SUSTAINABILITY STRATEGY REPORT

Proposed Multi-Unit Residential Development
10-12 Marshall Avenue, St Leonards NSW

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EXECUTIVE SUMMARY

LC Consulting Engineers has been engaged by New Golden St Leonards Pty. Ltd. to assess the sustainability perspectives of the proposed residential flat building development at 10 & 12 Marshall Avenue, St Leonards in accordance with the objectives of the Lane Cove Sustainability Action Plan 2016-2021 and the St Leonards South Landscape Masterplan.

The development site forms part of the St Leonards South Precinct and contains the area identified as Area 12. It is zoned R4 High Density Residential under Lane Cove Local Environmental Plan 2009.

This sustainability strategy report forms part of the Development Application (DA), which comprises demolition of the existing three single detached dwellings, construction of a 13-storey residential flat building containing 105 apartments and three level of basement parking for 113 vehicles, and 400 m2 of public open space.

The main objective of this report is to confirm design and development compliance with the relevant environmental and ecologically sustainable development regulations. The sustainability strategy proposed to be incorporated into the development in this report has identified sustainability measures being included in the building and landscape design, and has addressed the sustainability objectives of the St Leonards South Landscape Masterplan, Lane Cove Sustainability Action Plan 2016-2021 and the Apartment Design Guide (NSW).

A brief summary of the sustainability initiatives applied to the proposed residential development has been provided below:

- Energy Efficiency
- Indoor Environment Quality
- Water Conservation
- Transport
- Sustainable Resource Management & Waste Minimisation
- Land Use and Ecology
- Emissions

The proposed development aims to demonstrate that by incorporating the sustainability initiatives above into the project design and development, it should improve sustainability performance and the community living quality in a holistic way.

1. INTRODUCTION

1.1. SITE & PROJECT DESCRIPTION

The development site with a total site area of approximately 2,631 m^2, located at 10-12 Marshall Avenue, St Leonards, forms part of the St Leonards South Precinct and contains the area identified as Area 12. It is zoned R4 High Density Residential under Lane Cove Local Environmental Plan 2009.

Key features of the surrounding context include:

- North – St Leonards Health and education precinct comprising the Royal North Shore Hospital, North Shore Private Hospital, Pacific Highway, Gore Hill Oval, Gore Hill Cemetery, St Leonards train station and TAFE NSW St Leonards campus;
- East – Australia Post, retail shops, education centres, low and high density housing'
- South – Newlands park, low residential housing'
- West – Low residential housing.

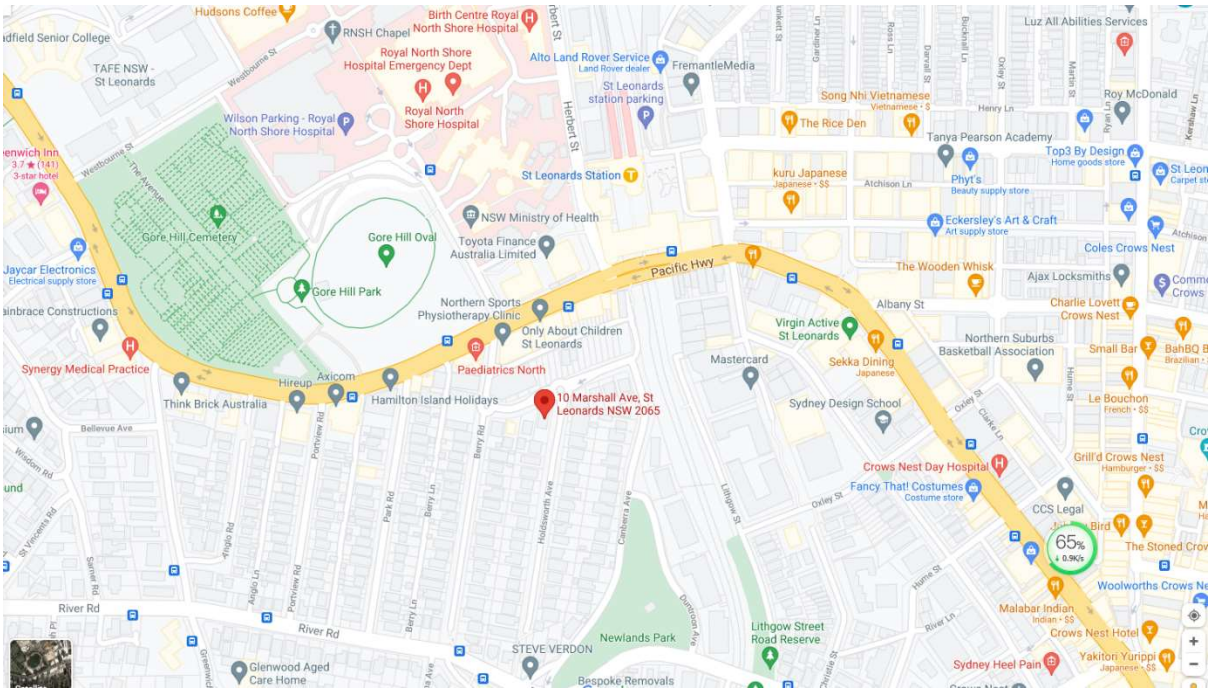

Figure 1 - Site Location (Source: Google Maps, date – 02/06/2021)

The proposed development comprises demolition of the existing three detached single dwellings, construction of a 13-storey residential flat building containing 105 apartments and three level of basement parking for 113 vehicles, and 400 m^2 of public open space.

1.2. LOCAL CLIMATE

The proposed site is located in the NatHERS climate zone 56, typical warm termperate climate. This climate zone features moderate diurnal (day–night) temperature range, warm to hot summers and mild winters, and relatively balanced heating and cooling demand.

The following chart provides the average High and Low temperature of St Leonards.

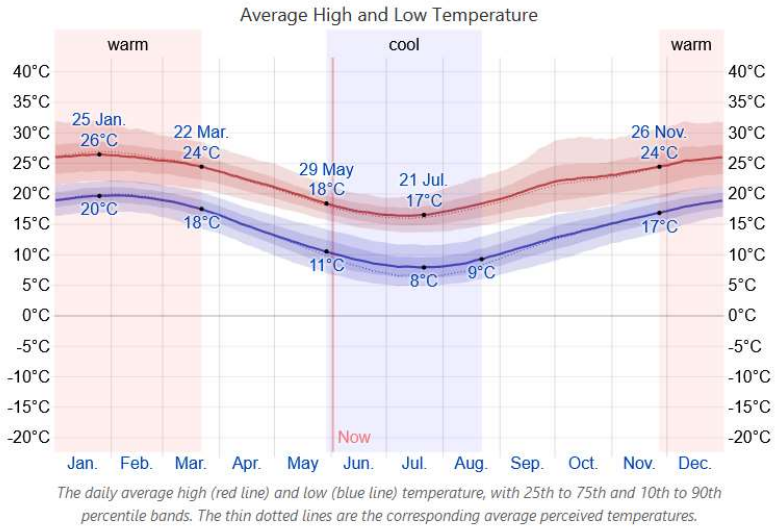

Figure 2 – Average High and Low Temperature (Source: https://weatherspark.com, date - 1 June 2021)

The prevailing wind direction varies throughout the year. The wind is most often from the south from 23 March to 25 May, often from the west from 25 May to 25 September, often from the east from 5 November to 23 March.

The following chart provides the mean wind direction of St Leonards.

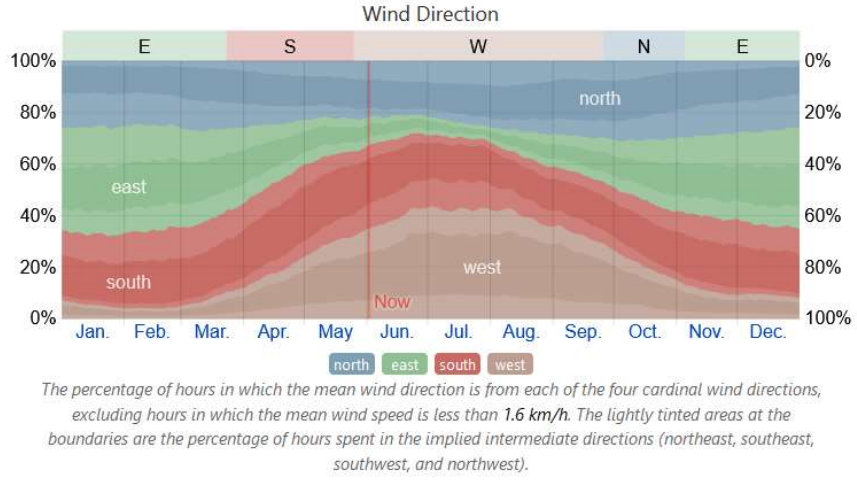

Figure 3 – Wind Direction (Source: https://weatherspark.com, date - 1 June 2021)

The average daily incident shortwave solar energy experiences extreme seasonal variation over the course of the year. The brighter period of the year lasts for 3.4 months, from 2 November to 13 February, with an average daily incident shortwave energy per square meter above 6.7 kWh. The brightest day of the year is 31 December, with an average of 7.8 kWh. The darker period of the year lasts for 3.2 months, from 1 May to 8 August, with an average daily incident shortwave energy per square meter below 3.6 kWh. The darkest day of the year is 16 June, with an average of 2.6 kWh.

The following chart provides the average daily incident shortwave solar energy of St Leonards.

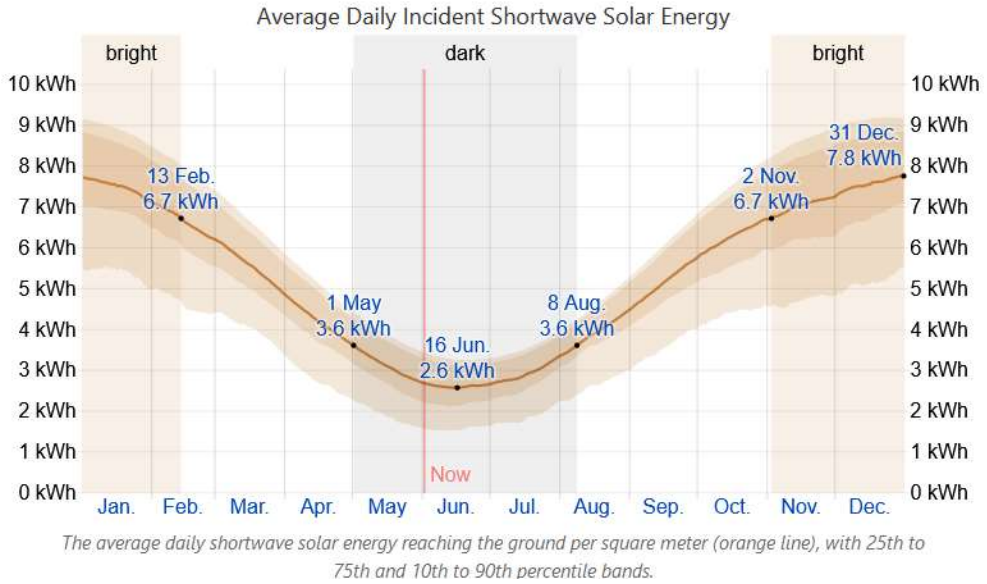

Figure 4 – Average Daily Incident Shortwave Solar Energy (*Source: https://weatherspark.com, date: 1 June 2021)*

1.3. SUSTAINABILITY GUIDELINES

This report has been prepared in accordance with the relevant sustainability measures outlined by the following rules, regulations and tools:

- **NSW Building Sustainability Index (BASIX) & NatHERS Certification**
  The proposed development shall meet / exceed all minimum sustainability requirements of all three BASIX sections – water, thermal comfort and energy. In addition, the proposed residential component shall achieve 6-star NatHERS rating in accordance with the St Leonards South Precinct sustainability requirements.

- **National Construction Code (NCC) 2019 (Amendment 1) – Section J & J(A) Energy Efficiency**

  The residential component of the development shall meet the relevant requirements outlined in the provisions of NSW Subsection J(A), which contains energy efficiency requirements for Class 2 buildings, and complements requirements that arise under BASIX;

  The basement car park shall meet the relevant requirements outlined in the national provisions of Section J.

- **Lane Cove Local Environmental Plan 2009**
- **St Leonards South Landscape Masterplan**
- **Lane Cove Sustainability Action Plan 2016-2021**
- **Apartment Design Guide (NSW)**
- **The State Environmental Planning Policy (SEPP) 65**

2. PRINCIPLES OF ECOLOGICALLY SUSTAINABLE DEVELOPMENT

- **Precautionary Principle**

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. Public and private decisions should be guided by careful evaluation to avoid serious or irreversible damage to the environment wherever practicable, and an assessment of the risk-weighted consequences of various options.

The proposed development is to be built on a brown field site (previously developed land) and should not cause any environmental degradation in the local community. The project team will adopt sustainability measures included in this report and improve sustainability and environmental performance during the design, demolition and construction stages. Careful considerations will also be given to the environmental risk management (by identifying relevant environmental risks and implementing mitigation measures from the early design phase) by the project team throughout the building operation.

The project team has opted for preserving existing trees in the public open space with high retention value wherever possible, trees No.30 and No.32 in particular, by further diminishing the north-west corner of the building site footprint voluntarily.

- **Inter-Generational Equity**

The present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

The proposed development will commit to environmental responsibility and sustainable development by implementing a series of sustainability initiatives to ensure that the environmental benefits and wellbeing of future generations.

Energy efficiency and carbon reduction measures will be incorporated into the building design to meet or exceed the BASIX energy requirements and the relevant Section J requirements by providing a thermally improved building envelope, highly efficient building services (including HVAC, artificial lighting, domestic hot water units, plumbing, and lifts), and selection of efficient electrical appliances (with high energy star ratings). A photovoltaic system is also planned to be installed to provide onsite renewable energy to the proposed development.

Water conservation measures to be adopted include selection of water fixtures and fittings of high WELS ratings, rainwater capture and reuse for landscape irrigation, dual flush feature for all toilets, and use of indigenous or low water use species for landscaping wherever possible.

Waste generated during all phases of demolition, construction and operation will be diverted from landfill wherever possible. The principle of sourcing building materials in construction should follow the hierarchy of reduce – reuse – recycle – dispose. Particularly, existing sandstone walls in public open spaces are planned to be retained for the purpose of waste minimisation.

- **Conversation of Biological Diversity and Ecological Integrity**

Conservation of biological diversity and ecological integrity should be a fundamental consideration in environmental planning and decision-making processes. Biodiversity refers to the variety of all life. Environmental and species impact statements are one way that this principle is enacted.

The proposed development is to be built on a brown field site (previously developed land) and should not have any significant negative impact on the biological diversity and ecological integrity of the local community. Existing trees with very high landscape significance and high retention value in public open spaces are to be retained and preserved wherever possible, for

Trees No.30 and No. 32 in particular, the design team along with the developer has opted for preserving them, by further diminishing the north-west corner of the building site footprint voluntarily.
Native species will be selected for landscaping design wherever possible, and the creation of the public open spaces as part of the development should improve flora and fauna, and ecological health in both of local community and the broader environment.

- **Improved Valuation, Pricing and Incentive Mechanisms**

Environmental factors should be included in the valuation of assets and services, such as:

- *polluter pays – those who generate pollution and waste should bear the cost of containment, avoidance or abatement,*
- *the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste,*
- *environmental goals, having been established, 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 energy and water conservation measures proposed in this report will reduce operation costs and therefore improve asset valuation.

3. SUSTAINABILITY INITIATIVES

The proposed development has committed to a series of sustainability initiatives within the following sustainability categories –

- Energy Efficiency
- Indoor Environment Quality
- Water Conservation
- Transport
- Sustainable Resource Management & Waste Minimisation
- Biodiversity
- Emissions

3.1 ENERGY EFFICIENCY

Energy efficiency is an essential factor for sustainable development. Therefore the proposed development is to be designed to meet / exceed minimum BASIX energy target for the residential apartments, by means of a combination of good design initiatives in passive design, HVAC systems, appliances, lighting, photovoltaic systems and etc.

Passive Building Design

Passive environmental and energy efficient design takes advantage of the climate to maintain thermal comfort and reduce energy costs inside a building. Efficient passive design is to be incorporated into the proposed development through the following aspects:

- **Solar & Daylight Access**

Solar and daylight access is important for residential apartments in the Sydney Metropolitan Area, by reducing reliance on active heating and artificial lighting to maintain occupants' comfort level. The proposed residential development is to be designed to meet the minimum compliance requirement that living rooms and private open spaces of at least 70% of apartments receive a minimum of 2 hours direct sunlight between 9 am and 3 pm at mid-winter in the Sydney Metropolitan Area, under the Apartment Design Guide (ADG), NSW.

Undesired overheating in individual dwellings should be avoided or mitigated by providing shading devices to the majority of the flush windows on the west façade.

- **Natural Ventilation**

Natural ventilation allowed for the residential apartments is an efficient approach to reduce reliance on air conditioning and mechanical ventilation in the Sydney Metropolitan Area,. The proposed residential development is to be designed to meet the minimum requirement of 60% of apartments in the first nine Levels of any building, under the Apartment Design Guide (ADG) NSW. Apartments above Level 9 generally have greater exposure to breezes and are easier to benefit from cross ventilation.

- **Building Insulation & Glazing**

A detailed thermal comfort analysis using NatHERS approved software tools is to be undertaken for all the proposed residential apartments as part of the BASIX assessment. The results of the thermal comfort analysis estimate the heating and cooling demands for each apartment in MJ/m^2 conditioned floor area per annum.

The proposed residential development is designed to exceed the required BASIX thermal targets (meaning lower MJ/m^2) for both individual and average targets, and to achieve a 6-star NatHERS rating for the project. Apart from the good design of natural cross ventilation and solar access and shading, this will be achieved by using better building insulation, energy efficient glazing and provision of sufficient shading to the west facade where required. The

reduction on heating and cooling loads can pass the benefits of significant energy savings onto the apartment residents.

Thermal mass should be carefully designed to reflect the warm temperate climate, orientation of buildings and adjacent overshadowing effects and therefore maximise the thermal storage benefits in conjunction of building insulation design.

- **Air Conditioning and Electrical Appliances**

Energy efficient air-conditioners and electrical appliances are to be selected for all residential apartments to help meeting or exceeding the BASIX energy targets – representing 20% savings (comparing to the pre-BASIX benchmark) for high-rise (6 storey or taller) apartment buildings.

Detailed BASIX energy analysis is being conducted for the submission of Development Application and the minimum energy star ratings for the air-conditioners and electrical appliances are to be determined at the time of assessment. It is recommended that products of high energy efficiency be specified for air-conditioners and electrical appliances including dishwashers, clothes dryers and fridges where applicable.

Hot Water Systems

Water heating is the largest source of greenhouse gas emissions from an average Australian home. To demonstrate initiatives on carbon footprint reduction, the proposed residential development is to have low carbon footprint (minimum 5 star or better) central instantaneous gas hot water systems, and both of the external and internal pipes are to be insulated to meet / exceed the BASIX requirements.

Car Park Ventilation

The ventilation in the basement carparks is to be automatically controlled using variable speed drive (VSD) by a carbon monoxide monitoring system in accordance with NCC 2019.

Interior Lighting

LEDs lighting is to be used throughout the residential apartments and common areas within the proposed building. It is also recommended that lighting to fire stairs, hallways and lift lobbies is to be controlled by motion sensors.

Lift Lighting

LED lift lighting is to be used and connected to lift call buttons.

Car Park Lighting

Lighting to all basement car parks is to be LEDs, with zoned motion detector control.

Public Lighting

External lighting at the building perimeter and the public open spaces provided as part of the development is to be energy efficient lighting such as LED lighting, and photoelectric sensors shall be used to provide 'dusk to dawn' light control.

Solar Photovoltaics Systems

Photovoltaic panels are planned on the roof to power common areas to mitigate peak electricity demand and reduce consumption of grid. The actual installed wattage shall exceed the minimum rated output of the photovoltaic system required by BASIX. Rooftop spaces on Level 12 have been selected for solar collection and the system details are to be advised by a qualified solar expert at the detailed design stage.

3.2 INDOOR ENVIRONMENT QUALITY

Thermal Comfort

A thermal comfort analysis using NatHERS approved software tools is to be undertaken for all the proposed residential apartments as part of the BASIX assessment at the stage of Development Application. In order to maintain high level of thermal comfort, the proposed development is to be designed to exceed the required BASIX thermal targets (meaning lower MJ/m2) for both individual and average targets. A combination of sustainable aspects including natural ventilation, solar access, building insulation and glazing, is being examined as part of the process of BASIX thermal assessment.

In addition, the proposed residential development is to be designed to meet a 6-star NatHERS rating in accordance with the St Leonards South Precinct sustainability requirements.

Low Volatile Organic Compounds (VOC) Materials

VOCs are organic compounds that produce vapours readily at room temperature and normal atmospheric pressure. They react with other elements in the air and cause ozone, which cause air pollution and a series of health issues including breathing problems, headache, watery eyes and nausea.

The use of low levels of Volatile Organic Compounds (VOCs) paints and carpets is recommended wherever possible to improve indoor environment quality.

Low Formaldehyde Wood Products

Formaldehyde is a colourless, flammable gas at room temperature and has a strong unpleasant odour. It is often present in engineered wood products. Exposure to a high concentration of formaldehyde may cause adverse health issues including irritation of nose, throat or eyes, headache, nausea, skin rashes and sleep interference.

The use of low formaldehyde wood products is recommended where possible to improve indoor environment quality.

3.3 WATER CONSERVATION

The direct approach to conserve water for new buildings is to reduce the potable water consumption. By complying with the BASIX water section for the residential part of the development, the proposed development will have achieved a minimum of 40% potable water savings than an average pre-BASIX development in NSW.

The following water conservation measures are to be implemented in the proposed project to ensure that significant water savings be achieved for the proposed residential development:

High water efficiency fittings and fixtures
All water fittings and fixtures including showerheads, water tap outlets, urinals and toilet cisterns in all residential development are to achieve / exceed the minimum required BASIX targets; Also, dual flush toilets are to be fitted throughout the proposed development.

Rainwater / storm water collection
Rainwater tanks (and / or storm water tanks) are to be designed to sufficiently service all public and private landscaping irrigation, car wash bays and garbage room wash-down where applicable.

Indigenous / low water use species
Indigenous / low water use species are to be selected, where appropriate and possible for landscaped open spaces, in order to reduce the amount of water consumption for irrigation.

3.4 TRANSPORT

The applicant is undertaking an integrated approach to facilitate a reduction of the dependency of occupants on private car use as an important means of reducing overall greenhouse gas emissions. It is therefore necessary to maximize alternative transport options and encourage the use of public transport, walking, and cycling. In addition, walking and cycling act in a favourable way on both physical and mental well-being of residents.

Walk Score
A comprehensive network of pedestrian infrastructure contributes to the Site at 10-12 Marshall Avenue, St Leonards, which achieves excellent walk score – 94 points out of 100, and high transit score - 74 points as determined by the website – walkscore.com, using the ‘street smart’ method of calculation. This web based tool is referenced and used by the Green Star Design and As Built Rating tool, as an indicator for ‘walkability’ of the site location. The

assessment results indicate that the location is a 'Walker's Paradise' as daily errands do not require a car, and an 'excellent transit' that recognises the convenience for most trips.

Public Transport

The proposed site is well serviced by public transport. It only requires a six minute walk (approximately 400m) from the Central Coast and Newcastle Line, the T1 North Shore Line, and the Northern Line at the St Leonards Station Platform 3 stop. The Pacific Highway is directly accessible from the site. Regular bus networks are available along this highway, which provide enhanced connectivity throughout St Leonards and wider Sydney and metropolitan area.

Bicycle Parking Facilities

The proposed site is conveniently located approximately 2.5 km northwest of North Sydney and 6.5 km northwest of the Sydney CBD, which provides significant opportunities for commuters to travel on bicycles.

Alternative transport options including provision of secure bicycle parking is proposed using a holistic approach in order to maximise benefits of residents and visitors.

Efficient cars

It is recommended that car parking areas where appropriate and possible, are to be designed to allow electric vehicle charging points can be installed for current or future needs (as a mean to provide access to green infrastructure).

3.5 SUSTAINABLE RESOURCE MANAGEMENT & WASTE MINIMISATION

The principle of sourcing building materials in construction should follow the hierarchy of reduce – reuse – recycle – dispose:

a) avoiding unnecessary resource consumption
b) recovering resources for reuse
c) recovering resources for recycling or reprocessing
d) disposing of residual waste (as a last resort)

The objectives of Part Q of the Lane Cove Development Control Plan (Amendment 2 – 09/12/2011) in pursuit of sustainable waste management include:

1 Waste minimisation

a. To minimise resource requirements and construction waste through reuse and recycling and the efficient selection and use of resources.

b. To minimise demolition waste by promoting adaptability in building design and focusing upon end of life deconstruction.
c. To encourage building designs, construction and demolition techniques in general which minimise waste generation.
d. To maximise reuse and recycling of household waste and industrial/commercial waste.

2 Waste management
a. To assist applicants in planning for sustainable waste management, through the preparation of a site waste minimisation and management plan.
b. To assist applicants to develop systems for waste management that ensures waste is transported and disposed of in a lawful manner.
c. To provide guidance in regards to space, storage, amenity and management of waste management facilities.
d. To ensure waste management systems are compatible with collection services.
e. To minimise risks associated with waste management at all stages of development.

The proposed development should aim to reduce the amount of materials used in construction wherever possible, for instance, retaining existing sandstone walls in public open space, and using prefabricated components for internal fit outs wherever possible.

Bricks and sandstones, featuring long lifespan and long durability, have been selected as the major materials for the solid façade construction, which improves life-cycle performance in greenhouse gas emissions when accounting for both embodied energy and operational energy in a holistic way.

In addition, construction materials with high reuse potential or high recycled content are to be used wherever possible or practical.

It is also recommended that all timber be either sourced from sustainable sources (with relevant certification, e.g. Forest Stewardship Council (FSC) certification) or be recycled.

To reduce the amount of waste ending up in landfill from the proposed development, effective waste management provisions are to be implemented in accordance with Part Q – Waste Management & Minimisation of the Lane Cove Development Control Plan.

A waste management plan is to be implemented in compliance with the policy above to provide efficient waste minimization and resource recovery for all phases including demolition, construction and operational management.

3.6 LAND USE & ECOLOGY

Public open spaces in addition to various planter areas are to be planned to improve the ecological value of the proposed development in a holistic way.

Existing trees with very high landscape significance and high retention value in public open spaces are to be retained and preserved wherever possible, for Trees No.30 and No. 32 in particular, the design team along with the developer has opted for preserving them, by further diminishing the north-west corner of the building site footprint voluntarily.

Native species are to be selected and designed wherever possible to provide the following benefits to the residents and the local environment:

- Compatibility with local flora and fauna to promote biodiversity
- Improvement of local air quality
- Mitigation of urban heat island effect (as a climate change adaptation strategy)
- Reduction of noise level
- Visual comfort

3.7 EMISSIONS

Light pollution

All external lighting (including building perimeter lighting and lighting in public open spaces) is to be carefully designed to minimise light pollution to night sky.

Microbial Control

All hot water systems should be designed to manage the risk of microbial contamination.

4. CONCLUSIONS

The New Golden International Group has proactively demonstrated sustainability initiatives and has adopted the following sustainability principles on all the past development –

- Reduction of energy consumption and greenhouse emissions
- Water conservation
- Improvement in thermal, acoustic, air & natural light qualities within buildings
- Waste minimization
- Sustainable building materials sourcing

And the above sustainability principles will continue to be rolled out into the proposed development at 10 & 12 Marshall throughout the design, construction and operation phases.

This report has outlined site specific sustainable strategies for the proposed residential development that have been aligned with the sustainability objectives included in Lane Cove DCP 2009, St Leonards South Landscape Masterplan and Lane Cove Sustainability Action Plan 2016-2021 and Apartment Design Guide (NSW). These sustainability strategies, across many aspects will help reduce greenhouse gas emission, potable water consumption and waste, improve indoor environment, biodiversity and climate change adaption, promote renewable energy and nurture the wellbeing of people in the community.