22 July 2020

Frasers Property Australia / Altis Property Partners

Dear Paul Solomon / Stephen O'Connor

KEMPS CREEK WAREHOUSE, LOGISTICS AND INDUSTRILA FACILITTIES SUB – UPDATED MASTERPLAN

As requested, please find enclosed a summary of the changes within the Ecologically Sustainable Development Report with regard to the originally exhibited report (dated 10th May 2019 and as available at https://www.planningportal.nsw.gov.au/major-projects/project/10376) when compared to the updated masterplan (dated 10 July 2020). Changes are summarised in the table below.

Section	Changes
1.1 Development Overview	• Update of total development buildings and areas from 6 lots with a total warehouse area of 163,671 sqm to 9 warehouses across 8 lots, with a total warehouse area of 164,755 sqm. • Figure 1 removed.
2 Sustainable Design Strategies	• Table 2 reorganised and a stormwater specific row added.
2.1 Green Star	• Green Star rating ambition clarified and set from 5-star to 6-star world leadership.
3.2 Measures to improve energy efficiency	• Additional detail on the breakdown energy uses of a typical warehouse • Figure 2 has been reformatted so to be larger and can be read better • Table 5 adjusted that provides detail on the key initiatives assumed for the reference and proposed warehouse that feed into the typical warehouse energy demand.
4.1.2 National Carbon Offset Standard	• Section heading renamed to be "Climate Active Standard" from "National Carbon Offset Standard" to reflect the new name of the carbon neutral certification. • A new paragraph added to reflect the most up to date numbers of current Climate Active certifications
4.3 Measures to Reduce Greenhouse Gas Emissions	• Figure 4 has been reformatted so to be larger and can be read better
6 Conclusion	• Greater detail added that summarises the anticipated energy and water savings because of the environmentally sustainable design initiatives being implemented.

If you require any further information or clarification, please do not hesitate to contact the undersigned at your convenience.

Regards,

Andrew Thai
Sustainability Manager
Frasers Property Australia Pty Limited

Frasers Property Australia Pty Limited
A member of the Frasers Centrepoint Group

Ecologically Sustainable Development Report

Proposed Warehouse, Logistics and Industrial Facilities Hub
Mamre Road & Bakers Lane,
Kemps Creek

10/05/2019
Revised: 22/7/2020

TABLE OF CONTENTS

TABLES

FIGURES

DOCUMENT CONTROL

Version	Date	Comment	Prepared By
Draft	14/08/18	Greenhouse Gas Efficiency Performance & Ecologically Sustainable Development Report	Andrew Thai
Issue	20/08/18	Greenhouse Gas Efficiency Performance & Ecologically Sustainable Development Report	Andrew Thai
Rev1	05/09/2018	Ecologically Sustainable Development Report	Andrew Thai
Rev 2	6/03/2019	Report revised with comments to align with EIS requirements	Andrew Thai
Rev 3	10/5/2019	Updated Table 1 and Figure 1 for revised areas and drawings for SSDA drawings Revision I	Andrew Thai
Rev 4	31/7/2019	Revised references from 5 star to 6 star Revised conclusion	Andrew Thai
Rev 5	8/10/2019	Updated to reflect comments from DPIE, areas adjustment	Andrew Thai
Rev 6	4/11/2019	Updated in relation to comments from Consultant	Andrew Thai
Rev 7	6/11/2019	Minor comments from EG	Andrew Thai
Rev 8	18/2/2020	Revised with updated site plan drawing	Andrew Thai
Rev 9	09/04/2020	Revised with updated site plan drawing	Andrew Thai
Rev 10	23/4/2020	Revised with master plan and comments from eg	Andrew Thai
Rev 11	22/7/2020	Revised with updated site plan drawing	Andrew Thai

1 Introduction

This Ecologically Sustainable Development Report has been prepared by Frasers Property on behalf of a joint venture between Frasers Property Australia (Frasers Property) and Altis Property Partners (Altis). The Proposed Development seeks the construction and operation of a Warehouse, Logistics and Industrial Facilities Hub as well as subdivision of the site. The site is located at 657-769 Mamre Road, Kemps Creek and is legally described as Lot 34 DP 1118173, Lot X DP 421633, Lot 1 DP 1018318, Lot Y DP 421633 & Lot 22 DP 258414. The proposed development aims be a world leader in sustainable design by seeking independent third-party certification against Green Star with a 6-star rating from the Green Building Council of Australia.

Section 2 of the report addresses, in general, the key issue of Ecologically Sustainable Development (ESD). It is noted that within the Secretary's Environment Assessment Requirements (SEARs) – no specific requirements on ESD are stipulated as a part of the Environmental Impact Assessment. **Section 3** (Energy Efficiency) and **Section 4** (Greenhouse Gas Emissions) detail the expected energy demand and list potential efficiency measures that should be implemented to produce energy efficiency. **Section 5** outlines the possible potable water measures required to reduce water demand.

1.1 Development Overview

This State Significant Development Application seeks approval for a warehouse, logistics and industrial facilities hub including subdivision to create lots including internal estate roads and areas for recreation. 8 lots will be developed for warehouse and industrial facilities, and their Gross Floor Areas are detailed in Table 1 below:

Lot Number	Warehouse	Component	Gross Floor Area
Lot 1	1A and 1B	Warehouse 1A Office 1A Warehouse 1B Office 1B	11,670 m2 550 m2 11,670 m2 550 m2
Lot 2	2	Warehouse Office	22,490 m2 1,150 m2
Lot 3	3A and 3B	Warehouse 3A Office 3A Warehouse 3B Office 3B	8,140 m2 550 m2 8,140 m2 550 m2
Lot 4	4	Warehouse Office	13,235 m2 800 m2
Lot 5	5	Warehouse Office	23,105 m2 1,100 m2
Lot 6	6	Warehouse Office Dock Office	26,220 m2 1,500 m2 50 m2
Lot 7	7	Warehouse Office Dock Office	17,175 m2 840 m2 50 m2
Lot 8	8	Warehouse Office	14,420 m2 800 m2

Table 1: Proposed State Significant Development

As Table 1 above shows, there is a total of 164,755 sqm of warehouse and office across 8 lots.

2 Sustainable Design Strategies

This section addresses in general, the key issues of Ecologically Sustainable Development (ESD) as it relates to the Proposed Development. There are opportunities to achieve ESD with the whole development. Also, there are areas for consideration and recommendations (identified in Table 2 below) that apply to individual buildings.

Theme	Recommendations
1. Transport	To reduce the reliance on private vehicles and relieve any traffic pressures on nearby roads and local communities, the following approaches should be investigated: • Secure bicycle parking facilities. • Extension of existing bus routes or the provision of a regular bus service from the Project to nearby public transport facilities. • Promote car-pooling/car-sharing initiatives.
2. Stormwater	Develop a stormwater management plan that incorporates water sensitive urban design (WSUD) such as: - Infiltration trenches and bio retention basins. - Bioswales. - Rain gardens. - Gross pollutant traps. - Rainwater tanks. These initiatives reduce the quantity and quality of storm water runoff, protect waterways and ecosystems, minimise drainage infrastructure costs and enhance liveability.
3. Materials	• Endeavour to use material with minimal carbon dioxide equivalent (CO2e) emissions and embodied energy during the construction and operation of the Project. • All timber products used at the site should be procured from certified sustainably harvested resources. No timber should be specified from rainforest or old growth forest. • Use insulation and refrigerants with zero ozone depleting potential. • Use of all paints, carpets, adhesives and sealants that have low volatile organic compounds (VOCs) during the construction and operation phase. • Use low emission Formaldehyde composite wood products during the development of the Project. • Promote the use of regional or local manufacturers.
4. Management	• Adopt an independent consultant to provide tuning and maintenance for fire, mechanical, electric and hydraulic services to ensure all aspects are running to their design specification as efficient as possible. • These strategies are recommended to be implemented via a Site Management Plan or equivalent.

Theme	Recommendations
5. Water	• Implement rainwater harvesting techniques to minimise potable water use by using rainwater collected from warehouse and/or office roofs for non-potable uses such as toilet flushing and irrigation. If implemented during the construction stage, rainwater harvesting could be used to mitigate dust generation. • Adopt a landscaping plan that promotes the use of plants that are drought resistant and have low water requirements. • Use water efficient fixtures with high WELS rating. • Timely maintenance of fixtures and fittings.
6. Indoor Environment Quality	Consider a design to optimise occupant satisfaction in accessibility, usability, air quality and public space utility by adopting a high level of indoor environmental quality. This can be achieved by: • Optimising natural light in work environment through clear roof sheeting in the warehouse. • Optimising fresh air ventilation by increase outdoor air into conditioned spaces • Optimising thermal comfort through passive solar design such as insulation, air conditioning, glazing, curtains, external louvers/eves, high performance glass and a reflective roof or 'cool roof'. • Minimising internal noise transference between warehouse tenants by: o Using noise absorbent fillers to reduce any reverberation. o Installing walls with a high acoustic transmission loss value. o Using door seals. • Installing eco-certified workstations within the office space.
7. Noise	• Consider a warehouse wall and roofing design that limits internal noise transmission to nearby neighbourhood residences. This can be accomplished by using: o Concrete walls. o Double sheeted zincalume roofing with insulation. o Door seals.
8. Energy Efficiency	• Investigate the possible viability of the following energy sources to reduce bought electricity: o Solar water heating with gas boost. o Solar panels (photovoltaics) or future proofing building for future installation. • Adopt the use of the air conditioning design features to minimise the associated bought electricity. • Adopt the use of energy efficient appliances and equipment used within the office and warehouse space.
9. Waste	• Ensure the bulk earthworks on-site balance cut and fill where possible. • Construction contractor develops and implements a Waste Management Plan.

Theme	Recommendations
10. Land Use and Ecology Impact	• Use indigenous planting appropriate to the area. • Design external lighting to avoid releasing light into the night sky or beyond the site boundary. • Adopt the use of water sensitive urban design (WSUD) described above. • Employ specialist advice to develop an independent ecological report to identify any protected local flora and fauna.

Table 2: Summary of Sustainable Design Strategies

2.1 6-Star Green Star Rating

The Proposed Development is committed to delivering 'World Leadership' in sustainable buildings, as defined by the Green Building Council of Australia. Every proposed warehouse, logistics and industrial facility within this estate will aim achieve as 6-Star Green Star 'Design & As-Built' certification (World Leadership).

Green Star is a voluntary sustainability rating system for buildings in Australia. It was launched in 2003 by the Green Building Council of Australia. The Green Star rating system assesses the sustainability of projects, at all stages of the built environment life-cycle. Ratings can be measured and achieved at the planning phase or during the design, construction or fit out phases of building. A Green Star Performance rating will also be pursued for this SSD project during the ongoing operational phase.

The system assesses and rates buildings and fit-outs against a range of environmental categories and aims to encourage leadership in environmentally-sustainable design and construction. The rating will also showcase innovation in sustainable building practices, and deliver superior occupant health, productivity and operational cost savings.

Green Star certification is a formal process in which an independent assessment panel, reviews documentary evidence that a project meets Green Star benchmarks within each credit. The assessment panel awards points, with a Green Star rating, determined by comparing the overall building score against that of the rating scale:

Score	Rating	Category
10-19	One Star	Minimum Practice
20-29	Two Star	Average Practice
30-44	Three Star	Good Practice
45-59	Four Star	Best Practice
60-56	Five Star	Australian Excellence
75+	Six Star	World Leadership

Table 3: Green Star Rating Scheme

Green Star rating tools for building and fit-out design and construction, reward projects that achieve best practice or above. This means that ratings of 1, 2 or 3 are not awarded. Ongoing performance of a building can be rated up to any of the 6 star ratings shown in Table 3 above.

For this industrial estate and this SSD project to achieve a 6-star rating, it would elevate its sustainable performance to World Leadership level.

2.2 Impacts of a Changing Climate

The NSW Office of Environment and Heritage, has recommended that NSW and ACT Governments' Regional Climate Modelling (NARCliM) climate change projections, be used to inform the building design and asset life of buildings. This is the data used in assessing this SSD project.

In 2016, a Climate Change Risk Assessment[1] was undertaken for an industrial development at Horsley Park, one suburb away from Kemps Creek. The risk assessment was undertaken using NARCliM as one of the data sets. A summary of risks identified from the assessment of the Proposed Development is detailed in Table 4 below.

CLIMATE VARIABLE NO.	RISK
Higher Mean Temperatures	
T5	An increase in soil dryness could affect the building structure and integrity.
Higher Maximum Temperature Extreme	
T8	An increase in the number of extreme heat days could lead to heat stress, solar exposure and reduced thermal comfort of staff and contractors, resulting in increased sickness (and absence of staff).
T10	An increase in the number of extreme heat days could lead to higher exposure (and heating) of transport and utility infrastructure servicing assets resulting in loss of power and service provision to water and wastewater assets and, an increase in the number of environmental and safety/health related incidents.
T11	An increase in the number of extreme heat days could lead to power supply disruptions from programmed load shedding and heat damage to network infrastructure (increases in black outs and brown outs) causing tenant inconvenience and business interruption.
T12	An increase in the number of extreme heat days could lead to higher summer cooling loads on buildings resulting in increased water and energy demand/costs.
T14	An increase in the number of extreme heat days could lead to heat stress and solar exposure of the tenants/ building occupants, resulting in increased illness, dehydration related illness and/or morbidity.
T15	An increase in extreme heat days would reduce thermal comfort in buildings. Existing HVAC systems and thermal comfort may not be adequate.

[1] The purpose of a Climate Change Risk Assessment is to identify and assess the risks that climate change poses to assets, operations and services; and prioritise the risks that require planning.

CLIMATE VARIABLE NO.	RISK
T16	An increase in the number of extreme heat days could lead to heat stress and solar exposure of the tenants/ building occupants resulting in decrease in comfort levels, pressure on social services and reduced productivity.
Decrease in mean precipitation	
P2	Short-duration droughts could lead to increased dehydration of vegetation and other green spaces and the degradation of natural and landscaped areas resulting in increased maintenance costs for landscaping.
Increase in Frequency of High Precipitation Extreme	
P7	An increase in intense rainfall, runoff, wind and hail events (in combination or isolation) could result in higher costs of property maintenance and clean up.
P8	An increase in intense rainfall and hail events could result in damage to properties, causing displacement and disruption of the tenants business and other activities while clean up and recovery occurs.
P9	An increase in rainfall and runoff could lead to localised flooding causing damage to structures resulting in increased insurance premiums for assets.
P10	An increase in rainfall has the potential to cause flash flooding from overflow of stormwater drainage creating hazardous conditions and health & safety risks for the tenants/ building occupants.
P11	An increase in extreme rainfall will increase localised flooding, limiting access and egress, causing business interruption and tenant/ building occupant inconvenience.
P14	An increase in frequency of storms could lead to impacts on the ICT networks – in turn this may affect communication, emergency response management and other ICT based applications.
Increase in Severity of Precipitation Extremes	
C1	Short-duration droughts could lead to higher pressure on urban water resources resulting in increased need for alternative water supplies such as wastewater recycling.
Increase Storm Severity	
P3	An increase in the frequency and severity of storms could lead to greater disruption to transport resulting in a larger number of absences or reduced punctuality of staff.
C5	An increase in frequency and severity of extreme storms and high winds could lead to higher exposure of built assets and property resulting in more damage to assets with associated costs and losses of service.

CLIMATE VARIABLE NO.	RISK
C6	An increase in extreme winds could lead to a higher exposure of built assets and property to strong winds resulting in a higher frequency of falling trees and branches onto assets.

Table 4: Summary of Climate Change Risk at the Proposed Development Site (Source: Ramboll Environ (2016), Climate Adaptation Plan Horsley Drive Business Park NSW, North Sydney, Australia.)

As table 4 above shows, there will be an increase in severity of weather events in the next 50 years. For this industrial estate and this SSD project to be a world leader in sustainable and resilient design, the risks have been factored into the estate design.

3 Energy Efficiency

Energy efficiency is using less energy to achieve the same operational outcomes. In order to achieve a 6-Star Green Star rating, a building must achieve an exemplary level of energy efficiency through multiple design aspects.

3.1 Sources of Energy use

The main sources of energy used in a typical distribution warehouse, include:

- Mechanical ventilation of warehouse and storage areas;
- Air conditioning of office area;
- Internal and external lighting; and
- Office and warehouse equipment

The above constitute around 80% of a typical warehouse facility energy consumption.

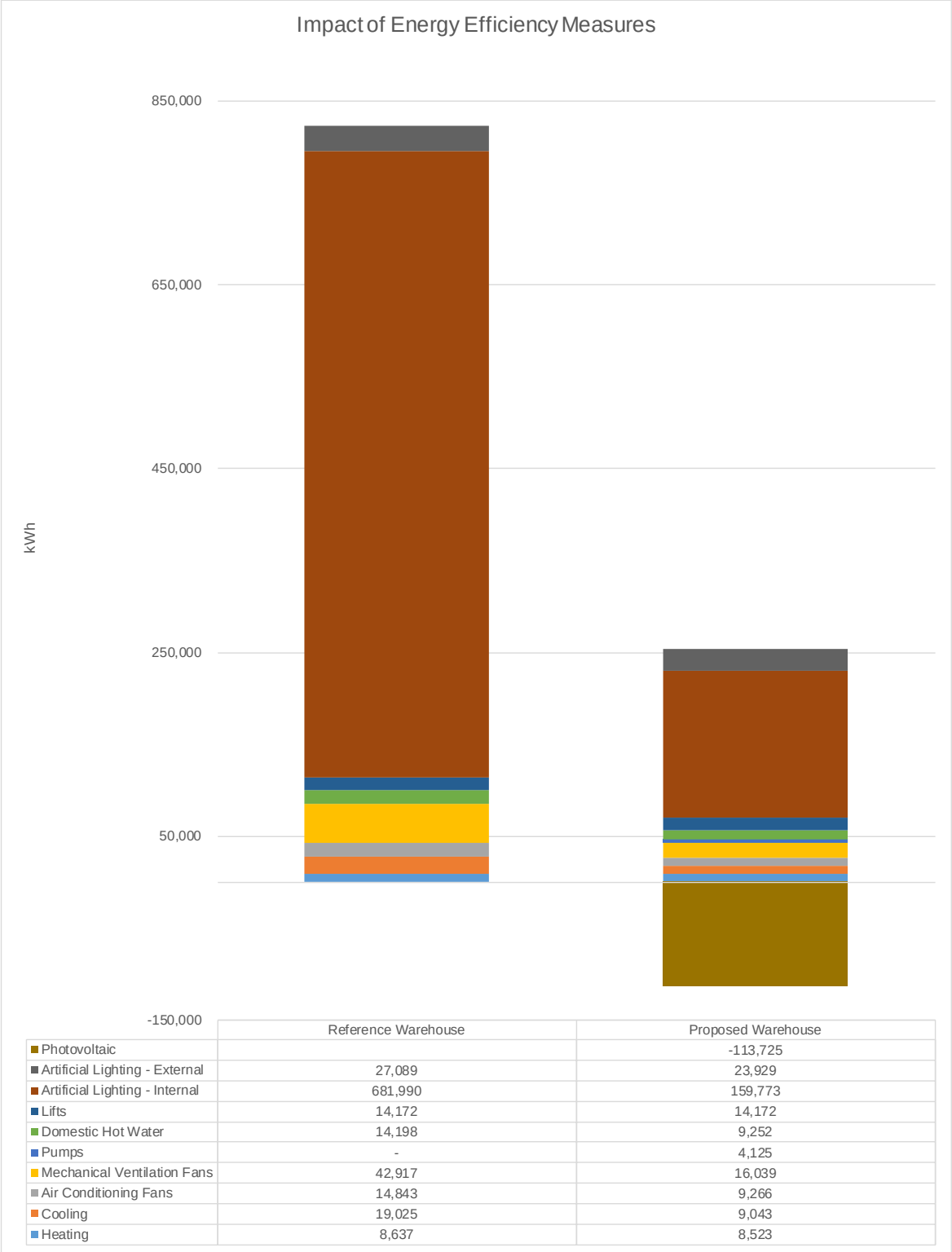
3.2 Measures to Improve Energy Efficiency

In order to improve energy efficiency, initiatives such as efficient lighting, air conditioning and on-site renewable energy need to be effectively implemented. These will be considered for every warehouse and office in the Proposed Development. See a full list in Table 5 overleaf.

An analysis of integrating these initiatives into a Proposed Warehouse are illustrated in Figure 1 overleaf. The Proposed Warehouse assumed is 13,050m² warehouse area and 760m² office area. The analysis finds that the Proposed Warehouse has a potential to reduce energy demand by 81% when compared to a Reference Warehouse. The analysis breaks down the total energy use of a warehouse into ten sub-categories:

1. Heating: electrical energy consumed as a result of heating the office space;
2. Cooling: electrical energy consumed as a result of cooling the office space;
3. Air Conditioning Fans: electrical energy consumed as a result of distributing the heated or cooled are within the office space;
4. Mechanical Ventilation Fans: electrical energy consumed as a result of mechanical moving air in and out of the warehouse and office space (e.g. toilet exhaust);
5. Pumps: electrical energy consumed as a result of distributing water around the warehouse (e.g. water from rainwater tanks to toilets or landscape irrigation);
6. Domestic Hot Water: electrical energy consumed as a result of heating water;
7. Lifts: electrical energy consumed as a result of using lifts;
8. Artificial Lighting – Internal: electrical energy consumed as a result of internal lighting in the warehouse and office;
9. Artificial Lighting – External: electrical energy consumed as a result of external lighting in the carpark and hardstand areas; and
10. Photovoltaic: electricity generated from on-site solar panels.

The Reference Warehouse has been defined energy efficiency consultants, Cundall Johnson and Partners, in line with the minimum energy efficiency performance mandated by Section J of the Building Code of Australia 2016 for all warehouse and office developments.



	Reference Warehouse	Proposed Warehouse
Photovoltaic		-113,725
Artificial Lighting - External	27,089	23,929
Artificial Lighting - Internal	681,990	159,773
Lifts	14,172	14,172
Domestic Hot Water	14,198	9,252
Pumps	-	4,125
Mechanical Ventilation Fans	42,917	16,039
Air Conditioning Fans	14,843	9,266
Cooling	19,025	9,043
Heating	8,637	8,523

Figure 1: Impact of Energy Efficiency Measures

Design Aspects	Initiatives for Reference Warehouse	Initiatives for Proposed Warehouse
Ventilation	Use natural ventilation in warehouse and mezzanine storage level to reduce mechanical ventilation costs.	Same as Reference Warehouse
Solar Design	Minimum insulation, building sealing and glazing requirements that comply with Section J of the Building Code. There is no consideration on the extent of glazing and the orientation of glazing.	Incorporate passive solar design principles that reduce the air conditioning of office space and mechanical ventilation of warehouse space. This can be accomplished by using: - Limited glass on east and west facing office walls. - Enhanced glazing, such as high solar performance tinted glass. - Block-out curtains on the interior of office windows. - External louvers/eves on east and west facing office windows. - Plant deciduous trees on east and west facing office walls to disperse direct sunlight during summer and promote sunlight in winter. - Use a highly reflective roof or 'cool roof' to decrease internal thermal fluctuations. - Wall insulation for office space.
Energy Sources	All electric storage hot water heating and no consideration for solar panels.	Investigate the viability of the following energy sources to reduce bought electricity: - Solar water heating or high efficiency electric heat pump - Solar panels (photovoltaics) or future proofing building for future installation.
Air Conditioning Design	Standard air conditioning equipment efficiency. No energy sub-metering and energy monitoring and tracking platform.	Adopt the use of the following air conditioning design features to minimise the associated bought electricity. This can be achieved through implementing: - Mixed mode air conditioning to any office space with openable windows where sensors determine if windows are open. - Energy efficient air conditioning equipment. - Energy sub metering that is linked to tracking and monitoring systems to allow for self- assessment, problem solving and ongoing improvements during operations. - Independent units being installed in board rooms and server rooms to deal with differing loads and operating hours within the office building. - Separate operating systems for separate areas with different occupancy periods. - Ensure temperature sensors are located in areas that avoid direct solar gain or heat transfer through walls. - Adequately insulated pipework and ductwork to avoid further loads on air conditioning. - Regular tuning and maintenance of the system to allow the system to function as per its original energy efficient intent.

Design Aspects	Initiatives for Reference Warehouse	Initiatives for Proposed Warehouse
Lighting	Standard fluorescent tubes for lighting	Use LED lighting strategies with advanced controls systems to dim or turn off lights when not in use.
	No daylight dimming sensors to reduce energy use	Optimise natural light in warehouse by using clear roof sheeting to reduce lighting costs.
Appliances and Equipment	No control over the energy efficiency of appliances and equipment installed.	Adopt the use of energy efficient appliances and equipment used within the office and warehouse space.

Table 5: Summary of Energy Efficiency Measures

Table 5 is a summary of key initiatives assumed of the Reference and Proposed Warehouse.

4 Greenhouse Gas Emissions

4.1 Relevant Legislation and Standards

The main legislation governing Greenhouse Gas Emissions is National Greenhouse and Energy Reporting Act 2007. The National Carbon Offset Standard has also been developed by the Australian Government to provide guidance for Corporations to offset their Greenhouse Gas Emissions.

4.1.1 NATIONAL GREENHOUSE AND ENERGY REPORTING FRAMEWORK

The *National Greenhouse and Energy Reporting Act 2007* establishes a mandatory obligation on Corporations which exceed defined thresholds to report their Greenhouse Gas Emissions (GHG); energy consumption and energy production.

Corporate and facility reporting thresholds for GHG emissions and energy consumption (or energy production) are provided in Table 6. Table 6 below. As Table 6 shows, the emissions are measured in terms of tonnes of $CO_{2\text{-}e}$ ($t.CO_{2\text{-}e}$). Emissions are normalised to their equivalent Global Warming Potential (GWP) of CO_2.

Corporate Threshold		Facility Threshold	
GHG Emissions (Scope 1&2)	**Energy Usage**	**GHG Emissions (Scope 1&2)**	**Energy Usage**
50,000 **$t.CO_{2\text{-}e}$**	200 **TJ**	25,000 **$t.CO_{2\text{-}e}$**	100 **TJ**

Table 6: NGER reporting thresholds (*Source: DCCEE, 2007)*

If a Corporation has operational control over facilities whose GHG emissions or energy use in a given reporting year:

- individually exceed the relevant facilities threshold; or
- when combined with other facilities under the corporation's operational control, exceed relevant corporate thresholds, that Corporation must report its GHG emissions or energy use for that year under the NGER Act.

This may include the Project's lessee-company, construction or other contractors.

It is anticipated that during construction, there will be multiple parties with operational control over different aspects of the site development. For this reason, while it is anticipated that there may be some reporting requirement under the NGER scheme, this is likely to be apportioned across the NGER reporting corresponding to several Corporations. Once operational, the Project could have combined Scope 1 and Scope 2 emissions greater than 25,000 tonnes CO_2-e in a financial year. If this is the case, the reporting of emissions is expected to be required under the NGER scheme.

4.1.2 CLIMATE ACTIVE STANDARD

Climate Active is a voluntary standard to manage GHG and to achieve carbon neutrality. It provides best-practice guidance on how to measure, reduce, offset, report and audit emissions for organisations, products & services, events, precincts and buildings.

The Standard can be used in a number of ways. Organisations can use the Standard to better understand and manage their carbon emissions or to credibly claim carbon neutrality and to seek carbon neutral certification.

As of 2017, Frasers Property is a certified carbon neutral organisation, certified annually under the Climate Active. As part of the Certification, Frasers Property has voluntarily opted to offset the Greenhouse Gas Emissions of their operations. Construction activities undertaken directly by Frasers Property and Altis Property Partners will be carbon neutral. Carbon neutral Certification will be achieved through the purchase of carbon offsets that are voluntarily retired against Frasers Property and Altis' construction activities. This process is independently verified and certified by the Climate Active Office.

This will negate the Greenhouse Gas Emissions from the construction of the Proposed Development. In February 2020, only 65 organisations in Australia held carbon neutral certification.

In addition to carbon neutral certification for organisations, the Climate Active program allows building to be certified. At present, only 13 buildings are certified carbon neutral. Frasers Property holds five of these certifications and aims to continue partnering with our tenants to offset the greenhouse gas emissions associated with building operations.

4.2 Sources for Greenhouse Gas Emissions

The Greenhouse Gas Protocol (**WRI & WBCSD, 2004**) establishes an international standard for accounting and reporting of greenhouse gas emissions. The Greenhouse Gas Protocol has been adopted by the International Organization for Standardization, endorsed by greenhouse gas initiatives (such as the Carbon Disclosure Project) and is compatible with existing greenhouse gas trading schemes.

Under this protocol, three "scopes" of emissions (scope 1, scope 2 and scope 3) are defined for greenhouse gas accounting and reporting purposes. This terminology has been adopted in Australian greenhouse gas reporting and measurement methods and has been employed in this assessment. Figure 2 below, is a visual representation of potential sources of Greenhouse Gas Emissions. The definitions for scope 1, scope 2 and scope 3 emissions are provided in the following sections.

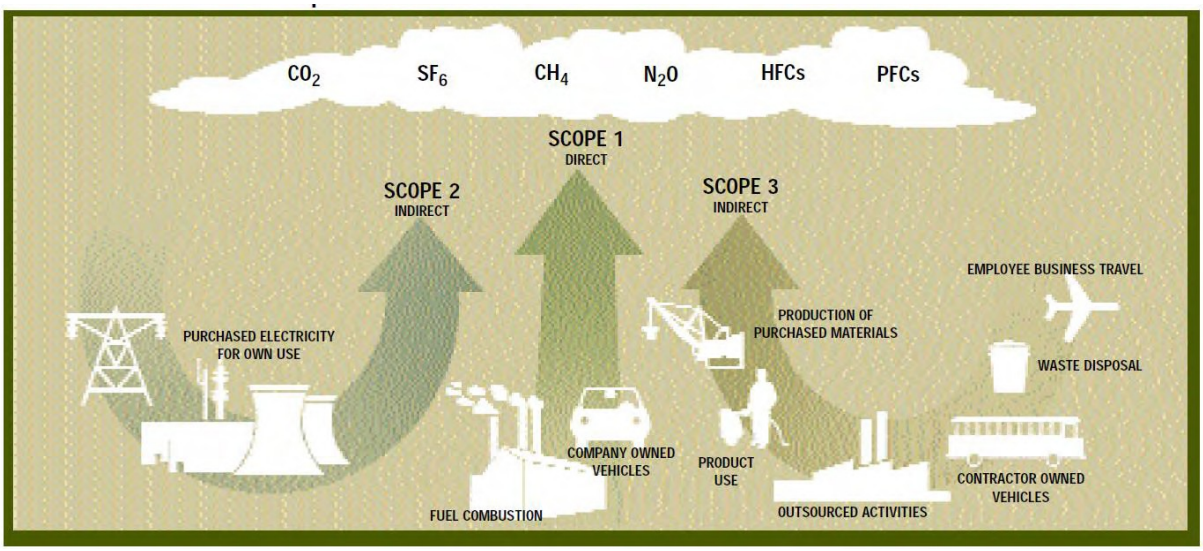


Figure 2: Overview of Scopes and Emissions across a Reporting Entity. Source: WRI & WBCSD 2004

4.2.1 SCOPE 1: DIRECT EMISSIONS

Direct greenhouse gas emissions are defined as emissions that occur from sources owned or controlled by the reporting entity. For the Project, direct greenhouse gas emissions primarily result from sources below.

- Contractor-owned vehicles used during the construction of the Project.
- Tenant-owned vehicles used during the operation of the Project.
- Operator-owned vehicles used during the operation of the Project.
- Carbon sequestered within cleared vegetation.
- Project facilities (not including electricity).
- Back-up power generators (if relevant).

4.2.2 SCOPE 2: INDIRECT EMISSIONS

Scope 2 emissions are indirect greenhouse gas emissions from the generation of purchased energy by the Project. Scope 2 in relation to the Project covers purchased electricity, defined as electricity that is purchased or otherwise brought into the organisational boundary of the entity. Scope 2 emissions physically occur at the facility that generates the electricity, rather than the facility that uses the electricity. Therefore, they are often referred to as indirect greenhouse gas emissions.

4.2.3 SCOPE 3: OTHER INDIRECT EMISSIONS

Scope 3 emissions are defined as those emissions that are a consequence of the activities of an entity, but which arise from sources not owned or controlled by that entity. For the Project, other indirect greenhouse gas emissions primarily result from sources below.

- Privately owned vehicles travelling to and from the Project site during the construction and operational phase.
- Tenants' employee business travel.
- Taxis to and from the Project.
- Public transport serving the Project.
- Off-site waste disposal.

The Greenhouse Gas Protocol allows optional reporting of scope 3 emissions. If an organisation believes that scope 3 emissions are a significant component of the total emissions inventory, these can be reported along with scope 1 and scope 2 emissions. However, the Greenhouse Gas Protocol notes that reporting scope 3 emissions can result in double counting of emissions and can also make comparisons between organisations and/or products difficult (because reporting is voluntary). Double counting needs to be avoided when compiling national (country) inventories under international agreements such as the Kyoto Protocol. The Greenhouse Gas Protocol also recognises that compliance regimes are more likely to focus on the "point of release" of emissions (i.e., direct emissions) and/or indirect emissions from the purchase of electricity.

In this regard, it is noted that the National Greenhouse and Energy Reporting scheme applies only to scope 1 and scope 2 emissions (**DCCEE, 2007**).

4.3 Measures to Reduce Greenhouse Gas Emissions

To reduce Greenhouse Gas Emissions, the following approach will be applied to the Proposed Development:

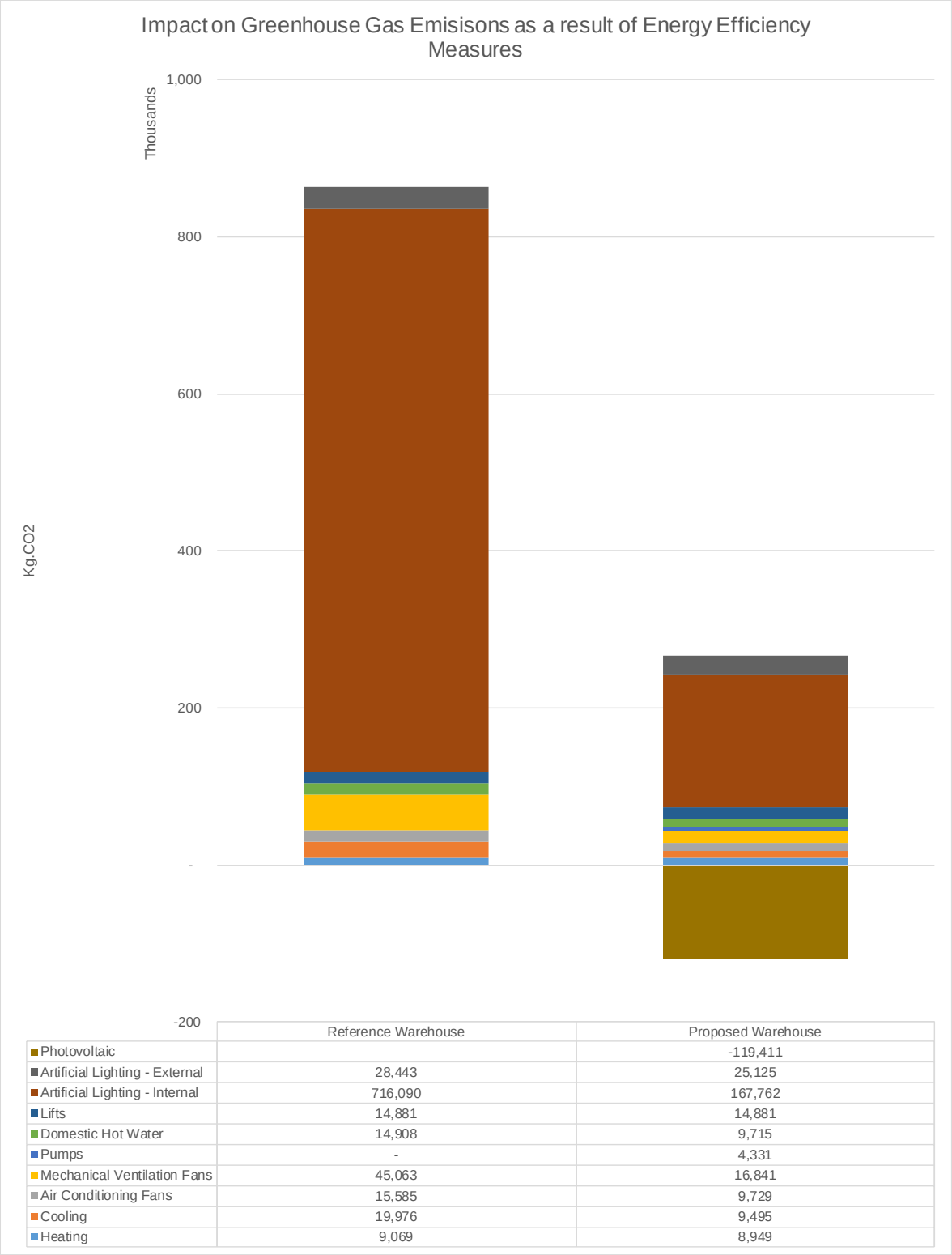
1. Design for reduced emissions which includes the selection of lower greenhouse gas intensive building materials;
2. Design for improved energy efficiency (refer to Section 3) to minimise greenhouse gas emissions through operations; and
3. Purchase certified carbon offsets.

Table 7 outlines measures, based on scope of emission, which will be considered for every warehouse in the Proposed Development to reduce Greenhouse Gas Emissions. The impact of these initiatives is illustrated in Figure 4, based on the example introduced in Section 3.

Scope	Recommendations
1	Support the education of contractor owned vehicle drivers in techniques to conserve fuel during the construction phase e.g. implement a no-idling policy.
	Support alternatively fuelled and 'modernised' tenant owned equipment and vehicles used during the operational phase – including compressed natural gas, hydrogen, electric, compressed air and hybrid vehicles.
	Support tenant management procedures that consider the reduction of fuel use as far as practical during the operation phase.
	Make use of renewable energy sources where practical for the generation, use or purchase of electricity, heating and cooling.
	Install tenant energy sub-metering systems.
2	Design energy efficient buildings to meet national / international benchmarking schemes (e.g. 6-star Green Star ratings).
3	Consider the use of high capacity public transport to and from the proposed Project.
	Support the use of the low emission vehicles to and from the proposed Project, including the provision of recharging stations priority queuing and parking.
	Develop an integrated solid waste management plan to implement waste saving initiatives such as composting and recycling.

Table 7: Summary of Greenhouse Gas Mitigation Measures

Taking the example first introduced in Section 3, the emissions reduction associated with energy efficient design is illustrated in Figure 3. In NSW, the carbon coefficient of electricity is 1.05kg$CO_{2\text{-}e}$/kWh. Through implementing energy efficiency measures, it can be demonstrated that the Proposed Development can achieve at least 80% reduction in Greenhouse Gas Emissions for each development during operation.



	Reference Warehouse	Proposed Warehouse
Photovoltaic		-119,411
Artificial Lighting - External	28,443	25,125
Artificial Lighting - Internal	716,090	167,762
Lifts	14,881	14,881
Domestic Hot Water	14,908	9,715
Pumps	-	4,331
Mechanical Ventilation Fans	45,063	16,841
Air Conditioning Fans	15,585	9,729
Cooling	19,976	9,495
Heating	9,069	8,949

Figure 3: Impact on Greenhouse Gas Emissions as a Result of Energy Efficiency Measures

5 Water

5.1 Potable Water Demand

The water demand was assessed based on the "Average Daily Water Use by Property Type", a Sydney Water publication (**Sydney Water, 2015**). This document provides guidance on potable water demand based on floor areas that are generated from a development. This document is supported by studies that Sydney Water has undertaken to determine a realistic assessment of the average water demand.

The values presented in Table 8 show how an average daily water demand of 39 kL/day for the site was derived. The floor area is based on the example provided in Section 3.

Space type	Average daily demand	Floor area	Average daily demand
Industrial – Warehousing	2.82 L/m²/day	13,050 m²	36.8 kL/day
Commercial – Office	2.27 L/m²/day	760 m²	2.2 kL/day
		Total	**39**

Table 8: Potable Water Demand

5.2 Measures to Reduce Potable Water Demand

As presented in the sustainable design strategies (refer to Table 2) rainwater harvesting techniques will be implemented to minimise potable water use by using rainwater collected from warehouse and/or office roofs for non-potable uses such as toilet flushing and irrigation. The design plans show water tanks for rain water harvesting at the suggested locations. However, there are no final designs yet for the sizes of these tanks, since the final use of the warehouses is not known at this stage.

Indoor/Domestic Water

- Install high-efficiency dishwashing equipment and run only when full; and
- Fit restrooms with water-saving fixtures. Water efficient urinals, dual-flush toilets, and motion-detecting faucets can all reduce water usage. Motion detectors on restroom lights, and high-efficiency hand dryers, also contribute toward savings. As a minimum the WELS star ratings for the fittings would be:
    - 4 Star WC;
    - 6 Star urinals;
    - 6 Star tapware; and
    - 3 Star showers.

Outdoor Water Use

- Use a weather-based irrigation control or soil moisture sensor for automatic irrigation system control;
- Choose native, drought-resistant plants for landscaping; and
- Audit and optimize irrigation systems to achieve maximum distribution uniformity of water.

6 Conclusion

This report has addressed the ESD requirements to support the State Significant Development Application for a proposed 6-star Green Star warehouse, logistics and industrial facilities hub at 657-769 Mamre Road Kemps Creek. The proposed strategy outlined within this report aims to reduce both Energy Demand and Greenhouse Gas Emissions by 81% as well as minimise water consumption to 39kL per day.

The approach will be benchmarked against the Green Building Council of Australia's Green Star rating scheme with a 6-star World Leadership rating targeted for all industrial buildings within the proposed development. As each individual warehouse or industrial facility design develops, the specific initiatives outlined in this report will be applied. It is expected that the specific initiatives will vary slightly from building to building as the ESD strategy is tailored to each warehouse and office facility to achieve the 6-star Green Star Rating.

7 References

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