

SYD 1 Stage 2

Ecologically Sustainable Development (ESD)

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1 Preface

1.1 Executive Summary

This Ecologically Sustainable Development (ESD) Report has been prepared by Aurecon to support the State Significant Development Application (SSDA) for the proposed data centre at 3 Brookhollow Avenue, Norwest. The report outlines how the project satisfies the Secretary's Environmental Assessment Requirements (SEARs) for ESD and demonstrates alignment with relevant state and national sustainability policies.

The proposed facility will form part of a data centre campus designed to support forecast demand for digital infrastructure, including computing capacity for artificial intelligence. The site is well situated near public transport and surrounded by a mix of commercial, residential, and recreational land uses.

The report outlines how the design incorporates ESD principles in accordance with Section 193 of the Environmental Planning and Assessment Regulation 2021 and the provisions of the SEPP (Sustainable Buildings) 2022.

Key sustainability features include:



Energy and Carbon

All-electric design (excluding emergency systems) targeting PUE ≤ 1.34 to support a 5-star NABERS Energy pathway, backup generators capable of operating on certified biofuels, and low Global Warming Potential refrigerants to minimise Scope 1 emissions.



Water Efficiency

A target Water Usage Effectiveness (WUE) of <0.35 L/kWh, rainwater harvesting and reuse systems will supply water for toilet flushing, irrigation, and mechanical services, and provision for future recycled water connection.



Sustainable Materials and Circular Economy

Preference for materials with Environmental Product Declarations (EPDs), Green Tag certifications, and Climate Active accreditation, circular economy approaches including reuse, disassembly, and product stewardship.



Resilience and Nature

Climate-responsive design with flood-resilient drainage, high SRI roofing, bushfire smoke, retention and enhancement of a 20-metre-wide green belt of vegetation to support biodiversity and habitat connectivity.



Transport and Accessibility

Access within walking distance of Norwest Metro Station and bus routes. Freight access designed through swept path analysis, and future pedestrian and cycling infrastructure under consideration.

Following implementation of the proposed mitigation measures, the development is expected to achieve strong performance across energy, water, materials and resilience indicators, consistent with current best practice for data centre design.

1.2 Abbreviations and Glossary

CSP	Community Strategic Plan
DCCEEW	Department of Climate Change, Energy, the Environment and Water
DtS	Deemed to Satisfy
EPD	Environmental Product Declaration
ESD	Ecologically Sustainable Development
HVO	Hydrotreated Vegetable Oil
GREP	Government Resource Efficiency Policy
LSPS	Local Strategic Planning Statement
NCC	National Construction Code
PUE	Power Use Effectiveness
SDRP	State Design Review Panel:
SEARs	Secretary's Environmental Assessment Requirements
SEPP	State Environmental Planning Policies
SSDA	State Significant Development Application
WELS	Water Efficiency Labelling and Standards
WUE	Water Use Efficiency

2 Introduction

2.1 Purpose of this report

This Ecologically Sustainable Development (ESD) Report has been prepared to support the State Significant Development Application (SSDA) for the proposed data centre at 3 Brookhollow Avenue, Norwest. The purpose of the report is to demonstrate how the development responds to the Secretary's Environmental Assessment Requirements (SEARs) for ESD and how sustainability principles have influenced the project's design, construction and operational strategy.

2.2 Project overview

The proposed development forms part of a new data centre campus designed to meet increasing demand for digital infrastructure. The SSDA seeks approval for a four-storey, all-electric facility with associated infrastructure, plant, water systems and landscaping. A summary of the site context, planning history and existing conditions is provided in Section 3.

2.3 Scope of the ESD Assessment

This ESD Report addresses the requirements of Section 193 of the Environmental Planning and Assessment Regulation 2021 and responds to the applicable provisions of the State Environmental Planning Policy (Sustainable Buildings) 2022. The assessment focuses on the project's performance and opportunities in the following key areas:

- Greenhouse gas emissions and operational energy
- Water efficiency and integrated water management
- Sustainable materials and resource efficiency
- Circular economy principles
- Climate resilience and adaptation
- Biodiversity and site-based ecological outcomes
- Compliance with applicable rating tools and industry standards

These topics reflect both statutory requirements and best-practice sustainability outcomes for data centre design.

2.4 SEARs requirements

The SEARs issued on 8 April 2025 require the SSDA to demonstrate how the project meets ESD principles and relevant sustainability standards. Table 2-1 identifies the specific requirements and where they are addressed in this report.

Table 2-1 SEARs compliance

SEARs requirement	Report reference
Identify 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 5
Demonstrate how the development will meet or exceed the relevant industry recognised building sustainability and environmental performance standards	Section 6

Demonstrate 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 7

If Chapter 3 of SEPP (Sustainable Buildings) 2022 applies:

Section 6.5

- demonstrate how the development has been designed to address the provisions set out in Chapter 3.2(1).
 - provide a NABERS Embodied Emissions Material Form to disclose the quantity of embodied emissions attributable to the development in accordance with section 35B of the EP&A Regulation.
-

Appendix A- NABERS
Embodied Emissions
Material Form.

3 The Site

3.1 Site Context

The site is known as 3 Brookhollow Avenue, Norwest (Lot 2021 DP 831173) and is in the Norwest locality, which forms part of the Hills Local Government Area (LGA). Development surrounding the site comprises of a mix of commercial, retail and residential land uses as described below:

- To the north of the site is Norwest Boulevard, commercial office buildings, an early learning centre, 'Castle Pines' retirement community and Castle Hill Country Club Golf Course.
- To the east of the site is Windsor Road, commercial office buildings, small pockets of residential development and industrial development.
- To the south of the site is Brookhollow Avenue, commercial developments, a hotel and medium density residential development; and
- To the west of the site is commercial development, including a shopping centre (Norwest Marketown), various retail offerings and the Norwest Metro Station.

The site is well serviced by public transport including bus and Metro. Norwest Metro Station provides connections to Tallawong in the northwest and Sydney CBD to the southeast. Bus stops along Norwest Boulevard provide connections through to Parramatta, Seven Hills and Rouse Hill.

As shown in the below mapping, the site is in proximity to Strangers Creek and Brookhollow Reserve, located at the site's southwestern border. Norwest Lake is located approximately 90m northwest of the site.

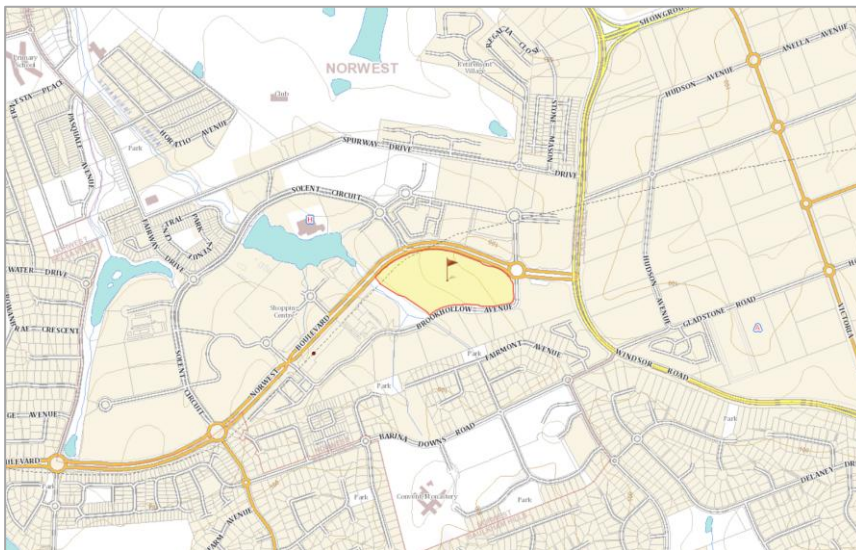


Figure 3-1 Site context map

3.2 Site Description

The subject site is legally described as Lot 2021 of Deposited Plan (DP) 831173. The site can be described as irregularly shaped and has a total land area of approximately 51,867sqm. A portion of the site currently comprises an existing 4MW data centre that was approved under D93/318, dated 21 June 1993.

The site is bound by Brookhollow Avenue to the south and east, Brookhollow Reserve and the Hills Corporate Centre to the west and Norwest Boulevard to the North. The primary frontage of the site is to Brookhollow Avenue, where vehicular access is provided.

Based on a review of topographical mapping, the site appears to fall from east to west from a maximum height of RL104 in the northeastern corner of the site to RL82m along the western portion of the site.

The site is located approximately 500m to the east of the Norwest Metro station, with the metro line running under the north / northwest boundary of the site.

The site is heavily vegetated at the perimeter of the site, however, none of the vegetation is mapped on the biodiversity values mapping prepared under the *Biodiversity Conservation Act 2016* (BC Act).

Refer to aerials of the site at Figure 3-2 below.



Figure 3-2 Aerial image of the site

3.3 Relevant approvals

There are several development approvals of relevance to the SSDA including:

- Complying Development Certificate (CDC): Certificate No. 25/250218-01 which provided consent for partial demolition of the existing data centre. The CDC was issued on 9 September 2025.
- Development Application for alterations and additions to existing data centre campus (1382/2025/JP) was approved by Council on 4 September 2025.
- Development Application for substation and bulk earthworks currently being prepared for submission to Council and expected for approval by June 2026.

3.4 CDC (certificate no. 25/250218-01) – demolition of existing internal structures

On 9 September 2025, a CDC, Certificate No. 25/250218-01, Council Reference 239/2026/PC was issued by Certatude, which provided consent for the partial demolition of the existing data centre. Specifically, the proposed works included the demolition of internal walls, access floors, slabs and roof, across Levels 1 to 4 of the existing data centre. The demolition works were required in order to facilitate the future Stage 1 development (1382/2025/JP).

The works have since been completed.

3.5 Stage 1 development application

Stage 1 approval was obtained from the Regional Planning Panel on 4 September 2025 under DA1382/2025/JP.

Stage 1 involves significant upgrades and refurbishment of an existing data centre facility that occupies the site previously operated by IBM. The works enable the repositioning of the existing dilapidated facility to be fit-for purpose and responsive to the evolving data storage demands of the market.

3.6 Substation and early works development application

A planning application is currently being prepared, which will seek approval for on-site power infrastructure, including a substation that will transform utility power supplied via a high voltage (132 kilovolts) line to medium voltage (33 kilovolts). The substation will comprise two main structures, a control building and two power transformers.

The substation is proposed to service Stage 1 (SYD01), with the intent to expand to Stage 2. Ahead of the construction of the substation, the intent is to connect Stage 1 to the 11 kv power supply before creating a new point of connection from the proposed substation, which will be established once constructed.

Supply infrastructure will be provided from an Endeavour substation located nearby and will be delivered to the site under Part 5 powers held by Endeavour as an Electricity Supply Authority.

3.7 Project Summary

This SSDA seeks development consent for the construction and operation of a data centre, with a total power consumption of approximately 96MW (IT load). The proposal will form part of a broader state-of-the-art data centre campus, equipped to cater for growing data storage needs within Australia and the emergence of artificial intelligence (AI).

In summary, approval for the following is sought:

- Minor excavation works beyond earthworks intended to be undertake under the separate Substation Development Application under assessment by The Hills Shire Council;
- Civil earthworks and the installation of relevant servicing infrastructure and utilities;
- Construction of a four (4) storey data centre with roof top plant, equating to an RL 130 and Gross Floor Area (GFA) of 16,191m²;
- Installation of 77 x diesel fuel generators and associated storage
- Provision of on-site car parking for approximately 25 spaces and EV charging space; and
- Landscaping, tree removal and offset tree planting.

4 ESD Assessment Summary

The proposed development embeds Ecologically Sustainable Development (ESD) principles through the design and intended operation of the facility. The approach is consistent with the EP&A Regulation 2021, the SEPP (Sustainable Buildings) 2022 and the project's SEARs. It prioritises efficient, all-electric base building systems, industry-leading operational efficiency, water stewardship, circular materials selection and climate-resilient design.

The project intent across key ESD themes is:

- **Energy & carbon:** All-electric base-building design (excluding emergency systems) with a design pathway targeting PUE ≤ 1.34 to support a 5-star NABERS Energy (Infrastructure) outcome, use of low-GWP refrigerants, and backup generators enabled for certified biofuels.
- **Water:** Annualised WUE < 0.35 L/kWh design intent with adiabatic assist only in hot conditions, rainwater harvesting for toilets, irrigation and mechanical system top-up, infrastructure provision for future recycled-water connection.
- **Materials & circularity:** Preference for EPDs, Green Tag and Climate Active certified products, circular strategies including reuse, disassembly and product stewardship, construction waste planning and reporting.
- **Ecology & resilience:** Retention and enhancement of a ~20 m green belt to support habitat connectivity, high-SRI roofing and flood-resilient drainage sized with a +10% allowance to the 1% AEP, smoke resilience and operational monitoring for extreme conditions.
- **Transport & access:** Proximity to Norwest Metro and buses, efficient freight access, consideration for future cycling/pedestrian connections.

5 ESD Principles

The EP&A Regulation 2021 requires consideration of four Ecologically Sustainable Development (ESD) principles. The project's response to each principle is summarised below, reflecting how the design avoids environmental harm, improves long-term performance, and supports responsible resource use.

5.1 The Precautionary Principle



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.

The precautionary principle requires proactive measures to prevent environmental harm where there is risk of serious or irreversible impact.

Project response

- **Low-GWP refrigerants** are specified for cooling systems, subject to OEM selection during detailed design, reducing greenhouse gas impact from mechanical plant.
- **Evaporative air-cooled chillers** operate primarily dry, with adiabatic assist only under high-ambient conditions, minimising annual water use while improving peak efficiency.
- **Backup generators** are diesel sets enabled for renewable diesel (HVO) or biodiesel blends subject to supply, providing a lower-emission pathway without changing the selected technology.
- **Fuel storage and handling** will comply with AS 1940 and AS 1692, with bunding and spill-management controls to reduce soil and water contamination risk.
- **Drainage capacity** and climate design allowances are integrated via the hydraulic/stormwater approach (roof drainage designed to 1:100 AEP + allowance) to manage more intense rainfall.
- **Risk-based options assessment** informed the selection of cooling plant, envelope improvements and backup generation solutions to minimise environmental risk while maintaining operational resilience.

5.2 Inter-generational equity



The present generation should ensure the health, diversity and productivity of the environment are maintained or enhanced for the benefit of future generations.

This principle requires that environmental quality be maintained or enhanced for future generations.

Project response

- **All-electric base-building systems** (excluding emergency generation) and high-efficiency plant reduce long-term operational emissions intensity.
- **Provision for future recycled-water supply** (utility connection) supports long-term potable demand reduction for mechanical make-up water.
- **Rainwater harvesting + WELS-rated fixtures** reduce amenity water use
- **Separate centralised water storage** for industrial use (mechanical systems) enables resilient cooling water supply independent of short-term mains variability
- **Durable, lower-impact materials** and design for maintainability reduce lifecycle impacts.
- **Climate-responsive plant and envelope selection** limits heat ingress and supports efficient operation under future climate conditions.

5.2.1 Conservation of biological diversity and ecological integrity



The conservation of biological diversity and ecological integrity should be a fundamental consideration.

The principle requires biodiversity protection and support for ecological processes.

Project response

- **Retention and enhancement** of a ~20 m vegetated buffer to maintain habitat connectivity and provide landscape cooling benefits.
- **Native, climate-tolerant species** for planting to support ecological resilience and reduce long-term maintenance.
- **WSUD measures** manage stormwater quality and runoff to protect adjacent waterways (roof capture, filtration before reuse/ discharge pathways).
- Habitat enrichment opportunities such as nesting boxes and pollinator features will be incorporated through detailed landscape design.

5.2.2 Improved valuation, pricing and incentive mechanisms



Environmental factors should be included in the valuation of assets and services.

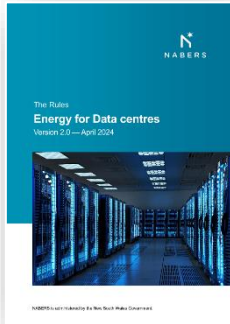
This principle encourages lifecycle-based cost/benefit analysis and market mechanisms that support sustainability outcomes.

Project response

- **Whole-of-life assessment** informs key plant selections such as chillers, controls, and distribution transformers, prioritising long-term efficiency, maintainability and risk reduction over initial cost alone.
- **Embodied-carbon disclosure** via the NABERS Embodied Emissions Material Form will transparently report material impacts and highlight reduction opportunities.
- **Renewable electricity procurement pathways** for tenants are supported through separate NMI metering and clear energy monitoring architecture.
- **Circular economy considerations** such as durability, disassembly and take-back schemes reduce disposal costs and resource impacts across the asset life.

6 Sustainability Performance Standards

This chapter summarises how the proposed development aligns with key sustainability and environmental performance standards relevant to a State Significant Development (SSD), including NABERS, the National Construction Code (NCC), NSW climate policy, The Hills Shire Council DCP, and the SEPP (Sustainable Buildings) 2022. Each section outlines the applicable requirement and the project's response.



6.1 NABERS Energy for Data Centres

NABERS Energy provides a nationally recognised method for benchmarking the operational energy performance of data centres based on actual energy consumption and Power Usage Effectiveness (PUE). A 5-star rating typically corresponds to a PUE of ~1.34 or better.



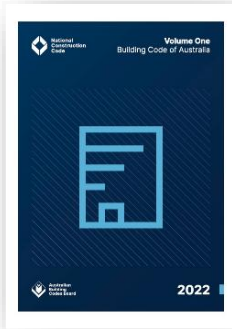
SUPERIOR PERFORMANCE

PUE 1.34

The project would be seeking an **Infrastructure** rating, which measures a facility's energy efficiency of supplying infrastructure services including cooling, power delivery, back up power and lighting to tenant IT equipment housed in a data centre. The Infrastructure rating type measures and benchmarks the greenhouse gas emissions generated when supplying these services to the IT equipment.

Project response

- The facility is designed to achieve a minimum of a 5-star NABERS Energy (Infrastructure) outcome, with a design pathway targeting $PUE \leq 1.34$, based on mechanical and electrical design optimisation.
- The project's mechanical design uses evaporative air-cooled chillers where the cooling mode switches from dry to wet (adiabatic) cooling only in specific ambient conditions.
- Specific energy reductions in the cooling system will be investigated through the ongoing design process as more detailed and supplier specific data becomes available to optimise and improve energy efficiency, lowering the PUE.
- Low-GWP refrigerants, subject to OEM confirmation, are specified in the design to minimise Scope 1 emissions and support long-term NABERS performance.
- The electrical design incorporates dry-type transformers, efficient UPS systems, and LED lighting, reducing the base building energy use and reinforcing performance outcomes.
- Metering across major loads supports ongoing monitoring and post-occupancy optimisation in line with NABERS reporting requirements.



6.2 NCC Section J

Section J of the NCC establishes minimum energy performance requirements for commercial buildings, including thermal envelope performance, HVAC efficiency, lighting efficiency and metering.

Project response

- The project's all-electric design (excluding emergency systems) aligns with NCC electrification-ready requirements
- Envelope design incorporates high-SRI roof materials, optimised insulation and limited glazing to minimise heat ingress.
- HVAC systems use high-efficiency evaporative air-cooled chillers, variable-speed pumping and controls designed to reduce operational energy.
- Lighting is provided by high-efficiency LEDs with sensor-based controls and manual override options.
- Metering and monitoring systems facilitate NCC-compliant energy tracking for major loads.

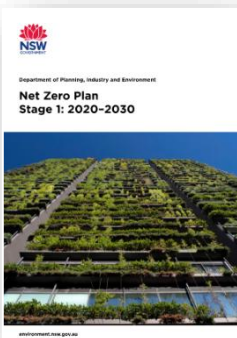


6.3 NSW Climate Change Policy Framework & Net Zero Plan

The NSW Net Zero Plan commits to a 50% emissions reduction by 2030 and net zero by 2050, with a focus on reducing energy demand, supporting renewable energy and enhancing climate resilience.

Project response

- The facility's all-electric base building systems, combined with high-efficiency mechanical and electrical design, reduce long-term Scope 1 and Scope 2 emissions.
- Backup generators are designed for compatibility with renewable diesel (HVO) or B100 biodiesel blends, subject to supply chain availability, consistent with the Infrastructure report's viability assessment.
- Provision for renewable electricity procurement is enabled through dedicated NMI metering, allowing tenants to contract renewable supply.
- Climate-responsive design includes vertical heat rejection, high-SRI roofing, and drainage systems sized for 1% AEP + climate allowance, supporting resilience to future climate conditions.
- Infrastructure enables future recycled-water connection, strengthening long-term water resilience in hotter, drier conditions.



6.4 The Hills Shire Council DCP

The Hills DCP sets local objectives relating to water efficiency, biodiversity protection, resource conservation and ESD outcomes.

Project response

- **Precautionary approach** applied to refrigerants, fuel storage, drainage and climate allowances.
- **Water efficiency** measures include rainwater harvesting, WELS-rated fixtures and a hybrid cooling strategy that only uses water above high-ambient thresholds.
- **Biodiversity** and ecological values are protected through retention and enhancement of a ~20 m green belt, native species planting and WSUD treatment.
- **Energy-efficient technology**, including evaporative chillers, LED lighting, low-GWP refrigerants and dry-type transformers, aligns with DCP objectives.
- **Waste hierarchy** principles are applied through circular material selection and construction waste management planning.

6.5 SEPP (Sustainable Buildings) 2022

The SEPP requires SSD projects to demonstrate performance against provisions for waste minimisation, energy efficiency, passive design, renewable energy integration, metering and potable water reduction.

Project response

- | | |
|---|---|
| (a) Minimisation of waste from demolition and construction, including by the choice and reuse of building materials | ■ Circular economy principles adopted: reuse, disassembly, modularity, take-back schemes and construction waste management planning |
| (b) Reduction in peak demand for electricity, including through the use of energy efficient technology | ■ High-efficiency chiller systems with adiabatic mode at high-ambient temperatures reduce peak electrical loads.
■ LED lighting and efficient electrical systems further reduce peak demand. |
| (c) Reduction in reliance on artificial lighting and mechanical heating and cooling through passive design | ■ Data halls rely on mechanical cooling, but building envelope optimisation (high-SRI, limited glazing, shading) reduces heat loads and improves system efficiency. |
| (d) Generation and storage of renewable energy | ■ Embedded NMI metering enables tenants to procure renewable electricity contracts aligned with operational goals.
■ Generators are compatible with renewable diesel (HVO/B100), supporting low-carbon backup power. |
| (e) Metering and monitoring of energy consumption | ■ Sub-metering provided for major mechanical, electrical and water systems, supporting SEPP-aligned monitoring and optimisation. |
| (f) the minimisation of the consumption of potable water | ■ Rainwater harvesting for toilets, irrigation and mechanical systems.
■ WELS-compliant fixtures across the development.
■ Provision for future recycled-water connection to reduce long-term potable demand.
■ Hybrid cooling system ensures optimised WUE, with water use only during high-temperature events. |

7 Technical Sustainability Strategy

The design integrates high-efficiency, all-electric systems (excluding emergency generation), very low water use cooling, lifecycle-aware materials, and climate resilience measures tailored to the data centre. This chapter consolidates the initiatives, targets and verification pathways to deliver performance in operation while transparently managing embodied impacts.

7.1 Energy & Carbon Strategy

Targets & philosophy

The infrastructure is designed to achieve high efficiency, with a target minimum 5-star NABERS (Infrastructure) outcome, with the rating to be verified post-occupancy through NABERS.

Mechanical - cooling & refrigerants

- Evaporative air-cooled chillers operate dry for most of the year, switching from dry to wet cooling mode during high-temperature ambient conditions, reducing peak power and annual energy while minimising water consumption. Cooling use roof-mounted vertical heat rejection to project warm air away from intakes and sensitive receptors.
- A thermal energy storage tank paired to each chiller supports uninterrupted cooling during generator start-up and enables rapid thermal recovery after grid interruptions.
- Refrigerants are low-GWP, subject to OEM selection during detailed design.

Electrical (distribution, UPS, lighting, switchgear)

The electrical topology is selected using a resilient power design that saves energy when the building isn't at full load. The number of standby circuits that sit idle is limited, avoiding unnecessary conversion steps, and equipment sizes are selected to match the likely demand. This reduces the energy consumption of the system when in idle or running below full capacity. Key features include:

- Dry-type distribution transformers specified for safety, maintainability and reduced environmental risk.
- The UPS system is designed to support the IT equipment for short durations during outages until generators start, with battery options being considered in design based on safety and performance.
- Efficient lighting with LED luminaires, sensor-based controls and manual overrides.
- Selection of non-SF₆ switchgear where available and feasible, aligning with the project's Scope 1 minimisation approach.

Backup power & fuels

- Reciprocating diesel generator sets, with 2.5 MW units per data hall lineup and additional 750 kW front of house sets housed in acoustic enclosures on the gantry, that are HVO/B100 compatible subject to supply and OEM approval.
- Commissioning and ongoing test regimes planned within environmental limits, with staged concurrent testing to minimise total run time.

Metering, procurement & optimisation

- Separate NMI metering enables tenants to contract renewable electricity for IT loads; sub-metering provided to major plant for tuning and lifecycle optimisation.

Benchmark comparison

According to the NABERS FY25 Annual Report for Data Centres, the average NABERS Infrastructure Energy rating across certified facilities was 4.0 stars, corresponding to an average PUE of ~1.52.

PUE calculation methodology

The design PUE has been estimated in accordance with NABERS for Data Centres (Infrastructure) conventions. The calculation includes:

- **IT load profile (tenant energy use):** staged ramp-up to 96 MW maximum capacity, constant load assumed for the full year.
- **Non-IT infrastructure loads (operator energy use):** chilled water plant, fans, pumps, UPS losses, transformers, lighting and controls, derived from equipment schedules and manufacturer data.
- **Climate basis and control sequences:** Meteorological data file reflects site conditions, with predominantly dry operation and assisted evaporative cooling enabled only at high-ambient thresholds.

Post-occupancy PUE will be verified under NABERS (Infrastructure) using sub-metering of all major systems and routine performance reviews.

Estimated operational energy reduction

The energy use of the proposed facility compared with a benchmark has been calculated. At full development, the project comprises up to 96 MW IT capacity with associated infrastructure loads. Based on the project's calculated design PUE of 1.33 and a maximum IT capacity of 96 MW, the facility achieves an estimated 13% reduction in operational energy compared with a benchmark facility. The calculated values are summarised in Table 7-1.

Table 7-1 Data Centre Energy Reduction Summary

Item	Benchmark (Market average)	Design estimate	Reduction %
PUE	1.52	1.33	
Total Facility energy (kWh/year)	1,251,628,800	1,091,941,683	13%

Note: Constant IT Loads were assumed for the calculation as the data centre is intended for co-location and the data centre is not responsible for its customers ITC equipment.

Estimated GHG emission reduction

Similarly, the facility achieves an estimated GHG emission reduction of 12.5% when compared to a benchmark facility. The calculated values are summarised in Table 7-2 GHG emission reduction estimate.

Table 7-2 GHG emission reduction estimate

Resource	Benchmark	Proposed	Reduction %
PUE	1.61	1.33	
Scope 1 and Scope 2 GHG emissions (tCO ₂ -e)	801,042,432	698,842,677	13%

Embodied emissions

As well as the operational emission reductions described above, the project also addresses embodied carbon through measures set out in Embodied emissions sub-section and the NABERS Embodied Emissions Materials Form (Appendix A), which will be refined through detailed design, including:

- Low-GWP concrete mix optimisation
- High-recycled-content reinforcing steel
- Product selection preferencing materials with EPDs, Climate Active certifications and implemented circular-economy principles
- Design for disassembly for non-critical steelwork and modular elements.

7.2 Water Strategy

Targets & operating mode

The project uses evaporative air-cooled chillers that run dry during most operating hours. Water is only used when outdoor temperatures are high enough to trigger adiabatic assisted cooling, helping to maintain more energy efficient cooling performance on the hottest days.

Because the cooling system does not rely on a traditional cooling tower, the data centre avoids the associated large, continuous water demand. This significantly reduces overall water consumption and avoids risks associated with Legionella from evaporative cooling towers.

The system has been designed with a WUE below 0.35 L/kWh, and early calculations indicate performance could be considerably lower once in operation. This reflects the strengths of a closed-loop cooling design and controlled use of adiabatic assistance.

Non-potable sources & storages

- Rainwater harvesting with 150 kL storage for toilet flushing, irrigation and mechanical top-up, passing through a centralised filtration system prior to reuse.
- Stage 2 centralised industrial make-up water storage with an effective capacity ~4,800 kL, sized to provide approximately 24 hours of storage (~3,600 kL) for Buildings B, C, D, plus ~1,200 kL redundancy, with dual reticulation to roof plant for resilience and staging.
- Provision for a future recycled water connection at the site to reduce long-term potable water demand.

Water-efficient fixtures

Inside the building, all fixtures will meet or exceed WELS high-efficiency requirements, including 6-star taps and urinals. These fixtures reduce the daily demand for potable water in staff and flex areas without affecting usability or comfort.

Water monitoring and leak detection

To ensure water use remains low over the life of the building, the project incorporates:

- Sub-metering of major water systems
- Pulse-output meters for leak detection
- A monitoring system that alerts operations teams if water use is higher than expected.

This enables quick identification of leaks or inefficiencies and supports ongoing optimisation.

Water quality, monitoring & flood resilience

The hydraulic design also supports climate resilience as follows:

- Sub-metering and pulse meters for water use and leak detection, with monitoring supporting proactive maintenance.
- Roof drainage is designed to 1% AEP + climate allowance to manage increased rainfall intensity under future scenarios.
- Water-sensitive urban design (WSUD) measures help manage stormwater quality and reduce runoff impacts on nearby waterways.

With these measures, the site can safely manage heavy rainfall while maintaining operational continuity.

Water use reduction

The proposed cooling system design is configured to operate as a closed loop for most of the year, only using water through adiabatic pre-cooling during very hot conditions. This allows the project to achieve a very low Water Usage Effectiveness (WUE) compared with typical evaporative-cooled data centres.

Table 7-3 Water reduction summary for data centre

Resource	Benchmark	Proposed	Reduction %
WUE	0.35	0.08	
Water Use l/kWh	0.35 l/kWh	0.08 l/kWh	77%

The annual water consumption based on a worst-case operating scenario has been determined as outlined in the table below.

Table 7-4 Annual water consumption

Water consumption	
Mechanical water consumption (kL/year)	69,418
Domestic water consumption (kL/year)	292

Rainwater harvesting, high-efficiency fixtures, and future-proofing for recycled water connection further reduce reliance on potable water supplies.

7.3 Materials, Waste & Circularity

Key materials uses

The NABERS Embodied Emissions Materials Form (Appendix A) shows a preliminary estimate of construction material quantities, with the following materials contributing the most to the embodied carbon emissions of the project:

- In-situ high strength concrete
- Precast concrete panels
- Reinforcing steel including bar, mesh and fibres
- Foundations, including reinforced concrete and steel piles

- Envelope metals including the profiled steel roof, aluminium louvre walling and profiled aluminium wall cladding

Reduction strategy - design & procurement

- **Concrete & foundations:** optimise member sizes, prioritise low-GWP concrete in each strength class, apply SCM substitution for each mix design and exposure class, standardise precast panel modules to reduce waste, and procure high-volume mixes that have EPDs.
- **Reinforcing & structural steels:** specify recycled content and products with EPDs; rationalise bar schedules/mesh, design for disassembly in non-critical ancillary steelwork.
- **Envelope metals:** preference for EPD/GreenTag certified products and high-recycled-content aluminium and steel, coordinated façade and acoustics design.
- **Circular construction:** design for modularity, use take-back schemes, on-site waste segregation with reporting, with diversion targets set in the construction Waste Management Plan. Engage specialist partners for secure, responsible e-waste recycling during operations; align procurement with documented take-back schemes.
- **End-of-life considerations:** Favour durable, maintainable assemblies and non-critical steelwork that can be demounted; align with supplier stewardship where available.
- **Lifecycle transparency:** maintain and submit the NABERS Embodied Emissions Materials Form at the construction certificate stage with updated quantities and supplier EPDs to disclose the final embodied profile

Circular economy principles and strategies to achieve this aim are shown below.

Principle	Strategy
 USE LESS	Reduce need for materials by design Refuse / remove toxic products and materials
 USE LONGER	Repair, reuse and refurbish existing assets and products Adaptability by design Durability/longevity by design
 USE AGAIN	Repurpose and recycle existing materials Recover and recycle materials in construction and operation Disassembly by design
 REGENERATE NATURE	Promote biodiversity Enhance green infrastructure Restore eco-system services

Sustainability factors for material selection are summarised in Figure 7-1 .



Figure 7-1 Material selection principles

7.4 Ecology & Resilience

Ecology & landscape

The overall landscape of the site is demonstrated in Figure 7-2 below.



Figure 7-2 Extent of existing vegetation.

Nature-positive aspects of the design include:

- Retain and enhance the existing ~20 m vegetated green belt to maintain habitat connectivity and microclimate benefits
- Adopt native, climate-tolerant species and integrate habitat features such as nesting boxes and pollinator attracting species.

Climate risk & adaptation

Norwest, located in Sydney's Hills District, experiences a temperate climate with warm summers and mild winters. However, its inland position and rapid urban development make it particularly vulnerable to climate extremes, exacerbated by the urban heat island effect. The project site is not directly located in a flood-prone or a bushfire location. The project design includes climate change resilient features such as:

- **Heat & smoke:** climate-responsive envelope and plant selections; monitoring allows proactive operational responses.
- **Intense rainfall & flash flooding:** 1% AEP + allowance roof drainage; landscape WSUD to moderate runoff and protect adjacent waterways.
- **Power continuity:** generator system sized and biofuel-enabled to improve resilience during grid or supply disruptions

Passive resilience features

- Optimised envelope with a high-SRI roof, limited glazing and shading to limit heat ingress



EXM01 - EXPANDED METAL MESH



LV01 - LOUVRE



M01 - METAL CLAD WINDOW SHROUD

- Clean intake paths and vertical heat rejection to avoid recirculation

8 Consolidated Mitigation Measures Summary

Table 8-1: Project mitigation measures (summary only; details in Chapter 7)

Theme	Mitigation measure	Verification	ESD Report Reference
Energy & carbon	Predominantly dry cooling; adiabatic assist only at high ambient	Sub-meters: chillers, CHW pumps, FWUs, OAPs; PUE tracking (NABERS post-occupancy verification)	Sections 7.1, 7.2
Energy & carbon	Low-GWP refrigerants (subject to OEM); non-SF ₆ switchgear where feasible	Commissioned specifications Refrigerant logs	Section 7.1
Energy & carbon	Dry-type transformers; efficient UPS; optimised equipment sizing	Sub-meters on key distribution boards Loss analysis	Section 7.1
Energy & carbon	Tenant NMI metering; renewable procurement pathways	Billing + NMI evidence	Section 7.1
Energy & carbon	LED lighting with motion sensor controls	Lighting design	Section 7.1
Backup & fuels	Generators compatible with HVO/B100 (subject to OEM/supply)	Fuel certification Test logs	Section 7.1
Water	WUE-led hybrid profile (dry first, adiabatic on heat events)	Water sub-meters WUE tracking Seasonal tuning	Section 7.2
Water	Rainwater harvesting for toilets, irrigation, mech top-up	Rainwater tank meters & reuse logs	Section 7.2
Water	Future recycled-water connection; central make-up storage	Interface provision Storage level alarms	Section 7.2
Materials	EPD/GreenTag/Climate Active preferred procurement	Procurement records EPD register	Section 7.3
Materials	Circular design (modularity, disassembly, take-back)	Specs; supplier commitments	Section 7.3
Waste	C&D Waste Management Plan; on-site segregation & diversion tracking	Waste dockets Diversion report at practical completion	Section 7.3

Theme	Mitigation measure	Verification	ESD Report Reference
Ecology	Retain & enhance ~20 m green belt; native species; habitat features	Landscape plan Establishment maintenance	Section 7.4
Resilience	1% AEP + allowance roof drainage; WSUD; high-SRI roof; smoke/heat response	As-built; maintenance; monitoring	Section 7.4

9 References

- IPCC. (2007). *Climate Change 2007: The Physical Science Basis. Contribution of Working Group I to the Fourth Assessment Report of the IPCC*. Cambridge University Press. Retrieved from https://archive.ipcc.ch/publications_and_data/ar4/wg1/en/ch2s2-10-2.html
- IPCC. (2014). *Climate Change 2014: Mitigation of Climate Change. Contribution of Working Group III to the Fifth Assessment Report of the IPCC*. Cambridge : Cambridge University Press.
- NABERS. (2025). *NABERS Annual Report FY25*. Sydney: National Australian Built Environment Rating System. Retrieved from <https://nabers.info/annual-report/2024-2025/data-centres-energy/>
- Oxford Economics Australia. (2025). *Data Centre Energy Demand Final Report – July 2025*. Sydney: Oxford Economics Australia. Retrieved from https://www.aemo.com.au/-/media/files/stakeholder_consultation/consultations/nem-consultations/2024/2025-iasr-scenarios/final-docs/oxford-economics-australia-data-centre-energy-consumption-report.pdf
- Standards Australia. (2016). *AS 2067:2016 – Substations and High Voltage Installations Exceeding 1 kV a.c.* Sydney: Standards Australia.

Appendix A NABERS Embodied Emission Form

Step 1: About the building

Fill out blue cells

Building location and site data	Value	Unit	Note	Comment
Building address	3 Brookhollow Avenue, Norwest	Concept		
postcode	2153		Required	Postcode of building
Township	BAULKHAM HILLS + 5 other localities		Required	Township/suburb/region of the building site
Distance to nearest major city/town	30	km	Enter for nonregional locations only	Declare the shortest route by road to your site from the centre of your nearest major city (>100,000 people). The route must be traversable by a semi-trailer truck.
Project stage	Development Application		Required	Stage of development
New build or major renovation?	New build		Required	
Brownfield or greenfield site?	Brownfield		Required	

Floor area by NCC building classification	Gross (GFA)	Net (NLANBA/UPA)	Unit	Note
Please enter all floor areas relevant to your building. Leave areas blank if not applicable. Please enter Gross Floor Area (GFA) for all building classifications. Please also enter the corresponding net area (Net Lettable Area, Net Sellable Area or Usable Floor Area) where it is commonly used for that building classification.				
Class 1a: Detached residential buildings			m ²	Required for Class 1a: Detached residential houses, townhouses
Class 1b: Boarding houses and hostels			m ²	Required for Class 1b: Boarding house, guest house, hostel
Class 2: Multi-unit residential buildings			m ²	Required for Class 2: Multi-unit residential, including apartment buildings
Class 3: Other residential buildings			m ²	Required for Class 3: Other residential buildings
Class 4: Residential inside non-residential			m ²	Required for Class 4: Residential building inside a non-residential building, e.g., carolinar
Class 5: Office buildings			m ²	Required for Class 5: Office building
Class 6: Retail buildings			m ²	Required for Class 6: Retail building, e.g., shop, restaurant, café
Class 7a: Carparks			m ²	Required for Class 7a: Carparks
Class 7b: Warehouse-type buildings			m ²	Required for Class 7b: Warehouses, wholesalers and storage facilities
Class 8: Industrial buildings	49,241	49,241	m ²	Required for Class 8: Industrial buildings, e.g., factories and workshops
Class 9a: Healthcare buildings			m ²	Required for Class 9a: Healthcare, e.g., hospitals, clinics, day surgeries
Class 9b: Civic buildings			m ²	Required for Class 9b: Civic buildings, e.g., theatres, civic centres, train stations
Class 9c: Aged care and personal care buildings			m ²	Required for Class 9c: Aged care and personal care
Class 10a: Non-habitable buildings			m ²	Required for Class 10a: Non-habitable buildings including sheds, carports and privates
Class 10b: Miscellaneous structures			m ²	Required for Class 10b: Miscellaneous structures, including fences, masts, antennas
Class 10c: Bushfire shelters			m ²	Required for Class 10c: Bushfire shelters not attached to a Class 1a building
Total	49,241	49,241	m ²	Required: Sum of m ² inputs must be more than 0.

Project information	Value	Unit	Note
Total cost of project	1,248,408,618		Required
Building design life	50	years	Required
Estimated envelope life		years	Optional
Estimated replacement cycle for mechanical services		years	Optional
Estimated replacement cycle for vertical transportation		years	Optional

Dimensions of the building and the site	Value	Unit	Note
Site area	51,863	m ²	Required
Shared services or infrastructure	No		Required
Building footprint area	26,450	m ²	Required
Typical floor area (if different to building footprint area)		m ²	Only needed if different to row above
Typical floor perimeter	347	m	Required
Area of external carpark (not included in GFA)	0	m ²	Required: Enter 0 if not applicable.
Area of external hardstand (not included in GFA)	0	m ²	Required: Enter 0 if not applicable.
Area of other hard landscaping (not included in GFA)	0	m ²	Required: Enter 0 if not applicable.
Number of floors/storeys above ground, including ground floor	4	no.	Required
Number of floors/storeys below ground	3	no.	Required: Enter 0 if not applicable.
Number of floors/storeys of car parking	1	no.	Required: Enter 0 if not applicable.
Total height above ground	41.5	m	Required

Structural material choices	Value	Unit	Note
Foundation type	Piles		Required
Frame type (dominant)	Reinforced concrete		Required
Suspended floor type (typical)	Post-tensioned concrete		Only needed for multi-storey buildings
Describe low carbon materials specified in your building (e.g. green concrete, low carbon bricks)	Low carbon materials not yet specified due to preliminary nature of design		Required
Describe recycled content specified in your building (e.g. recycled steel)	Recycled content not yet specified due to preliminary nature of design		Required

Step 2: Quantity of materials

Complete all blue cells that are applicable to the building. Leave items that aren't applicable blank.

Fill out blue cells

Material category	Sub-category 1	Sub-category 2	Sub-category 3	Value	Unit of measure	Comment	AQSP ACMM Code	ICMS3 (Level 3 Codes Construction)
Structure								
The structural parts of the building that are below ground (substructure) and above ground (superstructure). This includes fill below the substructure, foundations, basement levels, suspended floors, wall structure, roof structure, stairs, lift shafts and balconies. It excludes external areas such as hardstands, carparks, patios, etc.								
Coverage of structural material spend	-	-	-	80	%	Required: Coverage of <u>aggrd</u> for structural elements entered below. Minimum requirement = 80%. Exclude head contractor preliminaries and margins.		
Concrete in-situ	≤10 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>10 MPa to ≤20 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>20 MPa to ≤32 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>32 MPa to ≤40 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>40 MPa to ≤50 MPa	-	-	47,243.0	m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>50 MPa to ≤60 MPa	-	-	7,694.0	m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>60 MPa to ≤80 MPa	-	-	1,710.0	m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>80 MPa to ≤100 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	01_SB or 02-11	02 or 03
Concrete in-situ	>100 MPa	-	-		m³	Please enter reinforcing steel in relevant line items below. If not known at DA stage, please make your best estimate. If not known at CC stage, please ask your supplier.	01_SB or 02-11	02 or 03
Concrete pre-cast panel	>40 MPa to ≤50 MPa	-	-	20,804.0	m²			
Concrete block	Hollow core	-	-		m³	Enter as <u> cubic metres</u> , calculated as (area in m²) * (thickness in mm / 1000).	01_SB	02 or 03
Concrete block/brick	Solid	-	-		m³	Enter as <u> cubic metres</u> , calculated as (area in m²) * (thickness in mm / 1000).	01_SB	02 or 03
Concrete block/brick	Solid AAC	-	-		m³	Solid Aerated Autoclaved Concrete (AAC) block. Enter as <u> cubic metres</u> , calculated as (area in m²) * (thickness in mm / 1000).	01_SB	02 or 03
Mortar	-	-	-		kg		01_SB	02 or 03
Reinforcing steel	Bar & mesh	-	-	9,263,467	kg	Include all reinforcing steel bar/mesh in the building's structure in this row. Usually this is calculated as kg/m² per concrete element and then summed. Example: 10 m² of 40 MPa concrete @ 180 kg/m² = 1,800 kg of 40 MPa concrete @ 150 kg/m² = 1,500 kg reinforcing steel.	01_SB or 02-11	02 or 03
Reinforcing steel	Fibre & strand	-	-	3,653	t	Include all steel fibre reinforcing and steel strand in the building's structure in this row.	01_SB or 02-11	02 or 03
Structural steel	Hot rolled structural	-	-		t	Examples include Universal beams, universal columns and welded beams	01_SB	02 or 03
Structural steel	Cold formed structural	-	-		t	Examples include C purlins, Z purlins and all light gauge steel framing	01_SB	02 or 03
Structural steel	Other welded structural	-	-		t		01_SB	02 or 03
Structural steel	Plate	-	-		t		01_SB	02 or 03
Structural steel	Sheet	-	-		t	Include any allowance for connections here	01_SB	02 or 03
Stainless steel	-	-	-		t		02_11	02 or 03
Reinforced concrete piles	Concrete	-	-	2,274	m³	Primarily for engineered timber structure connections	01_SB	02 or 03
Reinforced concrete piles	Steel reinforcing	-	-	332,730	kg	Please enter reinforcing steel in the line below. If not known at DA stage, please make your best estimate. If not known at CC stage, please ask your supplier.	01_SB	02 or 03
Steel piles	-	-	-	143	t	If not known at DA stage, please make your best estimate. If not known at CC stage, please ask your supplier.	01_SB	02 or 03
Timber poles/piles	-	-	-		m³	Where concrete and reinforcing steel are also used, enter these in the rows above.	01_SB	02 or 03
Timber (solid)	Sawn softwood	-	-		m³	Where concrete and reinforcing steel are also used, enter these in the rows above.	02_11	02 or 03
Timber (solid)	Sawn hardwood	-	-		m³		02_11	02 or 03
Timber (engineered)	CLT	-	-		m³		02_11	02 or 03
Timber (engineered)	Glulam	-	-		m³		02_11	02 or 03
Timber (engineered)	LVL	-	-		m³		02_11	02 or 03
Timber (engineered)	OSB	-	-		m³		02_11	02 or 03
Brick	Heat cured	-	-		m³	Enter as <u> cubic metres</u> , calculated as (area of wall in m²) * (thickness in mm / 1000).	02_11	02 or 03
Structural Insulated Panel (SIP)	Steel outer	-	-		m²	Enter as <u> cubic metres</u> , calculated as (area of wall in m²) * (thickness in mm / 1000).	01_SB	02 or 03
Structural Insulated Panel (SIP)	Aluminium outer	-	-		m²		01_SB	02 or 03
Structural Insulated Panel (SIP)	Engineered timber outer	-	-		m²		01_SB	02 or 03
Fill	-	-	-		t	Include purchased material only. Exclude site-won material.	01_SB	01
Sand & gravel	-	-	-	1,056	t	Include purchased material only. Exclude site-won material and sand/gravel in concrete.	01_SB	01
Waterproofing membrane	Bituminous	-	-		m²		01_SB	01 or 02 or 03
Waterproofing membrane	Polyethylene	-	-	24,610	m²		01_SB	01 or 02 or 03
Other structural (Describe and add unit >>)	Epoxy Sealer	-	-	10,690.0	m²	Please enter a description for any structural material that does not fit a predefined classification		
Other structural (Describe and add unit >>)	Stairs	-	-	3.0	ris	Core (concrete) stairs including ralling and landing, 1 no. 42 rises, 1 no. 37 rises, 1 no. 46 rises		
Other structural (Describe and add unit >>)	Workforce Grating	-	-	3,698.0	m²	Please enter a description for any structural material that does not fit a predefined classification		
Envelope								
The skin of the building that separates the internal building from the external environment. This includes the roof cladding, wall cladding, windows, doors and internal/external shading. It also includes insulation and the internal wall lining of envelope walls.								
Coverage of envelope material spend	-	-	-	80	%	Required: Coverage of <u>aggrd</u> for the envelope items you have entered below. Minimum requirement = 80%. Exclude head contractor preliminaries and margins.		
Roof cladding	Profiled steel	-	-	17,250	m²	Enter as m² of roof area. Exclude allowances for overlap in the roofing sheets. This row includes all metal-coated and pre-painted steel sheets where steel is the base metal. Examples include galvanneal steel, zinc-aluminium (zincalume) coated steel and zinc-aluminium-magnesium (ZAM) coated steel, whether painted or unpainted.	06_RF	03 or 04
Roof cladding	Profiled aluminium	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap in the roofing sheets. This row also includes pre-painted aluminium sheets.	06_RF	03 or 04
Roof cladding	Profiled zinc	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap in the roofing sheets. This row also includes pre-painted zinc sheets.	06_RF	03 or 04
Roof cladding	Membrane	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap in the membrane sheets.	06_RF	03 or 04
Roof cladding	Tiles (traditional clay)	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap between the tiles.	06_RF	03 or 04
Roof cladding	Tiles (concrete)	-	-		m²	Enter as m² of roof area. Exclude allowances for overlap between the tiles.	06_RF	03 or 04
Roof cladding	Other (Please describe >>)				m²	Please enter a description for any roofing that does not fit a predefined classification	06_RF	03 or 04
Wall cladding	Bricks (heat cured)	-	-		m²	Enter as m² of wall area. Heat-cured bricks use a kiln or furnace to raise the brick temperature above ambient temperature during curing process.	06_EW	03 or 04
Wall cladding	Bricks (air dried)	-	-		m²	Enter as m² of wall area. Air-dried bricks are cured using ambient temperature.	06_EW	03 or 04
Wall cladding	Bricks (under fired)	-	-		m²	Enter as m² of wall area.	06_EW	03 or 04
Wall cladding	Bricks (concrete)	-	-		m²	Enter as m² of wall area.	06_EW	03 or 04
Wall cladding	Mortar and render	-	-		kg		06_EW	03 or 04
Wall cladding	Profiled steel	-	-		m²	Enter as m² of wall area. Exclude allowances for overlap in the cladding sheets, offsets, etc. This row includes all metal-coated and pre-painted steel sheets where steel is the base metal. Examples include galvanneal steel, zinc-aluminium (zincalume) coated steel and zinc-aluminium-magnesium (ZAM) coated steel, whether painted or unpainted.	06_EW	03 or 04
Wall cladding	Profiled aluminium	-	-	8,701	m²	Enter as m² of wall area. Exclude allowances for overlap in the cladding sheets, offsets, etc. This row also includes pre-painted aluminium sheets.	06_EW	03 or 04
Wall cladding	Profiled zinc	-	-		m²	Enter as m² of wall area. Exclude allowances for overlap in the cladding sheets, offsets, etc. This row also includes pre-painted zinc sheets.	06_EW	03 or 04
Wall cladding	GRC cladding	-	-		m²	Enter as m² of wall area. GRC = Glass Reinforced Concrete.	06_EW	03 or 04
Wall cladding	Timber weatherboards	-	-		m²	Enter as m² of wall area. Exclude allowances for overlap between weatherboards, offsets, etc.	06_EW	03 or 04
Wall cladding	Fibre cement board	-	-		m²	Enter as m² of wall area. Exclude allowances for offsets, etc.	06_EW	03 or 04
Wall cladding	Terracotta	-	-		m²	Enter as m² of wall area. Exclude allowances for offsets, etc.	06_EW	03 or 04
Wall cladding	Brick tiles / veneers	-	-		m²	Enter as m² of wall area. Exclude allowances for offsets, etc.	06_EW	03 or 04
Wall cladding	Plasterboard	-	-		m²	Enter as m² of wall area. Exclude allowances for offsets, etc. Include both external wall linings and internal wall linings for envelope walls.	12_WF or 06_EW	03 or 04
Wall cladding	Plywood	-	-		m²	Enter as m² of wall area. Exclude allowances for offsets, etc. Include both external wall linings and internal wall linings for envelope walls.	12_WF or 06_EW	03 or 04
Wall cladding	Other (Please describe >>)				m²	Please enter a description for any wall cladding that does not fit a predefined classification	06_EW or 12_WF	03 or 04
Windows & doors	Aluminium frame	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Aluminium frame	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Aluminium frame	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Timber frame	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Timber frame	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Timber frame	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	uPVC frame	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	uPVC frame	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	uPVC frame	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Frameless	Single glazed	-		m²	Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Frameless	Double glazed	-		m²	Include all double glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Frameless	Triple glazed	-		m²	Include all triple glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Windows & doors	Other (Please describe >>)				m²	Please declare all single-skin façade area in this section. All double-skin façade area should be entered in the next section. Include all single glazing, including standard, toughened, laminated and low-E	07_WW or 08_ED	03 or 04
Curtain wall	Single skin façade	Glazed panel	Single glazed	424	m²		06_EW	03 or 04
Curtain wall	Single skin façade	Glazed panel	Double glazed		m²	Include all double glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Curtain wall	Single skin façade	Glazed panel	Triple glazed		m²	Include all triple glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Aluminium cladding		m²		06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Insulated shadow box		m²		06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Brick cladding		m²		06_EW	03 or 04
Curtain wall	Single skin façade	Opaque panel	Stone cladding		m²		06_EW	03 or 04
Curtain wall	Double skin façade	Glazed panel	Single glazed		m²	Please declare all double-skin façade area in this section. Please declare as the area of the curtain wall and do not enter the inner and outer skins twice.	06_EW	03 or 04
Curtain wall	Double skin façade	Glazed panel	Double glazed		m²	Include all single glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Curtain wall	Double skin façade	Glazed panel	Triple glazed		m²	The type of glazing refers to the building's envelope wall, not including the outer skin	06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Aluminium cladding	570	m²	The type of glazing refers to the building's envelope wall, not including the outer skin	06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Insulated shadow box		m²		06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Brick cladding		m²		06_EW	03 or 04
Curtain wall	Double skin façade	Opaque panel	Stone cladding		m²		06_EW	03 or 04
Curtain wall	Other (Please describe >>)				m²	Please enter a description for any curtain wall that does not fit a predefined classification	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Glazed section	Single glazed		m²	Include all single glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Glazed section	Double glazed		m²	Include all double glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Glazed section	Triple glazed		m²	Include all triple glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Aluminium cladding		m²		06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Insulated shadow box		m²		06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Brick cladding		m²		06_EW	03 or 04
Stick-framed wall system	Aluminium frame	Opaque section	Stone cladding		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Glazed section	Single glazed		m²	Include all single glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Steel frame	Glazed section	Double glazed		m²	Include all double glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Steel frame	Glazed section	Triple glazed		m²	Include all triple glazing, including standard, toughened, laminated and low-E	06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Aluminium cladding		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	GRC cladding		m²	GRC = Glass-fibre Reinforced Concrete	06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Insulated shadow box		m²		06_EW	03 or 04
Stick-framed wall system	Steel frame	Opaque section	Brick cladding		m²		06_EW	03 or 04

Stick-framed wall system	Steel frame	Opaque section	Stone cladding		m²		06_EW	03 or 04
Stick-framed wall system	Other (Please describe >>)		-		m²	Please enter a description for any wall system that does not fit a predefined classification	06_EW	03 or 04
Wall louvre system	Aluminium	-	-	15,160	m²		06_EW	03 or 04
External shading system	Aluminium frame	Aluminium cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	GRC cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000). GRC = Glass-fibre Reinforced Concrete.	06_EW	03 or 04
External shading system	Aluminium frame	Terracotta cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Stone cladding	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Pre-cast concrete	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Timber	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Glass (opaque)	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Aluminium frame	Steel	-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
External shading system	Other (Please describe >>)		-		m²	Please enter as m² of shaded area = linear metres * (width in mm / 1000)	06_EW	03 or 04
Roller doors	Steel profile	-	-	63	m²	Please note unit is square metres, not quantity	06_ED	03 or 04
Roller doors	Hardwood over steel	-	-		m²	Please note unit is square metres, not quantity	06_ED	03 or 04
Roller doors	Softwood over steel	-	-		m²	Please note unit is square metres, not quantity	06_ED	03 or 04
Revolving doors	Glass/aluminium/steel	-	-		no.		06_ED	03 or 04
Fire-rated doors	Engineered timber	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	06_ED	03 or 04
Fire-rated doors	Steel	-	-	27	no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	06_ED	03 or 04
Fire-rated doors	Aluminium/glass	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	06_ED	03 or 04
Insulation	Glass wool / fibreglass	-	-		m²	Please include both wall and ceiling insulation	06_RF or 06_EW	03 or 04
Insulation	Stone wool	-	-		m²	Please include both wall and ceiling insulation	06_RF or 06_EW	03 or 04
Insulation	Polyester	-	-		m²	Please include both wall and ceiling insulation	06_RF or 06_EW	03 or 04
Insulation	Expanded polystyrene	-	-		m²	Please include both wall and ceiling insulation	06_RF or 06_EW	03 or 04
Insulation	Other (Please describe >>)		-		m²	Please include both wall and ceiling insulation	06_RF or 06_EW	03 or 04
Other (Please describe and add unit >>)	External staircase	-	-	5.0	no.	Allow for external staircases noted to carpark	14_SS	
Other (Please describe and add unit >>)	Steel staircases	-	-	2.0	no.	Steel staircase including landing (42 rises)	14_SS	
Other (Please describe and add unit >>)		-	-			Please enter a description for any envelope material that does not fit a predefined classification		

Permanent internal walls and doors

Walls and doors within the building that are either structural or designed to be permanent.

Coverage of material spend on permanent internal walls and doors				80	%	Enter the % coverage of spend for the items you have entered below. There is no minimum requirement: enter what you know. This should include all structural walls. Exclude head contractor preliminaries and margins.		
Interior wall (permanent)	Steel (light framing)	-	-	9	t		09_NW	03 or 04
Interior wall (permanent)	Timber framing	-	-		m³		09_NW	03 or 04
Interior wall (permanent)	AMC panel (reinforced)	-	-		m²	Panels of autoclaved aerated concrete (AAC) with reinforcing steel. E.g., Hebel.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Concrete-filled steel panel	-	-		m²	Panels made from a steel sheet outer with an aerated concrete core. E.g., Speedpanel.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Plasterboard	-	-		m²	Enter as single-layer equivalent. If using 2 layers, multiply the area by 2.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Plywood	-	-		m²	Enter as single-layer equivalent. If using 2 layers, multiply the area by 2.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Fibre cement sheet	-	-		m²	Enter as single-layer equivalent. If using 2 layers, multiply the area by 2.	09_NW or 12_WF	03 or 04
Interior wall (permanent)	Insulation	-	-		m²		09_NW or 12_WF	03 or 04
Interior wall (permanent)	Glass	-	-	280.0	m²		09_NW or 12_WF	03 or 04
Interior wall (permanent)	Other (Please describe >>)		-		m²	Please enter a description for any internal wall that does not fit a predefined classification	09_NW or 12_WF	03 or 04
Internal door (permanent)	Aluminium/glass	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Timber/glass	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Timber solid lightweight	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Fire resistant	-	-		no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Steel	-	-	160	no.	Please enter as single-leaf equivalent. For double-leaf doors, multiply the quantity by 2.	11_ND	03 or 04
Internal door (permanent)	Other (Please describe >>)		-		no.	Please enter a description for any internal door that does not fit a predefined classification	11_ND	03 or 04
Other (Please describe and add unit >>)	SCEC Rates Walls	-	-			Please enter a description for any material that does not fit a predefined classification		
Other (Please describe and add unit >>)	Speed Panels	-	-	5,654		Please enter a description for any material that does not fit a predefined classification		
Other (Please describe and add unit >>)	Blockwork Walls (Fire Rated)	-	-			Please enter a description for any material that does not fit a predefined classification		

Services

					Unit of measure			
						0		
Mechanical services	-	-	-	43,690,437	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	28_SS	05
Vertical transportation	-	-	-	724,000	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	28_SS	05
Electrical services	-	-	-	49,386,830	AUD excl. GST	Electrical services including the main power supply, backup generators, security and communications. Excluding solar installations.	26_LP	05
Solar photovoltaic installations	-	-	-	0	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	26_LP_LPGP	05
Plumbing/hydraulic services	-	-	-	3,605,950	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	18_PD and 19_WS	05 or 06
Fire services				6,015,100	AUD excl. GST	Where possible, enter material costs excluding labour, plant, equipment, margins and taxes	25_FPS04 or 39_XVAV_03 or 41_XF	05
Other services (Please describe)	Fuel	-	-	1,122,000	AUD excl. GST	Please group all other services here, meaning that coverage will always be 100% for services. Enter only the material costs (excluding labour, plant, equipment, margins and taxes)	29_SS or multiple	

External works

The materials associated with hard landscaping and outbuildings on the site but outside the building envelope.

This includes hardstands, carparks, driveways, covered walkways, decks, patios, awnings, fences, gates, etc. Soft landscaping should be excluded.

Coverage of spend on external works	-	-	-		%	Required. Coverage of <u>spend</u> for external works (excluding soft landscaping) entered below. Minimum requirement = 80%. Exclude head contractor preliminaries and margins.		
Asphalt	-	-	-		t		33_XR	07
Concrete in-situ	≤10 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>10 MPa to ≤20 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>20 MPa to ≤32 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>32 MPa to ≤40 MPa	-	-	1,296.0	m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>40 MPa to ≤50 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Concrete in-situ	>50 MPa	-	-		m³	Please enter reinforcing steel as part of "Reinforcing steel" below	33_XR or 34_XN or 35_XB or 36_XL	07
Pavers, bricks and blocks	Concrete	-	-		m²		33_XR	07
Pavers, bricks and blocks	Clay	-	-		m²		33_XR	07
Reinforcing steel	Bar & mesh	-	-	155,400	kg		33_XR	07
Reinforcing steel	Fibre & strand	-	-		kg	Include all reinforcing steel bar/mesh in the external works in this row. Usually this is calculated as kg/m³ per concrete element and then summed. Example: 10 m³ of 40 MPa concrete @ 100 koin/m³ + 5 m³ of 50 MPa concrete @ 150 koin/m³ = 1,750 kg reinforcement steel.	33_XR or 34_XN or 35_XB or 36_XL	07
Structural steel	-	-	-		t	Include all steel fibre reinforcing and steel strand in the external works in this row.	02_11	07
Structural aluminium	-	-	-		t	Includes structures, louvre systems, etc.	35_XB	07
External roof/wall cladding	Polycarbonate	-	-		m²	Enter as profiled polycarbonate sheet that would ordered, including allowance for overlap	35_XB	07
External roof/wall cladding	PVC	-	-		m²	Enter as profiled PVC sheet that would ordered, including allowance for overlap	35_XB	07
External roof/wall cladding	Blumen sheet	-	-		m²	Enter as bituminous sheet that would ordered, including allowance for overlap	35_XB	07
External roof/wall cladding	Steel profile	-	-		t	Include purchased material only. Exclude site-won material.	33_XR or 34_XN or 35_XB or 36_XL	07
Fill	-	-	-		t	Include purchased material only. Exclude site-won material and sand/gravel in concrete.	33_XR or 34_XN or 35_XB or 36_XL	07
Sand & gravel	-	-	-	1,038	t		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (solid)	Sawn softwood	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (solid)	Sawn hardwood	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	CLT	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	Glulam	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	LVL	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Timber (engineered)	OSB	-	-		m³		33_XR or 34_XN or 35_XB or 36_XL	07
Fabric (awning/sunshade)	-	-	-		m²		35_XB or 36_XL	07
Other (Please describe and add unit >>)	Fencing	-	-	761.0	m	Please enter a description for any external works that does not fit a predefined classification	33_XR or 34_XN or 35_XB or 36_XL	
Other (Please describe and add unit >>)	Bi-fold vehicular gate	-	-	1.0	no		33_XR or 34_XN or 35_XB or 36_XL	

Step 3: Certifier details

Fill out blue cells

The material quantities must be determined through an itemised list of building materials (such as a bill of quantities) and certified by a quantity surveyor, designer, engineer or NABERS Assessor.

Person that completed this form	Value	Note
Name	Abisheka Sirdhar	Required
Company	Turner & Townsend	Required
ABN	84115688830	
Profession	Quantity Surveyor	Required
Qualification or registration	MSc Quantity Surveying	Required

Person that certified the details in this form	Value	Note
Name	Charlotte Nichols	Required
Company	Turner & Townsend	Required
ABN	84115688830	
Profession	Quantity Surveyor	Required
Qualification or registration	Quantity Surveying & Construction Management	Required

Confirmation of certification	Value	Note
Are 80% of material costs captured for the building's structure, envelope and external works?	Yes	Required
If no - why not?		

Additional comments from data provider

Additional comments of certifier
Reuse of existing data center, reducing need for carbon intense new build elements such as structure & façade.

Attach this Excel spreadsheet to your development application or construction certificate application.

Document prepared by

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