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Proposed Co living development
1246 Canterbury Road Roselands 2196

Part J BCA Report

NCC 2022 Volume One

Project name:

Proposed Co living development
1246 Canterbury Road Roselands 2196

1) INTRODUCTION

This report assesses the Proposed Co living devel. - 1246 Canterbury Road Roselands 2196 against the Deemed-to-Satisfy provisions of Section J of the National Construction Code (NCC) 2022 Volume One.

2) PURPOSE

The purpose of this report is to evaluate the design proposal's compliance with the Deemed-to-Satisfy provisions of Section J of the NCC 2022 Volume One. The report identifies the areas where compliance has not been achieved and outlines the relevant Deemed-to-Satisfy provisions of each Section or Part subject to the Performance Solution.

3) NSW J101 OBJECTIVE

The objective of NSW J101 is to achieve the highest greenhouse gas abatement at the lowest cost to the economy, lower the cost of household energy bills, and improve occupant comfort and resilience to extreme weather.

4) SCOPE

This report addresses only matters relevant to Section J of Volume 1 of the Building Code of Australia (BCA) 2022 pertaining to the Proposed Co living devel. - 1246 Canterbury Road Roselands 2196- Class 3.
For completely new buildings the application of the BCA provisions is straightforward applying to all aspects of the construction but for existing buildings being altered, extended or refurbished, the BCA is generally only applicable to the new building work, that is, to those parts of the building directly being affected by the new building work.

5) ASSESSMENT DATA

The following architectural plans are supplied for assessment in accordance with Section J of the BCA:
• Site Plan
• Floor Plans
• Elevations
• Section

6) ASSUMPTIONS AND LIMITATIONS

Assumptions made in the preparation of this report are as follows:
The North point marked as True North is taken from the Site plan.
The major building classification is Building Class 3.
The information not shown on the plans is assessed as general provisions.
The report addresses only the new building work.
The thermal envelope is limited to the rooms and the bathrooms without ventilation opening (see Thermal Envelope pg.19 for new building work and new glazing).

7) BUILDING CLASSIFICATION

According to the BCA Part A (Classification of Buildings and Structures), the major classification of the building is Class 3.

(1)A Class 3 building is a residential building providing long-term or transient accommodation for a number of unrelated persons.

(2) Class 3 buildings include the following:

- ***a. A boarding house, guest house, hostel, lodging house or backpacker accommodation.***
- ***b. A residential part of a hotel or motel.***
- ***c. A residential part of a school.***
- ***d. Accommodation for the aged, children, or people with disability.***
- ***e. A residential part of a health-care building which accommodates members of staff.***
- ***f. A residential part of a detention centre.***
- ***g. A residential care building.***

8) CLIMATE ZONE

The proposed project is located at 1246 Canterbury Road Roselands 2196, which is in Climate Zone 5 according to the New South Wales-Climate zone map.

9) NSW J1P1 ENERGY USE-PERFORMANCE REQUIREMENTS

A building including its services, must have features that facilitate the efficient use of energy appropriate to—

a. the function and use of the building; and
b. the level of human comfort required for the building use; and
c. solar radiation being—
i. utilised for heating; and
ii. controlled to minimise energy for cooling; and
d. the energy source of the services; and
e. the sealing of the building envelope against air leakage; and
f. for a conditioned space, achieving an hourly regulated energy consumption, averaged over the annual hours of operation, of not more than—
i. for a Class 6 building, 80 kJ/m².hr; and
ii. for a Class 5, 7b, 8 or 9a building other than a ward area, or a Class 9b school, 43 kJ/m².hr; and
iii for all other building classifications, 15 kJ/m².hr.

10) COMPLIANCE METHOD- *Deemed-to-Satisfy Solution*

For a Class 3 and 5 to 9 building, *Performance Requirement* NSW J1P1 is satisfied by complying with—

- a. Part J4, for the building *fabric*; and
- b. Part J5, for building sealing; and
- c. Part J6, for *air-conditioning* and ventilation; and
- d. Part J7, for artificial lighting and power; and
- e. Part J8, for heated water supply and *swimming pool* and spa pool plant; and
- f. J9D3, for facilities for energy monitoring.

Proposed Co living development
1246 Canterbury Road Roselands 2196

STATEMENT OF COMPLIANCE

The design documentation as referred to in this report has been assessed against the applicable provisions of Section J of the National Construction Code (NCC2022) and it is considered that such documentation complies with or is capable of complying (as outlined above) with that Code (NCC2022).
The proposed building fabric and glazing requirements are analysed using the SPECKEL software (Clauses J4D4 Roof and ceiling construction, J4D5 Roof lights, J4D6 Walls and glazing and J4D7 Floors). Please note that while the remaining parts J5 to J9 are listed in this report as requirements from the NCC, their implementation falls under the purview of competent and licensed professionals, such as engineers and contractors.
Overall, the building will comply with the applicable provisions of Section J of the NCC2022, with each professional responsible for ensuring compliance with the relevant clauses of the code in their respective fields.

Assessor: Zoran Cvetkovski
Thermal Performance Assessor
B.Eng.

Conclusions

SUMMARY OF SOLUTIONS TO COMPLY WITH SECTION J PERFORMANCE REQUIREMETS DTS Method (NCC2022)

The following table is a summary of the requirements for compliance with Section J.

<table>
<tr><th>Clause-Description</th><th>Status</th></tr>
<tr><td>Part J1 Energy efficiency performance requirements</td><td>Table of NCC requirements
<table>
<tr><th>Wall Type</th><th>R-Value m²K°/W</th><th>Solar Absorptance</th></tr>
<tr><td>External</td><td>1.4</td><td>0.6</td></tr>
<tr><td colspan="3">(applicable to new walls only)</td></tr>
<tr><th>Floor Type</th><th>R-Value m²K°/W</th><th>Solar Absorptance</th></tr>
<tr><td>Bottom</td><td>2</td><td>-</td></tr>
<tr><td>External</td><td>2</td><td>-</td></tr>
<tr><td colspan="3">(applicable to new floors only)</td></tr>
<tr><th>Roof Type</th><th>R-Value m²K°/W</th><th>Solar Absorptance (Max)</th></tr>
<tr><td>External</td><td>3.7</td><td>0.45</td></tr>
<tr><td colspan="3">(applicable to new roofs only)</td></tr>
</table></td></tr>
<tr><td>NSW J1P4 Renewable energy and electric vehicle charging</td><td>A building must have features that facilitate the future installation of on-site renewable energy generation and storage and electric vehicle charging equipment.</td></tr>
<tr><td></td><td></td></tr>
<tr><td>Roof and wall thermal break</td><td>The roof and the wall thermal bridges are analyzed with SPECKEL thermal bridge calculator. The calculation is attached to the report in the section (Speckel).</td></tr>
<tr><td>PART J4 Building fabric.</td><td></td></tr>
<tr><td>J4D3 Thermal construction — general</td><td>(1) Where required, insulation must comply with AS/NZS 4859.1 and be installed so that it—

a. abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must be against the member; and
b. forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
c. does not affect the safe or effective operation of a service or fitting.

(2) Where required, reflective insulation must be installed with—

a. the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
b. the reflective insulation closely fitted against any penetration, door or window opening; and</td></tr>
</table>

	c. the reflective insulation adequately supported by framing members; and d. each adjoining sheet of roll membrane being— i. overlapped not less than 50 mm; or ii. taped together. (3) Where required, bulk insulation must be installed so that— a. it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and b. in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm. (4) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36. (5)The required Total R-Value and Total System U-Value, including allowance for thermal bridging, must be— a. calculated in accordance with AS/NZS 4859.2 for a roof or floor; or b. determined in accordance with Specification 37 for wall-glazing construction; or c. determined in accordance with Specification 39 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.

The clauses J4D4 Roof and ceiling construction, J4D5 Roof lights, J4D6 Walls and glazing and J4D7 Floors are assessed with the Speckel software and the NCC Façade Calculator, and the results are summarized in the table below:
Below is given only one option, how the NCC requirements for the building elements can be met. Any other solution meeting the values of NCC requirement table (Page 3 of the report) is acceptable.

<table>
<tr><td rowspan="3">J4D4 Roof and ceiling construction</td><td>Required</td><td>Additional insulation</td></tr>
<tr><td>R3.7
(downwards)
* The solar absorptance of the upper surface of a roof must be not more than 0.45.</td><td><u>Timber Frame Metal Roof</u>
Additional insulation:
➢ Membrane: Ametalin Ametalin CeaseFire™ (0.17mm)
➢ Composite: Knauf Insulation Earthwool® Ceiling Batt (175mm) R3.5

<u>Timber Frame Flat Roof</u>
Additional insulation:
➢ Composite: Knauf Insulation Earthwool® Ceiling Batt (195mm) R4.0

/see SPECKEL summary/</td></tr>
<tr><td colspan="2">*This is only one proposed option how to meet the NCC requirements</td></tr>
</table>

J4D5 Roof lights	**The clause is not applicable because the roof lights are existing.**
J4D6 Walls and glazing	**Walls /Glazing** /see Speckel Summary and NCC Façade Calculator/ **Walls** Average Wall R value includes thermal bridges. **Double Brick Wall** Additional insulation: ➢ Slightly ventilated drainage cavity (35mm) ➢ *Membrane:* Class 4 - Vapour Permeable Membrane- 3.9 µg/N.s (0.6mm) ➢ *Composite:* Knauf Insulation DriTherm® Cavity slab (50mm) R1.4 **Lightweight Wall** *(to outdoor air)* Additional insulation: ➢ Slightly ventilated drainage cavity (35mm) ➢ *Membrane:* Class 4 - Vapour Permeable Membrane- 3.9 µg/N.s (0.6mm) ➢ *Composite:* Glass Wool (90mm) **Lightweight Wall** *(against unconditioned spaces)* Additional insulation: ➢ *Membrane:* Class 4 - Vapour Permeable Membrane- 3.9 µg/N.s (0.6mm) ➢ *Composite:* Glass Wool (90mm) ***For details see the Speckel calculator** ***This is only one proposed option how to meet the NCC requirements (Any other solution is acceptable as long as meet the NCC requirements)** ***For details see the Speckel summary** **Glazing** **Windows** **UV 5.8 SHGC 0.55** **Sliding Doors** **UV 3.7 SHGC 0.25** ***For details see the NCC Façade Calculator**
J4D7 Floors	• A floor without an in-slab heating or cooling system must achieve Total R value of R2.0 • **For details see the Speckel summary** • This is only one proposed option how to meet the NCC requirements

	Required R2.0 (downwards)	Additional Insulation **Concrete Slab on Ground** ➢ Extruded Polystyrene (XPS) (20mm) **Suspended Timber Floor** *(above the garage and to outdoor air)* ➢ Knauf Insulation Earthwool® FloorShield underfloor batt (90mm) R2.5

PART J5 Building sealing	***Applicable only if there is an opportunity to install new building sealants.***
J5D3 Chimneys and flues	The chimney or flue of an open solid fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.
J5D4 Roof lights	A roof light must be sealed, or capable of being sealed, when serving a conditioned space, or a habitable room in climate zones 4, 5, 6, 7 or 8. The roof light required to be sealed, must be constructed with an imperforate ceiling diffuser or a weatherproof seal; or a shutter system readily operated either manually, mechanically or electronically by the occupant.
J5D5 Windows and doors	1)A door, openable window or the like must be sealed when forming part of the envelope; or in climate zones 4, 5, 6, 7 or 8, except windows complying with AS 2047; or fire doors or smoke doors; or roller shutter doors, roller shutter grille or other security door or device installed only for out-of-hours security. 2)A seal to restrict air infiltration for the bottom edge of a door, must be a draft protection device, and for the other edges of a door or the edges of an openable window or other such opening, maybe a foam or rubber compression strip, fibrous seal or the like. 3)An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, rapid roller door, revolving door or the like, except where the conditioned space has a floor area of not more than 50 m2; or where a café, restaurant, open front shop or the like has a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; (at all other entrances to the café, restaurant, open front shop or the like, self-closing doors)
J5D6 Exhaust fans	An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space, or a habitable room in climate zones 4, 5, 6, 7 or 8.
J5D7 Construction of ceilings, walls, and floors	Ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise the air leakage when forming part of the envelope. The construction must be enclosed by internal lining systems that are closely fitted at the ceiling, wall and the floor junctions. The junctions and penetrations must be sealed with close fitting architrave, skirting or cornice; or expanding foam, rubber compressible strip, caulking or the like. The openings such as grilles or the like required for smoke hazard management do not need to be sealed.
J5D8 Evaporative coolers	An evaporative cooler must be fitted with a self-closing damper or the like when serving a heated space or in climate zones 4, 5, 6, 7 or 8.

PART J6 Air-conditioning and ventilation systems	*Requirements /For this part are assessed as general provisions (BCA requirements only, because they are subject of service area of other professional practitioners /* ***Applicable only if there are new air-conditioning and ventilation systems.***
J6D3 Air-conditioning system control. ***Comment:*** *a. The air-conditioning system must be capable of being deactivated when the building or part of a building served by that system is not occupied.* *b. When serving more than one air-conditioning zone or area with different heating or cooling needs, the air-conditioning system must thermostatically control the temperature of each zone or area, and not control the temperature by mixing actively heated air and actively cooled air. The system must limit reheating to not more than 7.5 K rise in temperature for a fixed supply air rate, or a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased for a variable supply air rate.* *c. If the total air flow rate of any airside component of an air-conditioning system is greater than or equal to the flow rates in Table J6D3 and it provides the required mechanical ventilation (except in climate zone 1 or where dehumidification control is needed), the system must have an outdoor air economy cycle.* *d. If the air-conditioning system contains more than one water heater, chiller or coil, it must be capable of stopping the flow of water to those not operating.* *e. If the air flow of the air-conditioning system is more than 1000 L/s and its supply air quantity is capable of being varied, the system must have a variable speed fan.* *f. If the air-conditioning system is serving a sole-occupancy unit in a Class 3 building, it must not operate when any external door of the sole-occupancy unit that opens to a balcony or the like, is open for more than one minute.* *g. The air-conditioning system must have the ability to use direct signals from the control components responsible for the delivery of comfort conditions in the building to regulate the operation of central plant.* *h. The air-conditioning system must have a control dead band of not less than 2°C, except where a smaller range is required for specialised applications.* *i. The air-conditioning system must be provided with balancing dampers and balancing valves as required to meet the needs of the system at its maximum*	(1) An air-conditioning system— a. must be capable of being deactivated when the building or part of a building served by that system is not occupied; and b. when serving more than one air-conditioning zone or area with different heating or cooling needs, must— i. thermostatically controls the temperature of each zone or area; and ii. not control the temperature by mixing actively heated air and actively cooled air; and iii. limit reheating to not more than— 1. for a fixed supply air rate, a 7.5 K rise in temperature; and 2. for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and c. which provides the required mechanical ventilation, other than in climate zone 1 or where dehumidification control is needed, must have an outdoor air economy cycle if the total air flow rate of any airside component of an air-conditioning system is greater than or equal to the flow rates in Table J6D3; and d. which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and e. with an airflow of more than 1000 L/s, must have a variable speed fan when its supply air quantity is capable of being varied; and f. when serving a sole-occupancy unit in a Class 3 building, must not operate when any external door of the sole-occupancy unit that opens to a balcony or the like, is open for more than one minute; and g. must have the ability to use direct signals from the control components responsible for the delivery of comfort conditions in the building to regulate the operation of central plant; and h. must have a control dead band of not less than 2°C, except where a smaller range is required for specialised applications; and i. must be provided with balancing dampers and balancing valves, as required to meet the needs of the system at its maximum operating condition, that ensure the maximum design air or fluid flow is achieved but not exceeded by more than 15% above design at each— i. component; or ii. group of components operating under a common control in a system containing multiple components; and j. must ensure that each independently operating space of more than 1 000 m2 and every separate floor of the building has provision to terminate airflow independently of the remainder of the system sufficient to allow for different operating times; and k. must have automatic variable temperature operation of heated water and chilled water circuits; and l. when deactivated, must close any motorised outdoor air or return air damper that is not otherwise being actively controlled. (2) When two or more air-conditioning systems serve the same space they must use control sequences that prevent the systems from operating in opposing heating and cooling modes. (3) Time switches — the following applies:

operating condition, that ensure the maximum design air or fluid flow is achieved but not exceeded by more than 15% above design at each component or group of components operating under a common control in a system containing multiple components. *j. The air-conditioning system must ensure that each independently operating space of more than 1 000 m2 and every separate floor of the building has provision to terminate airflow independently of the remainder of the system sufficient to allow for different operating times.* *k. The air-conditioning system must have automatic variable temperature operation of heated water and chilled water circuits.* *l. When deactivated, the air-conditioning system must close any motorised outdoor air or return air damper that is not otherwise being actively controlled.* *In addition, if the air-conditioning system has a capacity of more than 2 kWr, a time switch must be provided to control its operation. The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. However, this requirement does not apply if the air-conditioning system serves only one sole-occupancy unit in a Class 2, 3 or 9c building, or a Class 4 part of a building, or if the conditioned space requires air conditioning for 24-hour continuous use.*	a. A time switch must be provided to control— i. an air-conditioning system of more than 2 kWr; and ii. a heater of more than 1 kW heating used for air conditioning. b. The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. c. The requirements of (a) and (b) do not apply to— i. an air-conditioning system that serves— 1. only one sole-occupancy unit in a Class 2, 3 or 9c building; or 2. a Class 4 part of a building; or ii. a conditioned space where air conditioning is needed for 24-hour continuous use. *For details see the detailed clause BCA* **J6D3**
J6D4 Mechanical ventilation system control ***Comment:*** *Mechanical ventilation systems, including those that are part of an air-conditioning system, must be capable of being deactivated when the building or part of the building served by that system is not occupied.* *When serving a conditioned space, except in periods when evaporative cooling is being used, the mechanical ventilation system must either:* *a. Have an energy reclaiming system that preconditions outdoor air at a minimum sensible heat transfer effectiveness of 60%; or* *b. Have demand control ventilation in accordance with AS 1668.2 if appropriate to the application.* *For an airflow of more than 1000 L/s, the mechanical ventilation system must have a variable speed fan unless the downstream airflow is required by Part F6 to be constant.* *An exhaust system with an airflow rate of more than 1000 L/s must be capable of stopping the motor when the system is not needed, except for an exhaust system in a sole-occupancy unit in a Class 2, 3 or 9c building.*	**J6D4 Mechanical ventilation system control** (1) General — A mechanical ventilation system, including one that is part of an air-conditioning system, except where the mechanical system serves only one sole-occupancy unit in a Class 2 building or serves only a Class 4 part of a building, must— a. be capable of being deactivated when the building or part of the building served by that system is not occupied; and b. when serving a conditioned space, except in periods when evaporative cooling is being used— i. where specified in Table J6D4, have— 1. an energy reclaiming system that preconditions outdoor air at a minimum sensible heat transfer effectiveness of 60%; or 2. demand control ventilation in accordance with AS 1668.2 if appropriate to the application; and ii. not exceed the minimum outdoor air quantity required by Part F6 by more than 20%, except where— 1. additional unconditioned outdoor air is supplied for free cooling; or 2. additional mechanical ventilation is needed to balance the required exhaust or process exhaust; or 3. an energy reclaiming system preconditions all the outdoor air; and c. for an airflow of more than 1000 L/s, have a variable speed fan unless the downstream airflow is required by Part F6 to be constant. (2) Exhaust systems — An exhaust system with an air flow rate of more than 1000 L/s must be capable of stopping the motor when the system is not needed, except for an exhaust system in a sole-occupancy unit in a Class 2, 3 or 9c building.

Carpark exhaust systems must have a control system in accordance with clause 4.11.2 or 4.11.3 of AS 1668.2. *A time switch must be provided to a mechanical ventilation system with an airflow rate of more than 1000 L/s, which must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. However, this requirement does not apply to mechanical ventilation systems that serve only one sole-occupancy unit in a Class 2, 3 or 9c building or a Class 4 part of a building, or to a building where mechanical ventilation is needed for 24-hour occupancy.*	(3) Carpark exhaust systems — Carpark exhaust systems must have a control system in accordance with— a. clause 4.11.2 of AS 1668.2; or b. clause 4.11.3 of AS 1668.2. (4) Time switches — The following applies: a. A time switch must be provided to a mechanical ventilation system with an air flow rate of more than 1000 L/s. b. The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. c. The requirements of (a) and (b) do not apply to— i. a mechanical ventilation system that serves— 1. only one sole-occupancy unit in a Class 2, 3 or 9c building; or 2. a Class 4 part of a building; or ii. a building where mechanical ventilation is needed for 24-hour occupancy. *For details see the detailed clause BCA* **J6D4**
J6D5 Fans and duct systems	Fans, ductwork and duct components that form part of an *air-conditioning* system or mechanical ventilation system must comply with the provisions in the **J6D5** *For details see the detailed clause BCA* **J6D5**
J6D6 Ductwork insulation	**J6D6 Ductwork insulation** (1) Ductwork and fittings in an air-conditioning system must be provided with insulation— a. complying with AS/NZS 4859.1; and b. having an insulation R-Value greater than or equal to— i. for flexible ductwork, 1.0; or ii. for cushion boxes, that of the connecting ductwork; or iii. that specified in Table J6D6. (2) Insulation must— a. be protected against the effects of weather and sunlight; and b. be installed so that it— i. abuts adjoining insulation to form a continuous barrier; and ii. maintains its position and thickness, other than at flanges and supports; and c. when conveying cooled air— i. be protected by a vapour barrier on the outside of the insulation; and ii. where the vapour barrier is a membrane, be installed so that adjoining sheets of the membrane— 1. overlap by at least 50 mm; and 2. are bonded or taped together. (3) The requirements of (1) do not apply to— a. ductwork and fittings located within the only or last room served by the system; or b. fittings that form part of the interface with the conditioned space; or c. returns air ductwork in, or passing through, a conditioned space; or d. ductwork for outdoor air and exhaust air associated with an air-conditioning system; or e. the floor of an in-situ air-handling unit; or f. packaged air conditioners, split systems, and variable refrigerant flow air-conditioning equipment complying with MEPS; or g. flexible fan connections. (4) For the purposes of (1), (2) and (3), fittings— a. includes non-active components of a ductwork system such as cushion boxes; and

	b. excludes active components such as air-handling unit components. *For details see the detailed clause BCA* **J6D6**
J6D7 Ductwork sealing	Ductwork in an air-conditioning system with a capacity of 3000 L/s or greater, not located within the only or last room served by the system, must be sealed against air loss in accordance with the duct sealing requirements of AS 4254.1 and AS 4254.2 for the static pressure in the system.
J6D8 Pump systems *Comment:* *The pumps and pipework must either separately comply with (2), (3), and (4) or achieve a pump motor power per unit of flow rate lower than the pump motor power per unit of flow rate achieved when applying (2), (3), and (4) together.* *Circulator pumps used in closed loop systems must have an energy efficiency index (EEI) not more than 0.27 if they are glandless impeller pumps with a rated hydraulic power output of less than 2.5 kW.* *Other pumps must have a minimum efficiency index (MEI) of 0.4 or more if they are in accordance with Articles 1 and 2 of European Union Commission Regulation No. 547/2012.* *Pipework must achieve an average pressure drop of not more than the values nominated in Table J6D8a, J6D8b, J6D8c, or J6D8d depending on the type of system.* *The requirements of (4) do not apply to valves and fittings or where the smallest pipe size compliant with (4) results in a velocity of 0.7 m/s or less at design flow.*	(1) General — Pumps and pipework that form part of an air-conditioning system must either— a. separately complies with (2), (3) and (4); or b. achieves a pump motor power per unit of flowrate lower than the pump motor power per unit of flowrate achieved when applying (2), (3) and (4) together. (2) Circulator pumps — A glandless impeller pump, with a rated hydraulic power output of less than 2.5 kW and that is used in closed loop systems must have an energy efficiency index (EEI) not more than 0.27 calculated in accordance with European Union Commission Regulation No. 622/2012. (3) Other pumps — Pumps that are in accordance with Articles 1 and 2 of European Union Commission Regulation No. 547/2012 must have a minimum efficiency index (MEI) of 0.4 or more when calculated in accordance with European Union Commission Regulation No. 547/2012. (4) Pipework — Straight segments of pipework along the index run, forming part of an air-conditioning system— a. in pipework systems that do not have branches and have the same flow rate throughout the entire pipe network, must achieve an average pressure drop of not more than— i. for constant speed systems, the values nominated in Table J6D8a; or ii. for variable speed systems, the values nominated in Table J6D8b; or b. in any other pipework system, must achieve an average pressure drop of not more than— i. for constant speed systems, the values nominated in Table J6D8c; or ii. for variable speed systems, the values nominated in Table J6D8d. (5) The requirements of (4) do not apply— a. to valves and fittings; or b. where the smallest pipe size compliant with (4) results in a velocity of 0.7 m/s or less at design flow. *For details see the detailed clause* **J6D8**
J6D9 Pipework insulation ***Comment:*** *Piping, vessels, heat exchangers, and tanks containing heating or cooling fluid, where the fluid is held at a heated or cooled temperature, that are part of an air-conditioning system, other than in appliances covered by MEPS, must be provided with insulation complying with AS/NZS 4859.1.* *Insulation provided to piping, vessels, heat exchangers or tanks containing cooling fluid must be protected by a vapor barrier on the outside of the insulation.* *The requirements of (1) and (2) do not apply to piping, vessels, or heat exchangers located within the only or last room served by the system and downstream of the control device for the regulation of heating or cooling service to that room.*	(1) Piping, vessels, heat exchangers and tanks containing heating or cooling fluid, where the fluid is held at a heated or cooled temperature, that are part of an air-conditioning system, other than in appliances covered by MEPS, must be provided with insulation— a. complying with AS/NZS 4859.1; and b. for piping of heating and cooling fluids, having an insulation R-Value in accordance with Table J6D9a; and c. for vessels, heat exchangers or tanks, having an insulation R-Value in accordance with Table J6D9b; and d. for refill or pressure relief piping, having an insulation R-Value equal to the required insulation R-Value of the connected pipe, vessel or tank within 500 mm of the connection. (2) Insulation must— a. be protected against the effects of weather and sunlight; and b. be able to withstand the temperatures within the piping, vessel, heat exchanger or tank.

Heating fluids include refrigerant, heated water, steam, and condensate. *Cooling fluids include refrigerant, chilled water, brines, and glycol mixtures, but do not include condenser cooling water.*	(3) Insulation provided to piping, vessels, heat exchangers or tanks containing cooling fluid must be protected by a vapour barrier on the outside of the insulation. (4) The requirements of (1) and (2) do not apply to piping, vessels or heat exchangers— a. located within the only or last room served by the system and downstream of the control device for the regulation of heating or cooling service to that room; or b. encased within a concrete slab or panel which is part of a heating or cooling system; or c. supplied as an integral part of a chiller, boiler or unitary air-conditioner complying with the requirements of J6D10, J6D11 and J6D12; or d. inside an air-handling unit, fan-coil unit, or the like. (5) For the purposes of (1), (2), (3) and (4)— a. heating fluids include refrigerant, heated water, steam and condensate; and b. cooling fluids include refrigerant, chilled water, brines and glycol mixtures, but do not include condenser cooling water. *For details see the detailed clause BCA* **J6D9**
J6D10 Space heating	A heater used for air conditioning or as part of an air-conditioning system must be any of the following: a solar heater; or a gas heater; or a heat pump heater; or a heater using reclaimed heat from another process such as reject heat from a refrigeration plant or an electric heater or any combination. *For details see the detailed clause BCA* **J6D10**
J6D11 Refrigerant chillers	An air-conditioning system refrigerant chiller must comply with MEPS and the full load operation energy efficiency ratio and integrated part load energy efficiency ratio in Table J6D11a or Table J6D11b when determined in accordance with AHRI 551/591. *For details see the detailed clause* **J6D11**
J6D12 Unitary air-conditioning equipment	Unitary air-conditioning equipment including packaged air-conditioners, split systems, and variable refrigerant flow systems must comply with MEPS and for a capacity greater than or equal to 65 kWr— a. where water cooled, have a minimum energy efficiency ratio of 4.0 Wr/W input-power for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power; or b. where air cooled, have a minimum energy efficiency ratio of 2.9 Wr/W input power for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power. *For details see the detailed clause* **J6D12**
J6D13 Heat rejection equipment	(1) The motor rated power of a fan in a cooling tower, closed circuit cooler or evaporative condenser must not exceed the allowances in Table J6D13. (2) The fan in an air-cooled condenser must have a motor rated power of not more than 42 W for each kW of heat rejected from the refrigerant, when determined in accordance with AHRI 460 except for— a. a refrigerant chiller in an air-conditioning system that complies with the energy efficiency ratios in J6D11; or

	b. packaged air-conditioners, split systems, and variable refrigerant flow air-conditioning equipment that complies with the energy efficiency ratios in J6D12. *For details see the detailed clause* **J6D13**

Part J7- for artificial lighting and power	*Requirements /For this part are assessed as general provisions (BCA requirements only, because they are subject of service area of other professional practitioners /* ***Applicable only if there is new artificial lighting.***
J7D3 Artificial lighting	In a Class 3 or Class 5 to 9 building for artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the maximum illumination power density in Table J7D3a. The aggregate design illumination power load is the sum of the design illumination power loads in each of the spaces served, and where there are multiple lighting systems serving the same space, the design illumination power load is the sum of all systems; or it is based on the highest illumination power load (where the control system permits only one system to operate at a time) The aggregate design illumination power load must not exceed the aggregate design illumination power from the lighting calculator or not to exceed the values in the Table J7D3a Maximum illumination power density.

Table J7D3a Maximum illumination power density	
Space	Maximum illumination power density (W/m2)
Auditorium, church and public hall	8
Board room and conference room	5
Carpark - general	2
Carpark - entry zone (first 15 m of travel) during the daytime	11.5
Carpark - entry zone (next 4 m of travel) during the day	2.5
Carpark - entry zone (first 20 m of travel) during night time	2.5
Common rooms, spaces and corridors in a Class 2 building	4.5
Control room, switch room and the like - intermittent monitoring	3
Control room, switch room and the like - constant monitoring	4.5
Corridors	5
Courtroom	4.5
Dormitory of a Class 3 building used for sleeping only	3
Dormitory of a Class 3 building used for sleeping and study	4
Entry lobby from outside the building	9
Health-care - infants' and children's wards and emergency department	4
Health-care - examination room	4.5
Health-care - examination room in intensive care and high dependency ward	6
Health-care - all other patient care areas including wards and corridors	2.5
Kitchen and food preparation area	4
Laboratory - artificially lit to an ambient level of 400 lx or more	6
Library - stack and shelving area	2.5
Library - reading room and general areas	4.5
Lounge area for communal use in a Class 3 or 9c building	4.5
Museum and gallery - circulation, cleaning and service lighting	2.5
Office - artificially lit to an ambient level of 200 lx or more	4.5
Office - artificially lit to an ambient level of less than 200 lx	2.5
Plant room where an average of 160 lx vertical illuminance is required on a vertical panel such as in switch rooms	4
Plant rooms with a horizontal illuminance target of 80 lx	2
Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks	14

<table>
<tr><td></td><td>

Retail space including a museum and gallery whose purpose is the sale of objects	14
School - general purpose learning areas and tutorial rooms	4.5
Sole-occupancy unit of a Class 3 or 9c building	5
Storage	1.5
Service area, cleaner's room and the like	1.5
Toilet, locker room, staff room, rest room and the like	3
Wholesale storage area with a vertical illuminance target of 160 lx	4
Stairways, including fire-isolated stairways	2
Lift cars	3

For details see the detailed clause BCA **J7D3**
</td></tr>
<tr><td>

NSW J7D4 Interior artificial lighting and power control

Comment:
All artificial lighting of a room or space must be individually operated by a switch; or other control device; or a combination of both (clause 1)
An artificial lighting switch or other control device must not operate lighting for an area of more than 250 m2 (clause 3)
95% of the light fittings must be controlled by a time switch or an occupant sensing device (clause 4)
Artificial lighting in a natural lighting zone adjacent to windows must be separately controlled from artificial lighting not in a natural lighting zone in the same storey (clause 5)
</td><td>

(1) All artificial lighting of a room or space must be individually operated by a switch; or other control device; or a combination of both
(2)An occupant activated device, such as a room security device, a motion detector in accordance with Specification 40, or the like, must be provided in the sole-occupancy unit of a Class 3 building, other than where providing accommodation for people with a disability or the aged, to cut power to the artificial lighting, air-conditioner, local exhaust fans and bathroom heater when the sole-occupancy unit is unoccupied.
(3) An artificial lighting switch or other control device in (1) must—
if an artificial lighting switch, be located in a visible and easily accessed position—
in the room or space being switched; or
in an adjacent room or space from where 90% of the lighting being switched is visible; and
for other than a single functional space such as an auditorium, theatre, swimming pool, sporting stadium or warehouse—
if in a Class 5 building or a Class 8 laboratory, not operate lighting for an area of more than 250 m2: or
if in a Class 3, 6, 7, 8 (other than a laboratory) or 9 building, not operate lighting for an area of more than—
250 m2 for a space of not more than 2000 m2; or
1000 m2 for a space of more than 2000 m2.
(4)95% of the light fittings in a building or storey of a building, other than a Class 3 building of more than 250 m2 must be controlled by—
a time switch in accordance with Specification 40; or
an occupant sensing device such as—
a security key card reader that registers a person entering and leaving the building; or
a motion detector in accordance with Specification 40.
(5) In a Class 5, 6 or 8 building of more than 250 m2, artificial lighting in a natural lighting zone adjacent to windows must be separately controlled from artificial lighting not in a natural lighting zone in the same storey except where—
the room containing the natural lighting zone is less than 20 m2; or
the room's natural lighting zone contains less than 4 luminaires: or
70% or more of the luminaires in the room are in the natural lighting zone.
(6) Artificial lighting in a fire-isolated stairway, fire-isolated passageway or fire-isolated ramp, must be controlled by a motion detector in accordance with Specification 40.
(7) Artificial lighting in a foyer, corridor and other circulation spaces—
of more than 250 W within a single zone; and
adjacent to windows,
must be controlled by a daylight sensor and dynamic lighting control device in accordance with Specification 40.
</td></tr>
</table>

	(8) Artificial lighting for daytime travel in the first 19 m of travel in a carpark entry zone must be controlled by a daylight sensor in accordance with Specification 40. (9) The requirements of (1), (2), (3), (4), (5), (6), (7) and (8) do not apply to the following: Emergency lighting in accordance with Part E4. Where artificial lighting is needed for 24-hour occupancy such as for a manufacturing process, parts of a hospital, an airport control tower or within a detention centre. (10) The requirements of (4) do not apply to the following: Artificial lighting in a space where the sudden loss of artificial lighting would cause an unsafe situation such as— in a patient care area in a Class 9a building or in a Class 9c building; or a plant room or lift motor room; or a workshop where power tools are used. A heater where the heater also emits light, such as in bathrooms. *For details see the detailed clause BCA* **J7D4**
J7D5 Interior decorative and display lighting.	(1) Interior decorative and display lighting must be controlled separately from other artificial lighting and by a manual switch for each area other than when the operating times of the displays are the same as in the other areas and by a time, switch in accordance with Specification 40 where the display lighting exceeds 1 kW. (2) Window display lighting must be controlled separately from other display lighting. *For details see the detailed clause BCA* **J7D5**
J7D6 Exterior artificial lighting	Exterior artificial lighting must be controlled by a daylight sensor; or a time switch that can switch on and off electric power to the system at variable pre-programmed times and on variable pre-programmed days. When the total lighting load exceeds 100 W uses LED luminaires for 90% of the total lighting load; or to be controlled by a motion detector in accordance with Specification 40. When used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification 40. *For details see the detailed clause BCA* **J7D6**
J7D7 Boiling water and chilled water storage units.	Power supply to a boiling water or chilled water storage unit must be controlled by a time switch in accordance with Specification 40 *For details see the detailed clause BCA* **J7D7**
J7D8 Lifts	Lifts must be configured to ensure artificial lighting and ventilation in the car are turned off when it is unused for 15 minutes and achieves the idle and standby energy performance level in Table J7D8a and achieves energy efficiency class in Table J7D8b or if a dedicated goods lift, energy efficiency class D in accordance with ISO 25745-2. *For details see the detailed clause BCA* **J7D8**
7D9 Escalators and moving walkways.	Escalators and moving walkways must have the ability to slow to between 0.2 m/s and 0.05 m/s when unused for more than 15 minutes. *For details see the detailed clause BCA* **J7D9**

Part J8- for heated water supply and swimming pool and spa pool plant	*Requirements /For this part are assessed as general provisions (BCA requirements only, because they are subject of service area of other professional practitioners /*
J8D2 Heated water supply	A heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.
Part J9- Energy monitoring and on-site distributed energy resources	
J9D3 Facilities for energy monitoring ***Comment:*** *Energy meters (1) configured to record the time-of-use consumption of gas and electricity must be installed.* *Energy meters (2) are required to be installed for air-conditioning plant (including, where appropriate, heating plant, cooling plant, and air handling fans), artificial lighting, appliance power, central hot water supply, internal transport devices (including lifts, escalators, and moving walkways where there is more than one serving the building), on-site renewable energy equipment, on-site electric vehicle charging equipment, on-site battery systems, and other ancillary plant. However, this requirement is not mandatory since the building's floor area is less than 2,500 m2.* *Energy meters, if installed, must be interlinked by a communication system that collates the time-of-use energy data to a single interface monitoring system where it can be stored, analysed and reviewed. Note that the provisions of (4) do not apply in this case since the building is not a Class 2 building and its floor area is not less than 2,500 m2.*	(1)A building or sole-occupancy unit with a floor area of more than 500 m2 must have energy meters configured to record the time-of-use consumption of gas and electricity. (2)A building with a floor area of more than 2 500 m2 must have energy meters configured to enable individual time-of-use energy data recording, in accordance with (3), of— air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and artificial lighting; and appliance power; and central hot water supply; and internal transport devices including lifts, escalators and moving walkways where there is more than one serving the building; and on-site renewable energy equipment; and on-site electric vehicle charging equipment; and on-site battery systems; and other ancillary plant. (3) Energy meters required by (2) must be interlinked by a communication system that collates the time-of-use energy data to a single interface monitoring system where it can be stored, analysed and reviewed. (4) The provisions of (2) do not apply to energy meters serving— a Class 2 building where the total floor area of the common areas is less than 500 m2: or individual sole-occupancy units with a floor area of less than 2 500 m2. *For details see the detailed clause BCA* **J9D3**
J9D4 Facilities for electric vehicle charging equipment ***Comment:*** *This regulation states that a carpark associated with certain types of buildings must have electrical distribution boards dedicated to electric vehicle charging in each storey of the carpark, according to Table J9D4. These distribution boards must be labelled for use with electric vehicle charging equipment and fitted with a charging control system that can manage and schedule charging in response to total building demand.* *The capacity of the charging circuits must meet specific requirements depending on the building class. The distribution boards must also be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in a certain percentage of car parking spaces associated with each building class and must contain space for individual sub-circuit electricity metering.*	(1) Subject to (2), a carpark associated with a Class 2, 3, 5, 6, 7b, 8 or 9 building must be provided with electrical distribution boards dedicated to electric vehicle charging in accordance with Table J9D4 in each storey of the carpark; and labelled to indicate use for electric vehicle charging equipment. (2) Electrical distribution boards dedicated to serving electric vehicle charging in a carpark must be fitted with a charging control system with the ability to manage and schedule charging of electric vehicles in response to total building demand; and when associated with a Class 2 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 11:00 pm to 7:00 am daily; and when associated with a Class 5 to 9 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 9:00 am to 5:00 pm daily; and when associated with a Class 3 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 48 kWh from 11:00 pm to 7:00 am daily; and be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in— 100% of the car parking spaces associated with a Class 2 building: or

This regulation does not apply to a stand-alone Class 7a building.	10% of car parking spaces associated with a Class 5 or 6 building; or 20% of car parking spaces associated with a Class 3, 7b, 8 or 9 building; and contain space of at least 36 mm width of DIN rail per outgoing circuit for individual sub-circuit electricity metering to record electricity use of electric vehicle charging equipment; and be labelled to indicate the use of the space required by (f) is for the future installation of metering equipment. Limitations J9D4 does not apply to a stand-alone Class 7a building. *For details see the detailed clause BCA* **J9D4**
J9D5 Facilities for solar photovoltaic and battery systems ***Comment:*** *The main electrical switchboard of the building must contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labeled for solar photovoltaic and battery systems. These spaces must be sized to accommodate solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area.* *At least 20% of the roof area of the building must be left clear for the installation of solar photovoltaic panels, except for buildings with installed solar photovoltaic panels on at least 20% of the roof area, an equivalent generation capacity elsewhere on-site, where 100% of the roof area is shaded for more than 70% of daylight hours, where the roof area is not more than 55 m2, or where more than 50% of the roof area is used as a terrace, car park, roof garden, roof light, or the like.* *The limitations state that the requirements for empty circuit breaker slots and DIN rail spaces do not apply to a building with solar photovoltaic panels installed on at least 20% of the roof area, and the requirements for battery systems do not apply to a building with battery systems installed.*	(1) The main electrical switchboard of a building must contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for a solar photovoltaic system and a battery system. They must be sized to accommodate the installation of solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area. (2) At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels, except for buildings— with installed solar photovoltaic panels on— at least 20% of the roof area; or an equivalent generation capacity elsewhere on-site; or where 100% of the roof area is shaded for more than 70% of daylight hours; or with a roof area of not more than 55 m2; or where more than 50% of the roof area is used as a terrace, car park, roof garden, roof light or the like. Limitations The requirements of J9D5(1)(a)(i) and (b) do not apply to a building with solar photovoltaic panels installed on at least 20% of the roof area. The requirements of J9D5(1)(a)(ii) and (b) do not apply to a building with battery systems installed. *For details see the detailed clause BCA* **J9D5**

Assessor: Zoran Cvetkovski
Thermal Performance Assessor
Home Sustainability Assessor
B.Eng.

Proposed Co living development
1246 Canterbury Road Roselands 2196

EVIDENCE OF COMPLIANCE CHECKLIST

The purpose of this checklist is to provide a comprehensive list of evidence that should be collected during the construction phase of the project to demonstrate compliance with the Energy Efficiency requirements of Section J of the BCA as identified during the design phase. Evidence should take the form of delivery receipts, photographs, or signed and dated statements from installers.

1. Building Fabric
   - Delivery receipts for insulation materials
   - Photographs of insulation installation
   - Statement from installer confirming compliance with R-value requirements
2. Building Sealing
   - Delivery receipts for sealing materials
   - Photographs of sealing installation
   - Statement from installer confirming compliance with air-leakage requirements
3. Air-conditioning and Ventilation
   - Delivery receipts for air-conditioning and ventilation equipment
   - Photographs of installation
   - Statement from installer confirming compliance with performance requirements
4. Artificial Lighting and Power
   - Delivery receipts for lighting and power equipment
   - Photographs of installation
   - Statement from installer confirming compliance with power density requirements
5. Heated Water Supply and Swimming Pool and Spa Pool Plant
   - Delivery receipts for hot water systems and swimming pool equipment
   - Photographs of installation
   - Statement from installer confirming compliance with performance requirements
6. Facilities for Energy Monitoring
   - Delivery receipts for energy monitoring equipment
   - Photographs of installation
   - Statement from installer confirming compliance with monitoring requirements
7. Solar Hot Water
   - Delivery receipts for solar hot water system
   - Photographs of installation
   - Statement from installer confirming compliance with performance requirements
8. Renewable Energy Systems
   - Delivery receipts for renewable energy systems
   - Photographs of installation
   - Statement from installer confirming compliance with performance requirements

Note: This checklist is not exhaustive and may be adapted to suit the specific requirements of the project. It is the responsibility of the project team to ensure all relevant evidence is collected and documented.

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Thermal Performance Assessor
Home Sustainability Assessor
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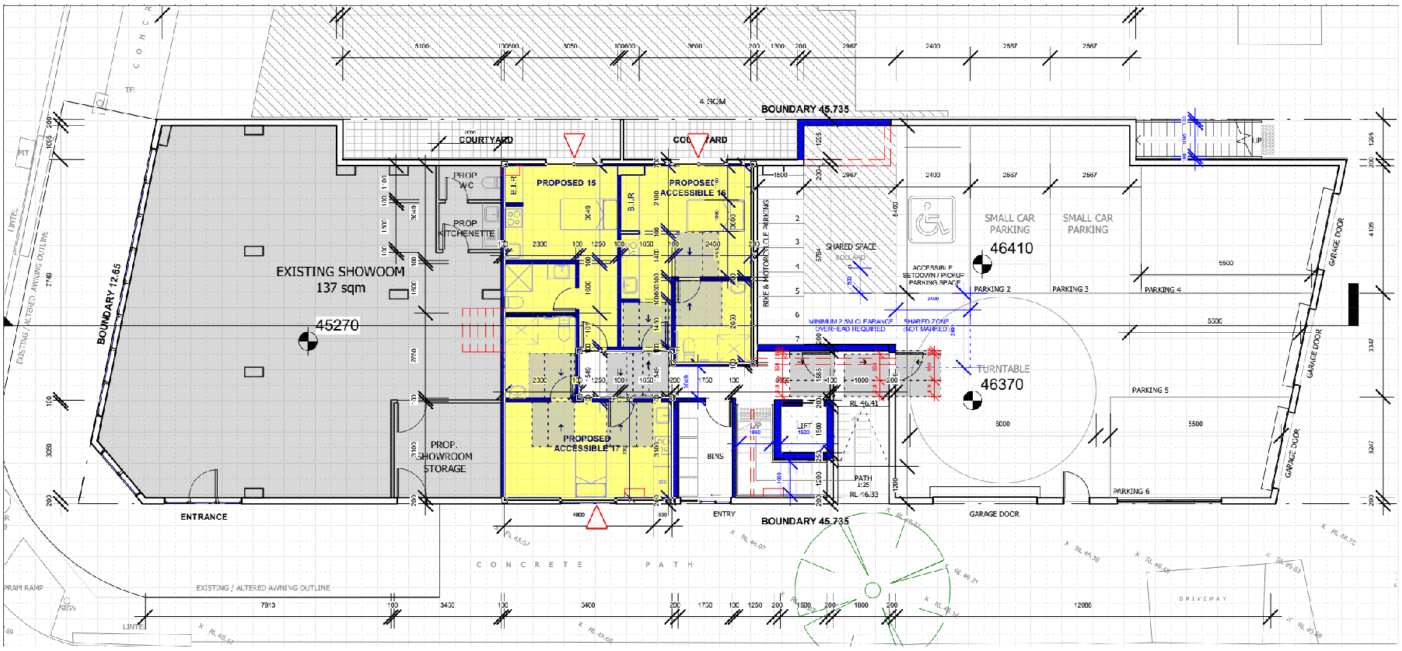
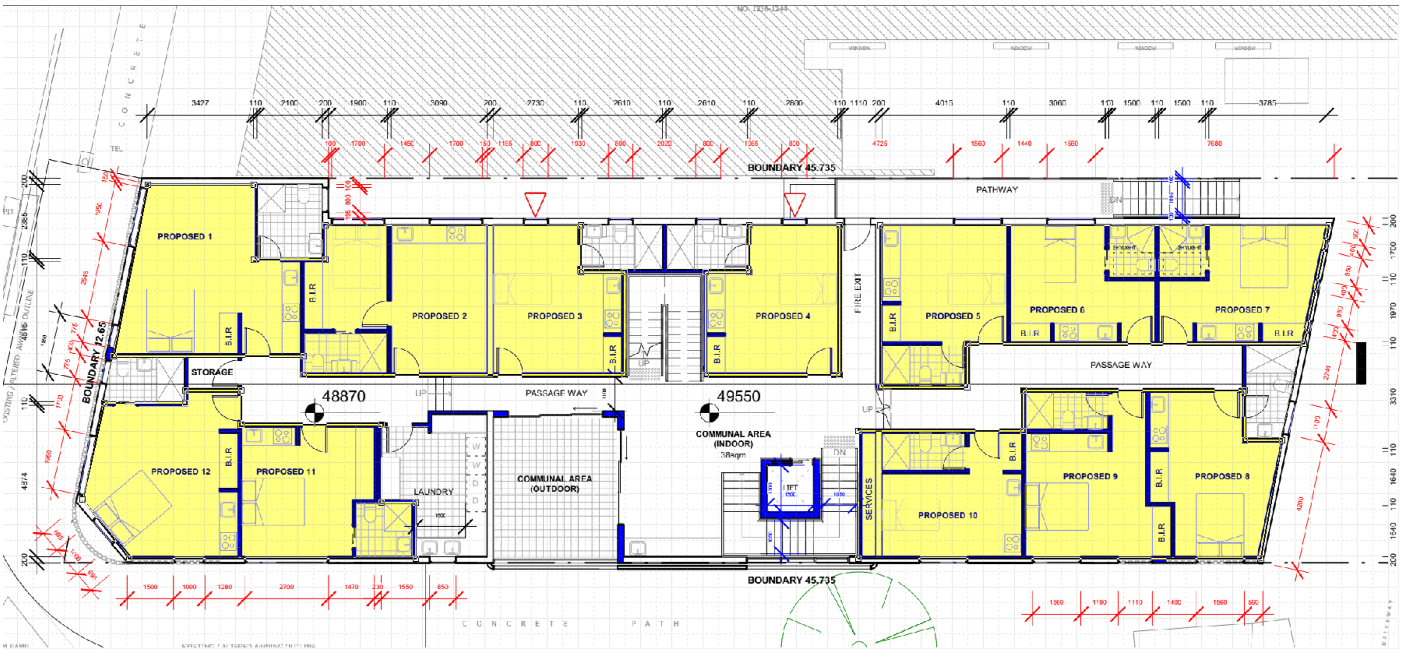
THERMAL ENVELOPE

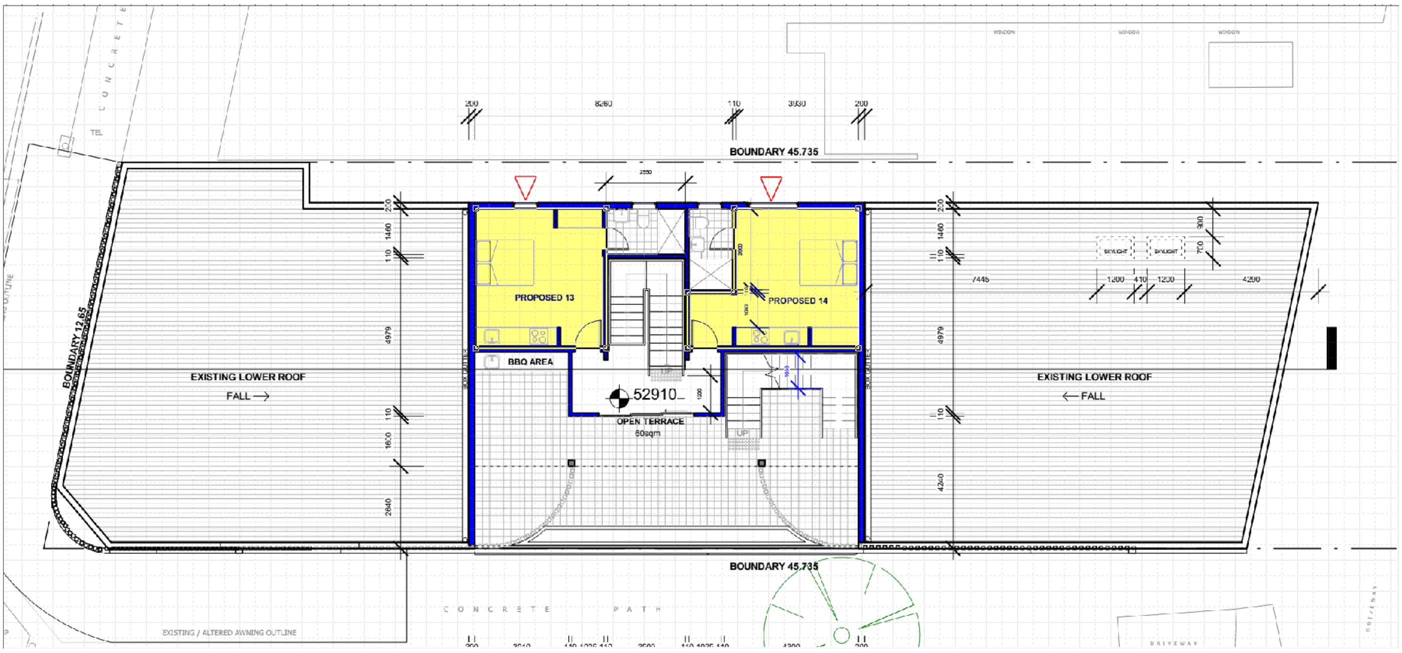
▽ -NEW GLAZING



GROUND FLOOR



FIRST FLOOR



SECOND FLOOR

Timber Frame-Metal Roof 3deg

speckel.

Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:12 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

Using Speckel

Speckel provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. 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 Requirements - 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 Provisions of each relevant area.

Results

Calculation	Result		Req.	Outcome
Total R-value	3.76	≥	3.70	Pass

Timber Frame-Metal Roof 3deg

speckel.

Method

Approach

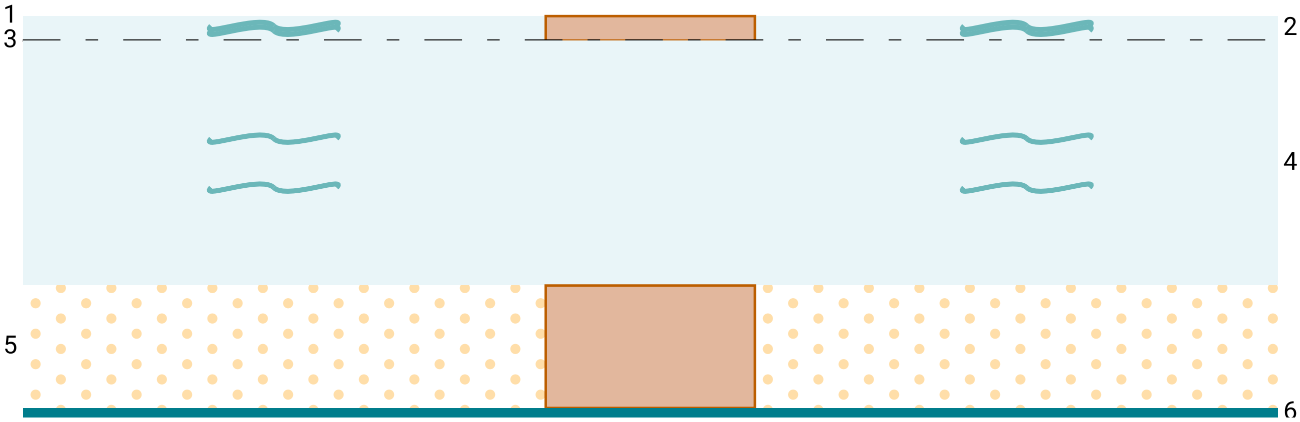
- This assessment has been performed in accordance with AS/NZS 4859.2 (2018) - Thermal insulation materials for buildings Part 2: Design which determines the total thermal resistance of insulation products used in thermal calculations. AS/NZS 4859.2 uses a prescriptive calculation methodology for determining the thermal resistance of airspaces with parallel bounding surfaces of varying emissivity including a range of conversion coefficients for multiple insulation types and a prescriptive reporting requirements for demonstrating total R-value and system R-value calculations.
- NZS 4214 (2006) - Methods of Determining the Total Thermal Resistance of Parts of Buildings - has been used in conjunction with and as a secondary reference within AS/NZS 4859.2 (2018) as it gives methods of determining the thermal resistance of building components and elements consisting of thermally homogeneous layers which may include air layers. This is to account for structural thermal bridging.

Assumptions/Limitations

- A single building class is assumed for this result.
- When Contact Resistance is enabled, a further 0.03 R-value is added to each side of Steel framing to account for imperfect contact between Steel and adjacent materials.
- Where there is a mismatch between framing and insulation dimensions in a Composite layer, the extra framing is treated as a discrete Bridged Air Cavity layer.
- When Cavity Bridging is enabled, R-values determined for Bridged Air Cavity layers are determined by:
  1. Considering the layer without framing (i.e. as an Air Cavity layer), then
  2. Performing a bridged layer calculation for the Bridged Air Cavity layer using the proposed framing geometry and materiality, and treating the Air Cavity as a monolithic material.
  3. Due to workflow limitations, impacts on temperature corrections due to Cavity Bridging are not considered
- When Air Cavity or Bridged Air Cavity layers are adjacent, they are combined to determine a single Air Cavity R-value.
- As per Example F2 of NZS 4214 (2006), Membrane layers are ignored when considering adjacent Air Cavity / Bridged Air Cavity layers for addition to Composite layers.
- Bridged Air Cavities which are exposed to the internal environment are ignored for R-value calculations

Timber Frame-Metal Roof 3deg

Inputs



Materials

Layer	Type	Product
1	External Material	Steel sheeting
		Slope: 3.0 °
		Material Width: 0.3 mm
		Conductivity: 47.500 W/(m.K)
2	Bridged Air Cavity	
		Slope: 3.0 °
		Layer Width: 35.0 mm
		Ventilation Area: 1000.0 mm² (Slightly Ventilated External)
3	Membrane	Ametalin Ametalin CeaseFire™
		Slope: 3.0 °
		Layer Width: 0.17 mm
		External Emissivity: 0.9
		Internal Emissivity: 0.9
		Material Facing: External
4	Air Cavity	
		Layer Width: 350.0 mm
		Ventilation Area: 1000.0 mm² (Slightly Ventilated Internal)
5	Composite	Knauf Insulation Earthwool® Ceiling Batt
		Slope: 0.0 °

Timber Frame-Metal Roof 3deg

Layer	Type	Product
		Material Width: 175.0 mm
		Conductivity: 0.050 W/(m.K) (R-value: 3.50 m².K/W)
		Material Positioned: External
		Vertically-Repeating Framing
		Material - Timber
		Conductivity - 0.16 W/(m.K)
		Vertical Spacing - 600 mm
		Projection - 175 mm
		Frame Height - 50 mm
6	Internal Material	Gypsum plasterboard
		Slope: 0.0 °
		Material Width: 13.0 mm
		Conductivity: 0.170 W/(m.K)

Timber Frame-Metal Roof 3deg

Detailed Results

Thermally-Bridged Results

Summer

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.01
2	External Material	-	-	
3	Bridged Air Cavity + Air Cavity + Composite	-	-	3.5
	Layer / Layer / Framing (Vertical)	8	1.64	
	Layer / Layer / Layer	92	3.89	
4	Internal Material	-	-	0.08
5	Internal Surface	-	-	0.16
			Total R-value (m².K/W)	3.76

Winter

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.01
2	External Material	-	-	
3	Bridged Air Cavity + Air Cavity + Composite	-	-	3.15
	Layer / Layer / Framing (Vertical)	8	1.18	
	Layer / Layer / Layer	92	3.68	
4	Internal Material	-	-	0.08
5	Internal Surface	-	-	0.11
			Total R-value (m².K/W)	3.35

Temperature-Corrected Results

Summer

Timber Frame-Metal Roof 3deg

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			36.00	35.95	35.98	0.05	0.01
2	External Material	0.9	0.9	35.95	35.95	35.95	0.00	0.00
3	Bridged Air Cavity			35.95	35.68	35.81	0.27	0.08
4	Membrane	0.9	0.9	35.68	35.68	35.68	0.00	0.00
5	Air Cavity			35.68	34.17	34.93	1.50	0.46
6	Composite	0.9	0.9	34.17	24.77	29.47	9.40	2.87
7	Internal Material	0.9	0.9	24.77	24.52	24.65	0.25	0.08
8	Internal Surface			24.52	24.00	24.26	0.52	0.16

Winter

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			12.00	12.03	12.01	0.03	0.01
2	External Material	0.9	0.9	12.03	12.03	12.03	0.00	0.00
3	Bridged Air Cavity			12.03	12.18	12.10	0.15	0.08
4	Membrane	0.9	0.9	12.18	12.18	12.18	0.00	0.00
5	Air Cavity			12.18	12.18	12.18	0.00	0.00
6	Composite	0.9	0.9	12.18	17.66	14.92	5.49	3.04
7	Internal Material	0.9	0.9	17.66	17.80	17.73	0.14	0.08
8	Internal Surface			17.80	18.00	17.90	0.20	0.11

Timber Frame-Metal Roof 3deg

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Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:13 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

Using Speckel

Speckel provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. 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 Requirements - 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 Provisions of each relevant area.

Results

Calculation	Result		Req.	Outcome
Total R-value	3.86	≥	3.70	Pass

Method

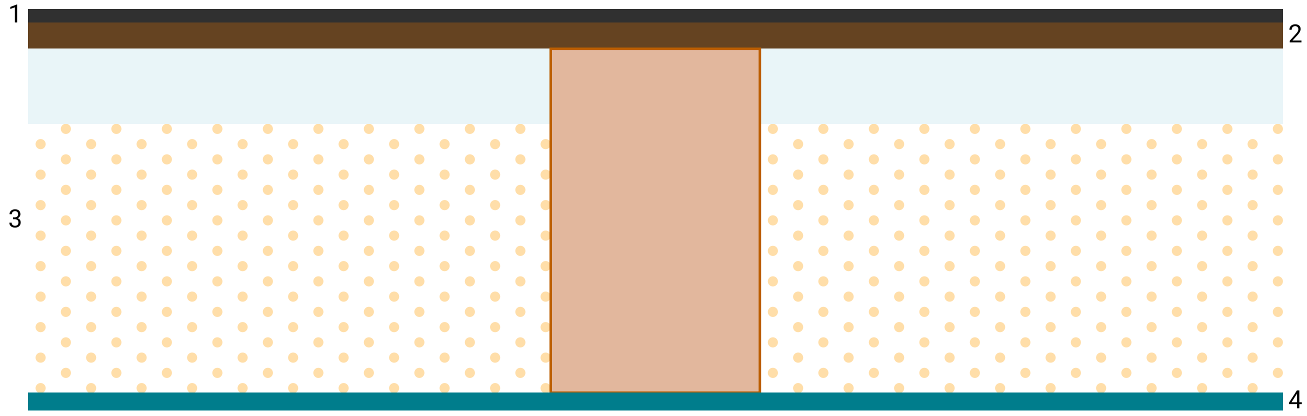
Approach

- This assessment has been performed in accordance with AS/NZS 4859.2 (2018) - Thermal insulation materials for buildings Part 2: Design which determines the total thermal resistance of insulation products used in thermal calculations. AS/NZS 4859.2 uses a prescriptive calculation methodology for determining the thermal resistance of airspaces with parallel bounding surfaces of varying emissivity including a range of conversion coefficients for multiple insulation types and a prescriptive reporting requirements for demonstrating total R-value and system R-value calculations.
- NZS 4214 (2006) - Methods of Determining the Total Thermal Resistance of Parts of Buildings - has been used in conjunction with and as a secondary reference within AS/NZS 4859.2 (2018) as it gives methods of determining the thermal resistance of building components and elements consisting of thermally homogeneous layers which may include air layers. This is to account for structural thermal bridging.

Assumptions/Limitations

- A single building class is assumed for this result.
- When Contact Resistance is enabled, a further 0.03 R-value is added to each side of Steel framing to account for imperfect contact between Steel and adjacent materials.
- Where there is a mismatch between framing and insulation dimensions in a Composite layer, the extra framing is treated as a discrete Bridged Air Cavity layer.
- When Cavity Bridging is enabled, R-values determined for Bridged Air Cavity layers are determined by:
  1. Considering the layer without framing (i.e. as an Air Cavity layer), then
  2. Performing a bridged layer calculation for the Bridged Air Cavity layer using the proposed framing geometry and materiality, and treating the Air Cavity as a monolithic material.
  3. Due to workflow limitations, impacts on temperature corrections due to Cavity Bridging are not considered
- When Air Cavity or Bridged Air Cavity layers are adjacent, they are combined to determine a single Air Cavity R-value.
- As per Example F2 of NZS 4214 (2006), Membrane layers are ignored when considering adjacent Air Cavity / Bridged Air Cavity layers for addition to Composite layers.
- Bridged Air Cavities which are exposed to the internal environment are ignored for R-value calculations

Inputs



Materials

Layer	Type	Product
1	External Material	Ceramic Tiles
		Slope: 0.0 °
		Material Width: 10.0 mm
		Conductivity: 6.000 W/(m.K)
		Note: Settings of this material have been customised.
2	Bracing	Plywood (Heavyweight)
		Slope: 0.0 °
		Material Width: 19.0 mm
		Conductivity: 0.150 W/(m.K)
		Note: Settings of this material have been customised.
3	Composite	Knauf Insulation Earthwool® Ceiling Batt
		Slope: 0.0 °
		Material Width: 195.0 mm
		Conductivity: 0.049 W/(m.K) (R-value: 4.00 m².K/W)
		Material Positioned: Internal
		Vertically-Repeating Framing
		Material - Timber
		Conductivity - 0.16 W/(m.K)

Layer	Type	Product
		Vertical Spacing - 600 mm
		Projection - 250 mm
		Frame Height - 50 mm
4	Internal Material	Gypsum plasterboard
		Slope: 0.0 °
		Material Width: 13.0 mm
		Conductivity: 0.170 W/(m.K)

Detailed Results

Thermally-Bridged Results

Summer

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.03
2	External Material	-	-	
3	Bracing	-	-	0.13
4	Bridged Air Cavity + Composite	-	-	3.47
	Layer / Framing (Vertical)	8	1.39	
	Layer / Layer	92	3.98	
5	Internal Material	-	-	0.08
6	Internal Surface	-	-	0.16
			Total R-value (m².K/W)	3.86

Winter

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.03
2	External Material	-	-	
3	Bracing	-	-	0.13
4	Bridged Air Cavity + Composite	-	-	3.66
	Layer / Framing (Vertical)	8	1.38	
	Layer / Layer	92	4.27	
5	Internal Material	-	-	0.08
6	Internal Surface	-	-	0.11
			Total R-value (m².K/W)	4

Temperature-Corrected Results

Summer

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			36.00	35.91	35.95	0.09	0.03
2	External Material	0.9	0.9	35.91	35.90	35.90	0.01	0.00
3	Bracing	0.9	0.9	35.90	35.50	35.70	0.40	0.13
4	Bridged Air Cavity			35.50	34.97	35.24	0.53	0.17
5	Composite	0.9	0.9	34.97	24.74	29.86	10.23	3.26
6	Internal Material	0.9	0.9	24.74	24.50	24.62	0.24	0.08
7	Internal Surface			24.50	24.00	24.25	0.50	0.16

Winter

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			12.00	12.05	12.02	0.05	0.03
2	External Material	0.9	0.9	12.05	12.05	12.05	0.00	0.00
3	Bracing	0.9	0.9	12.05	12.24	12.14	0.19	0.13
4	Bridged Air Cavity			12.24	12.48	12.36	0.24	0.16
5	Composite	0.9	0.9	12.48	17.72	15.10	5.23	3.46
6	Internal Material	0.9	0.9	17.72	17.83	17.78	0.12	0.08
7	Internal Surface			17.83	18.00	17.92	0.17	0.11

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Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:37 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

Using Speckel

Speckel provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. 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 Requirements - 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 Provisions of each relevant area.

Results

Calculation	Result		Req.	Outcome
Total R-value	1.60	≥	1.40	Pass

Method

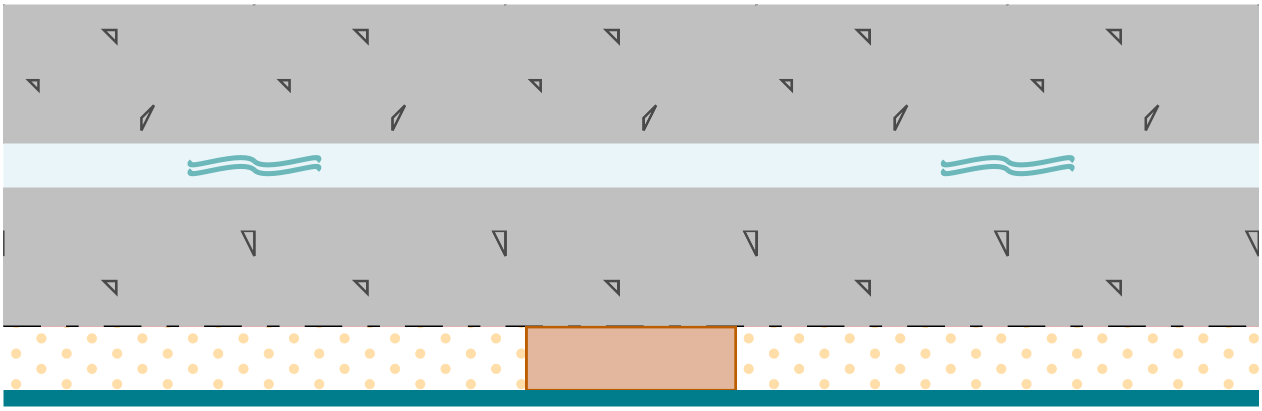
Approach

- This assessment has been performed in accordance with AS/NZS 4859.2 (2018) - Thermal insulation materials for buildings Part 2: Design which determines the total thermal resistance of insulation products used in thermal calculations. AS/NZS 4859.2 uses a prescriptive calculation methodology for determining the thermal resistance of airspaces with parallel bounding surfaces of varying emissivity including a range of conversion coefficients for multiple insulation types and a prescriptive reporting requirements for demonstrating total R-value and system R-value calculations.
- NZS 4214 (2006) - Methods of Determining the Total Thermal Resistance of Parts of Buildings - has been used in conjunction with and as a secondary reference within AS/NZS 4859.2 (2018) as it gives methods of determining the thermal resistance of building components and elements consisting of thermally homogeneous layers which may include air layers. This is to account for structural thermal bridging.

Assumptions/Limitations

- A single building class is assumed for this result.
- When Contact Resistance is enabled, a further 0.03 R-value is added to each side of Steel framing to account for imperfect contact between Steel and adjacent materials.
- Where there is a mismatch between framing and insulation dimensions in a Composite layer, the extra framing is treated as a discrete Bridged Air Cavity layer.
- When Cavity Bridging is enabled, R-values determined for Bridged Air Cavity layers are determined by:
  1. Considering the layer without framing (i.e. as an Air Cavity layer), then
  2. Performing a bridged layer calculation for the Bridged Air Cavity layer using the proposed framing geometry and materiality, and treating the Air Cavity as a monolithic material.
  3. Due to workflow limitations, impacts on temperature corrections due to Cavity Bridging are not considered
- When Air Cavity or Bridged Air Cavity layers are adjacent, they are combined to determine a single Air Cavity R-value.
- As per Example F2 of NZS 4214 (2006), Membrane layers are ignored when considering adjacent Air Cavity / Bridged Air Cavity layers for addition to Composite layers.
- Bridged Air Cavities which are exposed to the internal environment are ignored for R-value calculations

Inputs



Materials

Layer	Type	Product
1	Concrete / Masonry	Clay brick – 2.75 kg
		Material Width: 110.0 mm
		Conductivity: 0.550 W/(m.K)
2	Air Cavity	
		Layer Width: 35.0 mm
		Ventilation Area: 1000.0 mm² (Slightly Ventilated External)
3	Concrete / Masonry	Clay brick – 2.75 kg
		Material Width: 110.0 mm
		Conductivity: 0.550 W/(m.K)
4	Membrane	Class 4 - Vapour Permeable Membrane - 3.9 μg/N.s
		Layer Width: 0.6 mm
5	Composite	Knauf Insulation DriTherm® Cavity slab
		Material Width: 50.0 mm
		Conductivity: 0.036 W/(m.K) (R-value: 1.40 m².K/W)
		Material Positioned: External
		Stud Framing
		Material - Timber
		Conductivity - 0.16 W/(m.K)

Layer	Type	Product
		Horizontal Spacing - 600 mm
		Noggings - 1
		Projection - 50 mm
		Frame Width - 35 mm
		Frame Height - 35 mm
		Nogging Height - 35 mm
6	Internal Material	Gypsum plasterboard
		Material Width: 13.0 mm
		Conductivity: 0.170 W/(m.K)

Detailed Results

Thermally-Bridged Results

Summer

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.01
2	Concrete / Masonry	-	-	0.1
3	Air Cavity	-	-	0.07
4	Concrete / Masonry	-	-	0.2
5	Composite	-	-	1.01
	Framing (Horizontal)	5.7	0.31	
	Framing (Nogging)	1.4	0.31	
	Framing (Vertical)	2.9	0.31	
	Layer	90	1.34	
6	Internal Material	-	-	0.08
7	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	1.6

Winter

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.01
2	Concrete / Masonry	-	-	0.1
3	Air Cavity	-	-	0.09
4	Concrete / Masonry	-	-	0.2
5	Composite	-	-	1.06
	Framing (Horizontal)	5.7	0.31	
	Framing (Nogging)	1.4	0.31	
	Framing (Vertical)	2.9	0.31	
	Layer	90	1.44	
6	Internal Material	-	-	0.08

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
7	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	1.66

Temperature-Corrected Results

Summer

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			36.00	35.89	35.94	0.11	0.01
2	Concrete / Masonry	0.9	0.9	35.89	35.14	35.51	0.75	0.10
3	Air Cavity			35.14	34.57	34.85	0.56	0.07
4	Concrete / Masonry	0.9	0.9	34.57	33.07	33.82	1.50	0.20
5	Membrane	0.9	0.9	33.07	33.07	33.07	0.00	0.00
6	Composite	0.9	0.9	33.07	25.48	29.27	7.59	1.01
7	Internal Material	0.9	0.9	25.48	24.90	25.19	0.57	0.08
8	Internal Surface			24.90	24.00	24.45	0.90	0.12

Winter

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			12.00	12.05	12.03	0.05	0.01
2	Concrete / Masonry	0.9	0.9	12.05	12.42	12.24	0.36	0.10
3	Air Cavity			12.42	12.74	12.58	0.32	0.09
4	Concrete / Masonry	0.9	0.9	12.74	13.46	13.10	0.72	0.20
5	Membrane	0.9	0.9	13.46	13.46	13.46	0.00	0.00
6	Composite	0.9	0.9	13.46	17.29	15.38	3.83	1.06
7	Internal Material	0.9	0.9	17.29	17.57	17.43	0.28	0.08
8	Internal Surface			17.57	18.00	17.78	0.43	0.12

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Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:09 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

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Results

Calculation	Result		Req.	Outcome
Total R-value	2.01	≥	1.40	Pass

Method

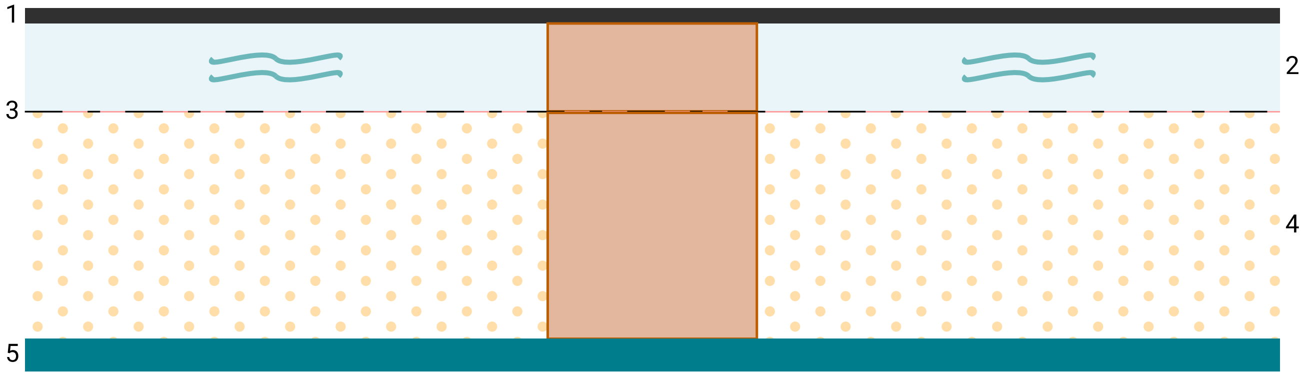
Approach

- This assessment has been performed in accordance with AS/NZS 4859.2 (2018) - Thermal insulation materials for buildings Part 2: Design which determines the total thermal resistance of insulation products used in thermal calculations. AS/NZS 4859.2 uses a prescriptive calculation methodology for determining the thermal resistance of airspaces with parallel bounding surfaces of varying emissivity including a range of conversion coefficients for multiple insulation types and a prescriptive reporting requirements for demonstrating total R-value and system R-value calculations.
- NZS 4214 (2006) - Methods of Determining the Total Thermal Resistance of Parts of Buildings - has been used in conjunction with and as a secondary reference within AS/NZS 4859.2 (2018) as it gives methods of determining the thermal resistance of building components and elements consisting of thermally homogeneous layers which may include air layers. This is to account for structural thermal bridging.

Assumptions/Limitations

- A single building class is assumed for this result.
- When Contact Resistance is enabled, a further 0.03 R-value is added to each side of Steel framing to account for imperfect contact between Steel and adjacent materials.
- Where there is a mismatch between framing and insulation dimensions in a Composite layer, the extra framing is treated as a discrete Bridged Air Cavity layer.
- When Cavity Bridging is enabled, R-values determined for Bridged Air Cavity layers are determined by:
  1. Considering the layer without framing (i.e. as an Air Cavity layer), then
  2. Performing a bridged layer calculation for the Bridged Air Cavity layer using the proposed framing geometry and materiality, and treating the Air Cavity as a monolithic material.
  3. Due to workflow limitations, impacts on temperature corrections due to Cavity Bridging are not considered
- When Air Cavity or Bridged Air Cavity layers are adjacent, they are combined to determine a single Air Cavity R-value.
- As per Example F2 of NZS 4214 (2006), Membrane layers are ignored when considering adjacent Air Cavity / Bridged Air Cavity layers for addition to Composite layers.
- Bridged Air Cavities which are exposed to the internal environment are ignored for R-value calculations

Inputs



Materials

Layer	Type	Product
1	External Material	Fibre-cement
		Material Width: 6.0 mm
		Conductivity: 0.250 W/(m.K)
2	Bridged Air Cavity	
		Layer Width: 35.0 mm
		Ventilation Area: 1000.0 mm² (Slightly Ventilated External)
3	Membrane	Class 4 - Vapour Permeable Membrane - 3.9 µg/N.s
		Layer Width: 0.6 mm
4	Composite	Glass Wool (Wall)
		Material Width: 90.0 mm
		Conductivity: 0.040 W/(m.K)
		Material Positioned: External
		Stud Framing
		Material - Timber
		Conductivity - 0.16 W/(m.K)
		Horizontal Spacing - 600 mm
		Noggings - 1
		Projection - 90 mm

Layer	Type	Product
		Frame Width - 35 mm
		Frame Height - 35 mm
		Nogging Height - 25 mm
5	Internal Material	Gypsum plasterboard
		Material Width: 13.0 mm
		Conductivity: 0.170 W/(m.K)

Detailed Results

Thermally-Bridged Results

Summer

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.01
2	External Material	-	-	0.01
3	Bridged Air Cavity + Composite	-	-	1.79
	Layer / Framing (Horizontal)	5.7	0.64	
	Layer / Framing (Nogging)	1	0.64	
	Layer / Framing (Vertical)	2.9	0.64	
	Layer / Layer	90.4	2.21	
4	Internal Material	-	-	0.08
5	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	2.01

Winter

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.01
2	External Material	-	-	0.01
3	Bridged Air Cavity + Composite	-	-	1.91
	Layer / Framing (Horizontal)	5.7	0.65	
	Layer / Framing (Nogging)	1	0.65	
	Layer / Framing (Vertical)	2.9	0.65	
	Layer / Layer	90.4	2.4	
4	Internal Material	-	-	0.08
5	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	2.14

Temperature-Corrected Results

Summer

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			36.00	35.91	35.95	0.09	0.01
2	External Material	0.9	0.9	35.91	35.84	35.87	0.07	0.01
3	Bridged Air Cavity			35.84	35.39	35.61	0.45	0.07
4	Membrane	0.9	0.9	35.39	35.39	35.39	0.00	0.00
5	Composite	0.9	0.9	35.39	25.19	30.29	10.20	1.69
6	Internal Material	0.9	0.9	25.19	24.73	24.96	0.46	0.08
7	Internal Surface			24.73	24.00	24.36	0.73	0.12

Winter

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			12.00	12.04	12.02	0.04	0.01
2	External Material	0.9	0.9	12.04	12.08	12.06	0.03	0.01
3	Bridged Air Cavity			12.08	12.33	12.21	0.26	0.09
4	Membrane	0.9	0.9	12.33	12.33	12.33	0.00	0.00
5	Composite	0.9	0.9	12.33	17.44	14.89	5.10	1.78
6	Internal Material	0.9	0.9	17.44	17.66	17.55	0.22	0.08
7	Internal Surface			17.66	18.00	17.83	0.34	0.12

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Lightweight Wall-Against unconditioned spaces

speckel.

Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:10 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

Using Speckel

Speckel provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. 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 Requirements - 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 Provisions of each relevant area.

Results

Calculation	Result		Req.	Outcome
Total R-value	1.94	≥	1.40	Pass

Method

Approach

- This assessment has been performed in accordance with AS/NZS 4859.2 (2018) - Thermal insulation materials for buildings Part 2: Design which determines the total thermal resistance of insulation products used in thermal calculations. AS/NZS 4859.2 uses a prescriptive calculation methodology for determining the thermal resistance of airspaces with parallel bounding surfaces of varying emissivity including a range of conversion coefficients for multiple insulation types and a prescriptive reporting requirements for demonstrating total R-value and system R-value calculations.
- NZS 4214 (2006) - Methods of Determining the Total Thermal Resistance of Parts of Buildings - has been used in conjunction with and as a secondary reference within AS/NZS 4859.2 (2018) as it gives methods of determining the thermal resistance of building components and elements consisting of thermally homogeneous layers which may include air layers. This is to account for structural thermal bridging.

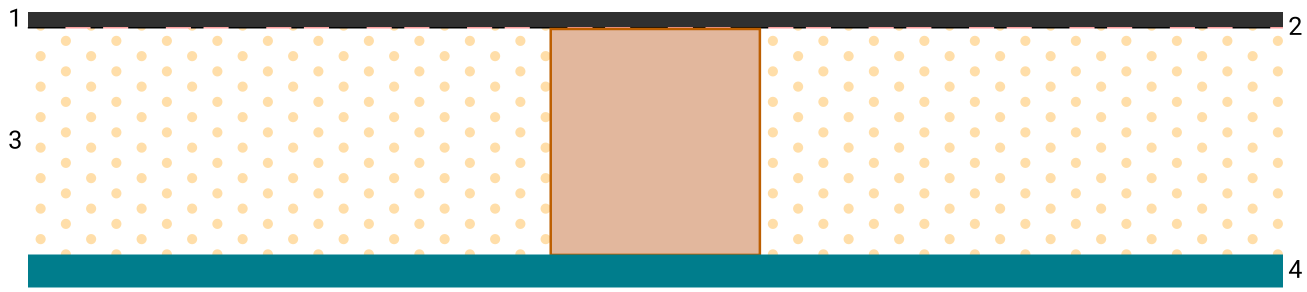
Assumptions/Limitations

- A single building class is assumed for this result.
- When Contact Resistance is enabled, a further 0.03 R-value is added to each side of Steel framing to account for imperfect contact between Steel and adjacent materials.
- Where there is a mismatch between framing and insulation dimensions in a Composite layer, the extra framing is treated as a discrete Bridged Air Cavity layer.
- When Cavity Bridging is enabled, R-values determined for Bridged Air Cavity layers are determined by:
  1. Considering the layer without framing (i.e. as an Air Cavity layer), then
  2. Performing a bridged layer calculation for the Bridged Air Cavity layer using the proposed framing geometry and materiality, and treating the Air Cavity as a monolithic material.
  3. Due to workflow limitations, impacts on temperature corrections due to Cavity Bridging are not considered
- When Air Cavity or Bridged Air Cavity layers are adjacent, they are combined to determine a single Air Cavity R-value.
- As per Example F2 of NZS 4214 (2006), Membrane layers are ignored when considering adjacent Air Cavity / Bridged Air Cavity layers for addition to Composite layers.
- Bridged Air Cavities which are exposed to the internal environment are ignored for R-value calculations

Lightweight Wall-Against unconditioned spaces

speckel.

Inputs



Materials

Layer	Type	Product
1	External Material	Fibre-cement
		Material Width: 6.0 mm
		Conductivity: 0.250 W/(m.K)
2	Membrane	Class 4 - Vapour Permeable Membrane - 3.9 µg/N.s
		Layer Width: 0.6 mm
3	Composite	Glass Wool (Wall)
		Material Width: 90.0 mm
		Conductivity: 0.040 W/(m.K)
		Material Positioned: External
		Stud Framing
		Material - Timber
		Conductivity - 0.16 W/(m.K)
		Horizontal Spacing - 600 mm
		Noggings - 1
		Projection - 90 mm
		Frame Width - 35 mm
		Frame Height - 35 mm
		Nogging Height - 25 mm

Lightweight Wall-Against unconditioned spaces

Layer	Type	Product
4	Internal Material	Gypsum plasterboard
		Material Width: 13.0 mm
		Conductivity: 0.170 W/(m.K)

Lightweight Wall-Against unconditioned spaces

Detailed Results

Thermally-Bridged Results

Summer

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.03
2	External Material	-	-	0.02
3	Composite	-	-	1.69
	Framing (Horizontal)	5.7	0.56	
	Framing (Nogging)	1	0.56	
	Framing (Vertical)	2.9	0.56	
	Layer	90.4	2.14	
4	Internal Material	-	-	0.08
5	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	1.94

Winter

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.03
2	External Material	-	-	0.02
3	Composite	-	-	1.78
	Framing (Horizontal)	5.7	0.56	
	Framing (Nogging)	1	0.56	
	Framing (Vertical)	2.9	0.56	
	Layer	90.4	2.32	
4	Internal Material	-	-	0.08
5	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	2.03

Temperature-Corrected Results

Summer

Lightweight Wall-Against unconditioned spaces

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			36.00	35.81	35.91	0.19	0.03
2	External Material	0.9	0.9	35.81	35.67	35.74	0.15	0.02
3	Membrane	0.9	0.9	35.67	35.67	35.67	0.00	0.00
4	Composite	0.9	0.9	35.67	25.22	30.44	10.45	1.69
5	Internal Material	0.9	0.9	25.22	24.74	24.98	0.47	0.08
6	Internal Surface			24.74	24.00	24.37	0.74	0.12

Winter

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			12.00	12.09	12.04	0.09	0.03
2	External Material	0.9	0.9	12.09	12.16	12.12	0.07	0.02
3	Membrane	0.9	0.9	12.16	12.16	12.16	0.00	0.00
4	Composite	0.9	0.9	12.16	17.42	14.79	5.26	1.78
5	Internal Material	0.9	0.9	17.42	17.65	17.53	0.23	0.08
6	Internal Surface			17.65	18.00	17.82	0.35	0.12

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Façade

Report

Calculator

Project Summary

Date
19/09/2024

Name
Zoran Cvetkovski

Company
Sustainability-Z Pty Limited

Position
GP

Building Name / Address
1246 Canterbury Road, Roselands, NSW 2196
0

Building State
NSW

Climate Zone
Climate Zone 5 - Warm temperate

Building Classification
Class 3 - other

Storeys Above Ground
1

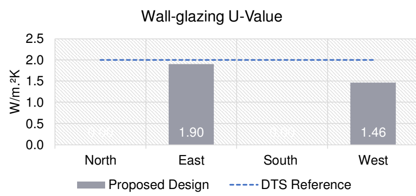
Tool Version
1.2 (June 2020)

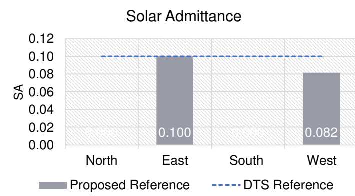
The summary below provides an overview of where compliance has been achieved for Specification NCC 2022 DTS method -J4D6Walls and glazing

Compliant Solution =
Non-Compliant Solution =

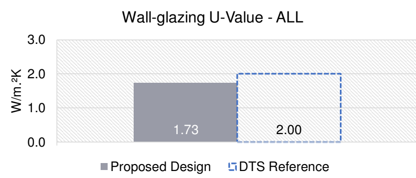
	Method 1 North	Method 1 East	Method 1 South	Method 1 West	Method 2 All
Wall-glazing U-Value (W/m².K)		1.90		1.46	1.73
Solar Admittance		0.10		0.08	
AC Energy Value					3

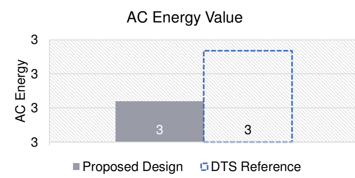
Method 1





Method 2





Project Details

	North	East	South	West
Glazing Area (m²)		9.12		2.16
Glazing to Façade Ratio		40%		15%
Glazing References		SD		W
Glazing System Types		DEFAULTS (GENERIC)		DEFAULTS (GENERIC)
Glass Types		DEFAULTS (GENERIC)		DEFAULTS (GENERIC)
Frame Types		DEFAULTS (GENERIC)		
Average Glazing U-Value (W/m².K)		3.70		5.80
Average Glazing SHGC	0.00	0.25	0.00	0.55
Shading Systems	Horizontal Device	Horizontal Device	Horizontal Device	Horizontal Device
Wall Area (m²)		13.7		12.4
Wall Types		Wall		Wall
Methodology	Wall			
Wall Construction		Min Wall R vallue		
Wall Thickness		150		150

Average Wall R-value (m².K/W)		1.41		1.41
Solar Absorptance	0.6	0.6	0.6	0.6

Façade

Report

Calculator

Project Summary

Date
19/09/2024

Name
Zoran Cvetkovski

Company
Sustainability-Z Pty Limited

Position
GP

Building Name / Address
1246 Canterbury Road, Roselands, NSW 2196
0

Building State
NSW

Climate Zone
Climate Zone 5 - Warm temperate

Building Classification
Class 3 - other

Storeys Above Ground
2

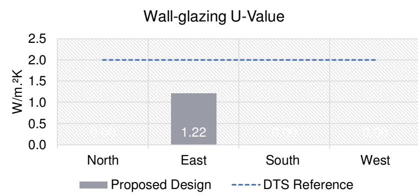
Tool Version
1.2 (June 2020)

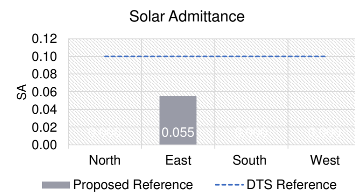
The summary below provides an overview of where compliance has been achieved for Specification NCC 2022 DTS method -J4D6Walls and glazing

Compliant Solution =
Non-Compliant Solution =

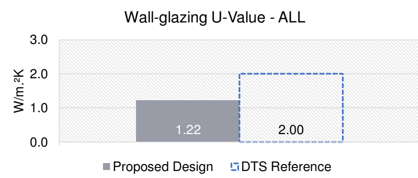
	Method 1 North	Method 1 East	Method 1 South	Method 1 West	Method 2 All
Wall-glazing U-Value (W/m².K)		1.22			1.22
Solar Admittance		0.05			
AC Energy Value					0

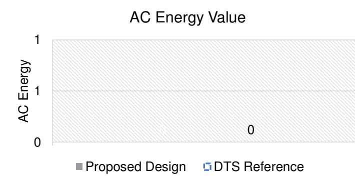
Method 1





Method 2





Project Details

	North	East	South	West
Glazing Area (m²)		1.44		
Glazing to Façade Ratio		10%		
Glazing References		W		
Glazing System Types		DEFAULTS (GENERIC)		
Glass Types		DEFAULTS (GENERIC)		
Frame Types		DEFAULTS (GENERIC)		
Average Glazing U-Value (W/m².K)		5.80		
Average Glazing SHGC	0.00	0.55	0.00	0.00
Shading Systems	Horizontal Device	Horizontal Device	Horizontal Device	Horizontal Device
Wall Area (m²)		13		
Wall Types		Wall		
Methodology	Wall			
Wall Construction		Min Wall R vallue		
Wall Thickness		150		

Average Wall R-value (m².K/W)		1.41		
Solar Absorptance	0.6	0.6	0.6	0.6

Façade

Report

Calculator

Project Summary

Date
19/09/2024

Name
Zoran Cvetkovski

Company
Sustainability-Z Pty Limited

Position
GP

Building Name / Address
1246 Canterbury Road, Roselands, NSW 2196
0

Building State
NSW

Climate Zone
Climate Zone 5 - Warm temperate

Building Classification
Class 3 - other

Storeys Above Ground
3

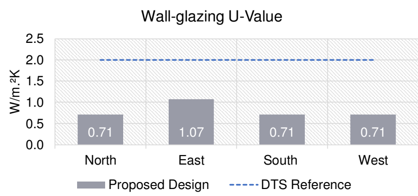
Tool Version
1.2 (June 2020)

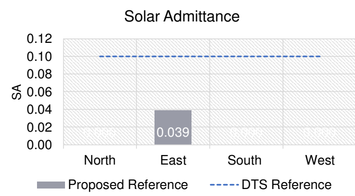
The summary below provides an overview of where compliance has been achieved for Specification NCC 2022 DTS method -J4D6Walls and glazing

Compliant Solution =
Non-Compliant Solution =

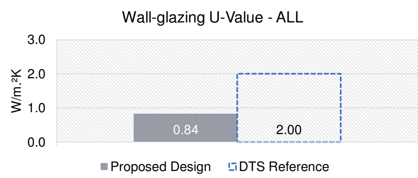
	Method 1 North	Method 1 East	Method 1 South	Method 1 West	Method 2 All
Wall-glazing U-Value (W/m².K)	0.71	1.07	0.71	0.71	0.84
Solar Admittance		0.04			
AC Energy Value					0

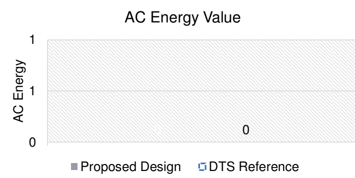
Method 1





Method 2





Project Details

	North	East	South	West
Glazing Area (m²)	0	1.44	0	0
Glazing to Façade Ratio	0%	7%	0%	0%
Glazing References		W		
Glazing System Types		DEFAULTS (GENERIC)		
Glass Types		DEFAULTS (GENERIC)		
Frame Types		DEFAULTS (GENERIC)		
Average Glazing U-Value (W/m².K)		5.80		
Average Glazing SHGC	0.00	0.55	0.00	0.00
Shading Systems	Horizontal Device	Horizontal Device	Horizontal Device	Horizontal Device
Wall Area (m²)	11.9	19	11.9	14
Wall Types	Wall	Wall	Wall	Wall
Methodology	Wall			
Wall Construction	Min Wall R vallue	Min Wall R vallue	Min Wall R vallue	Min Wall R vallue
Wall Thickness	150	150	150	150

Average Wall R-value (m².K/W)	1.41	1.41	1.41	1.41
Solar Absorptance	0.6	0.6	0.6	0.6

Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:07 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

Using Speckel

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Results

Calculation	Result		Req.	Outcome
Total R-value	2.04	≥	2.00	Pass

Method

Approach

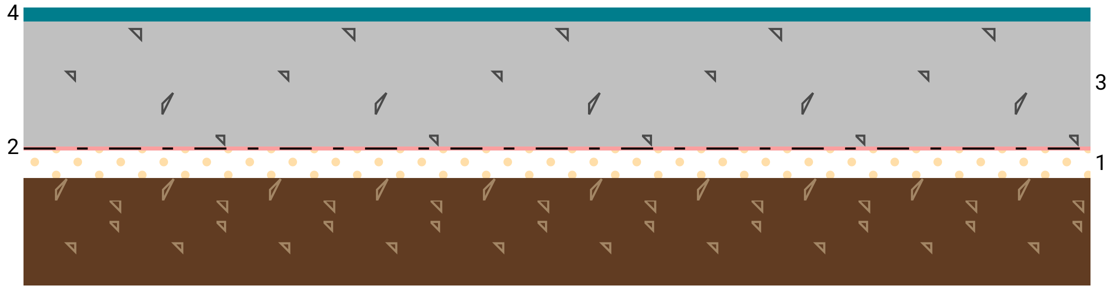
- When subfloor has been defined for the Design, the approach for the Speckel Floor System R-Value calculation has been derived from CIBSE Guide A Section 3.5 Ground Floors and Basements.
- Following the guidelines of CIBSE Guide A, there are four modes of floor calculations:
  1. Ground Contact with edge insulation
  2. Ground Contact without edge insulation
  3. Suspended Floor (insulated)
  4. Suspended Floor (uninsulated)
- The calculation methodology is dependent on the inputs of the user. The base method is that of a simple ground contact floor, which is then used by all other methods (but is changed slightly when suspended).
  1. The floor is initialised as if it were in contact with the ground.
  2. Relevant components for each type of floor are collected.
  3. Determine if the floor is edge insulated or suspended above the ground, and if so collect other necessary components.
  4. Using the complete collected components, these are combined into the final calculation to produce an R-Value of that floor type.
- If edge insulation is detected in the design, then the edge insulation factor is calculated which will alter the final result.
- If the floor is found to be suspended, then the calculation performed is always for the uninsulated suspended floor.
- If the floor is found to be insulated, the previous calculation (where the floor thermal resistance is considered without insulation) is then used in conjunction with its prescribed thermal resistance.
- A single building class is assumed for this result.

Assumptions/Limitations

- Ground Contact Collection - The thermal resistance of the floor is derived solely from 'any all-over insulation layers above, below, or within the floor slab', with some pre-described surface resistances added. In addition, the floor perimeter is solely the perimeter of the floor that is exposed to unconditioned space.
- Edge Insulation Collection - There are two approaches for edge insulation - direct edge insulation applied to the floor and surrounding wall (currently unavailable), or when the surrounding wall has a lower conductivity than that of the ground (performed by default).
- If the floor is edge insulated, then components derived from the surrounding wall thermal resistance, thickness, and depth are collected.
- Suspended Floor Collection - A floor is deemed to be suspended simply when the user specifies a height above ground greater than zero metres, with the following inputs used:
  1. wind speed at ten metres above ground level
  2. the wind shielding factor
  3. area of ventilation openings per unit perimeter of the surrounding wall.
- There are two types of suspended floors, which then determines which calculation methodology is used: uninsulated and insulated, with the latter relying on the calculation of the former.

- NOTE: The thermal resistance of the floor itself is treated differently here again. For uninsulated floors, it is treated as a regular centre pane R-value calculation, adding R 0.17 twice for internal and external surface resistances. For insulated floors, AS/NZS 4859.2:2018 is recruited, with surface resistances omitted.

Inputs



Materials

Layer	Type	Product
1	Insulation	Extruded Polystyrene (XPS)
		Material Width: 20.0 mm
		Conductivity: 0.036 W/(m.K)
		Note: Settings of this material have been customised.
2	Membrane	Waterproof Membrane
		Layer Width: 3.0 mm
3	Concrete / Masonry	Concrete block - dense solid
		Material Width: 90.0 mm
		Conductivity: 1.100 W/(m.K)
4	Internal Material	Ceramic tile
		Material Width: 10.0 mm
		Conductivity: 5.000 W/(m.K)
		Note: Settings of this material have been customised.

Detailed Results

Input	Value	Detail
B'	4.81	Characteristic dimension (m)
Rsi	0.17	Internal surface r-value (m^2.K/W)
Rse	0.04	External surface r-value (m^2.K/W)
Rf	0.56	Thermal resistance of floor (m^2.K/W)
def	1.8	Total equivalent thickness of the floor (m)
Uf	0.53	Thermal transmittance of slab on ground (W/m^2.K)
Ri'	0.58	Difference between r-value of edge insulation (or low density wall) and the soil it replaces (m^2.K/W)
dei'	1.16	Additional equivalent thickness due to edge insulation (m)
	VERTICAL	Insulation Direction
Ψ	-0.1	Edge insulation factor (W/m.K)
Ψ	-0.1	Edge insulation factor (W/m.K)
Ufi	0.49	Thermal transmittance of slab on ground with edge insulation (or density surrounding wall) (W/m^2.K)

Subfloor

Input	Value	Detail
Afg	105.1	Area of floor (m^2)
pf	43.7	Perimeter of floor (m)
λg	2.0	Ground conductivity (W/m.K)
dw	0.3	Thickness of surrounding wall (m)
Wi	0.3	Width of horizontal edge insulation (m)
Di	0.5	Depth of vertical edge insulation (or depth of low density surrounding wall) (m)

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Report

Project	1246 Canterbury Road, Roselands, NSW 2196
Address	1246 Canterbury Rd, Roselands NSW 2196, Australia (33.93° S, 151.06° E)
Date	2024-09-19, 08:11 PM
Author	Zoran Cvetkovski (Sustainability-Z Pty Ltd) sustainability-z@outlook.com
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	Comparison with the Deemed-to-Satisfy Provisions
Building Class	3
Climate Zone	5
Storeys	3
Floor to Floor Height	2700 mm

Using Speckel

Speckel provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. 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 Requirements - 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 Provisions of each relevant area.

Results

Calculation	Result		Req.	Outcome
Total R-value	2.19	≥	2.00	Pass

Method

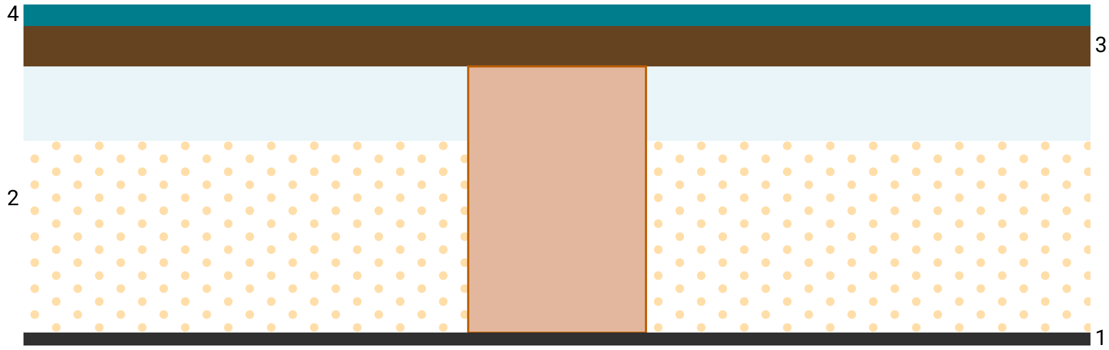
Approach

- This assessment has been performed in accordance with AS/NZS 4859.2 (2018) - Thermal insulation materials for buildings Part 2: Design which determines the total thermal resistance of insulation products used in thermal calculations. AS/NZS 4859.2 uses a prescriptive calculation methodology for determining the thermal resistance of airspaces with parallel bounding surfaces of varying emissivity including a range of conversion coefficients for multiple insulation types and a prescriptive reporting requirements for demonstrating total R-value and system R-value calculations.
- NZS 4214 (2006) - Methods of Determining the Total Thermal Resistance of Parts of Buildings - has been used in conjunction with and as a secondary reference within AS/NZS 4859.2 (2018) as it gives methods of determining the thermal resistance of building components and elements consisting of thermally homogeneous layers which may include air layers. This is to account for structural thermal bridging.

Assumptions/Limitations

- A single building class is assumed for this result.
- When Contact Resistance is enabled, a further 0.03 R-value is added to each side of Steel framing to account for imperfect contact between Steel and adjacent materials.
- Where there is a mismatch between framing and insulation dimensions in a Composite layer, the extra framing is treated as a discrete Bridged Air Cavity layer.
- When Cavity Bridging is enabled, R-values determined for Bridged Air Cavity layers are determined by:
  1. Considering the layer without framing (i.e. as an Air Cavity layer), then
  2. Performing a bridged layer calculation for the Bridged Air Cavity layer using the proposed framing geometry and materiality, and treating the Air Cavity as a monolithic material.
  3. Due to workflow limitations, impacts on temperature corrections due to Cavity Bridging are not considered
- When Air Cavity or Bridged Air Cavity layers are adjacent, they are combined to determine a single Air Cavity R-value.
- As per Example F2 of NZS 4214 (2006), Membrane layers are ignored when considering adjacent Air Cavity / Bridged Air Cavity layers for addition to Composite layers.
- Bridged Air Cavities which are exposed to the internal environment are ignored for R-value calculations

Inputs



Materials

Layer	Type	Product
1	External Material	Fibre-cement
		Material Width: 6.0 mm
		Conductivity: 0.250 W/(m.K)
2	Composite	Knauf Insulation Earthwool® FloorShield underfloor batt
		Material Width: 90.0 mm
		Conductivity: 0.036 W/(m.K) (R-value: 2.50 m².K/W)
		Material Positioned: External
		Stud Framing
		Material - Timber
		Conductivity - 0.16 W/(m.K)
		Horizontal Spacing - 600 mm
		Noggings - 1
		Projection - 125 mm
		Frame Width - 45 mm
		Frame Height - 80 mm
		Nogging Height - 25 mm
3	Bracing	Particleboard
		Material Width: 19.0 mm

Layer	Type	Product
		Conductivity: 0.120 W/(m.K)
4	Internal Material	Ceramic tiles
		Material Width: 10.0 mm
		Conductivity: 5.000 W/(m.K)
		Note: Settings of this material have been customised.

Detailed Results

Thermally-Bridged Results

Summer

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.03
2	External Material	-	-	0.02
3	Composite + Bridged Air Cavity	-	-	1.86
	Framing (Horizontal) / Layer	7	0.73	
	Framing (Nogging) / Layer	1	0.73	
	Framing (Vertical) / Layer	6.7	0.73	
	Layer / Layer	85.4	2.53	
4	Bracing	-	-	0.16
5	Internal Material	-	-	
6	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	2.19

Winter

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
1	External Surface	-	-	0.03
2	External Material	-	-	0.02
3	Composite + Bridged Air Cavity	-	-	1.97
	Framing (Horizontal) / Layer	7	0.74	
	Framing (Nogging) / Layer	1	0.74	
	Framing (Vertical) / Layer	6.7	0.74	
	Layer / Layer	85.4	2.75	
4	Bracing	-	-	0.16
5	Internal Material	-	-	

Layer	Type	Fraction (%)	Fraction R-value (m².K/W)	R-value (m².K/W)
6	Internal Surface	-	-	0.12
			Total R-value (m².K/W)	2.31

Temperature-Corrected Results

Summer

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			36.00	35.83	35.91	0.17	0.03
2	External Material	0.9	0.9	35.83	35.69	35.76	0.14	0.02
3	Composite	0.9	0.9	35.69	26.54	31.12	9.15	1.61
4	Bridged Air Cavity			26.54	25.59	26.07	0.95	0.17
5	Bracing	0.9	0.9	25.59	24.69	25.14	0.90	0.16
6	Internal Material	0.9	0.9	24.69	24.68	24.69	0.01	0.00
7	Internal Surface			24.68	24.00	24.34	0.68	0.12

Winter

Layer	Type	Ext. ε	Int. ε	Ext. °C	Int. °C	Mean °C	Δ °C	R-value
1	External Surface			12.00	12.08	12.04	0.08	0.03
2	External Material	0.9	0.9	12.08	12.15	12.11	0.07	0.02
3	Composite	0.9	0.9	12.15	16.75	14.45	4.60	1.69
4	Bridged Air Cavity			16.75	17.24	16.99	0.49	0.18
5	Bracing	0.9	0.9	17.24	17.67	17.45	0.43	0.16
6	Internal Material	0.9	0.9	17.67	17.67	17.67	0.01	0.00
7	Internal Surface			17.67	18.00	17.84	0.33	0.12

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