BADGERYS CREEK DEVELOPMENT - DHL LOGISTICS FACILITY

Sustainability Management Plan
SSD-70817958 Precinct 1 - South

Prepared for:

DHL Supply Chain (Australia) Pty Ltd
Level 4, Building C
1 Homebush Bay Drive
Rhodes, NSW 2138

SLR Ref: 610.30951.00000-R03
Version No: v4.0
December 2025

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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 DHL Supply Chain (Australia) 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 the610 agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.30951.00000-R03-v4.0	10 December 2025	Anthony Marklund	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
610.30951.00000-R03-v3.0	20 March 2025	Prameena Karunairaj	Dr Neihad Al-Khalidy	Dr Neihad Al-Khalidy
610.30951.00000-R03-v2.0	3 October 2024	Dr Neihad Al-Khalidy	Mark Hobday	Dr Neihad Al-Khalidy
610.30951.00000-R03-v1.0	19 April 2023	Dr Neihad Al-Khalidy	Lucas Wilson	Dr Neihad Al-Khalidy

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1 INTRODUCTION

This Sustainability Management Plan (SMP) supports a State Significant Development Application (SSDA) (SSD-70817958) submitted to the NSW Department of Planning, Housing, and Industry (**DPHI**) on behalf of DHL Supply Chain (Australia) Pty Ltd (**DHL**).

The SSDA constitutes a detailed development application (**DA**) insofar that it is linked to and is consistent with the concept plan (**SSD- 70316465**) by seeking consent for the construction and operation of two singular storey industrial buildings for use as a warehouse and logistics facility with 24 hour/ seven day a week operation plus car parking and associated landscaping within part (25 hectares) of Lot 1 in Deposited Plan 1306448 at 1953-2109 Elizabeth Drive, Badgerys Creek known as the DHL Masterplan site.

This SSDA represents the second of two (2) SSDAs proposed by DHL and will apply to the northern half of the DHL Masterplan site, known as "the site" (**the site**) refer to Figure 3. Stage 2 relates to the southern half of the DHL Masterplan site, known as the DHL Stage 2 site and is subject to separate SSDA (**SSD-70818708**).

The project vision is to develop a world class warehouse and logistics facility which is fully integrated with its green infrastructure and Connection to Country. Having been informed by key landscape and Connecting to Country themes, the development of the site can deliver on the objectives that contribute to the Aerotropolis Vision which is to:

- Achieve a landscape led approach and starting with Country- the project has been guided by Cultural Design Principals and local leaders in the Aboriginal community.
- Create a new global gateway which will be a regionally and nationally significant employment area by providing for warehouse and logistics land uses in a highly sought-after location adjacent to the new Western Sydney Airport.
- Design a cool, green new city with a landscape approach that increases urban tree canopy, provides useable open space areas throughout and restores key riparian corridors on the site.
- Transitioning to an Aerotropolis through a sustainable, orderly and transformational development in the Western Sydney Aerotropolis,
- Retaining a green, biodiverse landscape informed by Country and an indigenous lens on maintenance and land management.

2 BACKGROUND

The DHL Masterplan site occupies approximately 25-hectares (**ha**) of the larger 171.84ha site at 1953-2109 Elizabeth Drive, Badgerys Creek. The wider site is currently the subject of an existing SSDA (SSD- 70316465).

SSD- 70316465: 1953-2109 Elizabeth Drive 'Burra Park'

SSD- 70316465 is an SSDA which was issued SEARs on the 22 May 2024 and is currently in the process of finalising the application for lodgement following Test of Adequacy with the DPHI in September 2024.

SSD- 70316465 is seeking development consent for a concept plan including future development lots and building footprints. The development also seeks consent for the Stage 1 works which will include bulk earthworks across the site, infrastructure delivery, road access/intersections, internal road construction, civil infrastructure and utilities, stormwater infrastructure works and the construction of three (3) warehouse buildings.

The applicant for SSD- 70316465 is the trustee for Burra Park Prop Trust 1 which is a joint venture entity, with ISPT Core Fund and UniSuper each holding an equal share.

DHL intend to develop part of the site for a logistics facility, the subject of this SSDA. The DHL Masterplan Site is known as Super lot 4a and 4b within the wider concept plan. Super lot 5B to the north of the DHL Logistics Facility SSDA lots have been sold to Canberra Data Centres (CDC) refer to Figure 3.

3 SITE DESCRIPTION

The subject site is located within part of Lot 101 in DP 1306448, at 1953-2109 Elizabeth Drive, Badgerys Creek. The site is approximately 25 hectares in size and situated north of the new Western Sydney Airport. It is located within the Penrith local government area (LGA) and is approximately 12.5km from Penrith Central Business District (CBD), 27km from Parramatta CBD, and 47km from Sydney CBD. The site is owned by Roberts Jones Development Pty Ltd.

The site is currently used for agricultural purposes and is largely cleared of vegetation with areas of dispersed grass and scattered natural and/or planted tree growth. The site contains several farm dams, primarily within the central and southern areas. The location context and aerial plans are depicted in Figures 1 and 2.

Figure 1 Location Context Area Plan

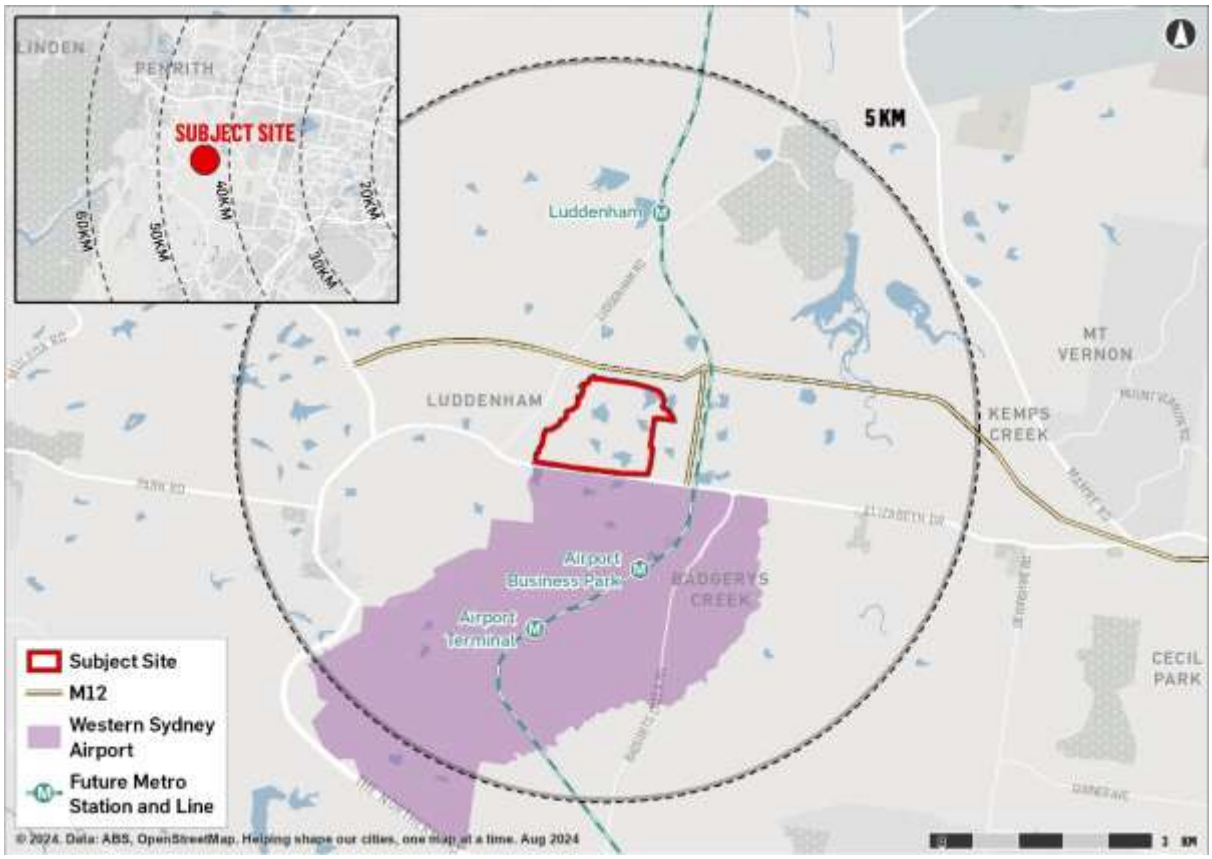


Figure 2 Site Location Plan

Figure 3 DH Masterplan Site

4 PLANNING APPROVALS STRATEGY

Development consent is sought under Section 4.12(8) and Division 4.4. of the *Environmental Planning and Assessment Act 1979* (**EP&A Act**) and Division 5 of the *Environmental Planning and Assessment Regulation 2021* (**EP&A Regulation**) for the construction and operation of a warehouse and logistics facility (**the Project**) under Schedule 1 of *State Environmental Planning Policy (Planning Systems) 2021* (**Planning Systems SEPP**).

5 DESCRIPTION OF THE PROJECT

Staged construction of warehouse buildings for use as a logistics centre with 24 hour/ day, seven days a week operation, comprising the following:

- Construction of two warehouses (Warehouses 3 and 4) with a gross floor area of 57,165 m^2 .
- Building fit out;
- Construction of hardstand, loading and carparking;
- Landscaping works; and
- Signage.

More detailed drawings for Warehouse 3 and 4 is shown in **Figure 4** to **Figure 9.**

Figure 4 Precinct 1 Masterplan

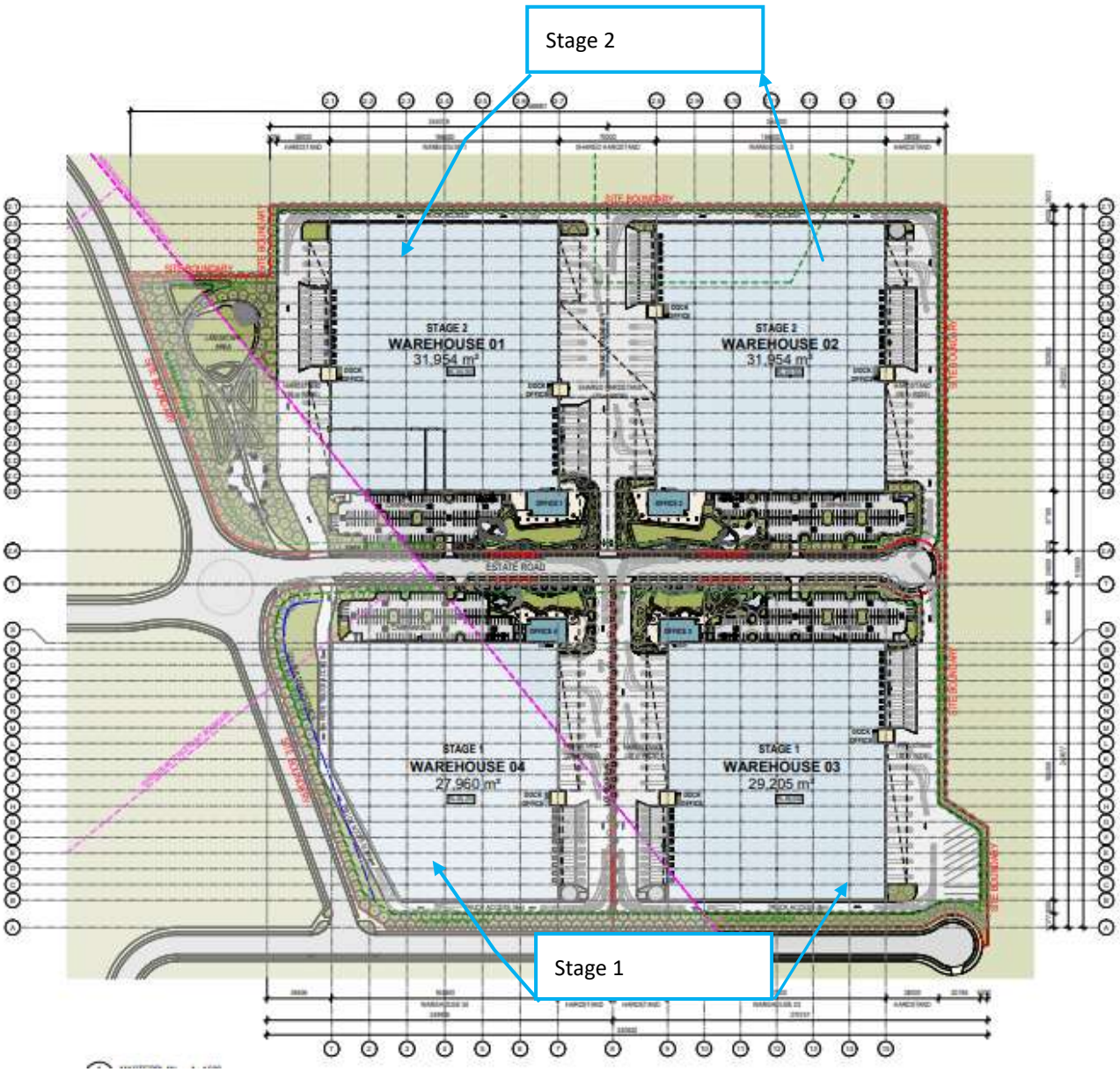


Figure 5 Precinct 1 (Warehouse 3 and Warehouse 4) North Elevation

Figure 6 Precinct 1 (Warehouse 3 and Warehouse 4) South Elevation

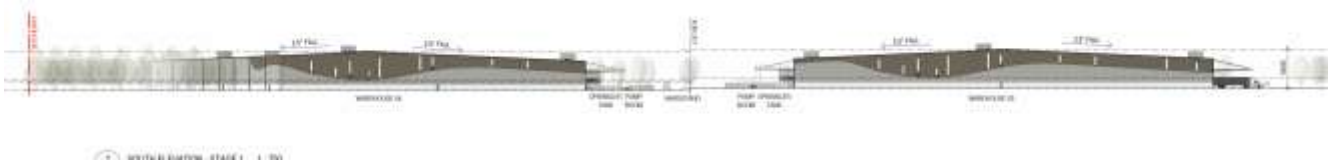


Figure 7 Warehouse 3 Offices

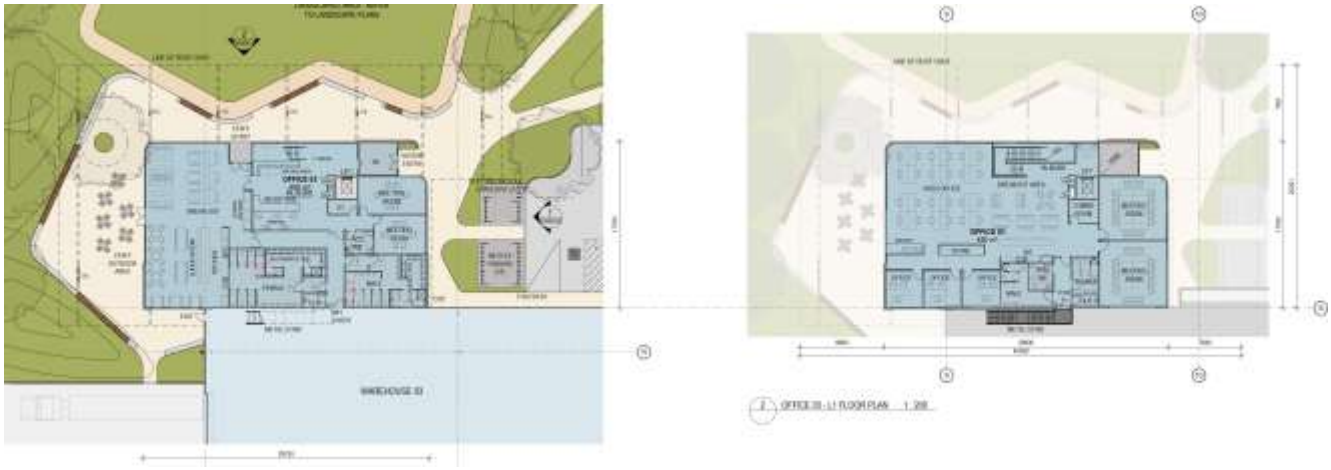


Figure 8 Warehouse 4 Offices

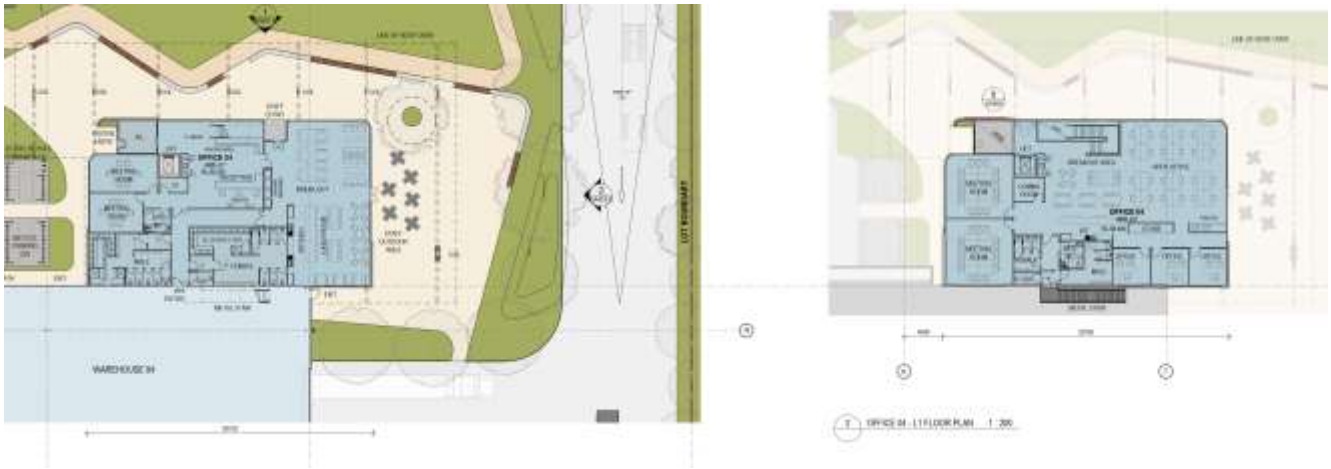
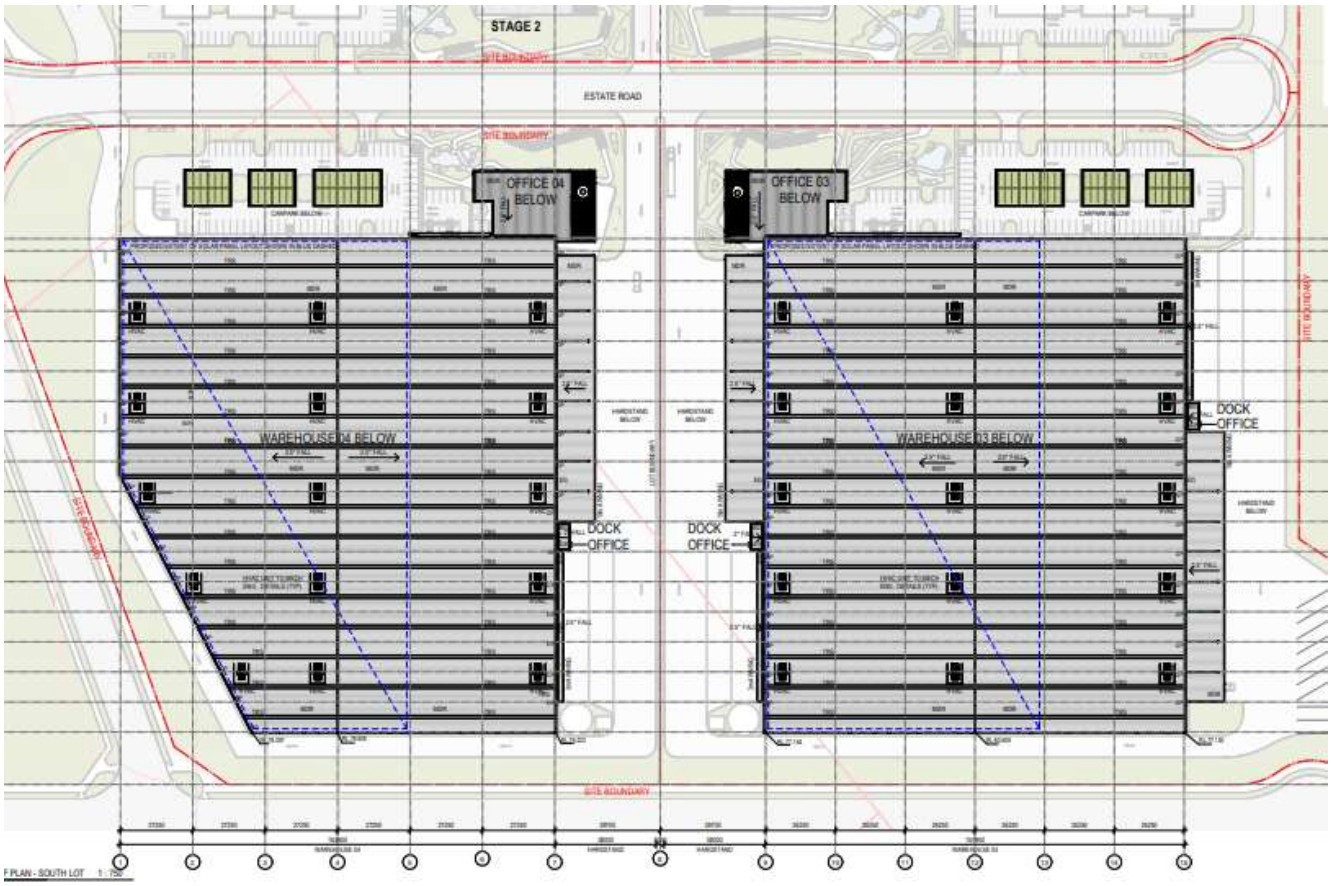


Figure 9 Roof Plan



Overview of Proposed Development

The Precinct 1 building areas are outlined in **Table 1**.

Table 1 Summary of Proposed Precinct 1

Site	Area (m^2)
Warehouse 3	29,205
Warehouse 4	27,960
Office 3	966
Office 4	966
Dock office Warehouse 3	458
Dock office Warehouse 4	229
Carpark Spaces (Warehouse 3)	225
Carpark Spaces (Warehouse 4)	216
Landscape Area (Required 15% site coverage	17404

6 SECRETARY'S ENVIRONMENTAL ASSESSMENT REQUIREMENTS

The Department of Planning and Environment provided industry specific Secretary's Environmental Assessment Requirements (SEARs) to the applicant for the preparation of an Environmental Impact Statement for the proposed development on 23 March 2022.

This report has been prepared to accompany the EIS. It addresses the relevant requirements of the SEARs for the project. A summary of the relevant SEARs is listed below.

Table 2 Regulatory Requirements – Sustainability Management Plan

Item	Item for inclusion	Action and Report Location
8.1	Identify how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development	Section 5.1 details how ESD principles, as defined in section 193 of the EP&A Regulation, are being incorporated into the project's design, construction, and operation phases.
8.1	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 principles and a wide range of ESD initiatives, including renewable energy, to offset the site energy use and reduce peak demand on electricity supply infrastructure.
8.3	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 minimise greenhouse gas emissions, reflecting the goal of achieving net zero emissions. • The project is predicted to achieve a 51.6% GHG emission reduction by including improved systems efficiencies and a rooftop solar PV system when compared with the NCC Reference Building. 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 43%. Refer Section 6

7 ECOLOGICALLY SUSTAINABLE DESIGN

7.1 Definitions of Key Concepts

7.1.1 Ecologically Sustainable Development (ESD)

The concept of Ecologically Sustainable Development (ESD) was outlined in "Our Common Future", the report of the 1987 United Nations World Commission on the Environment and Development (the Brundtland Commission). It defined Sustainable Development as

"Development that meets the needs of the present
without compromising the ability of future generation to meet their own needs".

This concept was adopted within Australia in 1990 when the Council of Australian Governments endorsed a National Strategy for Ecologically Sustainable Development. The Commonwealth Government suggested the following definition for ESD in Australia:

"Using, conserving and enhancing the community's resources so that ecological processes, on which life depends, are maintained, and the total quality of life, now and in the future, can be increased".

Put more simply, ESD is development which aims to meet the needs of Australians today, while conserving our ecosystems for the benefit of future generations. To do this, it is necessary to develop ways of using those environmental resources which form the basis of our economy in a way which maintains and, where possible, improves their range, variety and quality.

The National Strategy for Ecologically Sustainable Development notes that there is no identifiable point where it can be said that ESD has been achieved. The strategy further states that there are two main features which distinguish an ecologically sustainable approach to development:

- We need to consider, in an integrated way, the wider economic, social and environmental implications of our decisions and actions for Australia, the international community and the biosphere; and
- We need to take a long-term rather than short-term view when taking those decisions and actions.

Ultimately ESD should lead to changes in our patterns of resource use, including improvements in the quality of our air, land and water, and in the development of new, environmentally friendly products and processes.

7.1.2 National Strategy for ESD Objectives and Guiding Principles

The National Strategy for ESD sets its core objectives as:

- To enhance individual and community well-being and welfare by following a path of economic development that safeguards the welfare of future generations.
- To provide for equity within and between generations.
- To protect biological diversity and maintain essential ecological processes and life-support systems.

The Guiding Principles of the National Strategy for ESD are documented as:

- Decision making processes should effectively integrate both long and short-term economic, environmental, social and equity considerations.

- Where 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.
- The global dimension of environmental impacts of actions and policies should be recognised and considered.
- The need to develop a strong, growing and diversified economy which can enhance the capacity for environmental protection should be recognised.
- The need to maintain and enhance international competitiveness in an environmentally sound manner should be recognised.
- Cost effective and flexible policy instruments should be adopted, such as improved valuation, pricing and incentive mechanisms.
- Decisions and actions should provide for broad community involvement on issues which affect them.

These guiding principles and core objectives need to be considered as a package. No objective or principle should predominate over the others. A balanced approach is required that takes into account all these objectives and principles to pursue the goal of ESD.

7.2 Specific Objectives of this 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.

8 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.

8.1 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.

8.2 Energy Sources

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

9 SUSTAINABILITY MEASURES COMMITMENTS

9.1 Documentation

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

Table 3 Project Documentation Sources

Document Type	Document Number	Issue Date
Architectural Drawing	21254 DA00 DA600 Drawing Set	29 August 2024 to 30 September 2024

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 which has a higher solar reflectivity is proposed. • 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 offices, client rooms, meeting rooms, lunchroom and outdoor seating area • Low VOC paints, carpet and sealant will be used as per the green star requirements • Refer proposed landscaping aera, Architectural Drawings • Selection of endemic and low maintenance landscaping species • Both AC and lighting control will be 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.	✓ ✓	• Refer Architectural Drawings (**Figure 3**). Spaces for small cars and motorbikes are provided. • Refer Architectural Drawings (**Figure 4**). Secure Bicycle parking and end of trip facilities are provided. • Car park numbers and provision are provided in accordance with Consent Authority requirements. • 441 car spaces are provided for warehouses 3 & 4. Refer **Table 1**

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 warehouses 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 glazing to all air-conditioned areas to satisfy NCC Section J requirements • Translucent roof sheeting is proposed. Refer **Figure 9** • Refer Section 5.5 of this report for proposed set up temperatures • Insulation as per the NCC Section J requirements • LED lighting and lighting controls to warehouse and offices. • Adequate ventilation will be supplied in accordance with AS1668. • Awnings are proposed and shown in Architectural Drawings. Refer **Figure 4**

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.	✓ ✓ ✓ ✓ ✓ ✓ ✓	• Building fabric and insulation as per the NCC requirements • Design brief sets the temperature - Refer Section 9.4 of this report. • LED lighting to warehouse and offices. • Lighting controls to warehouse and offices. • Solar hot water or heat pump system • Sub meters for major energy/water uses as per the latest green star rating tool V1.0 • Colorbond CoolMax WhiteHaven is proposed to reduce heat load through the roof. • As per NCC Section J requirement.

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). • 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.

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 80% of the predicted construction waste arising from development can be re-used (on-site or at another development) or recycled off-site as per the green star requirements. • 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 • SLR recommends water efficient dishwashers • 100 kL Rainwater tanks have been recommended 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.	• 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.

9.2 Baseline and Proposed Energy Consumption

A National Code Construction (NCC) Sections J Deem-to-Satisfy compliant building is used as the baseline building for energy consumption savings.

The NCC 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 NCC contains mandatory technical provisions for the design and construction of NCC class buildings.

Volume 1, Section J of the NCC 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)

it is predicted that the proposed development will have more than 51.6% energy reduction - refer **Section 9.8** for the energy simulation results. The reduction has been enabled via:

- On-site solar photovoltaic (PV) system
- 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
- Translucent sheets to the warehouse to receive daylight.

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

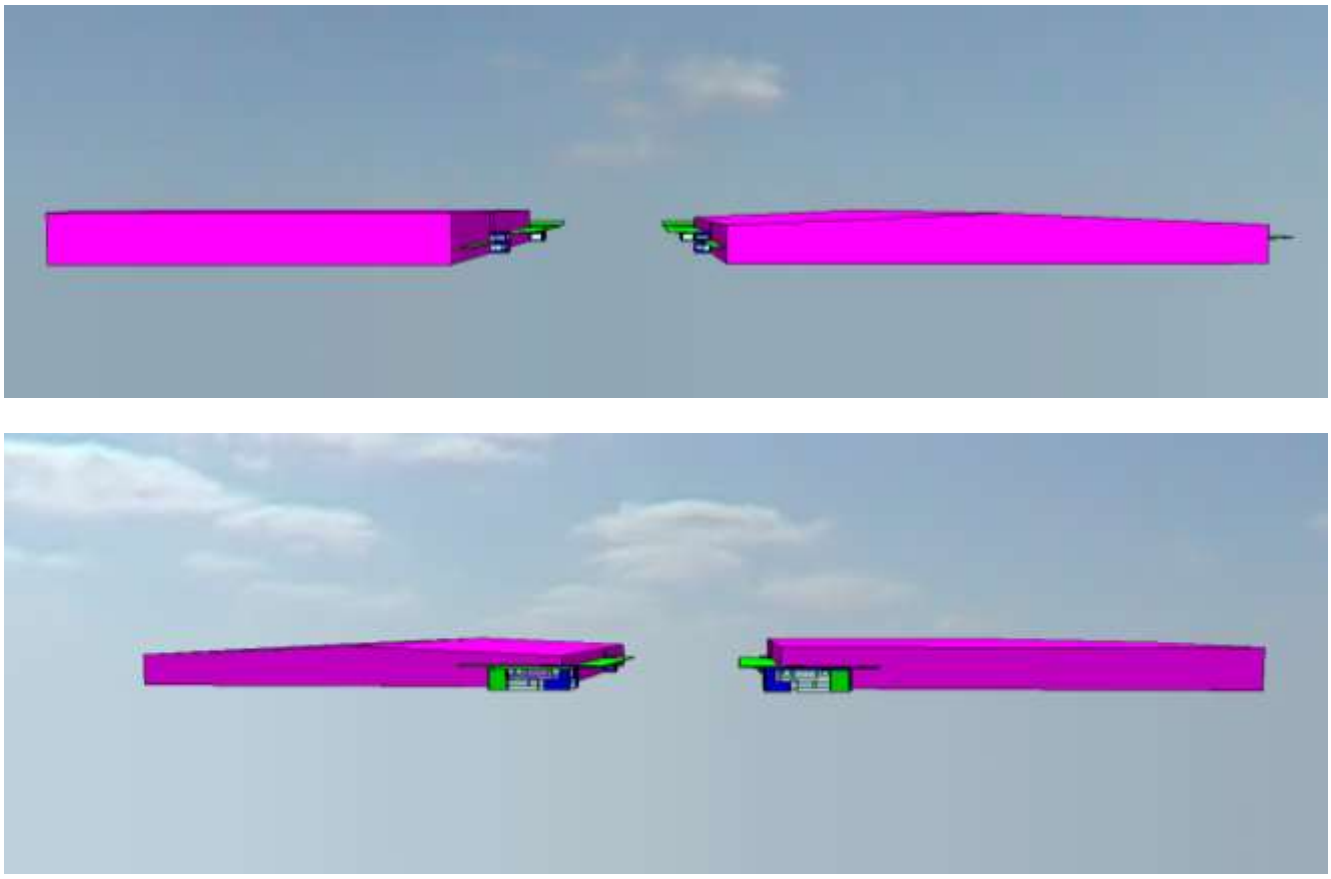
The Energy Simulation Program used in this study is the IES computer program Virtual Environment 2019 (VE). The program is based on the ASHRAE response factor and the modifications included utilising Australian weather data and including building materials more appropriate to those used in Australia 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_88 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 24-hour building operating profiles such as occupancy, lighting, air conditioning, and equipment were adopted for the office areas; and
- At least 300 kW of PV system has been proposed on the rooftop of the warehouses.

The developed 3D model for energy modelling is shown in **Figure 10**.

Figure 10 Proposed Warehouses in IES Model (Precinct 1 South)



9.3 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 Volume One). The maximum illumination density for a storage warehouse is 4 W/m² as per Table J6.2a of the NCC 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 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% lighting energy reduction when compared with reference building. Detailed calculation is shown in **Appendix A.**

9.4 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.

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 5

Table 5 AC Unit Temperature Control Range

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

Air-conditioning Energy Efficiency Requirements

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

Table 6 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

9.5 Building Fabric Requirements

Parts J1 to J3 of the NCC 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 assumptions are shown below:

Table 7 Reference Dynamic Modelling Inputs for the Offices

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Climate Data</td><td>Weather data from NSW_Richmond_88_Test Reference Year (TRY)</td></tr>
<tr><td>External wall</td><td>All external walls have a total R-value of R2.8</td></tr>
<tr><td>Internal wall</td><td>All internal walls to unconditioned space have a total R-value of R2.1</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 colspan="2">Glazing Properties</th></tr>
<tr><th>U-Value</th><th>SHGC</th></tr>
<tr><td>All offices</td><td>3.4</td><td>0.40</td></tr>
</table></td></tr>
<tr><td>Roof</td><td>Concrete roof with insulation, Total R-value= R3.2</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 m3/hr.m^2 at 50 Pa reference pressure</td></tr>
<tr><td>Lighting Density</td><td>4.5W/m^2 for offices as per NCC Table J6.2a</td></tr>
<tr><td>Lighting hours</td><td>24hrs</td></tr>
<tr><td>Equipment density</td><td>The equipment load in the model for the air-conditioned area is 11W / m² as per NCC Table 2h</td></tr>
<tr><td>Occupant density</td><td>As per Table D1.13 of the NCC</td></tr>
<tr><td>Occupancy Schedule</td><td>Assumed 70% peak density continuous for 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>24hrs</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, dated 29th August 2024 provided by SBA Architects</td></tr>
</table>

Table 8 Proposed Dynamic Modelling Input for the Offices

<table>
<tr><th>Item</th><th>Description</th></tr>
<tr><td>Climate Data</td><td>Weather data from NSW_Richmond_RO_88_Test Reference Year (TRY)</td></tr>
<tr><td>External wall</td><td>All external walls have a total R-value of R2.8</td></tr>
<tr><td>Internal wall</td><td>All internal walls to unconditioned space have a total R-value of R2.1</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 colspan="2">Glazing Properties</th></tr>
<tr><th>U-Value</th><th>SHGC</th></tr>
<tr><td>All offices</td><td>4.6</td><td>0.60</td></tr>
</table></td></tr>
<tr><td>Roof</td><td>Concrete roof with insulation, Total R-value= R3.2</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 m3/hr.m^2 at 50 Pa reference pressure</td></tr>
<tr><td>Lighting Density</td><td>4W/m^2 for offices</td></tr>
<tr><td>Lighting hours</td><td>24hrs</td></tr>
<tr><td>Equipment density</td><td>The equipment load in the model for the air-conditioned area is 11W / m^2 as per NCC Table 2h</td></tr>
<tr><td>Occupant density</td><td>As per Table D1.13 of the NCC</td></tr>
<tr><td>Occupancy Schedule</td><td>Assumed 70% peak density continuous for 24 hours</td></tr>
<tr><td>HVAC System type</td><td>HVAC efficiencies for heating and cooling as follows:
EER: 4.0; **CoP:** 4.0</td></tr>
<tr><td>HVAC Hours</td><td>24hrs</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, dated 29th August 2024 provided by SBA Architects</td></tr>
</table>

9.6 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. If the domestic hot water usage is less than the energy required to heat to the water also decreases. Moreover, the supplement natural gas consumption will be reduced by using the proposed solar hot water system.

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

9.7 Renewable Energy

SLR recommends offsetting the total energy consumption using renewable energy such as PV solar energy.

SLR recommend at least 150 kW PV Solar per warehouse (300 kW for the Precinct 1 south).

The proposed PV system can be optimised during the detailed designs stage.

9.8 Estimated Annual Energy Consumption for Precinct 1 - South

- The proposed building is likely to achieve a 12% lighting energy reduction when compared with reference building. Refer **Section 9.3**
- At least 300 kW of PV solar system has been proposed.
    - The proposed 300 kW PV solar system will offset 416,100 kWh/year of energy usage
- The design of the air conditioning system for the proposed development is not progressed at this stage. Efficient air conditioning system with a minimum Energy Efficiency Ratio (EER) of 4 is proposed. Refer **Table 6**

The predicted Total Annual Energy Consumption of the NCC Reference Building and the Proposed Building is summarised in **Table 9**.

Table 9 Comparison of Annual Energy Consumption Between the Reference and Proposed Building – Precinct 1 (Warehouse 3 and Warehouse 4)

Electricity Usage	Reference Building (MWh)	Proposed Building (MWh)
Heating	38.5	32.8
Cooling	48.6	35.5
Auxiliary	28.9	37.2
Lighting	1,004.4	879.61
Equipment[1]	215	215
DHW	3.6	2.2[2]
Lift	3.5	3.5
PV System	-	-416
Total	**1,142.9**	**590.53**

Note 1 Equipment Load of 11 W/m^2 is assumed for the air-conditioned area as per the NCC requirements.
Note 2: Heat pump hot water system is considered for the proposed development

By implementing all energy efficiency measures described in **Section 6**, the project is predicted to reduce GHG emissions by 51.6% compared with the NCC Reference Building.

10 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.

SLR recommendation is summarised in **Table 10**.

Table 10 Proposed Rainwater Tank for the Master Plan

Building No	(kL)
Warehouse 3	50
Warehouse 4	50
Total	**100 kL**

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 33%.

The quantities of each water fittings are not available at this stage. SLR has assumed the data based on proposed quantitates for similar size warehouses.

11 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.

As specified within the Tenant Base Building Specification, 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.

11.1 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.

11.2 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 is recommended for the Project. The Building Users' Guide should provide 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.

11.3 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

12 CONCLUSIONS

SLR Consulting Australia Pty Ltd (SLR) has been engaged by DHL Supply Chain (Australia) Pty Ltd to prepare a Sustainability Management Plan (SMP) for the proposed warehouse and logistics facilities, including two warehouses and associated landscaping works within part of Lot 101 in DP 1306448 at 1953-2109 Elizabeth Drive, Badgerys Creek (herein referred to as the project). The project is located immediately north of Elizabeth Drive and the Western Sydney International (Nancy Bird Walton) Airport (WSA).

The project is a staged development with a concept approval inclusive of bulk earthworks, infrastructure delivery, and road access for the wider Northern Gateway Warehouse and Logistics Estate, as well as a detailed proposal for the construction of two warehouses (Precinct 1 - Warehouses 3 and 4) with a gross floor area of 57,165 m^2 .

The current study covers the sustainability management plan and greenhouse gas reduction for the proposed warehouse and logisdtic facilities of Precinct 1 (Warehouses 3 and 4).

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

- Identify how ESD principles (as defined in section 193 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 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:

- At least 300 kW PV Solar system (150 kW per warehouse);
    - The proposed 300 kW PV solar system will offset 416,100 kWh/year of energy usage
    - The estimated greenhouse gas CO2 emission saving is approximately 341,202 kgCO2/annum
- 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;
- R3.2 total roof insulation for the air-conditioned office areas;
- R2.8 total external wall insulation for the air-conditioned office areas;
- High performance glazing to all air-conditioned areas or minimum NCC requirements;
- Passive solar design for external outdoor areas;

- Colorbond CoolMax roof to reduce heat load through the roof.
- Efficient air conditioning system with a minimum Energy Efficiency Ratio (EER) of 4;
- A solar hot water or electric heat-pump system for domestic hot water use;
- 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 51.6% GHG emission reduction when compared with 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 33%.

The project is committed to achieve a 5-Star Green Star Design and As Built Rating using the Green Building Council of Australia (GBCA) Building V1.0 Rating Tool. The project design will be reviewed and refined during design development in line with Section 4.7 of the Western Sydney Aerotropolis Precinct Plan requirements. As per the associated sustainable regenerative targets for Non-residential uses (subject to final modelling), a pathway to 6+ star Green Star will be considered.

In addition, the development is targeting to achieve net-zero emissions compliance. Refer Appendix A for a Net Zero Statement. The Net Zero Statement is in line with the Planning Circular PS23-001 and the Net Zero Statement Technical Note. It incorporates the required building envelope, systems, onsite renewables, energy and carbon reductions, electrification and Greenpower details to become a net zero development.

The Net Zero Statement is also in line with Section 2.12 of the Aerotropolis Phase 2 DCP. It responds to the objectives and performance outcomes by providing details of how building envelope and systems minimise energy consumption, and how electrification, onsite and offsite renewable energy sources can achieve 100% renewable energy supply and net zero emissions.

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

Proposed Lighting Requirements Northern Gateway Pricinct 1 (Warehouses 3 & 4)								
BCA Comply Building	**BCA Requirements**		**Area**	**Operating Hrs**	**Lighting Control**			**Total Annual Energy Consumption (kWh)**
	Warehouse W/m2	4	57165	Monday to saturday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	1078690
	Offices W/m2	4.5	2619	Monday to saturday 24 hours	Motion Detector	0.9	1	92662
			59784				**Total**	**1171352**
							kWh/m2	**19.59**

Proposed Lighting Requirements Northern Gateway Pricinct 1 (Warehouses 3 & 4)								
BCA Comply Building	**BCA Requirements**		**Area**	**Operating Hrs**	**Lighting Control**			**Total Annual Energy Consumption (kWh)**
	Warehouse W/m2	3.5	57165	Monday to saturday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	943854
	Offices W/m2	4	2619	Monday to saturday 24 hours	Motion Detector	0.9	1	82367
			59784				**Total**	**1026220**
							kWh/m2	**17.17**

APPENDIX B

Water Saving Recommendations

WATER SAVINGS CALCULATION Northern Gateway (Warehouses 3&4)

Table B1 - Number of fixtures

Area	Toilets	Urinal	Basins	Showers
Amenities	38	12	48	4
Total	38	12	48	4

Assume 70% of toilet water usage is supplied by rainwater

Fraction not supplie	0.3

Table B2 - Results

No water saving measures		Max water usage rate [1]	
Toilet	Adopt 3* Average Flush Usage in Table C3	152	L/s
Tap	Adopt 3* Tap Usage in Table C3	432	L/s
Urinal	Adopt 3* Urinal Usage in Table C3	24	L/s
Water reuse measures (4*) with RWH		**Max water usage rate [1]**	
Toilet	Adopt 4* Average Flush Usage in Table C3	133	L/s
Tap	Adopt 4* Tap Usage in Table C3	360	L/s
Urinal	Adopt 4* Urinal Usage in Table C3	18	L/s
Water reuse measures (5*) with RWH		**Max water usage rate [1]**	
Toilet	Adopt 5* Average Flush Usage in Table C3	114	L/s
Tap	Adopt 5* Tap Usage in Table C3	288	L/s
Urinal	Adopt 5* Urinal Usage in Table C3	12	L/s

	3* with RWH	4* with RWH	5* with RWH
Improvement Percent	20	33	46

Calculation Notes

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

[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*

APPENDIX C

Net-Zero Statement for Badgerys Creek Development - DHL Logistics Facility SSD-70817958 Precinct 1 - South

NSW has whole-of-economy targets to reduce greenhouse gas emissions by 70 per cent by 2035 compared to 2005 levels and reach net zero emissions by 2050.

The proposed development at Badgerys Creek – DHL Logistics Facility SSD – 70817958 Precinct 1 – South – by implementing all energy efficiency measures described in the current study, including the proposed PV solar system, will significantly minimise greenhouse gas emissions, reflecting the goal of achieving net zero emissions.

The project has strong alignment to net-zero requirements. Some of the initiatives being proposed are:

- Key consideration for the building envelop include:
    - Translucent roof sheeting to warehouse areas;
    - R3.2 total roof insulation for the air-conditioned office areas;
    - R2.8 total external wall insulation for the air-conditioned office areas;
    - High performance glazing to all air-conditioned areas or minimum NCC requirements;
    - Passive solar design for external outdoor areas;
    - Colorbond CoolMax roof to reduce heat load through the roof.
- Key consideration for the building system include:
    - At least 300 kW PV Solar system (150 kW per warehouse);
        - The proposed 300 kW PV solar system will offset 416,100 kWh/year of energy usage
        - The estimated greenhouse gas CO2 emission saving is approximately 341,202 kgCO2/annum
    - 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;
    - Efficient air conditioning system with a minimum Energy Efficiency Ratio (EER) of 4;
    - A solar hot water or electric heat-pump system for domestic hot water use;
    - Power sub-metering to enable continued review of power consumption for the offices, and warehouse.

Subject to implementing the energy efficiency measures recommended, the project is predicted to achieve a 51.6% GHG emission reduction when compared with NCC Reference Building

Other considerations to achieve a net zero development by 2050 include:

- Electrification of all appliances and equipment.
- Use of Green Power to contribute to a reduction in total greenhouse gas emissions produced by the proposed development. Greenpower is produced from environmentally friendly renewable energy sources such as solar, wind, water or biomass.

Net Zero Emissions by 2030 will also be met as 100% Greenpower and no fossil fuel will be used in the building systems from commencement to meet Green Star requirements.

Once the design of the building services is progressed during the detailed design stage, SLR will carry out detailed energy modelling to assess the energy use and optimise design as required.

Yours sincerely,

Dr Neihad Al-Khalidy, ME Mech, PhD

SLR Consulting Australia

Technical Director – Accredited Green Star and NABERS Professional

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