NORTHROP

SSDA ESD REPORT

# Horsley Drive Business Park

## Buildings 2 & 3,130-156 Cowpasture Rd, Wetherill Park NSW 2178

**PREPARED FOR**
Charter Hall
Level 20, No. 1 Martin Place
Sydney, NSW, 2000

Ref: SY211381
Rev: 2
Date: 30.08.2021

# SSDA ESD Report

## Revision Schedule

| Date | Revision | Issue | Prepared By | Approved By |
|---|---|---|---|---|
| 28.06.2021 | 1 | Draft Issue | R. McShane | I.Van Eerden |
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# 1. Introduction

Northrop has been commissioned by Charter Hall to prepare this Ecologically Sustainable Design (ESD) and Greenhouse Gas Assessment in support of a development application SSD 17161650 to the approved Concept masterplan known as State Significant Development, SSD 7664 and subsequent modifications.

This development application is the next phase of the development of the Horsley Drive Business Park – Stage 2 (the Site) and proposes to seek consent for the construction and operation of the following:

- Two light industrial warehouse buildings with ancillary office spaces and utilities buildings:
  - Warehouse 2, accommodating a warehouse of approximately 14,803 $m^2$ and a single storey ancillary office building of 416 $m^2$; and
  - Warehouse 3, accommodating a warehouse of approximately 9,720 $m^2$ and a two-storey ancillary office building of approximately 549 $m^2$
- Associated car parking spaces;
- Associated hardstand vehicle parking, loading and manoeuvring areas;
- Associated landscaping.

This report is intended to provide an overview of the ESD principles and greenhouse gas and energy efficiency measures that will be implemented and is intended to form part of the Environmental Impact Statement (EIS) for the State Significant Development Application (SSDA). For the facilities officer and users to understand the sustainability initiatives, a building user's guide will be included.

Specific sustainability initiatives proposed for the facility include, but are not limited to:

- Space efficient building layout
- Water Sensitive urban design principles
- High Efficiency Electrical Systems
- Large scale on-site renewable energy generation utilized within the buildings electrical and water systems.
- Increased use of daylighting to reduce power usage.
- Installation of a rainwater capture and reuse system for all buildings on-site
- Energy Efficient heating, ventilation and air conditioning including natural ventilation to open spaces.
- Waste Minimisation strategies.

Through the implementation of the initiatives noted in this report, the project addresses and endeavors to mitigate against negative environmental, social and economic impacts associated with the site. Overall achieving a minimum five (5) star Green Star Design and As Built rating in accordance with the Green Building Council of Australia (GBCA).

## 1.1 Response to Secretaries Environmental Assessment Requirements (SEARs)

This report addresses how the proposed project addresses the SEARs. These requirements are outlined below alongside where the response to each can be found within this report;

| Key Issue | Item for inclusion | Action to Address Requirement | Report Location |
|---|---|---|---|
| Greenhouse Gas and Energy Efficiency | Including an assessment of the energy use of the proposal and all reasonable and feasible measures that would be implemented on site to minimise the proposal's greenhouse gas and carbon emissions (reflecting the Government's goal of net zero emissions by 2050). | The proposal, as outlined in the report, will seek to include substantial energy efficiency measures to minimise the proposal's greenhouse gas and carbon emissions. | Section 3.1 & Section 3.2 |
| Ecologically Sustainable Development | Description of how the proposal will incorporate the principles of ecologically sustainable development in the design, construction, and ongoing operation of the development. | This ESD report details how the project aims to address ESD Principles and their incorporation into the design and ongoing operation of the project. | Section 3 |
| | Demonstration of how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards, and | The project will be seeking a 5 Star Green Star Design and As Built Rating, reflective of Australian Excellence in reference to building sustainability and Environmental Performance. | Section 5 |
| | A description of the measures to be implemented to minimise consumption of resources, especially energy and water. | A report is to be prepared regarding strategies put in place to manage increasingly volatile climate situations. This report will produce outcomes for design to reduce the impact of these climate outcomes. | Section 3.2 & Section 3.6 |

## 1.2 Limitations

Due care and skill have been exercised in the preparation of this report.

No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of this report by any third party. Any third party wishing to act upon any material contained in this report should first contact Northrop for detailed advice, which will consider that party's requirements.

All simulations and performances noted within this report are estimations only. They are based on the existing design of the facility and best practice estimation techniques. These figures are indicative only and should not be used for cost or other analysis purposes.

# 2. The Proposal

## 2.1 Project Details

| Component | Description |
|---|---|
| Site Name | Horsley Drive Business Park Stage 2 - Building's 2 & 3 |
| Address and Legal Description | 130-156 Cowpasture Rd, Wetherill Park NSW 2178<br>Lot 18-20, DP 13961 |
| Site Area | Total area of 54,689 $m^2$ |
| Current Use | The current operations on the site are agricultural and residential |

## 2.2 Proposed Development

The proposed development comprises the works outlined in the following table:

**Table 1 - Overview of Proposed Development**

| Element | Proposed |
|---|---|
| Development summary | ▪ Infrastructure comprising civil works and utilities servicing<br>▪ Construction of two warehouses |
| Hours of Operation | ▪ It has been assumed that the facility will continue to operate 24 hours per day, seven days per week |

# 3. Ecologically Sustainable Development

The following section describes how ESD principals (as defined in clause 7(4) of Schedule 2 of the Environmental Planning and Assessment Regulation 2000) are being incorporated in the design, construction, and operation phases of the project. These initiatives illustrate how the project addresses the following;

- The precautionary principle – through the implementation of environmental management and an assessment of the building's operational maintainability, the project attempts to incorporate adaptability and resilience into the project design. The concepts behind the precautionary principle is to create spaces that can both; accommodate for changes, which may eventuate in the future, and avoid the risk of serious or irreversible damage to the environment.
- Inter-generational equity to ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations – through the inclusion of zero ozone depleting refrigerants, best practice PVC and low impact paints, sealants and adhesives, alongside a focus on providing greater vegetation and support for the buildings connection with nature, the project demonstrates a strong commitment to the preservation of environmental health, diversity and productivity of the local area.
- Conservation of biological diversity and ecological integrity – through the planting of native vegetation, improvement of stormwater runoff from the site and use of integrated landscaping, the project will act to improve, conserve and support the local biological diversity and integrity.
- Improved valuation, pricing and incentive mechanisms - the design process should involve significant input from the Quantity Surveyor who will be involved ensure that the project both remains on budget and effectively considers environmental factors in the valuation of assets and services. Furthermore, the project will look at maintainability and the operational costs associated with individual design initiatives and the overall design.

Through the inclusion of the above and the sustainability initiative outlined within this report the project clearly addresses the ESD Principles into the design, construction and operation of the building as defined in clause 7(4) of schedule 2 of the Environmental Planning and Assessment Regulation 2000. Further detail of the general sustainability initiatives is outlined below.

## 3.1 Energy Usage

The calculation guidelines of the Green Building Council of Australia for unconditioned warehouse spaces indicate that energy consumption for the proposal can be estimated at circa 0.87 GWh a year assuming 24/7 operation. This energy usage will be reduced significantly with inclusion of on-site solar energy generation, which is discussed within this report.

The expansion will also look to minimise the use of fossil fuels, in line with Charter Hall's commitment to becoming net-zero emissions by 2030. This will be supported by a transition plan and power purchase agreements, resulting in an elimination of Greenhouse Gas Emissions from the facility 10 years ahead of the Government's goal of net zero emissions by 2050.

## 3.2 Energy Efficiency:

Energy efficiency will be considered throughout the design development process with the following improvements to be considered by the design team. It is expected that the measures outlined in the following section, alongside a large solar array, will significantly reduce the site's grid electricity demands when compared to a standard practice building.

### 3.2.1 Natural Ventilation of Tertiary Spaces

The project incorporates significant logistic areas, and areas for circulation and vehicles, these spaces will, where achievable, be naturally ventilated or open air in the case of truck loading areas. These areas will be able to operate as naturally ventilated spaces exploiting the buoyancy of air to draw ventilation through the space. Central circulation spaces such as bathrooms and stairs should also look to incorporate natural ventilation and the use of spill air from adjacent spaces to provide passive temperature control.

### 3.2.2 Insulation within the Warehouse Spaces

Given the nature of the project, there is not currently a need for air conditioning or refrigeration of the warehouse areas, however each of the warehouse will incorporate insulation to minimise heat gains into these spaces and provide resilience into the future as temperatures increase.

### 3.2.3 Improved building fabric and glazing performance.

The building envelope comprises several different façade types, with the proposed scheme using a combination of light-colored metal finishes, prefabricated concrete and glazing to lower heat gains throughout summer while maintaining good daylighting throughout of the building.

The use of well-designed glazing and building materials will also assist the projects targets for energy efficiency, acoustic performance and thermal comfort.

### 3.2.4 Integration of Cool roofs

To address heat islanding across the site and wider area, the site should incorporate cool roofing with a high Solar Reflectivity Index (SRI 82) which will minimise the buildup of heat within the material and reduce load on the HVAC system.

### 3.2.5 HVAC System Control

The proposed HVAC system incorporates individual area controls for thermal comfort conditions within the office spaces allowing building occupants to maintain comfort conditions suitable to the use and occupancy of spaces. This system assists in optimising the sites energy efficiency while maintaining comfortable conditions.

### 3.2.6 Energy Metering and Monitoring

An energy metering and monitoring strategy is to be considered to effectively monitor the main energy uses within the building, alongside the lighting and small power use. This aims to provide fault detection and monitoring of the different areas of the building. This will be connected to Charter Halls portfolio monitoring system with data reported and tracked to achieve their overarching energy and water performance targets.

### 3.2.7 Improved Outdoor Air Provision

The project will aim to improve the outdoor air provided to regularly occupied spaces. This will minimise CO2 build up within the office areas and improve comfort for the building occupants.

To address energy use concerns the design will also look to incorporate on an outdoor air economy cycle which will allow the building to exploit periods where the buildings external conditions can effectively provide thermal comfort in the space reducing the run times of the air-conditioning system.

### 3.2.8 Highly efficient lighting system

The installation of LED lighting throughout the building will assist in the minimisation of lighting energy use. Improved lighting energy also reduces the heat loads within cooled spaces and therefore lowers the energy used to condition the building. The use of efficient controlled lighting within the warehouse areas will provide a significant improvement in energy use.

### 3.2.9 Electric-Only Building

All building systems and appliances will be electric, avoiding on-site use of gas.

### 3.2.10 Environmentally Friendly Refrigerants

Where required, the use of Environmentally friendly refrigerants, such as hydrofluorocarbons (HFC's), are targeted within the project to minimise global warming potential and ozone depletion potential

### 3.2.11 Low Impact

Embodied energy will be reduced by avoiding unnecessary use of materials and procuring materials with a low carbon footprint where appropriate options are available

## 3.3 Energy Generation:

With the above energy efficiency measures, the energy load of the facility will be reduced, allowing a large portion of the sites electrical energy demand to be met through the inclusion of a large solar array. This will assist to both offset the sites energy use and minimise the sites daytime peak demand from the grid. A 100kW solar array for each building is currently proposed.

## 3.4 Indoor Environment Quality

Indoor environment quality is always an important consideration in spaces that are regularly occupied such as the offices and ambient warehouse areas. The following considerations have been considered as part of the building design:

### 3.4.1 Daylight Access

The design of the extension should aim to allow good daylight penetration into both internal and external spaces. Daylighting can be achieved through skylights and other methods, whilst not sacrificing thermal transfer. This access to daylight throughout the building will both minimise energy used for lighting and will improve occupant connection to their external environment.

### 3.4.2 Interior noise level control

Internal noise levels will be actively considered with the building layout and systems design considering how noise will reverberate through the building. The use of acoustic insulation and sound isolation will ensure that interior noise levels to be maintained below acceptable limits.

### 3.4.3 Material selection

Materials selection for the project aims to improve the internal environment of the site with materials with low volatile organic compound and formaldehyde content preferred to help minimise respiratory issues for building occupants. To increase durability, steel reinforced polymer (SRP) can be incorporated instead of normal concrete. The use of different materials within the concrete creates a stronger material which is more likely to withstand climate related disasters.

## 3.5 Sustainable Transport

### 3.5.1 End of Trip Facilities

End of trip facilities, including bicycle racks, will be provided to encourage walking and cycling by staff.

## 3.6 Water Efficiency

A strong focus has been put on the effective management of water within the building with the following initiatives being included in the design in all areas throughout the project. It is expected that these initiatives will reduce the sites potable water demand by more than 50% compared to a standard practice building.

### 3.6.1 Water efficient fixtures and fittings


Water Efficient fixtures and fitting will reduce the water consumption of the site. As an indication, the following should be targeted:

- Wash hand basin taps 6-star WELS
- General taps 6-star WELS
- Toilets dual flush 4-star WELS
- Urinals 0.8 L per flush 6-star WELS
- Shower heads 7-9 L per minutes 3WELS

### 3.6.2 Water Sensitive Urban Design

The project will look to incorporate a strong focus on water sensitive urban design with the external landscape design assisting to minimise water use for irrigation. The inclusion of landscaped area will also assist in the reduction of site stormwater discharge and assist in the management of the projects broader impact on urban stormwater flows.

### 3.6.3 Rainwater capture and reuse

A large rainwater capture and reuse system is required for installation to offset the sites water usage for washdown, toilet flushing and irrigation. This system would have the ability to offset most of the sites potable water usage.

## 3.7 Improved Ecology

Through planting native vegetation and promoting improved interaction with the natural environment, the project will look to improve the site's ecology and minimise the ongoing environmental impact of the project. The project is currently implementing the following:

- Incorporation of a site vegetation.
- Minimisation of light spill from the facility which impacts on migratory animals and insects; and
- Reduced dissolved pollutants in stormwater discharged from the site.

## 3.8 Waste Management

Effective waste management throughout demolition, construction and operation of the site will help to promote resource efficiency and minimise the adverse environmental impacts of the project. The following are being considered as part of the design process.

### 3.8.1 Waste Management Plan

A Waste Management Plan will be prepared with the following key objectives:

1. To minimise the environmental impacts of the operations of the development
2. To minimise the impact of the management of waste within the development
3. To ensure waste is managed so as to reduce the amount landfilled and to minimise the overall quantity generated

These objectives will be achieved through strategies such as the integration of recycling bins and back-of-house separation areas, which will encourage recycling and separation of cardboard/paper waste, glass, food waste and comingled recycling and general waste.

### 3.8.2 Separated Waste and Recycling Streams

The provision of separated waste and recycling streams could allow for more effective recycling of the project's operation waste. Providing separate bins for cardboard/paper waste, glass, food wastes, comingled recycling and general waste will improve the buildings operational efficiency and result in significant environmental benefits.

### 3.8.3 Construction and Demolition Waste Minimisation

The project should look to minimise the demolition and construction waste associated with the project and can aim to divert over 90% of waste from landfill to recycling or reuse facilities.

## 3.9 Green Infrastructure

Green infrastructure will be integrated into the project to provide urban cooling, slowing, and filtering of rainwater, climate resilience, strengthen biodiversity and improved community nature connection.

# 4. Climate Change Projections

As part of the design review the project has completed a risk assessment for the sites climate adaption risks based on the CSIRO climate change projections for Western Sydney. This risk assessment reviewed the following three elements:

- Consequence: what will be the effect of the development should the impact occur?
- Likelihood: how likely is it that the impact will occur?
- Risk Rating: what is the associated risk of the development when the likelihood of it happening is measured against the possible consequence of the impact?

Key risks posed to the site which will be addressed as part of this process and high-level issues are outlined below with comment on how these are addressed within the current design; further detail will be developed within the projects detailed design development stages.

- Changing Surface Temperatures should be addressed through the following.
    - Use of high reflectivity roofing to minimise heat gain and heat island effects.
    - Integration of solar panels to provide shading to areas of the roof and provide increased power to the site when peak energy use for cooling is required.
    - Incorporation of heating, ventilation, air conditioning (HVAC) systems designed to modulate in the event of changing outside air temperatures. Equipment will be rated to continue operating during higher temperatures.
- An increase in rainfall intensity should be managed through the following.
    - Inclusion of rainwater and stormwater storage systems to modulate flows exiting the site.
    - Ability to provide increased finished floor level (FFL) designed to be 0.30 m above freeboard requirement to account for increased flooding potential at the site.
    - Inclusion of awnings to the entry access points to promote allow continued operation during adverse conditions.
- An increase to wind speed intensity should be addressed through the following.
    - The metal roof design incorporating roof bracing to fasten the roof onto the building structure to account for increasingly strong winds on site and prevent damage to the roof due to prevailing winds.
    - Improved structural integrity to ensure that the building is not significantly impacted in the event of high intensity wind loads. This includes wind loading on loading dock awnings and doors.
- Decrease in humidity and increased drought conditions will be addressed through the following.
    - Increased capacity within the fire safety systems to assist in the management of bushfire risk associated with dryer conditions.
    - Additional non potable water supply for irrigation needs and the integration of native and drought tolerant vegetation.

Overall, the current design incorporates significant measures to address key projections for climate change in the near term. The project will incorporate further initiatives to address all high and extreme risks posed to the site as per the Climate Adaption Credit within the targeted Green Star rating.

# 5. Green Star Framework

## 5.1 Overview

The Green Building Council of Australia's provides an internationally recognised system to assess sustainable outcomes throughout the life cycle of the built environment. It was developed by the Australian Building Industry through the Green Building Council of Australia (GBCA), which is now the nation's leading authority on sustainable buildings and communities.

This section provides a summary of elements drawn from the Green Star tool that may be applied at the proposal. Whilst the project is targeting a Five (5) Star Green Star Rating, the credits referred to in the summary below are subject to change.

The Green Star system incorporates ESD principals across nine major categories:

- Management
- Indoor Environment Quality
- Energy
- Transport
- Water
- Materials
- Land Use and Ecology
- Emissions
- Innovation

It is noted that a Certified 5 Star Green Star Design & As-Built Rating is being targeted at this stage.

## 5.2 Management

The credits within the Management category promote the adoption of environmental principles from project inception, design, and construction phase, to commissioning, tuning and operation of the building and its systems. The following credits are currently being considered for incorporation.

### 5.2.1 Accredited Professional

The project team have engaged with an accredited professional to provide advice, support and information related to sustainability principles and processes, at all stages of the project.

### 5.2.2 Commissioning and Tuning

#### *5.2.2.1 Services and Maintainability Review*

The project team will perform a comprehensive services and maintainability review led by the head contractor or the owner's representative (or the ICA) during the design stage and prior to construction.

The services and maintainability review is to facilitate input from the design team, the facilities manager and operations staff, and any relevant suppliers and subcontractors. The review looks to address the following aspects of the project:

- Commissionability;
- Controllability;
- Maintainability;
- Operability, including 'Fitness for Purpose'; and

- Safety.

#### *5.2.2.2 Building Commissioning*

The project team will demonstrate that the pre-commissioning and commissioning activities have been performed based on the approved standards and guidelines.

#### *5.2.2.3 Building Systems Tuning*

The project team will demonstrate a formal commitment to a tuning process for all nominated building systems. At a minimum, this includes quarterly adjustments and measurement for the first 12 months of occupation.

### 5.2.3 Adaption and Resilience

#### *5.2.3.1 Implementation of a Climate Action Plan*

The project will consider the impacts of climate change through identifying and addressing all high and extreme risks posed over the expected lifecycle of the project. This will be done through the creation of a Climate Adaption Plan.

**Climate Adaption Plan**

The Climate Adaption Plan will contain as a minimum the following information:

- Summary of project's characteristics (site, location, climatic characteristics);
- Assessment of climate change scenarios and impacts on the project using at least two time scales, relevant to the project's anticipated lifespan. This must include a summary of potential direct and indirect (environmental, social and economic) climate change impacts on the project;
- Identification of the potential risks (likelihood and consequence) for the project and the potential risks to people. This risk assessment is to be based on a recognised standard;
- A list of actions and responsibilities for all high and extreme risks identified; and
- Stakeholder consultation undertaken during plan preparation and how these issues have been.

### 5.2.4 Metering and Monitoring

The project team will include implementation of effective energy and water metering and monitoring systems, which will be at a minimum on a floor by floor basis. Items with energy usages greater than 5%, or 100 kW, will be independently metered.

## 5.3 Indoor Environment Quality

### 5.3.1 Indoor Air Quality

#### *5.3.1.1 Paints, Adhesives, Sealants and Carpets*

At least 95% of all internally applied paints, adhesives, sealants and carpets meet the below stipulated 'Total VOC Limits' (TVOC).

Maximum TVOC limits for paints, adhesives and sealants are detailed in the table below.

Table 2 Maximum TVOC Limits for Paints, Adhesives and Sealants

| Product Category | Max TVOC content in grams per litre (g/L) of ready to use product |
|---|---|
| General purpose adhesives and sealants | 50 |
| Interior wall and ceiling paint, all sheen levels | 16 |
| Trim, varnishes and wood stains | 75 |
| Primers, sealers and prep coats | 65 |
| One and two pack performance coatings for floors | 140 |
| Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives | 250 |
| Structural glazing adhesive, wood flooring and laminate adhesives and sealants | 100 |

To demonstrate compliance for the use of carpets all products will be certified under a recognised Product Certification Scheme or other recognised standards. With the certification current at the time of specification.

#### *5.3.1.2 Engineered Wood Products*

At least 95% of all engineered wood products including: particleboard, plywood, Medium Density Fibreboard (MDF), Laminated Veneer Lumber (LVL), High-Pressure Laminate (HPL), Compact Laminate and decorative overlaid wood panels meet stipulated formaldehyde limits or no new engineered wood products are used in the building.

All engineered wood products used in the building will meet the relevant limits specified in the table below as per the specified test protocol or have product specific evidence that it contains no formaldehyde.

Table 3 Formaldehyde Emission Limit Values for Engineered Wood Products

| Test Protocol | Emission Limit/Unit of Measurement |
|---|---|
| AS/NZS 2269:2004, testing procedure AS/NZS 2098.11:2005 method 10 for Plywood | ≤1mg/ L |
| AS/NZS 1859.1:2004 - Particle Board, with use of testing procedure AS/NZS 4266.16:2004 method 16 | ≤1.5 mg/L |
| AS/NZS 1859.2:2004 - MDF, with use of testing procedure AS/NZS 4266.16:2004 method 16 | ≤1mg/ L |
| AS/NZS 4357.4 - Laminated Veneer Lumber (LVL) | ≤1mg/ L |
| Japanese Agricultural Standard MAFF Notification No.701 Appendix Clause 3 (11) - LVL | ≤1mg/ L |
| JIS A 5908:2003- Particle Board and Plywood, with use of testing procedure JIS A 1460 | ≤1mg/ L |
| JIS A 5905:2003 - MDF, with use of testing procedure JIS A 1460 | ≤1mg/ L |
| JIS A1901 (not applicable to Plywood, applicable to high pressure laminates and compact laminates) | ≤0.1 mg/m²hr* |
| ASTM D5116 (applicable to high pressure laminates and compact laminates) | ≤0.1 mg/m²hr |
| ISO 16000 part 9, 10 and 11 (also known as EN 13419), applicable to high pressure laminates and compact laminates | ≤0.1 mg/m²hr (at 3 days) |
| ASTM D6007 | ≤0.12mg/m³** |
| ASTM E1333 | ≤0.12mg/m³*** |
| EN 717-1 (also known as DIN EN 717-1) | ≤0.12mg/m³ |
| EN 717-2 (also known as DIN EN 717-2) | ≤3.5mg/m²hr |

*mg/m²hr may also be represented as mg/m²/hr.

**The test report must confirm that the conditions of Table 3 comply for the particular wood product type, the final results must be presented in EN 717-1 equivalent (as presented in the table) using the correlation ratio of 0.98.

***The final results must be presented in EN 717-1 equivalent (as presented in the table), using the correlation ratio of 0.98.

### 5.3.2 Acoustic Comfort

To create an acoustically comfortable and appropriate space for occupants, the project will achieve the following standards.

- Internal ambient noise levels, in the nominated area, are no more than 5dB(A) above the “satisfactory” sound levels provided in Table 1 of AS/NZS 2107:2016.
- "Reverberation time in the nominated area must be below the maximum stated in the ‘Recommended Reverberation Time’ provided in Table 1 of AS/NZ 2107:2016"
- The partition between the spaces should be constructed to achieve a weighted sound reduction index (Rw) of at least 45.

### 5.3.3 Lighting Comfort

#### *5.3.3.1 Minimum Lighting Comfort*

The project lighting design has ensured that all lights in internal spaces are flicker free and accurately address the perception of colour in the space.

Flicker-free lighting refers to luminaires that have either:

- A minimum Class A1 & A2 ballast;
- High frequency ballasts for all fluorescent lamps; or
- Electronic ballasts in High Intensity Discharge (HID) lighting.

#### *5.3.3.2 General Illuminance and Glare Reduction*

The project team has also ensured that, in the nominated area, lighting levels comply with best practice guidelines for Office Spaces; corresponding to Table 3.1 of AS 1680.2. and that glare is eliminated using baffles, louvers, translucent diffusers, ceiling design, or other means that obscures the direct light source from all viewing angles of occupants.

### 5.3.4 Thermal Comfort

The project team will also ensure that the facility will provide a thermally comfortable space for occupants. This is achieved through meeting National Construction Code 2019: Section J JV3 compliance, and additional Green Star modelling.

## 5.4 Energy

The 'Energy' category aims to facilitate reductions in greenhouse gas emissions by facilitating efficient energy usage and encouraging the utilisation of energy generated by low-emission sources.

### 5.4.1 Greenhouse Gas Emissions – Comparison to a Reference Building Pathway

The current project design is targeting a 30% reduction in the predicted energy consumption and GHG emissions compared to a minimum code compliant building.

Prediction of the building performance against this benchmark is to be confirmed using building performance modelling that assesses potential energy use for building services systems including:

- Mechanical Services
- Electrical Services
- Communications, AV and security systems
- Hydraulic Services
- Vertical Transportation Systems

### 5.4.2 Peak Electricity Demand Reduction – Reference Building

By using efficient systems and on-site generation sources the project is targeting a reduction in peak electricity demand by at least 20%. Peak electricity demand is the predicted annual peak calculated as the sum of all distribution boards (to include all miscellaneous loads) relevant to the building as shown in the as-installed electrical schematics.

## 5.5 Sustainable Transport

Sustainable transport criteria aim to provide design and operational measures that reduce the carbon emissions arising from occupant travel to and from the project, when compared to a benchmark building. In addition, it also promotes the health and fitness of commuters, and the increased accessibility of the location.

### 5.5.1 End of Trip Facilities

End of trip facilities will be provided within the facility for employees. The inclusion of these facilities will encourage commuters to consider cycling or walking to work. Bicycle storage is also to be provided, ensuring security for those who choose to cycle.

### 5.5.2 Parking Provisions

The Parking areas provided for employees will look to include provisions for electric charging, to encourage the transition to electric vehicles. The parking areas should also provide fuel-efficient car parking spaces, as well as parking space for car share vehicles.

## 5.6 Water

The aim of the credit is to encourage building design that minimises potable water consumption in operations. The potable water credit will be considered for implementation as follows.

### 5.6.1 Sanitary Fixture Efficiency

The project is looking to further improve fixture water efficiency to achieve WELS ratings within one star or those stated in the table below.

Table 4 Sanitary Fixture Efficiencies

| Fixture / Equipment Type | WELS Rating |
|---|---|
| Taps | 6 Star |
| Urinals | 6 Star |
| Toilet | 5 Star |
| Showers | 3 Star (> 4.5 but <= 6.0) |
| Clothes Washing Machines | 5 Star |
| Dishwashers | 6 Star |

### 5.6.2 Heat Rejection Water

A waterless heat rejection system is proposed on site, eliminating water usage for the purposes of air conditioning office spaces.

### 5.6.3 Water Harvesting System

Water Harvesting system provisioned to minimise potable water usage of Refrigeration system. This system is provision to serve approximately 65% of the water requirement of the Refrigeration system.

### 5.6.4 Landscape Irrigation

Rainwater supported drip irrigation with moisture sensor override is to be installed to minimise potable water used for the project irrigation.

## 5.7 Materials

The aim of the materials credits is to reward projects that include building materials that are responsibly sourced or have a sustainable supply chain. Should these be targeted the project would need to consider.

### 5.7.1 Life Cycle Impacts

### 5.7.2 Responsible Building Materials

#### *5.7.2.1 Permanent Formwork, Pipes, Flooring, Blinds and Cables*

90% (by cost) of all cables, pipes, flooring and blinds in the project will either:

- Do not contain PVC and have an Environmental Product Declaration (EPD); or
- Meet Best Practice Guidelines for PVC.

### 5.7.3 Construction and Demolition Waste – Percentage Benchmark

This project should target 90% of the waste generated during construction and demolition being diverted from landfill. Compliance verification summaries should also be provided for the waste contractor and waste processing facilities.

## 5.8 Land Use and Ecology

The 'Land Use & Ecology' category aims to reduce the negative impacts on sites' ecological value because of urban development and reward projects that minimise harm and enhance the quality of local ecology.

### 5.8.1 Endangered, Threatened or Vulnerable Species

At the date of site purchase or date of option contract, the project site did not include old growth forest or wetland of ‘High National Importance’ or did not impact on ‘Matters of National Significance’.

### 5.8.2 Heat Island Effect Reduction

At least 75% of the whole site area (when assessed in plan view) comprises of one or a combination of the following:

- Vegetation;
- Roofing materials, including shading structures, having the following:
    - For roof pitched <15°– a three year SRI >64; or
    - For roof pitched >15°– a three year SRI >34.
- Only where the three year Solar Reflectance Index (SRI) for products is not available, use the following:
    - For roof pitched <15° – an initial SRI > 82; or
    - For roof pitched >15° – an initial SRI > 39.

- Unshaded hard-scaping elements with a three year SRI > 34 or an initial SRI > 39;
- Hard-scaping elements shaded by overhanging vegetation or roof structures, including solar hot water panels and photovoltaic panels;
- Areas directly to the south of vertical building elements, and areas shaded by these elements at the summer solstice.

## 5.9 Emissions

The 'Emissions' category aims to assess the environmental impacts of 'point source' pollution generated by projects. Negative impacts commonly associated with buildings include damage to the environment through refrigerant leaks or disturbances to native animals and their migratory patterns as a result of light pollution.

### 5.9.1 Stormwater

#### *5.9.1.1 Reduced Peak Discharge*

The project is aiming to achieve a post-development peak event discharge from the site which does not exceed the pre-development peak event discharge using the design Average Recurrence Interval (ARI) that corresponds to the associated flooding risk identified in the Climate Change and Adaption Assessment undertaken as part of the Adaption and Resilience credit.

#### *5.9.1.2 Reduced Pollution Targets*

Additionally, the project aims to demonstrate that all stormwater discharged from the site meets the pollution reduction targets in Table 5 below.

Table 5 Minimum Pollution Reduction Targets

| Pollutant | Reduction Target (% of the Typical Urban Annual Load) |
|---|---|
| Total Suspended Solids (TSS) | 80% |
| Gross Pollutants | 85% |
| Total Nitrogen (TN) | 30% |
| Total Phosphorus (TP) | 30% |
| Total Petroleum Hydrocarbons | 60% |
| Free Oils | 90% |

### 5.9.2 Light Pollution

#### *5.9.2.1 Light Pollution to Neighbouring Bodies*

The project design ensures that all outdoor lighting on the project complies with AS 4282:1997 at all inhabited boundaries, apart from boundaries with roads.

#### *5.9.2.2 Light Pollution to Night Sky*

Outdoor lighting has been designed to achieve control of upward light output ratio (ULOR) by demonstrating that no external luminaire on the project has a ULOR that exceeds 5%, relative to its actual mounted orientation.

### 5.9.3 Microbial Control

The project would look to integrate no water-based heat rejection systems preventing the buildup of microbes in these systems.

## 5.10 Innovation

The 'Innovation' category aims to recognise the implementation of innovative practices, processes and strategies that promote sustainability in the built environment.

### 5.10.1 Market Transformation

The project has undertaken a sustainability initiative that substantially contributes to the broader market transformation towards sustainable development in Australia or in the world. Through the targeting of world leading sustainability principles, the project is contributing to a broader market transformation that repositions tenant health and well-being as a key indicator of sustainability.

### 5.10.2 Innovation Challenge – Financial Transparency

This Innovation Challenge aims to encourage owners, developers, and operators to disclose the costs of sustainable building practices, and to agree to participate in a yearly report developed by GBCA that will inform the building industry on the true costs of sustainability.

# 6. Conclusion

This report has addressed the ESD and Greenhouse Gas requirements to support the SSDA for the Development of the Horsley Drive Business Park.

Specific sustainability initiatives proposed for the building include, but are not limited to:

- Space efficient building layout.
- Water Sensitive urban design principles
- High Efficiency Electrical Systems
- Large scale on-site renewable energy generation
- Increased use of daylighting to reduce power usage
- Installation of a rainwater capture and reuse system for all buildings on-site
- Energy Efficient heating, ventilation and air conditioning including natural ventilation to open spaces.
- Waste Minimisation strategies.

Overall, through the implementation of the initiatives noted within this report the project clearly demonstrates the site's commitment to ESD principles throughout the design, construction, and operation. Additionally, the project design team has worked to optimise the sites energy performance, address key climate related risks posed to the site, and align to the NSW Government's commitment to carbon neutrality by 2050.

Overall through the projects commitment to Green Star and an outcomes focused approach to sustainability the project aims to exceed the required ESD measures and demonstrate Australian Leadership in sustainability.