ESR WESTLINK - STAGE 1

Sustainability Management Plan

Prepared for:

ESR Developments (Aust) Pty Ltd
Level 29, 20 Bond Street
Sydney NSW 2000

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PREPARED BY

SLR Consulting Australia Pty Ltd
ABN 29 001 584 612
Tenancy 202 Submarine School, Sub Base Platypus, 120 High Street
North Sydney NSW 2060 Australia

T: +61 2 9427 8100
E: sydney@slrconsulting.com www.slrconsulting.com

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 ESR Developments (Aust) Pty Ltd (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
610.30208-R02-v1.0	8 September 2022	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 ESR Australia to prepare a Sustainability Management Plan (SMP) for the proposed warehouse and distribution facilities of Stage 1, Lots at Kemps Creek logistic parks (the Project).

The SMP has been undertaken in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development SSD-9138102.

1.1 Objectives of the Study

The principal objective of this Sustainability Management Plan is to identify all potential energy savings that may be realised 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 Council 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 Council's development consent conditions and other 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:

- **Greenhouse Gas and Energy Efficiency** – including an assessment of the energy use on-site and all reasonable and feasible measures that would be implemented on-site to minimise the development's greenhouse gas emissions.
- **Ecologically Sustainable Development** – including a description of how the development will incorporate the principles of ecologically sustainable development in the design, construction and operation of the development.

3 DESCRIPTION OF THE PROJECT

The Development Site, which is known as ESR Kemps Creek logistic park, is located at 290-308 Aldington Road, Kemps Creek (Lot 13 DP 253503), 59-62 Abbotts Road (Lot 12 DP 253503), 63 Abbotts Road, Kemps Creek (Lot 11 DP 253503) within Penrith City Local Government Area (LGA) in the Western Sydney Employment Area (WSEA).

The project is a staged development which includes bulk earthworks, civil works and the construction of infrastructure and stormwater management. The overall masterplan comprises 6 developments lots and is shown in **Figure 1**

The current study covers the sustainability management plan for the Stage 1 development. More detailed drawing for Stage 1 (Lot 1 and Lot 4) are shown in **Figure 2** to **Figure 8**.

Figure 1 ESR Westlink Master Plan

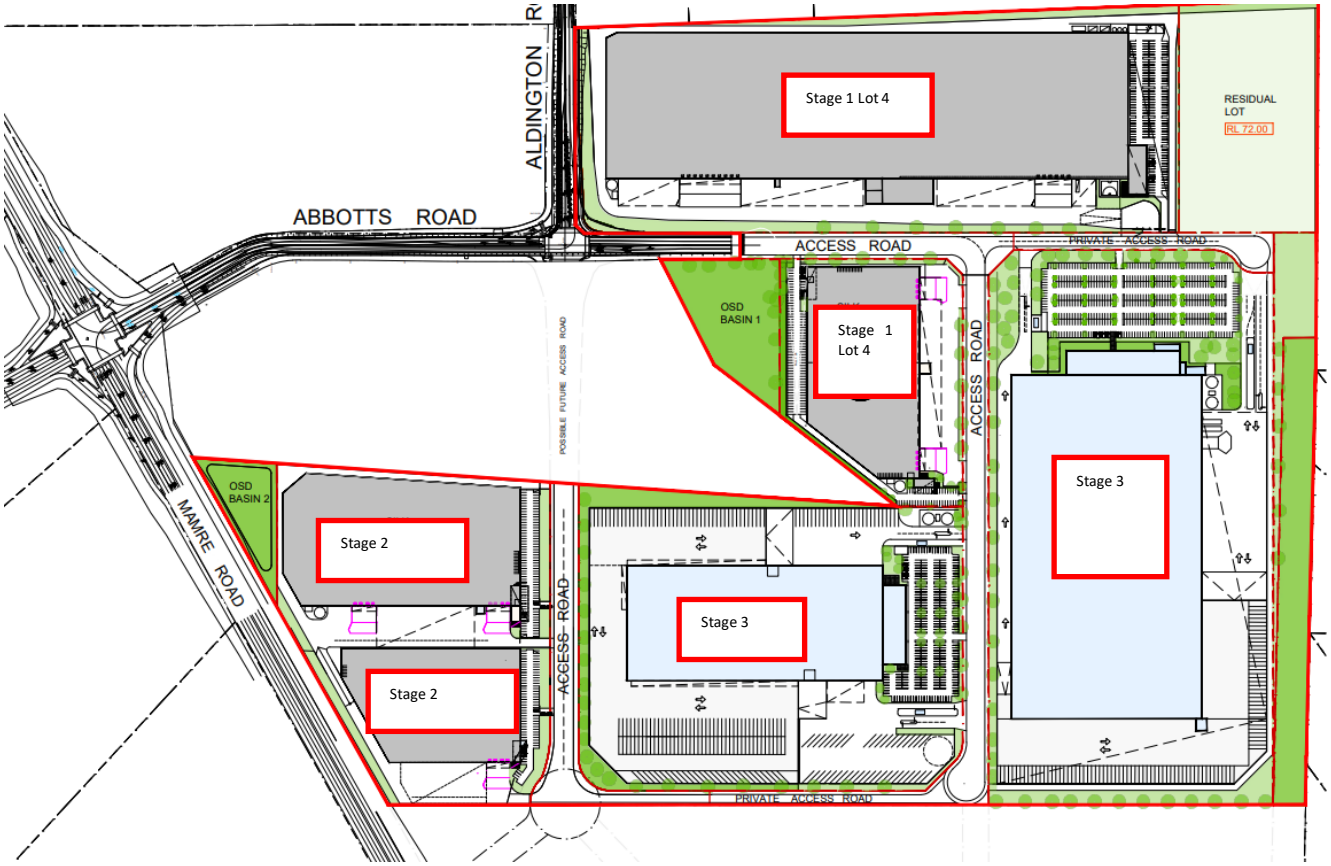


Figure 2 ESR Westlink – Stage 1

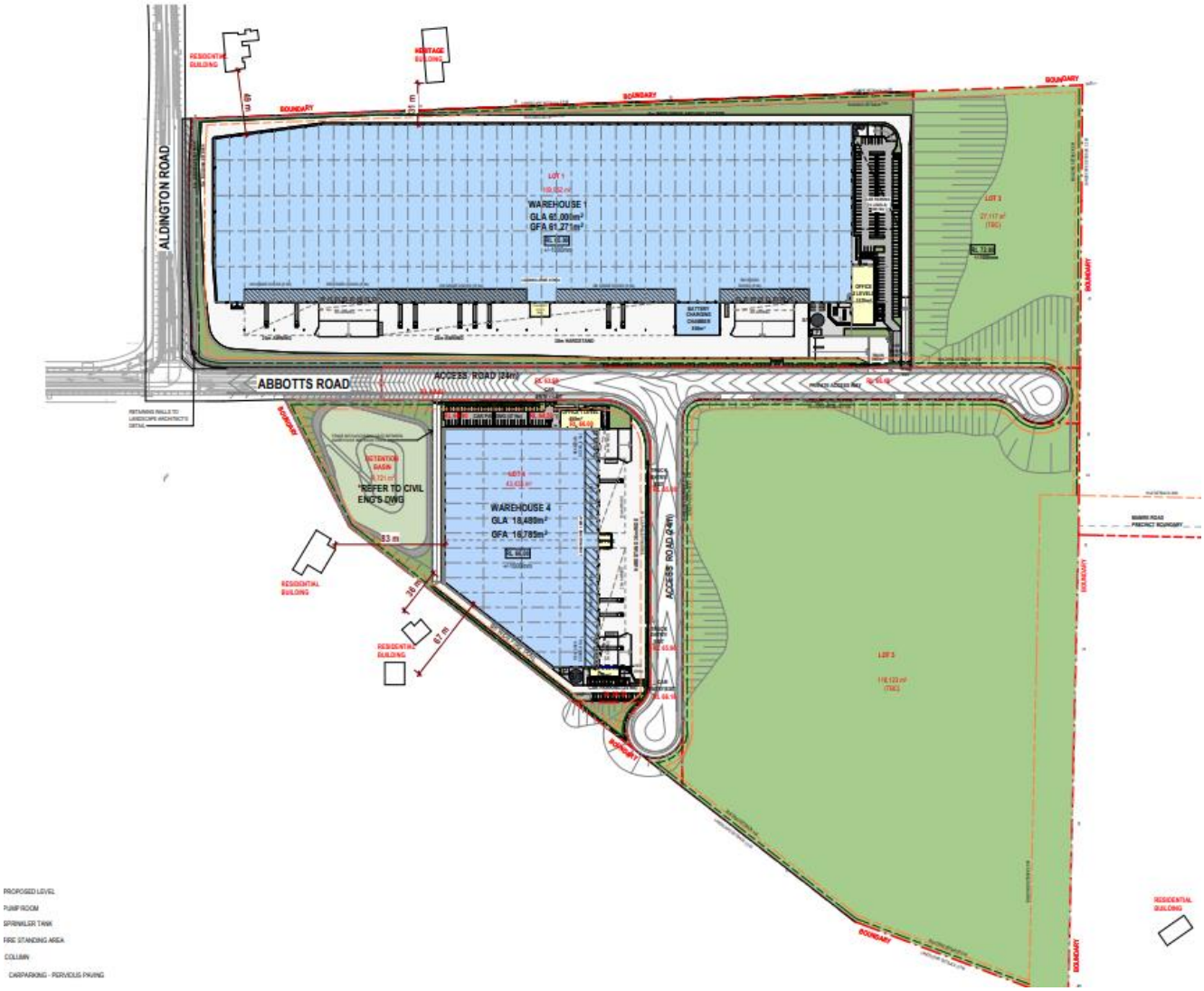


Figure 3 Ground Floor Plan – Lot 1

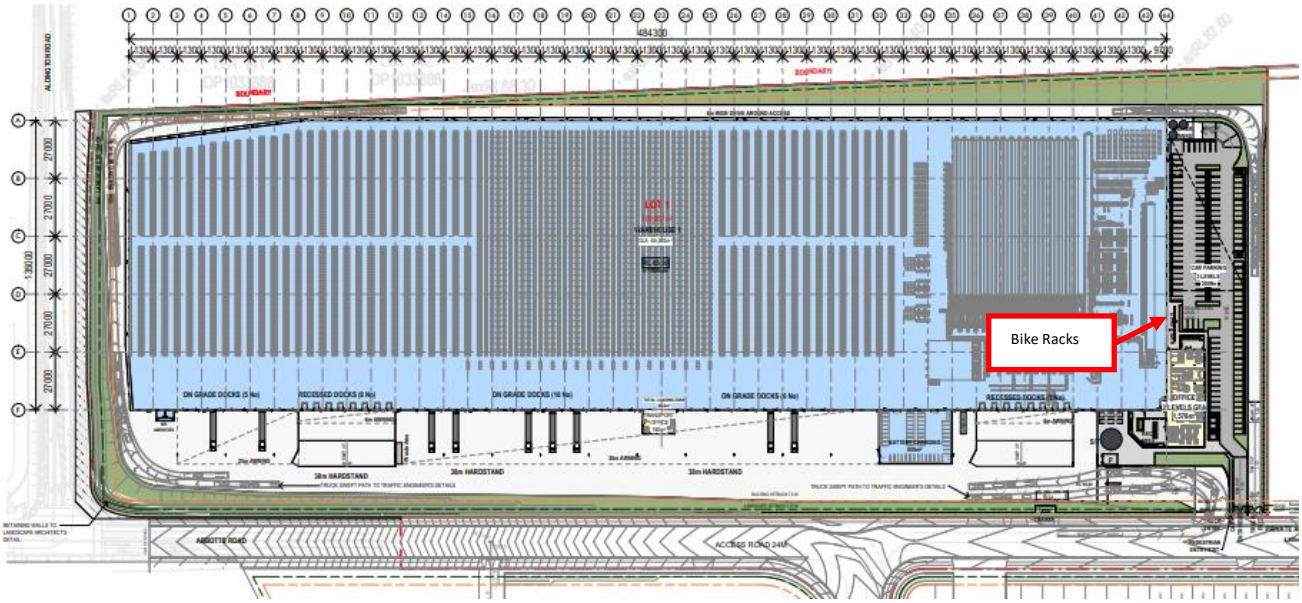
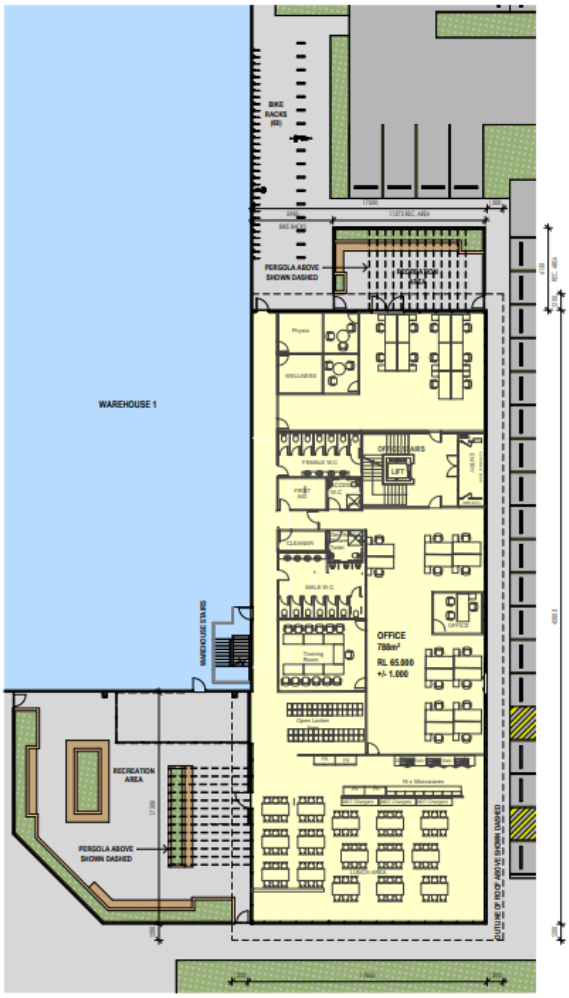
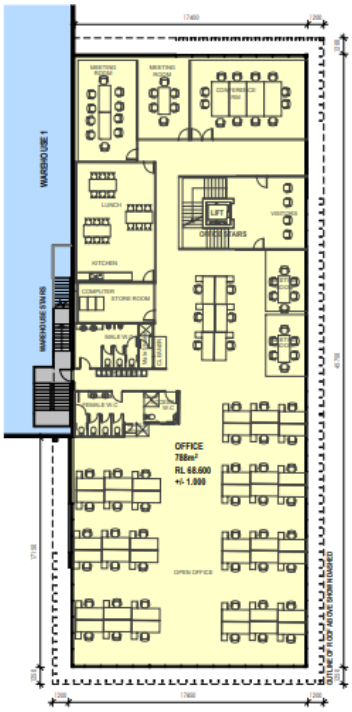


Figure 4 Roof Plan – Lot 1

Figure 5 Office Plan – Lot 1



G LOT 1 - OFFICE 1 PLAN - GROUND LEVEL
1 : 200



1 LOT 1 - OFFICE 1 PLAN - LEVEL 1
1 : 200

Figure 6 Ground Floor Plan – Lot 4

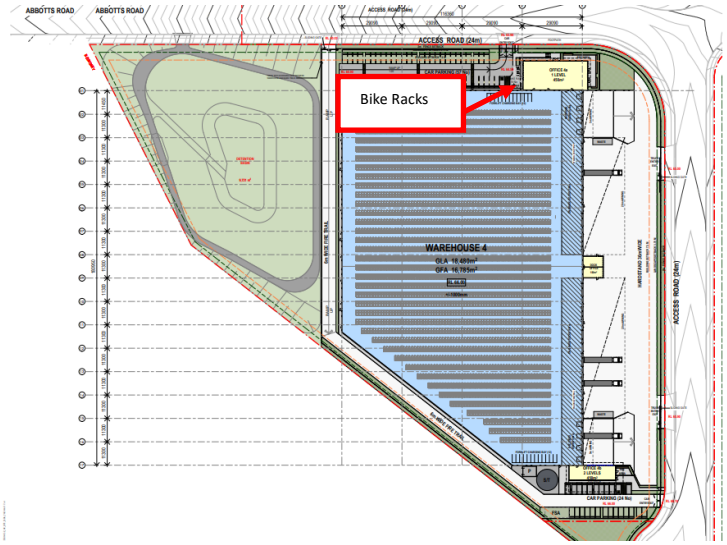


Figure 7 Roof Plan – Lot 4

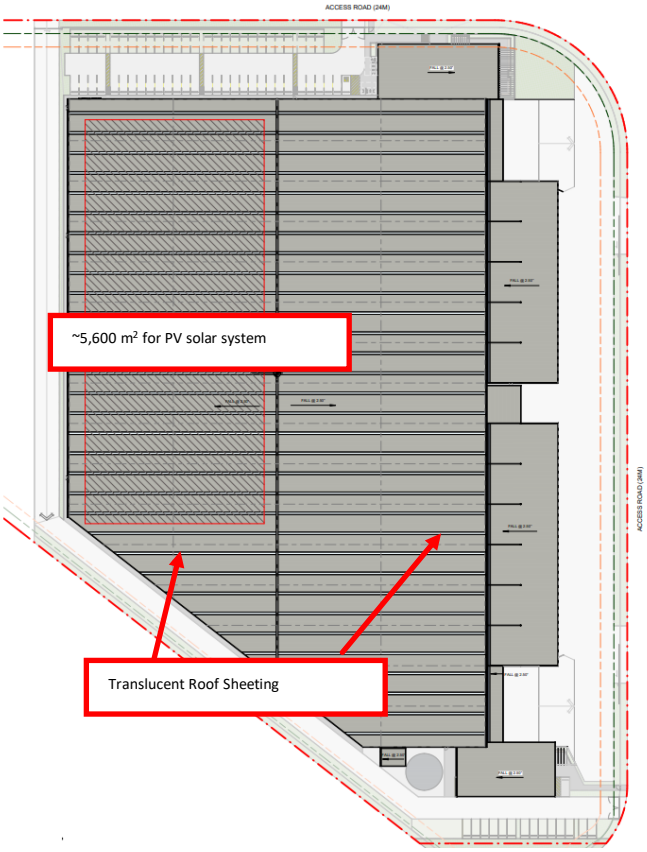
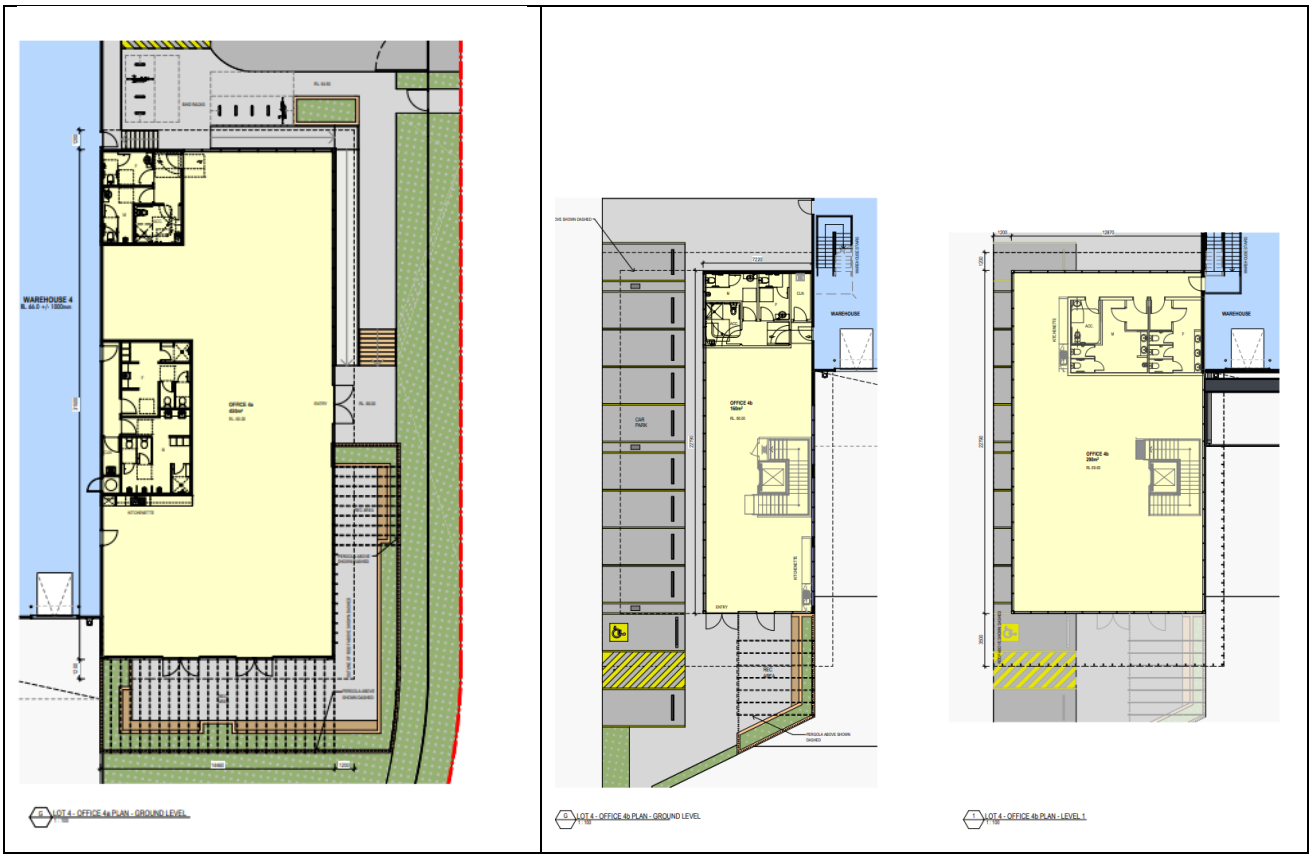


Figure 8 Office Plan – Lot 4



3.1 Overview of Proposed Development

The master plan comprises a total land area of 320,258 m^2 and a net development area of 298,609 m^2.

The stage 1 site area is 153,387 m^2 (Lot 1 Site area = 109,952 m^2 and Lot 4 Site Area = 43,435 m^2). Overall Stage 1 building areas are outlined in **Table 1** and **Table 2**.

Table 1 Stage 1 - Lot 1 Building Area

	Lot 1
Warehouse (GFA)	61,271 m^2
Offices	1,576 m^2
Transport Office	160 m^2
Total Building Area GFA Area	63,857 m^2
Landscaped Area	12,590 (11.5%) m^2
Car Parking	300

Table 2 Stage 1 - Lot 4 Building Area

	Lot 4
Warehouse (GFA)	16,785 m^2
Office	900 m^2
Dock Office	100 m^2
Total Building Area GFA Area	17,785 m^2
Landscaped Area	4,935 (11.45) m^2
Light Duty Area	3,100 m^2
Car Parking	81

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 COMMITMENTS

5.1 Documentation

The documentations used in this report is listed in **Table 3**.

Table 3 Project Documentation Sources

Document Type	Document Number	Issue Date
Stage 1 DA	1257_DA 100 to DA 182	29/08/2022
SLR Energy Efficiency Questionnaires	Completed Energy Efficiency Questionnaires	27/11/2020

Energy Efficiency measures have been recommended and approved for project implementation and have informed the sustainability assessment of this project – they are listed in **Table 4**.

Table 4 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. • Investigate costs and viability of commissioning and building tuning requirements and appointing an independent commissioning agent. • Independent consultant to perform quarterly tuning of fire, mechanical, electrical, 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 with high reflectivity 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.	✓ ✓ ✓ ✓	• NCC Section J report needs to be prepared by a qualified ESD consultant. • This warehouse will comply with all the requirements specified within the report during construction stage. • Colourbond roof sheeting (0.42 BMT Trimdek Colourbond screw fixed metal cladding) which has a higher solar reflectivity is proposed. • Double glazing compliant with relevant section of the Building Code is proposed.

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, meeting rooms, lunch room 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 10% of total parking spaces for small cars and 5% for motorbikes situated near the office entrance. • The site is located within close proximity (<5km) to both the M7 and M4 motorways. • The roads linking the site to the motorways are predominantly used for industrial traffic, as such the traffic is unlikely to impact on local areas.	✓ ✓ ✓	• SLR recommends allocating 10% of total parking spaces for small cars and motorbike. • Bicycle parking spaces as per the Architectural Drawings – Refer **Figure 3** and **Figure 5** • 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. • 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 double glazing to all air-conditioned areas to satisfy Section J requirements • Shown on the Architectural Drawings. Refer **Figure 4** and **Figure 7** • Refer **Section 5.5** of this report for proposed set up temperatures. • Insulation as per the NCC requirements. • 50mm insulation blanket with sisalation and safety wire mesh will be provided to the roof. • R2.8 to external wall of all conditioned areas. • LED lighting and lighting controls to warehouse and offices. • Adequate ventilation will be supplied in accordance with AS1668. • Will be shown Architectural Drawings during detailed design stage.

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 high Solar Reflective Index • Investigate current insulation design and determine proposed options.	✓ ✓ ✓ ✓ ✓ ✓ ✓	• Shown on the Energy Efficiency information for the project. • Design brief sets the temperature - Refer Section 5.5 of this report. • LED lighting to warehouse and offices. • Lighting controls to warehouse and offices. • Solar hot water system is proposed • Sub meters for major energy/water uses • Colourbond roof sheeting which has a higher solar reflectivity is proposed. • 50 mm roof insulation is proposed

Category	Objective	Proposed Target	Proposed Strategy	Commitment	Comment
					• Insulations will be specified as per the NCC Section J compliance report.
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). • Reduce embodied energy in concrete and plasterboard elements. • Consider 95% of timber to be AFS or FSC certified. • Reduce emissions associated with insulation and refrigerant. • Reduce environmental impact of materials for tiling, awning.	• Jointless fibre reinforced slab. • Use pre-cast concrete panels with recycled content.	✓	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. The project will use • reinforced concrete floor slab with steel trowel burnished finish laid over sub grade. • Office-mineral fibre acoustic tiles (13mm), • Vinyl faced ceiling tiles to all amenity's areas.

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. • Consider a design that can be disassembled at the end of the building's life.	• 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. Consider operational waste plans and training for staff to provide incentive to reduce waste.	✓ ✓	• SLR recommends 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 rainwater 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. • SLR recommends water efficient dishwashers • 100 kL Rainwater tanks have been proposed 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 including Ropes Creek adjacent to the site.	• Install indigenous plating appropriate to the area and the adjacent biodiversity lots. • 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

The design of the building services is not progressed at this stage. A preliminary energy simulation model for Stage 1 is developed based on the available building information and associated parameters are listed in the following sections of this report.

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 have more than 53.5% energy reduction - refer **Section 5.2.6** for the energy simulation results. The reduction has been enabled via:

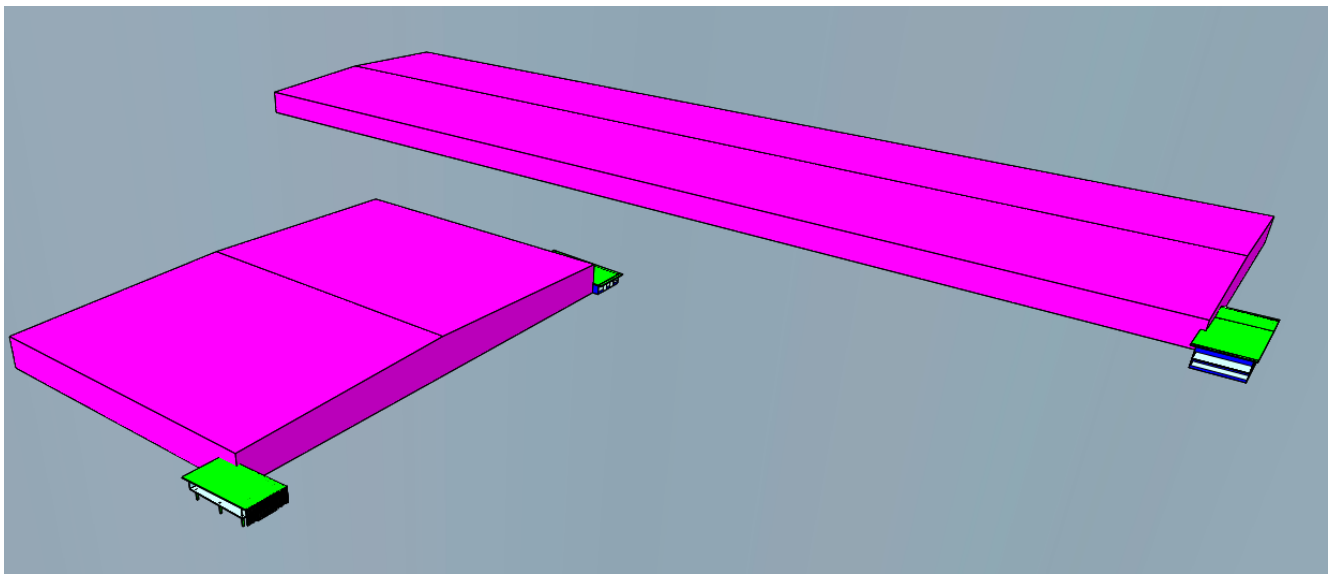
- All luminaire shall be low energy LED type;
- Warehouse lighting is generally to be zonally controlled via motion sensor;
- Office lighting shall be controlled via dual technology infrared/ultrasonic sensor;
- Daylight harvesting function to office with external windows;
- Efficient Air-conditioning system; and
- Onsite renewable energy. At least 500 kW of PV system has been proposed for Lot 1 and Lot 4.

5.2.1 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 Richmond 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 warehouse and office area.

Figure 9 Proposed Offices and Warehouses in IES Model – Stage 1



5.2.1.1 Input Data for Reference Building

Table 5 Input Data for Dynamic Modelling of Reference Building – Office Component

Item	Description
Climate Data	Weather data from ACADS-BSG, NSW_Richmond_88_Test Reference Year (TRY)
External Shade	Horizontal shading above windows as per architectural drawings
External wall	All external walls have a minimum total R-value of R2.1
Internal wall	All internal walls to unconditioned space have a total R-value of R2.8.
Roof	Concrete/Metal roof with insulation, Total R-value= R3.2.
External Floor	Concrete Floors with carpet overlay / tiles with R2.0 floor insulation above unconditioned space.

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Glazing</td><td>Glazing system (glass and frame) with U value & Solar Heat Gain Coefficient following the minimum NCC requirements in accordance with Section J:
<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>Office 1 (Ground)</td><td>North</td><td>5.80</td><td>0.47</td></tr>
<tr><td></td><td>East</td><td>2.61</td><td>0.18</td></tr>
<tr><td></td><td>South</td><td>3.52</td><td>0.26</td></tr>
<tr><td></td><td>West</td><td>5.80</td><td>0.81</td></tr>
<tr><td>Office 1 (1st)</td><td>North</td><td>5.45</td><td>0.49</td></tr>
<tr><td></td><td>East</td><td>3.63</td><td>0.31</td></tr>
<tr><td></td><td>South</td><td>3.24</td><td>0.26</td></tr>
<tr><td></td><td>West</td><td>5.80</td><td>0.79</td></tr>
<tr><td>Office 4a</td><td>North</td><td>3.0</td><td>0.22</td></tr>
<tr><td></td><td>East</td><td>3.60</td><td>0.27</td></tr>
<tr><td></td><td>South</td><td>No Glazing</td><td>No Glazing</td></tr>
<tr><td></td><td>West</td><td>4.70</td><td>0.36</td></tr>
<tr><td>Office 4b (Ground)</td><td>North</td><td>4.60</td><td>0.34</td></tr>
<tr><td></td><td>East</td><td>2.54</td><td>0.18</td></tr>
<tr><td></td><td>South</td><td>3.52</td><td>0.31</td></tr>
<tr><td></td><td>West</td><td>No Glazing</td><td>No Glazing</td></tr>
<tr><td>Office 4b (1st)</td><td>North</td><td>3.85</td><td>0.28</td></tr>
<tr><td></td><td>East</td><td>3.09</td><td>0.27</td></tr>
<tr><td></td><td>South</td><td>2.82</td><td>0.20</td></tr>
<tr><td></td><td>West</td><td>2.54</td><td>0.19</td></tr>
</table></td></tr>
<tr><td>Lighting Density</td><td>4.5 W/m^2</td></tr>
<tr><td>Lighting hours</td><td>24 hours</td></tr>
<tr><td>Equipment density</td><td>Equipment load in the model is 11 W / m² as per 2019 NCC Table 2h.</td></tr>
<tr><td>Occupant density</td><td>70%</td></tr>
<tr><td>Occupancy Schedule</td><td>24 hours</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 Hours</td><td>24 hours</td></tr>
<tr><td>HVAC Control</td><td>Space temperature indoor conditions 22.5±1.5°CBD.</td></tr>
<tr><td>Document References</td><td>The reference buildings were modelled in IES <VE> as per the architectural drawings provided by Nettleton Tribe Partnership Pty Ltd, dated August 2022.</td></tr>
</table>

5.2.1.2 Input Data for Proposed Building

Table 6 Input Data for Dynamic Modelling of Proposed Building – Office Component

Item	Description
Climate Data	Weather data from ACADS-BSG, NSW_Richmond_88_Test Reference Year (TRY)
External Shade	Horizontal shading above windows as per architectural drawings
External wall	All external walls have a minimum total R-value of R2.1
Internal wall	All internal walls to unconditioned space have a total R-value of R2.8.
Glazing	Glazing system (glass and frame) with U value & Solar Heat Gain Coefficient for all windows was assumed to be as follows: U=4.60; SHGC = 0.60
Roof	Concrete/Metal roof with insulation, Total R-value= R3.2.
External Floor	Concrete Floors with carpet overlay / tiles with R2.0 floor insulation above unconditioned space.
Lighting Density	4.0 W/m^2
Lighting hours	24 hours
Equipment density	Equipment load in the model is 11 W / m^2 as per 2019 NCC Table 2h.
Occupant density	70%
Occupancy Schedule	24 hours
HVAC System type	Same as Reference with COP/EER = 4.0
HVAC Hours	24 hours
HVAC Control	Space temperature indoor conditions 22.5±1.5°CBD.
Document References	The reference buildings were modelled in IES <VE> as per the architectural drawings provided by Nettleton Tribe Partnership Pty Ltd, dated August 2022.

5.2.2 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/m^2 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.

Warehouse lighting

- LED fitting for warehouse.

Outside lighting

- LED external lighting for all outside areas.

Lighting Control

- Occupancy sensors to low occupancy areas. as follows:
  - Office areas – Movement control and timeclock.
  - Amenities and circulation areas - Movement control and timeclock.
  - Warehouse areas – PE (daylight harvesting) and timeclock. 2 x PE cells per 4,000m^2 of warehouse.
  - Warehouse peripheral areas, Service and plant rooms - Movement control and timeclock.
  - Warehouse awnings - PE and timeclock.

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 provided at the time of preparing this report. It is assumed the maximum design lighting power density will be achieved as below:

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

Therefore, the proposed building is likely to achieve a 12.45% lighting energy reduction when compared with reference building. Detailed calculation is shown in **Appendix A.**

5.2.3 Mechanical Air-Conditioning

The mechanical service design is not available at this stage. Performance reverse cycle package units to offices with individual controls. As per the mechanical specification of the Tenant Base Building Specification, air conditioning to be designed to the BCA/NCC section J and other statutory authorities and applicable Australian standards.

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

5.2.3.1 Air-conditioning Control

The temperature control and setpoints are summarised in **Table 7**.

Table 7 AC Unit Temperature Control Range

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

5.2.3.2 Air-conditioning Energy Efficiency Requirements

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

Table 8 BCA Unitary Plant Requirement

Office Equipment	Minimum Energy Efficiency Ratio	
	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 proposed package 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

5.2.4 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.

5.2.5 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.

Hot water will be generated from the roof mounted solar water packaged plant.

With the installation of water efficient fixture, the hot water consumption will be decreased and thus the domestic hot water usage will also decrease.

The energy simulation in this analysis is assumed both reference and proposed building are using same hot water system for DHW. The actual energy consumption will be reduced once solar hot water or electrical heat pump is adopted for the proposed building.

5.2.6 Simulation Results

The predicted Total Annual Energy Consumption of the NCC Reference Building and the Proposed Building (Lot 1 and Lot 4) is summarised in **Table 9**. For both buildings, temperatures lie within the range 16°CDB to 27°CDB for 100% of the plant operation time.

Table 9 Comparison of Annual Energy Consumption Between the Reference and Proposed Building (Stage 1)

Electricity Usage	Reference Building (MWh)	Proposed Building (MWh)
Heating	15.0	14.7
Cooling	72.7	53.7
Auxiliary	28.4	26.8
Lighting	1574.0	1378.6
Lift	24.6	24.6
Miscellaneous Ventilation Fans	46.5	465
Equipment	assumed identical	assumed identical
DHW	assumed identical	assumed identical
PV System	-	-693.5
Total	**1761.7**	**851.4**

By implementing all energy efficiency measures described in **Section 6**, the Stage 1 is predicted to achieve a 51.7% GHG emission reduction when compared with 2019 NCC Reference Building.

Other lots are anticipated to have similar ESD initiatives and achieve similar GHG emission reduction when compared with 2019 NCC Reference Building.

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 – 100 kL 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.

The Contractor must provide an above ground rainwater harvest tank connected to warehouse roof downpipes, with change over switch and slow fill line connected to mains water for drought periods.

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 36%.

The quantities of each water fittings are calculated from the Stage 1 drawing and listed in **Appendix B**.

7 MONITORING AND REPORTING

All committed sustainability-related measures need to be commissioned and tuned once the project is completed, to ensure all services operate to their full potential and as designed.

The building tuning will be provided by service contractors and overseen by an independent assessor, at least once a month within the Defects Liability Period (DLP) period to ensure that services are operating effectively and efficiently. Monthly reports to be provided to the tenant for DLP.

7.1 Energy Review and Audit

An energy usage review should be undertaken within the first few months of operation to ensure the Energy Management Plan is sufficient for the development's needs. A breakdown of energy usage per month at the Project Site will help to measure the development's baseline energy use and assess what appliances, equipment and processes are consuming energy.

An energy review is also necessary for the assessment of energy utilisation to further identify opportunities for improvement. Energy usage data obtained during the review process may be used to establish key performance indicators and annual energy targets for the Project.

Energy usage to be included in the review should include all purchased electricity and energy which is consumed by stationary equipment on site. Energy consumed by mobile equipment (e.g. forklifts) should also be examined as this will identify variations in warehouse operation efficiency. (Refer to 'Guidelines for Energy Savings Action Plans' (2005) (as developed by the former Department of Energy, Utilities and Sustainability) for reporting templates and further information.)

An energy audit and management review should also be undertaken on a half-yearly basis to ensure employees are following energy savings procedures correctly. Where audits show that energy savings procedures are not carried out effectively, additional employee training should be undertaken and signage and procedures re-examined.

The Energy Management Plan should be progressively improved and updated on an annual basis, or as required, to reflect changes to the Energy Management System and to promote continual improvement of energy management at the Project Site.

7.2 Energy Metering and Monitoring

To enable effective review of energy usage by the project, sub-metering should be implemented for all major energy consuming processes or items of equipment including sub-metering for all loads greater than 100 kVA.

Electrical equipment should be maintained to Australian Standards to ensure unnecessary energy wastage is minimised. Roof access system is proposed for third party access to roof for carry out necessary maintenance as required.

A Building Users' Guide will be prepared for the Project. The Building Users' Guide provides details regarding the everyday operation of a building and should include energy minimisation initiatives such as natural ventilation strategies, user comfort control, maintenance of air conditioning units and other electrical devices to ensure maximum operating efficiency, and lighting zoning strategies.

An effective Building Users' Guide will ensure that:

- Facility managers understand in detail their responsibilities for the efficient operation of the facility and any additional building tuning necessary to continuously improve energy management.
- Maintenance contractors understand how to service the particular systems to maintain reliable operations and maximum energy efficiency.
- Employees understand energy minimisation procedures and working limitations required to maintain design performance for energy efficiency.
- Future fit-out / refurbishment designers understand the design basis for the building and the systems so that these are not compromised in any changes.

7.3 Roles and Responsibilities

It is the responsibility of the facility manager to routinely check energy savings procedures are undertaken correctly (i.e. lighting turned off while areas of the development are not in use). The facility manager should also ensure all monitoring and audit results are well documented and carried out as specified in the Energy Management Plan.

Senior management should also be involved in energy management planning as an indication of the organisation's commitment to the Energy Management Plan.

8 CONCLUSIONS

SLR Consulting Australia Pty Ltd (SLR) has been engaged by ESR Australia to prepare a Sustainability Management Plan (SMP) for the proposed warehouse and distribution facilities of Stage 1, Lots 1 and 4 at Kemps Creek logistic parks (the Project).

This SMP has been undertaken in accordance with the Secretary's Environmental Assessment Requirements (SEARs) for the State Significant Development SSD-9138102.

- **Greenhouse Gas and Energy Efficiency** – including an assessment of the energy use on-site and all reasonable and feasible measures that would be implemented on-site to minimise the development's greenhouse gas emissions.
- **Ecologically Sustainable Development** – including a description of how the development will incorporate the principles of ecologically sustainable development in the design, construction and operation of the development.

The principal objective of this Sustainability Management Plan is to identify all potential energy savings that may be realised 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. BCA Section J provides the minimum requirement for energy efficiency and it is expected that the proposed development will operate energy efficiently via:

- 500 kW PV Solar system for the Stage 1 - Lots 1 and 4;
    - An annual energy output of around 693.5 MWh will be obtained from the proposed PV solar system
    - The estimated greenhouse gas CO2 emission saving is approximately 568.6 tonCO2/annum
- Solar hot water system;
- 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 2019 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 with a minimum Energy Efficiency Ratio (EER) of 4 ;
- Power sub-metering to enable continued review of power consumption for the offices, and warehouse;
- Selection of endemic and low maintenance landscaping species;
- 100 kL rainwater tanks for rainwater harvesting and re-use for landscape irrigation and toilet flushing;
- Low flow fixtures and fittings including taps and shower heads;
- Low VOC paints, carpet and sealant; and

- Other measures as detailed in this report.

By implementing all energy efficiency measures described in **Section 5** of this report, the project is predicted to achieve a 53.5% GHG emission reduction when compared with 2019 NCC Reference Building.

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 36%.

In conclusion, the relevant ESD initiatives and Energy Efficiency measures outlined in this report are incorporated into the proposed building and development details. The proposed ESD initiatives will help to achieve significant reductions in the energy required by the development both in building and operation.

Building tuning will be conducted by builder and SLR recommends that quarterly reviews of actual building energy and water consumption be carried out once the warehouses are operational to check the actual energy usage and energy savings and verify that all systems are performing at their optimum efficiency. This will provide an opportunity for the systems to be tuned to optimise time schedules to best match occupant needs and system performance while satisfying the sustainability target for the project.

APPENDIX A

Energy Saving Lighting Design Recommendations – Lot 1 and Lot 4

BCA Lighting Requirements ESR Kemps Creek Logistics Park								
BCA Comply Building	**BCA Requirements**		**Area**	**Operating Hrs**	**Lighting Control**			**Total Annual Energy Consumption (kWh)**
	Warehouse (Lot 1 - Lot 6) W/m2	4	139371	Monday to saturday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	2629897
	Offices (Lot 1 - Lot 6) W/m2	4.5	5,800	Monday to saturday 24 hours	Motion Detector	0.9	1	205209
	Café (Lot 7) W/m2	14	200	Monday to saturday 10 hours		1	1	8736
			145371				**Total**	**2843842**
							kWh/m2	**19.56**

Proposed Lighting Requirements ESR Kemps Creek Logistics Park								
BCA Comply Building	**Proposed**		**Area**	**Operating Hrs**	**Lighting Control**			**Total Annual Energy Consumption (kWh)**
	Warehouse (Lot 1 - Lot 6) W/m2	3.5	139371	Monday to saturday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	2301160
	Offices (Lot 1 - Lot 6) W/m2	4	5800	Monday to saturday 24 hours	Motion Detector	0.9	1	182408
	Café (Lot 7) W/m2	10	200			1	1	6240
			145371				**Total**	**2489808**
							kWh/m2	**17.13**

APPENDIX B

Water Saving Recommendations, Lot 1 and Lot 4

WATER SAVINGS CALCULATION - ESR Westlink (Lot 1 and Lot 4)

Table B1 - Number of fixtures

Area	Toilets	Urinal	Basins	Showers
Amenities	48	10	46	6
Total	48	10	46	6

Assume 70% of toilet water usage is supplied by rainwater

Fraction not supplied	0.3

Table B2 - Results

No water saving measures		**Max water usage rate [1]**	
Toilet	Adopt 3* Average Flush Usage in Table C3	192	L/s
Tap	Adopt 3* Tap Usage in Table C3	414	L/s
Urinal	Adopt 3* Urinal Usage in Table C3	20	L/s
Water reuse measures (4*) with RWH		**Max water usage rate [1]**	
Toilet	Adopt 4* Average Flush Usage in Table C3	168	L/s
Tap	Adopt 4* Tap Usage in Table C3	345	L/s
Urinal	Adopt 4* Urinal Usage in Table C3	15	L/s
Water reuse measures (5*) with RWH		**Max water usage rate [1]**	
Toilet	Adopt 5* Average Flush Usage in Table C3	144	L/s
Tap	Adopt 5* Tap Usage in Table C3	276	L/s
Urinal	Adopt 5* Urinal Usage in Table C3	10	L/s

	3* with RWH	4* with RWH	5* with RWH
Improvement Percent	24	36	49

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 urinal flushing*

ASIA PACIFIC OFFICES

BRISBANE
Level 2, 15 Astor Terrace
Spring Hill QLD 4000
Australia
T: +61 7 3858 4800
F: +61 7 3858 4801

CANBERRA
GPO 410
Canberra ACT 2600
Australia
T: +61 2 6287 0800
F: +61 2 9427 8200

DARWIN
Unit 5, 21 Parap Road
Parap NT 0820
Australia
T: +61 8 8998 0100
F: +61 8 9370 0101

GOLD COAST
Level 2, 194 Varsity Parade
Varsity Lakes QLD 4227
Australia
M: +61 438 763 516

MACKAY
21 River Street
Mackay QLD 4740
Australia
T: +61 7 3181 3300

MELBOURNE
Suite 2, 2 Domville Avenue
Hawthorn VIC 3122
Australia
T: +61 3 9249 9400
F: +61 3 9249 9499

NEWCASTLE
10 Kings Road
New Lambton NSW 2305
Australia
T: +61 2 4037 3200
F: +61 2 4037 3201

PERTH
Ground Floor, 503 Murray Street
Perth WA 6000
Australia
T: +61 8 9422 5900
F: +61 8 9422 5901

SYDNEY
2 Lincoln Street
Lane Cove NSW 2066
Australia
T: +61 2 9427 8100
F: +61 2 9427 8200

TOWNSVILLE
Level 1, 514 Sturt Street
Townsville QLD 4810
Australia
T: +61 7 4722 8000
F: +61 7 4722 8001

TOWNSVILLE SOUTH
12 Cannan Street
Townsville South QLD 4810
Australia
T: +61 7 4772 6500

WOLLONGONG
Level 1, The Central Building
UoW Innovation Campus
North Wollongong NSW 2500
Australia
T: +61 404 939 922

AUCKLAND
68 Beach Road
Auckland 1010
New Zealand
T: +64 27 441 7849

NELSON
6/A Cambridge Street
Richmond, Nelson 7020
New Zealand
T: +64 274 898 628