CE Sustainable Design

ESD | BASIX | NatHERS | Section J | J1V3 | Condensation

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SEARs ESD Report

25077 - 241-245 Pennant Hills Road, Carlingford

Prepared For

Albert Bechara c/o

Triple Eight Corporation Pty Ltd atf The Carlingford Unit Trust

10/10/2025

Prepared By

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CE Sustainable Design

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Document Control

Revision	Issue Date	Description	Approved By	Signature
0.1	7/10/2025	SSDA - Draft Report	Robert Romanous Director | Sustainability Engineer	
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CE Sustainable Design

Cadence Efficiency (CE) specialises in making buildings more energy efficient. We apply Environmentally Sustainable Design (ESD) principles to optimise building performance while balancing development costs. This ensures that the buildings we work on are well-designed, comfortable, and comply with all relevant energy, water, and thermal comfort regulations.

Our Key Services

BASIX and NatHERS

We use HERO software to assess glazing and insulation, prioritising solutions and commitments that align with the architectural vision, while considering the practical and financial implications of meeting BASIX and NatHERS requirements.

Section J Compliance and J1V3 Verification Method

Section J within the National Construction Code (NCC) emphasises energy efficiency in buildings to mitigate greenhouse gas emissions. Our consultancy services focus on navigating these requirements for you.

Our J1V3 specialists use IES VE modelling software to assess proposed building GHG emissions, ensuring compliance with NCC Section J. This method offers more practical or cost-effective solutions for achieving Section J energy efficiency requirements.

DCP and SEARs ESD Reports

In New South Wales, we help ensure your development meets sustainability standards outlined in DCPs and SEARs, promoting positive community outcomes.

Compliance Inspections and Completion Statements

Cadence Efficiency can provide compliance inspections and completion statements for all services we provide, supported by evidence like photos, brochures, receipts, and installation certificates, ensuring all requirements are met.

Speciality Modelling

Additional services include Condensation Management, Home Energy and Thermal Comfort Simulation, and Natural Light Modelling.

Please refer to our website to find out more. www.cesd.au/services

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Glossary and Definitions

Term	Definition
BASIX	The Building Sustainability Index
NatHERS	Nationwide House Energy Rating Scheme
EMP	Environmental Management Plan
ESD	Ecologically Sustainable Development
GHG	Greenhouse Gas
EP&A	Environmental Planning and Assessment Act
Sustainable Buildings SEPP	Sustainable Buildings State Environmental Planning Policy
HVAC	Heating, Ventilating and Air-Conditioning
LEP	Local Environment Plan
NCC	National Construction Code
AAO	Assessor Accrediting Organisation
ABSA	Australian Building Sustainability Association
PV	Photovoltaic
Rt	Total R-value for the system
R-value (m2.K/W)	The thermal resistance of a component is determined by dividing its thickness by its thermal conductivity, while also accounting for factors such as air gaps, thermal bridging, and surface resistances
SHGC	Solar heat gain coefficient
U-value (W/m2K)	The heat transfer rate through the composite element, considering the influence of air gaps, thermal bridging, and related surface resistances
WELS	Water Efficiency Labelling and Standard
CPTED	Crime Prevention through Environmental Design

SEARs Requirements Declaration: Project

Declaration		
Name	Robert Romanous | CE Sustainable Design	
Qualifications	10 years of energy consulting experience NatHERS accredited assessor Bachelor of Engineering (Mechanical)	
	The undersigned declares that this ESD report has been prepared in response to the following SEARs requirements issued for the Project on 23 May 2025 for SSD- SSD-84699461:	
SEARs item no.	**SEARs Requirement**	**Relevant Section of this Report**
15	**15. Ecologically Sustainable Development (ESD)** • 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. • Where relevant, provide an assessment of the development against the standards for non-residential development set out in Chapter 3 of *State Environmental Planning Policy (Sustainable Buildings) 2022*.	Whole report
Signed	Robert Romanous Digitally signed by Robert Romanous Reason: I am the author of this document Date: 2025.11.27 08:46:59+11'00'	
Dated	10th October 2025	

1. Introduction

1.1. The Project

This ESD Report has been prepared by Cadence Efficiency Pty Ltd (CE) on behalf of Triple Eight Corporation Pty Ltd atf The Carlingford Unit Trust for the construction and operation of a mixed-use development, including infill affordable housing (the proposal) on land at 241-245 Pennant Hills Road, Carlingford (the site).

This report has been prepared to respond to Item 15 – Ecologically Sustainable Development.

This report accompanies a State Significant Development Application that seeks approval for the demolition and construction of a mixed-use residential and commercial development, including infill affordable housing, which involves the following:

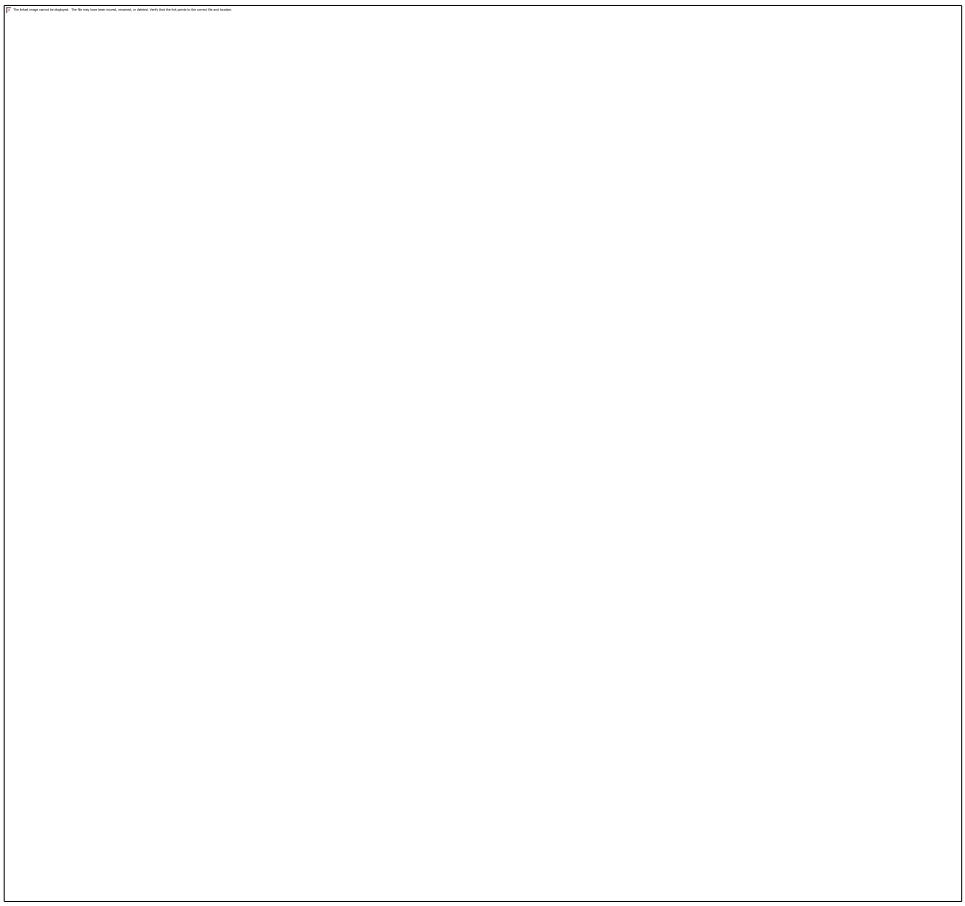
- Site preparation works, including demolition of existing structures, vegetation removal as necessary, and bulk excavation.
- Construction and operation of a mixed-use development comprising commercial premises, gymnasium, child care centre and shop top housing as follows:
  - One 18-storey building (Building A) in the Northeast corner of the site; and two 4-5 storey buildings (Building B & C) along the western edge of the site.
  - A publicly accessible through site link between Pennant Hills Road and Felton Road.
  - 6 commercial tenancies at ground floor
  - A three-storey gymnasium within the southern portion of Building C[JM1]
  - A 98 place child care centre located on level 01 of Building A
  - 2,356m^2 of communal open space in the following locations:
    - the roof of Building A, B and C,
    - the two-storey podium of Building A
    - the publicly accessible through site link
  - A total of 136 residential apartments across the three buildings, including 25 infill affordable apartments,
- Provision of three levels of basement parking with a total of 263 car parking spaces comprising:
  - 151 residential car parking spaces (including 24 accessible spaces);
  - 30 commercial car parking spaces (including 4 accessible spaces);
  - 25 child care parking spaces (including 4 accessible spaces);
  - 26 gymnasium parking spaces (including 2 accessible spaces);
  - 26 visitor car parking spaces (including 12 accessible spaces); and
  - 3 car share spaces.
- Street tree planting and landscaping, extension and augmentation of services and infrastructure as required. For a detailed project description, refer to the Environmental Impact Statement prepared by Planning Direction.

1.2. Site Description and Location

The site is identified as 241-245 Pennant Hills Road, Carlingford, within the City of Parramatta Local Government Area (LGA). It is situated in the western portion of the Carlingford Local Centre and is located approximately 18km northwest of the Sydney Central Business District (CBD).

The site is an irregular triangular shape and comprises approximate frontages of 140m to Pennant Hills Road to the southeast, 100m to Felton Road to the north and 135m to the adjoining properties to the west. The site comprises a total area of 6,331m^2, with the entirety of the site under single ownership.

The site is described in the table below and illustrated in the Site Aerial Map.



1.3. Building Classifications

Table 1 – Building Classifications and Description

Class	Level	Description
5, 6 and 9b	00 - 01	Commercial / Retail Tenancies Gym Early Child Care Centre
2	01 - 17	Residential

1.4. Design Documentation

This report has been based on the following Design Plan and Specifications.

- Kennedy Associates Architects | Revision: P10 | Issue: 05.09.25

1.5. Report Scope

The purpose of this report is to assess the proposed design against the relevant environmentally sustainable design strategies to ensure the design is environmentally, culturally, socially, and economically sustainable, with resilience built in to anticipate future challenges. This report addresses:

- Sustainability drivers stipulated from relevant regulatory and project requirements.
- Project's design responses corresponding to the sustainability drivers.

1.6. Limitations

This report aims to provide high-level ESD design guidance to the project in accordance with the SEARs objectives and provisions. It is intended that the options nominated in this report are subject to discussion, assessment and workshop into the detailed design of the development. Formal BASIX and Section J compliance must refer to separate, designated assessment reports.

2. SEARs ESD Requirements and Strategy

The project will be assessed under the following regulatory and benchmarking provisions:

- 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.
  - The principles of ecologically sustainable development are the following—
    - the precautionary principle,
    - inter-generational equity,
    - conservation of biological diversity and ecological integrity,
    - improved valuation, pricing, and incentive mechanisms.
- Where relevant, provide an assessment of the development against the standards for non-residential development set out in Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022.
  - The development is designed to enable the following—
    a) the minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials,
    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.
  - The embodied emissions attributable to the development must be quantified.
  - This section applies to non-residential development that is declared to be State significant development by State Environmental Planning Policy (Planning Systems) 2021. The development will minimise the use of on-site fossil fuels, as part of the goal of achieving net zero emissions in New South Wales by 2050.

2.1. Section 193 of the EP&A Regulations

Detailed in the tables below are project commitments that address the principles highlighted in Section 193 of the EP&A 2021.

2.1.1. The Precautionary Principle

The precautionary principle states that where there are threats of serious or irreversible environmental damage, a lack of full scientific certainty should not be used as a reason to delay measures that prevent environmental degradation. Decisions applying this principle should be guided by:

- Careful evaluation to avoid, where practicable, serious or irreversible environmental harm; and
- An assessment of the risk-weighted consequences of various options.

Project Response:

To ensure compliance with this principle, the project will compile and consider relevant findings from specialist environmental studies during the design and assessment process. These studies will identify potential environmental risks and inform design responses that prevent or minimise environmental harm.

The following investigations collectively ensure the project adopts a precautionary and evidence-based approach to environmental management:

- Environmental Impact Statement
- Geotechnical assessment to determine requirements for:
  - Surface and groundwater impact assessment
  - Salinity management and/or acid sulphate soils management
- Stormwater and flooding assessments, including a stormwater management plan
- Biodiversity Development Assessment Report (BDAR) Waiver, as the site is void of significant vegetation.

These studies demonstrate the project's commitment to identifying and addressing site-specific environmental risks early in the design process, consistent with the precautionary principle.

In addition, the project's BASIX and NatHERS assessments are to be used as key design tools to test and validate building performance during design development. By assessing water use, energy demand, and thermal comfort outcomes at an early stage, potential inefficiencies can be identified and addressed proactively, ensuring that risks of environmental harm or excessive resource consumption are avoided through evidence-based design decisions.

2.1.2. Inter-generational Equality

The principle of inter-generational equity is that the present generation should ensure the health, diversity, and productivity of the environment are maintained or enhanced for the benefit of future generations.

Project Response:

To support this principle, the project will aim to reduce environmental impacts and promote long-term sustainability through the use of low-toxicity, resource-efficient, and future-ready design measures.

Key initiatives include:

- Use of materials and finishes that meet recognised low-VOC standards and product certification schemes, ensuring minimal release of contaminants and hazardous substances to protect occupant health and the surrounding environment.
- An all-electric building design consistent with NCC 2022 Section J passive and active performance requirements.
- Provision for photovoltaic (PV) and electric vehicle (EV) infrastructure in accordance with NCC 2022 Section J9, supporting the future transition to renewable energy and reduced greenhouse gas emissions.
- Tree and landscaping plans to reduce the urban heat island effect, enhance canopy cover, and provide shade and amenity for future occupants.
- Social Impact Assessment to ensure that the development contributes positively to long-term community wellbeing.
- CPTED Report to support safe, inclusive environments that remain viable and functional for future generations.
- The project's BASIX energy and water efficiency commitments and NatHERS thermal comfort performance collectively contribute to the inter-generational equity principle by reducing ongoing greenhouse gas emissions, improving occupant comfort, and conserving potable water for the long term. These measures ensure that future occupants inherit a building that maintains environmental health, resource efficiency, and liveability over its lifespan.

Together, these measures ensure that the project maintains environmental health, social well-being, and energy efficiency for the benefit of both current and future communities.

2.1.3. Conservation of Biological Diversity and Ecological Integrity

The principle of the conservation of biological diversity and ecological integrity is that the conservation of biological diversity and ecological integrity should be a fundamental consideration in decision-making, including in the formulation, adoption, and implementation of any economic or development plan, program, or project.

Project Response:

The project design incorporates measures to conserve and enhance local biodiversity through sensitive site planning and landscaping. The development will retain, restore, or offset vegetation where possible and strengthen ecological connections within the site and its surroundings.

The following studies and design strategies will guide the achievement of this principle:

- Tree and landscaping plans to conserve local flora and dependent fauna, increase green infrastructure, and enhance canopy cover to improve habitat conditions and ecological integrity.
- The project's BASIX landscaping and water efficiency commitments will also support the conservation of local biodiversity by reducing irrigation demand and promoting drought-tolerant and native species planting. These measures minimise pressure on local water resources and enhance ecological integrity within and around the site.
- Biodiversity Development Assessment Report (BDAR) Waiver, as the site is void of significant vegetation.

These measures ensure that biodiversity and ecosystem function are actively considered in design and decision-making, consistent with the principle of conserving biological diversity and ecological integrity.

2.1.4. Improved Valuation, Pricing, and Incentive Mechanisms

The principle of **improved valuation, pricing and incentive mechanisms** is that environmental factors should be included in the valuation of assets and services, such as:

- Polluter pays, that is, those who generate pollution and waste should bear the cost of containment, avoidance, or abatement, and
- The users of goods and services should pay prices based on the full life cycle of the costs of providing the goods and services, including the use of natural resources and assets and the ultimate disposal of waste, and
- Established environmental goals should be pursued most cost-effectively by establishing incentive structures, including market mechanisms, that enable those best placed to maximise benefits or minimise costs to develop their solutions and responses to environmental problems

Project Response:

A Life Cycle Cost (LCC) assessment is recommended to evaluate the environmental and financial implications of materials, systems, and services used throughout the project's lifespan. This process promotes responsible resource selection, waste reduction, and long-term operational efficiency.

The project's BASIX and NatHERS commitments also contribute to this principle by embedding resource efficiency into the economic valuation of the development. By reducing operational energy and water costs through improved building fabric, efficient fixtures, and passive design, these tools internalise environmental costs and deliver long-term financial and environmental value. The reduction in embodied energy through careful material selection further supports life-cycle value and aligns with circular economy objectives.

Suppliers and contractors will be encouraged to account for the full life-cycle costs of their products and services, supporting broader incentives to minimise waste and embodied carbon. Water and energy-efficient fixtures and equipment will be selected to reduce operational resource use and ongoing maintenance costs.

The project will also adopt key principles of the NSW Circular Economy Policy, shifting design and construction practices toward resource efficiency and long-term value retention. Key principles include:

- Sustainable management of all resources
- Valuing resource productivity
- Designing out waste and pollution
- Maintaining the value of products and materials for as long as possible
- Innovating new solutions for resource efficiency
- Supporting new circular economy jobs
- Encouraging behavioural change through education and engagement

These measures ensure environmental costs are recognised and managed throughout the project's lifecycle, consistent with the principle of improved valuation, pricing, and incentive mechanisms.

2.2. Chapter 3 of State Environmental Planning Policy (Sustainable Buildings) 2022

To ensure non-residential developments incorporate measures to improve energy and water performance, reduce embodied emissions, and move toward net-zero operational emissions, the following measures are to be implemented within the design.

SB Sepp Requirements	Compliance Pathway
The minimisation of waste from associated demolition and construction, including by the choice and reuse of building materials.	A Construction and Demolition Waste Management Plan will be prepared in accordance with the EPA Waste Classification Guidelines (2022). The plan will identify opportunities to reuse and recycle demolition materials, segregate waste streams on site, and establish targets for landfill diversion. Preference will be given to locally sourced and recycled materials where practicable.
A reduction in peak demand for electricity, including through the use of energy-efficient technology.	The development will comply with NCC 2022 Section J Parts J6 and J7 to ensure that all HVAC and artificial lighting systems meet high energy-efficiency standards. Mechanical systems will incorporate high Coefficient of Performance (COP) heat pumps, variable refrigerant flow (VRF) systems, or equivalent energy-efficient technology selected to minimise electrical demand. Lighting will incorporate LED fittings, occupancy sensors, and further controls to further reduce energy use during high-demand periods.
A reduction in the reliance on artificial lighting and mechanical heating and cooling through passive design.	The non-residential building form and envelope have been designed in accordance with NCC 2022 Section J Part J4 to maximise passive performance. Shading, glazing selection, and insulation have been considered to enhance thermal comfort and reduce the reliance on mechanical conditioning. Large viewing openings, particularly for the gym and child care centre, have been considered to enhance natural light and reduce the reliance on artificial lighting.
The generation and storage of renewable energy	The roof layout and electrical infrastructure are designed to enable the installation of approximately 50kW of on-site photovoltaic (PV) systems. Provisions for battery storage and EV charging infrastructure will be incorporated in accordance with NCC 2022 Section J Part J9 to support future renewable energy integration.
The metering and monitoring of energy consumption.	The development will incorporate energy metering and monitoring systems in accordance with NCC 2022 Section J Part J9. If required, separate metering will be provided for major energy end-uses, including HVAC, lighting, lifts, and central plant, to allow building management to monitor consumption and identify efficiency opportunities.

The minimisation of the consumption of potable water.	Water-efficient fixtures (minimum 4-Star WELS) will be specified throughout the non-residential portion of the development. A rainwater reuse system connected to landscape irrigation for all common area landscaping is to be implemented.
The embodied emissions attributable to the development must be quantified.	The project will quantify embodied carbon impacts using the NABERS Embodied Carbon Upfront Emissions Calculator at the detailed design stage. Outcomes will inform material selection and construction methods to reduce embodied greenhouse gas emissions associated with building structure and finishes.
The development will minimise the use of on-site fossil fuels, as part of the goal of achieving net zero emissions in New South Wales by 2050.	The non-residential components will be designed to operate without reliance on fossil fuels. Where practical and safe to do so, all services such as space or water heating will be powered by electricity. The building's electrical infrastructure will be configured to accommodate on-site renewable generation, including an approximate 50kW photovoltaic (PV) system, and enable future integration of battery storage and EV charging in accordance with NCC 2022 Section J Part J9. These measures collectively support the project's transition toward a low-carbon operational profile consistent with the NSW Government's Net Zero Emissions 2050 objective.

3. Design Summary

The proposed development has been designed in accordance with the Sustainable Buildings SEPP, NCC 2022 Section J, and the ESD principles set out in Section 193 of the EP&A Regulation. The project integrates passive design, efficient building systems, and water conservation measures to achieve strong environmental performance and alignment with NSW sustainability objectives.

The design responds to the four ESD principles:

- Precautionary Principle: Early identification and management of potential environmental impacts through evidence-based design and specialist assessments.
- Inter-generational Equity: Electric systems, low-toxicity materials, and renewable-energy readiness to ensure long-term environmental and social benefit.
- Conservation of Biological Diversity and Ecological Integrity: Landscaping and biodiversity planning that support local ecosystems.
- Improved Valuation, Pricing and Incentive Mechanisms: Life-cycle costing, reduced embodied energy, and circular-economy measures to minimise waste and maximise material value.

For the non-residential components, compliance with Chapter 3 of the Sustainable Buildings SEPP will be achieved through:

- A Construction and Demolition Waste Management Plan.
- Efficient HVAC, lighting and control systems to reduce peak electrical demand
- Passive design measures for daylighting and comfort
- 50 kW of rooftop PV, with provision for battery storage and EV charging
- Energy metering and monitoring in accordance with J9.
- 4-Star WELS fixtures and a rainwater-reuse system for irrigation.
- Embodied-carbon assessment using the NABERS Upfront Emissions Calculator.
- All-electric operation to eliminate on-site fossil fuels and support the NSW Net Zero 2050 goal.

Together, these commitments ensure the development achieves a high standard of sustainable design, improving energy and water efficiency, reducing emissions, and supporting resilient, low-carbon operation over the life of the building.