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Kemps Creek Data Centre

Ecologically Sustainable Development (ESD) Report

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Arup Australia Pty Ltd ABN 76 625 912 665

Arup
Level 5
151 Clarence Street
Sydney NSW 2000
Australia
www.arup.com

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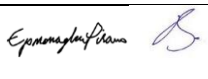
		Signature			
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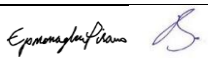
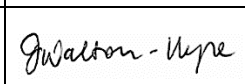
		Name	Linda Slechta Ethan Monaghan-Pisano	Jo Walton-Hespe	Linda Slechta
		Signature			
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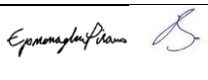
		Signature			
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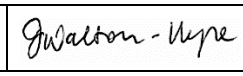
		Signature			
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Contents

1 Introduction

1.1 Purpose of this report

The purpose of this report is to address the Secretary's Environmental Assessment Requirements (SEARs) by providing a description of how the Proposal will incorporate the principles of ecologically sustainable development (ESD) into the design, construction and ongoing operation of the development. Consideration will also be given to the design initiatives included in the Proposal, or earmarked for further evaluation, which relate to ESD principles.

1.2 Proposal overview

1.2.1 Site context

The identified site address that is the subject of this technical report is legally defined as 757-769 Mamre Road, Kemps Creek. The entire Site comprises a total area of approximately 17.38 hectares (ha) and is subject to the applicable provisions outlined within SEPP (WSEA) 2009. Access to the Site is currently obtained via the proposed Estate Access Roads (SSD 9522), which are accessed from Mamre Road. Access into the Site is made possible via Mamre Road, which is subject to future road widening as part of the Mamre Road Widening Proposal (Transport for NSW).

The Site is situated approximately 40.26 km west of the Sydney CBD, 22.11 km west of Parramatta and 11.97 km southeast of Penrith. It is within close proximity to transport infrastructure routes (predominantly the bus network), as well as sharing direct links with the wider regional road network, including Mamre Road and both the M4 & M7 Motorways. All of which provide enhanced connectivity to the Subject Site and immediate vicinity, as well as the wider locality.

Additionally, the Subject Site is located within close proximity to active transport links, such as bicycle routes, providing an additional mode of accessible transport available to the Subject Site. In its existing state, the Subject Site comprises an undeveloped land portion; however, is subject to bulk earthworks and infrastructure works under a concurrent State Significant Development (SSD) Application – SSD 9522.

The Proponent is proposing to construct and operate a Data Centre on the Subject Site. The Site is located within the Penrith Local Government Area (LGA) and is zoned IN1 General Industrial under the provisions of State Environmental Planning Policy (Western Sydney Employment Area) 2009 (SEPP (WSEA) 2009). Development for the purpose of a Data Centre is permissible with consent within the IN1 General Industrial zone pursuant to the provisions outlined with Part 3, Division 3, Clause 27 of State Environmental Planning Policy (Infrastructure) 2007 (ISEPP).

The site and surrounding context are illustrated below in Figure 1.

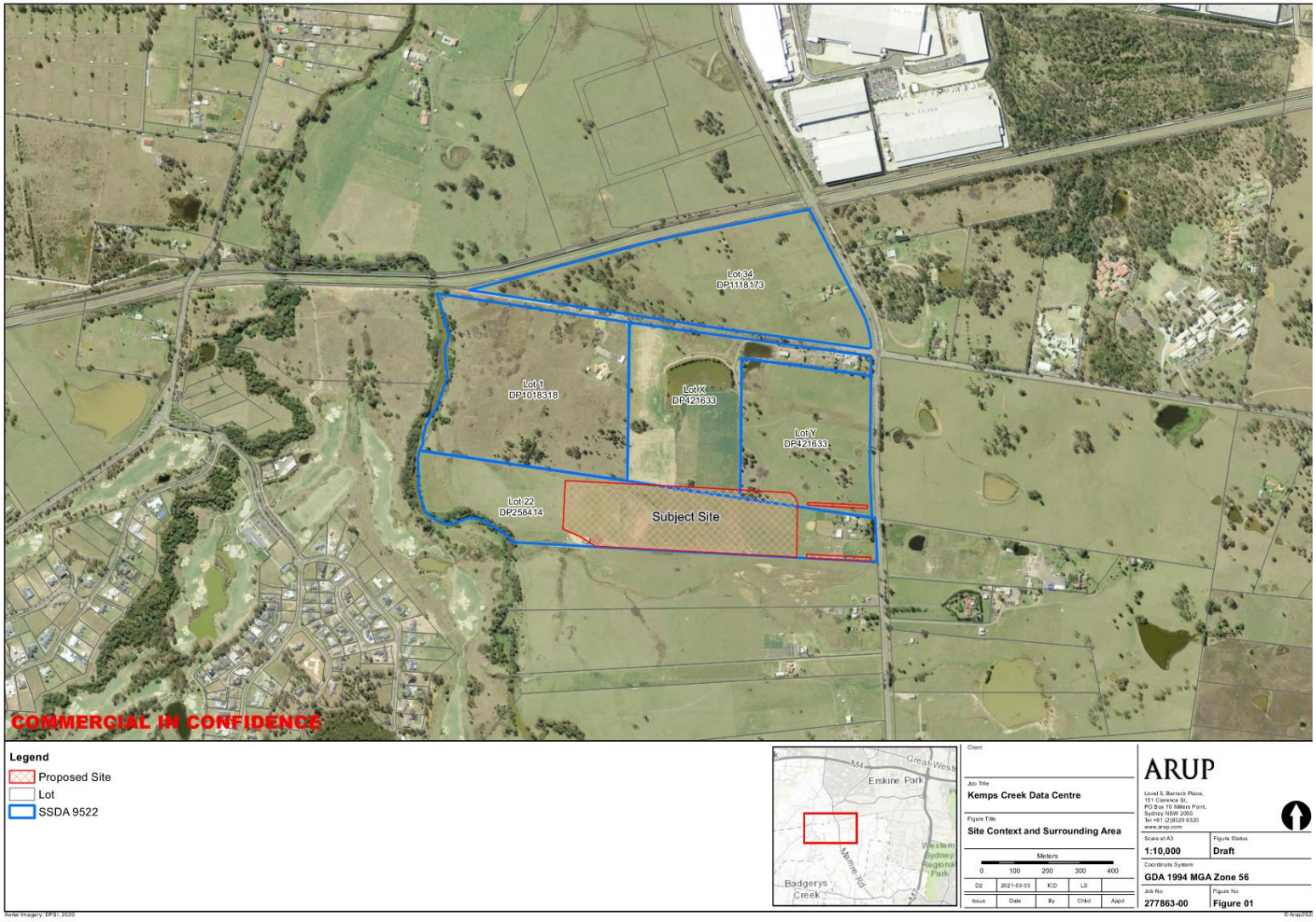

Figure 1: Proposal overview

1.3 SEARs and DCP requirements relevant to this report

Table 1 identifies the SEARs and Development Control Plan (DCP) requirements which are relevant to this technical assessment.

Table 1: SEARs and DCP requirements for ESD principles.

SEARs requirements	Where addressed in this technical report
A description of how the Proposal will incorporate the principles of ecologically sustainable development in the design, construction and ongoing operation of the development	Section 3, Section 4, Section 0
Consideration of the use of green walls, green roofs and/or cool roofs in the design of the data centre	Section 4
A description of the measures to be implemented to minimise consumption of resources, especially energy and water.	Section 4, Section 0
DCP requirements	
To save energy through well considered passive building design applications	Section 4, Section 0
To improve the environmental performance and efficiency of buildings	
To minimise the volume of potable water consumed	
To minimise the volume of water consumed by irrigation systems	
To promote landscape design that is both beneficial and appropriate for an industrial setting	
Encourage development designed to minimise energy usage	
Encourage development to consider the application of energy efficient technology and systems	

2 Policy and planning context

This section identifies the key strategic and regulatory drivers that will drive sustainability outcomes for the Proposal. These drivers will help frame sustainability actions and ESD considerations to be embedded into the design and the delivery of the development.

Table 2: Relevant Policy and Planning Documents

Legislation/Policy		Where addressed in this technical report
Commonwealth Environment Protection and Biodiversity Conservation Act (1999)	This Act provides a legal framework to protect and manage nationally and internationally important flora, fauna, ecological communities and heritage places. It also promotes ESD through the conservation and ecologically sustainable use of natural resources.	Section 3
NSW Environmental Planning and Assessment Regulation (2000)	The EP&A Act legislates for ESD while the Regulation describes the ESD principles. ESD principles as defined in clause 7(4) of Schedule 2 of the EP&A 2000 Regulation are as follows. *The precautionary principle* – namely, 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. In the application of the precautionary principle, public and private decisions should be guided by: (i) careful evaluation to avoid, wherever practicable, serious or irreversible damage to the environment, and (ii) an assessment of the risk-weighted consequences of various options, *Inter-generational equity* - namely, that the present generation should ensure that the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations. *Conservation of biological diversity and ecological integrity* – namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration *Improved valuation, pricing and incentive mechanisms* – namely, that environmental factors should be included in the valuation of assets and services such as -	Section 3, Section 4, Section 0

	(i) polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance or abatement, (ii) the users of goods and services should pay prices based on the full life cycle of costs of providing goods and services, including the use of natural resources and assets and the ultimate disposal of any waste, (iii) environmental goals, having been established, 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.	
NSW Government Resources Efficiency Policy (2019)	This policy acts to drive resource efficiency by NSW Government agencies in four main areas - energy, water, waste and air emissions. The policy aims to ensure NSW Government agencies; meet the challenge of rising costs for energy, water clean air and waste management; use power purchasing to drive down the cost of resource-efficient technologies and services; and show leadership by incorporating resource efficiency in decision making.	Section 3, Section 4
Organisational policy	The organisation have made a series of commitments to reduce their impact, covering carbon, ecosystems, water, and waste. Key commitments include: - Carbon negative by 2030 - Water positive by 2030 - Zero waste by 2030	Section 0

3 EP&A Regulation 2000 ESD principles

3.1 SEARS Requirements

The SEARs requires details of how ESD principles (as defined in clause 7(4) of Schedule 2 of the Regulation, see Table 1) will be incorporated in the design and ongoing operation phases of the development. The ESD principles defined in clause 7(4) of Schedule 2 are detailed in this section. These include high level principles, concepts and ideologies to be incorporated into the design, construction and operation of the Proposal including commitments to relevant industry benchmarks, climate change risk mitigation and adaptation and best practice in water, energy and waste. For specific design initiatives related to the ESD principles, both at the Proposal and organisational level, see Section 1 and Section 0.

3.2 The precautionary principle

The process of deciding on the scope of assessment to be included in the EIS adopted a precautionary risk-based approach by treating those issues for which the risk was unknown or uncertain at that time as key issues requiring further detailed assessment.

The environmental impact statement process undertaken within this assessment aims to identify potential environmental risks and minimise any potential threats of serious or irreversible damage to the environment resulting from the Proposal, along with specific mitigation and management measures. Initial identification of environmental risk factors helped inform the scope for further investigations, including an ecology assessment to determine potential impacts to biological diversity and ecological integrity of the site. Based on historic site use, the site was identified to be of limited ecological value. See section 3.4 for further details.

There is limited identifiable risk to the environment through operation of a datacentre, however inherently, datacentres consume vast amounts of electricity and power during operations. The Proposal aims to achieve a LEED rating on the design, with specific targets around greenhouse gas emissions and energy efficiency. These include optimisation of mechanical design to improve energy performance, and the purchase of Greenpower or carbon offsets in order to reduce emissions associated with operations. Implementation of these measures subsequently reduce the carbon and environmental footprint of the facility, minimising potential long term impact on future generations.

While it is recognised that datacentres use considerable amounts of energy, it should be noted that there are efficiencies achieved in largescale data storage compared to multiple small-scale data storage servers. Largescale data centres use less energy per unit of data, which from an energy perspective, strengthens the case for datacentres of this type.

3.3 Inter-generational equity

Through optimisation of the facility design, operational energy use has been minimised. Implementation of appropriate energy efficiency measures subsequently reduce the carbon and environmental footprint of the facility, minimising potential long-term impact on future generations.

Datacentres are considered to be critical infrastructure and service which supports the safe and long-term storage of cloud and electronic data for both business and consumer transactions. The facility will not only provide employment generating opportunities for the present, but also opportunities beyond the medium to longer term and support operation of businesses and services over the longer term through a continually evolving technology future. Hence, the Proposal positively contributes to a diverse and productive environment for future generations.

3.4 Conservation of biological diversity and ecological integrity

The site is located in Kemps Creek, a suburb in western Sydney and is largely cleared as a result of previous habitation. The immediate surrounding areas are largely industrial or currently undeveloped and zoned for future industrial-related purposes.

A biodiversity study undertaken on the site indicates little to no existing ecological integrity, due largely to previous land use practices and clearing undertaken at the site. The nearest sensitive land uses are comprised by the E2 Environmental Conservation, RE1 Public Recreation and RE2 Private Recreation zones located to the west of the Subject Site, which are noted to be appropriately separated from the Subject Site and therefore deemed to be unaffected by the Proposal. Some small patches of Shale Plain Woodland and Aluvial Woodland have been identified nearby to site and the Proposal footprint will involve some clearing of vegetation, however this has been minimised through the site layout.

3.5 Improved valuation, pricing and incentive mechanisms

To ensure the successful integration of the principles of ESD and to secure long-term sustainable development, it is of critical importance that these measures and incentives are appropriately valued and therefore costed into the Proposal. The Proposal has considered social, economic, and environmental sustainability requirements during the design and review process. In addition, as part of the LEED requirement, it is likely that a Life Cycle Assessment (LCA) will be undertaken ensuring that ESD principles are appropriately considered, valued and priced at each stage of the Proposal lifecycle.

This is an important approach to the Proposal as it allows for the development of a more sustainable and resilient asset that can be identified and accounted for effectively and that is recognised for its the long-term asset value for the community.

4 ESD Design Mitigations

The following section outlines the ESD mitigations that are either being implement into the design or are earmarked for further consideration. As required by the SEARS, consideration has been given to the use of green walls, roofs and cool roofs, however following consultation with the architect, the use of green walls or roofs is not considered viable for this proposal. Consideration will however be given to the use of materials to mitigate the urban heat island effect, as outlined in Table 3. Table 3 also provides a summary of the mitigations to reduce consumption of resources, particularly energy and water. Other mitigations which relate to the ESD principles have been included for completeness.

Table 3: ESD Project design initiatives

Impact	Mitigation	Mitigation Details
Heat island effect – The proposal is a large structure with significant thermal mass so will contribute to the heat island effect	High Solar Reflectivity (SR) materials	Consideration will be given to the use of roof and non-roof materials with high SR values to mitigate the heat island effect where appropriate and where not conflicting with other requirements (such as safety around airport safeguarding).
Water use – The unmitigated water impact is approximately 50,000m^3 of water use per year once operational. The majority of this demand is required for cooling.	Reverse Osmosis integrated AHU's	AHU's are proposed to include reverse osmosis which will enable 75% of discharge water to be reused. This is expected to reduce the total water consumption required for cooling by approximately 6,000 m^3 per year.
	Planting water efficient native plants	It is intended that water efficient native plants will be used for landscaped areas which will reduce the volume of water required for irrigation or mitigate the need for on-site irrigation altogether. The extent of water saved will be further developed through detailed design.
	Rainwater recycling	If on-site irrigation is required, rainwater harvesting will be implemented to capture the majority of the roof's water. Allocation of rainwater to irrigation and cooling will be part of specification with no mains back up for rainwater. This will reduce the use of potable water for the proposal. The extent of water saved will be further developed through detailed design.

Impact	Mitigation	Mitigation Details
	Water efficient appliances	All newly installed toilets, urinals, private lavatory faucets, and showerheads that are eligible for labelling will be WELS labelled. The design will target a 20% reduction in water use for toilets, urinals, lavatory faucets, kitchen faucets and showerheads against an agreed baseline. Opportunities to reduce water use by greater than 20% will be considered where practical.
	Building-level metering	Water metering will likely happen per cell, enabling ongoing tracking of water consumption and identification of leaks to prevent unnecessary losses. The extent of water saved will be further developed through detailed design.
	Sub-metering	Further design work is required to establish sub-metering requirements for AHUs, indoor plumbing fixtures and the rainwater tank (if applicable). A schedule for water sub-meters and their location is to be included in the specs. The extent of water saved will be further developed through detailed design.
Energy use – The unmitigated energy use is approximately 2,00,000 MWh of grid electricity per year.	Power Utilization Effectiveness (PUE) reduction	The data hall is designed to run at a higher temperature than typical, up to 35 degrees. In addition, evaporative cooling will be used to cool the servers, mitigating the need for additional chillers. This is estimated to result in a PUE of 1.25 rather than an industry standard of 1.6, a saving of 22%.
	Whole-building energy simulation	It is intended that energy modelling will be used throughout the design to analyse energy efficiency measures. This will enable prioritisation of the most effective energy saving measures and will be further developed through detailed design.
	Building-level metering	Building-level energy meters will be installed in compliance with NSW service and installation rules, enabling ongoing tracking of energy consumption and identification of energy management strategies to reduce consumption. The extent of the energy saved will be further developed through detailed design.
	Sub-metering	All IT loads, air-conditioning plant, artificial lighting, appliance power and voltage transformers (VT) will be metered individually. Energy meters will be linked to a communications system that collates the time of use energy consumption data to a single interface monitoring system. The extent of the energy saved will be further developed through detailed design.

Impact	Mitigation	Mitigation Details
Refrigerants – The unmitigated refrigerant use is approximately 72,000 kg	Refrigerant use reduction	The amount of refrigerant required will be reduced through the use of evaporative cooling to cool the servers and main areas. Air conditioning will only be provided to offices and equipment rooms. As a result, the project is expected to use just 1,500 kg of refrigerant.
	Avoid CFC-based refrigerants	The use of CFC-based refrigerants will be avoided by using refrigerant type R410A throughout the building. This will reduce emissions from refrigerants by up to 75%.
Waste – The unmitigated waste to landfill rate during construction is approximately 11,000 tonnes	Storage and collection of recyclables	The design will provide dedicated areas accessible to waste haulers and building occupants for the collection and storage of recyclable materials for the entire building. Recyclable materials will include mixed paper, corrugated cardboard, glass, plastics, and metals. This is expected to divert approximately 70% of construction waste from landfill.
	Construction and demolition waste management planning	A construction and demolition waste management plan will be developed with a final report detailing all major waste streams generated, including disposal and diversion rates.
Local pollution	Construction activity pollution prevention	An erosion and sedimentation control plan for all construction activities associated with the Proposal will be prepared to reduce levels of pollution.
	Bicycle facilities	Bicycle storage, lockers and showering facilities will be included in the design. Current provision is for 20 covered parking spaces, 10 lockers, 6 showers and 2 changing rooms. This will encourage staff to cycle to work, having a positive impact on traffic and local pollution.
	Electric vehicle charging	Parking bays will contain charging facilities for electric vehicles (EV) with at least 6 EV bays. This will encourage the use of EV's, again having a positive impact on local pollution.

The above mitigation measures act to reduce the impacts of the proposal, particularly with regards to energy and water consumption. While savings of measures included in the design have been noted, other measures have been earmarked for further consideration where the savings will be further progressed through detailed design. As a result, it is not possible at this stage to give a definitive answer to the total savings

achieved. Despite this, mitigations which have been included in the design have achieved significant savings across energy and water. Below provides a summary of the key savings.

- **Energy use –** Designing to a PUE of 1.25 rather than an industry standard of 1.6 has resulted in a 22% saving in energy use, amounting to as saving of approximately 440,000 MWh per year.
- **Water use -** Reverse osmosis will enable 75% of the AHU discharge water to be reused. This is expected to reduce the total water consumption required for cooling by approximately 6,000 m^3 per year.

The mitigation measures in Table 3 also act to impact or influence the ESD principles. The ESD principles that are particularly influenced by the above measures include:

- **Intergenerational equity –** By reducing environmental impacts and the consumption of resources due to the proposal, the measures help towards ensuring the health and productivity of the environment is maintained for the benefit of future generations.
- **The precautionary principle –** By reducing environmental impacts and resource consumption, the measures serve to avoid, wherever practicable, serious or irreversible damage to the environment.

5 ESD Organisational Mitigations

Table 4 provides a summary of the organisations policy which will, in time, impact the operational sustainability of the Proposal.

Table 4 ESD organisational policy initiatives

Mitigation Theme	Mitigation	Mitigation Details	ESD principle(s) addressed
Energy use	Green Power	2025 will see a 100 percent shift to renewable energy for the organisations data centres, buildings and campuses, meaning that all electricity will be purchased through power purchase agreements for green energy.	• The precautionary principle • Inter-generational equity • Improved valuation, pricing and incentive mechanisms Inter-generational equity
Carbon	Carbon neutrality	By 2030 the organisation will remove more carbon than it emits via a portfolio of negative emission technologies (NET) potentially including afforestation and reforestation, soil carbon sequestration, bioenergy with carbon capture and storage (BECCs), and direct air capture (DAC).	
Water	Water neutrality	By 2030 the organisation will be water positive. This will be done by putting back more water in stressed basins than their global water consumption across all basins. The amount returned will be determined by how much water is used and how stressed the basin is.	
Waste	Waste neutrality	By 2030, the organisation will divert at least 90 percent of the solid waste headed to landfills and incineration from its campuses and datacentres, manufacture 100 percent recyclable computer devices, use 100 percent recyclable packaging and achieve, at a minimum, 75 percent diversion of construction and demolition waste for all proposals.	