

Sustainability Management Plan
Oakdale East Austral Plant and Warehouse Development
Oakdale East

Project Number 610.18365.00000

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Goodman Property Services (Aust) Pty Ltd
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Australia

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Sustainability Management Plan

Oakdale East Austral Plant and Warehouse Development

Oakdale East

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DOCUMENT CONTROL

Reference	Status	Date	Prepared	Checked	Authorised
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1 INTRODUCTION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by Goodman Property Services (Aust) Pty Ltd to provide a Sustainability Management Plan (SMP) for the Oakdale East Austral Plant and Warehouse Development of the proposed Oakdale East.

The SMP has been prepared in accordance with the State Significant Development – Secretary's Environmental Assessment Requirements (Section 78A(8A) of the Environmental Planning and Assessment Act 1979, and will be lodged to Fairfield Council for Development Application.

2 OBJECTIVES

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.

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 development consent conditions and other relevant regulatory authorities.
- Confirm the total greenhouse savings achieved in comparison to the base case development.
- Include a calculation of water requirements and measures incorporated to reduce water use.
- To include a program to monitor and report annually on the efficiency of measures implemented.
- To ensure the long term sustainability of resource use through more efficient and cost effective energy use practices for the life of the development.

3 SUSTAINABILITY MANAGEMENT GUIDELINES AND LEGISLATION

3.1 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, Class 8 Masonry Plants and Class 5 Offices). There are eight (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)

3.2 Secretary's Environmental Assessment Requirements (SEARs)

The SEARs of the Oakdale Site states:

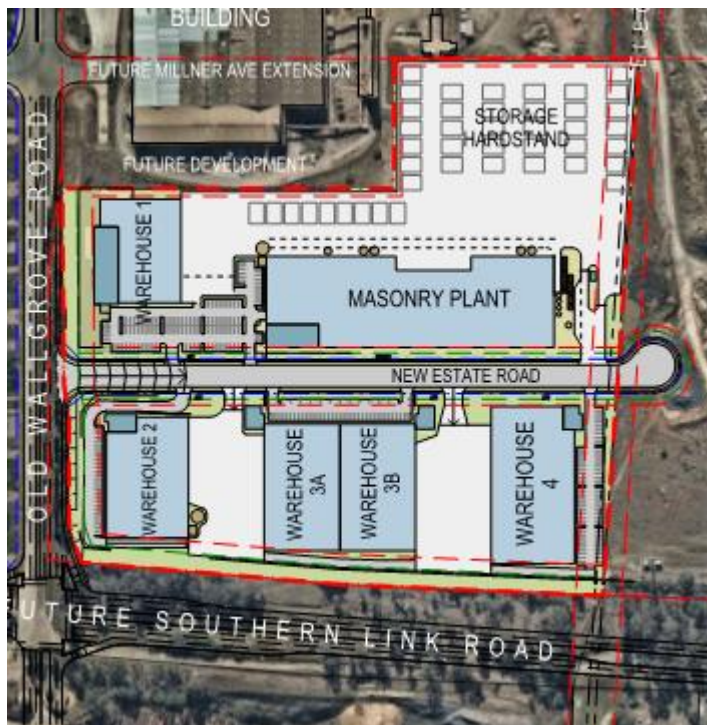
- **Greenhouse Gas and Energy Efficiency** – *including an assessment of the energy use on site, and demonstrate what measures would be implemented to ensure the proposal is energy efficient.*
- **Ecologically Sustainable Development** – *including an assessment of how the development will incorporate ecologically sustainable development principles in all phases of the development.*

4 PROJECT DESCRIPTION

The Development Site is located at 224-398 Burley Road, Horsley Park and will be known as 'Oakdale East'. It is situated within an approved Concept Plan area (Oakdale East Concept Plan), which forms part of the broader Oakdale East. The development site includes 6 ancillary offices, a masonry plant, five (5) warehouses for generic warehouse and distribution area. The Oakdale East master plan is shown in **Figure 1**.

This report has been prepared to inform a Secretary's Environmental Assessment Requirements for the staged development of the Oakdale Developments. The current study covers the sustainability management plan, greenhouse gas reduction and water reduction for Oakdale East development.

Figure 1 Oakdale East Masterplan

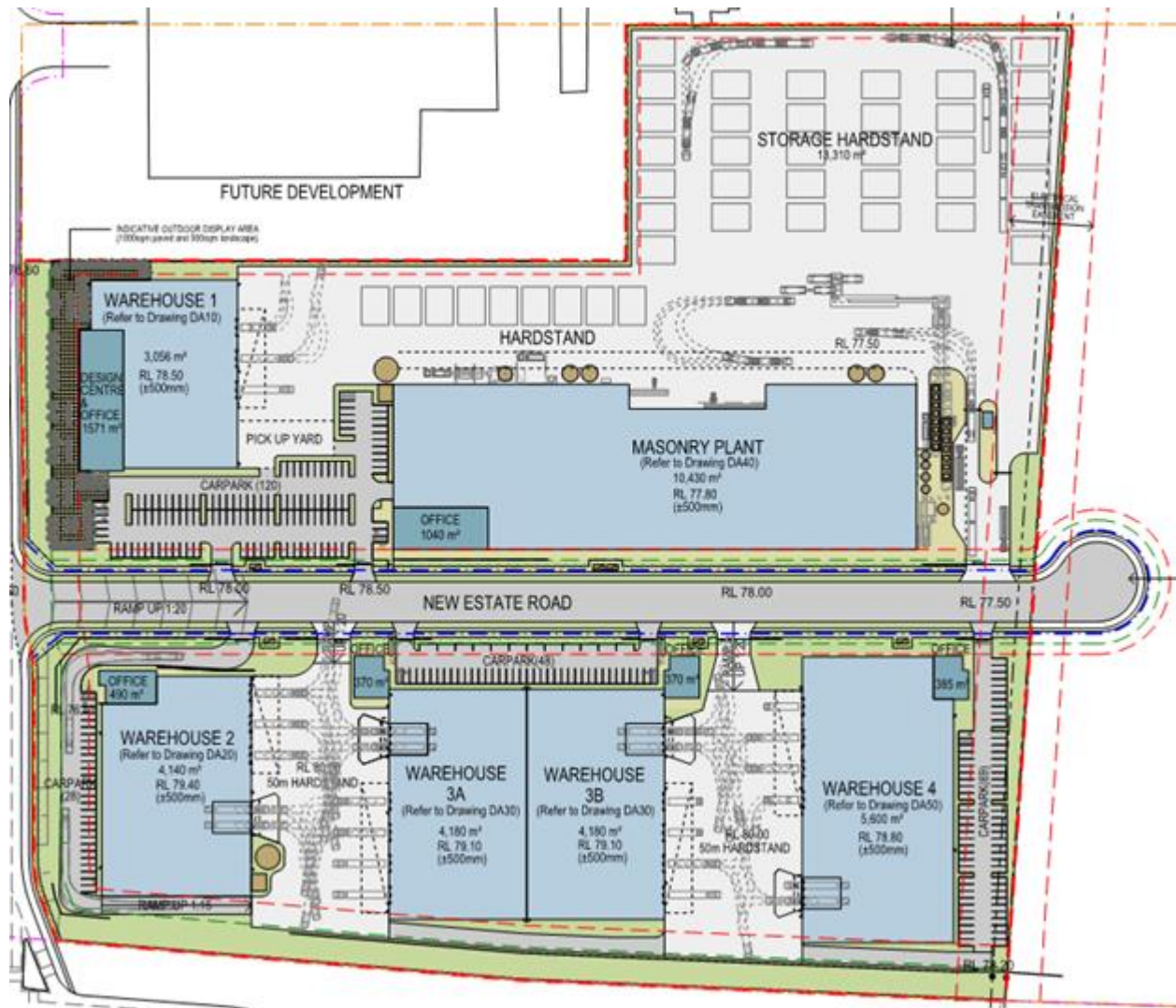


When completed the development site of Oakdale East will consist of:

- Warehouse 1 area 3,056 m²;
- Warehouse 2 area 4,140 m²;
- Warehouse 3A and 3B area 8,360 m²;
- Warehouse 4 area 5,600 m²;
- 6 Offices 4,126 m² (1,471 m², 490 m², 370 m², 370 m², 385 m², and 1,040 m²)
- Masonry Plant 10,430 m²;
- 265 car parks.

The development site is illustrated in **Figure 2 to Figure 7**.

Figure 2 Proposed Site Plan of Oakdale East



The development provides a masonry plant, 5 new warehouses with 6 ancillary offices. Operational activities are 24/7 and include the following:

- Unloading and loading of goods via trucks, forklift and shipping containers;
- Hardstand, landscaping and
- Car park.

Figure 3 Proposed Plan of Warehouse 1

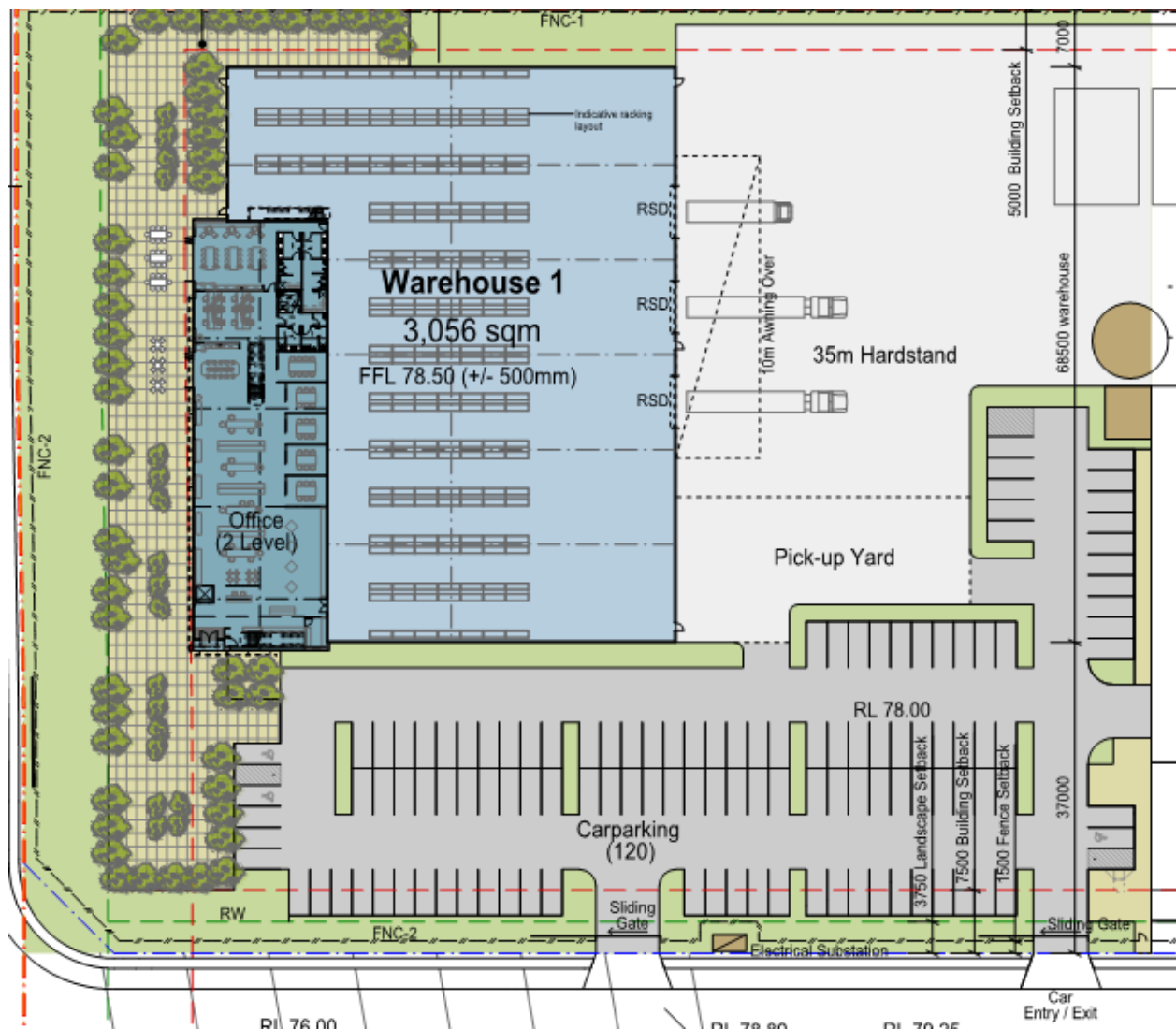


Figure 4 Proposed Plan of Warehouse 2

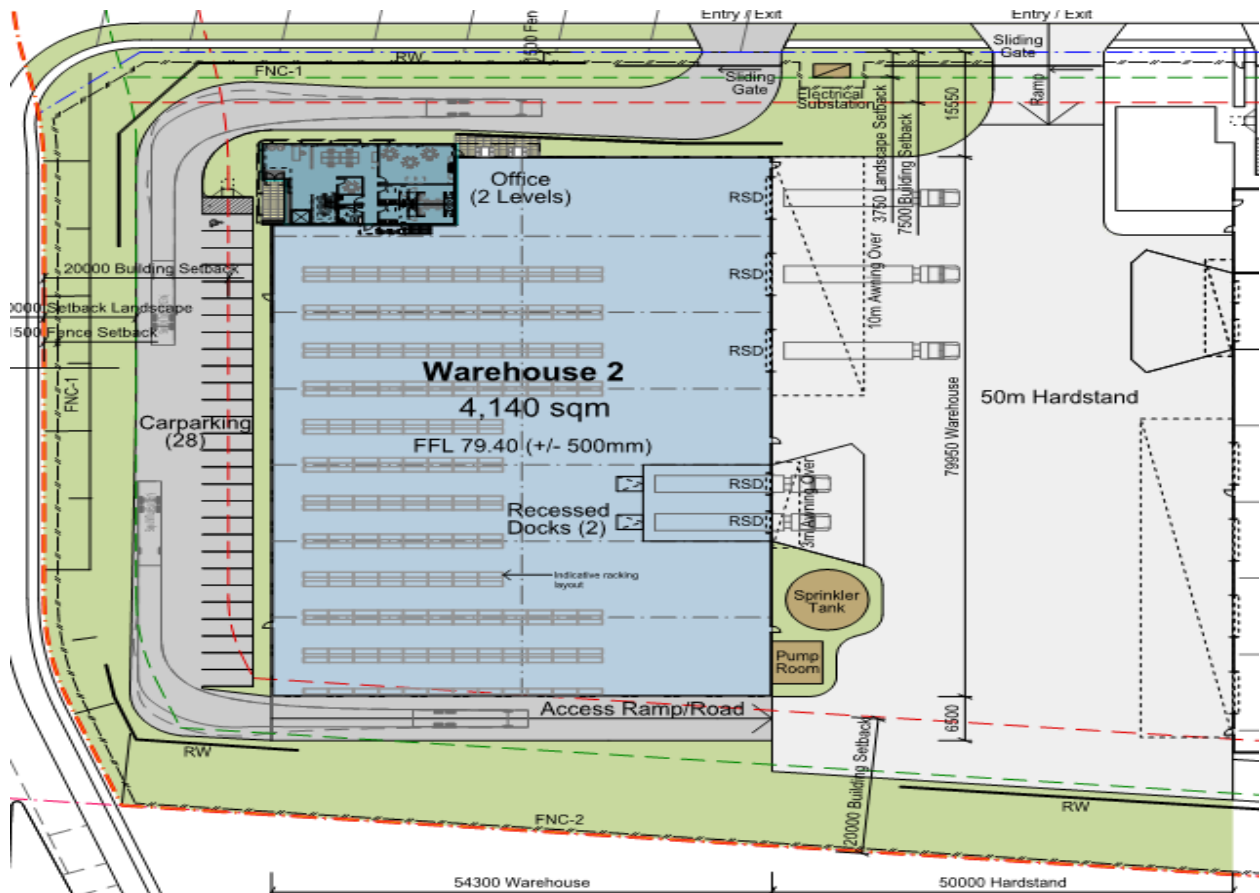


Figure 5 Proposed Plan of Warehouse 3

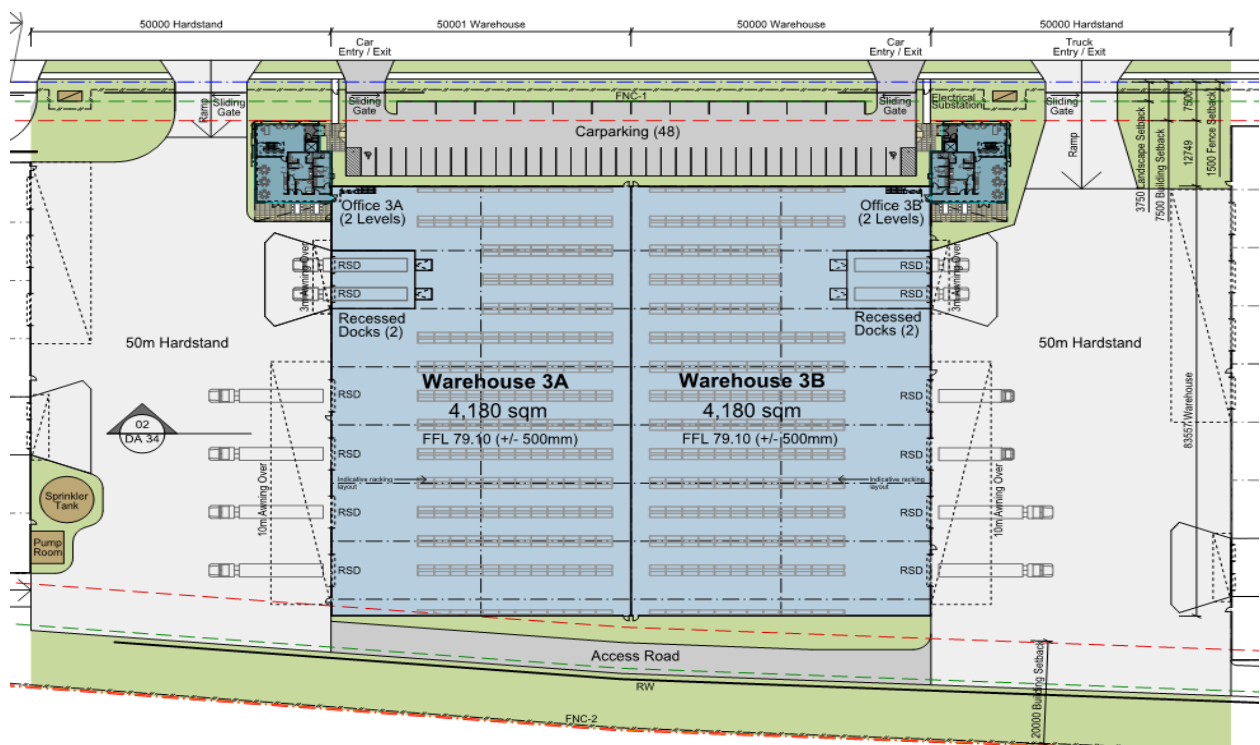


Figure 6 Proposed Plan of Warehouse 4

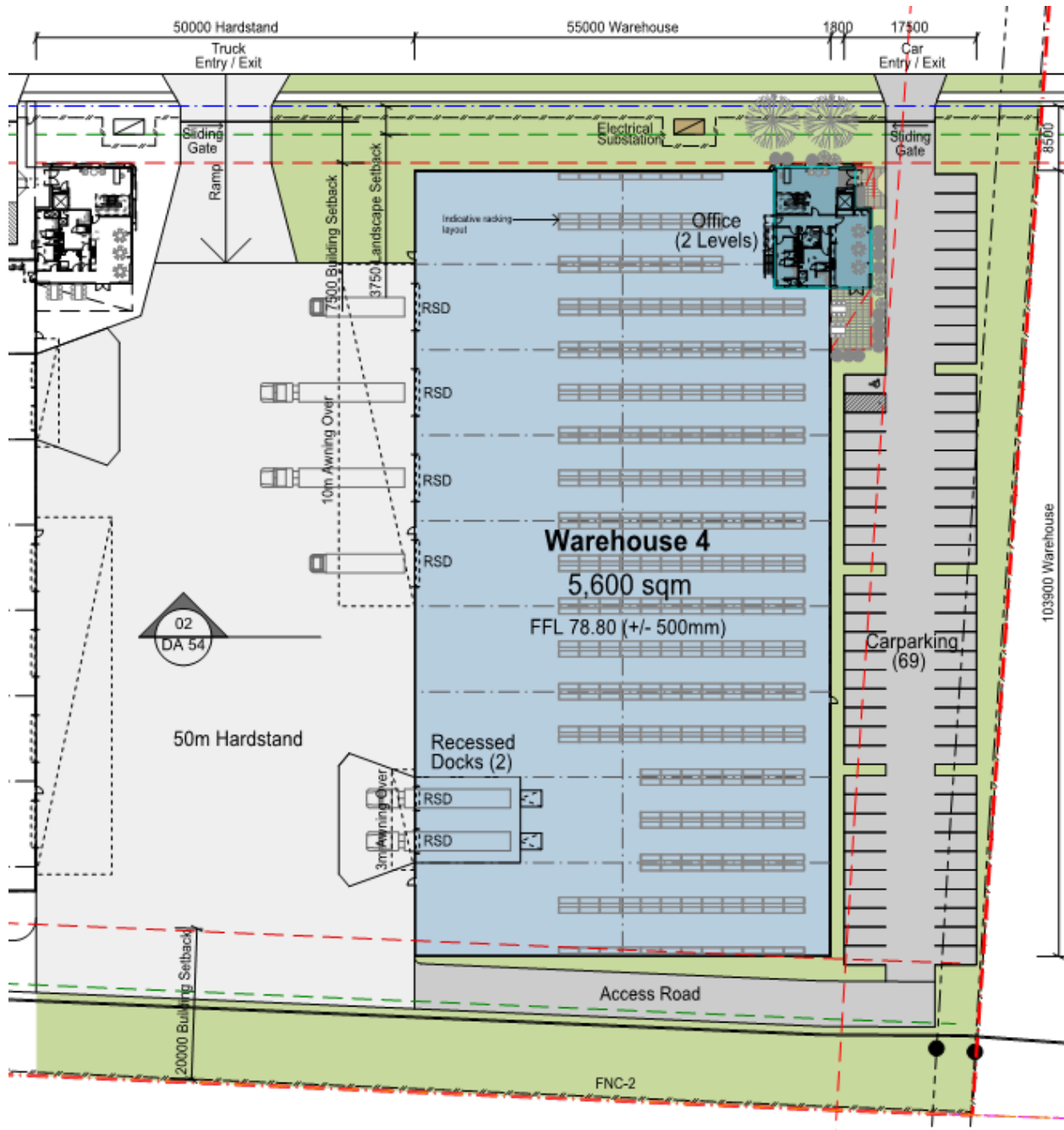
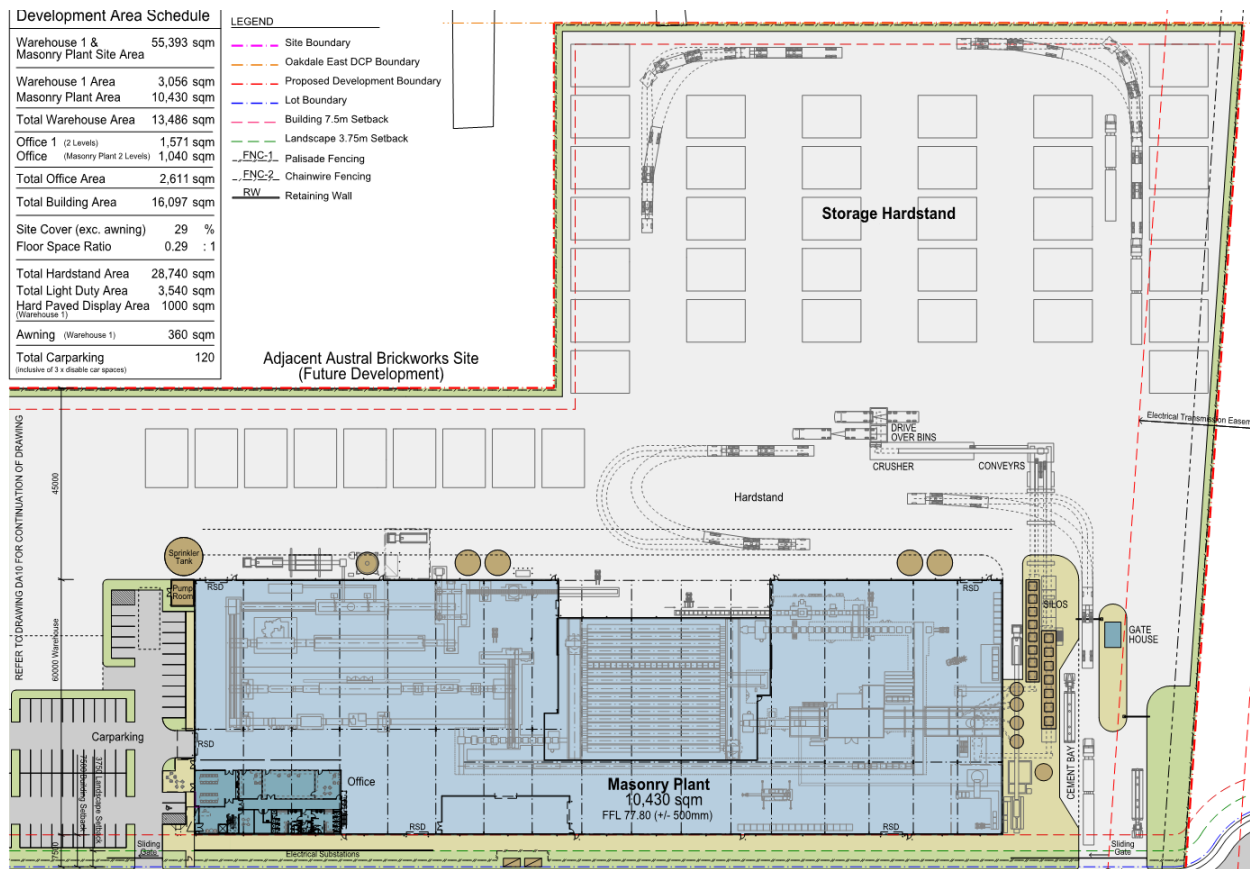


Figure 7 Proposed Plan of Masonry Plant



5 OPERATIONAL ENERGY MANAGEMENT

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

Effective energy management is achieved through the implementation of an SMP for the operational life of the project.

5.1 Identified Major Energy Use Components

5.1.1 Warehouses and Offices

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.
- Power for equipment

5.1.2 Masonry Plant

The majority Brickworks energy consumption can be attributed to

- the combustion of natural gas for firing bricks and
- air compressors and other electrical equipment.

5.2 Energy Sources

The main source of energy for the warehouses and associated offices is electricity.

The masonry plant uses gas and electricity

6 PROPOSED SUSTAINABLE MEASURES

The following ESD initiatives and Energy Efficiency measures are recommended and assessed regarding project implementation.

The following documentations are used in this report.

Document Type	Document Number	Issue Date
Architectural drawings	OAK-E MP 02 (C)	24/01/2019
Architectural drawings	OAK-E MP 03 (F)	24/01/2019
Architectural drawings	OAK-E DA 10 (D)	24/01/2019
Architectural drawings	OAK-E DA 20 (B)	24/01/2019
Architectural drawings	OAK-E DA 30 (B)	24/01/2019
Architectural drawings	OAK-E DA 40 (C)	24/01/2019
Architectural drawings	OAK-E DA 50 (C)	24/01/2019

Table 1 Summary of Assessment – Warehouses and Offices

Objective	Proposed Target	Proposed Strategy	Comments
Design and Management <ul style="list-style-type: none"> Documentation of design intent and expected outcomes. Appropriate commissioning. 	<ul style="list-style-type: none"> Communicate sustainability initiatives and operation to building users. Commissioning and building tuning required by contractors and reviewed for 12 months after completion. 	<ul style="list-style-type: none"> 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. 	<p>SLR recommends the preparation of Building User Guide that enables building users to optimise the building's environmental performance.</p> <p>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.</p>
Façade Performance <ul style="list-style-type: none"> Optimised façade performance. 	<ul style="list-style-type: none"> Achieve minimum performance requirements under NCC Section J1 and J2. Reduce heat gain through the warehouse façade. 	<ul style="list-style-type: none"> 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. Performance glazing of office spaces appropriate to the window size and orientation. 	<p>NCC Section J report needs to be prepared by a qualified ESD consultant.</p> <p>This warehouse will comply with all the requirements specified within the report during construction stage.</p> <p>Colourbond roof sheeting which has a higher solar reflectivity is proposed;</p> <p>As per project NCC Section J report.</p>

Objective	Proposed Target	Proposed Strategy	Comments
Social sustainability <ul style="list-style-type: none"> Consider design with due regard to occupant satisfaction in accessibility, usability, Indoor air quality and public space utility. 	<ul style="list-style-type: none"> High level of occupant satisfaction. Provide external as well as internal comfort. 	<ul style="list-style-type: none"> Flexibility of space for potential future configurations. Use of Low VOC paints, carpets and sealants. Warehouses - Consider using dense planting to screen the outdoor areas from the docks to increase visual and acoustic amenity. Consider occupant user control e.g. A/C systems, glare reducing strategies, lighting etc. 	<p>The design will incorporate open plan workspaces, offices, client rooms, meeting rooms, lunch room and outdoor seating area</p> <p>Low VOC paints, carpet and sealant will be used</p> <p>Selection of endemic and low maintenance landscaping species</p> <p>Both AC and lighting control is provided to offices; and only lighting control is provided to warehouses, masonry plants and offices.</p>

Objective	Proposed Target	Proposed Strategy	Comments
Minimising Transport Impact <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Bicycle racks and amenity and change room facilities are recommended in accordance with planning guidelines for walking and cycling. NSW department of infrastructure, Planning and Natural Resources; Road and Traffic Authority. 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. 	<p>Car park numbers and provision for disabled parking are provided be in accordance with Consent Authority requirements.</p>

Objective	Proposed Target	Proposed Strategy	Comments
Optimising IEQ <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> Daylight: rationalised glazing to offices; high performance glass. Daylight: evenly spaced translucent roof sheeting to warehouses areas. Thermal comfort: Office envelope, Warehouses, Masonry plant, and HVAC system designed to meet thermal comfort requirements; Warehouse considers whirly birds and fans for heat reduction. Provide R1.5 roof insulation to the warehouse and consider insulation to the inside face of the warehouse walls. 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: Minimum to AS: 1668 or consider increased fan and duct sizing. Provide sufficient shading and blinds with rationalised glazing for visual and thermal comfort. 	<p>High performance glazing to all offices to satisfy Section J requirements</p> <p>Architectural Drawings</p> <p>Refer Section 6.3.1 of this report for proposed set up temperatures</p> <p>The facility will have internal fans - potential for night purging of warehouse</p> <p>Warehouse external walls and roof to satisfy NCC Section J requirements.</p> <p>Architectural Drawing</p> <p>Architectural Drawing</p> <p>LED lighting to warehouse and lighting controls to warehouse and offices.</p> <p>Adequate ventilation will be supplied in accordance with AS1668.</p> <p>Architectural Drawings</p>

Objective	Proposed Target	Proposed Strategy	Comments
Minimising Energy Use <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. Optimise insulation for energy and thermal comfort. 	<ul style="list-style-type: none"> Predominantly west/east facing office, consider additional shading or solar controlled glazing to reduce heat transfer into the office space. Allow high-level ventilation openings to masonry plant and warehouse spaces. Consider alternative passive exhaust options such as wind or solar assisted whirly birds to improve thermal comfort. Consider office air conditioning temperature set-points for an increased comfort band. Provide energy efficient lighting, with zoning and automatic controls where reasonable. Consider LED lighting strategies and advanced controls. 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. 	<p>Architectural Drawing</p> <p>The facility will have internal fans - Potential for night purging.</p> <p>Design brief sets the temperature - Refer Section 6.3.1 of this report.</p> <p>LED lighting to warehouse and lighting controls to warehouse, masonry plant and offices.</p> <p>Sub meters for offices, warehouses, major energy/water uses in the Masonry plant and external areas.</p> <p>Colourbond roof sheeting which has a higher solar reflectivity is proposed.</p> <p>As per project NCC Section J report.</p>

Objective	Proposed Target	Proposed Strategy	Comments
Choosing Materials <ul style="list-style-type: none"> • With consideration to energy inputs in manufacture. • Consequential impacts – rain forest timbers. • Regional or local manufacturer employment support. 	<ul style="list-style-type: none"> • 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. 	<ul style="list-style-type: none"> • Joint less fibre reinforced slab. • Use pre-cast concrete panels with recycled content. • Re-use material during the construction stage. 	<p>To minimise the environmental impacts of materials used by encouraging the use of materials with a favorable lifecycle assessment based on the following factors:</p> <ul style="list-style-type: none"> - Fate of material - Recycling / re-use - Embodied energy - Biodiversity - Human health - Environmental toxicity - Environmental responsibility.

Objective	Proposed Target	Proposed Strategy	Comments
Minimising Waste <ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<ul style="list-style-type: none"> 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. 	<p>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.</p> <p>The following waste avoidance measures are recommended in the Waste Management Plan for the Project:</p> <ul style="list-style-type: none"> - Provision of take back services to clients to reduce waste further along the supply chain; - re-work/re-packaging of products prior to local distribution to reduce waste arising; - review of packaging design to reduce waste but maintain 'fit for purpose'; and - Investigating leased office equipment and machinery rather than purchase and disposal.

Objective	Proposed Target	Proposed Strategy	Comments
Water Conservation and Reuse <ul style="list-style-type: none"> Monitoring of meters to track the 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. 	<ul style="list-style-type: none"> Reduce potable water in internal fixtures. Reduce potable water for irrigation. Water efficient operation of appliances. Utilise rainwater and/or recycled water. 	<ul style="list-style-type: none"> Water efficient sanitary taps and toilets. Water efficient and drought tolerant landscaping. Water and energy efficient dishwasher. Rainwater collection for irrigation and toilets flushing. 	<p>Low flow fixtures and fitting including taps and shower heads</p> <p>Selection of endemic and low maintenance landscaping species</p> <p>SLR recommends water efficient dishwashers</p> <p>Rainwater tanks have been proposed for rainwater harvesting and re-use for landscape irrigation and flushing of toilets.</p>
Land Use and Ecology Impact <ul style="list-style-type: none"> Consider local biodiversity impacts of flora and fauna. Look to specialist advice on land in development. 	<ul style="list-style-type: none"> Encourage biodiversity. Reduce light pollution from the site. Consider reducing impact of stormwater flows off the site into the natural water courses including Ropes Creek adjacent to the site. 	<ul style="list-style-type: none"> Install indigenous planting 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, e.g. bio retention, OSD tanks and treatment. 	<p>Selection of endemic and low maintenance landscaping species</p> <p>LED lights have been proposed for all external lights to avoid emitting light</p> <p>The warehouse sustainability objectives include:</p> <ul style="list-style-type: none"> - Reduce the impact of stormwater runoff and improve quality of stormwater runoff - Achieve best practice stormwater quality outcomes - Incorporate water sensitive urban design principles.

6.1 Baseline and Proposed Energy Consumption

A 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 based on data for similar warehouses, it is expected that the proposed development will have more than 30% energy reduction.

The following initiatives have been proposed for the warehouses, offices and masonry plant:

- 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 warehouses, masonry plant and offices.
- High efficiency glazing and shading for the offices.
- High efficient air conditioning system for the offices.
- Good levels of day lighting (including warehouse windows along all sides and doors) will reduce the amount of artificial lighting required during the day.
- Heat-reflective semi-translucent roller blinds on all windows will reduce solar heat load to the building.
- Lighting zoning will offer flexibility for light switching in zones.
- All lighting system is to be programmable and incorporate timeclock, photo electric (PE) daylight sensors and motion sensors in the warehouses and masonry plant.
- All lighting system is to be programmable and incorporate timeclock, and motion sensors in the offices and amenities.
- Energy efficient floodlights will be utilised for lighting of external perimeter of building.
- Awnings over windows will reduce the solar heat load to the building therefore decreasing the cooling load requirements from the air conditioning system.
- Air-conditioning control zoning provided where necessary to cater for varying occupancy rates, orientation to solar loads etc. Also, time clock provided with provision for after hour override.
- Achieving high insulating values of external development fabrics (in compliance with NCC requirements) will allow for lower energy demand on the air-conditioning system.
- Door seals for recessed loading docks and doors and airlock for reception areas will help to maintain a comfortable indoor air environment and lower energy demand on the air-conditioning system.
- Hot water systems implemented in staff amenities, including toilets, lunchrooms and cleaners room to be connected to a solar hot water system.
- A Building Users' Guide is to be prepared and implemented. These measures will help to monitor the energy consumption of the building.
- Electrical sub-metering to all metered loads will facilitate ongoing management of energy consumption.

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

The following additional measures are recommended to reduce the operational energy consumption from the masonry plant:

- Energy Efficient Burner.
- Variable speed air compressors to significantly reduce electricity consumption.
- Plant management system

6.2 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 2016 Volume One). The maximum illumination density for a warehouse and masonry plant is 10 W/m² as per Table J6.2a of the NCC 2016 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.
- Lighting will be dimmable up to 10% when daylight allows or area is vacated.

Warehouse and Masonry Plant lighting

- LED fitting for warehouse.
- Occupancy sensors to low occupancy areas.
- Lighting will be dimmable to 10% when daylight allows or area is vacated.

Outside lighting

- LED external lighting for all outside areas.
- External lighting will be controlled with a central daylight sensor.

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 10 W/m²
- Offices 9 W/m²
- Masonry plant 10 W/m²

The illumination power density adjustment factor for the control device is based on BCA Table J6.2b as below:

- Motion detector adjustment factor is 0.9.
- Daylight sensor adjustment factor is 0.6.

From above, the annual lighting energy consumption per square meter has been estimated to be 61.6 kwh/m².

By implementing above energy efficiency measures, the project is likely to achieve a 72.4% lighting energy reduction when compared with BCA reference building. Detailed calculation is shown in Appendix A.

The electrical lighting layout of Oakdale East Austral Plant and Warehouse Development is not provided at the time of preparing this report, so similar warehouses has been utilised to represent warehouses of Oakdale East Austral Plant and Warehouse Development. Both warehouses are under the same Goodman's design concept and requirements.

The lighting energy density of a similar warehouse has been previously estimated to be 17.3 kwh/m².

Therefore, the warehouses of Oakdale East Austral Plant and Warehouse Development is likely to achieve a 72.4% lighting energy reduction when compared with BCA reference building.

6.3 Mechanical Air-Conditioning and Ventilation

The mechanical service design is not available at this stage. It is presumed the Daikin multi split systems will be installed for office area.

Table 2 AC Units Temperature Control Range

Space Type	Temperature Control Range (°C)
Office	22.0 ± 2°C BD

6.3.1 Air-conditioning Energy Efficiency requirements

2016 NCC Section J5.2e has specified the minimum energy efficiency ratios requirements for package air conditioning equipment.

Table 3 NCC Unitary Plant Requirement

Equipment	Energy Efficiency Ratio (EER)	
Cooling Efficiency	2.6	3.01 - 3.68 (As per Daikin split system catalogue)
Heating Efficiency	2.6	3.01 - 3.68 (As per Daikin split system catalogue)

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

6.3.2 Warehouse Ventilation Strategy

Table 4 Warehouse Ventilation

Space Type	Air intake/ Makeup air	Air outlet/Exhaust	Control strategy
Warehouse	Combination of roller shutter door and weatherproof louvres	Internal and exhaust fans	Time clock with night purge facility

When the air flow rate of a mechanical ventilation system is more than 1000L/s, the system must have a fan motor power to air flow rate ratio in accordance with NCC 2016 Section J5.2a below.

Table 5 Maximum Fan Motor Power to Air Flow Ratio – General Mechanical Ventilation Systems

Filtration	Maximum fan motor power to air flow rate ratio (W/(L/S))
With filters	0.98
Without filters	0.65

SLR recommends all proposed ventilation fans should have a motor power to air flow rate ratio less than the value specified in **Table 5**. All exhaust fans should work in conjunction with motorized volume control damper, roller shutter doors, temperature sensor and CO sensor where required etc.

6.4 Building Fabric Requirements

Part J1 to J3 of the 2016 NCC Section J contains 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 warehouses and masonry plant shall comply with 2016 NCC Section J. Project Section J report will need to be submitted with the application for a Construction Certificate.

6.5 Domestic Hot Water (DHW)

The BCA specifies the thermal efficiency for hot water systems to be at least 80%. With the installation of water efficient fixture, the hot water consumption will be decreased and thus the domestic hot water usage will also decrease. Therefore, there will be less energy consumption for DHW.

7 POTABLE WATER CONSUMPTION

The project has been proposed to 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.
- Water sensitive landscape design.

Further to above sustainable water measures, the following items are 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 assumed from the drawing and listed in **Appendix B**.

8 MONITORING AND REPORTING

All sustainable measures will be implemented into the project need to be commissioned and tuned once the project 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 need to be provided to the tenant for DLP.

8.1 Energy Review and Audit

An energy usage review will 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 will be conducted 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 masonry plant and warehouses 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 will be undertaken on a 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 shall be progressively improved and updated on an annual basis, to reflect changes to the Energy Management System and to promote continual improvement of energy management at industry best practice over time.

8.2 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.

In accordance with the Goodman's general Industrial Building Specification, a Building Users' Guide is to 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:

- 1 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.

- 2 Maintenance contractors understand how to service the particular systems to maintain reliable operations and maximum energy efficiency.
- 3 Employees understand energy minimisation procedures and working limitations required to maintain design performance for energy efficiency.
- 4 Future fit-out/refurbishment designers understand the design basis for the building and the systems so that these are not compromised in any changes.

8.3 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.

9 CONCLUSION

SLR Consulting Australia Pty Ltd (SLR Consulting) has been engaged by Goodman to provide a Sustainability Management Plan (SMP) for the Oakdale East Austral Plant and Warehouse Development of the proposed Oakdale East.

The SMP has been prepared in accordance with the State Significant Development – Secretary's Environmental Assessment Requirements Section 78A (8A) of the Environmental Planning and Assessment Act 1979 of the Department of Planning Condition.

- **Greenhouse Gas and Energy Efficiency** – *including an assessment of the energy use on site, and demonstrate what measures would be implemented to ensure the proposal is energy efficient.*
- **Ecologically Sustainable Development** – *including an assessment of how the development will incorporate ecologically sustainable development principles in all phases 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.

Energy and water consumption reduction can be achieved via the following initiatives:

- Improved daylight to warehouse and masonry plant with translucent sheeting;
- Daylight controlled LED lighting for the warehouse and masonry plant instead of metal halide, resulting in a considerable energy reduction and reduced maintenance.
- Motion sensors to all LED lights within the warehouse, masonry plant and offices;
- Internal and exhaust fans to the warehouse and masonry plant with the potential for night purging;
- Colourbond roof sheeting which has a higher solar reflectivity;
- Office roof with a minimum NCC requirements;
- High performance glazing to all offices or a minimum NCC requirements;
- Passive solar design for internal and external outdoor areas;
- High efficient air conditioning system;
- Power sub-metering to enable continued review of power consumption for the offices, warehouse, masonry plants;
- Selection of endemic and low maintenance landscaping species;
- Rainwater tank 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 and recommendations are detailed in this report.

By implementing the recommended energy efficiency measures in **Section 6.2**, the project is likely to achieve a 72.4% lighting energy reduction.

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%.

Annual reviews of actual building energy will be carried out once the warehouses and Masonry plants 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.

10 CLOSURE

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the manpower and resources devoted to it by agreement with the client. Information reported herein is based on the interpretation of data collected and has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of Goodman Property Services. 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 Consulting.

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

Appendices

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APPENDIX A: LIGHTING CALCUATION

BCA Lighting Requirements Oakdale East								
BCA Comply Building	BCA Requirements		Area	Operating Hrs	Lighting Control			Total Annual Energy Consumption (kWh)
	Warehouse W/m2	10	21156	Monday to saturday 24 hours	Motion Detector, Daylight Sensor	0.9	0.6	998022
	Offices W/m2	9	4126	Monday to saturday 24 hours	Motion Detector	0.9	1	291962
	Masonry plant W/m2	10	10430	Monday to saturday 24 hours	Motion Detector	1	1	911165
			35712					
							Total	2201149
							kWh/m2	61.64

APPENDIX B: WATER CALCULATION

WATER SAVINGS CALCULATION				
Table C1 - Number of fixtures				
Area	Toilets	Urinal	Basins	Showers
Amenities	40	14	43	22
Total	40	14	43	22
Assume 70% of toilet water usage is supplied by rainwater				
Fraction not supplied by RWH	0.3			

No water saving measures		Max water usage rate ¹	
Toilet	Adopt 3* Average Flush Usage in Table C3	160	L/s
Tap	Adopt 3* Tap Usage in Table C3	387	L/s
Urinal	Adopt 3* Urinal Usage in Table C3	28	L/s
Water reuse measures (4*) with RWH		Max water usage rate ¹	
Toilet	Adopt 4* Average Flush Usage in Table C3	140	L/s
Tap	Adopt 4* Tap Usage in Table C3	322.5	L/s
Urinal	Adopt 4* Urinal Usage in Table C3	21	L/s
Water reuse measures (5*) with RWH		Max water usage rate ¹	
Toilet	Adopt 5* Average Flush Usage in Table C3	120	L/s
Tap	Adopt 5* Tap Usage in Table C3	258	L/s
Urinal	Adopt 5* Urinal Usage in Table C3	14	L/s
	3* with RWH	4* with RWH	5* with RWH
Improvement Percentage (%) ³	23	36	48