Aspect Industrial Estate
Warehouse 6 & 7

ESD Report

28/02/2024 **Ref: 301351424**

PREPARED FOR:

Mirvac

PREPARED BY:

Madhu Muthumalai

Stantec

Revision

Revision No.	Date	Description	Prepared by	Quality Reviewer
1	28/02/2024	Issue for DA	MPM	RD

Disclaimer

This report has been developed based on the development level information provided to Stantec. Stantec has taken every effort to ensure the information presented in this report is an accurate reflection of the development but cannot guarantee the final performance of the building. The content of the development, including systems, materiality and finishes is subject to final architectural and client approval and subject to change.

Contents

1 Executive Summary

This Ecological Sustainable Development Report has been prepared for Mirvac for the proposed new Warehouses 6 and 7 at Aspect Industrial Estate development located at 788-882 Mamre Road, Kemps Creek NSW 2178. This report is intended to provide an overview of the ecologically sustainable design (ESD) principles and greenhouse gas and energy efficiency measures that will be implemented and is intended to form part of the construction and operation of warehouses 6 and 7 at Aspect Industrial Estate.

Information contained within this report has been prepared in direct response to:

- The NSW Environmental Planning and Assessment Act 1979;
- The NSW Environmental Planning and Assessment Regulation 2021;
- State Environmental Planning Policy (Industry and Employment) 2021;
- Section 3.2(1) of the State Environmental Planning Policy (Sustainable Buildings) 2022;
- Penrith Development Control Plan (DCP) 2014; and
- Mamre Road Precinct Development Control Plan (DCP) 2021.

The report includes:

- An overview of the sustainability drivers for the project (both regulatory & identified project drivers);
- Detail regarding specific ecological sustainable development initiatives through all phases of the project;
- Initiatives that will minimise the consumption of energy, water and material resources, whilst maintaining a high indoor environmental quality for occupants.

The project will implement a number of greenhouse gas and energy efficiency initiatives and sustainable design principles, including:

- Buildings to be net positive for carbon emissions where determined by Mirvac to be appropriate;
- On-site renewable energy production:
    - Warehouse 6A: 100 kW solar system
    - Warehouse 6B: 100 kW solar system
    - Warehouse 7: 200 kW solar system
- Environmental outcome benchmarked to a minimum of 5 Star Green Star Buildings;
- Smart metering;
- Electric car and truck charging dedicated bays;
- Rainwater harvesting and reuse for irrigation;

2 Introduction

2.1 Aspect Industrial Estate Concept Masterplan & Warehouse 6 and 7

Aspect Industrial Estate (AIE, the site) is legally described as Lots 1, 2 & 5 (DP 1285305) and Lots 6 & 7 (DP 1291562), with a total site area of 558,323m^2. The site is located in 788-882 Mamre Road, Kemps Creek NSW 2178 within the Penrith Local Government Area (LGA). Lot 6 (Warehouse 6) within AIE has a site area of 19,568 m^2 and lot 7 (Warehouse 7) within AIE has a site area of 27,135 m^2.

The site has approximately 950m of direct frontage to Mamre Road with a proposed intersection providing vehicular access via Mamre Road to the M4 Motorway and Great Western Highway to the north and Elizabeth Drive to the south.

The site is located approximately 4km north-west of the future Western Sydney Nancy-Bird Walton Airport, 13km south-east of the Penrith CBD and 40km west of the Sydney CBD.

The Department of Planning, Industry and Environment (DPIE) rezoned Mamre Road Precinct, including the site, in June 2020 under the State Environmental Planning Policy (Western Sydney Employment Area) 2009 (WSEA SEPP). The rezoning of this precinct responds to the demand for industrial land in Western Sydney. The site primarily zoned IN1 General Industrial with a small sliver of land zoned E2 Environmental Conservation.

Figure 1 – Aspect Industrial Estate – SSDA Mod 3 Estate Masterplan *(*SBA Architects, dated 07/02/2023*)*

2.1.1 New Warehouse 6 & 7

As part of the staged development of Aspect Industrial Estate, Mirvac is seeking approval for a new DA for the staged development of Warehouses 6 and 7. The development has been prepared in accordance with the approved concept development as well as the approved Stage 1, site preparation works and pad levels. The proposal includes the following:

Warehouse 6 (Lot 6)- Stage 01

- Construction of a single building comprising warehouse 6A and 6B to a height of 13.7m including:
  - Warehouse 6A- 4,212 m^2 warehouse area and 500 m^2 of office space.
  - Warehouse 6B- 4,212 m^2 warehouse area and 500 m^2 of office space.
- Construction of two heavy vehicle crossings and two car park crossings to Access Road 3.
- Construction of hardstand area to the north-east of the warehouse for truck manoeuvring.
- On site services and infrastructure.
- Grading and civil works, including a retaining wall.
- Landscaping along site frontages and within car park area.
- Parking for 72 cars across two carparking areas at the north-west and south-east sides of the warehouse building.
- Use of Warehouse 6A and 6B for the purposes of a Warehouse and Distribution Centre use 24 hours a day, 7 days a week.

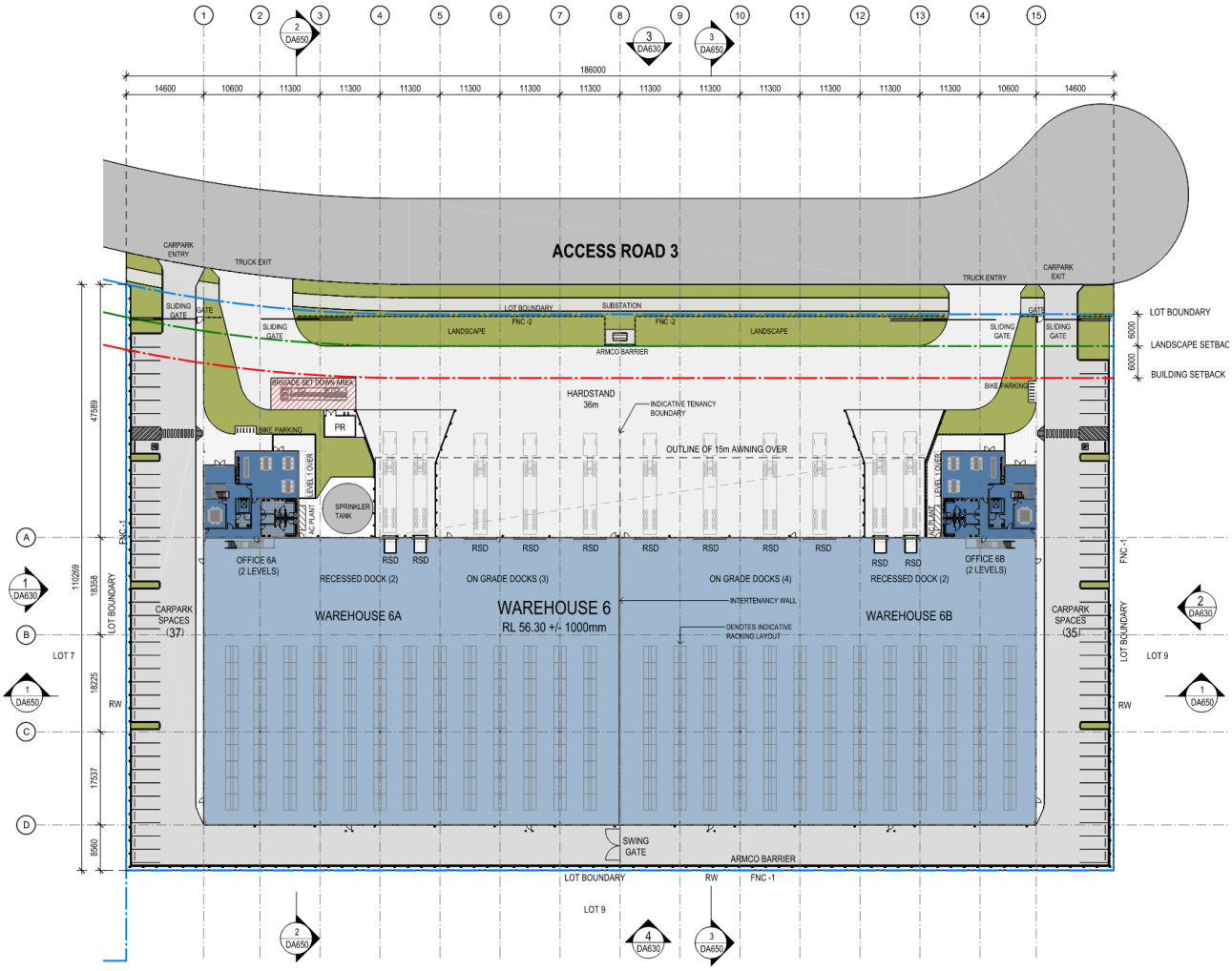

Figure 2- Lot 6 Site and Warehouse Floor Plan (SBA Architects, dated 19/02/2024)

LOT 6 GFA AREA SCHEDULE GROSS FLOOR AREA DEFINED AS PER PENRITH COUNCIL LEP 2010	
SITE AREA	19568 m²
WAREHOUSE 6A WAREHOUSE 6B OFFICE 6A (2 LEVEL) OFFICE 6B (2 LEVEL)	4212 m² 4212 m² 500 m² 500 m²
TOTAL GFA	9424 m²
SITE COVERAGE	47.5%
CARPARK SPACES PROVIDED	72

Warehouse 7 and Cafe (Lot 7)- Stage 02

- Construction of a single building comprising Warehouse 7 to a height of 13.7m, including:
  - 14,358 m^2 Ambient Warehouse area
  - 750 m^2 Office
  - 100 m^2 Dock Office
- Construction of a 112 m^2 Café building at the north-west corner of Lot 7 to a height of 2.8m.
- Construction of one heavy vehicle crossing and one car park crossing to Access Road 3 for access to Warehouse 7. Construction of one car park crossing to Access Road 4 for dedicated access to the proposed café.
- Construction of hardstand area to the south-east of the warehouse for truck manoeuvring.
- On site services and infrastructure.
- Grading and civil works, including retaining walls.
- Landscaping along site frontages and within car park area.
- Parking for 82 cars across:
  - 62 parking spaces at the carpark area to the north-east of the warehouse building in support of the proposed Warehouse 7 operations.
  - 20 parking spaces at the carpark area to the north-west of the warehouse building in support of the estate café.
- Use of Warehouse 7 for the purposes of a Warehouse and Distribution Centre use 24 hours a day, 7 days a week. Use the Café as a Food and Drink Premises.

Figure 3- Lot 7 Site and Warehouse Floor Plan (SBA Architects, dated 19/02/2024)

LOT 7 GFA AREA SCHEDULE GROSS FLOOR AREA DEFINED AS PER PENRITH COUNCIL LEP 2010	
SITE AREA	27135 m²
CAFE	112 m²
OFFICE (2 LEVEL)	750 m²
DOCK OFFICE	100 m²
WAREHOUSE	14358 m²
LESS LOADING ZONE	2100 m²
TOTAL GFA	13220 m²
SITE COVERAGE	56.5%
CARPARK SPACES PROVIDED	82 82

Figure 4- Cafe Plans (SBA Architects, dated 22/02/2024)

3 Sustainable Design Framework

The proposed sustainability response for the project includes various associated drivers, including the following regulatory frameworks:

- The NSW Environmental Planning and Assessment Act 1979;
- The NSW Environmental Planning and Assessment Regulation 2021;
- State Environmental Planning Policy (Industry and Employment) 2021;
- Penrith Council Development Control Plan (2014);
- Penrith Council Local Environmental Plan (2010); and
- Mamre Road Precinct Development Control Plan (DCP) 2021.

3.1 The NSW Environmental Planning and Assessment Regulation 2021

Schedule 193 of Division 5 of Part 8 of the Environmental Planning and Assessment Regulation 2021 states:

193 Principles of ecologically sustainable development

1. *The principles of ecologically sustainable development are the following—*
    - *a) the precautionary principle,*
    - *b) inter-generational equity,*
    - *c) conservation of biological diversity and ecological integrity,*
    - *d) improved valuation, pricing and incentive mechanisms.*
2. *The precautionary principle is that if there are threats of serious or irreversible environmental damage, lack of full scientific certainty should not be used as a reason for postponing measures to prevent environmental degradation.*
3. *In applying the precautionary principle, public and private decisions should be guided by—*
    - *a) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and*
    - *b) an assessment of the risk-weighted consequences of various options.*
4. *The principle of inter-generational equity is that the present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.*
5. *The principle of the conservation of biological diversity and ecological integrity is that the conservation of biological diversity and ecological integrity should be a fundamental consideration.*
6. *The principle of improved valuation, pricing and incentive mechanisms is that environmental factors should be included in the valuation of assets and services, such as—*
    - *a) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, and*
    - *b) the users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and*
    - *c) established environmental goals should be pursued in the most cost effective way by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their own solutions and responses to environmental problems.*

3.2 State Environmental Planning Policy (Industry and Employment) 2021

Chapter 2 Western Sydney employment area of the State Environmental Planning Policy (Industry and Employment) 2021 states:

Part 2.4 Principal development standards

2.19 Ecologically sustainable development

The consent authority must not grant consent to development on land to which this Chapter applies unless it is satisfied that the development contains measures designed to minimise-

a) the consumption of potable water, and

b) greenhouse gas emissions.

3.3 State Environmental Planning Policy (Sustainable Buildings) 2022

Section 3.2 (1) of the State Environmental Planning Policy (Sustainable Buildings) 2022 states:

3.2 Development consent for non-residential development

(1) In deciding whether to grant development consent to non-residential development, the consent authority must consider whether the development is designed to enable the following—

(a) the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials, - refer to 4.6 Waste Management

(b) a reduction in peak demand for electricity, including through the use of energy efficient technology, - refer to Section 4.2 Greenhouse Gas & Energy Efficiency.

(c) a reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design, - refer Section 4 ESD Opportunities & Initiatives.

(d) the generation and storage of renewable energy, - refer to Section 4.2 Greenhouse Gas & Energy Efficiency.

(e) the metering and monitoring of energy consumption, - refer to Section 4.5 Building Management

(f) the minimisation of the consumption of potable water. - refer to Section 4.3 Water Efficiency.

3.4 Penrith Development Control Plan (DCP) 2014

The Penrith Development Control Plan 2014 has been prepared in accordance with Section 74C of the Environmental Planning and Assessment Act 1979 and clause 16 of the Environmental Planning and Assessment Regulation 2000.

Chapter ***C1 Site Planning and Design Principles*** of the Penrith Development Control Plan 2014 states:

"1.2. Design Principles

B. Objectives

b) To ensure that development is designed on a 'whole of building' approach by:
- *ii. responding to climatic and contemporary environmental conditions by:*
  - *encouraging passive solar building design;*
  - *allowing reasonable daylight access to all developments and the public domain;*
  - *reducing the necessity for, or improve the control of, mechanical heating and cooling;*
  - *reducing the energy consumed by installed appliances and equipment;*
  - *improving the indoor environmental quality of occupants;*
  - *minimising greenhouse gas emissions;*

1.2.2. Built Form – Energy Efficiency and Conservation

a) The selection criteria for construction materials, including internal fit-out work, should include detailed documentation of their energy efficiency properties.
b) Buildings should be designed on passive solar design principles which:
- *i. Respond to orientation to maximise the northerly aspect and solar access in the cooler periods;*

ii. *Reduce overheating in summer and promote solar gain in winter; and*
iii. *Ensure there is adequate cross flow of air by utilising natural ventilation, resulting in a reduction in the use of mechanical ventilation and/or air-conditioning systems.*

c) *The future use and occupants of the building should be considered in the design and location of building services/equipment to ensure that:*
   i. *The thermal comfort of occupants is optimised through zoning sections of the floor area to*
   ii. *of building services is provided enable individual control of heating and cooling;*
   iii. *Lighting systems and fittings have reduced energy consumption that are also appropriate for the use/activity located in that part of the building;*
   iv. *The equipment or service will be used and its future use will not affect other elements of sustainability; and*
   v. *Sub-metering to individual tenancies within the development to enable individual monitoring of consumption performance.*

d) *Common and service areas in the building should incorporate energy and water efficiency/conservation measures in their design and location.*

Chapter ***C3 Water Management*** of the Penrith Development Control Plan 2014 states:

C. Controls

3) Proposed Industrial Land Uses

The following controls apply to new industrial buildings and significant alterations/additions to industrial buildings:

b) *All proposed industrial sites with a hard surface area (including roof area, driveways, parking areas, loading bays, covered storage areas, etc.) greater than 1,000m2 shall submit a water management plan which estimates required water needs, and includes an investigation into the feasibility of the measures listed below, outlines those to be adopted on the site and explains why any measures not adopted were unable to be implemented:*
   i. *Rainwater tanks connected to roof and gutter systems and installed to enable reuse of rainwater for irrigation, industrial processes, toilet flushing or other non-drinking purposes;*
   ii. *Stormwater detention systems installed and maintained to enable the reuse of stored water for irrigation, industrial processes, toilet flushing or other non-drinking purposes, and to minimise the impact of runoff from the site;*
   iii. *Roof gardens, either for recreational purposes or as a means to reduce hard stand area.*

3.5 Penrith Local Environmental Plan (LEP) 2010

Part 7.4 of the Penrith Local Environmental Plan 2010 states:

"Part 7 Additional local provisions

7.4 Sustainable development

In deciding whether to grant development consent for development, the consent authority must have regard to the principles of sustainable development as they relate to the development based on a "whole of building" approach by considering each of the following—

a) *conserving energy and reducing carbon dioxide emissions,*
b) *embodied energy in materials and building processes,*
c) *building design and orientation,*
d) *passive solar design and day lighting,*
e) *natural ventilation,*
f) *energy efficiency and conservation,*
g) *water conservation and water reuse,*
h) *waste minimisation and recycling,*
i) *reduction of vehicle dependence,*
j) *potential for adaptive reuse."*

3.6 Mamre Road Precinct Development Control Plan 2021

The Mamre Road Precinct Development Control Plan 2021 provides detailed planning controls for industrial development in Mamre Road Precinct within the Western Sydney Employment Area.

Chapter 4 General Requirements for Industrial Development of the Mamre Road Precinct Development Control Plan 2021 states:

4.2 Built form design controls

4.2.5 Building Design

Objectives

a) To encourage innovation and a high standard of architectural design, utilising quality materials and finishes.

b) To ensure buildings achieve a high level of sustainability and environmental performance.

f) To embed circular economy design principles to maximise recycling and reuse of materials.

Controls

1) Developments with a construction cost of $1 million or more are to demonstrate a commitment to achieving no less than 4 stars under Green Star or 4.5 stars under the Australian Building Greenhouse Rating system (now part of the National Australian Built Environment Rating System (NABERS)).

Siting/Building Orientation

2) Buildings should take advantage of a north or north-easterly aspect to maximise passive solar illumination, heating and natural cross-ventilation for cooling.

Architectural Design

7) External finishes should contain a mix of materials and colours and low reflectivity to minimise glare and reflection.

*11) Energy efficient design principles shall be employed in all building designs (*Figure 5*).*

17) Roof design must provide natural illumination to the interior of the building.

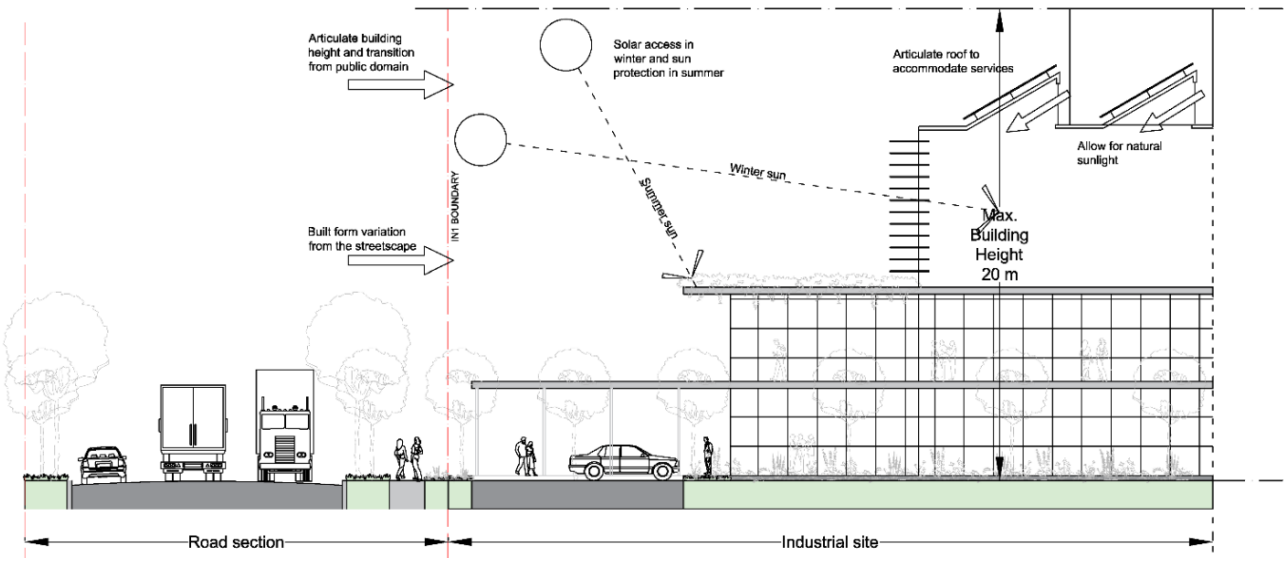

Figure 5- Energy efficient design (Source: Mamre Road Precinct DCP 2021)

Environmentally Sustainable Design

18) Development applications shall demonstrate Ecological Sustainable Design (ESD) measures have been incorporated into the design, including a consideration of:

- *Building and window orientation;*
- *Window size and glass type;*
- *Materials, colour and surface treatment (note control 19 in relation to roof colour);*
- *Insulation;*
- *Landscaping and trees to provide shade and moderate the building microclimate;*
- *Natural ventilation and light with generous, all weather openings;*
- *Utilise extensive roof areas for energy and water collection;*
- *Air flow, ventilation and building morphology to support cooling; and*
- *Circular economy in the design, construction and operation of buildings, public domain, infrastructure, and energy, water and waste systems.*

19) Light coloured materials should be used in roof construction to reduce the urban heat effect.

20) Building services, excluding manufacturing plant and operations, should promote:

- *Separate metering of water and electricity for multiple uses or tenants;*
- *Shut-off valves at stormwater outlets to trap toxic spills;*
- *Waterless urinals;*
- *Energy efficient lighting;*
- *Gas boosted solar hot water for staff amenities (kitchen, toilets, showers);*
- *Rainwater and recycled water for toilet flushing, irrigation or other non-potable uses;*
- *Waste heat recovery systems;*
- *Integrated systems for energy generation- waste and water;*
- *Air-cooled systems, ground source heat rejection or pond heat rejection; and*
- *Energy storage systems combined with the use of photo voltaic cells for roof areas.*

21) Measures to improve air quality and visual and thermal comfort to be considered include:

- *Low VOC paints and low-formaldehyde floor covering, adhesives and furniture;*
- *Glazed facades to be shaded and/or use performance glass to control radiant heat;*
- *Occupant control of comfort parameters (e.g., operable windows, control of air flow);*
- *Protection from noise (e.g. open windows or between production and office areas);*
- *Provision of high quality landscaped outdoor amenity areas for staff;*
- *Hydronic heating and ceiling fans; and*
- *Materials with low reflectance values.*

4.6 Access and Parking

4.6.1 Parking and Manoeuvring Areas

Objectives

8) Parking areas should incorporate dedicated parking bays for electric vehicle charging.

25) The following bicycle destination facilities for staff are to be provided: o For ancillary office and retail space with a gross floor area over 2500m2 , at least 1 shower cubicle with ancillary change rooms; o For industrial activities with a gross floor area over 4000m2 , at least 1 shower cubicle with ancillary change rooms; o Change and shower facilities are to be located close to the bicycle storage areas; and o Where the building is strata-titled, the facilities are to be available to all occupants.

26) Bicycle parking, facilities and storage must be in convenient locations, visible, secure, and provide weather protection for the bicycle.

3.7 Project Design Response

The project team has assessed the energy use profile of the development and will implement a number of energy efficiency measures that will reduce significantly the greenhouse gas emissions and footprint of the project. Also, as listed below, a series of best practice sustainable initiatives will be incorporated so that potential environmental impacts are mitigated substantially.

There are no perceived threats of serious or irreversible environmental damage as a result of locating the Aspect Industrial Estate development on the desired site. The site is not listed within the Schedule 5 Environmental Heritage – Part 1 Heritage items of the Penrith Local Environmental Plan 2010. The proposed development will have predominantly the same uses as the current industrial warehouses and developments from the surroundings.

The development will give strong consideration to potential environmental impacts by reducing it through application of best practice design and processes such as the many ESD commitments and initiatives listed in the following Section. The documented initiatives to be implemented – which are the basis for the response to the Sustainable Design Frameworks outlined above include:

- Buildings to target net positive for carbon emissions where determined by Mirvac to be appropriate;
- On-site renewable energy production:
  - Warehouse 6A: 100 kW solar system
  - Warehouse 6B: 100 kW solar system
  - Warehouse 7: 200 kW solar system
- Environmental outcome benchmarked to a minimum 5 Star Green Star Buildings;
- Smart metering;
- Electric car and truck charging future provisioning;
- Rainwater harvesting and reuse for irrigation;
- Energy Efficient lighting systems (internal and external) and lighting controls;
- Best Practice Façade Thermal Performance / Building Thermal Mass;
- Solar Gain Reduction / Shading;
- Efficient HVAC System Equipment (Office spaces);
- Explore opportunities to reduce embodied energy reduction associated to construction material selection;

- Increased access to natural daylight where possible;
- Water efficient fixtures and fittings (WELS rating);
- Selection of native & low water plants / trees;
- Application of Water Sensitive Urban Design (WSUD) principles;
- Increased Indoor & Outdoor Environmental Quality;
- Waste Management Plan;
- Bike racks and end-of-trip facilities;
- Others as presented in the following Sections.

Any further concerns will be addressed through development of a Construction Environmental Management Plan that incorporates mitigation measures to ensure that environmental impacts to the site are minimised during construction. Contractors will also be requested to provide and abide by an Environmental Management System to be in accordance with NSW Environmental Management Systems Guidelines or a similar standard. This places a value on environmentally responsible building practices to ensure they are held responsible for the environmental management of the building site as they complete their work.

Once the new development is under activity, operational guidelines, best practice procedures and appropriate monitoring and control measures will be defined by the building owner. This will be in accordance to the sustainable strategies adopted by the development, and will be distributed to the tenants to ensure environmental impacts associated with operational processes are minimised wherever possible.

4 ESD Opportunities & Initiatives

The following section addresses the Greenhouse Gas, Energy Efficiency and Ecologically Sustainable Development aspects in response to the Sustainable Design Frameworks (as per Section 3) for the project. It uses best practice sustainable design principals and borrows elements from external sustainability tools to develop a set of metrics for the site.

There are several Ecological Sustainable Development opportunities and initiatives that will be implemented in the project. The following examples are to be read in conjunction with design documentation prepared by SBA Architects. Stantec note the design is in its very early stages, and the following concepts will be considered going forward.

Fundamental to the success of improving the ESD outcome for the project is the adoption of strong design philosophy. Passive design features have the ability to:

- Lower operational energy demand via improved thermal performance;
- Promote greater indoor environmental quality;
- Reduce the buildings' reliance on HVAC systems;
- Improve building occupant comfort; and
- Improve the project's capacity to deliver a responsible development.

The warehouses designs will include several passive design options and provide a robust and environmentally sensitive framework. Furthermore, several energy efficiencies measures and intelligent selection of systems are being proposed in order to improve the environmental outcome of the development while maintaining occupant level comfort and well-being.

4.1 Australian Excellence ESD Framework (Green Star)

The project's as-built environmental performance will be equivalent to a 5 Star Green Star project, based on the Green Star Building tool. As proposed by the Green Star framework, a holistic approach will be taken towards the environmental performance of the development, where relevant ESD principles will be applied and voluntarily accessed against the Green Star scheme so that the project can be benchmarked to achieve the equivalent of a 5 Star Green Star Building standard – which represents Australian Excellence within the built environment.

Green Star is currently accepted within the building and construction industry as representative of Australian Excellence in design & construction with reference to environmental conservation and performance. Green Star is Australia's foremost holistic built environment assessment tool and outlines a series of environmental performance criteria design to improve environmental sustainability & building performance. There are eight performance categories within Green Star Building, as follows:

- Responsible;
- Healthy;
- Resilient;
- Positive;
- Places;
- People;
- Nature; and
- Leadership.

The development may not target a formal Green Star certification, but further investigation is being undertaken by Mirvac on the certification pathway.

4.2 Greenhouse Gas & Energy Efficiency

A variety of greenhouse gas and energy efficiency measures are applicable to the proposed development and form part of the initial design and operation plan for the warehouses. The final strategy will be a combination of sustainability, operational feasibility, architectural intent and site-specific appropriateness.

The energy efficiency strategy follows the hierarchy pyramid below. Best practice energy conservation dictates that in the first instance demand is reduced. This has a much greater benefit to the overall long-term sustainability of the site compared to efficiency measures or renewables/offsets. As such, the focus will be on the elements that provide the greatest impact and return on investment.

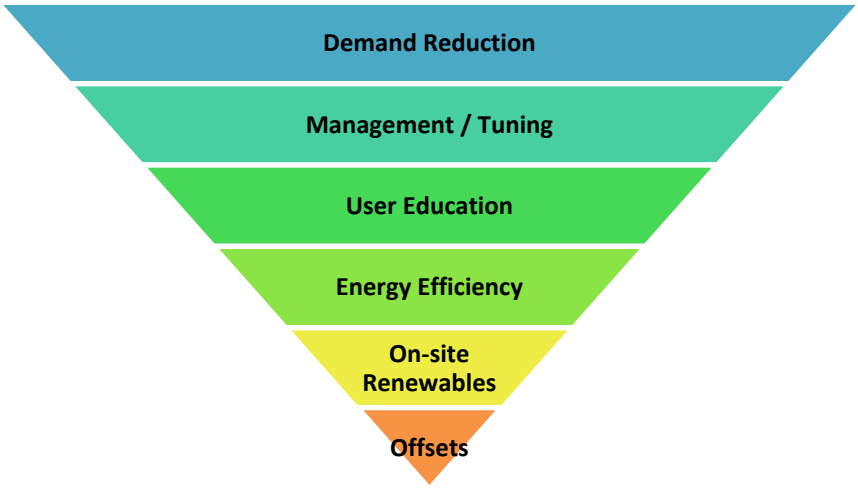

Figure 6 - Energy Efficiency Strategy Hierarchy

4.2.1 Site-wide Energy Strategies

Methods to achieve the greenhouse gas & energy efficiency goals of the projects will go above and beyond the regulatory requirements and industry benchmarks. The below is proposed to be implemented:

- **Buildings to be net positive for carbon emissions**

  The development site is proposed not only to be net carbon zero but to potentially go above and beyond industry benchmarks and deliver a net positive development for embodied carbon emissions. This accounts for scope 1 and 2 greenhouse gas (GHG) emissions from the development site. Reaching net positive carbon by 2030 is part of Mirvac's plan for the future. This is outlined in Mirvac's plan released in 2022 "Carbon Emissions | Mirvac".

  The proposed method of achieving the net positive carbon emission principle is as follows:

  - Designing electrified, energy efficient buildings with solar PV.
  - Measurement of scope 1 & 2 emissions:

    Scope 1 and 2 emissions include Mirvac's own direct emissions and indirect emissions from the services, goods and energy Mirvac consumes. These emissions extend to the development of the building and the building's energy consumption, but not the tenant's emissions. Noting that carbon emissions by tenants of Mirvac's building (scope 3 emissions) are not included within Mirvac's scope 1 & 2 emissions, for example, car exhaust emissions by a building tenant are part of the tenant's carbon emission footprint.
  - Purchase of high-quality carbon offsets for the scope 1 & 2 emissions.

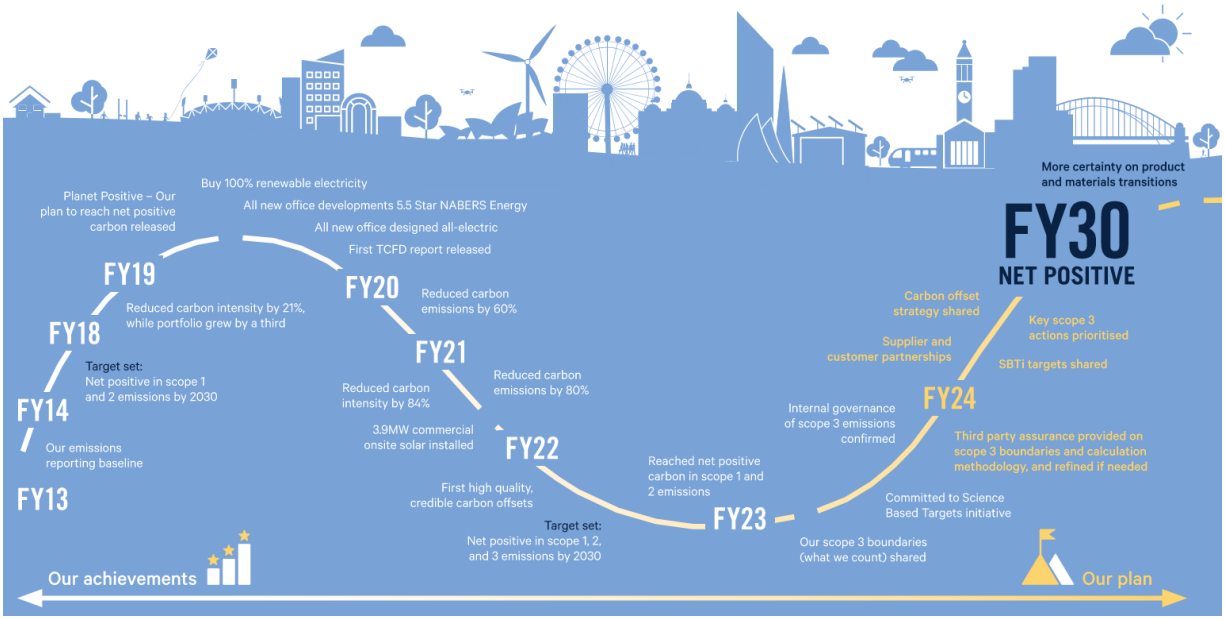

Figure 7- Mirvac's Net Positive Carbon by 2030 Infographic

"It's important to emphasise that being net positive involves going a step further than reaching net zero. For us, net positive means that our positive actions (energy efficiency, renewable energy, transitioning away from fossil fuels, and either minimising or offsetting other emissions) outweigh the carbon emissions from our buildings." Planet Positive – Mirvac's Plan to reach net positive carbon by 2030.

- **On-site Renewable Energy Production – Min. 100 kW solar system each for warehouse 6A and 6B, and 200 kW solar system for warehouse 7:**

  On-site renewable energy production will be implemented in the design to minimise utilisation of energy from the grid system. The system will be designed so that renewable energy is prioritised for use. Consideration can also be given to selling excess energy back into the grid or storage on site for peak reduction.

  Further feasibility will be completed regarding the ideal system configuration, sizing, annual energy generation, etc., but it is anticipated that there will be a minimum 100 kW solar system provided to each building. It is noted the electricity consumption from the site is still to be estimated where the appropriate renewable energy contribution will depend on the final architectural design, industrial arrangement, building services design and tenants operational requirements.

  While there is a minimum target of 100 kW solar system to be provided to each warehouse, Warehouse 6 and 7 is proposed to have a 200 kW capacity solar system each, which represents a fantastic initiative that will have a tremendous impact on the Warehouse 6 and 7 operational carbon footprint.

Figure 8- Source: Google Images

- **Electric car and truck charging dedicated bays:**

  The current development includes dedicated bays in the design for electrical vehicle charging, which reduces the harmful air pollution associated to vehicles exhaust emissions. Furthermore, if renewable energy is used to feed the stations (either through the solar systems or Green Power) then this can represent a complete transition away from fossil fuels related to transport.

- **Energy Efficient Lighting Systems (internal and external):**

  Energy Efficient lighting selection (LED lighting) and system can reduce the electrical load on the grid significantly for the same illuminance output in comparison to traditional incandescent lights. Further, LED globes have a longer life, reducing replacement periods which demands less maintenance, as well as reducing landfill of precious materials. Mirvac will be utilising LED lighting throughout all buildings for the Aspect development.

- **Controls of Lighting Systems:**

  This can include zoned switching, lighting control systems with time clocks and may include lighting sensors where appropriate. This will reduce base building energy consumption by assuring artificial lighting is turned off when not required.

- **Façade Thermal Performance / Building Thermal Mass:**

  Building envelope thermal performance to comply with NCC 2019 Section J requirements (conditioned spaces). This will reduce reliance on mechanical cooling and heating and therefore bringing down HVAC operational energy consumption.

  The warehouses roof material and colour will be reflective of solar radiation, and consideration will be given to building overall thermal mass and to application of thermal insulation appropriate to the local weather profile.

- **Solar Gain Reduction / Shadings:**

  External shading devices will be implemented in the architectural design adjacent to conditioned spaces in order to reduce solar exposure / solar gains thus reducing the reliance on mechanical systems for internal conditioning. Awnings will be provided at each access point to the warehouses. This will be provided on the warehouse edge where trucks load/unload to provide sun protection for employees.

The building roof is designed to be light coloured (low solar absorptance), which also reduces solar gains by reflecting light and is beneficial to the local heat island effect.

- **Efficient HVAC System Equipment (Office spaces):**

  Efficient and bespoke HVAC systems with high COPs will be appropriately designed and sized for the development. This will include high efficiency centralised plant.

- **Embodied Energy reduction associated to construction material selection:**

  Construction materials are a highly carbon intensive component of any development. They often involve energy intensive production processes, large amounts of raw materials including water and energy, and long transport distances to reach the location of the development. However, there are a number of environmentally friendly practices starting to become accepted by the construction industry. Depending on the materials selected for the constructions, and the options available in the area, use of low embodied energy and water materials with preference for sourcing from local or sustainable materials suppliers will be adopted – where possible – during material selection and pre-construction process. This can also include materials with high recycled content.

4.2.2 Warehouse Areas

The warehouse floor areas represents a large portion of the site area (22,782 m^2) and as such is responsible for the significant component of energy consumption within the site. A number of initiatives are proposed to reduce the greenhouse gas emissions and environmental impacts associated to the warehouse component on the development. These include:

- Energy efficient lighting systems (internal and external);
- Controls of lighting systems, including zoned switching, motion sensors and time clocks / lighting sensors as appropriate;
- Large solar PV array to offset the energy consumption of the warehouse machinery and building services.

4.2.3 Office Areas

The office has been analysed for a number of different design elements and configurations. These include:

- Energy efficient lighting systems (internal and external);
- Controls of lighting systems, including zoned switching, motion sensors and time clocks / lighting sensors as appropriate;
- High thermally performing glazing and general façade materials – to meet NCC 2022 Section J requirements;
- Increased mechanical equipment performance;
- Zoned mechanical systems (centre/perimeter);
- Wider temperature control band.

By combining all the above elements within the office design, there is a potential for the office energy consumption to be reduced significantly in comparison to a standard office space (considering business as usual systems in line with the BCA and standard operational procedures).

4.3 Water Efficiency

A variety of water efficiency measures can be applied to the proposed development. These best practice water efficiency measures implemented to reduce water consumption include:

- **Water efficient fixtures and fittings (WELS rating):**

  By implementing low-flow water fixtures, the consumption associated with amenities can be reduced. This includes taps, wash basins, WCs, Urinals, showers and supplementary water uses.

- **Water efficient appliances (WELS rating):**

  Where applicable, priority will be given to efficient water appliances, such as dishwashers for the office spaces.

- **Rainwater harvesting and reuse:**

  A rainwater tank will be implemented as required. Further feasibility will be completed regarding the ideal tank sizing, capture area and end-use for any non-potable water collected. Rainwater on this site is particularly advantageous given the significant collection area across the building roofs. The captured water can offset irrigation water consumption and toilet flushing.

- **Water use metering and monitoring:**

  Which can identify leaks and amend losses before greater loss occurs.

- **Selection of native & low water plants / trees:**

  Native plants are designed to thrive in the Australian environment and are typically more resilient than their exotic counterparts. Low water species will reduce even more irrigation demand.

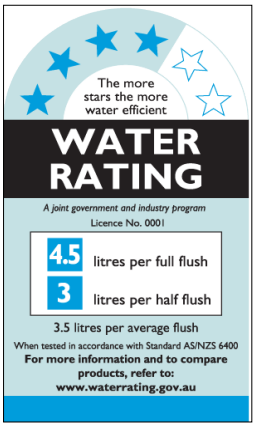

Figure 9 - Illustration of WELS rating label.

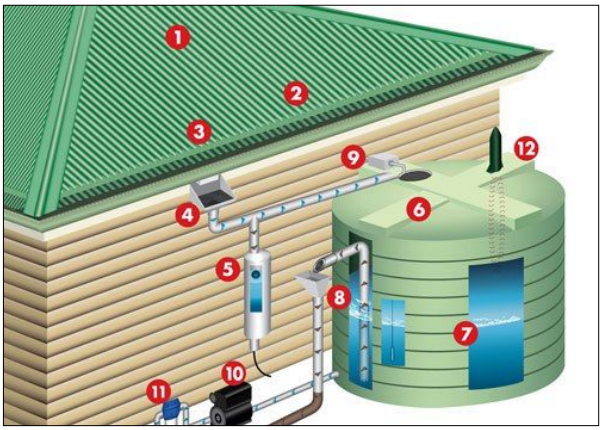

Figure 10 - Illustration of a Rainwater Harvesting System.

The above initiatives are sufficient to allow the project to meet best practice consumption benchmarks considering the HVAC mechanical design will most likely apply waterless heat rejection systems due to the size and volume of the commercial office spaces within the development.

4.3.1 Water Sensitive Urban Design (WSUD)

The WSUD principles outlined in Chapter C3 Water Management - Water Sensitive Urban Design - of the Penrith DCP will be considered for implementation by the project. These include:

- To maintain the natural water balance;
- To make more efficient use of water resources by conserving water, particularly potable (drinking) water;

- To reduce general flood risk;
- To reduce erosion of waterways, slopes and banks;
- To control stormwater and waste water pollution and improve water quality in waterways and groundwater;
- To integrate stormwater management with water supply and waste water treatment; and
- To integrate stormwater treatment into the landscape so as to maximise the visual and recreational amenity of urban development.

4.4 Indoor & Outdoor Environmental Quality

Internal environmental quality and occupant comfort will be a key consideration in the warehouses design. A comfortable workplace encourages greater productivity, workplace satisfaction and tangible health benefits. These benefits range from reduction in stress, increased physical and mental health and general quality of life. Therefore, provision of more thermally comfortable spaces for employees and allowance to natural daylight are being envisaged.

Initiatives being contemplated that would improve overall occupants' comfort and internal environmental quality include:

- **Preference for reflective roof sheeting**

  Solar heat is expected to be passively absorbed by the warehouse's roof sheeting, which shall drive the internal temperatures of the building up. By using a more reflective roofing material – which has a lower solar absorptance (SA) – the internal heat gains are reduced, thus reducing the average internal temperature of the building throughout the year.

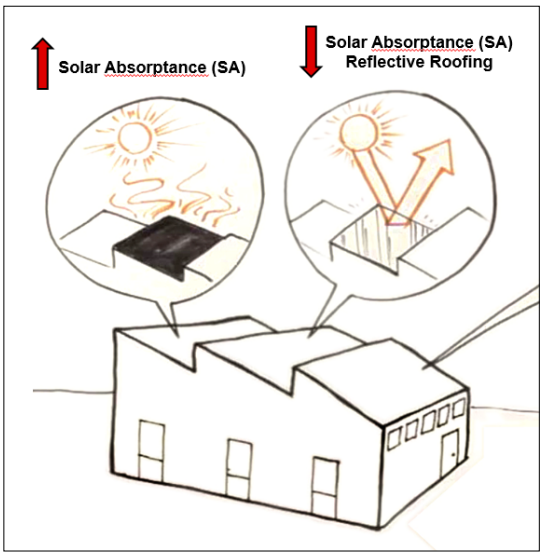

Figure 11 - Effect of roofing solar absorption (SA).

Figure 12 - Illustration of a light coloured (reflective) roof sheeting.

- **Application of translucent roof materials**

  Encouraging natural lighting where possible (e.g., where internal thermal comfort is not compromised), through application of translucent roof materials across the warehouse roofing components. This reduces reliance on artificial lighting and supports an energy efficient design.

- **Amenity area**

  An amenity area is currently being considered within the office area. This will be developed for occupants' amusement and well-being. A high-quality breakout area with access to daylight and spaces for staff to relax and socialise could be included in such an amenity zone.

- **End-of-trip facilities**

  Showers and changing areas will be developed for the use of regular occupants to encourage active transport to-and-from the site, and active break activities.

4.5 Building Management

Via the implementation of industry recognised best practice frameworks, the project design and built form will seek to respond to the ongoing environmental challenges of urban development and ensure the project implements a range of ESD initiatives aimed at improving ongoing building management.

Through specific contractual commitments and documented design intent the project proposes to address environmental management & building operational performance through the following initiatives.

- **Building Commissioning & Tuning Procedures**

  Prior to practical completion / 12 months post practical completion. By implementing this via project contract documents the project ensures operational efficiency & building operation is optimised in accordance with the intended building design.

- **Smart Metering**

  Smart metering will provide relevant data for the use & management of building staff. This will provide detailed information about the project energy use and profile on a regular basis and through an easily accessible online platform. This information will help in the understanding of the usage profile so that adjustments can be made to guarantee optimal performance. This ensures operational efficiency is maintained and also facilitates detection of systems failures, thus improving maintenance and tuning processes.

- **Waste provisions**

  Appropriate waste provisions are going to be included within the project to ensure recycling rates & reduced waste to landfill is optimised.

4.6 Waste Management

In order to facilitate sustainable waste management within the City of Penrith in accordance with the principles of Ecologically Sustainable Development, waste minimisation and resource recovery, easy access to waste systems, pollution prevention associated with waste management practices will be taken into consideration as part of waste management strategy.

The Industrial Estate development is targeting to increase on-site recycling and resource optimisation through adoption of the Waste Management Hierarchy with the ultimate goal of reducing waste going to landfill, which is in line with the *The Waste Avoidance and Resource Recovery Act, 2001* and the *NSW Waste Avoidance and Resource Recovery Strategy 2014-21*. The waste reduction strategy follows the hierarchy pyramid below.

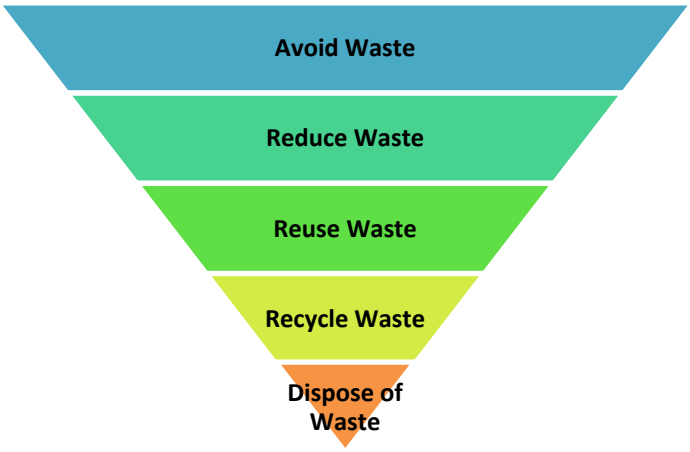

Figure 13 - The "Waste Hierarchy"

Best practice initiatives will be explored through a development of a Waste Management Plan, which is going to address Demolition, Early Works, Construction and Operation Waste Management Strategies, where appropriate.

The key objectives for the management of waste generated by the demolition, early works and construction will include:

- Minimise waste generation on site;
- Segregate waste on site to maximise recycling;
- Store wastes on site appropriately to prevent cross-contamination and/or mixing of different waste;
- Segregate hazardous waste for appropriate treatment and disposal, where applicable;
- Where appropriate, set targets for demolition and construction waste diversion from landfill;

Where appropriate, analyse potential operational waste generation profile from the warehouses and propose best practice Waste Management Strategies.

5 Summary of Design Response

Ecologically Sustainable Design continues to be a driving consideration in the ongoing development of Warehouses 6 and 7, Aspect Industrial Estate, Kemps Creek development. Warehouses 6 and 7 will incorporate a number of ESD initiatives - which are aligned with the applicable - to complement the initiatives undertaken to reduce the greenhouse gas emissions, potable water consumption and material resources of the site. These constitute the sustainability response from the project to the site applicable sustainable design frameworks, as listed within Section4 ESD Opportunities & Initiatives.

The ESD initiatives outlined in this report are intended to be used as a design guide for the development. The specific initiatives that will be installed across the precinct will be determined throughout the development application stage for each individual building and will be subject to feasibility analysis, including that of the final use and layout. The initiatives are being designed to comply with the guidelines set out by the relevant authorities.

The development's commitment to reducing the overall environmental impact is evident of the holistic approach taken to long-term sustainability. Documented initiatives cover a range of categories including:

- Energy & greenhouse gas emissions reduction
- Potable water reduction
- Minimising waste to landfill
- The indoor environment
- Occupant amenity and comfort
- Building management

We trust this report provides sufficient overview of the project commitment to environmentally sustainable design and greenhouse gas and energy efficiency vision for the Warehouse 6 and 7 development.

Level 9, The Forum
203 Pacific Hwy
St Leonards NSW 2065
Tel (02) 8484 7000

For more information, please visit
www.stantec.com