ACCELERATE
Sustainability Assessments

Unit 12, 8 Navigator Place
Hendra, QLD, 4011

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A.B.N: 81 625 027 778

J1V3 REPORT

Project Description: Duplex SDA Housing

Site Address: 26 Pear Street, Gillieston Heights, NSW, 2321

Client: PNP Residential Constructions

Drawings: VA design studio, Oct 2023

Assessment Number: 240999

Assessment Date: 02/04/2024

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Project Details	**Address:**	26 Pear Street, Gillieston Heights, NSW, 2321
	Lot and Plan:	1336 DP1277104
	Council:	Maitland City Council
	Climate Zone:	5
	Description:	Duplex SDA Housing
	Classification:	3
Result	**The building complies with performance requirement J1P1 using assessment method J1V3 – Verification using a reference building.**	

Construction Details and Minimum Requirements	**Roof and ceiling**	
	Roof colour	The solar absorptance of the upper surface of a roof must not be more than **0.475**
	R-Value	**R3.0** (Total system value)
		Example roof type: Metal roof with R3.5 ceiling batts or equivalent
	Roof lights	
		Nil
	Wall and Glazing	
	Glazing	Glazing must not exceed max total **U-value of 7.00** and a max **SHGC value of 0.81** (Total system value).
	External walls	**R1.0** (Total system value) as per table J1.5a, accounting for thermal bridging
		Example Lightweight wall: Cladding with a non-reflective cavity to a steel frame with R1.5 batts or equivalent.
	Floor construction	
	Ground floor slab	**R1.71** (Total system value)
		Nil insulation to concrete slab
	Other	
		The building must also comply with the additional requirements in Specification 33.

Assessor Details	**Name:**	Kevin Luu
	Accreditation:	HERA 10259
	Signature:	

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1.0 Introduction

The Australian Building Codes Board (ABCB) specifies minimum performance standards for the energy efficiency of buildings through the National Construction Code (NCC) 2022 - Volume One, Section J.

To enable flexibility of the architectural design of the building, a performance solution has been used to comply with the Performance Requirement – J1P1 (Energy use).

The assessment method, J1V3 (Verification using a reference building), has been used and is an alternative solution for the building fabric only. As such, a proposed building with the proposed fabric has been modelled as part of this approach, to compare against the reference building services.

To meet the acceptance criteria, the annual Green House Gas (GHG) emissions of the proposed building must be less than the reference building services.

The proposed building must also maintain a Predicted Mean Vote (PMV) thermal comfort level between -1 and +1 across 95% of occupied floor area for at least 98% of the annual hours of operation.

The proposed building must also meet the additional requirements in Specification 33.

Speckel

This project was modelled in Speckel, using EnergyPlus v22.2.0, meeting the ANSI/ASHRAE Standard 140 requirements for a building's thermal envelope and fabric test.

Speckel provides various calculations in line with the NCC 2022 - Volume One, Section J. These calculations are tested in line with all applicable NCC equations or NCC referenced primary or secondary documents, for them to represent an accurate performance solution against the Performance Requirement – J1P1 (Energy use).

A performance solution must be shown to comply with the relevant performance requirements through one or a combination of assessment methods. Speckel is a valid assessment method by comparison with the Deemed-to-Satisfy (DTS) provisions of each relevant area.

Assumptions/Limitations

- The results of this simulation and report are for regulatory compliance purposes only and do not reflect actual energy use and/or thermal performance.
- Parts J3, J5, J6, J7, J8 and J9 are not part of this assessment.
- Specification 34 (Modelling parameters for J1V3), S34C1 (Scope), S34C2(Reference building) and S34C3 (Proposed building and reference building) have been used to form the basis of the method of assessment.
- S34C4 (Services - proposed and reference building) is not part of this assessment, as the minimum performance requirements of the services are not included.
- To ensure the reference building can be calculated, windows are limited to a maximum of 99% window-to-wall ratio.
- When the simulated shading multipliers feature is enabled, each window is simulated in EnergyPlus twice, to compare a completely unshaded window, to a window affected by attached shading, building self-shading, and surrounding structures. The multiplier is based on the ratio of shaded versus unshaded annual average external incident solar radiation, limited between 0.0 and 1.0.

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2.0 Simulation and Analysis

2.1 Location & Climate

This project is located in Maitland.Visitors.Centre,NSW AUS. The climate file used in all simulations was AUS_NSW_Maitland.Visitors.Centre.957750_TMYx.2007-2021, sourced from Climate.OneBuilding, an online repository collated from public sources.

2.2 Building Envelope

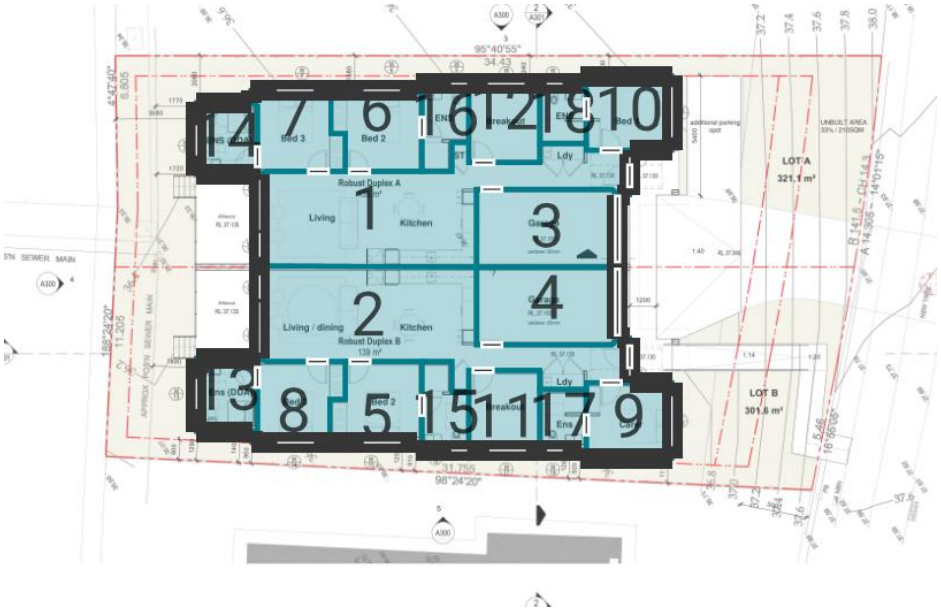

Figure 1: Building envelope (highlighted blue).

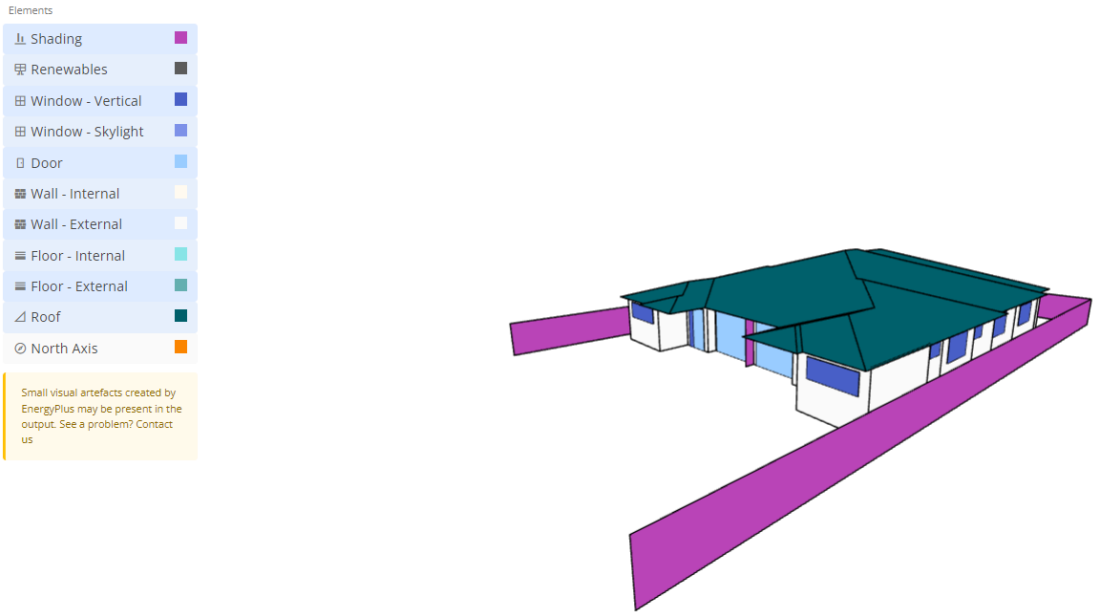

Figure 2: Project 3D Model.

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2.3 Simulation Inputs

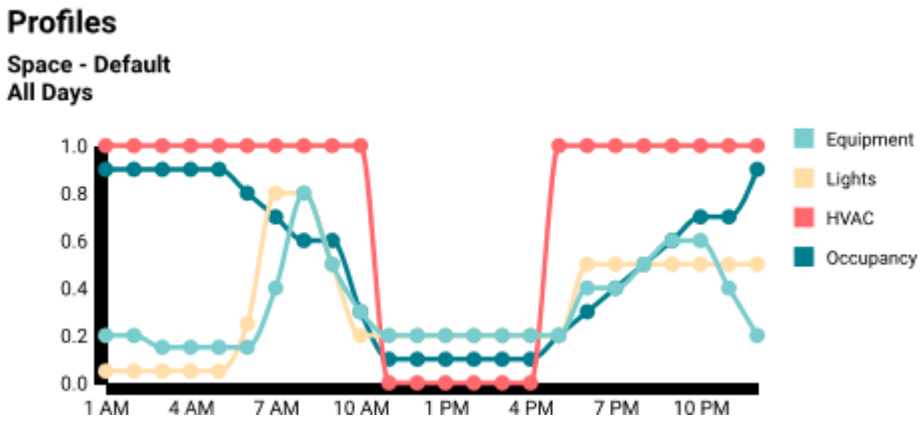

Figure 1: Occupancy and operation profiles from table S35C2b (Modelling profiles).

People, Lighting, Equipment, Infiltration & Thermostat	
Occupancy Density (m²/person)	11.0
Clothing	Dynamic Clothing Model ASHRAE55
Activity (W/person)	130 (as per table S35C2n)
Air velocity (m/s)	0.1
Lighting (W/m²)	5.0 (as per table J7D3a)
Equipment (W/m²)	No load (as per table S35C2l)
Infiltration on (ACH)	0.35
Infiltration off (ACH)	0.70

Table 1: Profile settings and inputs used as per S34C3 (Proposed and reference building), S34C4 (Services – proposed and reference building) and S35C2 (Modelling profiles).

Occupant density (m²/person), Lighting power density (W/m²) and Equipment density (W/m²) are stipulated in each thermal zone, subject to the function and purpose of the space. Internal heat gains for the Reference and Proposed Reference Building's occupant, lighting and equipment densities have been nominated as identical.

2.4 HVAC Details

As a fabric only assessment, air-condition equipment and mechanical ventilation rates for the reference and proposed building are identical. Minimum mechanical ventilation is required as per Part F6P3 (Outdoor air supply).

HVAC Details	
HVAC Type	Variable refrigerant flow (EnergyPlus HVAC template)
Cooling setpoint (°C)	24
Heating setpoint (°C)	20

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2.5 Building fabric

2.5.1 Walls

Total System R-values of all walls include the effects of thermal bridging, which are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006 (as per J4D3 Thermal construction — General (5)) or are stated values.
For the purpose of the reference building, the wall total system R-value of the wall-glazing construction has been calculated in accordance with J4D6 (Walls and glazing) and Specification 37 (Calculation of U-Value and solar admittance).

2.5.2 Roofs

Total system R-values of all roofs include the effects of thermal bridging are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006, as per J4D3 (Thermal construction — General (5)) or are stated values.
For the purpose of the reference building, the roof total system R-value has been assumed in accordance with J4D4 (Roof and ceiling construction).

2.5.3 Floors

Total system R-values of all floors include the effects of thermal bridging are calculated in accordance with AS/NZS 4859.2, NZ 4214:2006 and Section 3.5 of CIBSE Guide A, as per J4D3 (Thermal construction — General (5)) or are stated values.
For the purpose of the reference building, the floor total system R-value has been assumed in accordance with J4D7 (Floors).

2.5.4 Windows

Total system U-values of all windows include the effects of thermal bridging at the frame, which are calculated in accordance with ISO 15099, as per J4D3 (Thermal construction — General (5)).
For the purpose of the reference building, the glazing total system U-value and solar admittance of the wall-glazing construction has been calculated in accordance with J4D6 (Walls and glazing) and Specification 37 (Calculation of U-Value and solar admittance).

Building Fabric	DTS Reference	JV3 Proposal
Roof colour	The solar absorptance of the upper surface of a roof must not be more than 0.45 as per J4D4 (2)	**0.475** solar absorptance
Roof & ceiling R-value	R3.7 (Total system value) downwards heat flow in a climate zone 5 as per J4d4(1)	**R3.2** (Total system value)
Skylights	Nil	
Glazing	U-value of 5.80 and a max SHGC value of 0.77 (Total system value).	**U-value of 6.60** and a max **SHGC value of 0.80** (Total system value).
External walls	R1.4 (Total system value) as per table J4D6(a), accounting for thermal bridging	**R2.0** (Total system value), accounting for thermal bridging
Concrete Slab	R2.0 (Total system value) as per table J4D7.	**R0.30** Concrete slab

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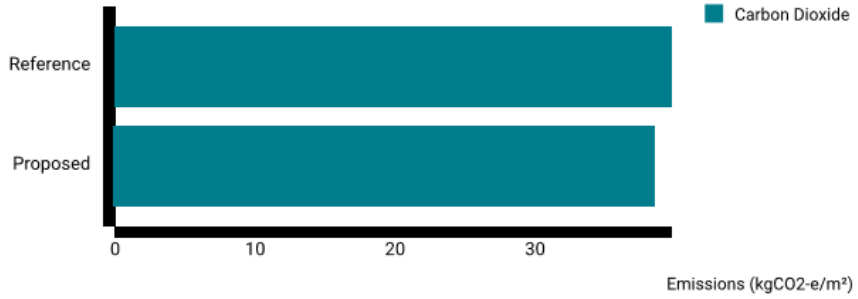
3.0 Results

3.1 Greenhouse Gas Emissions

Greenhouse gas emission factors are used according to NCC 2022 – Volume One, Specification 34 (Modelling parameters) - Table S34C3 Greenhouse gas emissions factors (kgCO2-e/GJ). In the case of this project, 236 kgCO2-e/GJ has been used for electricity only, based on the site location.

Building Emissions

To meet the acceptance criteria, annual Supplied Energy emissions must be less than **39.75** kgCO2-e/m². Based on a treated floor area of 300.02 m², the simulated building achieved **38.62** kgCO2-e/m², **meeting** the acceptance criteria.



Greenhouse gas emission factors have been nominated as **236.00** kilogram / GJ for electricity , and **51.53** kilogram / GJ for natural gas.

3.2 Thermal Comfort Level

The Predicted Mean Vote (PMV) is the thermal perception of building occupants determined in accordance with ANSI/ASHRAE Standard 55.

The results below indicate thermal comfort levels where the PMV is between -1 and +1.

Thermal Comfort

To meet the acceptance criteria, **95** % of total area across the assessed zones must meet the conditions:

- zone thermal comfort is between -1.0 and 1.0 PMV
- for at least 98 % of hours
- when above 20 % occupancy

A total area of 211.31 m² across 10 zones were assessed, where zones of **100.00** % area achieved the conditions, **meeting** the acceptance criteria.

Level	Zone	Area (m²)	Assessed (Hrs)	Pass (Hrs)	Ratio	Pass
1	1. Lot A Kitchen/Living/Dining/ Hallway	54.08	6205	6197	99.87	✓
1	12. Lot A Breakout	11.36	6205	6205	100.00	✓
1	11. Lot B Breakout	11.52	6205	6205	100.00	✓
1	10. Lot A Bed 1	13.02	6205	6205	100.00	✓
1	8. Lot B Bed 3	13.20	6205	6205	100.00	✓
1	7. Lot A Bed 3	13.36	6205	6205	100.00	✓
1	6. Lot A Bed 2	13.83	6205	6205	100.00	✓
1	5. Lot B Bed 2	13.96	6205	6205	100.00	✓
1	2. Lot B Kitchen/Living/Dining/ Hallway	53.81	6205	6099	98.29	✓
1	9. Lot B Carer	13.18	6205	6205	100.00	✓
					Pass	✓

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4.0 Conclusion

The assessment method J1V3 (Verification using a reference building), has been used to show compliance with performance requirement J1P1.

It has been determined that the annual GHG emissions of the proposed building are less than the GHG emissions of the reference building. Provided that the building fabric requirements for the proposed building are followed, the simulated building is predicted to produce 38.62 kgCO2-e/m^2 compared to the reference building which would produce 39.75 kgCO2-e/m^2.

A PMV of -1 to +1 has also been achieved across at least 95% of the floor area of all occupied zones for at least 98% of the annual hours of operation.