WOOLWORTHS LIMITED

PROPOSED WOOLWORTHS CUSTOMER FULFILLMENT CENTRE. 74 EDINBURGH ROAD, MARRICKVILLE NSW

ECOLOGICALLY SUSTAINABLE DESIGN CONCEPT REPORT

SEPTEMBER 2020

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Proposed Woolworths Customer Fulfillment Centre. 74 Edinburgh Road, Marrickville NSW
Ecologically Sustainable Design Concept Report

Woolworths Limited

WSP
Level 27, 680 George Street
Sydney NSW 2000
GPO Box 5394
Sydney NSW 2001

Tel: +61 2 9272 5100
Fax: +61 2 9272 5101
wsp.com

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	NAME	DATE	SIGNATURE
Prepared by:	Allissa Abrenica	31/08/2020	
Reviewed by:	Nick Asha	01/09/2020	
Approved by:	Nick Asha	09/09/2020	

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GLOSSARY

Term	Definition
The Site	74 Edinburgh Road, Marrickville (Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in
The Project	DP 180969)
Customer Fulfilment Centre	Demolition and the construction of a new warehouse and distribution centre with associated offices.
Associated Office	The purpose built Woolworths occupied warehouse and distribution facility located on Level 2.

ABBREVIATIONS

Abbreviation	Meaning
ACHA	Aboriginal Cultural Heritage Assessment
AHIMS	Aboriginal Heritage Information Management System
AS	Australian Standard
ASS	Acid Sulfate Soils
BC Act	*Biodiversity Conservation Act 2016*
BCA	Building Code of Australia
BDAR	Biodiversity Assessment Report
CMP	Construction Management Plan
Council	Inner West Council
CPTED	Crime Prevention Through Environmental Design
CPTMP	Construction Parking and Traffic Management Plan
District Plan	*Eastern City District Plan*
DPIE/Department	NSW Department of Planning, Industry and Environment
DP	Deposited Plan
DSI	Detailed Site Investigation
EIS	Environmental Impact Statement
EPA	*NSW Environment Protection Authority*
EPBC Act	*Environment Protection and Biodiversity Conservation Act 1999*
ESD	Ecologically Sustainable Development
Infrastructure SEPP	*State Environmental Planning Policy (Infrastructure) 2007.*
GANSW	NSW Government Architect's Office
HIS	Heritage Impact Statement
HMS	Hazardous Materials Survey
IMP	Infrastructure Management Plan
LGA	Local Government Area
m	metre
NIA	Noise Impact Assessment
Marrickville LEP 2011	*Marrickville Local Environmental Plan 2011*
OEH	Office of Environment and Heritage
OWMP	Operational Waste Management Plan
PSI	Preliminary Site Investigation
Region Plan	A Metropolis of Three Cities – Greater Sydney Region Plan
RAP	Remediation Action Plan
RAPs	Registered Aboriginal Parties
RMS	Roads and Maritime Services
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policy
SEPP 55	*State Environmental Planning Policy No.55 – Remediation of Land*
sqm	Square Metres
SSD	State Significant Development
SEPP SRD	*State Environmental Planning Policy (State and Regional Development) 2011*
SSD DA	State Significant Development Application
TfNSW	Transport for New South Wales
The Minister	The Minister for Planning, Industry and Environment
The Regulation	*Environmental Planning and Assessment Regulation 2000*
The Site	The new warehouse and distribution centre site
TPZ	Tree Protection Zone
Transport Strategy	*Future Transport Strategy 2056*
WSUD	Water Sensitive Urban Design

EXECUTIVE SUMMARY

The proposed Woolworths Client Fulfilment Centre development includes the construction of a new warehouse and distribution centre and office facilities for Woolworths located at 74 Edinburgh Road, Marrickville, NSW.

This document has been prepared as part of the Environmental Impact Statement for the purposes of the State Significant Development Application (SSDA).

This Ecologically Sustainable Development (ESD) Concept Report details the initiatives that the proposed development will be implementing to deliver a highly sustainable development and in response to the objectives of the Secretary's Environmental Assessment Requirements (SEARS), Marrickville Development Control Plan (DCP) 2011 and other policies influencing the development in the suburb of Marrickville.

The project team have worked to identify the potential for the development to reduce its energy and water consumption through onsite strategies. The development will also include other measures to ensure a holistic sustainable strategy for the development, such as:

- Implement energy efficiency measures to reduce greenhouse gas emissions;
- Highly efficient water fittings and fixtures to maximise reductions in water consumption, and supplemented with rainwater harvesting;
- Procurement of materials that have low environmental impacts and/or reuse of existing site materials to reduce demolition waste;
- Optimisation of Indoor Environment Quality (IEQ) as appropriate to the function of the development;
- Enhanced site ecology through high quality landscape design;
- Encourage the use of public transport and active modes of transport; and,
- Design that mitigates or adapts to climate change impacts.

Risks in delivering the sustainable initiatives have also been identified including potential impact of on the design intent and cost implication. Mitigation measures to manage these risks mainly comprise of analysing the appropriateness of these initiatives to the project in more detail, coordination with the project team and specification of these initiatives to ensure they are captured during construction.

As the Project progresses, the way that the targets are met may alter slightly to provide the best possible design outcomes for the development. At this early stage, however, the project team are satisfied that the ESD initiatives, which are beyond current best practice, are achievable within the scheme.

1 INTRODUCTION

WSP has been commissioned by Woolworths Group Limited (the Applicant) to prepare this report in accordance with the technical requirements of the Secretary's Environmental Assessment Requirements (SEARs), and in support of the SSD-10468 for the design, construction and operation of a warehouse and distribution centre with associated offices at 74 Edinburgh Road, Marrickville (the Site).

The warehouse will be fitted out for the purposes of a speculative warehouse(s) and Customer Fulfillment Centre which will service the inner west and city suburbs.

Specifically, this report addresses the following SEARs:

Table 1.1 SEARS Requirements

SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS	REFERENCE IN THE ESD CONCEPT DESIGN REPORT
Description of how the proposal will incorporate the principles of ecologically sustainable development into the design, construction and ongoing operation of the warehouse and the associated office space.	Section 3
Consideration of the use of green walls, green roofs and/or cool roofs in the design of the development.	Section 3.7
Description of the measures to be implemented to minimise consumption of resources, especially energy and water.	Section 3.1 to 3.2

1.1 PROJECT DESCRIPTION

The Site is legally described as Lot 202 in DP 1133999, Lot 3 in DP 318232 and Lot 3 in DP 180969, commonly known as 74 Edinburgh Road, Marrickville (see Figure 1). The Site has an area of approximately 27,315sqm and has frontages to both Edinburgh Road (north) and Sydney Steel Road (east).

The key elements within and surrounding the Site include:

- The Site is located within the industrial area of Marrickville and currently accommodates several large freestanding industrial buildings and associated car parking and loading areas;
- Vehicular access to the Site is via an existing entry and exit driveway at the Edinburgh Road frontage. Access is also available from Sydney Steel Road;
- The Site contains minimal vegetation which is fragmented by buildings and areas of hardstand surfaces. Vegetation is limited to scattered trees and shrubs within the Site and planted within the nature strip;
- Is located within 1km of Sydenham Railway Station, which is currently being upgraded as part of the Sydney Metro Chatswood to Bankstown metro line; and
- The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville.

Figure 1.1 Aerial view of the site *(Source: Six Maps)*

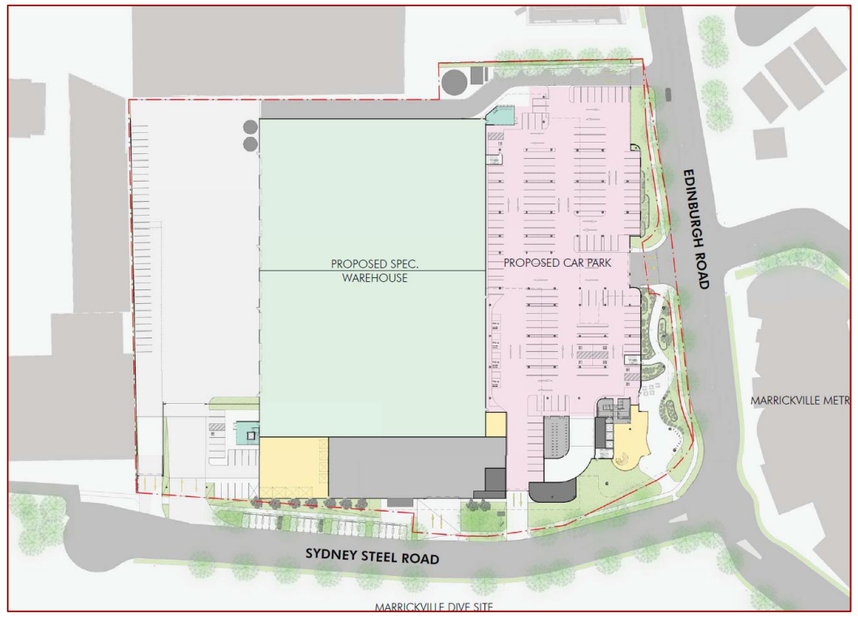

Figure 1.2 The Site: Location of proposed warehouse and CFC (*Source: Nettleton Tribe*)

1.2 THE SITE AND THE SURROUNDING CONTEXT

The Site is well positioned in terms of access to arterial and main roads, public transport modes of bus and rail, Sydney Airport and the retail centre of Marrickville. The Site is located on the northern periphery of the Sydenham Precinct which is part of the Sydenham to Bankstown Urban Renewal Corridor, earmarked for significant employment growth.

The Site also forms part of a large industrial precinct bounded by Edinburgh Road to the north, Railway Parade and the railway line to the east, Marrickville Road/the railway line to the south and Meeks Road/Farr Street/Shepherd Street to the west. The Industrial precinct includes:

- Large free-standing industrial buildings;
- Industrial estates including smaller individual warehouse buildings to the south and east;
- Manufacturing, freight and logistics uses and includes storage facilities, car smash repairs, warehousing and factories.

The Marrickville Metro Shopping Centre also lies to north of the Site. Residential uses are well separated from the Site to the south and east. The Site is also physically separated from residential dwellings to the north and north-west by Edinburgh Road.

1.3 PROJECT DESCRIPTION

The proposed works comprise the following:

- Demolition of the existing buildings, associated structures and landscaping;
- Construction of a two-storey warehouse comprising a speculative warehouse at level 1 (ground level) and Customer Fulfillment Centre (CFC) at level 2;
- Construction of associated offices across five levels to be used by Woolworths in conjunction with the warehouse and CFC;
- Two-storey car park adjacent to Edinburgh Road;
- Two-storey hardstand loading and delivery area adjacent Sydney Steel Road;
- Private vehicle access from two points on Edinburgh Road;
- Heavy vehicle / loading vehicle access from four points on Sydney Steel Road; and,
- Tree removal and landscaping works.

Use of the warehouse will be on a 24-hour, 7-day basis, consistent with surrounding operations.

1.4 LIMITATIONS

The analysis is based on the best available information at the time of assessment.

Actual performance of the building and its system will depend on its final design, implementation and operation.

2 ESD POLICY AND DRIVERS

Several sustainability frameworks exist at a global, federal, state and local level that have been used to provide the context for goals, objectives and targets for the ESD approach for the project.

2.1 GLOBAL

2.1.1 UNITED NATIONS SUSTAINABLE DEVELOPMENT GOALS

The United Nations prioritises 17 Sustainable Development Goals (SDGs) as part of a Sustainable Development Agenda with the purpose of transforming our world by ending poverty, protecting the planet and ensuring prosperity for all. Each goal has specific targets to be achieved by 2030 with six of these seventeen goals advocating for climate change and resource demand reduction initiatives. To achieve these goals, change is sought from governments, the private sector and civil society. The SDGs relevant to the proposed development include:

- Goal 7: Affordable and clean energy

  The project is implementing strategies to optimise its energy efficiency and reduce its greenhouse gas emissions through high performance façade, highly efficient services and potential for an on-site renewable energy source. Refer to Section 3.1.

- Goal 11: Sustainable cities and communities

  The project is promoting sustainable strategies in its design, construction and operation as outlined in Section 3. The development is situated in a previously developed land and aims to improve its ecological value by promoting native landscaping. It also has convenient access to amenities and alternative form of transport.

- Goal 12: Responsible consumption and production

  The project is implementing strategies to optimise its energy and water efficiency as per Sections 3.1 and 3.2. It also aims to re-use products and materials from the existing site where possible as well as procure products and materials with recycled content and/or sustainably certified as identified in Section 3.3.

- Goal 13: Climate action

  The project is implementing strategies to optimise its energy efficiency and reduce its greenhouse gas emissions as outlined in Section 3.1. Further design adaptations are also currently considered in Section 3.8 and will be developed further at the detailed design stage.

2.1.2 THE PARIS AGREEMENT

The Paris Agreement is an international agreement with a central aim to:

"Strengthen the global response to the threat of climate change by keeping global temperature rise this century well below 2 degrees Celsius above pre-industrial levels and to pursue other efforts to limit the temperature increase even further to 1.5 degrees Celsius." (United Nations, 2017)"

The Paris Agreement came into force on 9th November 2016.

2.2 FEDERAL

Australia became a signatory to the Paris Agreement on 22 April 2016. Ratification occurred thirty days after the date that parties making up an estimated 55% of the total global Greenhouse Gas (GHG) emissions chose to become signatories.

Under the Paris Agreement, Australia has committed to reducing emissions by 26-28% on 2005 levels by 2030. The Australian government aims to meet these commitments by 'Direct Action Policies' created with the objective of reducing emissions, increasing energy productivity and improving environmental health. These reduction targets have set the benchmark in which each state has developed their own climate positive strategies with an emphasis on either meeting or exceeding this target.

In response to this, the project is implementing strategies to optimise its energy efficiency and reduce its greenhouse gas emissions through high performance façade, highly efficient services and potential for an on-site renewable energy source.

2.2.1 NATIONAL CONSTRUCTION CODE 2019 SECTION J COMPLIANCE

To achieve the targets set out by the Paris Agreement in 2016, Section J Energy Efficiency of the NCC has recently been revised and officially released in May 2019 to improve the energy efficiency of new development. A package of measures for Volume One focusses on delivering ~ 35% reduction in energy consumption across commercial buildings. The focus shifts from energy-based metrics to a GHG emissions metric to provide a more holistic view of a building's environmental impact.

The 2019 updates to Section J also include Green Star and NABERS pathway options for demonstrating NCC compliance, to reflect the broad use of these rating tools and reduce the level of duplication of similar assessment processes across the industry. Section J Energy Efficiency is relevant to the Project and sets mandatory requirements for:

- The design of the building envelope and services, and provision of equipment and appliances to minimise energy use and GHG emissions;
- The design of the building envelope to maximise thermal comfort performance; and
- The provision of adequate facilities for energy monitoring.

Preliminary analysis against Section J compliance has been undertaken for the lobby and office areas which are areas understood to be conditioned and habitable. The analysis is provided in Section 3.1.

2.3 STATE

At a state level, the policy framework for considering sustainability outcomes for the proposed development includes the following:

- NSW Climate Change Policy Framework, which seeks to achieve net zero emissions by 2050 and for NSW to be more resilient to a changing climate;
- Smart Cities Plan call for us to become smarter investors in out cities' infrastructure through the coordination and driving of smarter city policy and smart technology to improve the sustainability of our cities and to drive innovation; and
- Future Transport strategy which sets the framework to working towards environmental sustainability, securing energy reliability and affordability, and managing a resilient transport system.

2.4 LOCAL

Inner West Council includes ecologically sustainable development principles as part of their decision-making processes and have policies and approaches currently in place that are applicable to the project. These include:

- Marrickville Local Environment Plan 2011 (Marrickville LEP 2011);
- Marrickville Development Control Plan 2011 (Marrickville DCP 2011); and
- Draft Inner West Local Environmental Plan 2020.

2.4.1 MARRICKVILLE LEP 2011

Aims of the Marrickville LEP 2011 applicable to this report are:

- To promote sustainable transport, reduce car use and increase use of public transport, walking and cycling;

  The project is conveniently located in close proximity to train stations and bus routes as well as various amenities reducing occupants' car use.

- To ensure development applies the principles of ecologically sustainable development as set-out in the DCP.

  The project is implementing initiatives as set out in Section 3 to deliver a highly sustainable development. These initiatives promote energy, water and resource efficiency, enhance site ecology and address climate change impacts.

2.4.2 MARRICKVILLE DCP 2011

The Marrickville DCP 2011 objectives and controls provide a framework for the application of ESD principles in the design, construction and operation of buildings across Marrickville. The applicable sections of the DCP for the proposed Woolworths Customer Fulfillment Centre are Part 2 – Generic Provisions and Part 6 – Industrial Development. These sections detail the specific areas that must be addressed by proposed industrial development to encourage a high standard of environmental design. Implementing these principles means that the development will be designed and constructed to comply with the following objectives:

- Encourage design that is sustainable and environmentally responsible and considers its social impact on environmental amenity – refer to Section 3 for project response;
- Improve the energy efficiency of buildings and reduce the amount of greenhouse gas emissions while improving the comfort levels to occupants – refer to Sections 3.1 and 3.4 for project response;
- Consider design for good environmental performance and amenity in conjunction with other design and amenity considerations within the local government area – refer to Sections 3.5, 3.6 and 3.7 for project response; and,
- Reduce the consumption of potable water through water efficient fittings and appliances, rainwater harvesting and wastewater reuse – refer to Section 3.2 for project response.

2.4.3 DRAFT INNER WEST LOCAL ENVIRONMENTAL PLAN

The applicable aims of the Draft Inner West Local Environmental Plan 2020 are similar to Marrickville LEP 2011 with the following updates and additions:

- To mitigate impact of climate change and adapt to its impacts;
- To protect, enhance and sustainably manage biodiversity, natural ecosystems, water resources, ecological processes and urban forest; and,
- To ensure that residents, visitors and workers have access to sustainable transport including walking and cycling, social and community infrastructure, services and public open space.

In response to the Draft Inner West Local Environmental Plan 2020, the current DCPs will also be updated to ensure consistency with the aims of the new LEP. However, the Marrickville LEP and DCP 2011 contains the current planning provision for the project.

Strategies outlined in Section 3 address the requirements of the Draft Inner West LEP.

3 ESD CONCEPT STRATEGY

The following section sets out the sustainability strategy for meeting the relevant requirement as outlined in the SEARS and Section 2. The strategies address the project's aim to demonstrate high standard of environmental design and efficient operation as well as consideration on reducing environmental impact during construction.

3.1 ENERGY AND GREENHOUSE GAS EMISSIONS

The reduction of GHG emissions in the built environment is a major focus at global, federal, state, and local levels to curb the impacts of climate change. Improving energy efficiency leads to a reduction in carbon emissions and reduces the consumption of finite resources.

The strategy for emissions reduction is to follow a "Lean, Clean, Green" approach, balancing immediate environmental and economic performance with long term deep-cut emissions potential. This approach has delivered opportunities to maximise development potential while minimising carbon footprint.

- **Lean** | Prioritising passive design, to mitigate the demand for resources through design of natural ventilation
- **Clean** | Selection of efficient equipment to deliver further improvements
- **Green** | Selection of green technology to reduce remaining carbon emissions

The following initiatives are proposed to ensure the Project reduces its carbon emissions as far as possible with on-site measures:

- For the conditioned areas, high performance façade: optimisation of window to wall ratio on NCC2019 compliance
- High efficiency heating, ventilation and air-conditioning (HVAC) systems
- High efficiency LED lighting (particularly relevant to the warehouse as lighting will be the main energy consumer)
- Roof mounted PV systems to offset grid energy and minimise peak energy demands
- Implement sustainable strategies during construction, including procurement of green power electricity, and construction and demolition waste recycling and recovery separation to minimise construction waste to landfill.
- Incorporation of commissioning, maintenance and building tuning into the project programme
- Incorporation of ongoing monitoring trends from energy metering.

3.1.1 FAÇADE CONFIGURATION

Window to wall ratios (WWR) in the lobby and the office spaces require a balance of improving façade efficiency and promoting daylight and views. A preliminary analysis has been undertaken using current design through the NCC 2019 façade calculator as a 'deemed to satisfy' approach to provide guidance on potential compliant glazing systems.

The following table indicates the glazing U-Values and SHGC requirements along with opaque fabric performance that can demonstrate compliance with NCC 2019 Part J1 for the proposed design.

Table 3.1 Lobby and Office indicative building fabric and glazing requirements

WINDOW TYPE	WWR	WALL R-VALUE[1]	GLAZING U-VALUE[2]	GLAZING SHGC
Lobby all orientations	>10% SW orientation >90% all others	1.00	≤4.00	≤0.75
Office all orientations	>10% SW orientation >90% all others	1.00	≤2.20	≤0.55

[1]The wall performance calculations should allow for the impact of thermal bridging and will need to be calculated as per the methodology presented in NZS 4214.

[2]Glazing and wall U-value requirements are interconnected and so performance can be traded between them up to a point. A higher performance in the glazing or wall U-value can result in a less stringent requirement in the other.

The glazing systems nominated in Table 3.1 represent a heavy laminate single glazing for the lobby and a high performance low-E treated double glazing system for the office. The current design also shows vertical fins on the office façade that contribute to the solar control shading scheme of the design and help to reduce air conditioning energy loads from excess solar gains.

A more detailed analysis will be undertaken at a later stage during the design to determine compliant building fabric and glazing parameters in line with the architectural intent.

3.1.2 PHOTOVOLTAIC SYSTEMS

PV systems will be integral in addressing the energy demands of the project with an onsite renewable energy source, particularly with its energy intensive nature from refrigeration requirements and automated equipment. PV panels can be installed on the roof of the warehouse, with suitable support framing to provide optimum North-facing tilt to maximise energy generation. There is currently 6,900m^2 available roof area with no overshadowing risk. The final installed capacity of PVs will depend on detailed calculations and coordination with the architectural intent.

3.1.3 ENERGY METERING AND MONITORING

Electrical sub metering is to be provided for significant end uses. This may include plant rooms, office floors and large areas that require high intensity lighting. Metering of energy consumption can assist considerably in ensuring that energy used in operation is measured and monitored so that it can be reduced. The meters should be connected to a central BMS or similar logging system, which will record the energy use and be capable of producing reports (hourly, daily, monthly and annual) to enable the effective monitoring of energy consumption.

3.2 WATER CONSUMPTION

Water scarcity is a major concern for Australia's growing population due to changing weather patterns that are occurring because of climate change. The water strategy for the building will be to first reduce consumption through maximised efficiency. The next step will be to include metering and monitoring to identify any leaks or unusual uses. The final step in the water strategy will be to supply non-potable uses with water from alternative sources such as rainwater.

The following objectives are proposed to demonstrate policy compliance and to address the SEARS and Marrickville DCP objectives.

To achieve water efficiency there will be a heavy emphasis on the efficiency of the water fixtures and fittings. Recommended WELs ratings are provided in Table 3.2.

Table 3.2 Recommended water fixture and fittings efficiencies

FIXTURE	WELS RATING AND FLOW/FLUSH RATE
Toilets	4 Star – 3/4.5L dual flush
Urinals	6 Star – 0.8 L/flush
Kitchen and bathroom taps	6 Star – 4.5L/min
Showers	4 Star – no more than 7.5L/min
Dishwashers	5 Star

- Commit to the installation of a rainwater tank, from which rainwater can be feasibly collected and plumbed to appropriate end uses such as toilets and urinal flushing, landscape irrigation and washdown.
  The development has a very large roof area with good potential to collect rainwater and simultaneously reduce stormwater flows requiring treatment. The strategy for rainwater reuse can be addressed through detailed design, however space for the tank will need to be allowed for and dual reticulation piping throughout the building should be included for applicable uses. The optimal tank size taking into consideration roof area, available rainfall and climate change scenarios will be determined in detailed design.

3.2.1 WATER METERING AND MONITORING

- Meters will be installed for all major water uses in the building, such as irrigation systems, toilets, and other major uses.
- Water meters should be connected to a central BMS, which will record the water use and will produce reports (hourly, daily, monthly and annual) to enable the effective monitoring of water consumption.

3.3 MATERIAL SELECTION

The targeted selection of materials with low environmental impacts can greatly contribute to sustainable outcomes and can also reduce total embodied carbon and improve indoor air quality for occupants.

The following initiatives are proposed for the Project.

- Encourage the re-use of products and materials, including from the existing site where practical, to reduce demolition and construction waste, repairing and recovering as necessary
- Use building materials, fittings and finishes that: have been recycled; are made from or incorporate recycled materials; and have been certified as sustainable or ‘environmentally friendly’ by a recognised third-party certification scheme

3.4 INDOOR ENVIRONMENT QUALITY

Occupant comfort and health is a growing focal point of ESD policies both locally and internationally. ESD initiatives that support the improvement of Indoor Environment Quality (IEQ) are often complementary to ESD initiatives in other areas including energy, water and materials.

The following initiatives are proposed:

- Localised lighting control
- Flicker free lighting that accurately addresses the perception of colour
- Optimized building layout to ensure greater access to daylight and high-quality external views
- Glare reduction from the installation of blinds or shading devices that can be controlled by the occupant
- Provide high rates of outdoor air to reduce the level of indoor pollutants
- Consider the use of natural or mixed mode natural ventilation where appropriate
- Use paints, sealants and floor coverings with low levels of volatile organic compounds (VOC) and wood products with low formaldehyde

3.5 BIODIVERSITY

Appropriate landscaping can improve urban ecology and enhance the users experience of a space. It has been evidenced to support better health and wellbeing outcomes for occupants and visitors.

The following landscape design elements are proposed:

- Use of native vegetation as opposed to exotic species in terraces and other applicable areas, which encourage native wildlife and have lower water requirements; and,
- The implementation of vegetation to reduce the causes and impacts of the urban heat island effect, including efforts to retain tree canopy where possible and landscaped roof area for the office.

3.6 TRANSPORT

Reducing individual car use and promoting alternative means of transport leads to minimising GHG emissions, reducing traffic congestion, improving air quality and encouraging active transport as a means of mobility. The location of the development is suitable for alternative forms of transport due to its proximity to a range of public transport services such as bus routes and rail.

The following initiatives will be investigated in more detail as the design develops for potential to support increased use of public transport and active modes of transport:

- The building benefits from its proximity to St Peters and Sydenham train station and bus routes;
- The building is conveniently located to various amenities, reducing the number of incidental vehicle trips required;
- The building will include electric vehicle charging stations for the office car park, charging facilities for outbound trucks from the warehouse and anticipated organisational transition to an EV / PHEV fleet.
- The building will provide active transport facilities such as bicycle storage, showers and lockers.

3.7 GREEN ROOFS, GREEN WALLS AND/OR COOL ROOFS

As part of the project’s SEARS, consideration of green roofs, green walls and/or cool roofs are required. The following information provides a brief description of these initiatives and their benefits and drawbacks. Further consideration of these initiatives and their applicability to the development will be investigated in more detail at a later stage of the design development.

3.7.1 GREEN WALLS/ROOFS

Green walls and green roofs in a development is the integration of landscaping onto walls and roofs to offer a diverse range of spatial and microclimatic opportunities with consideration to the risks associated with water features. They can provide thermal and noise insulation benefits, promote local biodiversity, mitigate heat island impacts and provide additional aesthetics to a development. Green roofs can also assist in prolonging a development’s roof lifespan and assist other on-site sustainable initiatives by minimising surface run-off and optimising rainwater collection and providing a cooler environment for solar panels to operate which improves their efficiency.

The main disadvantages of green walls and green roofs are the higher capital cost in construction and the recurring resource demand for maintenance. Green roofs are also heavier than a traditional roof therefore for this initiative to be implemented, structural consideration is required early in the design process to account for the additional weight. Green roofs are best suited to a flat roof design, and for this project with extensive pitched roof area, suitability will be reviewed further at the detailed design stage.

3.7.2 COOL ROOFS

Cool roofs incorporate roofing materials which are capable of reflecting more solar energy than absorbing it. These roofing systems generally come in lighter colours although available technology, such as heat reflective coating, allows for some increased solar reflectivity through the use of additives in darker coloured roofing materials.

Rooftop installed PV panels also contribute to a cool roof design, by providing additional shading while offsetting building energy demand.

There are many benefits to utilising cool roof systems:

- reducing the size of air-conditioning systems through better control of solar thermal loads;
- improving occupant comfort;
- promoting a cooler rooftop microclimate to improve performance of rooftop HVAC plant; and
- greatly reduced maintenance demand when compared to green roofs.

The project will explore the potential incorporation of cool roof and how this will impact its surrounding environment at the detailed design stage.

3.8 CLIMATE CHANGE

The impacts of climate change are starting to be seen and would become more extreme throughout the life of the development. Design adaptations are to be embedded to improve the resilience of the development to climate change including initiatives such as:

- Low carbon building design, including future proofing strategies for replacement of plant and equipment with technologies that may become more efficient in future
- Building design that is resilient to future changes in temperatures
- Reducing the urban heat island effect of the building
- Reduced use of resources and materials in the design of the building
- Reduced consumption of potable water
- Diversion of operational waste from landfill to more productive uses and reuse, maximising resource recovery and reducing landfill-associated greenhouse gas emissions.

4 MITIGATION MEASURES

This section of the report summarises any identified risks associated with the sustainability strategies proposed for the development, and potential mitigation measures that can be adopted. Sustainability initiatives should be determined early in the design phase and appropriately integrated into the project to ensure they are successfully implemented.

Table 4.1 Summary of the ESD Concept Strategies and further actions

SUSTAINABILITY STRATEGY / INITIATIVE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT / RISK
Façade configuration	Glazing and building fabric thermal compliance may impact design intent.	Performance analysis to seek optimal window to wall ratio, glazing system selection and potential shading devices.	Performance glazing and potential shading devices may impact project budget.
Solar Photovoltaic On Site Renewables	Capital cost of installing PV systems; structural and spatial requirements.	Coordination with design team to ensure sufficient spatial allocation of appropriate PV capacity. Cost/benefit analysis to determine expected payoff and time value of installed capacity to the business	Actual project payoff for PV may vary from that predicted due to operational factors. Changes in grid energy retail costs may alter the economics of the installation.
Energy metering and monitoring	Lack of meter allocation to significant end uses.	Specify the exact requirement for metering and monitoring in design documents.	Understanding of the monitoring systems.
Water consumption	Capital cost of installing a rainwater capture and reticulation system and spatial requirement.	Water balance and feasibility analysis to determine optimal rainwater capture capacity and ensuring appropriate spatial allocation.	Altered rainfall patterns, particularly where reduced, may result in different future potable water savings to those projected.
Water metering and monitoring	Lack of meter allocation to significant end uses.	Specify the exact requirement for metering and monitoring in design documents.	Lack of operational procedures for monitoring and taking rectifying action may limit the benefit of metering and monitoring design.

SUSTAINABILITY STRATEGY / INITIATIVE	POTENTIAL IMPACT	APPROACH	RESIDUAL IMPACT / RISK
Material selection	Contamination of existing materials. Methodology of procuring materials and products that are sustainably certified or environmentally friendly.	Undertake a site survey of the existing development to identify if hazardous materials are present and should be disposed appropriately. Specify the requirements for material and product procurement in design documents.	Resource demand in ensuring products procured are sustainably certified or environmentally friendly.
Indoor environment quality	IEQ initiatives inappropriate or impractical for building purpose and space uses.	Analyse the different area functions within the development and determine the most appropriate IEQ initiatives to be implemented.	Potential change in the function of areas within the development could render IEQ initiatives ineffective.
Biodiversity	Spatial allowance for landscaping optimisation.	Coordinate with the project team to determine how the project can maximise its ecological potential.	Continual resource demand for landscaping maintenance.
Transport	Additional cost of providing electric vehicle infrastructure. Appropriate spatial allowance for active transport facilities.	Understand the immediate and future need for electric vehicle infrastructure and active transport facilities and design appropriately.	Slower than forecast uptake in electric vehicles. Justify the need for active transport facilities if occupants choose to use public transport or private vehicles.
Green roofs, green walls and/or cool roofs	High capital cost in construction and recurring resource demand for maintenance of green roofs and green walls. Potential glare issues from implementing highly visually reflective cool roof systems.	Feasibility study of the implementation of green roofs, green walls and/or cool roofs at the detailed design stage. Coordination of design initiatives with visual requirements including airport flight path safety criteria	Continual resource demand for green walls and/or green roofs.
Climate Change	Cost of implementing climate change adaptation measures.	Identify potential climate change hazards early in design and incorporate design responses in the design.	Continuous identification of adaptation measures to ensure the development is prepared for climate change impacts.

5 CONCLUSION

This ESD Report has set out how the proposed development at 74 Edinburgh Road, Marrickville has considered sustainable design strategies from the outset of the project.

This has been achieved through the holistic approach to sustainable design detailed in this report, with a strong focus on energy efficiency, low carbon design strategies and reduced water consumption.

The proposed design targets have high ESD standards in accordance with the Secretary's Environmental Assessment Requirements (SEARS), Marrickville Development Control Plan (DCP) 2011 and other policies influencing the development in the suburb of Marrickville.

No specific performance targets and/or official sustainable certification have been identified as further analysis will be undertaken to ensure the appropriateness of these strategies to the development at detailed design stage.