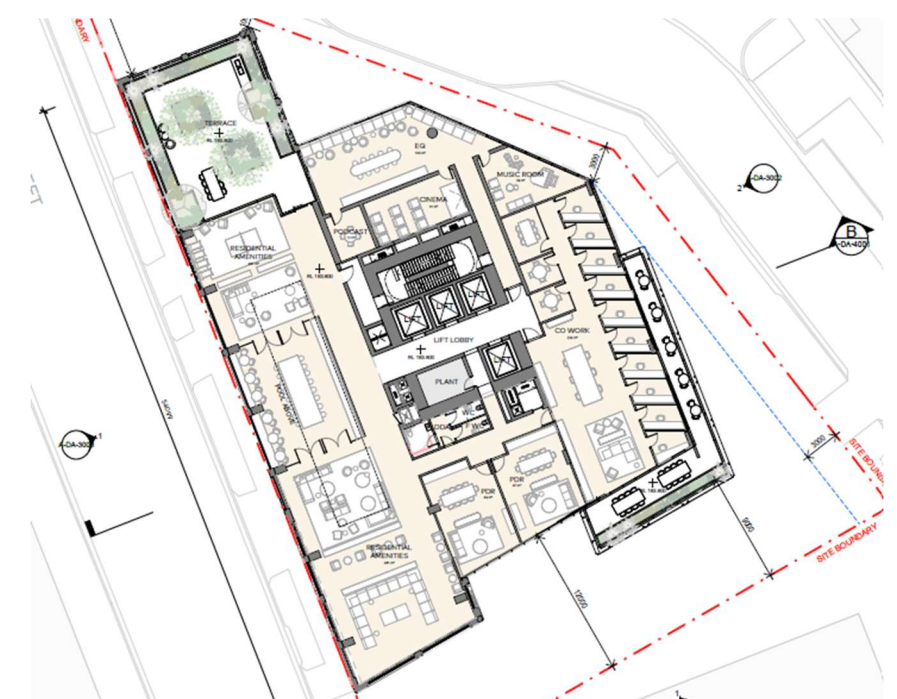
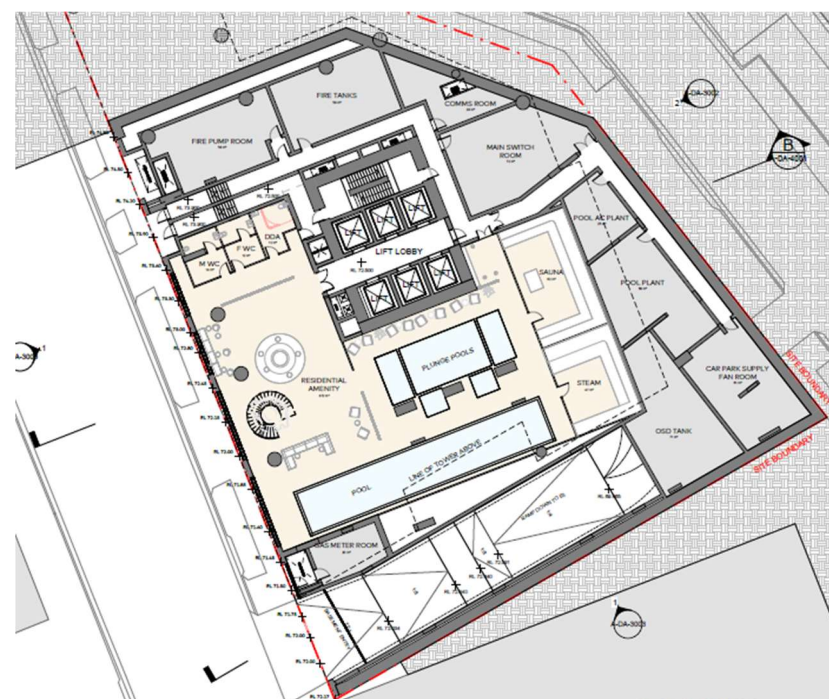
Communal Facilities and Spaces

The design provides extensive indoor and outdoor spaces for residents. These spaces will be embellished to support multiple indoor and outdoor 'wellness' experiences for wide interests. Activities provided for include co-work, cinema, gym, swimming pool and passive lounge areas.

- UG and LG includes gym, pools and wellness rooms
- Levels 1 and 2 lounge and outdoor
- Levels 33 and 34 outdoor pool, co-work, lounges, cinema

Inclusive design and spaces

The project complies with the equitable access requirements in the Disability Discrimination Act. Further, 10% or all apartments are adaptable under AS 4299 to allow future modification for people using wheel chairs. In addition 21% of all apartments achieve a minimum Silver level standard under the LHA Livable Housing Guidelines.



Proposed multi activity communal spaces on lower ground level (left) and level 33 (right)

Key abbreviations/glossary

ESD: Ecologically Sustainable Development or often Environmentally Sustainable Development

COP:/EER 'Co-efficient of performance' or 'Energy Efficiency Ratio' used to measure conversion of electrical energy into heating or cooling energy

GFA: Gross floor area

ACOP (AEER): 'Annualized co-efficient of performance' also used to measure conversion of electrical energy into heating energy but typically adjusted for local climate conditions. AEER is the equivalent for cooling.

NatHERS: National Home Energy Rating Scheme—note only refers to thermal performance of the home

BASIX: Building Sustainability Index measuring thermal, total energy and water efficiency in the home—part of the Sustainable Buildings SEPP 2022

EV: Electric vehicle

PV/solar array: Solar panels using photo voltaic technology to convert solar radiation into electricity

IEQ: Indoor environmental quality usually referring to air, noise and light quality in the building

DA/SSDA: Development Application/ State Significant Development Application'

SEPP: State Environmental Planning Policy

LEP: Local Environmental Planning Policy

DCP: Development Control Plan

CC: Construction certificate

SEAR: Secretary's Environmental Assessment Requirement issued to support a SSDA

ADG: NSW Apartment Design Guide setting apartment design standards in the NSW Housing SEPP

VOC: 'Volatile organic compound' that is a chemical gas release from typically internal building surfaces and materials

HVAC: Heating, ventilation and air conditioning—also includes cooling processes

Section J: The energy efficiency section requirements of the National Construction Code

GBCA: Green Building Council of Australia—the owner of Green Star ratings for buildings and communities

NABERS: National Australian Built Environment Rating Scheme—providing ratings from actual water and energy consumption in buildings

WELS: Water efficiency labelling and standards scheme

GEMS: Greenhouse and Energy Minium Standards

MEPS: Minimum Energy Performance Standards (under GEMS)

Emission scopes – A mechanism for classifying different sources of carbon/GHG emissions used in carbon accounting. There are three 'scopes'

Scope 1 covers direct emissions from on-site fuel combustion (e.g. diesel, natural gas and LPG).

Scope 2 covers indirect emissions from the consumption of purchased electricity, steam, heating and cooling.

Scope 3 covers indirect emissions from activities not owned or controlled by the reporting organisation, including production of fuels, electricity transmission losses, embodied carbon in construction and maintenance (including materials and products) tenant energy consumption, waste treatment, water treatment and travel to/from the building.

(adopted from Net Zero Technical Note—DPE 2023)