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ESD MEMO

PROPOSED MIXED USE DEVELOPMENT

289-295 VINCENT STREET, LEEDERVILLE

PREPARED BY

EMERGEN

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1 OVERVIEW

EMERGEN has developed an ESD Memo for the proposed multi-residential development located at 289–295 Vincent Street, Leederville in consultation with BUI Designs.

The purpose of this memo is to support the development application by identifying the principles incorporated in the design that meet environmentally sustainable design (ESD) objectives and targets for the site.

The review and recommendations are based on the City of Vincent Built Form Policy and a Life Cycle Assessment, an understanding of functionality, a review of current project documentation and a desktop analysis of the site. The initial assessment is based on preliminary documentation with the outcomes subject to change during design development.

2 PROJECT INFORMATION

The project involves the development of a medium to high-density mixed-use project at 289–295 Vincent Street, Leederville which is positioned within the R-AC0 / Urban Type A planning framework. The development is intended to support a diverse mix of residential, commercial and community uses while contributing to the ongoing transition of the area towards a higher-density, pedestrian-oriented urban environment.

The built form comprises a predominantly podium-based development, with a maximum height of up to 16 storeys where development bonuses are applicable. The design incorporates a strong street presence, articulated façades and high-quality material selections, with consideration given to pedestrian amenity and weather protection through integrated awnings.



Figure 1: Proposed Site Location and 3D Render

3 CITY OF VINCENT ESD REQUIREMENTS

The City's Policy No. 7.1.1 – Built Form (Built Form Policy) requires all applications for residential (including single houses, grouped dwellings and apartments), mixed use and commercial developments within the City of Vincent to achieve ESD by achieving certain objectives and environmental performance standards.

City of Vincent's ESD - Apartments & Mixed Use Information Sheet relates to the requirements for apartments, mixed use and commercial developments.

Volume 2 of the Built Form Policy requires apartments and mixed use developments to demonstrate that the development considers the whole-of-life environmental impacts of the building and incorporates measures to reduce this impact. This must be demonstrated through the requirements in Table 1.

Table 1: City of Vincent ESD Requirements

City of Vincent Requirements for Apartments And Mixed Use Developments
• The proposed development must demonstrate that it incorporates site planning principles that maximise solar passive design opportunities during winter and summer.
• The proposed development must demonstrate that it incorporates the recovery and re-use of rainwater, stormwater, grey water and/or black water.
• The proposed development must demonstrate that it achieves the environmental performance ratings shown below: o ISO 14044 "Environmental management – Life cycle assessment – Requirements and Guidelines" and EN15978 "Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method." ➢ 30% global warming potential saving against a code-compliant design. ➢ 25% freshwater use saving against a code compliant design.

4 SUSTAINABLE DESIGN

4.1 PASSIVE SOLAR DESIGN

The proposed development has considered passive design opportunities through its orientation, built form arrangement and façade response. The site analysis identifies the seasonal solar path, with winter sun access available from the northern arc across the site. The positioning and articulation of the building forms allow opportunities for winter solar exposure to habitable spaces and communal areas, while the use of façade shading, balconies, recessed glazing and awnings assists in managing summer heat gain and glare.

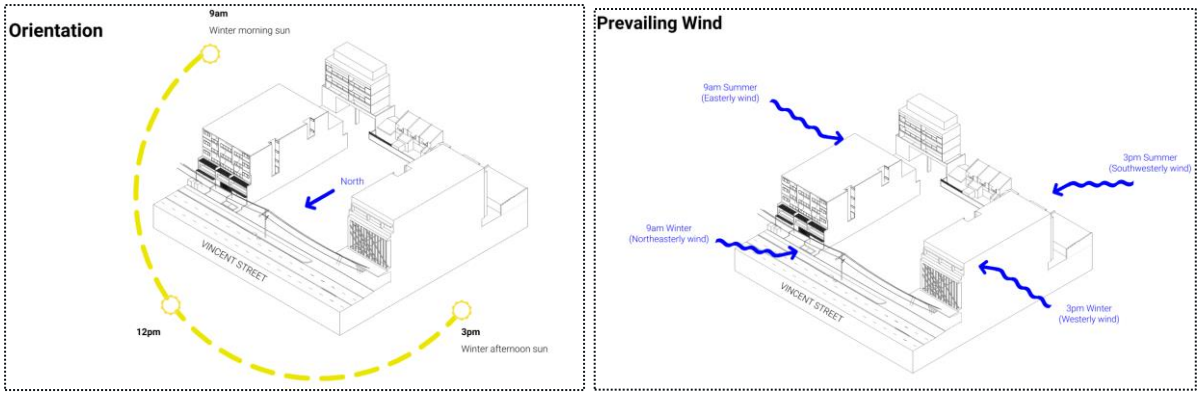


Figure 2: Passive Design

The development also responds to local prevailing wind conditions. The orientation study identifies seasonal wind patterns, including easterly/north-easterly morning winds and south-westerly/westerly afternoon winds. The building layout, façade openings and open areas provide opportunities for natural ventilation, particularly where apartments and common areas can benefit from cross-flow or purge ventilation. These measures support improved occupant comfort and reduce reliance on mechanical heating and cooling where practical.

4.2 WATER EFFICIENCY

The recovery and re-use of rainwater/stormwater was considered as part of the water efficiency strategy for the proposed development. However, due to the constrained roof area available for rainwater capture relative to the scale and demand profile of the development, on-site rainwater harvesting has been deemed not feasible for this project.

Notwithstanding this constraint, the development incorporates a range of water efficiency measures to reduce potable water consumption and support responsible water management. These include the specification of efficient sanitary fixtures and fittings, waterwise and drought-tolerant landscaping, and smart irrigation systems such as drip irrigation, soil moisture sensors and automated controls. Collectively, these initiatives are intended to minimise water demand across the development and improve landscape resilience while responding to the City of Vincent ESD requirements where practical.

4.3 SUSTAINABILITY INITIATIVES

The sustainability initiatives identified below have been selected and will be implemented in response to the whole-of-life environmental impacts of the building, incorporating measures to reduce these impacts across the design, construction and operational phases.

Table 2: Sustainability Initiatives

ESD THEME	GOAL	SUSTAINABILITY INITIATIVES
Energy Efficiency	Reduce operational energy demand and associated greenhouse gas emissions.	High Efficiency LED Lights.
	Reduce unnecessary energy use in common areas through automated lighting controls.	Lighting controlled by timers, motion sensors or light sensors as appropriate, particularly in common use areas such as storage rooms and roof terrace.
	Reduce domestic hot water energy demand.	Efficient electric Heat Pump system for water heating.
	Support occupant comfort and reduce energy wastage.	Zoned Air conditioning limited to living areas and bedrooms only to allow individual room control.
Water Efficiency	Reduce potable water consumption through efficient fixtures and fittings.	Efficient Sanitary Fixtures meeting the following WELS rating: Taps - 5 Star Toilets - 5 Star Showers - 3 Star Washing Machine - 4.5 Stars Dishwashers - 5.5 Stars
Efficient Landscape	Minimise irrigation demand and improve landscape resilience.	Waterwise plants or drought tolerant species for landscaping.
	Reduce irrigation water consumption.	Waterwise irrigation system including drip irrigation, soil moisture sensors and automated controls.
Renewable Energy	Offset common area electricity demand with on-site renewable energy.	Solar PV system to power common use items such as lighting, pool pumps and elevators.
Energy Monitoring	Enable residents to understand and manage their own energy consumption.	Energy monitoring will be provided via an Embedded Smart Metering system to individual units, preferably with real-time data available to occupants via a user-friendly platform to allow occupants easy monitoring of their own energy use.

5 LIFE CYCLE ASSESSMENT (LCA) TARGET SETTING

OneClick software has been used to model the proposed development's environmental impacts.

The study has been conducted in accordance with the following standards:

- European Standard EN 15978: Sustainability of Construction Works – Assessment of Environmental Performance of Buildings – Calculation Method

The target setting service is an early stage LCA study with the goal of determining the feasibility of various design options and deciding the performance target for a development. The target setting service is designed for very early-stage developments without any more information than a design brief and significant assumptions need to be made to study the life cycle impacts of design options.

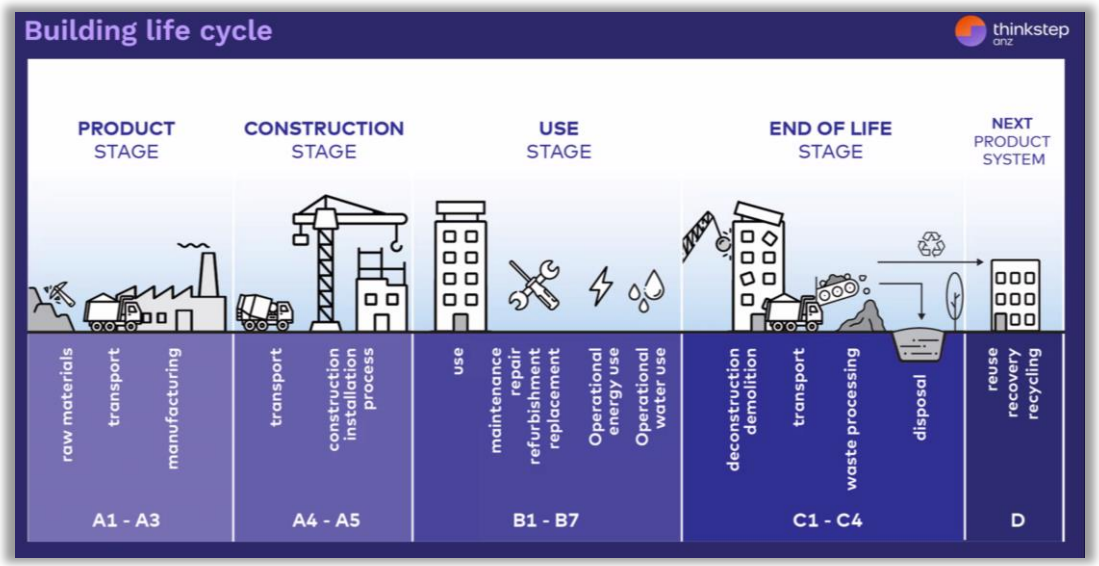


Figure 3: Whole Building Life Cycle Stages (Source: Thinkstep ANZ)

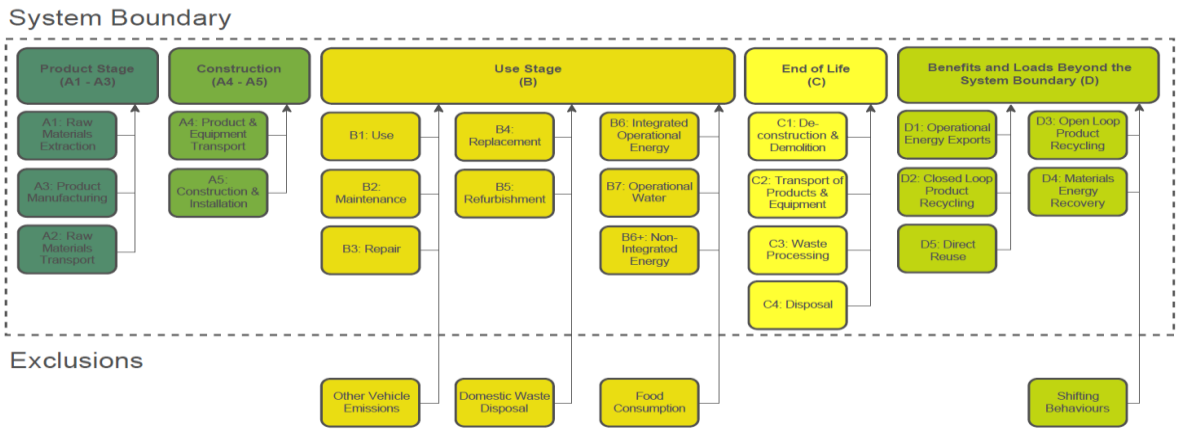
The assessment confirms the design team has thoroughly considered the life cycle design performance of the development and has shortlisted strategies that will enable the stated performance target to be met.

Emergen is competent to undertake independent Life Cycle Assessment (LCA) studies for building projects based on our demonstrated experience in preparing, co-producing and reviewing LCAs across a range of building types and Green Star projects. Our team has practical expertise in applying recognised LCA methodologies and using established LCA software platforms, including One Click LCA and Cerclos/eTool, to assess embodied carbon and whole-of-life environmental impacts.

Emergen follows a robust Quality Assurance (QA) review process for every LCA study conducted through an internal Quality Management System (QMS), which is a formalised system that documents processes, procedures, and responsibilities for achieving well-reviewed LCA studies. Emergen's QMS is in accordance with ISO 14001.

5.1 SCOPE OF WORKS / SYSTEM BOUNDARY

The figure below illustrates the system boundary adopted for the LCA assessment and identifies the building life cycle stages included in the assessment. This includes product, construction, use and end-of-life stages, together with relevant operational energy and water impacts where applicable, to support a holistic assessment of the development's whole-of-life environmental performance.



Life Cycle Stage	Detail Description	Code	In Scope
Construction Phases	Product Stage	A1-A3	Yes
	Transport of Equipment and Materials	A4	Yes
	Construction	A5	Yes
Use Phases	Use of Products	B1	Yes
	Maintenance	B2	Yes
	Repair	B3	Yes
	Replacement	B4	Yes
	Refurbishment	B5	Yes
	Integrated Operational Energy	B6	Yes
	Other Operational Energy	B6+	Yes
	Operational Water Use	B7	Yes
End of Life Phases	Deconstruction / Demolition	C1	Yes
	Transport of Waste Offsite	C2	Yes
	Waste Processing	C3	Yes
	Disposal	C4	Yes
Benefits and Loads Beyond the System Boundary	Operational Energy Exports	D1	Yes
	Closed Loop Recycling	D2	Yes
	Open Loop Recycling	D3	Yes
	Materials Energy Recovery	D4	Yes
	Direct Re-use	D5	Yes

Figure 4: LCA System Boundary

5.2 LCA RESULTS

The table below summarises the confirmed sustainability strategies assessed through the early-stage LCA target setting process. The combined initiatives, including efficient lighting, energy monitoring, zoned air conditioning, efficient fixtures, smart irrigation, heat pump water heating and solar PV for common areas, are expected to achieve a 32% saving in GWP (Global Warming Potential) and a 30% saving in FWU (Fresh Water Use) compared with the benchmark design. These results exceed the City of Vincent Built Form Policy benchmarks of 30% GWP saving and 25% FWU saving, providing a buffer above the minimum performance requirements.

Table 3: LCA Results

STRATEGY DESCRIPTION	GWP SAVING	FWU SAVING
Improved design performance compared to benchmark: • Lighting: High Efficiency LED Lights • Energy Monitoring: Residential, Basic • HVAC: Zoned Air conditioning limited to living areas and bedrooms • Efficient Sanitary Fixtures • Efficient irrigation system including drip irrigation, soil moisture sensors and automated controls. • Efficient Electric Heat Pump system for water heating. • Solar PV System to Common Areas (AU Grid Connected) *(A 20% factor of safety was applied on each improvement strategy)*	**32%**	**30%**

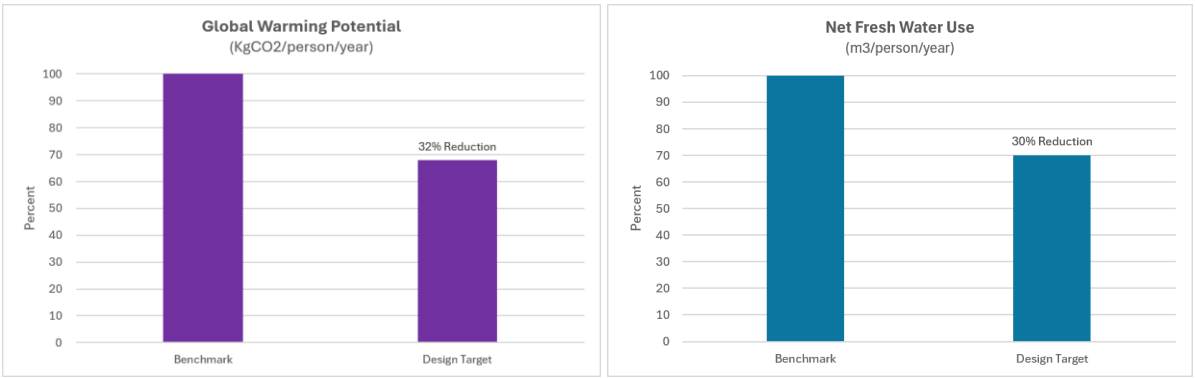


Figure 5: LCA Results

6 CONCLUSION

In conclusion, a sustainability assessment has been undertaken for the proposed development in accordance with the City of Vincent ESD requirements. The assessment demonstrates that sustainability initiatives have been identified and incorporated into the development to respond to the whole-of-life environmental impacts of the building, including measures relating to passive solar design, water efficiency, operational energy reduction and life cycle assessment performance. A summary of how the development addresses each applicable City of Vincent ESD requirement is provided in the table below.

Table 4: Summary Table

CITY OF VINCENT REQUIREMENTS FOR APARTMENTS AND MIXED USE DEVELOPMENTS	RELEVANT SECTION OF REPORT	ACHIEVED
• The proposed development must demonstrate that it incorporates site planning principles that maximise solar passive design opportunities during winter and summer.	• Refer Section 4.1 of this report.	✓
• The proposed development must demonstrate that it incorporates the recovery and re-use of rainwater, stormwater, grey water and/or black water.	• Refer Section 4.2 of this report.	✓
• The proposed development must demonstrate that it achieves the environmental performance ratings shown below: ○ ISO 14044 “Environmental management – Life cycle assessment – Requirements and Guidelines” and EN15978 “Sustainability of construction works – Assessment of environmental performance of buildings – Calculation method.” ➢ 30% global warming potential saving against a code-compliant design. ➢ 25% freshwater use saving against a code compliant design.	• Refer Section 5 of this report.	✓