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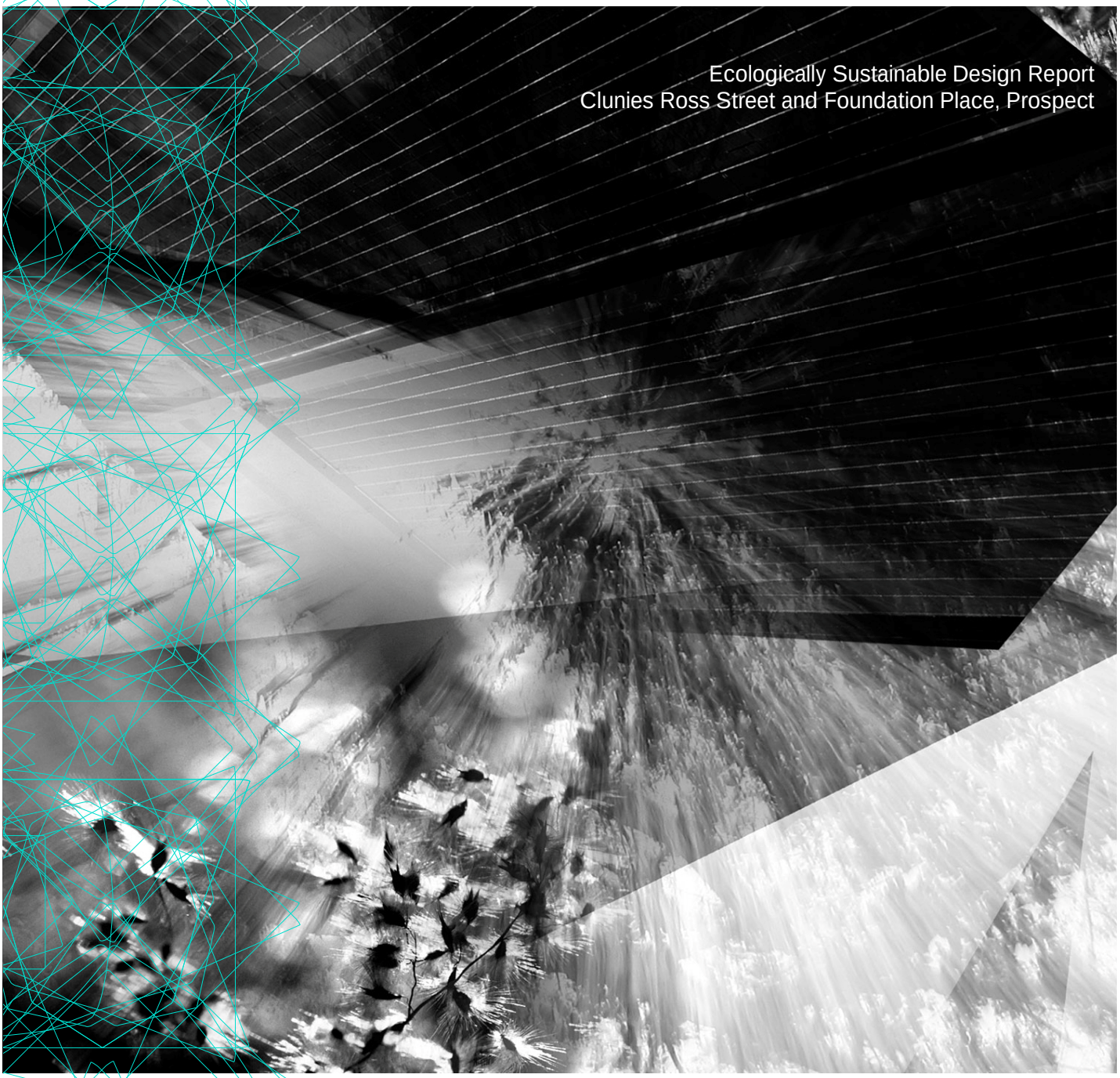

# Ecologically Sustainable Design Report
# Clunies Ross Street and Foundation Place, Prospect

SUSTAINABLE DEVELOPMENT
_CONSULTANTS

# Proposed Industrial Development Clunies Ross Street and Foundation Place, Prospect

Ecologically Sustainable Development Report

June 2020

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| Version | Date of Issue | Description | Author | Reviewed |
|---|---|---|---|---|
| V1 | 02-06-2020 | For Submission to Council | JP/SC | LR |

# 1. Introduction

This Ecologically Sustainable Development (ESD) Report has been prepared to assist the design, construction, and operation of the proposed industrial development at Clunies Ross Street and Foundation Place, Prospect, to achieve a range of best-practice sustainable development objectives.

Sustainable Development Consultants have assessed the proposed design and provided input to the design team.

This ESD Report captures initiatives necessary to ensure that the proposed development in its completed form meets the sustainability requirements of both the Cumberland and Blacktown Councils, as well as the Planning Secretary's Environmental Assessment Requirements (SEARs), particularly in relation to Greenhouse *Gas and Energy Efficiency* and *Ecologically Sustainable Development*.

## 1.1 Secretary's Environmental Assessment Requirements

The Secretary's Environmental Assessment Requirements (SEARs), issued by the NSW Department of Planning and Environment for SSD-10399 on 16 December 2019 contain the following requirements for:

Greenhouse Gas and Energy Efficiency

- An assessment of the energy use on-site, and demonstrate the measures proposed to ensure the development is energy efficient.

Ecologically Sustainable Development

- An assessment of how the development will incorporate ecologically sustainable development principles in all phases of the development – the use of green walls, green roof and/or cool roof into the design and – climate change projections developed for the Sydney Metropolitan area and how they are used.

## 1.2 Applicable Legislation and Guidance

The legislation and guidance set out below should be referenced with regard to ecologically sustainable development:

- AGO Factors and Methods Workbook (AGO, 2018): Provides a source of current greenhouse gas emission factors and methods for estimating emissions and emission abatement.
- Guidelines for Energy Savings Action Plans (DEUS, 2005): Guidelines for developing Energy Savings Action Plans for organisations designated by Minister for Utilities.
- National Construction Code (NCC) and relevant Australian Standards: NCC is a uniform set of technical provisions for the design, construction and performance of buildings, with Section J relating specifically to energy efficiency.

## 1.3 Site and Development Description

The site at Clunies Ross Street and Foundation Place, is located approximately 27km West of the Sydney CBD, and sits within both the Cumberland and Blacktown Councils.

It is situated in an industrial precinct near the intersection of the Western Motorway and Prospect Highway adjacent to Prospect Reservoir. The site is currently occupied by a combination of commercial and industrial buildings which are to be demolished prior to construction of the proposed development.

The proposed development includes seven warehouses, each with ancillary offices and car park, and a small cafe.

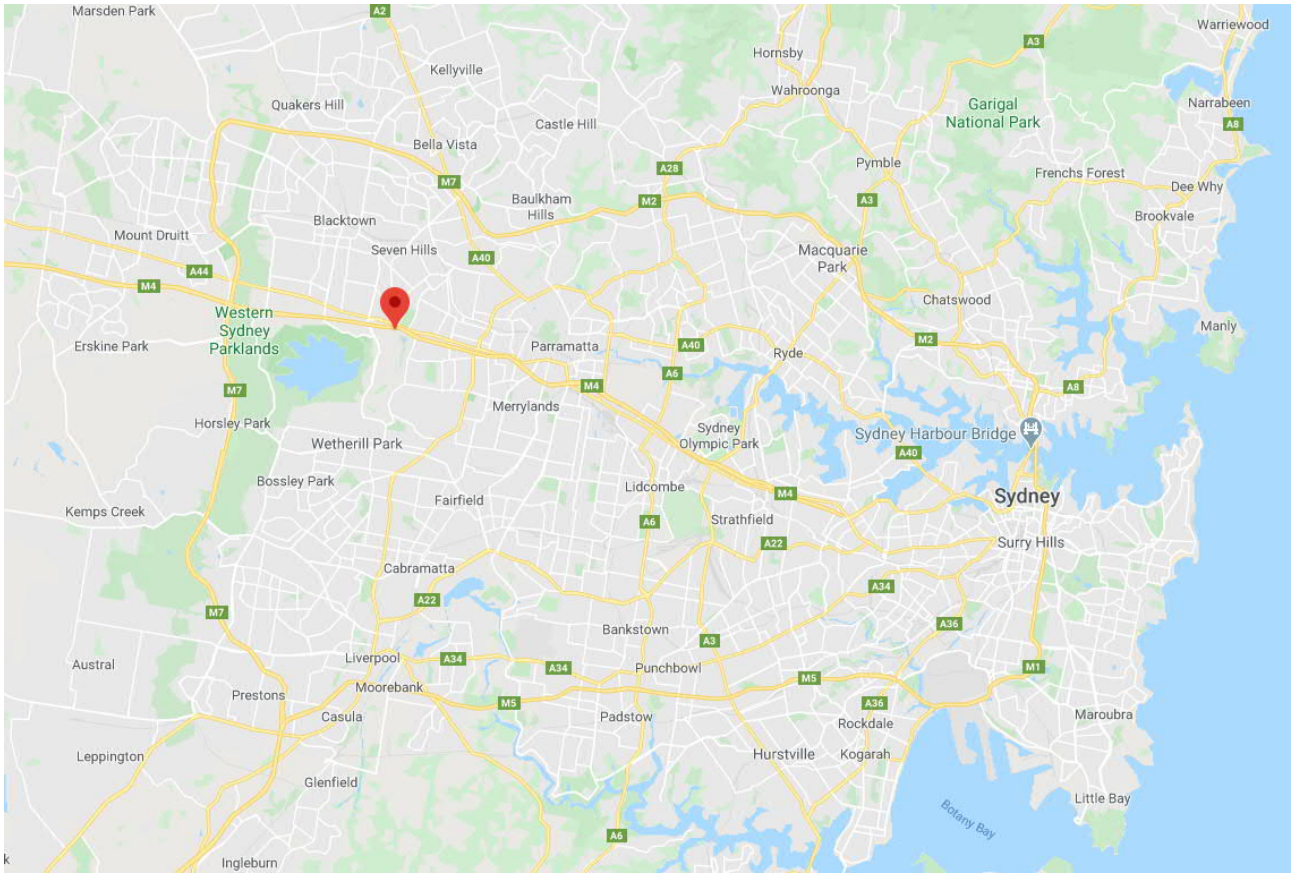


Figure 1: Location of the site in relation to the Sydney CBD (Source: Google Maps)


Figure 2: Aerial view of the site at Clunies Ross Street and Foundation Place (Source: Nearmap, mark-up by SDC)

The development summary is as follows:

| | Warehouse Gross Floor Area | Office Gross Floor Area (including dock offices) | Café Gross Floor Area |
|---|---|---|---|
| Unit 1 | 18,224m$^2$ | 1,396m$^2$ | - |
| Unit 2 | 24,071m$^2$ | 1,787m$^2$ | - |
| Unit 3 | 12,088m$^2$ | 1,318m$^2$ | - |
| Unit 4 | 5,349m$^2$ | 476m$^2$ | - |
| Unit 5 | 10,401m$^2$ | 1,109m$^2$ | - |
| Unit 6 | 8,441m$^2$ | 1,013m$^2$ | - |
| Unit 7 | 8,927m$^2$ | 893m$^2$ | - |
| Café | - | - | 146m$^2$ |
| Total | 87,501m$^2$ | 7,992m$^2$ | 146m$^2$ |
| Car parking | 564 Spaces | | |
| Total site area | 186,597m$^2$ | | |

# 2. Ecologically Sustainable Development

The following sections outline the initiatives that will be incorporated into the development throughout design, construction, and operation. Sections 1.2 and 1.3 specifically address the requirements as listed in their corresponding SEARs. The remainder of these sections address additional sustainability considerations and are included to demonstrate how the project will meet Best Practice ESD Principles throughout the life of the project.

The following sections, as well as nominating the sustainability initiatives, also identify the party/parties responsible for implementation of the initiative, and the stage at which implementation will be demonstrated. The following are the broad project stages:

| | | |
|---|---|---|
| 1 | Design Development | • Consultants develop conceptual design drawing to a detailed stage suitable as a basis for preparing working drawings - Integration of architectural, services, structure and site attributes<br>• Checking compliance with all statutory requirements, codes and standards<br>• Arranging special surveys or reports as required |
| 2 | Construction Documentation | • Architectural and services drawing sets completed<br>• All specialist reports completed<br>• All necessary planning and building consents obtained as required by authorities |
| 3 | Construction | • All work carried out onsite – site preparation, construction, alteration, extension, demolition<br>• Purchase of all materials / certification<br>• Evidence gathering from subcontractors<br>• Commissioning |
| 4 | Post Occupancy | • Operation and Maintenance<br>• Education – Building Users Guides |

## 2.1 Greenhouse Gas and Energy Efficiency

The development will minimise energy use through efficient heating and cooling systems, lighting, and superior building envelope. The proposed office floors of the development will meet and exceed the requirements of the Building Code of Australia (BCA) – Section J Energy Efficiency, which will be demonstrated through detailed thermal performance modelling. The following strategies will be employed to improve energy efficiency:

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Thermal and Energy Performance** | | |
| Reduction in greenhouse gas emissions resulting from energy consumption will be achieved across the development through a range of measures, including the following:<br>• Improved building form and thermal envelope building fabric, including increased insulation and high specification glazing;<br>• Energy efficient HVAC systems;<br>• LED lighting with illumination power densities equal to or less than the maximum as set out in table J6.2a of the 2019 NCC;<br>• Lighting controls such as sensors and timers for external lighting and lighting in infrequently used areas, such as corridors and toilets; and<br>• The provision of hot water through either high efficiency heat pump systems or solar boosted systems.<br>As a result of these initiatives, buildings in the proposed development will achieve a 10% improvement in energy consumption when compared to a reference building, as described by the JV3 verification method in the 2019 NCC. This will be demonstrated through thermal performance | Architect / Services Consultant / ESD Consultants | Construction Documentation |

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| modelling of the development which will also determine the exact reduction to be achieved. | | |
| Building Sealing | | |
| All windows, doors, exhaust fans and pipe penetrations will be constructed to minimise air leakage as required by the provisions outlined in Section J3 of the 2019 NCC. This will include the use of seals around operable windows and doors, as well as caulking to pipe penetrations, and the addition of self-closing louvers or dampers to exhaust fans. | Builder | Construction |
| Peak Electricity Demand Reduction | | |
| Peak electricity demand will be reduced through the above measures. As with similar projects, lighting is expected to be the end use with the highest energy consumption. Therefore, reductions in illumination power densities is expected to be the energy efficiency measure that provides the greatest reduction in peak electricity demand reduction. | Architect / Services Consultant | Design Development |

## 2.1 Climate Change, Urban Ecology, and Heat Island Effect Mitigation

The development will aim to reduce the negative impacts on site's ecological value as a result of urban development. It will also incorporate initiatives to adapt to a changing climate and mitigate urban heat island effects.

The risks and consequences of climate change have been assessed for the site, considering its location and characteristics. The Western Sydney region is humid subtropical, with cool weather in winter, and warm weather in summer. While the Sydney CBD's extreme temperatures are moderated through close proximity to the coast, Western Sydney sees more extreme conditions, which must be considered in assessing this proposed development.

Climate change scenarios were projected an Australian climate model: the Australian Community Climate and Earth System Simulator, or ACCESS. This has been selected as it has consistently been shown by national and international groups to be among the top performing models across a range of climate features important to Australia.

The climate projection has been modelled at the RCP 4.5 and RCP 8.5 values. This refers to the Representative Concentration Pathways (RCPs) which are the trajectories adopted by the IPCC. It measures the amount of radiative forcing, or 'rate of energy change per unit area across the globe at the top of the atmosphere', in terms of how much incoming energy the earth receives from sunlight, minus the energy the earth radiates out to space. RCP 4.5 is predictive of a 1.1-2.6$^{o}$C increase by 2100 and is the target reduction by the Paris climate agreement. However, RCP 8.5 would be the result of heating increase at current greenhouse gas emission trends and could see 2.6-4.8$^{o}$C temperature increases by 2100.

Under these projections, numerous risks have been identified. These have been tabulated below, along with adaptation strategies and the parties responsible for the implementation of these strategies.

| Climate Risk | Adaptation Action | Responsibility and Implementation |
|---|---|---|
| **Reduced Average Rainfall**<br>The reduced rainfall impacts on the reliability of the rainwater supply for potable water. | Oversize rainwater tanks and employ drought resistant landscaping to reduce the overall water load required for irrigation. | Hydraulic Engineer / Landscape Architect |

| Climate Risk | Adaptation Action | Responsibility and Implementation |
|---|---|---|
| **Extreme Rainfall Events**<br>Increased storm and rainfall intensities could cause property damage if not built to withstand high volumes of water from flooding. | Size all downpipes capable of withstanding high volumes of water flowing over the roofs, with eaves gutters designed for 1 in 20yr storm event, and surface drainage & box gutters designed for 1 in 100yr storm events. | Hydraulic Engineer / Civil Engineer |
| **Increased Average Annual Temperature – HVAC System Capacity**<br>The mean temperature rise will put a greater strain on HVAC systems in the conditioned offices, potentially causing risk of heat stroke and lost productivity. | Air conditioners will be designed to handle higher specified conditions than required in Western Sydney, to accommodate rising cooling loads. | Mechanical / Services Engineer |
| **Increased Average Annual Temperature –Thermal Comfort**<br>The mean temperature rise will increase the temperature in the main warehouse, potentially causing the risk of heat stroke and lost productivity from overly strained workers. | Consider providing space for adding insulation on the facades of the warehouse, to help reduce the thermal heat gain for workers.<br>Any skylights will be insulated and/or well ventilated to reduce the amount of heat transfer into the buildings. | Architect / Services Engineer - will advise of appropriate roof heat ventilation system |
| **Temperature Extremes**<br>Higher temperatures may lead to heat stress and reduced thermal comfort to staff or other patrons of the facility. This could lead to increased sickness or absence of staff. | Air conditioners will be designed to handle higher specified conditions than required in Western Sydney.<br>Consider having a policy where over an extreme heat day, i.e. 40°C, workers are allowed to go home. Also consider economic impact this will have as climate change increases. | Service Engineer / Warehouse Manager |
| **Urban Heat Island Effect**<br>Rising temperatures will cause the urban heat island effect to increase and compound the impact of heat in this development. | The urban heat island effect will be managed through maximising the landscaped areas on site and the use of green walls (proposed as a feature at the entrance to be considered for every office) This will also maintain the ecological value of the site.<br>In addition, roofing materials will be selected with a three-year Solar Reflectance Index (SRI) greater than 64 (roof pitch <15˚). This can be achieved through use of products such as light coloured Colorbond (eg. Surfmist) or Coolmax roofing. Paving on the site will also be of a light colour, where appropriate to increase solar reflectance.<br>These measures will reduce the amount of heat absorbed by the roofs and paved surfaces, and subsequent artificial temperature increase around the development. | Architect / Landscape Architect |

| Climate Risk | Adaptation Action | Responsibility and Implementation |
|---|---|---|
| **Storms – Property Damage**<br>An increase in intense rainfall, wind and hail events may result in extensive damage to property. This will increase clean-up and maintenance costs. | For coping with hail, ensure any solar panels are of a high quality with tempered glass – this is up to six times stronger than pane glass, and able to withstand most hail events. Additionally, ensure, comprehensive insurance covers the panels and entire buildings. | Electrical Engineer / Developer (Owner) |
| **Storms – Electricity Infrastructure Damage**<br>Storms could damage the power infrastructure around the site, increasing the risk of an electricity blackout, and loss of time and money. | Consider having batteries or alternative back-up power generation to have a reduced capacity to run essentials in the event of a prolonged power outage and to further help with peak load issues. | Electrical Engineer |

## 2.2 Management

The following building management initiatives will be implemented to improve sustainability outcomes relating to the operation of the buildings by building management and occupants. The development will aim to promote adoption of environmental management initiatives at different stages of the project – not just in the project design stage.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| Green Star Accredited Professional | | |
| One of the project's consultants will be a Green Star Accredited Professional. They will advise through the design and construction phases of the project. | ESD Consultant | Design Development |
| Environmental Performance Targets | | |
| Documented targets will be set for the environmental performance of the buildings. These targets will be monitored and reported on. | ESD Consultant | Design Development |
| Services and Maintainability | | |
| A comprehensive services and maintainability review of the project will be conducted during its design stage (prior to construction).<br>This will require input from the entity that will be responsible for the ongoing operations/maintenance of the project, post-construction. | Builder / Services Contractors | Construction Documentation |
| Building Commissioning | | |
| Comprehensive pre-commissioning, commissioning, and quality monitoring will be contractually required and building knowledge will be transferred from the design team and contractor to building manager and staff.<br>All commissioning activities will be performed based on approved standards and guidelines (e.g. CIBSE, ASHRAE/AIRAH, etc.). | Builder / Services Contractors | Construction |
| Building Systems Tuning | | |
| Initial tuning and ongoing maintenance and monitoring will be undertaken for all building systems included in the development.<br>This commitment must include quarterly adjustments and measurement for the first 12 months following occupation. | Builder / Services Contractors | Post Occupancy |

| | | |
|---|---|---|
| **Building Information** | | |
| Comprehensive operations and maintenance information will be developed and made available to the facilities management team.<br><br>Relevant and current building user information will also be developed and made available to all relevant stakeholders. The information can include descriptions of systems installed in the buildings, sustainable transport in the area as well as sustainable building operation suggestions relevant to building users. | Architect / ESD / Services Consultants | Construction Documentation |
| **Environmental Building Performance** | | |
| The building design will have performance targets set for at least two of the following environmental building performance metrics:<br><br>• Greenhouse gas emissions – commitment in kg/$CO_2$/$m^2$;<br>• Potable water usage – kL/person;<br>• Operational waste – kg/person; and<br>• Indoor environment quality – complete occupant comfort surveys, HVAC systems targets and thermal and lighting comfort.<br><br>The selected targets will be monitored and reported against. | Developer | Post Occupancy |
| **End of Life Waste Performance** | | |
| Contractual agreements will be put in place to commit to reduce demolition waste at the end of life of an interior fit-out or base building component. The intention is to prevent the mandatory "stripping out" of the proposed tenancies at the end of a lease period, thereby maximising the opportunity for a subsequent tenant to utilise a previous fit-out. | Developer | Post Occupancy |
| **Metering and Monitoring** | | |
| The design will include electronic metering systems that will be integrated into the buildings to monitor and report on energy and water consumption relating to all of the building services.<br><br>Energy and water consumption will be monitored and reported against set performance targets for all buildings. | Services Consultant | Design Development |
| **Construction Environmental Management** | | |
| As part of the construction process, the contractor will implement a project-specific Best Practice Environmental Management Plan—this must be in line with *NSW EMS Guidelines*. This will be in place before starting works and throughout the construction process. | Builder | Construction Documentation |
| **Formalised Environmental Management System** | | |
| Preferred head contractors for the project will hold an EMS certified by a third-party organisation that provides compliance to ISO 14001 Standards. | Builder | Construction Documentation |
| **Operational Waste** | | |
| A Waste Management Plan will be prepared for the development. The waste management of the development will address the following criteria:<br><br>• General waste going to landfill;<br>• Recycling streams to be collected by the buildings' waste collection service, (paper and cardboard, glass, and plastic); and<br>• At least one other waste stream (organics, electronic waste etc.).<br><br>The development will provide a dedicated waste area for the separation and storage of general and recycling waste and at least one other waste stream.<br><br>The waste storage area(s) will be located where they are easily accessible by building staff and waste contractors. | Architect | Design Development |

## 2.3 Indoor Environment Quality

The development will aim to create a healthy indoor environment free from toxins with an ample supply of daylight and outside air.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Ventilation System** | | |
| All air handling equipment in the project will meet the following conditions:<br>• Full compliance with ASHRAE Standard 62.1:2013 (to mitigate entry of outdoor pollutants);<br>• Will be easily maintained and cleaned; and<br>• Will be cleaned prior to use and occupation. | Mechanical Consultant | Design Development |
| **Provision of Outdoor Air** | | |
| For mechanically ventilated offices, improved outside air rates (at least 50% improvement) will be provided based on expected occupancy when compared to the Australian Standard. | Architect / Mechanical Consultants | Design Development |
| **Exhaust or Elimination of Pollutants** | | |
| Any exhaust ducts will be directly discharged from the buildings with no recirculation component. | Mechanical Consultant | Design Development |
| **Effective Natural Ventilation** | | |
| The warehouses will be designed to provide improved thermal comfort without demand for mechanical ventilation or HVAC systems, through the implementation of roof ventilators, large fans providing air movement and natural ventilation where appropriate. | Architect / Mechanical Consultants | Design Development |
| **Internal Noise Levels** | | |
| The preliminary design of the development will have the potential to achieve internal ambient noise levels suitable and relevant to the activity type in relevant spaces. | Acoustic Consultant | Design Development |
| **Reverberation** | | |
| The preliminary design of the office areas will have the potential to reduce reverberation to a level suitable for the activity type in the space. | Acoustic Consultant | Design Development |
| **Acoustic Separation** | | |
| The preliminary design of the development will have the potential to incorporate features that minimise crosstalk between rooms and open areas within the offices. | Acoustic Consultant | Design Development |
| **Minimum Lighting Comfort** | | |
| All luminaires will be installed with high-frequency ballast.<br>All lights selected will be flicker-free and will accurately address the perception of colour in the space, by having a minimum Colour Rendering Index (CRI) of 80. | Electrical Engineer | Construction Documentation |
| **General Illuminance and Glare Reduction** | | |
| For all spaces, Best Practice lighting levels will be met and will be in accordance with AS 1680.1:2006 for different space types. Internal lights are fitted with baffles, louvres or diffusers to obscure any direct light source to cut out glare. | Electrical Engineer | Design Development |
| **Surface Illuminance** | | |
| The design will include a combination of lighting and surface types / reflectance's that improve uniformity and give visual interest in the nominated area. This is of particular importance within the office areas. | Electrical Engineer | Design Development |

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Visual Comfort – Glare Reduction** | | |
| All offices will be provided with blinds. Blinds must have visual light transmittances of less than 10% and be capable of reducing glare to 95% of the floor area. | Architect | Design Development |
| **Daylight** | | |
| The preliminary design of the development has the potential to receive good levels of daylight.<br><br>The offices have been designed to have the open plan area close to the surrounding windows to offer natural daylight, and the warehouse is proposed to have clear roof panels to bring natural light into the space and reduce the subsequent lighting loads. | Architect | Design Development |
| **Views** | | |
| Office layouts will be designed to maximise the amount of office area with a clear line of sight to external views. | Architect | Design Development |
| **Volatile Organic Compounds** | | |
| All paints, adhesives and sealants, flooring, and wall and ceiling coverings will not exceed the limits outlined in Appendix 1. Alternatively, products with no VOCs will be selected. | Builder | Construction Documentation |
| **Formaldehyde Minimisation** | | |
| All engineered wood products will have 'low' formaldehyde limits outlined in Appendix 1. Alternatively, products with no formaldehyde will be specified. | Builder | Construction Documentation |
| **Thermal Comfort** | | |
| A high degree of thermal comfort in the office spaces will be achieved through a combination of passive design features such as improvement to the building fabric, and mechanical systems. | Builder | Construction Documentation |

## 2.4 Transport

Industrial estates rarely have much in the way of sustainable transport options. The proposed site does however include bicycle facilities and has access to some connecting public transport options.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Public Transport** | | |
| The development has direct access to the following public transport options:<br><br>Mode / Route / Description / Proximity<br>Bus: 800 Blacktown to Fairfield 200m; 810X Merrylands to Parramatta 300m; 812 Blacktown to Fairfield 900m<br><br>For further information, please refer to the Green Travel Plan, prepared by Ason Group. | N/A - Inherent in location | |
| **Cycling Facilities** | | |
| Bicycle parking and end of trip facilities, such as showers and lockers will be provided to encourage active transport. | Architect / Traffic Engineer | Design Development |

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Electric Vehicle Infrastructure** | | |
| At least one electric vehicle charger per site will be provided for the car parking area for building occupants to use. Infrastructure for additional charge points to be added later will also be provided at the outset to help future proof this development. Infrastructure proposed to be included for this purpose is space on distribution boards as well as conduits linking the nominated parking spaces with the distribution boards. | Architect / Electrical Engineer | Design Development |
| **Provision of Parking for Low-emission Vehicles** | | |
| Designated parking space provision for hybrids, electric vehicles, small cars and motorbikes will be considered. These spaces will be placed in the most convenient locations, such as near entrances/exits to encourage the use of low-emissions vehicles. | Architect / Electrical Engineer | Design Development |

## 2.5 Water

The development will aim to use water efficiently through the installation of efficient fixtures and fittings and via reuse of rainwater and fire system test water.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Potable Water Reduction – Efficient Fixtures** | | |
| Fixtures, fittings, and appliances will be installed with the following Water Efficiency Labelling Scheme (WELS) star ratings as a minimum:<br>• Toilets – 4 Star;<br>• Urinals – 6 Star;<br>• Kitchen and bathroom taps – 6 Star;<br>• Showerheads - 3 Star not to exceed 6L/min; and<br>• Dishwashers (where provided as part of base building works) – 4 star.<br>In addition, timely maintenance will be performed as the need arises to ensure that all fixtures and fittings are operating as rated. | Architect / Services Consultant | Construction Documentation |
| **Potable Water Reduction – Rainwater Collection and Use** | | |
| Rainwater use measures will be provided as part of future building development designs. Rainwater use is proposed to reduce potable water demand by at least 50%, with a target of 80%. The reduction in demand will target non-potable uses such as toilet flushing and landscape irrigation. | Hydraulic / Civil Engineer | Design Development |
| **Potable Water Reduction – Fire System Test Water** | | |
| Fire system test water will be captured back within the fire water tanks. This will ensure at least 80% of all fire system test water onsite will be diverted from being sent to stormwater or sewer. | Services Consultant | Design Development |
| **Potable Water Reduction – Heat Rejection** | | |
| No water-based heat rejection systems will be provided in the development. | Services Consultant | Design Development |

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Drought-Resistant Landscaping** | | |
| The landscaping plan will incorporate the use of drought resistant plant species with low water requirements. Where appropriate, the selection of indigenous species will be promoted. | Landscape Consultant | Design Development |
| **Water-Efficient Irrigation Systems** | | |
| Where landscape irrigation is implemented, water-efficient sub-surface drip systems will be used. | Landscape Consultant | Design Development |

## 2.6 Materials

The development will aim to promote the use of recycled materials and materials with lower embodied energy and environmental impacts.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Concrete** | | |
| A minimum of 50% of the concrete mix will contain recycled water (rainwater or purchased recycled water). | Builder | Construction |
| **Steel** | | |
| Reinforcing steel content of the development will be reduced by 5% compared to standard practice. | Builder | Construction |
| **Cables, pipes, floors and blinds** | | |
| At least 90% of all cable, pipe, floor and blind products installed in the buildings (by cost) will not contain PVC or will comply with the *Best Practice Guidelines for PVC in the Built Environment*. | Builder / Services Engineer | Construction Documentation |
| **Low CO2-e Materials** | | |
| Where possible, materials will be selected that have lower embodied emissions. Preference will also be given to materials with higher recycled content, and sourcing from regional and local manufacturers. | Builder / Services Engineer | Construction Documentation |
| **Product Transparency and Sustainability** | | |
| The project has the potential to use products that constitute at least 3% of the project material value, meeting transparency and sustainability requirements under one of the following initiatives:<br>A. Reused products;<br>B. Recycled content products;<br>C. Environmental Product Declarations;<br>D. Third-Party Certification; or<br>E. Stewardship Programs.<br>Examples of opportunities under these initiatives are:<br>• Re-used formwork (A);<br>• Reinforcing rod, bar, mesh and wire from One Steel (C);<br>• Steel – Welded Beams and Columns from Bluescope (C);<br>• Colorbond steel from Bluescope (C);<br>• Hot Rolled structural steel, products from One Steel (C);<br>• Carpets and flooring (D);<br>• Paints (D);<br>• Adhesives and sealants (D); and<br>• Engineered wood products (D). | Architect / Builder | Construction Documentation |

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Construction and Demolition Waste** | | |
| At least 90% of the waste generated during construction and demolition will be diverted from landfill.<br>In addition, the project will aim to have no more than 5kg of waste per $m^2$ of gross floor area be disposed of to landfill.<br>A separate Waste Management Plan has been prepared to go into more detail regarding these issues. | Builder | Construction Documentation |


Figure 3: Examples of approved environmental labels which may be incorporated for the development

## 2.7 Emissions

The development will aim to reduce the impacts of 'point source' pollutants from the project. This includes chemical, biological, and physical pollutants.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| **Reduced Peak Discharge** | | |
| Rainwater tank(s) will be provided and detention systems may be added to ensure that the post-development peak event discharge from the site shall not exceed the pre-development peak event discharge. | Civil Engineer | Construction Documentation |
| **Stormwater – Pollution Reduction Target** | | |
| With a rainwater collection and re-use system on-site, and additional stormwater treatment devices in place such as buffers, swales, and gross pollutant traps, the proposed development will achieve compliance with local load-based reduction targets. | Civil / Hydraulic Engineer / Landscape Consultant | Design Development |
| **Light Pollution to Neighbouring Bodies** | | |
| The projects lighting design must comply with AS4282 'Control of the Obtrusive Effects of Outdoor Lighting'. | Lighting Engineer | Detailed Design |
| **Light Pollution to Night Sky** | | |
| No external luminaire on the project will have an Upward light Output Ratio (ULOR) exceeding 5%, relative to its mounted orientation. Direct illuminance from external luminaires on the project produces a maximum initial point illuminance value no greater than: | Lighting Engineer | Detailed Design |

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| • 0.5 Lux to the site boundary, and<br>• 0.1 Lux to 4.5 metres beyond the site into the night sky. | | |
| Legionella | | |
| HVAC systems will be air-cooled and therefore eliminate the presence of stagnant water and the associated legionella risk. | Mechanical Consultant | Construction Documentation |

### 2.8 Innovation

The development will aim to demonstrate that the project is applying sustainability principles in a broader sense than just on a project scale.

| Design Requirements | Responsibility & Implementation | Project Stage |
|---|---|---|
| Innovative Technology or Process | | |
| The project will incorporate large-scale roof-mounted solar photovoltaic systems. This will reduce overall grid electricity consumption, peak energy demand, and associated greenhouse gas emissions.<br>It is proposed that each warehouse include a minimum 99kW solar PV array for use onsite, with central infrastructure designed to allow onsite storage and redistribution of solar power either later at night (for facilities that operate outside daylight hours) or for other higher energy users within the estate. | Electrical Consultant | Design Development |

## 3. Conclusion and Implementation of Initiatives

The proposed industrial estate at Clunies Ross Street and Foundation Place, Prospect, will meet best practice ESD outcomes via a number of initiatives such as the inclusion of rainwater tanks for rainwater capture and use, improved thermal performance of the building fabric with the use of efficient glazing, reduction in greenhouse gas emissions through efficient air conditioning and the inclusion of a solar PV system, as well as reduced environmental impact during the construction stage through the specification of sustainable materials and a mindful construction team.

The initiatives that have been included within this ESD Report have a proven track record to serve their individual purpose and can be easily maintained with any failures generally being obvious to the occupants of the development. This helps to ensure the ongoing sustainability of the development as the systems installed in the beginning are maintained for purpose throughout the life of the development.

With appropriate implementation, management, monitoring and maintenance, the initiatives outlined within this ESD Report will serve to provide the occupants with lower running costs, as well as benefit the surrounding environment with an ecologically and economically sustainable development.

# Appendix 1 – Green Star VOC and Formaldehyde Limits

Table 1 - Maximum Volatile Organic Compound Levels for construction materials. (Source: Green Building Council Australia – Green Star v1.2 Manual)

| Product Type/Sub Category | Max TVOC Content (g/L of ready-to-use-product) |
|---|---|
| **Paints, Varnishes and Protective Coatings** | |
| Walls and ceilings – interior semi-gloss | 16 |
| Walls and ceilings – interior low sheen | 16 |
| Walls and ceilings – interior flat washable | 16 |
| Ceilings – interior flat | 14 |
| Trim – gloss, semi-gloss, satin, varnishes, and wood stains | 75 |
| Timber and binding parameters | 30 |
| Latex primer for galvanised iron and zincalume | 60 |
| Interior latex undercoat | 65 |
| Interior sealer | 65 |
| One and Two pack performance coatings for floors | 140 |
| Any solvent-based coatings whose purpose is not covered in table | 200 |
| **Adhesives and Sealants** | |
| Indoor carpet adhesive | 50 |
| Carpet pad adhesive | 50 |
| Wood flooring and laminate adhesive | 100 |
| Rubber flooring adhesive | 60 |
| Sub-floor adhesive | 50 |
| Ceramic tile adhesive | 65 |
| Cove base adhesive | 50 |
| Dry wall and panel adhesive | 50 |
| Multipurpose construction adhesive (includes fire/waterproofing sealants) | 70 |
| Structural glazing adhesive | 100 |
| Architectural sealants | 250 |
| **Carpets** | |
| Total VOC limit | 0.5mg/m² per hour |
| 4-PC (4-Phenylcyclohexene) | 0.05mg/m² per hour |

Table 2 - Maximum Formaldehyde levels for processed wood products. (Source: Green Building Council Australia – Green Star v1.2 Manual)

| Formaldehyde emission limit values for different testing methods | | | |
|---|---|---|---|
| Test Method | **E1** | **E0** | Super E0 |
| AS 2098.11 for plywood | <1.0mg/L | <0.5mg/L | <0.3mg/L |
| AS 4266.16 for particle board | <1.0mg/L | <0.5mg/L | <0.3mg/L |
| For MDF | <1.5mg/L | | |
| JIS A1460 not applicable to plywood | <1.0mg/L | <0.5mg/L | <0.3mg/L |
| JAS 233 for plywood | <1.0mg/L | <0.5mg/L | <1.0mg/L |
| EN 120 for particle board and MDF For plywood | <9.0mg/(100g)<br><6.0mg/(100g) | <6.0mg/(100g)<br><9.0mg/L | |
| DIN EN 717 1 | <0.12mg/m³h | <0.08mg/m³h | <0.04mg/m³h |
| DIN EN 717 2 not applicable to MDF | <0.12mg/m³h | <0.08mg/m³h | <0.12mg/m³h |