efficient LIVING

ECOLOGICALLY SUSTAINABLE DESIGN (ESD) REPORT

13-19 Canberra Avenue, St Leonards NSW 2065

Prepared for: Hyecorp Property Group
Attention: Simon Truong

Issue	*File Ref.*	*Description*	*Author*	*Date*
A	*21-1957*	*Ecologically Sustainable Design Report*	*Alison Adendorff*	*29/06/2021*
B	*21-2423*	*Ecologically Sustainable Design Report*	*Alison Adendorff*	*12/10/2021*
C	*21-2423*	*Revised per comments*	*Alison Adendorff*	*14/10/2021*

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1 Introduction

Efficient Living has been engaged to prepare an Ecologically Sustainable Design (ESD) Report to accompany the Development Application (DA) for the development at 13-19 Canberra Avenue, St Leonards NSW 2065.

The development is required to demonstrate objectives and controls outlined within the following Development Control Plans (DCP) and Local Environmental Plans (LEP):

- *Apartment Design Guide, Sections 4A and 4B*
- *St Leonards South DCP Part B, Section 8 Environmental Sustainability*
- *Lane Cove DCP 2010, Part C Locality 8 – St Leonards South Precinct, 9. Environmental Sustainability*
- *Lane Cove DCP Part B Section 6.3 Energy and Water Efficiency for Buildings*
- *Lane Cove LEP 2009, 7.6 (vii) environmental impacts and (viii) Principles of Ecologically sustainable development*

The following table outlines the ESD controls within the applicable DCP's, also highlighting sections within the report demonstrating compliance with the environmental controls outlined below. The purpose of controls within the DCP is to ensure all objectives are satisfied, therefore only a response to the controls has been provided.

Apartment Design Guide Part 4	*Design Response*
4A Solar Access *Living rooms and private open spaces of at least 70% of apartments in a building receive a minimum of 2 hours of direct sunlight between 9am and 3pm at mid-winter* *A maximum of 15% of apartments in a building receive no direct sunlight between 9am and 3pm at mid-winter*	*See section 3.1 Thermal Comfort, 72% of apartments receive a minimum of 2 hours of direct sunlight at mid-winter, no apartments receive no direct sunlight at mid-winter.*
4B Natural Ventilation *4B-1 All habitable rooms are naturally ventilated* *4B-2 The layout and design of single aspect apartments maximises natural ventilation* *4B-3 The number of apartments with natural cross-ventilation is maximised to create comfortable indoor environments for residents.*	*See section 3.1 Thermal Comfort* *Note: habitable space in the basement levels is not naturally ventilated.*

St Leonards South DCP Part B Section 8 / Lane Cove DCP Part C Locality 8 – St Leonards South Precinct 9	*Design Response*
8.1 Environmental Performance *The design, construction, and operations of any new building in this precinct, including its services and fitouts must be capable of achieving a minimum 6 Star rating under the Nationwide*	*The BASIX report demonstrates that the building achieves an average of 6 Stars for all units.*

House Energy Rating Scheme (NatHERS) by a suitably qualified person	
8.2 Wind Impact Buildings shall comply Part B CI 6.2 of Council's Development Control Plan	The building will be designed to comply with the wind standards for St Leonards. See separate Wind Effects report.
8.3 Green Roofs All developments are encouraged to consider inclusion of a green roof to provide thermal efficiency	See section 3.6 Green Roof
8.4 Green Walls / Vertical Gardens All developments are encouraged to consider inclusion of green walls / vertical gardens	No green walls or vertical gardens will be included in the development.
8.5.1 Potable Water Minimise potable water use by: • Using water efficient appliances • Explore rainwater collection and reuse • Use drought tolerant plants	See section 3.12 Water.
8.5.2 Urban Stormwater • Collect, store and treat on site • Maintain maximum Green Spine and other deep soil for percolation • Provide on-site stormwater and infiltration including bio-retention systems such as rain gardens • Buildings shall comply Part B CI 6.3 of Council's Development Control Plan • All other stormwater management measures are detailed in Council's Development Control Plan Part O (Stormwater Management)	See section 3.12.3 Water Sensitive Urban Design and Section 3.12.4 Stormwater Management. See also separate Stormwater Management plan.
8.5.3 Flood Management Provide detention tanks desirably under paved areas, driveways, in retaining walls or in basement car parks	See Section 3.12.4 Stormwater Management and separate Stormwater Management Plan

Lane Cove DCP Part B.6	Design Response
6.3 Energy and Water Efficiency for Buildings • Incorporate passive solar design techniques to optimise heat storage within the building in winter and heat transfer in summer • Improve the control of mechanical heating and cooling by designing systems to allow individual control of different rooms, zones or tenancies combined with the ability to open windows and facades for natural ventilation when climatic conditions allow • Orientation of building and façade design of all developments should capture and manage solar access, natural ventilation and breezes into the building	See section 3.1 Thermal Comfort See section 3.12 Water. Note: the volume of water harvested is not enough to provide water for use in units. See section 3.2 Air conditioning and mechanical ventilation

• Provide external sun shading – vertical shading for east and west windows and horizontal sun shading for north facing windows • Use high performance glass with minimal glare impacts where possible • All developments are to capture and reuse rainwater for irrigation of landscape areas and for apartments, townhouses, villas and mixed use or commercial development also for toilet flushing and washing machines	

Lane Cove LEP 2009 Part 7	Design Response
7.6 Design Excellence – St Leonards South Area (4) In considering whether the development exhibits design excellence, the consent authority must have regard to the following matters- (g) how the development addresses the following matters – (vii) environmental impacts such as sustainable design, overshadowing, wind and reflectivity (viii) the achievement of the principles of ecologically sustainable development.	An ESD workshop was held with members of the design team and the applicable policies were discussed.

The Design Review Panel recommends that the design demonstrates achievement of the following ESD considerations:

DRP Panel Recommendations	Design Response
Connecting with Country particularly in terms of landscape design, place making, materiality and plant species connections	The design team's approach is guided by the NSW Government Architect's Connecting with Country draft framework for understanding the value of Aboriginal knowledge in the design and planning of places. Its successful implementation will result from a collaborative mindset and therefore we seek to foster partnerships that work towards the common goal of delivering a built environment that contributes to the well-being of Country, and which respects the oldest living culture.
Embodied Carbon to be reduced through the selection of materials	See section 4. Sustainable Procurement and section 3.1 Thermal Comfort
How does the proposal enable the **future community** to live a sustainable lifestyle that is comfortable, resilient and connected:	See section 3.12 Water Section 3.9 Community Space

• How is water managed throughout the proposal, from rainwater and stormwater harvesting through to use and re-use?	
• What role does green infrastructure play in creating shade, managing water, creating habitat and place making?	See section 3.5 Urban Heat Island Effect, section 3.6 Green Roof, Section 3.7 Community Open Space and the Green Spine
• How would future residents be able to easily access fossil-fuel free energy, and to what extent is that energy source safe during potential grid failure?	See section 5.3 Solar Power
• How has the proposal considered our changing climate, and what has been done to ensure residents are safe from extended heat events, particularly during times of grid failure. Also demonstrate how severe storm events and flooding have been addressed	See section 3.15 Climate Change
• How the residents manage waste and particularly organic waste	See section 5.1 Ongoing waste management and section 5.2 Organic Waste
• How does the proposal connect residents with nature throughout the development	See section 3.7 Urban Heat Island Effect, section 3.8 Green Roof and 3.9 Community Open Space

1.1 Aim of Report

This report identifies the design initiatives being considered that have the potential to reduce the environmental impact of 13-19 Canberra Avenue, St Leonards NSW 2065 in line with applicable DCP.

This report should be read in conjunction with the architectural plans and other supporting technical reports and documents that accompany the DA.

This report will be divided into the following sections:

- *Building Description*
- *Sustainable Design*
- *Sustainable Procurement*
- *Sustainable Operation and Management*

2 Building Description

2.1 The Site

The development is located at 13-19 Canberra Avenue St Leonards which is part of the new St Leonards South precinct. This precinct in St Leonards is bounded by the Pacific Highway to the north, the railway line to the east, River Road to the south and Greenwich Road to the west.

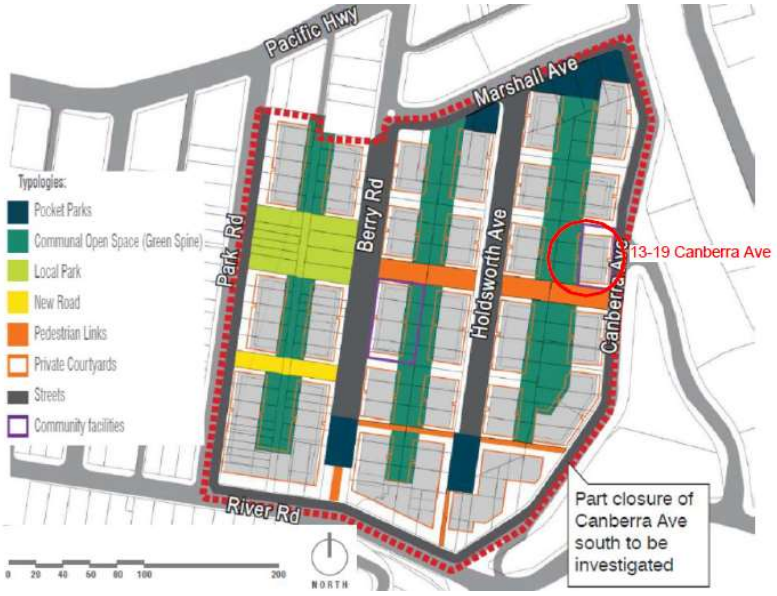


Figure 1: locality plan and landscape typology

The desired future character of the St Leonards South precinct is for a liveable, walkable, connected, safe precinct which builds upon the transit and land use opportunities of St Leonards and Metro stations and commercial centre.

The site at 13-19 Canberra Avenue has been identified as one of the sites to include community facilities. A community space is provided at Level 1 and is accessible from Canberra Avenue via the link stairs and lift. A childcare space and its own outdoor play area totalling approximately 1251sqm is provided to serve the new precinct. Outdoor play is integrated into the green spine landscaped zone. There is a retail space provided on the south-eastern corner of the building on the ground floor level adjacent to the pedestrian link.

The rest of the building comprises 4 levels of basement parking, and 84 residential dwellings with rooftop communal open space.

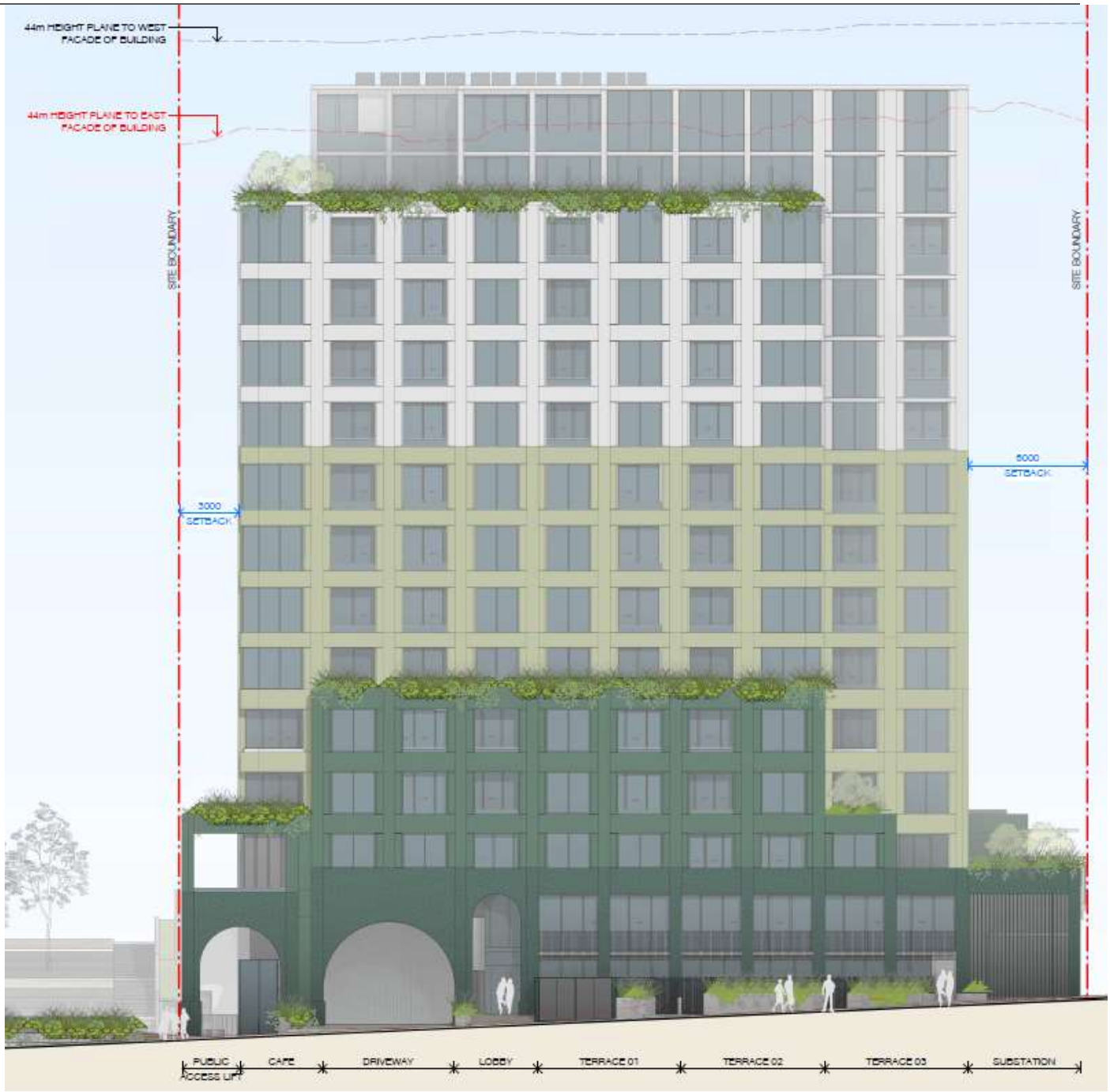


Figure 2: East elevation

3 Sustainable Design

3.1 Thermal Comfort

Solar Access: The floor plate of the building has been designed to maximise solar access, with most units facing east or west and no south facing units which is a great accomplishment. There is a 12m setback to the rear of the site (west) and a 4,5m setback to the north and south sides. There is a 4m setback to the east (Canberra Avenue) from the ground floor to level 5 where the floor plate steps back another 3m. 72% of all dwellings achieve at least 2 hours of direct sunlight at mid-winter between 9am and 3pm.

Ventilation: The floor plate of the building has been designed to maximise the number of dwellings achieving natural cross ventilation. More than 62% of the dwellings achieve natural cross ventilation. The common hallways with windows at both ends will be naturally ventilated where possible, reducing the need for mechanical air supply. The exhaust fans and range hoods from each unit will be ducted externally.

Façade: The façade is an expressed grid of masonry columns and beams, with glazing insets in the voids. This results in each panel of glass being shaded both horizontally above and vertically to the sides. Well shaded glazing is an important element of good passive design. Performance glazing and insulation values are determined by NatHERS thermal simulation modelling to ensure the design reaches and exceeds BASIX heating and cooling load limits. The stepped eastern façade prevents wind tunnels and downdrafts at street level.

Thermal mass: This development has high thermal mass walls, floors and ceilings that will work harmoniously with the generous solar access to provide excellent thermal mass performance. Heavy thermal mass reduces building peak loads and annual energy consumption.

Due to the above, the passive design initiatives incorporated into the design will reduce the need for mechanical ventilation during favourable ambient weather conditions. During times of extreme hot or cold, high performing windows and well insulated facades will ensure high energy performance when air conditioning is in operation.

NatHERS thermal simulation and Design Builder modelling will be completed, and the associated reports list the minimum amount of insulation required to satisfy the building code requirements. Final product selections however often over comply as products are chosen to suit the construction methodology and manage and control condensation.

Figure 2: Southwest view from the green spine.

3.2 Air Conditioning and Mechanical Ventilation

Air conditioning systems represent one of the highest single energy users. All dwellings will be equipped with energy efficient air conditioning units. The air conditioning units will be located either on the roof or in the basement. The air conditioning will be controlled separately for each room. A centralised cooling/heating system is not typical for a building of this scale. A centralised cooling system is also difficult to control when some parts of the building need heating and other parts need cooling, as would happen in a residential building like this one. Cooling towers use potable water while air-cooled condensers use no water in their operation.

The carpark ventilation system will have fans with carbon monoxide sensors and variable speed drives.

3.3 Lighting

Lighting can use over 20% of a buildings electricity consumption, therefore efficient luminaires and lighting control systems are critical in order to optimise a buildings energy efficiency. The following measures are being implemented in design:

- *LED lighting incorporated throughout development;*
- *Daylight control, motion sensors and zoned switching.*

The residential lighting energy load will be calculated within the BASIX assessment and the above initiatives contribute to the development meeting its BASIX energy target for the residential portion of the building.

3.4 Appliances

Appliance energy efficiency has been considered and the star ratings targeted are reflective of the best performance level available while still achieving the functionality, performance and budget set by the client.

Residential Units	*Star Rating*
Dishwashers	*3.5 Stars*
Clothes dryers	*2 Stars (highest star rating for traditional technology)*
Clothes washers (penthouses only)	*3.5 Stars*
All dwellings / common areas	*Star Rating*
Air-conditioners	*COP / EER of 3.5 or greater*
Mechanical ventilation to car park	*Controlled by carbon monoxide monitors and variable speed drive fans.*

3.5 Lifts

There will be two lifts serving the residents running from the basements to the top levels. There will be one publicly accessible lift from basement 1 (where the childcare parking is located) to level 1 (childcare and community space). The lifts will have efficient Variable Voltage Variable Frequency (VVVF) motors.

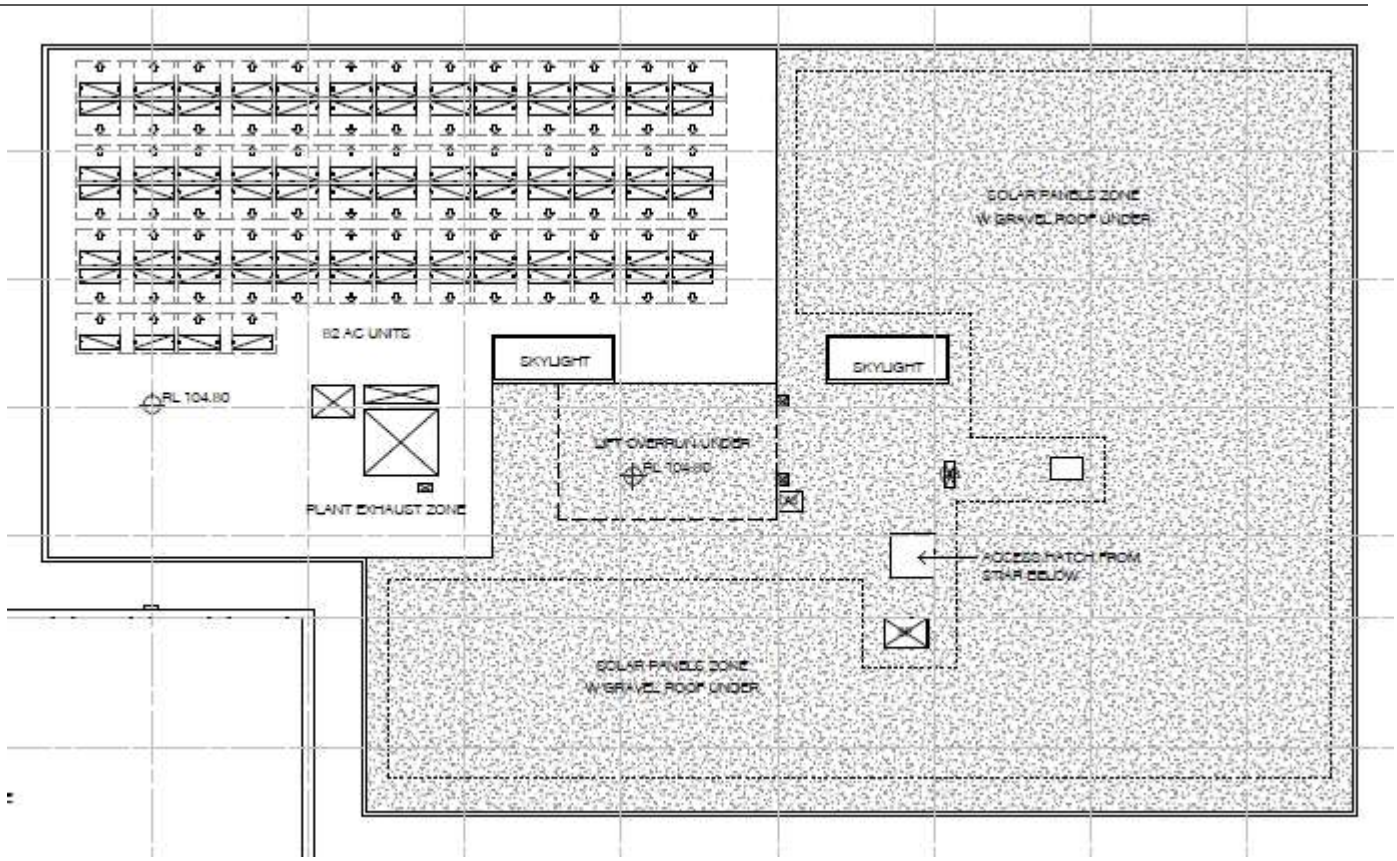


Figure 3: Roof gravel will be light coloured to reduce the urban heat island effect

3.6 Urban Heat Island Effect

The proposed perimeter planting and light-coloured roof with solar panels will significantly reduce the impacts of Urban Heat Island Effect. The roof top will be covered with Nepean gravel which will be specified in white to reduce heat absorption. Sydney's construction trend has included urban sprawl with a lot of hard surfaces and dark external colours. This new era of development will start to reverse these impacts by absorbing the heat energy back into the natural environment.

3.7 Green Roof

The St Leonards South Development Control Plan encourages green roof areas to reduce building energy use. There is planting on levels 2 and 4, and a communal open space with planting on level 12. The roof cannot be planted as the space is required for HVAC plant and solar panels.

3.8 Community Open Space and the Green Spine

The landscape masterplan for the St Leonards South precinct includes a green spine running the length of the block providing private open space for the use of the residents. The childcare's outdoor

play area is adjacent to the green spine. The outdoor play area will be accessible to the public outside of childcare operation hours. Planting will be a mix of 50% endemic and 50% exotic plants.

A communal open space with surrounding planted roof area is provided for residents on level 12. The space includes a kitchen, toilet, and barbeque as well as a retractable shading device.

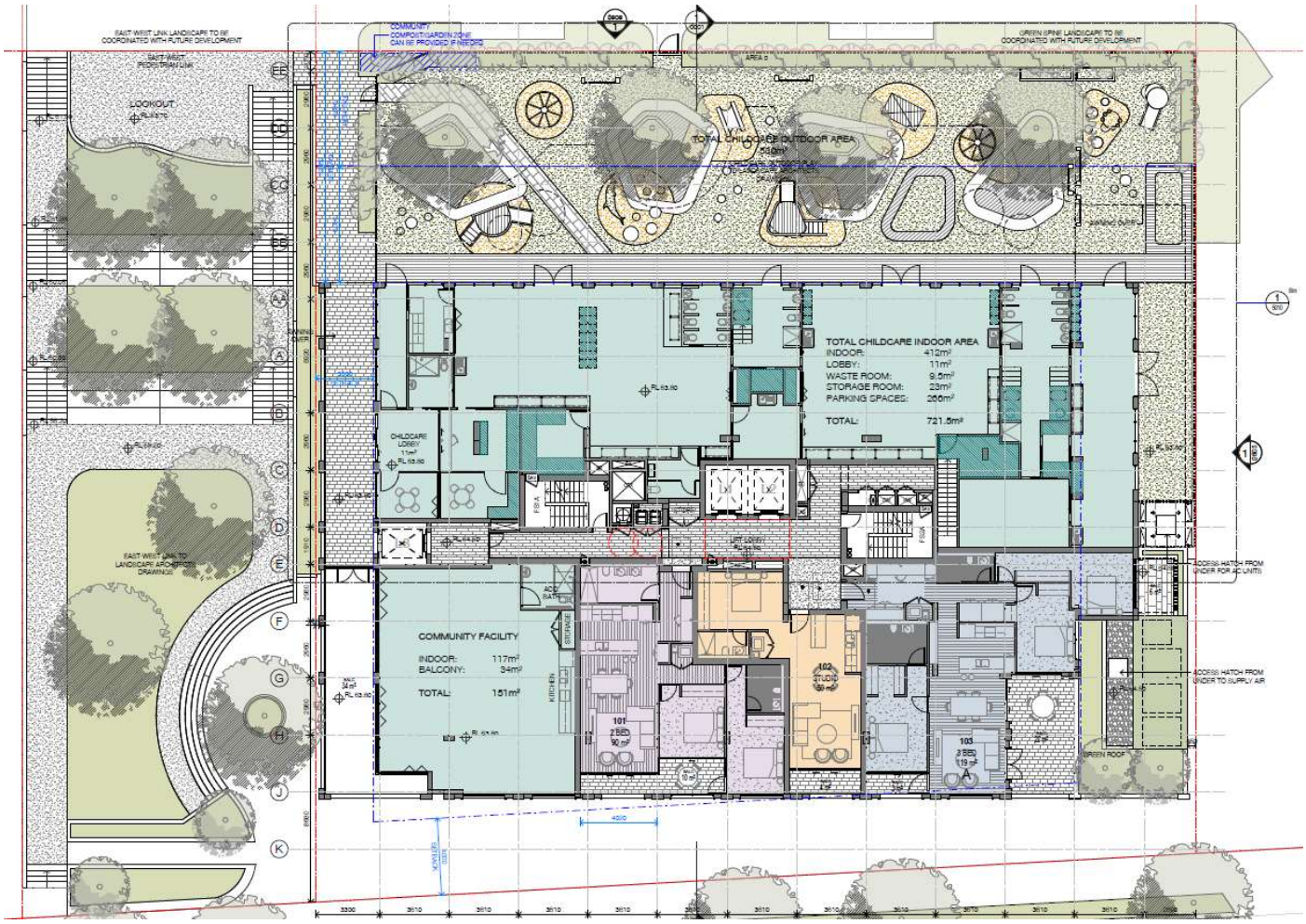


Figure 4: Ground Floor Plan indicating planting

3.9 Connected Community

The development includes a council run community room on level 1 (adjacent to the childcare centre). This community room will be controlled via keycard access and will be available for the community to use for meetings, education, classes such as yoga etc.

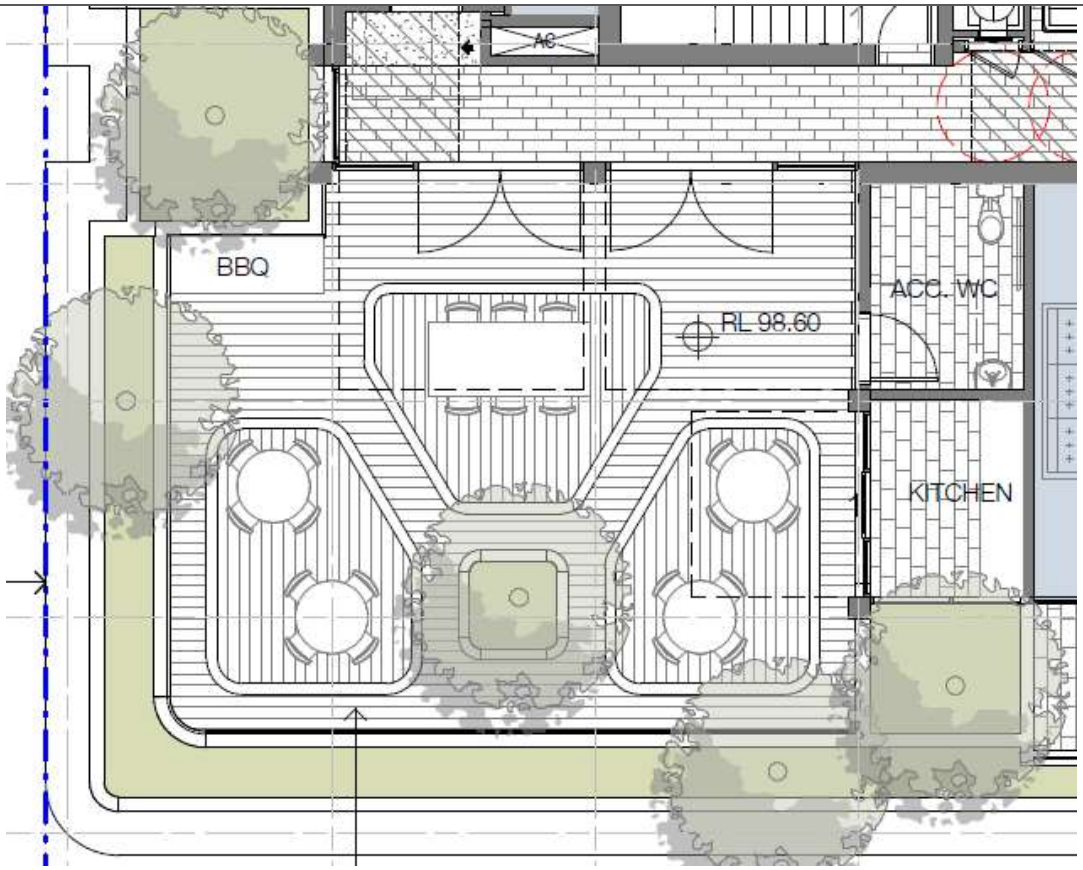


Figure 5: Level 12 plan showing community open space and green roof areas

3.10 Indoor Environmental Quality

The following measures will improve internal air quality:

- *Paints will contain low VOC levels.*
- *Openable doors to highly shaded balconies, which can be opened at favourable times throughout the year provide a well-ventilated internal living environment.*
- *All exhaust fans to wet areas and the kitchen range hood will be externally ducted to the façade.*
- *Individual air-conditioning systems per dwelling have been favoured for each unit over central HVAC. Central HVAC is more challenging in controlling the spread of diseases and can have temperature control issues.*

3.11 Daylight

The following measures will be implemented to improve internal daylight levels:

- *Light internal colour schemes to maximise daylight penetration.*
- *Lighting controls to dim down electric lights when favourable daylight levels are present to common areas*

- *Glass selection with optimised Visual Light Transmittance (VLT).*
- *Large window sizes have been maintained to maximise natural light and give the occupants a greater sense of space and connection to the outside world. High performance glazing will meet the thermal comfort obligations and still maintain large windows that promote a greater sense of wellbeing and opulence.*

3.12 Noise

An assessment of the projects acoustic requirements will be carried out for the development in accordance with Australian Standard AS2107:2016, considering external noise intrusion, noise separation between spaces, as well as noise from building services.

A good level of acoustic amenity will be embedded in the design in order to ensure a comfortable internal environment, reducing negative impacts associated with noise pollution.

3.13 Wind Impact

The façade is stepped back from the podium along Canberra Avenue as per the wind standards for St Leonards. The tower setback prevents downdrafts and wind tunnels at street level. A separate Wind Effects Report will be submitted.

3.14 Water

Water is becoming an increasingly scarce resource in Australia, therefore new buildings should aim to reduce water demand by incorporating efficient fixtures, fittings and white goods. These water saving initiatives reduce the pressure on the local infrastructure and protect the development from future water shortages resulting from climate change.

3.14.1 Fixtures and Fittings

The development will reduce potable water consumption by installing water efficient fixtures and fittings.

3.14.2 Landscape & Irrigation

In line with the St Leonards South DCP, the development is designed with a landscaped terrace on the podium as well as perimeter planting around the building.

Water reducing irrigation measures implemented include:

- *Irrigation systems will comprise of subsurface drip systems and automatic timers.*
- *Where possible, stormwater runoff (on grade & podium) will be directed to the lawn and garden beds.*
- *Irrigation will be provided to all soft landscape areas.*
- *Native low water use plants need less irrigation, further reducing the water demand.*

3.14.3 Rainwater Tank

A rainwater tank will be provided to harvest rainwater from the roof and hardscape terraces. The harvested water will be used for landscape irrigation and car wash bays.

3.14.4 Water Sensitive Urban Design

A Water Sensitive Urban Design (WSUD) approach will be incorporated into the design of the development. This improves the quality of the stormwater leaving the site through treatment methods which mimic natural systems. The flowrate of the stormwater is managed through various infiltration, capture and stormwater methods minimising the risks of flooding and erosion to downstream areas.

The WSUD approach for the management of stormwater runoff in the public domain also improves community awareness of stormwater treatment practices, engaging everyone in the process and leading to a holistic improvement in environmental management.

Groundwater recharge trenches will be included in the pedestrian link to the south of the site. These will divert stormwater from the main stormwater system at strategic locations along the link.

3.14.5 Stormwater Management

A combined on-site detention (OSD) and on-site retention (OSR) tank strategy will be developed in accordance with local council requirements. The OSD tanks will incorporate flow control measures to ensure peak flows generated under proposed conditions do not exceed flows generated under pre-developed conditions, in accordance with Sydney Water's requirements. The OSD tank will also be used for the watering of landscaped areas.

Overflows from hardscaped areas will be filtered and temporarily detained in OSD systems before slowly releasing back to community storm water systems.

Vegetated podium areas and open terraces will reduce peak rates of runoff and alleviate the pressure on storm drainage systems by the retention, diffusion and evapotranspiration of rainwater.

It is considered that storm water runoff is to be treated using appropriate devices and filtration systems to improve storm water quality.

3.15 Climate Change Considerations

Climate change impacts over the next 50 years are expected to be higher annual temperatures, decreased rainfall leading to possible water shortages and flooding during rainfall events. This development considers the impacts and risks of climate change in a number of ways including using energy efficient air conditioners that can work efficiently even at higher outdoor temperatures, rainwater tanks to capture rainfall and provide water for irrigation. The site is situated on a slope to lead stormwater away from the site. The basement has a pump-out tank to prevent flooding. Solar panels will be provided on the roof to provide power to common areas.

4 Sustainable Procurement and Project Delivery

4.1 Local Sourcing

Building materials will be locally sourced where possible, reducing the emissions from transport. Local sourcing can be beneficial as it uses less transport and consequently causes less carbon emission.

4.2 Demolition and Construction waste

A waste management plan for the construction and demolition phases of the development has been produced separately. During construction up to 90% demolition and construction waste will be recycled where possible.

4.3 Durability and Longevity

The average life span of a strata building far exceeds that of a single residential home. The construction methods and materials that will be used in this development are high quality, durable and low maintenance.

4.4 Reduced Consumerism

The environmental footprint of people living in a unit over a suburban home is significantly reduced, due to lower heating and cooling energy loads, greater reliance on public transport, smaller spaces

to furnish and less room to store clothes and goods. This often leads to the occupant buying less and investing in better quality.

5 Sustainable Operations

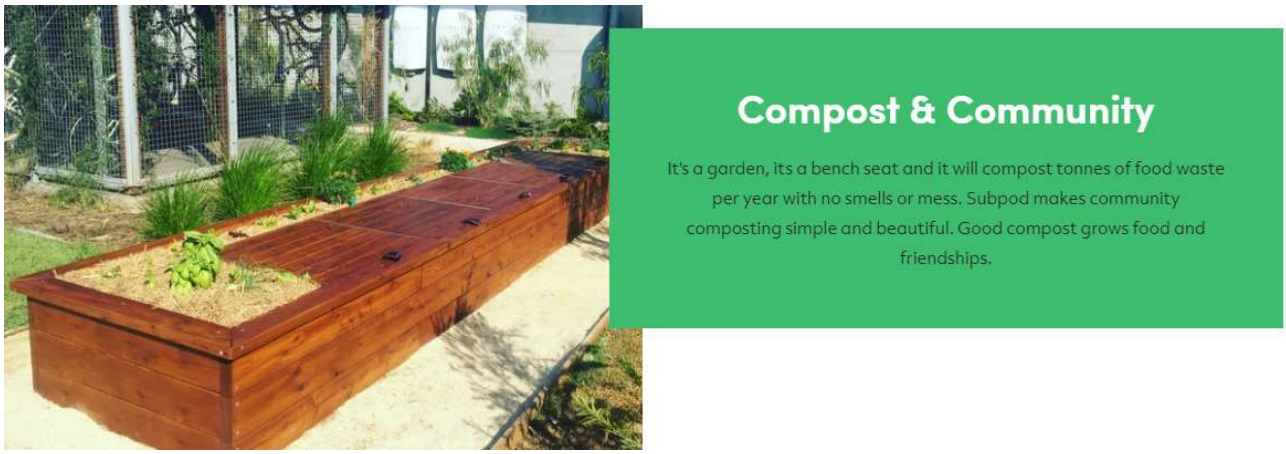
5.1 Ongoing waste management

Elephants Foot has been engaged as the project waste consultant, and therefore will be addressing applicable DCP requirements. In summary the following initiatives are provided for the operational waste management throughout the development:

- *Signage to educate occupants on correct waste disposal practices;*
- *Recycling bins and facilities will be provided in accordance with Council requirements with quantities estimated in line with waste consultant estimations.*
- *Green Waste will be separately addressed by the landscape contractor;*
- *Food retail tenants will responsibly dispose of cardboard and oils used for cooking;*
- *A suitable storage area will be provided for chemicals, pesticides and cleaning products;*

5.2 Organic Waste

Community compost opportunities will be available in the green spine for residents to use. Food waste disposed of in landfill rots and becomes a significant source of methane – a potent greenhouse gas with 21 times the global warming potential of carbon dioxide. Using worm farms to process food waste stops the carbon emissions and allows waste to naturally return to the food cycle.



5.3 Solar Power

Solar power systems derive clean pure energy directly from the sun. Installing solar panels helps combat greenhouse gas emissions and reduces our collective dependence on fossil fuel. Renewable energy also improves public health.

Photovoltaic panels will be provided at roof top level. The energy generated from these solar systems will be used to reduce main power for the common areas of the residential tower. The final design size and location of the system will be developed with the service provider.

5.4 Energy Metering

The building will have energy metering facilities to allow the building manager to monitor and optimise the buildings energy use. The facilities will individually record the energy consumption of the air-conditioning, lighting, appliance power, central hot water supply and the lifts.

This may facilitate features that include apps for individual unit's owners to monitor their daily energy use. Further exploration is still required.

Knowledge is power

Consumer education is a powerful tool in curving occupant behaviour and delivering energy savings. As a commitment to energy efficiency all occupants in the residential dwellings will be provided with an app that gives them real-time energy usage data.

Occupants will see the dollars and cents impact of running the air-conditioning compared to opening the doors or leaving the lights on when the leave the unit, this over time equates to changes in lifestyle habits and big wins for the environment.

5.5 Active and Public Transport Modes

The development is located 450m walking distance to the St Leonards station, allowing residents easy access to public transport. Trains run via St Leonards from Hornsby to the City. There are several bus stops on the nearby Pacific Highway to the north of the site for busses to the city and back and on River Road to the south for Bus 261 to the city and back.

5.6 Car Share Facilities

Each share car in an area reduces the number of private cars in the area by about 10. Local research found that car share members drive 50% less than other drivers by combining multiple errands in each trip. More car share drivers mean fewer cars on the road and more efficient use of those cars.

Two car share spaces will be provided for residents in the basement.

5.7 Bike Facilities

This area is well serviced by walking and bike paths, which promotes active and healthy lifestyles. There are 23 bike racks provided for residents in the basement and 13 bicycle parking spaces for visitors.

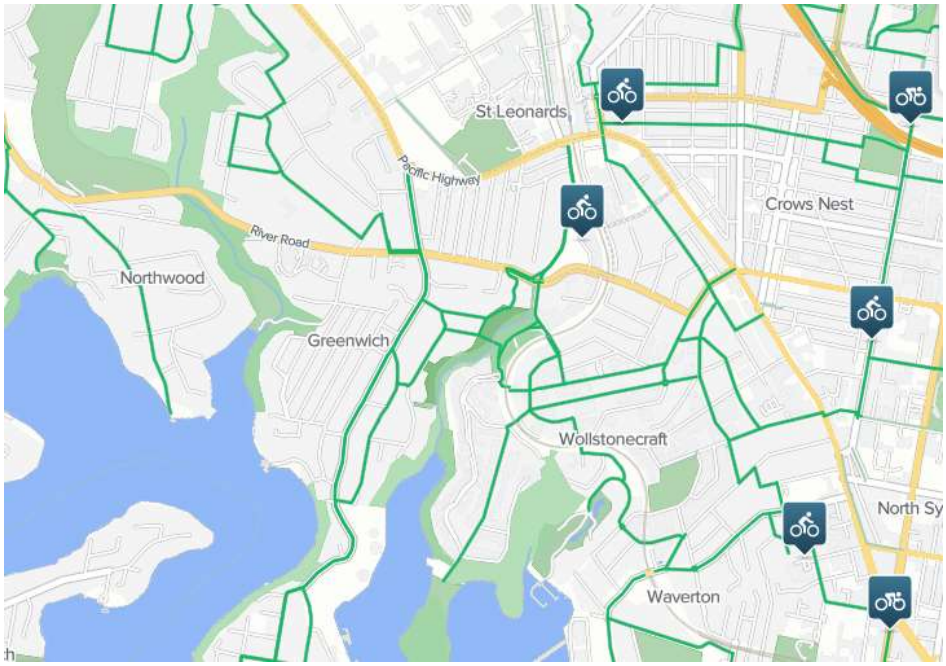


Figure 6: Map showing bike friendly roads/paths in the surrounding area (from bikemap.net accessed 26/06/2021)

5.8 Electric Vehicles

Hyecorp are committed to supporting Electric Vehicles (EV) trajectory targets and will be partnering with an experienced third-party EV infrastructure expert to provide integrated custom EV charging within the sites electrical system. Hyecorp have committed to at least 6 parking stations being EV capable.

The future of Electric power transport

Electrical cars are just the beginning, with an increased focus on health and social distancing our countries bike paths have never been busier. Service agreements with an EV charging specialist can also cater for charging electric bikes, scooters and electric Penny Farthings.

6 Conclusion

An ESD workshop was held with the project team. The relevant policies were discussed and responded to appropriately. This development meets the ESD requirements, will be energy and water efficient and will be an asset to the community.