ESD Report

251309 PROJECT ATLAS DATA CENTRE

Client:
Goodman Property Services (Aust) Pty Ltd

Revision:
A

Date:
27/03/2026

REPORT INFORMATION

Project	Project Atlas Data Centre
Title	ESD Report
Client	Goodman Property Services (Aust) Pty Ltd
Revision	A
Revision Date	27/03/2026
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REVISION SCHEDULE

Revision	Date	Issue Name	Author	Authorised
P1	30/01/2026	DRAFT	TD	VD
P2	19/02/2026	Revised Draft	TD	VD
P3	20/02/2026	SSDA Submission Draft	TD	VD
A	27/03/2026	SSDA Submission	TD	VD

CONTENTS

Executive Summary

This ESD Report has been prepared by LCI to accompany a State Significant Development Application (SSDA) for the construction and ongoing operation of a data centre facility and associated Offsite Enabling Infrastructure (OEI) at 10 Roberts Road, Eastern Creek within in the Blacktown Local Government Area ("LGA"). The site is legally described as Lot 553 in Deposited Plan 1110447.

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) in relation to ESD issued for the Project Atlas Data Centre (SSD - 101067971) dated 16th January 2026.

See Table 2 that provides the specific SEARs this report has been prepared to respond to and location of response.

In summary, ESD targets and features pursued for the development include:

- Power Usage Effectiveness (PUE) target of 1.25 annual average across the site, a marked improvement compared to the national average of approximately 1.55
- Operational energy performance that will support a 5 Star NABERS Energy for Data Centres Infrastructure rating
- Commitment to a NABERS Energy for Office 5.5 Star Base Building rating and NABERS Water for Office 3 Star rating for the relevant development office components through an Agreement to Rate.
- Incorporation of energy features to support target outcomes as follows:
  - Elevated data hall cooling setpoint temperature and relaxed humidity setpoints combined with the capability for direct to chip liquid cooling to maximise efficiency of mechanical plant
  - Waterside economy cycle / free cooling from hybrid dry coolers bypassing chiller operation to further reduce energy consumption
  - High efficiency chiller plant through modern compressor technology coupled with elevated operational chilled water temperatures due to relaxed hall conditions and direct to chip liquid cooling
  - On-site PV maximised to the available roof space with a targeted rated output capacity in the order of a minimum 1,200kWe across both data centre buildings. Roof top area available for installation is limited as majority is allocated to cooling chiller plant that cannot be installed over.
  - High efficiency LED lighting selections throughout to minimise demand coupled with occupant responsive controls to minimise operational time and associated energy consumption
  - Low absorptivity / high Solar Reflective Index (SRI) building external finishes to reduce radiant heat gains
  - High performance fabric / glazing to the office spaces and glazing shading to reduce thermal loads
- Reduced annual water consumption supported through:
  - Hybrid dry coolers used for the bulk of heat rejection needs that are able to operate in air cooling only mode in lieu of evaporative mode when ambient conditions allow
  - Cooling loads minimisation from elevated temperatures & direct to chip liquid cooling reducing heat rejection requirements and associated water consumption
  - Low or zero irrigation demand through selection of drought tolerant planting for landscaping such as endemic native vegetation
  - Rainwater capture and reuse system for supply to flush fixtures, irrigation and mechanical plant
- Considerations for Net Zero emissions in operations 2050 target including:
  - Commitment to procure 100% renewable electricity for all non-IT operational energy use within the facility and data halls. Leading hyperscale AI and cloud providers are actively investing in renewable energy procurement as part of their broader commitment to sustainable operations and net-zero carbon goals.
  - Use of very low GWP refrigerants in chillers minimising as far as practical associated Scope 1 emissions
  - Consideration of the future procurement of renewable diesel alternatives to fossil fuel based products

The ESD targets and initiatives being pursued for the development above are shown in the report to support the Planning Secretary's Environmental Assessment Requirements (SEARs) including the specific applicable elements of the Sustainable Buildings SEPP 2022.

1 Introduction

A State Significant Development Application (SSDA) has been prepared to support a data centre at 10 Roberts Road, Eastern Creek and associated offsite enabling infrastructure.

The proposal will include:

- Site preparation works including demolition, bulk excavation and removal of existing structures on the site, tree and vegetation clearing and bulk earthworks.
- Construction, fit-out and 24/7 operation of a Data Centre
- Offsite enabling infrastructure
- 2 Data Centre Buildings
  - Building 1 – 2 Level + rooftop plant
  - Building 2 – 3 Level + rooftop plant
- Ancillary office, EOT and amenity
- Provision of required utilities including:
  - diesel storage tanks
  - water tanks
  - substations on site
- Vehicle access for 20m articulated vehicles (semi-trailers)
- Associated landscaping and site servicing
- Installation of site services and drainage infrastructure

This report has been prepared to address the Secretary's Environmental Assessment Requirements (SEARs) and accompanying cover letter issued for the Project Atlas Data Centre (SSD- 101067971) dated 16th January 2026.

1.1 Site Description

The proposed Data Centre is located at 10 Roberts Road, Eastern Creek, legally referred to as Lot 553 DP1110447 with Offsite Enabling Infrastructure (OEI) proposed across Lot 21 DP1246626, Lot 20 DP1157491, and Lot 22 DP1246626 to connect to TransGrid's Sydney West Substation & Switchyard (refer to Figure 1 below). The site is located on Country of the Dharug people within the local government area of Blacktown.

The Data Centre site has a land area of approximately 168,574m^2.

The site is identified as part of the Eastern Creek Precinct Stage 3 within the Western Sydney Employment Area. It is located approximately 35km from the Sydney Central Business District (CBD) and 5.1 km from Rooty Hill Train Station.

The site has a site area of approximately 17 hectares and is bounded by industrial development and has a primary frontage of 400m to Roberts Road. The existing site contains an industrial warehouse and surrounding hard-stand areas.

Surrounding land uses in the vicinity include:

- Northeast: A range of mixed-use industry & commercial buildings
- Southeast: Data Centre and substation
- South, southwest and west: land primarily owned and operated by TransGrid Sydney
- Northwest: Commercial industry and the Industrial Harvest cafe

The site is zoned IN1 General Industrial within Chapter 2 Western Sydney Employment Area of State environmental Planning Policy (Industry and Employment) 2021 (IESEPP). The proposal is permissible with development consent in the IN1 zone as per the State Environmental Planning Policy (Transport and Infrastructure) 2021 (TISEPP).

A summary of key features for the site and surrounding context are also summarised in Table 1 below.

Table 1: Summary of Site Key Features

Item	Description
Site Area	Data Centre – 168,574m^2
Ownership	Goodman
Legal Description	Data Centre - Lot 553 DP1110447 OEI - Lot 21 DP1246626, Lot 20 DP1157491, and Lot 22 DP1246626

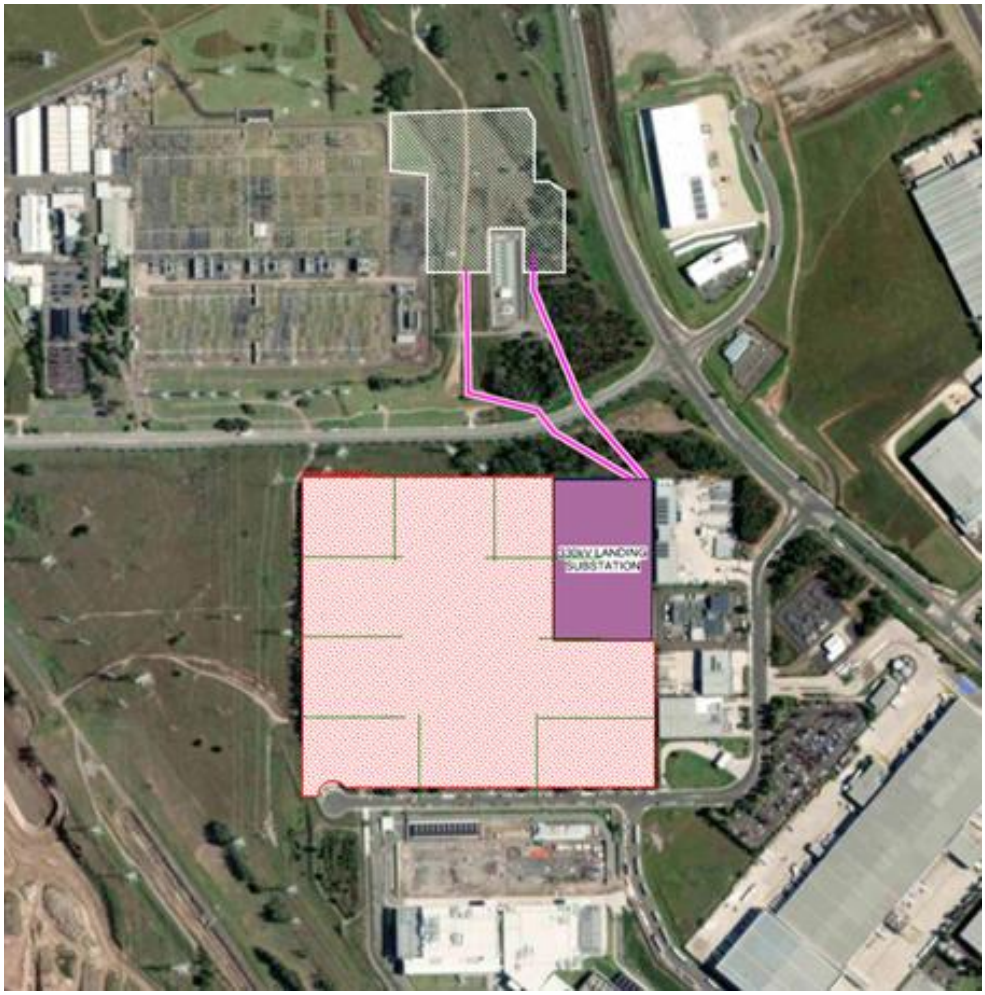

Figure 1: Aerial Imagery of the Site

1.2 Response to SEARs

This report has been prepared to respond to the specific SEARs requirements detailed below.

Table 2: SEARs Compliance

Key Issues Item	Description of Requirements	Section Reference (this report)
Ecologically Sustainable Development – including:	Identification of how ESD principles (as defined in section 193 of the EP&A Regulation) are incorporated in the design and ongoing operation of the development	Section 2.1.1
	Demonstration of how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards, including a maximum Power Usage Effectiveness (PUE) of 1.3 and a minimum NABERS rating of five stars	Section 2.1.3 and Section 2.2
	Identification of the projected Water Usage Effectiveness (WUE) for the development, compared against recognised 'best practice' benchmarks	Section 2.2.2
	Details of any proposed sustainability initiatives that will reduce electricity and water consumption	Section 2.2.1 and Section 2.2.2
	Demonstration of how the development minimises greenhouse gas emissions (reflecting the Government's goal of net zero emissions by 2050) and consumption of energy, water (including water sensitive urban design) and material resources	Section 2.2.4 and Section 2.2
	If Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022 applies, include: • demonstration as to how the development has been designed to address the provisions set out in Chapter 3.2(1) • a NABERS Embodied Emissions Material Form to disclose the amount of embodied emissions attributable to the development in accordance with section 35BA of the EP&A Regulation.	Section 2.1.2 The NABERS Embodied Emissions Material Form excel file has been submitted separately from this report with the SSDA submission.
Climate Change – including:	The preparation of a Greenhouse Gas Assessment in accordance with the NSW Guide for Large Emitters (EPA, 2025)	Refer to the GHG Assessment Report provided separately with the SSDA submission.
	Identification of emission reduction measures, which may include: • implementing energy efficiency practices • installing on-site renewable power generation systems • purchasing renewable energy certificates • entering into green power purchase agreements.	Section 2.2.4 and refer to the GHG Assessment Report provided separately with the SSDA submission.

2 Assessment and Mitigation of Impacts

2.1 Relevant legislation and policies

2.1.1 EP&A Regulation 2021 Ecologically Sustainable Development (ESD) Principles

Ecologically sustainable development (ESD) principles (as defined in Clause 193 of the Environmental Planning and Assessment Regulation 2021) will be incorporated into the design, construction and ongoing operation of the proposed development. The ESD principles defined are to be aligned with Section 193 – Environmental Planning & Assessment Regulation and include the following:

1. The precautionary principle
2. Inter-generational equity
3. Conservation of biological diversity and ecological integrity
4. Improved valuation, pricing and incentive mechanisms

1. 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.

PROJECT RESPONSE

The development aims to identify potential environmental risks and minimise any threats of serious or irreversible environmental damage through the environmental impact statement process undertaken. Potential issues identified have been addressed through analysis resulting in the reports produced for this submission. The following are some of the environmental initiatives being pursued to prevent environmental degradation:

- The Proponent has committed to ensure the existing ecological function of the site is not reduced. This will be achieved through maintaining a significant portion of existing site planting and new planting will be added to areas of the site to replace any existing vegetation requiring removal to enable construction. New planting will be to enhance visual amenity and biodiversity.
- The Proponent will implement a site specific environmental management plan during construction that will minimise environmental impacts by implementing best practice processes and procedures.
- Various sustainability measures covering aspects such as energy and water consumption will be targeted (see Section 2.2), in order to reduce the environmental footprint, including greenhouse gas emissions, and minimise the long-term impact of the development on the environment.

2. 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

PROJECT RESPONSE

To uphold inter-generational equity, the proposed development design is being carried out such that it minimises the consumption of energy and water resources whilst reducing waste.

Considerations for the project include:

- The proposed building systems are optimised so that energy and water consumption is minimised through efficiency measures as described in Section 2.2.
- The project will support high electrical power efficiency with a target annual average PUE for the data centres of 1.25, representing a significant improvement on the national average of 1.55.
- Waste generated during the construction and operational phases will be diverted from landfill and recycled or reused where possible.

The measures and targets outlined above shall ensure the development minimises its impact on the health, diversity and productivity of the environment, thus maintaining it for the benefit of future generations and supporting Inter-generational Equity.

3. Conservation of Biological Diversity and Ecological Integrity

namely, that conservation of biological diversity and ecological integrity should be a fundamental consideration

PROJECT RESPONSE

The Proponent is committed for the proposed development to maintain the ecological value within the site. The proposed development landscape design will include the following features to enhance visual amenity, improve pedestrian environment and conserve biodiversity and ecological integrity.

- A significant portion of the existing site planting will be maintained and new planting will be added to areas of the site to replace any existing vegetation requiring removal to enable construction.
- The site planting will incorporate a diversity of trees, shrubs, grasses and groundcovers, that are both native and exotic species and be selected ensuring they are climate ready, have minimal water use and will thrive under changing conditions.

4. Improved Valuation, Pricing and Incentive Mechanisms

namely, that environmental factors should be included in the valuation of assets and services, such as:

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.

PROJECT RESPONSE

The valuation of the project's assets and services consider environmental factors through the implementation of various ESD initiatives.

- A construction and demolition waste management plan will be implemented to establish recycling and landfill waste streams during construction. This will create a system where pollution is managed and controlled and creates an incentive to reduce pollution and waste.

- The energy and water conservation measures in the proposed design shall reduce consumption of resources by the development and associated operational cost relative to IT tenant load maximising asset value. See Section 2.2 for further details.
- The proponent is committed to procure 100% renewable electricity for all non-IT operational energy use within the facility and data halls, paying for the abatement of emissions. Leading hyperscale AI and cloud providers, are actively investing in renewable energy procurement as part of their broader commitment to sustainable operations and net-zero carbon goals.

2.1.2 State Environmental Planning Policy (Sustainable Buildings) 2022

The NSW State Environmental Planning Policy (Sustainable Buildings) 2022 came into effect in August 2022 and applies to relevant projects lodged for State Significant DA after 1 October 2023.

The Sustainable Buildings SEPP encourages the design and delivery of more sustainable buildings across NSW. It sets sustainability standards for residential and non-residential development and starts the process of measuring and reporting on the embodied emissions of construction materials.

The NSW Government's objectives for the SEPP are to:

- minimise the consumption of energy and potable water
- reduce greenhouse gas emissions from energy use
- monitor the embodied emissions of building materials
- deliver buildings that are comfortable in summer and winter
- provide household bill savings to families, especially for heating and cooling.

In response to the project SEARs, consideration must be given to Clause 3.2(1) of the Sustainable Buildings SEPP which requires the development be designed to enable the following :

a) the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,
b) a reduction in peak demand for electricity, including through the use of energy efficient technology,
c) a reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design,
d) the generation and storage of renewable energy,
e) the metering and monitoring of energy consumption,
f) the minimisation of the consumption of potable water.

Further, the SEPP Embodied Emissions Reporting requires quantification of embodied emissions attributable to the development through the disclosure of materials quantities. Quantification is completed through the NABERS Embodied Emissions Materials Form.

Project Response

The proposed development will demonstrate compliance and will meet or exceed the requirements as detailed below (project specific responses referenced):

a) The project will minimise waste from associated demolition and construction, including the use of recycled materials where possible – refer Section 2.2.3.
b) The project will have a reduction in peak demand for electricity, including through the use of energy efficient equipment – refer Section 2.2.1.
c) The project will have a reduction of the dependence of cooling through passive design features – refer Section 2.2.1.1 and 2.2.1.2.

d) The project includes on-site generation of renewable energy – refer Section 2.2.1.4.
e) The project will provide metering and monitoring of energy consumption – refer Section 2.2.1.4.
f) The project will minimise the consumption of potable water – refer Section 2.2.2.

The NABERS Embodied Emissions Materials form provides for the collection of key development construction materials across the substructure, superstructure and facade of the building. The NABERS Embodied Emissions Materials form excel file has been submitted separately from this report with the development SSDA submission.

2.1.3 Sustainability Rating Tool - NABERS Benchmarking and PUE

NABERS Energy ratings for data centres provides an indication of the operational energy efficiency and environmental impact of data centres in Australia. There are three rating scope types within the data centre tool covering the categories of IT energy, Infrastructure energy and the Whole Building energy. The Infrastructure energy scope rating that is most applicable to the development gives data centres a rating from one to six stars per the following figure based on Power Usage Effectiveness (PUE), a globally accepted metric.

Figure 2: How NABERS Energy for Data Centre star ratings correspond to PUE values (Source: Data Centres | NABERS)

Power Usage Effectiveness (PUE) is a metric providing assessment of the annual energy used on-site for operation of the data centre infrastructure plant relative to the IT equipment energy consumption. The lower the PUE the more energy efficient the data centre infrastructure plant is.

The proposed development is targeting an annual average PUE of 1.25 that represent a significant improvement on the national average PUE that is approximately 1.55. An annual average PUE of 1.25 represents excellent performance which would be sufficient to support a NABERS Energy for Data Centres Infrastructure rating of 5 Stars above the national average NABERS Energy rating currently around 4 Star, based publicly available data on current rated facilities. Refer to Section 2.2.1 for details of the energy efficiency considerations being pursued for the development design to support the target annual average PUE.

A predictive assessment was undertaken to estimate the NABERS Energy for Data Centres position for the proposed development and to estimate the annual average PUE. Summary of the assessment results are listed in the table below.

Table 3: Estimated Energy Consumption, PUE and NABERS Energy for Data Centres Infrastructure Scope Performance

Parameter for Estimating NABERS Energy for Data Centres Performance *Infrastructure Scope*	**Project Output**
Postcode	2766
IT Load Capacity Annual Average Utilisation	75%
Estimated energy consumed by the IT equipment load for whole development (MWh/yr)	2,286,360

Metered Heat Rejection Rate	100%
Estimated Data Centre Infrastructure electrical energy use (MWh/yr)	567,400
Estimated Backup Generator Testing diesel energy use (kL/yr)	390.73
Estimated Annual Average PUE	1.25
Potential Infrastructure NABERS Energy for Data Centres Rating	5

Note the estimate calculations have been based on various assumptions that includes operational diversity that may not be reflective of actual performance in operation.

In addition to the performance commitments specific to the Data Centres, the Proponent has committed to the following NABERS ratings for the relevant development office components that an Agreement to Rate will be completed for. This supports the requirements of the Sustainable Buildings SEPP Section 3.3 as applicable to 'large commercial development' which the office areas are classified as being over 1,000m^2:

- NABERS Energy for Office 5.5 Star Base Building rating (development office component only)
- NABERS Water for Office 3 Star rating (development office component only).

2.2 Sustainable Design Principles

2.2.1 Energy Use

Energy efficient initiatives are being pursued for the design as described in this section in support of the target annual average PUE of 1.25 representing an improvement on the national average PUE that is approximately 1.55 (per data for current NABERS rated developments).

The pursued energy performance initiatives will lead to reductions in operational energy consumption and associated greenhouse gas emissions from grid sourced electricity. The following table provides a comparison of the targeted performance to that of the approximate national average based on the loading assumptions of Table 3.

Table 4: Operational Energy Reduction Estimates

Operational Item	National Average Performance	Proposed Development	Improvement Estimate
Infrastructure Electrical Energy Consumption (MWh/yr)	1,252,303	567,400	684,903

The targeted performance for the proposed development compared to the approximate national average performance shown above represents around a 55% reduction in Infrastructure energy consumption and contributes the same percentage reduction in associated greenhouse gas emissions from grid sourced electricity. Greenhouse gas emissions will be reduced further in consideration of the proponents net zero pursuits as described in Section 2.2.4 and detailed further in the project GHG Assessment Report provided with the submission.

Note the estimate calculations have been based on various assumptions that includes operational diversity that may not be reflective of actual performance in operation.

2.2.1.1 Passive Design

Data Hall External Surface Finishes

All external surfaces of the data halls will be selected with finishes that support low absorptivity and high solar reflective index (SRI). This is to minimise the solar radiant heat gains and associated cooling loads.

Office Space Thermal Performance

The office areas of the data halls will be built with high thermal performance fabric and glazing to minimise thermal loads utilising continuous insulation where possible and avoiding thermal bridging that degrade thermal performance.

2.2.1.2 Mechanical Services

Elevated Data Hall Conditions and Direct To Chip Cooling

Significant reductions in mechanical system energy consumption are supported through the utilisation of relaxed data hall air temperature and humidity control setpoints in combination with the capability for direct to chip cooling through incorporating the necessary cooling fluid loops for improved heat exchange and utilisation of free cooling.

Chiller Plant

New chiller plant producing cooling chilled water will be of very high efficiency gained through current compressor technology and operating at elevated chilled water temperatures. Providing capability for direct to chip cooling and elevated hall temperatures allows the chilled water temperature to reset upwards optimising compressor efficiency and reducing subsequent energy consumption.

Waterside Free Cooling / Economy Cycle

The bulk of data hall cooling will be provided from hybrid dry coolers when ambient conditions allow bypassing the chiller plant to further improve energy efficiency. Combined with the elevated hall conditions and direct to chip cooling increases the annual operating time using waterside free cooling further reducing energy consumption.

2.2.1.3 Backup Power

Uninterruptible Power Supply (UPS) System

Utilisation of static UPS (battery type) for backup power in lieu of rotary flywheel style backup. Battery UPS provides a significant reduction and associated energy consumption of standby losses in comparison to rotary units.

2.2.1.4 Electrical Services

On-site Solar PV

On-site photovoltaics (PV) is being pursued for the design maximised for installation to the available roof space, coordinating with the roof area required for allocation to the cooling and other services plant. The project will incorporate a solar PV system with an anticipated rated capacity of 1,200 kWe across the finished site, subject to the availability of roof space to be finalised during detailed design. Based on the anticipated on-site solar PV rated capacity, generated energy is estimated to exceed 1,537,068 kWh/yr across the finished development that will be 100% utilised by the development.

Lighting

The proposed development will use robust, long-life LED lighting throughout the building for all luminaires to reduce the power demand and energy consumption. Occupant responsive controls will be utilised to ensure lighting is only engaged when required by occupants, dimmed or switched off when unoccupied, to further reduce energy

consumption. The long life of LEDs also reduces the need for replacement, which further reduces waste and its associated impact on the environment.

Energy Metering

Energy meters at the building level and sub-meters on major plant elements will be provided to enable ongoing tracking of energy consumption and identification of targeted energy management strategies to reduce consumption.

2.2.2 Water Use

Water efficient initiatives are being pursued for the design as described in this section. The pursued initiatives are estimated to support an annual average Water Usage Efficiency (WUE) for the campus of no greater than 1.47 representing an improvement on an industry benchmark of 1.73.

Water Usage Effectiveness (WUE) is a metric providing assessment of the water used on-site for operation of a data centre relative to the IT equipment energy consumption. The lower the WUE the more water efficient a data centre is.

Data centre water usage needs to be considered in the context of infrastructure energy performance and the mechanical plant configuration. Water-based heat rejection is more energy efficient than air-based heat rejection. To support the high energy efficiency for the project, and low PUE target a hybrid mechanical plant system including both air and water-based heat rejection has been selected. The hybrid system allow water consumption to be reduced compared to an entirely water-based heat rejection system for the bulk of cooling loads but will still consume water for higher cooling loads.

The following table provides a comparison of the targeted water performance to a benchmark aligned to the Australian average performance of NEXT DC facilities[1] at a WUE of 1.73, based on the IT loading assumptions of Table 3. Note that there is presently an absence of any published industry benchmarks for WUE available and limited publicly information on data centre water consumption. NEXT DC performance was utilised as a comparison due to having a large Australian industry presence and publicly available published data.

Table 5: Operational Water Consumption Estimates and Comparison to Benchmark

Operational Item	Benchmark Performance	Proposed Development	Improvement Estimate
Estimated energy consumed by the IT equipment load for whole development (MWh/yr)	2,286,360	2,286,360	-
Annual Data Centre Water Consumption (kL/yr)	3,955,403	3,354,146	601,257
Water Usage Effectiveness	1.73	1.47	0.26

The targeted performance for the proposed development compared to the benchmark performance shown above represents over a 15% reduction in water consumption.

Note the estimate calculations have been based on various assumptions that includes operational diversity that may not be reflective of actual performance in operation.

[1] NEXT DC average WUE performance sourced from their Climate Active Public Disclosure Statement available at https://www.climateactive.org.au/sites/default/files/2024-07/NextDC_Public%20Disclosure%20Statement_Org_Signed%20%281%29.pdf

Mechanical Plant Water Consumption

The base data hall mechanical cooling equipment utilises Hybrid Dry Coolers (HDC) for heat rejection that are able to operate both in an evaporative cooling mode and a dry air cooling only mode that consumes no water. For evaporative mode, the heat rejection air passed through the coolers is precooled evaporatively using wetted pads needed during for high loads and high ambient conditions. Dry air cooling mode is used during lower loads and cooler ambient conditions leading to significant savings in water consumption. The HDCs are supplemented with air-cooled chillers on building 1 that utilise wetted pads to pre-cool the heat rejection air for extreme ambient conditions. Building 2 supplements the HDCs with water cooled chillers connected to cooling towers.

Further, the elevated data hall temperature and humidity conditions and capability for direct to chip cooling reduces the cooling load density handled by the mechanical plant, relative to IT load density. The reduced cooling system heat loads further reduces evaporative water consumption for heat rejection for building 2.

Fittings and Fixtures

All fittings and fixtures selections will be made for the design with water efficiency and consumption minimisation in mind. Where appropriate, selections will be made toward the highest efficiency available.

Low-Irrigation Demand Plant Selection

Plants with low or zero ongoing irrigation demands such as endemic native vegetation are being considered for the development to reduce watering requirements. The potential for plants that require low or no ongoing irrigation will contribute strongly towards water usage minimisation.

Rainwater Collection and Reuse

Rainwater will be collected on site and reused for flush fixtures, irrigation if required and the mechanical plant.

Strategic Water Metering

Building-level and sub-metering will be provided to monitor and record the water consumption of the overall development, as well as irrigation systems, water fixtures and water use for the mechanical systems. This will enable ongoing tracking for identification of targeted strategies to minimise operational water consumption.

2.2.3 Waste Minimisation and Materials

Construction and Demolition Waste Reduction

Construction and demolition waste will be reduced by diverting waste from going to landfill. The project will identify the potential waste streams and their expected quantities, collection and diversion methods for each waste stream, roles and responsibilities, and the waste haulers to be engaged. Targets will be set for waste diversion from landfill with ongoing monitoring throughout construction to ensure project is on track.

Materials

Initiatives are being pursued for major materials elements of the development to minimise the embodied emissions footprint and environmental impact including:

- Use of concrete mixes with supplementary cementitious materials from recycled byproduct sources such as fly ash and granulated blast furnace slag to reduce Portland Cement content and the associated production greenhouse gas emissions.
- Use of structural steel and reinforcement products with high recycled material content to reduce the quantity of virgin material sourcing.
- Selection of low maintenance and high durability materials will be selected where practical for extended service life to minimise replacement needs and additional materials usage over the development lifetime.

2.2.4 Net Zero Pursuits

In addition to the energy efficiency and on-site renewable energy initiatives being pursued for the development to reduce energy and associated greenhouse gas emissions, further considerations are being made by the Proponent regarding support of the Government's goal of Net Zero by 2050 goal. Considerations include:

- Commitment to procure 100% renewable electricity for all non-IT operational energy use within the facility and data halls. Leading hyperscale AI and cloud providers are actively investing in renewable energy procurement as part of their broader commitment to sustainable operations and net-zero carbon goals.
- Selection of chiller plant refrigerants with very low Global Warming Potential (GWP) at 1 minimising as far as practical the associated Scope 1 emissions from leakage.
- Procurement of non fossil fuel based renewable diesel fuel such as hydrogenated vegetable oil (HVO) for some or all of the fuel stored on-site for emergency backup power is being considered. This would lead to a reduction in emissions from the diesel fuel in the order of 75%. Pursuit by the Proponent will be subject to a viable and cost effective source of renewable diesel becoming available on the market.

The GHG Assessment Report prepared provide more detailed information on the emissions associated with the development. In summary, the GHG assessment reviewed three comparative scenarios as follows across the identified assessment boundary to estimate the emissions for the anticipated sources of the project:

- **Scenario 1: Baseline –** Equivalent to the national average data centre performance of an annual average PUE of 1.55 (see Section 2.1.3).
- **Scenario 2: Design Measures –** Includes the targeted project design features that minimise demand and maximise efficiency in support of the target maximum annual average PUE of 1.25 (see section 2.2.1).
- **Scenario 3: All Measures –** As per scenario 2 plus 100% renewable electricity is procured for all non-IT operational energy use within the facility and data halls, per the proponent commitment detailed above.

The following table provides the Scope 1 and 2 emissions estimates summary from the GHG Assessment Report for the assessed scenarios.

Table 6: Operational Scope 1 and Scope 2 Emissions Estimate Summary Across Assessment Scenarios

Emissions Scope	**Annual Scope 1 and Scope 2 GHG Emissions ($T\text{-}CO_2\text{-}e/yr$)**		
	Scenario 1 Baseline	*Scenario 2 Design Measures*	*Scenario 3 All Measures*
Scope 1 Emissions	*125,066*	*53,807*	*22,018*
Scope 2 Emissions	*2,056,202*	*931,636*	*0*
Total GHG Emissions (Scope 1 & 2)	**2,181,268**	**985,443**	**22,018**
Difference	0	-1,195,825	-2,159,250
Percentage Difference	***0.0%***	***-54.8%***	***-99.0%***

The pursued design measures of Scenario 2 are seen to reduce the estimated annual Scope 1 & 2 emissions by over 54% compared to the approximate national average performance, as seen in Section 2.2.1.

When the commitment to procure 100% renewable electricity for all non-IT operational energy use within the facility and data halls is also considered per Scenario 3, the operational Scope 1 & 2 GHG emissions are close to entirely mitigated compared to the Baseline scenario.1

3 Conclusion

The report has described the Ecologically Sustainable Design (ESD) features being pursued for the development design. These are seen to support the Planning Secretary's Environmental Assessment Requirements (SEARs) that includes specific elements of the Sustainable Buildings SEPP 2022 applicable to the project.

In summary, ESD targets and features pursued for the development include:

- The project is targeting an annual average PUE of 1.25 representing a marked improvement on the national average of approximately 1.55.
- Operational energy performance that will support a 5 Star NABERS Energy for Data Centres Infrastructure rating if realised in operation compared to national average performance of approximately 4 Star, based on publicly available data for current ratings.
- Incorporation of energy features to support target outcomes as follows:
  - Elevated data hall cooling setpoint temperature and relaxed humidity setpoints combined with the capability for direct to chip liquid cooling to maximise efficiency of mechanical plant
  - Waterside economy cycle / free cooling from hybrid coolers for building 2 bypassing chiller operation to further reduce energy consumption
  - High efficiency chiller plant through modern compressor technology coupled with elevated operational chilled water temperatures due to relaxed hall conditions and direct to chip liquid cooling
  - On-site PV maximised to the available roof space with a targeted rated output capacity in the order of a minimum 1,200kWe across both data centre buildings. Roof top area available for installation is limited as majority is allocated to cooling chiller plant that cannot be installed over.
  - High efficiency LED lighting selections throughout to minimise demand coupled with occupant responsive controls to minimise operational time and associated energy consumption
  - Low absorptivity / high Solar Reflective Index (SRI) building external finishes to reduce radiant heat gains
  - High performance fabric / glazing to the office spaces and glazing shading to reduce thermal loads
- Reduced annual water consumption supported through:
  - Hybrid dry coolers used for the bulk of heat rejection needs that able to operate in air cooling only mode in lieu of evaporative mode when ambient conditions allow
  - Cooling loads minimisation from elevated temperatures & direct to chip liquid cooling reducing heat rejection requirements and associated water consumption
  - Low or zero irrigation demand through selection of drought tolerant planting for landscaping such as endemic native vegetation
  - Rainwater capture and reuse system for supply to flush fixtures, irrigation and mechanical plant
- Net Zero emissions in operations considerations by the Proponent with a target achievement by 2050 including:
  - Commitment to procure 100% renewable electricity for all non-IT operational energy use within the facility and data halls. Leading hyperscale AI and cloud providers are actively investing in renewable energy procurement as part of their broader commitment to sustainable operations and net-zero carbon goals.
  - Use of very low GWP refrigerants in chiller plant minimising as far as practical the associated Scope 1 emissions
  - Consideration of the future procurement of renewable diesel alternatives to fossil fuel based products

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