42 RAYMOND AVENUE, MATRAVILLE

Sustainability Management Plan

Prepared for:

Hale Capital Partners
Level 13, 333 George Street
Sydney NSW 2000

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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd (SLR) with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with Hale Capital Partners (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR.

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30618-R01-v3.1	4 July 2022	Dr Neihad Al-Khalidy	Lucas Wilson	Dr Neihad Al-Khalidy
610.30618-R01-v3.0	3 June 2022	Dr Neihad Al-Khalidy	Lucas Wilson	Dr Neihad Al-Khalidy
610.30618-R01-v2.0	9 March 2022	Dr Neihad Al-Khalidy	Lucas Wilson	Dr Neihad Al-Khalidy
610.30618-R01-v1.0	21 December 2021	Dr Neihad Al-Khalidy	Lucas Wilson	Dr Neihad Al-Khalidy

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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Hale Capital Partners to prepare a Sustainability Management Plan (SMP) for the proposed warehouse and distribution facilities at 42 Raymond Avenue, Matraville.

The SMP has been undertaken in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development.

1.1 Objectives of the Study

The principal objective of this Sustainability Management Plan is to identify potential energy savings that may be implemented into the design and during the operational phase of the Project, including a description of likely energy consumption levels and options for alternative energy sources such as solar power in accordance with SEARs requirements.

The specific objectives of this plan are as follows:

- To encourage energy use minimisation through the implementation of energy efficiency measures;
- To promote improved environmental outcomes through energy management;
- To ensure the appropriate management of high energy consumption aspects of the Project;
- To identify energy savings procedures for overall cost reduction, greenhouse gas emission reduction and effective energy management;
- To assist in ensuring that any environmental impacts during the operational life of the development comply with relevant regulatory authorities; and
- To ensure the long-term sustainability of resource use through more efficient and cost-effective energy use practices for the life of the development.

2 SUSTAINABILITY MANAGEMENT GUIDELINES AND LEGISLATION

2.1 Building Code of Australia

The Building Code of Australia (BCA) is produced and maintained by the Australian Building Codes Board (ABCB) on behalf of the Australian Government with the aim of achieving nationally consistent, minimum necessary standards of relevant health and safety, amenity and sustainability objectives efficiently. The BCA contains mandatory technical provisions for the design and construction of BCA class buildings.

Volume 1, Section J of the BCA outlines energy efficiency provisions required for BCA class buildings (including Class 7b Warehouses and Class 5 Offices). There are 8 Deemed-to-Satisfy subsections, J1 to J8, that focus on separate aspects of energy efficiency as follows:

- J1 - Building Fabric (i.e. the ability of the roof, walls and floor to resist heat transfer)
- J2 - External Glazing (i.e. the resistance to heat flow and solar radiation of the glazing)
- J3 - Building Sealing (i.e. how well parts of a building are sealed to ensure comfortable indoor environments are efficiently maintained)
- J4 - Air Movement (i.e. the provision of air movement for free cooling, in terms of opening and breeze paths)
- J5 - Air Conditioning and Ventilation Systems (i.e. the efficiency and energy saving features of heating, ventilation and air-conditioning systems)
- J6 - Artificial Lighting and Power (i.e. power allowances for lighting and electric power saving features)
- J7 - Hot Water Supply (i.e. the efficiency and energy saving features of hot water supply)
- J8 - Access for Maintenance (i.e. access to certain energy efficiency equipment for maintenance purposes)

2.2 Sustainability Management Plan Requirements

The sustainability management plan for the project Site, is prepared in accordance with the following SEARs requirement:

8. Ecologically Sustainable Development (ESD)

- Identify how ESD principles (as defined in clause 7(4) of Schedule 2 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.
- Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.
- Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.

The principles of ecologically sustainable development as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 are as follows:

- The precautionary principle, namely, that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation. In the application of the precautionary principle, public and private decisions should be guided by
    - careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and
    - an assessment of the risk-weighted consequences of various options,
- inter-generational equity, namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations,
- conservation of biological diversity and ecological integrity, namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration,
- improved valuation, pricing and incentive mechanisms, namely, that environmental factors should be included in the valuation of assets and services, such as—
- polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement,
    - 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.

3 DESCRIPTION OF THE PROJECT

The Development Site will comprise the construction of a two-storey warehouse and distribution centre comprising 19,460 m^2 GFA including ancillary office space, landscaping, bicycle and car parking.

The proposal comprises the redevelopment of the site as summarised below:

- Construction, fit out and operation of a two-storey warehouse and distribution centre comprising approximately 19,460 m^2 GFA including: 17,789 m^2 of warehouse and distribution GFA; and 1,671 m^2 GFA ancillary office space.
- Provision of 11 bicycle parking spaces and 101 car parking spaces at ground.
- Approximately 2,395 m^2 of hard and soft landscaping at ground.
- Provision of one additional access crossover from Raymond Avenue.
- Provision of internal vehicle access route and loading docks.
- Upgrades to existing on-site infrastructure.
- Building identification signage.
- Operation 24 hours per day seven days per week.

The site is legally described as Lot 1 in Deposited Plan 369888, Lot 32 Sec B Deposited Plan 8313, Lot 1 Deposited Plan 511092 and Lot 2 in Deposited Plan 1082623. The site is located near Sydney's port, Sydney airport, and major arterial road networks. The project site is shown in **Figure 1**.

The current study covers the sustainability management plan and greenhouse gas reduction for the proposed warehouse and distribution centres.

Figure 1 Aerial Photo of the Project Site

3.1 Overview of Proposed Development

This site will be comprised of 4 industrial warehouses and office tenancies, including car parking spaces and hardstand.

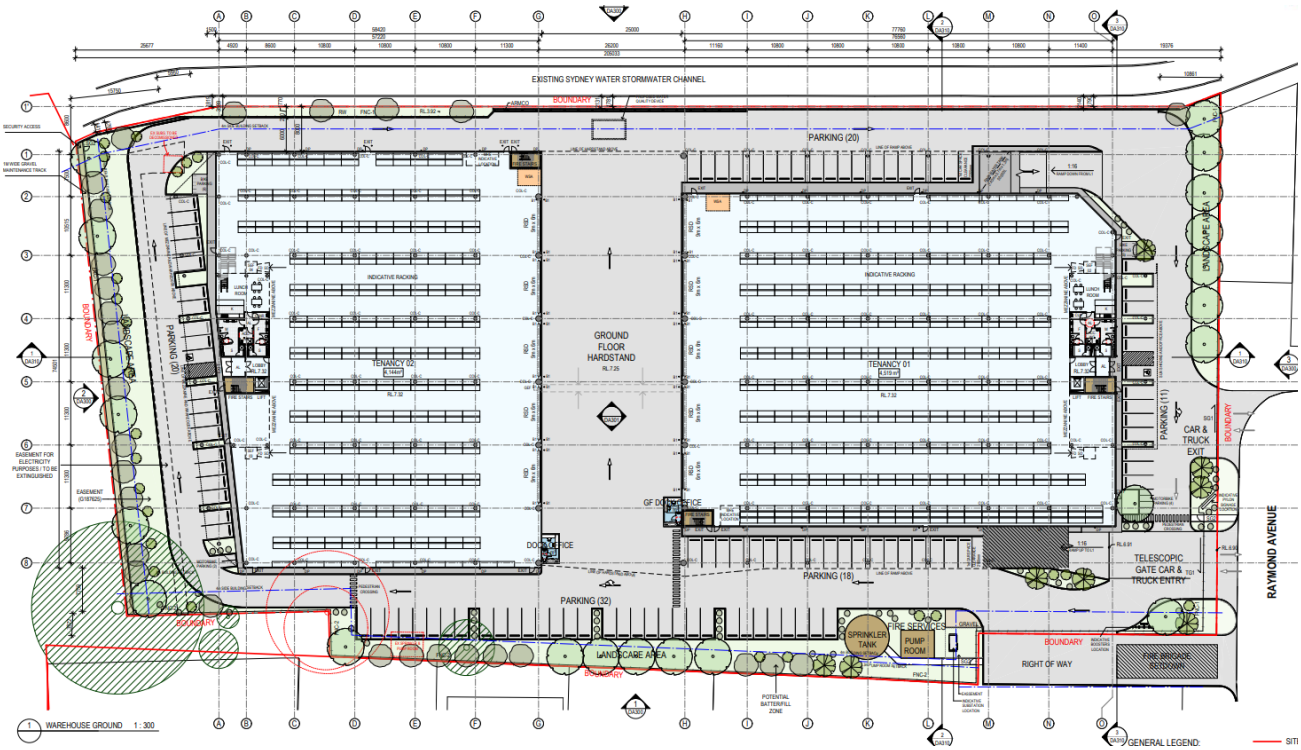
The building comprises 19,460 m^2. Overall building areas are outlined in **Table 1**.

Table 1 Proposed Industrial Development – 42 Raymond Avenue, Matraville

Site Summary	GFA Area
Tenancy 1	
Warehouse	4,519 m^2
Office	416 m^2
Tenancy 2	
Warehouse	4,144 m^2
Office	421 m^2
Tenancy 3	
Warehouse	4,522 m^2
Office	416 m^2
Tenancy 4	
Warehouse	4,448 m^2
Office	418 m^2
Lobby	96 m^2
Ground Floor and Level 1 Dock Offices	60 m^2
Landscaped Area	2,395 m^2
Car Parking	101
Motorcycles Parking	6
Bicycle Parking	11

Further details of the proposed industrial development are shown in **Figures 2 - 7.**

Figure 2 Ground Floor Plan



B: Ground Floor – Mezzanine Level

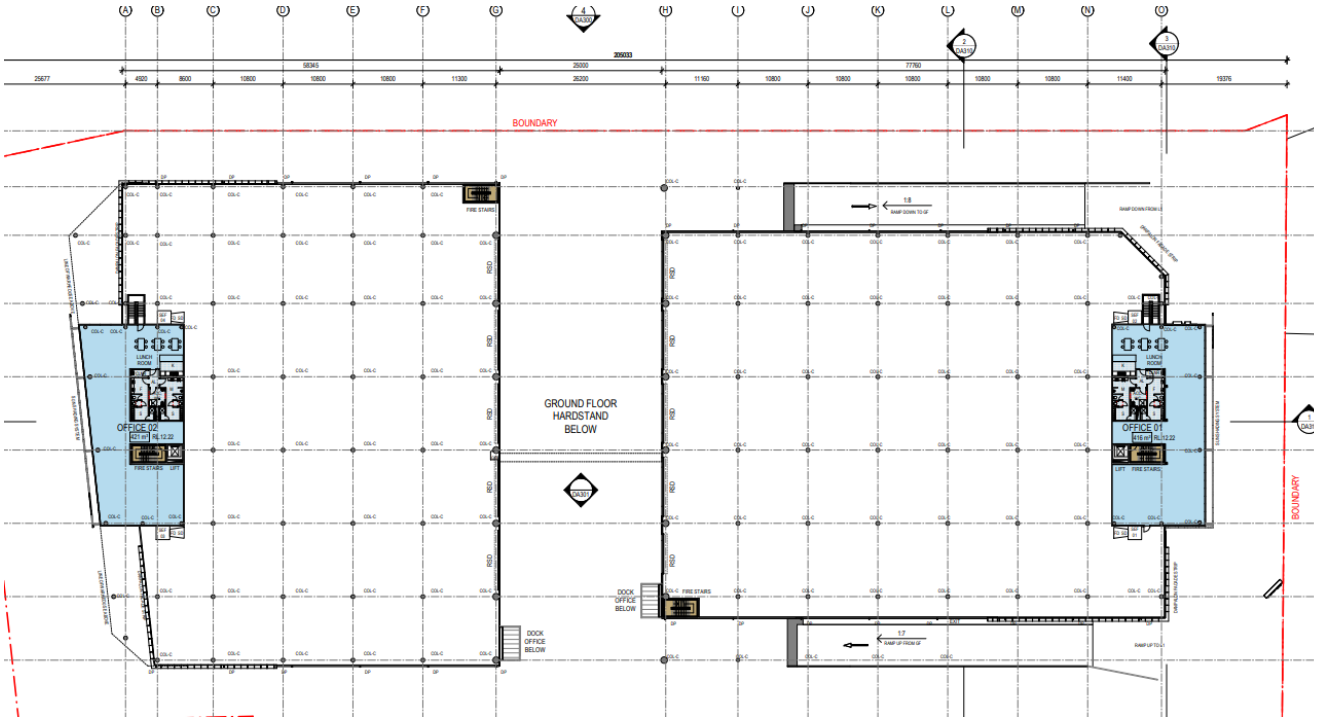
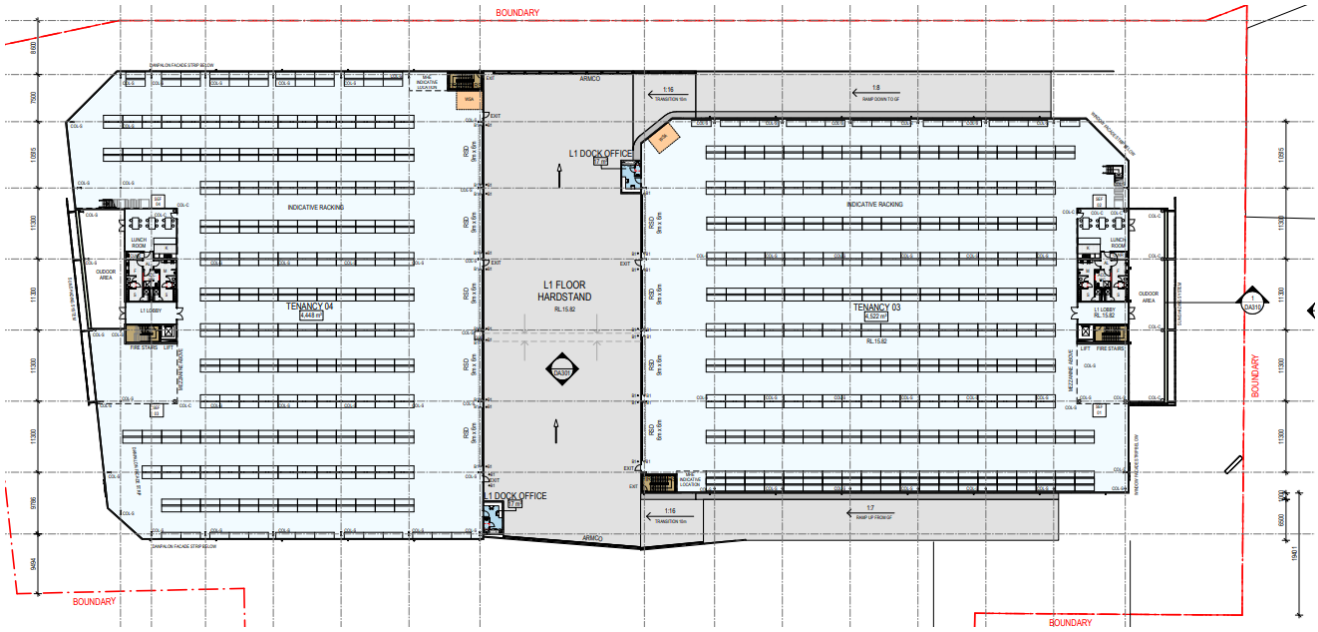
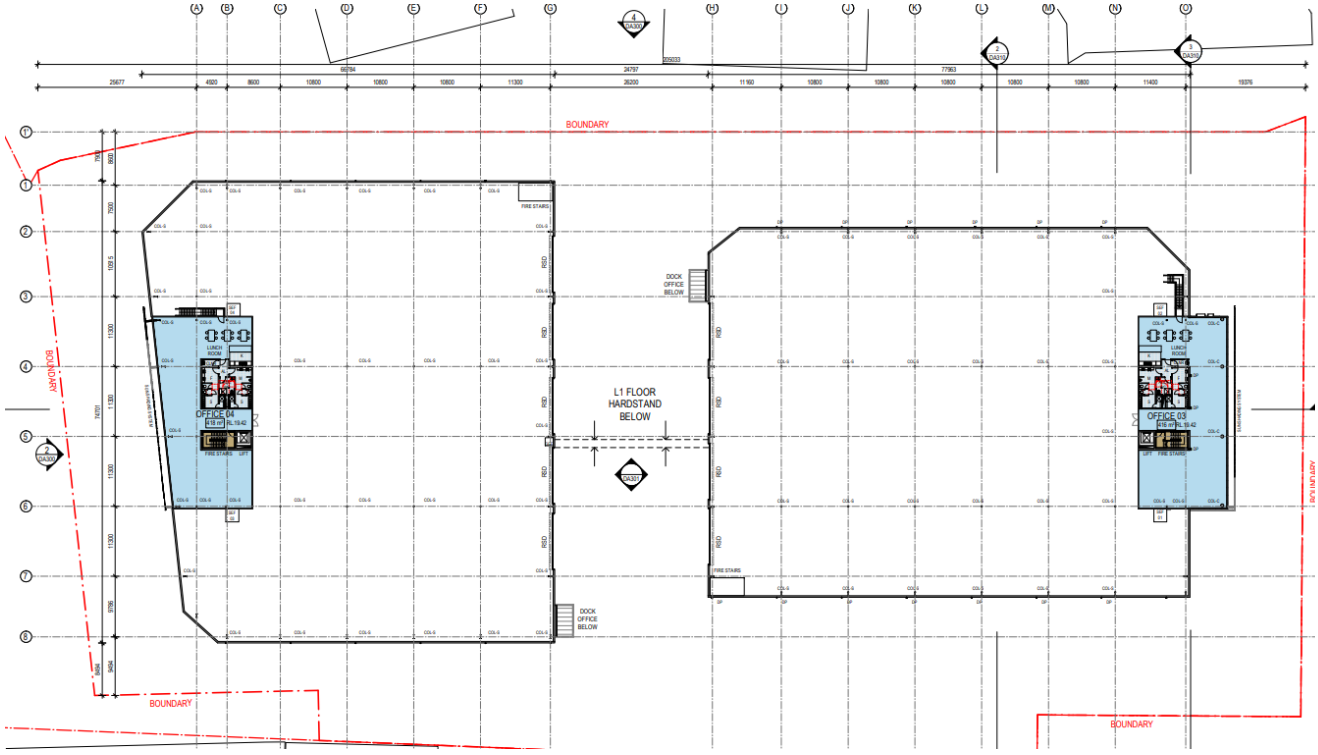


Figure 3 Level 1 Plan



A: Level 1 Floor



B: Level 1 – Mezzanine Level

Figure 4 Office 01 Floor Plans

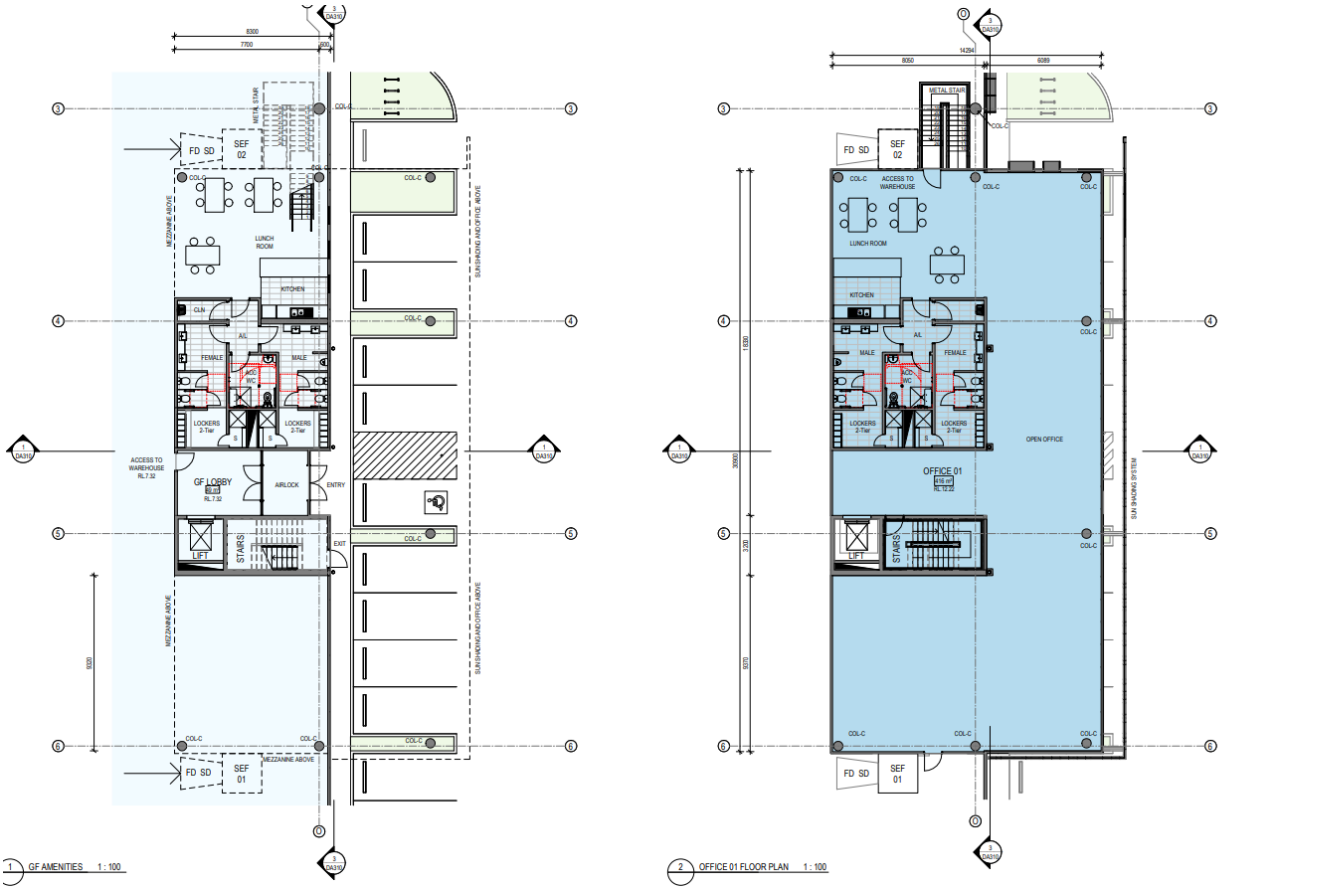


Figure 5 Office 2 Floor Plan

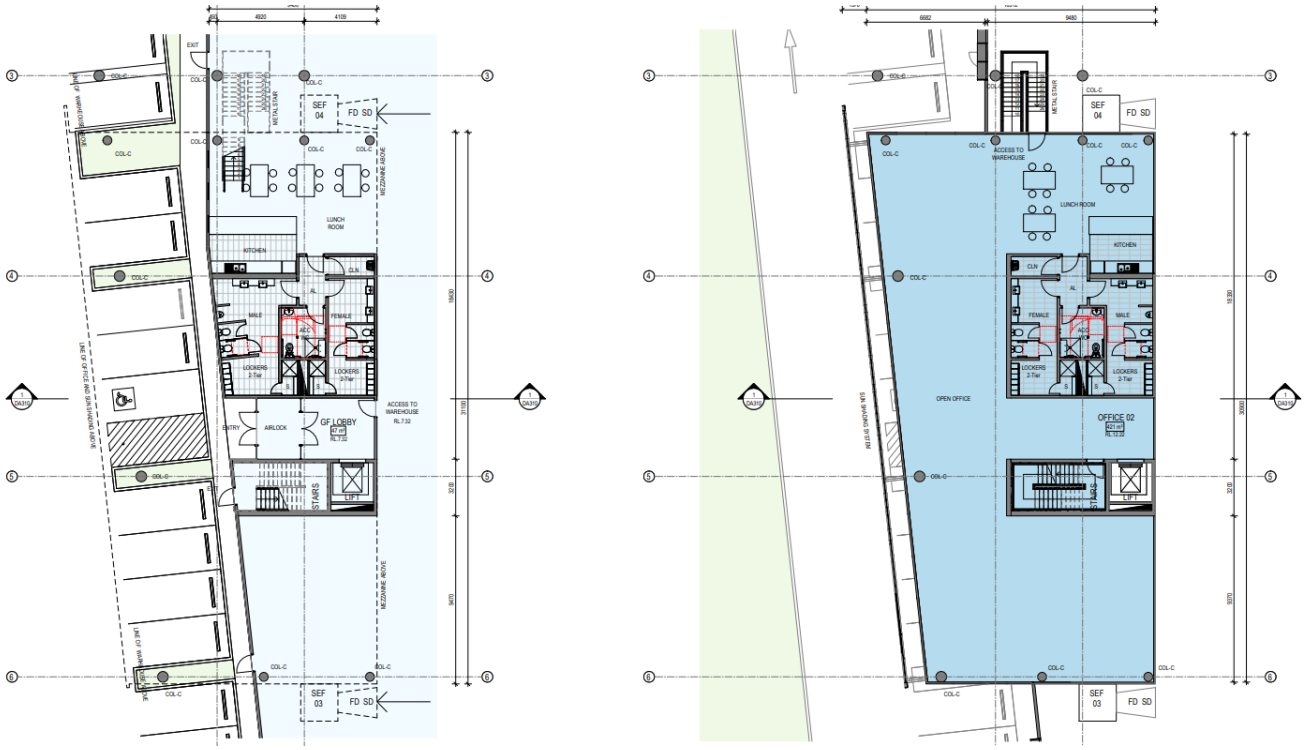


Figure 6 Office 3 Floor Plan

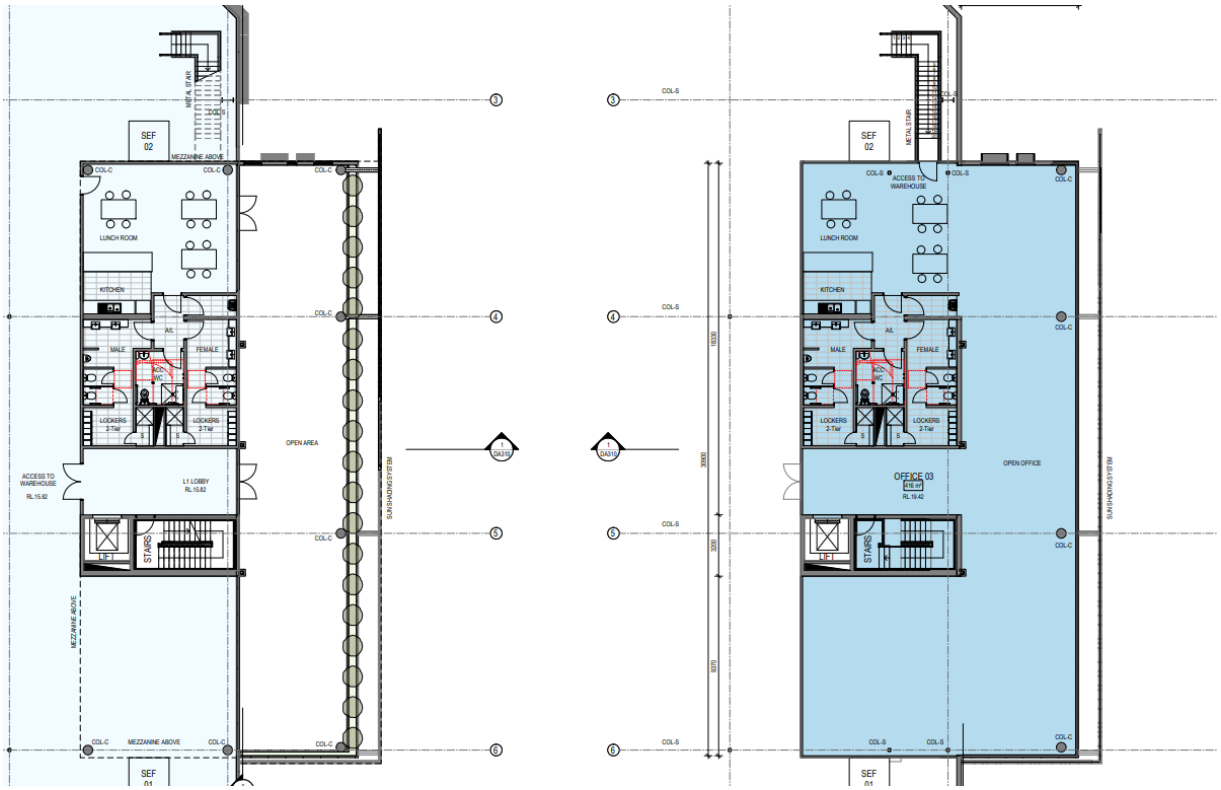
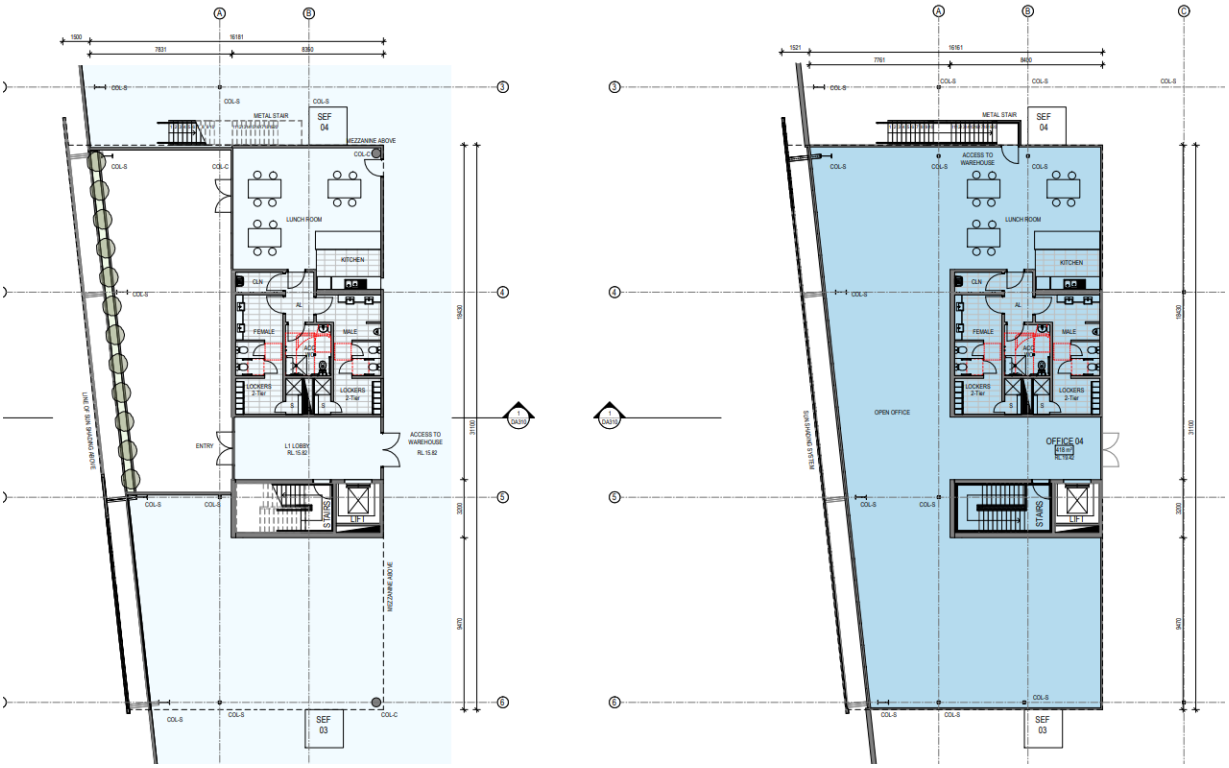


Figure 7 Office 4 Floor Plan



4 OPERATIONAL ENERGY MANAGEMENT

Ineffective energy management for industrial and commercial premises can lead to unnecessary growth in greenhouse gas emissions and consumption of natural resources. Effective energy management reduces costs using energy efficiency measures and improves environmental outcomes locally, regionally and globally.

Effective energy management is achieved through the implementation of a Sustainability Management Plan (SMP) for the operational life of the Project.

4.1 Identified Major Energy Use Components

The major energy use components of the Project Site have been identified below based on information available within the Project Design Brief.

- Lighting (include natural and artificial lighting and shading);
- Air Conditioning; AND
- Power.

4.2 Energy Sources

The main source of energy for the proposed site is electricity.

5 SUSTAINABILITY MEASURES INITIATIVES

5.1 Documentation

The documentations used in this report is listed in **Table 2**.

Table 2 Project Documentation Sources

Document Type	Document Number	Issue Date
Architectural Drawing	DA000, DA010-DA014, DA100-DA104 DA200-203, DA 300, DA301, DA401	30/06/2022
Completed Energy Efficiency Questionnaire	Emails	15/11/2021

The following section details how ESD principial as demined in clause 7 (4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 are being incorporated in the design, construction and operation phases of the project.

ESD principals have been implemented or recommended and approved for project implementation and have informed the sustainability assessment of this project – they are listed in **Table 3**.

Table 3 ESD Assessment Summary

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
Design & Management	• Documentation of design intent and expected outcomes. • Appropriate commissioning.	• Communicate sustainability initiatives and operation to building users. • Commissioning and building tuning required by contractors and reviewed for 12 months after completion.	• Provision of Building Users Guide. • Assess building tuning opportunities and associated costs. • Independent commissioning agent to be considered to perform regular tuning of fire, mechanical, electrical and hydraulic services.	✓ ✓ ✓	• SLR recommends the preparation of Building User Guide that enables building users to optimise the building's environmental performance. • A sub-contractor will be engaged to maintain the facility in accordance with the operations and maintenance manuals during the 12-month defects liability period.
Façade Performance	• Optimised façade performance.	• Achieve minimum performance requirements under NCC Section J1 and J2. • Reduce heat gain through the warehouse façade.	• Meet or exceed NCC Section J1 and J2 façade performance for conditioned spaces. • Light coloured roofing and appropriate insulation to reduce solar heat gain into the warehouse. • Daylight: evenly spaced translucent roof sheeting to warehouses areas. • Performance glazing in office spaces appropriate to the window size and orientation.	✓ ✓ ✓ ✓	• The project is committed to meeting or exceeding the NCC Section J requirements. • Light colour roof sheeting is proposed. • Refer Architectural drawings • As per project NCC Section J requirements.

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
Social Sustainability	• Consider design with due regard to occupant satisfaction in accessibility, usability, Indoor air quality and public space utility.	• High level of occupant satisfaction. • Provide external as well as internal comfort.	• Flexibility of space for potential future configurations. • Use of Low VOC paints, carpets and sealants. • Consider Landscaping and dense planting. • Consider occupant user control eg A/C systems, glare reducing strategies, lighting etc.	✓ ✓ ✓ ✓	• The design will incorporate open plan workspaces, offices, client rooms, meeting rooms, lunchroom and outdoor seating area • Low VOC paints, carpet and sealant will be used • Refer proposed landscaping - Architectural Drawings • Selection of endemic and low maintenance landscaping species • Both AC and lighting control is provided to offices and warehouses.
Minimising Transport Impact	• Consider location with links to public transport and employee services. • Consider location to reduce operational transport. • Consider the impact of industrial trucks on local traffic.	• Reward drivers of fuel-efficient vehicles by providing spaces for small cars and or motorbikes. • Provide alternatives to single-occupancy vehicles. • Reduce operational fuel consumption through close proximity to major arterial roads. • Reduce the impact of operational traffic on local communities.	• Consider providing parking spaces for electrical vehicles. • The site is located within close proximity (<5km) to M1. • All heavy vehicles will access the site to the south via Botany Road and McCauley Street, minimising the impact on surrounding residential properties to the east approximatively 150m.	✓ ✓	• Future EV charging points will be accommodated for 5% of the total car spaces • 6 motorcycles and 11 bicycle parking spaces are provided. Refer Architectural Drawings • Car Park numbers and provision for disabled parking are provided be in accordance with Consent Authority requirements.

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
Optimising IEQ	• Optimise natural light to work environment. • Optimise fresh air ventilation. • Consider Thermal Comfort of occupants. • Consideration of noise transference in space planning. • Minimise use of materials that emit volatile organic compounds. • Create a pleasant working environment.	• Daylight: Daylight Factor (DF) of at least 2% at finished floor level under a uniform sky for at least 60% of the GLA. • Thermal comfort: 95% of office areas have PMV levels between -1 and +1 for 98% of the year; Warehouse spaces include passive thermal comfort strategies. • Finishes: 95% of all paints, adhesives & sealants and all carpet and flooring to be low-VOC finishes; use low-formaldehyde wood products. • Electric lighting levels: 95% of GLA has a lighting system that is flicker free and has a maintained illuminance of no more than 25% above those recommended in AS1680.2.4, 2.1 and 0.1. • Reduce visual glare.	• Daylight: rationalised glazing to offices; high performance glass. • Daylight: evenly spaced translucent roof sheeting to warehouse areas where possible. • Thermal comfort: Office envelope and HVAC system designed to meet thermal comfort requirements; • Provide sufficient roof and wall insulation to the air-conditioned spaces; • Finishes: Specify and track correct finishes and wood products. • Provide pleasant indoor and outdoor breakout spaces with sufficient daylight and plants. • Lighting: Good light fixtures and well-designed layout. • Ventilation: Consider increased fan and duct sizing. • Provide sufficient shading and blinds with rationalised glazing for visual and thermal comfort.	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	• High performance glazing to all air-conditioned areas to satisfy Section J requirements • Shown on the Architectural Drawings • Acoustic measures will be installed as required to maintain acceptable levels • Refer Section 5.5 of this report for proposed set up temperatures • Insulation as per the NCC requirements • The design incorporates open plan workplaces and 2,250 m^2 of landscaping at ground. Refer Architectural Drawings • Refer LED lighting and lighting controls to warehouse and offices. • Adequate ventilation will be supplied in accordance with AS1668. • Shown on the Architectural Drawings

Minimising Energy Use	• Consider passive design to minimise energy use such as orientation, ventilation, shading and floor plate design. • Appropriate sizing of plant and equipment in heating and cooling, lighting, control systems, • Building management systems and renewable energy sources. • Reduce reliance on connection to grid electricity and gas.	• Target a 20% reduction in Greenhouse gas emissions. • Energy sub-metering for all major uses greater than 100kVa; linked to monitoring system. • High efficiency warehouse lighting and controls. • Reduce energy for water heating. • Integrated building management. • Consider renewable energy generation for a portion of energy consumption and/or consider future-proofing the building for future installation. • Reduce urban heat island effect and heat load through the roof by providing a highly reflective roof. • Reduce office equipment load from 20W/m² to 15W/m². • Optimise insulation for energy and thermal comfort.	• Roof Insulation, External Wall Insulations, Reduced Glazing area and associated heat loss in winter. • Consider office air conditioning temperature set-points for an increased comfort band. • Provide energy efficient T5 lighting, with zoning and automatic controls where reasonable. • Consider LED lighting strategies and advanced controls. • Consider a solar hot water system or a heat pump. • Sub-metering: install appropriate metering; develop metering and tracking strategy to allow for self-assessment, problem solving and ongoing improvements during operations • Use roofing material that has a light colour • Insulation to be considered and installed as required.	✓ ✓ ✓ ✓ ✓ ✓ ✓	• Insulation as per the NCC requirements. • Design brief sets the temperature - Refer Section 5.5 of this report. • LED lighting to warehouse and offices. • Lighting controls to warehouse and offices. • Sub meters for major energy/water . • Colourbond roof sheeting is proposed. • As per project NCC Section J requirements.

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
Choosing Materials	• With consideration to energy inputs in manufacture. • Toxicity. • Consequential impacts – rain forest timbers. • Regional or local manufacturer employment support.	• Reduce steel and cement in internal slab (10% reduction in embodied energy). • Consider 95% of timber to be AFS or FSC certified. • Reduce environmental impact of materials	• Structural detailed design to investigate ability to reduce the use of raw materials. • Use pre-cast concrete panels with recycled content. • Use certified timber • Recycle / reuse materials where possible	✓ ✓	To minimise the environmental impacts of materials used by encouraging the use of materials with a favourable lifecycle assessment based on the following factors: • Fate of material • Recycling / re-use • Embodied energy • Biodiversity • Human health • Environmental toxicity • Environmental responsibility.

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
Minimising Waste	• By clever design. • Contracted to builder as a requirement on site for construction waste. • During the life of the building. • And in dealing with building end of life options.	• Reduce construction waste going to landfill by 90%. • Reduce operational waste going to landfill.	• Contractor is to develop and implement a Waste Management Plan and track all waste going offsite to show that 90% of all construction waste is re-used or recycled. • Waste storage and recycling facilities to be provided for different operational recycling streams such as paper, glass, plastics, metals, food waste etc. • Tenants should be encouraged to implement operational waste management plans.	✓ ✓	• SLR estimates more than 70% of the predicted construction waste arising from development can be re-used (on-site or at another development) or recycled off-site. Refer project Waste Management Plan. • The following waste avoidance measures are recommended in the Waste Management Plan for the Project: - Provision of take back services to clients to reduce waste further along the supply chain.
Water Conservation and Reuse	• Monitoring of meters to track use. • Timely maintenance of fixtures and fittings. • Water sensitive landscape design. • Source potable water alternatives such as rain water harvesting, grey and black water treatment.	• Reduce potable water in internal fixtures. • Reduce potable water for irrigation. • Water efficient operation of appliances. • Utilise rainwater and/or recycled water.	• Water efficient sanitary taps and toilets. • Water efficient and drought tolerant landscaping. • Water and energy efficient dishwasher. • Rainwater collection for toilets, irrigation and truck wash down.	✓ ✓ ✓ ✓	• Low flow fixtures and fitting including taps and shower heads • Selection of endemic and low maintenance landscaping species • Installation of water efficient appliances including dishwashers • Rainwater tanks will be included for rainwater harvesting and re-use for landscape irrigation and flushing of toilets.

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
Land Use and Ecology Impact	• Consider local biodiversity impacts of flora and fauna. • Look to specialist advice on land in development.	• Encourage biodiversity. • Reduce light pollution from the site. • Consider reducing impact of stormwater flows off the site into the natural watercourses adjacent to the site.	• Install indigenous planting appropriate to the area. • Design external lighting to avoid emitting light into the night sky or beyond the site boundary. • Consider integrated stormwater management to minimise the impact on receiving waters of flow volumes and pollution content, eg bioswales, bio retention, OSD tanks and treatment. • Consider permeable concrete/paving for staff parking areas and footpaths, etc.	✓ ✓ ✓ ✓	• Selection of endemic and low maintenance landscaping species • LED lights have been proposed for all external lights to avoid emitting light • The warehouse sustainability objectives include: • Reduce the impact of stormwater runoff and improve quality of stormwater runoff • Achieve best practice stormwater quality outcomes • Incorporate water sensitive urban design principles.

5.2 Baseline and Proposed Energy Consumption

An NCC Sections J Deem-to-Satisfy compliant building is used as the baseline building for energy consumption savings. NCC Section J provides the minimum requirement for energy efficiency, and it is predicted that the proposed development will operate efficiently via:

- All luminaire shall be low energy LED type;
- Warehouse lighting is generally to be zonally controlled via motion sensor;
- Office lighting shall be controlled via dual technology infrared/ultrasonic sensor;
- Daylight harvesting function to office with external windows;
- Low-E Glazing;
- Efficient air conditioning system; and
- Rooftop Solar PV System.

All building information and associated parameters are listed in the following sections of this report.

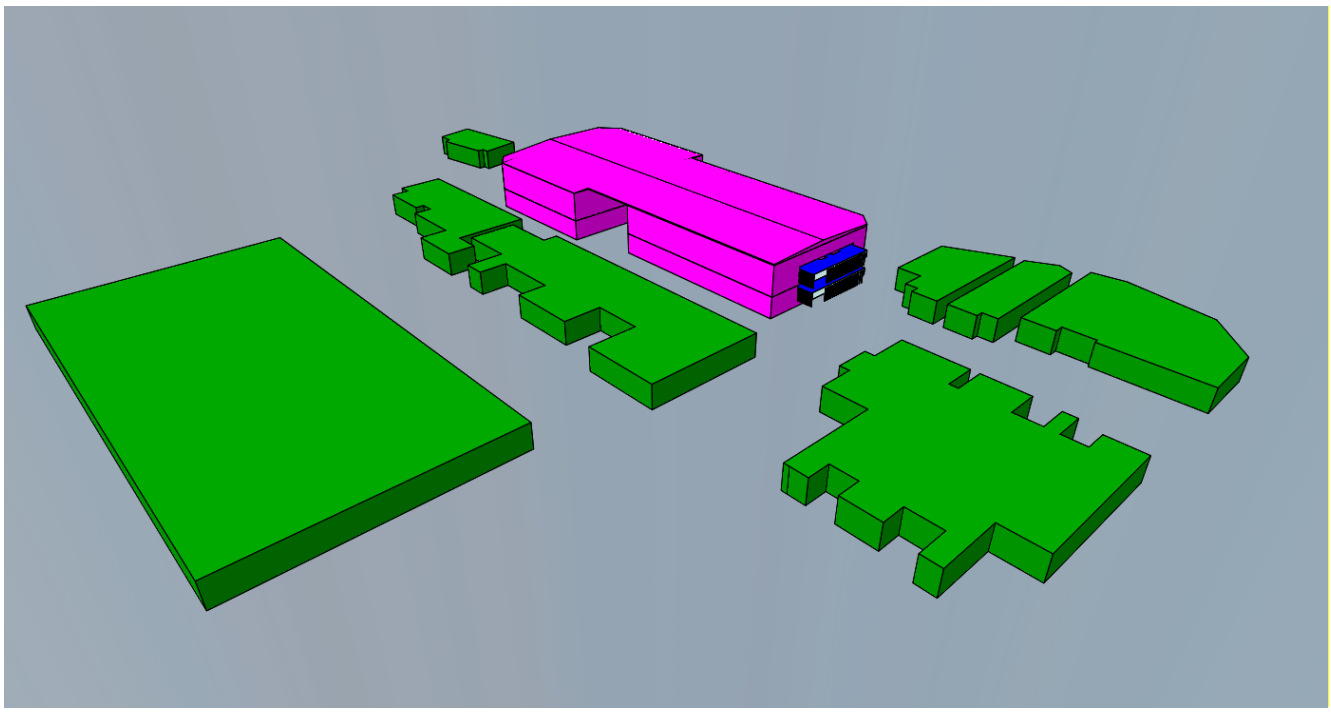
5.3 Energy Calculation of the Proposed and Reference Buildings

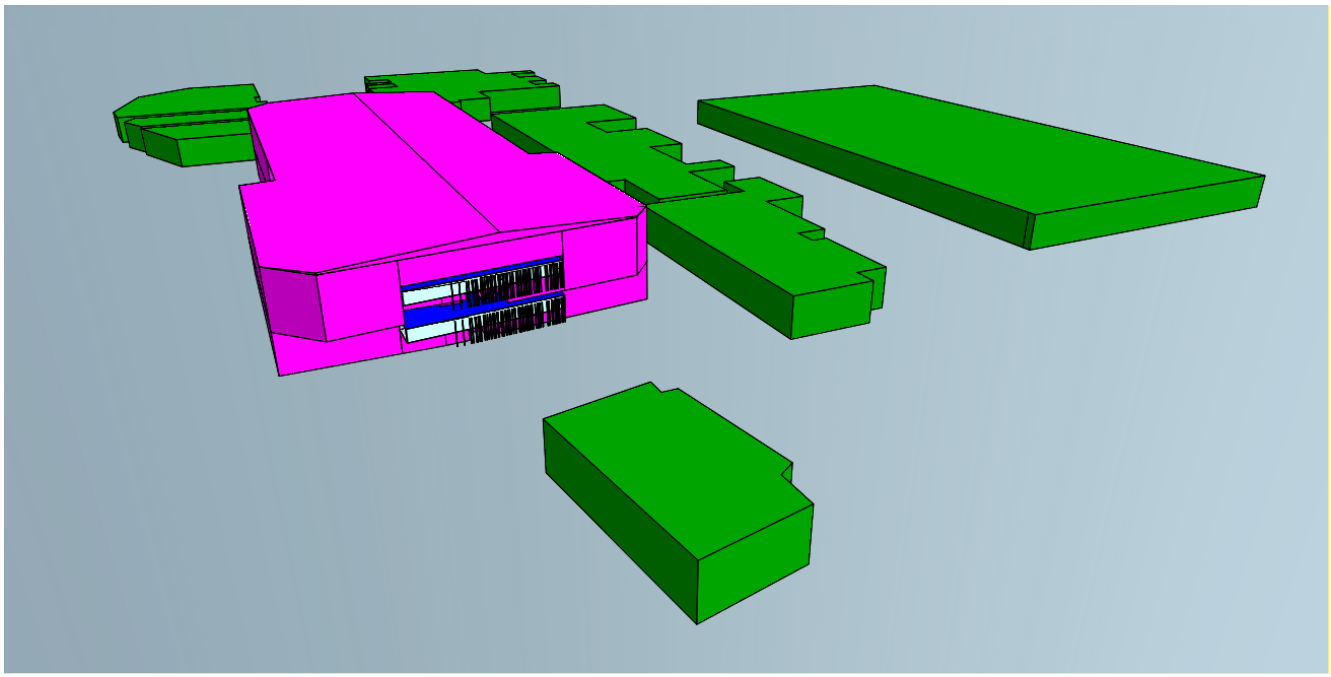
The Energy Simulation Program used in this study is the IES computer program Virtual Environment 2019 (VE). The program is based on the ASHRAE response factor and the modifications included utilising Australian weather data and including building materials more appropriate to those used in Australia and enabling the input of metric data.

- SLR supports a perpetual license of the Energy Simulation Software package IES <VE>;
- IES <VE> has passed the BESTEST (ASHRAE Standard 140) external validation process;
- The weather data from ACADS-BSG NSW_Sydney_RO_81 Test Reference Year (TRY) is used for the modelling;
- IES<VE> assesses U-Value, SHGC, and shade coefficient when evaluating the effect of glazing;
- Detailed warehouse operating schedules are not available at this stage. Therefore, NCC standard building operating profiles such as occupancy, lighting, air conditioning and equipment were adopted for the office areas; and
- At least 100 kW of PV system has been proposed the rooftop of the warehouse.

The developed 3D model for energy modelling is shown in **Figure 8**.

Figure 8 Proposed Warehouses in IES Model





5.4 Artificial Lighting

In Section J6 of the NCC, the requirement for the total lighting power load within the proposed spaces of a building is to be no greater than a maximum illumination power load, measured in Watts (W). The maximum allowable building illumination power load is based on the total illumination power load calculated for each space.

For artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances. This may be obtained by multiplying the area of each space by the maximum illumination power density (as found in Table J6.2a of the NCC 2019 Volume One). The maximum illumination density for a storage warehouse is 4 W/m² as per Table J6.2a of the NCC 2019 Volume One.

The proposed warehouses will adopt the following energy efficiency measures to reduce the lighting energy consumptions:

Office lighting

- LED fitting for offices.
- Occupancy sensors to low occupancy areas e.g. office, toilets and lunch room.

Warehouse lighting

- LED fitting for warehouse.
- Occupancy sensors to low occupancy areas.

Outside lighting

- LED external lighting for all outside areas.
- External lighting will be controlled via daylight sensor (photocell).

Electrical lighting is the major energy reduction component for warehouse with a large footprint.

The lighting calculation for NCC reference building is based on the maximum illumination power density specified within NCC Table J6.2A as below:

- Warehouse = 4 W/m^2
- Offices = 4.5 W/m^2

The electrical lighting layout of the proposed building is not available at the time of preparing this report. It is assumed the maximum design lighting power density will be achieved at a minimum as below:

- Warehouse 3.5 W/m^2
- Offices 4 W/m^2

Therefore, the proposed building is likely to achieve a 12.2% lighting energy reduction when compared with reference building. Detailed calculation is shown in **Appendix A.**

5.5 Mechanical Air-Conditioning

The detailed mechanical service design is not available at this stage. The air conditioning system will be ducted to each office. Warehouse spaces are not air-conditioned.

The air conditioning system will be designed to the BCA/NCC section J and other statutory authorities and applicable Australian standards.

Air-conditioning temperature control and set point – refer Table 4

Table 4 AC Unit Temperature Control Range

Space Type	Temperature Control Range (°C)
Offices	22.5±1.5°CBD

Air-conditioning energy efficiency requirements

2019 NCC Section J5.11 has specified the minimum energy efficiency ratios requirements for package air conditioning equipment.

Table 5 BCA Unitary Plant Requirement

Office Equipment	Minimum Energy Efficiency Ratio	
	2019 NCC Requirement	Proposed System [1]
Cooling	2.9	4
Heating	2.9	4

Note 1: Detailed Mechanical design is not available at this stage. It is assumed that the ducted system will achieve the performance requirements above.

When the air flow rate of a mechanical ventilation system is more than 1000L/s, the system must have a variable speed fan when its supply air quantity is capable of being varied.

Details or NCC Section J5 certification demonstrating compliance will need to be submitted with the application for a Construction Certificate

5.6 Building Fabric Requirements

Parts J1 to J3 of the BCA Section J contain the requirements of the Deemed-to-Satisfy compliance of the building fabric. The purpose of this subsection is to ensure that the building fabric will provide sufficient thermal insulation to minimise heating and cooling loads placed on the building and the commensurate energy consumption HVAC systems servicing internal building spaces.

All fabrics of the proposed building shall comply with NCC Section J. A Project Section J report will need to be submitted with the application for a Construction Certificate.

The reference and proposed building fabric data and other modelling data are shown below:

Table 6 Reference Dynamic Modelling Inputs

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Climate Data</td><td>Weather data from ACADS-BSG, NSW_Sydney_RO_81 Test Reference Year (TRY)</td></tr>
<tr><td>External wall</td><td>All external walls have a total R-value of R1.5 to comply with Section J1.5</td></tr>
<tr><td>Internal wall</td><td>All internal walls to unconditioned space as per the minimum NCC requirements</td></tr>
<tr><td>Glazing</td><td>Glazing system (glass and frame) with U value & Solar Heat Gain Coefficient as per reference wall glazing system building code calculations:
<table>
<tr><th rowspan="2">Description</th><th rowspan="2">Facade</th><th colspan="2">Glazing Properties</th></tr>
<tr><th>U-Value</th><th>SHGC</th></tr>
<tr><td rowspan="4">Office 1 & 3</td><td>North</td><td>3.5</td><td>0.28</td></tr>
<tr><td>East</td><td>4.2</td><td>0.42</td></tr>
<tr><td>South</td><td>No Glazing</td><td>No Glazing</td></tr>
<tr><td>West</td><td>4.2</td><td>0.42</td></tr>
<tr><td rowspan="4">Office 2</td><td>North</td><td>No Glazing</td><td>No Glazing</td></tr>
<tr><td>East</td><td>4.8</td><td>0.49</td></tr>
<tr><td>South</td><td>3.0</td><td>0.25</td></tr>
<tr><td>West</td><td>4.8</td><td>0.49</td></tr>
<tr><td rowspan="4">Office 4</td><td>North</td><td>No Glazing</td><td>No Glazing</td></tr>
<tr><td>East</td><td>4.8</td><td>0.49</td></tr>
<tr><td>South</td><td>3.0</td><td>0.25</td></tr>
<tr><td>West</td><td>4.8</td><td>0.49</td></tr>
</table></td></tr>
<tr><td>Roof</td><td>Concrete/Metal roof with insulation, Total R-value= R3.7</td></tr>
<tr><td>Floor</td><td>Concrete Floors with carpet overlay / tiles with R2.0 floor insulation above unconditioned space.</td></tr>
<tr><td>Permeability</td><td>No more than 5 $m^3/hr.m^2$ at 50 Pa reference pressure</td></tr>
<tr><td>Lighting Density</td><td>As per NCC 2019 Table J6.2a for different classification of building.</td></tr>
<tr><td>Equipment density</td><td>Equipment load in the model is 5W / m^2 as per 2019 NCC Table 2h.</td></tr>
<tr><td>Occupant density</td><td>As per Table D1.13 of the 2019 NCC</td></tr>
<tr><td>Occupancy Schedule</td><td>Schedules used in study are as per Table 2a in 2019 NCC JV Specification.</td></tr>
<tr><td>HVAC System type</td><td>HVAC efficiencies in the reference building are modelled in accordance with NCC Section J and Minimum Energy Performance Standards (MEPS).</td></tr>
<tr><td>HVAC Control</td><td>Space temperature indoor conditions 22.0±2.0°CBD.</td></tr>
<tr><td>Document References</td><td>The reference buildings were modelled in IES <VE> as per the latest architectural drawings.</td></tr>
</table>

Table 7 Proposed Dynamic Modelling Input

Item	Description
Climate Data	Weather data from ACADS-BSG, NSW_Sydney_RO_81 Test Reference Year (TRY)
External wall	All external walls have a total R-value of R1.5 to comply with Section J1.5
Internal wall	All internal walls to unconditioned space have a total R-value of R1.8.
Glazing	Glazing system (glass and frame) with U value & Solar Heat Gain Coefficient (SHGC) as follows: U-Value: 4.2; SHGC: 0.47
Roof	Concrete/Metal roof with insulation, Total R-value= R3.7.
Floor	Concrete Floors with carpet overlay / tiles with R2.0 floor insulation above unconditioned space.
Permeability	No more than 5 m3/hr.m2 at 50 Pa reference pressure
Lighting Density	4.0W/m^2
Equipment density	Equipment load in the model is 5W / m^2 as per 2019 NCC Table 2h.
Occupant density	As per Table D1.13 of the 2019 NCC
Occupancy Schedule	Schedules used in study are as per Table 2a in 2019 NCC JV Specification. See Appendix A.
HVAC System type	HVAC efficiencies for heating and cooling as follows: **Minimum EER:** 4.0; **CoP:** 4.0
HVAC Control	Space temperature indoor conditions 22.0±2.0°CBD.
PV Solar system	At least 100 kW PV system

5.7 Domestic Hot Water (DHW)

The BCA specifies the thermal efficiency for hot water systems to be at least 80%. The solar hot water reticulation system shall be provided to all faucets fittings, equipment, and apparatus within the development.

With the installation of water efficient fixture, the hot water consumption will be decreased and thus the domestic hot water usage will also decrease. If the domestic hot water usage is less than the energy required to heat to the water also decreases.

5.8 Minimization of Greenhouse Gas Emission

The predicted Total Annual Energy Consumption of the NCC Reference Building and the Proposed Building is summarised in **Table 8**. For both reference and proposed scenarios , temperatures lie within the range 16°CDB to 27°CDB for 100% of the plant operation time.

The annual energy consumption of the proposed building may be reduced by the amount of energy obtained from:

- an on-site renewable energy source; or
- another process as reclaimed energy.

The reference building uses:

a. The Deemed-to-Satisfy (DtS) Provision such as J1 Building Fabrics, J2 External glazing;

b. A solar absorptance of 0.6 for the external walls and 0.7 for roofs;

c. The maximum lamp power density without any increase for control device illumination power density adjustment factor;

d. Air-conditioning with the conditioned space temperature within the range 18°CDB to 26°CDB for 98% of the plant operation time;

e. Infiltration values:

    a. for the perimeter zone depth equal to the floor-to-ceiling height when pressuring plant is operating, 1.0 air change per hour and

    b. for the whole building, when the pressuring plant is not operating, 1.5 air change per hour.

f. Both the proposed and the reference building will use the same annual energy consumption calculation method and building features such as:

    a. location, adjacent structures, building form

    b. internal heat gains including people, lighting, appliances, meals and other electric power loads

    c. and other features as specified in the building code.

The predicted Total Energy Consumed annually by the reference building and the proposed building is summarised in **Table 8**.

Table 8 Comparison of Annual Energy Consumption Between the Reference and Proposed Building

Electricity Usage	Base Case Scenario Reference Building (MWh)	Scenario 1: Proposed Building With Reference Services Option 1 – 100kW PV (MWh)	Scenario 2: Proposed Building With Proposed Services Option 2 – 300kW PV (MWh)
Heating	8.95	8.58	6.29
Cooling	13.72	18.60	12.64
Auxiliary	4.3	3.63	3.16
Lighting	394.1	345.6	345.6
Equipment	assumed identical	assumed identical	assumed identical
DHW	assumed identical	assumed identical	assumed identical
PV System	-	-122.96	-381.176
Total	**421**	**253.48**	**-13.48**

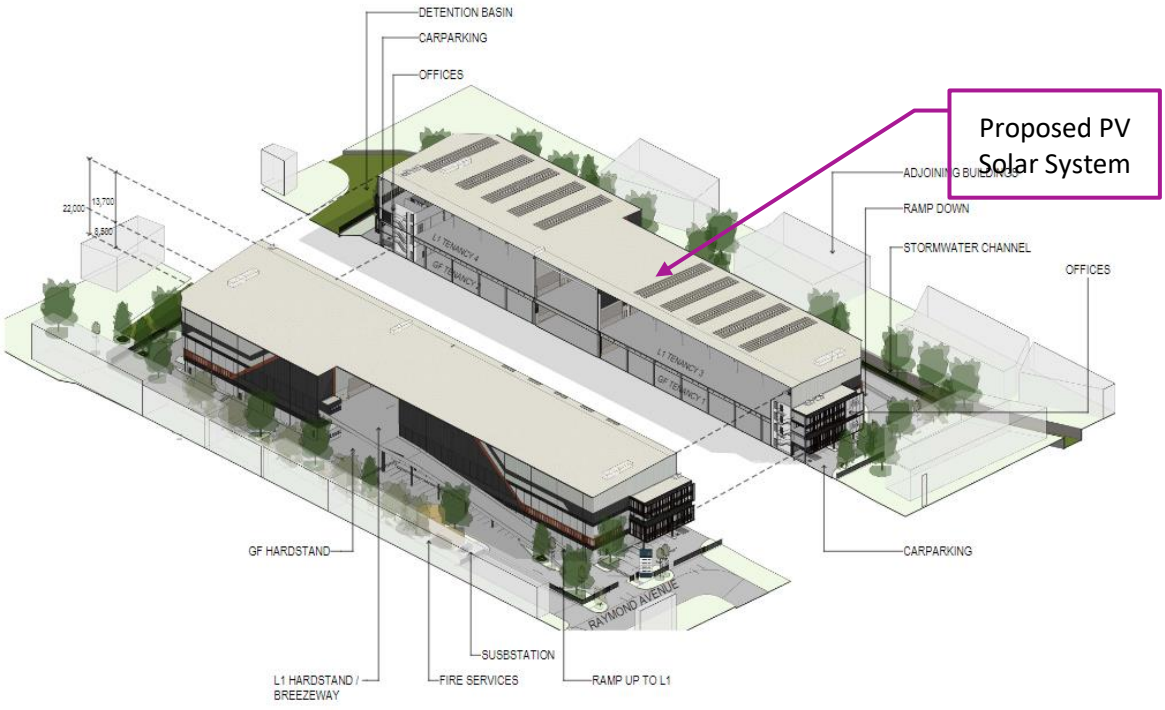
Note 1 these items are specific to a tenant's Fitout -hence assumed to be the same for the Reference and Proposed Buildings

The following conclusions can be reached from **Table 8**:

- The proposed building is likely to achieve a 12.2% lighting energy reduction when compared with reference building. Refer **Section 5.4**.

- The project implements a large-scale PV solar system (Refer **Figure 8**) to significantly minimises greenhouse gas emission reflecting the goal to achieve net zero emissions.
    - By implementing the energy efficiency measures described in Section 5, the project is predicted to achieve a 40% GHG emission reduction with a 100kW when compared with 2019 NCC Reference Building.
    - The project is predicted to achieve a net zero emission with a 300 kW PV solar system.
- Efficient air conditioning units as per **Section 5.5**.

Figure 9 3D View Showing the Proposed PV System



Coupling batteries with the proposed PV solar system allows that energy to be stored during times of low demand and released at times of peak demand or at night when electricity is required. The economic viability of storage is strongly driven by the degree to which electricity produced by the PV system is self-consumed.

In this instance battery storage would be ineffective as it is likely that the renewable energy will be consumed by the proposed development as it is produced. The night-time energy consumption is anticipated to be low with the installation of LED lighting and motion sensors.

The current battery storage options available on the market are also limited and operate at low efficiency. There will be an ability to add battery storage to the proposed development at a later date once technological advancements occur and the commercially viability is increased.

6 POTABLE WATER CONSUMPTION

It is proposed that the Project will have a number of sustainable water-saving measures, including:

- Rainwater reuse and reticulation system – Rainwater will be harvested from the roof and reuse for irrigation and toilet flushing. The reticulation will be a separate system to the domestic cold water with domestic water top up in the event of insufficient rainfall;
- Use of water saving plumbing devices; and
- Water sensitive landscape design.

Further to above sustainable water measures, the following items will be considered during the detailed design stage:

- Water efficient sanitary taps and toilets – install higher WELS Rating sanitary fixtures such as 4 stars for water taps, urinals and toilet.
- Water and energy efficient dishwashers with minimum 4-star WELS water rating.

By installing 4 star rated toilets, urinals and taps and the proposed rainwater harvesting facility the proposed development will reduce its potable water demand by approximately 32%.

The quantities of each water fittings are assumed from the drawing and listed in **Appendix B**.

7 MONITORING AND REPORTING

Energy metering and monitoring may be considered to ensure energy uses within the building including lighting are operating most effectively. Sub-metering and regular energy usage reviews may assist in this process.

8 CONCLUSIONS

SLR Consulting Australia Pty Ltd (SLR) has been engaged by Hale Capital Partners to prepare a Sustainability Management Plan (SMP) for the proposed warehouse and distribution facilities at 42 Raymond Avenue, Matraville.

The Development Site will comprise a 19,460 m^2 two-level warehousing and office facility.

This study has been prepared in accordance with the following Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development:

- Identify how ESD principles (as defined in clause 7(4) of Schedule 2 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.
- Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.
- Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.

The principal objective of this Sustainability Management Plan is to identify potential energy savings that may be implemented into the design and during the operational phase of the project, including a description of likely energy consumption levels and options for alternative energy sources such as PV solar power.

A BCA Sections J Deem-to-Satisfy compliant building is used as the baseline building for energy consumption savings. The development will strongly consider the implementation of the following initiative in order to operate efficiently:

- PV Solar system to significantly minimise greenhouse gas emission reflecting the goal to achieve net zero emissions.
- Daylight controlled LED lighting for the warehouse instead of metal halide, resulting in a considerable energy reduction and reduced maintenance;
- Motion sensors to all LED lights within the warehouse, and offices;
- Translucent roof sheeting to warehouse areas;
- Roof and external wall insulation as per the NCC requirements;
- High performance glazing to all air-conditioned areas or minimum NCC requirements;
- Passive solar design for external outdoor areas;
- Efficient air conditioning system;
- Selection of endemic and low maintenance landscaping species;
- Rainwater tanks for rainwater harvesting and re-use for landscape irrigation and toilet flushing;
- Low flow fixtures and fittings including taps and shower heads;
- Future Electrical Vehicle (EV) charging points to 5% of total car spaces;
- Low VOC paints, carpet and sealant; and
- Other measures as detailed in this report.

The project will target a 4-star Design & As building rating.

A detailed response to SEARS requirements is summarised in below table.

Item for inclusion	Action and Report Location
• Identify how ESD principles (as defined in clause 7(4) of Schedule 2 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development.	Section 5.1 details how ESD principial as demined in clause 7 (4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000 are being incorporated in the design, construction, and operation phases of the project.
• Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards.	Section 5 to Section 7 detail how the project exceeds relevant industry recognised building sustainability and environmental performance standards through the implementation of best design principal and a wide range of ESD initiatives including renewable energy to offset the site energy use and reduce peak demand on electricity supply infrastructure.
• Demonstrate how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources.	By implementing all energy efficiency measures described in Section 5 including the proposed PV solar system the project will significantly minimises greenhouse gas emission reflecting the goal to achieve net zero emissions. • The project is predicted to achieve a 40% GHG emission reduction with a 100kW when compared with 2019 NCC Reference Building. • The project is predicted to achieve a net zero emission with a 300 kW PV solar system. Refer Section 5 By installing 4-star rated toilets, urinals and taps and the proposed rainwater harvesting facility the proposed development will reduce its potable water demand by approximately 32%. Refer Section 6

In conclusion, the proposed ESD initiatives and Energy Efficiency measures outlined in this report will be incorporated where possible into the proposed building. These initiatives will help to achieve significant reductions in the energy required by the development both in construction and operation.

APPENDIX A

Energy Saving Lighting Design Recommendations

BCA Lighting Requirements - 42 Raymond Avenue, Matraville								
BCA Comply Building	**BCA Requirements**		**Area**	**Operating Hrs**	**Lighting Control**			**Total Annual Energy Consumption (kWh)**
	Warehouse W/m2	4	17693	Monday to Sunday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	334780
	Offices W/m2	4.5	1671	Monday to Sunday 24 hours	Motion Detector	0.9	1	59284
	Lobby W/m2	4	96	Monday to Sunday 24 hours	Motion Detector	0.9	1	3027
			19460				**Total**	**394064**
							kWh/m2	**20.25**

19460

Proposed Lighting Requirements 42 Raymond Avenue, Matraville								
BCA Comply Building	**BCA Requirements**		**Area**	**Operating Hrs**	**Lighting Control**			**Total Annual Energy Consumption (kWh)**
	Warehouse W/m2	3.5	17693	Monday to Sunday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	292932
	Offices W/m2	4	1671	Monday to Sunday 24 hours	Motion Detector	0.9	1	52697
	Lobby W/m2	4	96	Monday to Sunday 24 hours	Motion Detector	0.9	1	3027
			19460				**Total**	**345629**
							kWh/m2	**17.76**

APPENDIX B

Water Saving Recommendations

WATER SAVINGS CALCULATION - 42 Raymond Avenue, Matraville

Table B1 - Number of fixtures

Area	Toilets	Urinal	Basins	Showers
Amenities	40	8	64	8
Total	40	8	64	8

Assume 80% of toilet water usage is supplied by rainwater

Fraction not supplie	0.2

Table B2 - Results

No water saving measures		**Max water usage rate** [1]	
Toilet	Adopt 3* Average Flush Usage in Table C3	160	L/s
Tap	Adopt 3* Tap Usage in Table C3	576	L/s
Urinal	Adopt 3* Urinal Usage in Table C3	16	L/s
Water reuse measures (4*) with RWH		**Max water usage rate** [1]	
Toilet	Adopt 4* Average Flush Usage in Table C3	140	L/s
Tap	Adopt 4* Tap Usage in Table C3	480	L/s
Urinal	Adopt 4* Urinal Usage in Table C3	12	L/s
Water reuse measures (5*) with RWH		**Max water usage rate** [1]	
Toilet	Adopt 5* Average Flush Usage in Table C3	120	L/s
Tap	Adopt 5* Tap Usage in Table C3	384	L/s
Urinal	Adopt 5* Urinal Usage in Table C3	8	L/s

	3* with RWH	4* with RWH	5* with RWH
Improvement Percent	19	32	46

Calculation Notes

[1] *Water usage rate per use = Number of items in Table C1 x Usage rate in Table C3*

[2] *Assume total water usage is proportional to max water usage rate*

[3] *Improvement percentage = % difference between 3* rated fixtures max water usage rate with no rainwater harvesting and design fixture max water usage rate with 70% of toilet and*

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