nrg Efficient Homes

Site Address:
28 Drage Rd, West Wodonga
NCC 2022 Part J1V3 Performance Solution

Residential Assessment

Commercial Assessment

Sustainable Consulting

Performance Solutions

Daylight Analysis

Moisture Analysis

NCC 2022 Part J1V3 Performance Solution
Project Description: Proposed 'The Hudson Centre'
Client: Rob Pickett Designs
Date: 14/05/2025

This report was completed by:

Matthew Morelli
NRG efficient homes
ESD Consultant
DMN Accredited Thermal Performance Assessor
BESS trained professional
Dip. Building Design (Architectural)

Table of Contents:

Introduction

The purpose of this report is to assess the proposed development against Part J of the 2022 NCC Volume 1 and show compliance to all applicable sections.

Utilizing the J1V3 verification method, we are comparing the predicted annual energy consumption of a reference building against that of the proposed development.

J1V3 Verification using a reference building

(1) For a Class 3, 5, 6, 7, 8 or 9 building or common area of a Class 2 building, compliance with J1P1 is verified when—

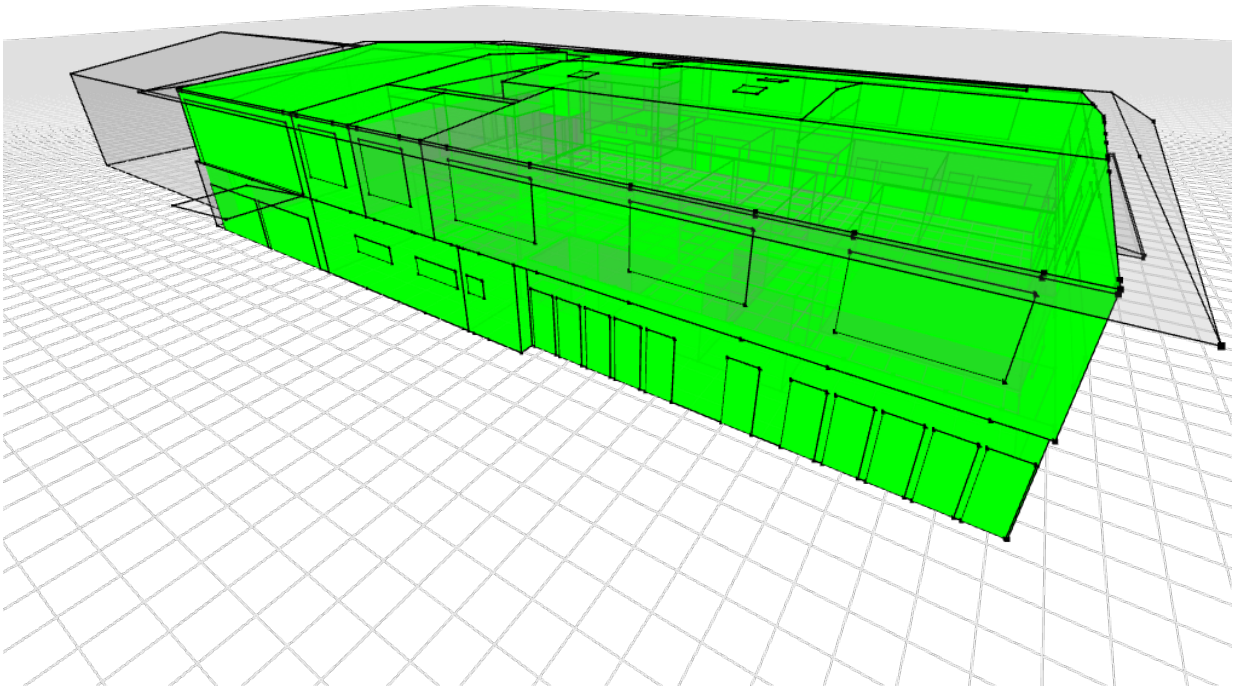
- *a. it is determined that the annual greenhouse gas emissions of the proposed building are not more than the annual (a)greenhouse gas emissions of a reference building when—*
  - *i. the proposed building is modelled with the proposed services; and*
  - *ii. the proposed building is modelled with the same services as the reference building; and*
- *b. in the proposed building, a thermal comfort level of between a Predicted Mean Vote of -1 to +1 is achieved across not less than 95% of the floor area of all occupied zones for not less than 98% of the annual hours of operation of the building; and*
- *c. the building complies with the additional requirements in Specification 33.*

(2) The annual greenhouse gas emissions of the proposed building may be offset by—

- *a. renewable energy generated and used on site; and*
- *b. another process such as reclaimed energy, used on site.*

(3) The calculation method used for (1) and (2) must comply with—

- *a. ANSI/ASHRAE Standard 140; and*
- *b. Specification 34.*



Project Details:

Climate Zone: 6

Building Class: Class 5 & 9b

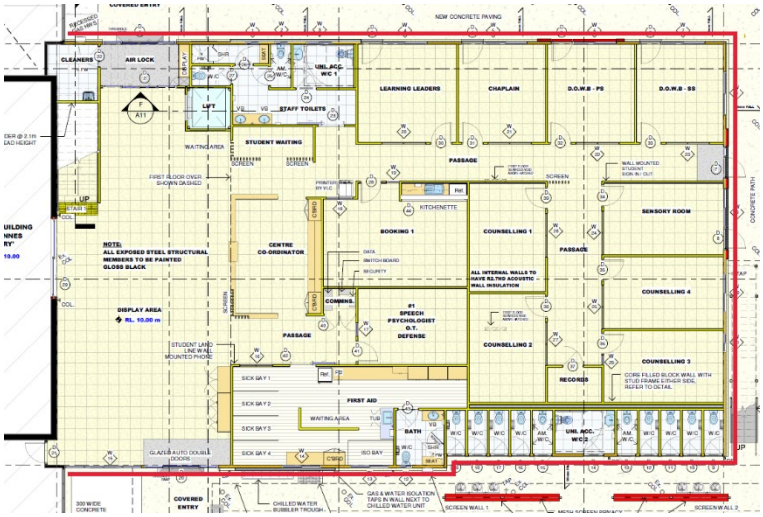
This report is based on the following architectural plans provided by the client,

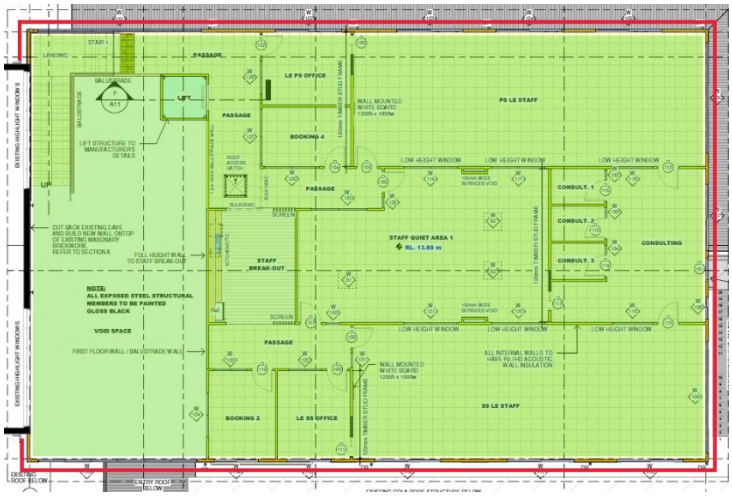
Project No: 7608 Revision: Prelim 5 Date: 10/04/2025

Envelope: *For the purposes of—*
Section J in NCC Volume One, the parts of a building's fabric that separate a conditioned space or habitable room from—
the exterior of the building; or
a non-conditioned space including—
the floor of a rooftop plant room, lift-machine room or the like; and
the floor above a carpark or warehouse; and
the common wall with a carpark, warehouse or the like;

Building Envelopes:

Ceiling/roof:	***R4.0***
External wall:	***R2.7***





Summary of requirements:

Ceiling / Roof	1. Install R4.0 insulation & R1.3 roof blanket to all proposed ceiling/roof areas (Refer to Building Envelope) **Or** provide a ceiling and roof system with total performance of R1.3
Walls	1. Install R2.7 insulation to all external walls serving the building envelope, 2. Install R0.20 Thermal Break wrap to all metal stud frame (where applicable) (Refer to Building Envelope) **Or** provide an external wall/glazing system/s with total performance of R2.6
Glazing	1. All external glazing to achieve a total U value of 6.7 & SHGC of 0.55. 2. All internal glazing to achieve a total U value of 6.7 & SHGC of 0.75. Must achieve the same or lower U values as specified above. Must achieve the same SHGC values or within 5% +/- tolerance as specified above.
Roof Lights	1. Roof Lights to achieve a total U value of no more than 6.0 & SHGC of ≤0.60
Floor	1. No additional insulation required.
Insulation	All reflective & bulk insulation must be installed in accordance with Part J4D3
Building Sealing	Conditioned building envelope to be sufficiently sealed in accordance with Part J5
Artificial lighting	The aggregate design illumination power load must not exceed Total 4639 watts
Air-conditioning	Air-conditioning and ventilation systems and components will be designed in accordance with the DTS requirements of Part J6 and a seperate report will be submitted by the mechanical services engineer/designer to verify compliance where required. Unitary *air-conditioning* equipment including packaged air-conditioners, split systems, and variable refrigerant flow systems must comply with *MEPS (Minimum Energy Performance Standards)*
Heated water supply	A heated water supply system for food preparation and sanitary purposes to be designed and installed in accordance with Part B2 of NCC Volume Three — Plumbing Code of Australia.
Energy monitoring	The proposed building exceeds 500 m2 floor area, provide an energy meter configured to record the time-of-use consumption of gas and electricity.
Renewable energy and electric vehicle charging	A ***min. 7kW PV solar system*** required to service the proposed building. The proposed building must have features that facilitate the future installation of on-site renewable energy generation and storage; and electric vehicle charging equipment (where applicable) in accordance with J9D4 & J9D5.

Part J4 - Building Fabric

J4D3 - Thermal construction - General
Where required, insulation must comply with AS/NZS 4859.1 and be installed so that it— 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 forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and does not affect the safe or effective operation of a service or fitting. Where required, reflective insulation must be installed with— the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and the reflective insulation closely fitted against any penetration, door or window opening; and the reflective insulation adequately supported by framing members; and each adjoining sheet of roll membrane being— overlapped not less than 50 mm; or taped together. Where required, bulk insulation must be installed so that— 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 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. Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36. The required Total R-Value and Total System U-Value, including allowance for thermal bridging, must be— calculated in accordance with AS/NZS 4859.2 for a roof or floor; or determined in accordance with Specification 37 for wall-glazing construction; or determined in accordance with Specification 39 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.

J4D4 - Roof and Ceiling construction	Compliance
A roof or ceiling must achieve a *Total R-Value* greater than or equal to— in *climate zones* 1, 2, 3, 4 and 5, R3.7 for a downward direction of heat flow; and in *climate zone* 6, R3.2 for a downward direction of heat flow; and in *climate zone* 7, R3.7 for an upward direction of heat flow; and in *climate zone* 8, R4.8 for an upward direction of heat flow. In *climate zones* 1, 2, 3, 4, 5, 6 and 7, the solar absorbance of the upper surface of a roof must be not more than 0.45.	J1V3 Performance Solution Refer to Appendix A

J4D5 - Roof lights	Compliance
Roof lights must have— a total area of not more than 5% of the floor area of the room or space served; and transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of— for Total system SHGC, in accordance with Table J4D5; and for Total system U-Value, not more than U3.9.	Roof Lights to achieve a total U value no more than 6.0 & SHGC of ≤0.60

J4D6 - Walls and glazing	Compliance
The Total System U-Value of wall-glazing construction, including wall-glazing construction which wholly or partly forms the envelope internally, must not be greater than— for a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a ward area, U2.0; and for a Class 3 or 9c building or a Class 9a ward area— in climate zones 1, 3, 4, 6 or 7, U1.1; or in climate zones 2 or 5, U2.0; or in climate zone 8, U0.9.	J1V3 Performance Solution Refer to Appendix

J4D7 - Floors	

A floor must achieve the Total R-Value specified in Table J4D7. For the purposes of (1), a slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-Value of R2.0, except— in climate zone 8; or a Class 3, Class 9a ward area or Class 9b building in climate zone 7 that has a floor area to floor perimeter ratio of less than or equal to 2. A floor must be insulated around the vertical edge of its perimeter with insulation having an R-Value greater than or equal to 1.0 when the floor— is a concrete slab-on-ground in climate zone 8; or has an in-slab or in-screed heating or cooling system, except where used solely in a bathroom, amenity area or the like. Insulation required by (3) for a concrete slab-on-ground must— be water resistant; and be continuous from the adjacent finished ground level— to a depth not less than 300 mm; or for the full depth of the vertical edge of the concrete slab-on-ground.	J1V3 Performance Solution Refer to Appendix A
For all other sections within Part J4, please refer to the NCC 2022 Volume 1 -Energy Efficiency	

Part J5 - Building Sealing

	Required	Compliance Requirement
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.	If applicable, adopt as a report condition
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. A roof light required by (1) to be sealed, or capable of being sealed, must be constructed with— an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or a weatherproof seal; or a shutter system readily operated either manually, mechanically or electronically by the occupant.	If applicable, adopt as a report condition
J5D5 - Window and doors	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. The requirements of (1) do not apply to— a window complying with AS 2047; or a fire door or smoke door; or a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security. 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, may be a foam or rubber compression strip, fibrous seal or the like. 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, other than— 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(i)space; and at all other entrances to the café, restaurant, open front shop or the like, self-closing doors. A loading dock entrance, if leading to a conditioned space, must be fitted with a rapid roller door or the like.	If applicable, adopt as a report condition
J5D6 - Exhaust fans	An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving— (i)a *conditioned space*; or (ii)a *habitable room* in *climate zones* 4, 5, 6, 7 or 8.	If applicable, adopt as a report condition

	Required	Compliance Requirement
J5D7 - Construction of ceilings, walls and floor	Ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage in accordance with (2)— when forming part of the envelope; or in climate zones 4, 5, 6, 7 or 8. Construction required by (1) must be- enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or sealed at junctions and penetrations with— close fitting architrave, skirting or cornice; or expanding foam, rubber compressible strip, caulking or the like. The requirements of (1) do not apply to openings, grilles or the like required for smoke hazard management.	If applicable, adopt as a report condition
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.	If applicable, adopt as a report condition
For all other sections within Part J5, please refer to the NCC 2022 Volume 1 -Energy Efficiency		

Part J6 - Air-conditioning and ventilation systems

	Required
J6D3 - Air-conditioning system control	An air-conditioning system— must be capable of being deactivated when the building or part of a building served by that system is not occupied; and when serving more than one air-conditioning zone or area with different heating or cooling needs, must— thermostatically control the temperature of each zone or area; and not control the temperature by mixing actively heated air and actively cooled air; and limit reheating to not more than— for a fixed supply air rate, a 7.5 K rise in temperature; and 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 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 which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and 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 when serving a sole-occupancy unit in a Class 3 building, must not operate when any external door of the sole-(f)occupancy unit that opens to a balcony or the like, is open for more than one minute; and 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 must have a control dead band of not less than 2°C, except where a smaller range is required for specialized applications; and 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— component; or group of components operating under a common control in a system containing multiple components; and 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 must have automatic variable temperature operation of heated water and chilled water circuits; and when deactivated, must close any motorised outdoor air or return air damper that is not otherwise being actively controlled. 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. Time switches — the following applies: A time switch must be provided to control— an air-conditioning system of more than 2 kWr; and a heater of more than 1 kWheating used for air-conditioning. The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. The requirements of (a) and (b) do not apply to— an air-conditioning system that serves— only one sole-occupancy unit in a Class 2, 3 or 9c building; or a Class 4 part of a building; or a conditioned space where air-conditioning is needed for 24 hour continuous use.

J6D4 - Mechanical ventilation system control	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— be capable of being deactivated when the building or part of the building served by that system is not occupied; and when serving a conditioned space, except in periods when evaporative cooling is being used— where specified in Table J6D4, have— an energy reclaiming system that preconditions outdoor air at a minimum sensible heat transfer effectiveness of 60%; or demand control ventilation in accordance with AS 1668.2 if appropriate to the application; and not exceed the minimum outdoor air quantity required by Part F6 by more than 20%, except where— additional unconditioned outdoor air is supplied for free cooling; or additional mechanical ventilation is needed to balance the required exhaust or process exhaust; or an energy reclaiming system preconditions all the outdoor air; and 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. 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 — Carpark exhaust systems must have a control system in accordance with— clause 4.11.2 of AS 1668.2; or clause 4.11.3 of AS 1668.2. Time switches — The following applies: A time switch must be provided to a mechanical ventilation system with an air flow rate of more than 1000 L/s. The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. The requirements of (a) and (b) do not apply to— a mechanical ventilation system that serves— only one sole-occupancy unit in a Class 2, 3 or 9c building; or a Class 4 part of a building; or a building where mechanical ventilation is needed for 24 hour occupancy.
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— where water cooled, have a minimum energy efficiency ratio of 4.0 Wr/Winput 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 where air cooled, have a minimum energy efficiency ratio of 2.9 Wr/Winput 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 all other sections within Part J6, please refer to the NCC 2022 Volume 1 -Energy Efficiency	

Part J7 - Artificial lighting and power

	Required	Compliance Requirement
J7D3 - Artificial lighting	In a sole-occupancy unit of a Class 2 building or a Class 4 part of a building— the lamp power density or illumination power density of artificial lighting must not exceed the allowance of— 5 W/m2 within a sole-occupancy unit; and 4 W/m2 on a verandah, balcony or the like attached to a sole-occupancy unit; and the illumination power density allowance in (a) may be increased by dividing it by the illumination power density adjustment factor for a control device in Table J7D3b as applicable; and when designing the lamp power density or illumination power density, the power of the proposed installation must be used rather than nominal allowances for exposed batten holders or luminaires; and halogen lamps must be separately switched from fluorescent lamps. In a building other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a 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.	Electrical contractor to ensure the maximum wattage allowances shown above are not exceeded. All artificial lighting and power to comply with Part J7 Refer to Appendix B for calculation
J7D4 - Interior artificial lighting and power control	All artificial lighting of a room or space must be individually operated by– a switch; or other control device; or a combination of (a) and (b).	
J7D5 - Interior decorative and display lighting	Interior decorative and display lighting, such as for a foyer mural or art display, 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 in a number of areas such as in a museum, art gallery or the like, in which case they may be combined; and by a time switch in accordance with Specification 40 where the display lighting exceeds 1 kW. Window display lighting must be controlled separately from other display lighting.	
J7D6 - Exterior artificial lighting	Exterior artificial lighting attached to or directed at the facade of a building, must be controlled by— a daylight sensor; or a time switch that is capable of switching on and off electric power to the system at variable pre-programmed times and on variable pre-programmed days	
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.	
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 achieve the idle and standby energy performance level in Table J7D8a; and achieve the energy efficiency class in Table J7D8b; or if a dedicated goods lift, energy efficiency class D in accordance with ISO 25745-2.	
For all other sections within Part J7, please refer to the NCC 2022 Volume 1 -Energy Efficiency		

Part J8 - Heated water supply and swimming pool and spa pool plant

	Required
J8D2 - Heated water supply	A heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with NCC Volume Three — Plumbing Code of Australia.
J8D3 - Swimming pool heating and pumping	Heating for a swimming pool must be by— a solar heater; or a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or a geothermal heater; or a gas heater that— if rated to consume 500 MJ/hour or less, achieves a minimum gross thermal efficiency of 86%; or if rated to consume more than 500 MJ/hour, achieves a minimum gross thermal efficiency of 90%; or a heat pump; or a combination of (a) to (e). Where some or all of the heating required by (1) is by a gas heater or a heat pump, the swimming pool must have— a cover with a minimum R-Value of 0.05; and a time switch to control the operation of the heater. A time switch must be provided to control the operation of a circulation pump for a swimming pool. Where required, a time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. Pipework carrying heated or chilled water for a swimming pool must comply with the insulation requirements of J6D9. For the purpose of J8D3, a swimming pool does not include a spa pool.
J8D4 - Spa pool heating and pumping	Heating for a spa pool that shares a water recirculation system with a swimming pool must be by— a solar heater; or a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or a geothermal heater; or a gas heater that— if rated to consume 500 MJ/hour or less, achieves a minimum gross thermal efficiency of 86%; or if rated to consume more than 500 MJ/hour, achieves a minimum gross thermal efficiency of 90%; or a heat pump; or a combination of (a) to (e). Where some or all of the heating required by (1) is by a gas heater or a heat pump, the spa pool must have— a cover with a minimum R-Value of 0.05; and a push button and a time switch to control the operation of the heater. A time switch must be provided to control the operation of a circulation pump for a spa pool having a capacity of 680L or more. Where required, a time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days. Pipework carrying heated or chilled water for a spa pool must comply with the insulation requirements of J6D9.
For all other sections within Part J8, please refer to the NCC 2022 Volume 1 -Energy Efficiency	

Part J9 - Energy monitoring and on-site distributed energy resources

	Required
J9D3 - Facilities for energy monitoring	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. 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; an other ancillary plant. 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. 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.
J9D4 - Facilities for electric vehicle charging equipment	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. 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 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.
J9D5 - Facilities for solar photovoltaic and battery systems	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; and be sized to accommodate the installation of 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 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, carpark, roof garden, roof light or the like.
For all other sections within Part J9, please refer to the NCC 2022 Volume 1 -Energy Efficiency	

Conclusion

The proposed works have been assessed by NRG efficient homes against Part J of the 2022 NCC Volume 1 and all applicable sections are deemed compliant.

If you have any further questions, feel free to contact me.

Regards
Matthew Morelli
NRG efficient homes
ESD Consultant
DMN Accredited Thermal Performance Assessor
BESS trained professional
Dip. Building Design (Architectural)

Appendix

Appendix A

Refer to the attached J1V3 Building Assessment report.

Appendix B

Refer to the attached NCC Artificial lighting report.

Appendix C

Refer to the attached R value calculators.

Please note: Calculations are a guide only. The list of materials and their values may differ depending on the final dwelling construction. The values represent only the minimum needed to meet the requirements as per the NCC.

Appendix A

J1V3 Building Assessment

National Construction Code 2022 - Volume 1

Project	Proposed 'The Hudson Centre'
Address	28 Drage Rd, West Wodonga VIC 3690, Australia (36.12° S, 146.85° E)
Date	2025-05-15, 02:21 PM
Author	Matthew Morelli (NRG efficient homes) matthew@nrgeh.com.au
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	A2G2 Performance Solution Clause (2)(b)(i)
Building Class	5
Climate Zone	6
Storeys	2
Floor to Floor Height	3800 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.

Project

This performance-based design brief (PBDB) has been developed in collaboration with key stakeholders as part of a proposed performance-based design and approval process. When completed, the PBDB becomes the platform upon which the proposed

design is constructed.

Modeller	Matthew Morelli
Reviewer	Matthew Morelli
Building owner or owner's representative	To be confirmed by Client
Builder or project manager	To be confirmed by Client
Relevant design process practitioners	Rob Pickett Design
Appropriate approval authority, including building surveyors	To be confirmed by Client

The purpose of this PBDB is to record fundamental activities and outcomes of the performance-based design process, as agreed during key stakeholder negotiations. When the PBDB is finalised, all critical activities and outcomes would have been identified. Consequently, the design process can be commenced with a high degree of confidence that, provided the requirements of the PBDB are achieved, the proposed design is likely to be approved.

Proposal summary	Proposed Building within existing commercial site (Victory Lutheran College), located in West Wodonga, VIC
Proposed solution	The proposed solution is to undertake a J1V3 Verification using a reference building assessment to meet the Performance Requirements of J1P1 - Energy Use
Nominated applicable Performance Requirement(s)	J1P1 Energy use 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 ofoperation, 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, other than a sole-occupancy unit of a Class 2 building or a Class 4 part ofa building, 15 kJ/m2.hr.
Agreed analytical assessment processes	Undertaking a J1V3 Verification using a reference building assessment using the Speckel Building Assessment App and EnergyPlus
Agreed acceptance criteria	As per J1V3 Verification using a reference building assessment, it will be determined that the annual greenhouse gas emissions of the proposed building are not more than the annual greenhouse gas emissions of a reference building.

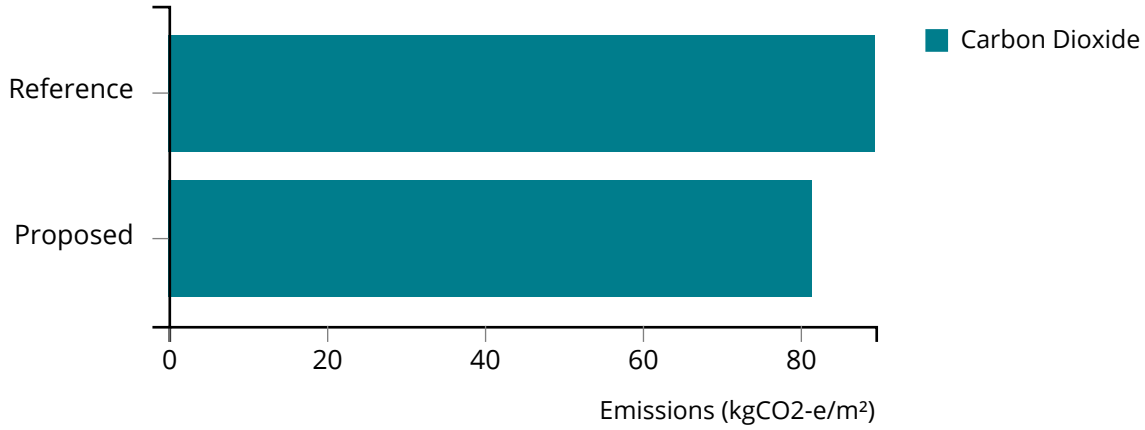
Results

The National Construction Code (NCC) specifies minimum performance standards for the energy efficiency of buildings through the Building Code of Australia (BCA) Volume 1, Section J. To enable flexibility in the architectural design of the building, a Performance Solution has been used to comply with the Performance Requirement - J1P1.

The Assessment Method, 'J1V3 Verification using a reference building' has been used and is an Alternative Solution for the Building Fabric only. As such, a Proposed Building with the proposed fabric has been modelled as part of this approach, to compare against the Reference Building services.

Building Emissions

To meet the acceptance criteria, annual Supplied Energy emissions must be less than **89.55** kgCO2-e/m². Based on a treated floor area of 1037.80 m², the simulated building achieved **81.47** kgCO2-e/m², **meeting** the acceptance criteria.



Thermal Comfort (PMV)

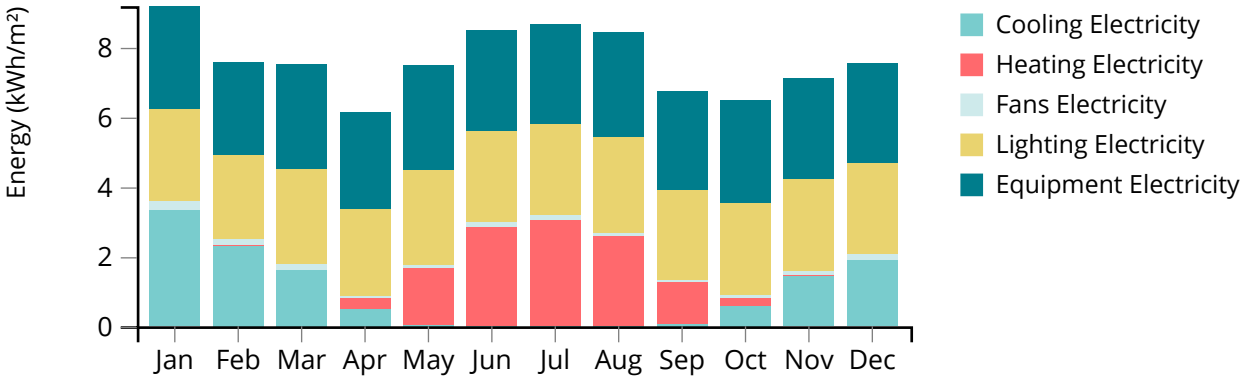
To meet the acceptance criteria, **95** % of total area across the assessed zones must meet the conditions:

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

A total area of 1037.80 m² across 33 zones were assessed, where zones of **96.10** % area achieved the conditions, **meeting** the acceptance criteria.

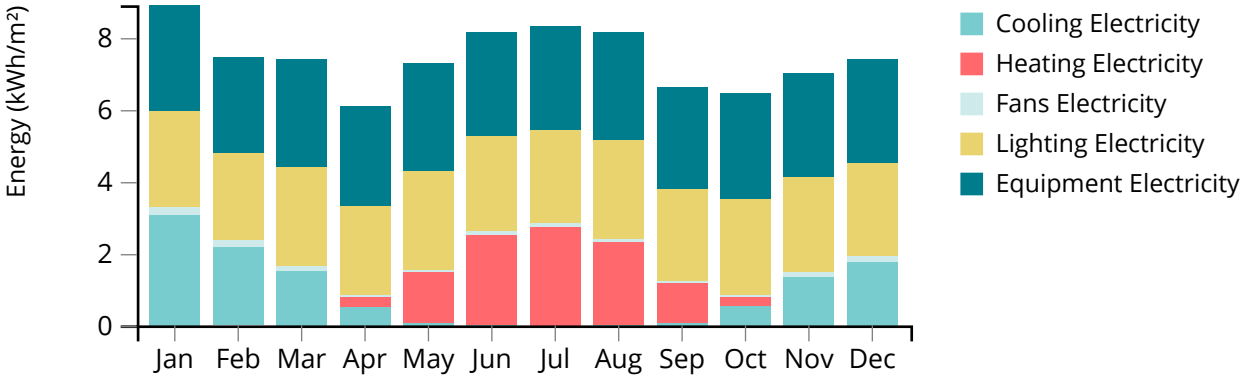
Building Meters

Proposed



Meter	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Cooling Electricity	12320.37	11.87	29.42	10 Feb 15:00
Heating Electricity	12368.22	11.92	30.87	12 Jun 07:45
Fans Electricity	1576.66	1.52	1.28	10 Feb 16:00
Lighting Electricity	32632.50	31.44	8.30	2 Jan 09:15
Equipment Electricity	35882.89	34.58	8.30	2 Jan 09:15

Reference



Meter	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Cooling Electricity	11532.91	11.11	27.40	10 Feb 15:00
Heating Electricity	11030.73	10.63	28.60	12 Jun 07:45
Fans Electricity	1444.07	1.39	1.19	10 Feb 16:00

Meter	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Lighting Electricity	32632.50	31.44	8.30	2 Jan 09:15
Equipment Electricity	35882.89	34.58	8.30	2 Jan 09:15

Method

Approach

- The National Construction Code (NCC) specifies minimum performance standards for the energy efficiency of buildings through the Building Code of Australia (BCA) Volume 1, Section J.
- To enable flexibility in the architectural design of the building, a Performance Solution has been used to comply with the Performance Requirement - J1P1.
- The Assessment Method, J1V3 verification using a reference building, has been used and is an Alternative Solution for the Building Fabric only. As such, a Proposed Building with the proposed fabric has been modelled as part of this approach to compare against the Reference Building services.
- To meet acceptance criteria, the Proposed Building with the proposed fabric Greenhouse Gas (GHG) emissions must be no greater than the Reference Building services.
- Greenhouse gas emission factors are selected according Vol 1 Specification 34 Modelling Parameters for J1V3 Table S34C3 Greenhouse Gas Emissions Factors (kgCO2-e/GJ). In the case of the ACT, an exception is made where a greenhouse gas emission factor of nil is provided, as the national emission factors are not applied as they do not take into account investments in renewable electricity generation in the National Electricity Market.
- When the Simulated Shading Multipliers feature is enabled, each window is simulated in EnergyPlus twice, to compare a completely unshaded window, to a window affected by attached shading, building self-shading, and surrounding structures. The multiplier is based on the ratio of shaded versus unshaded annual average external incident solar radiation, limited between 0.0 and 1.0.

Assumptions / Limitations

- Parts J3, J5, J6, J7, J8 and J9 are not part of this assessment.
- Specification 33 Additional requirements - General is only met for provisions (a) General Thermal Construction and (b) for Floor Edge Insulation. All other provisions (c - n) are not part of this assessment.
- Specification 34 Modelling parameters for J1V3 S34C1 Scope, S34C2 Reference building and S34C3 Proposed building and reference building have been used to form the basis of the Method of Assessment.
- S34C4 Services Proposed and Reference Building is not part of this assessment as the minimum performance requirements of the services are not included.
- To ensure the reference building can be calculated, windows are limited to a maximum of 99% window-to-wall ratio (WWR).

Inputs

The NCC 2022 - Vol 1 contains technical design and construction requirements for all commercial buildings and their associated structures.

Building Class	5
Wall Area (m²)	450.5
Window Area (m²)	132.64
Skylight	1.92
Opaque Door (m²)	18.4
Glazed Door (m²)	13.52
Roof Area (m²)	484.55
Ceiling Area (m²)	106.96
Floor Area (m²)	591.6
Window-Wall Ratio (%)	22.75

Levels

Level	Drawing	# Zones	Floor Area (m²)	Wall (m²)	Window (m²)
1	Ground floor	21	585.5	167.1	42.4
2	First floor	12	586.4	283.4	90.2
3	Untitled Roof	9	695.4	0.0	0.0

Zones

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
1	21. Lift	4.20	11.76	4.20
1	5. WCs	26.56	74.37	26.56
1	1. Display area	134.54	376.72	134.54
1	17. Airlock	8.19	22.93	8.19
1	18. Cleaners	5.75	16.09	5.75
1	16. Speech OT 1	18.11	50.69	18.11

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
1	4. Booking 1	31.17	87.27	31.17
1	3. Untitled	40.83	114.31	40.83
1	19. Bath	5.74	16.07	5.74
1	6. Staff toilets	25.27	70.75	25.27
1	7. Learning leaders	20.93	58.60	20.93
1	13. Chaplain	18.43	51.60	18.43
1	12. D.O.W.B - PS	18.65	52.23	18.65
1	14. D.O.W.B - SS	18.43	51.60	18.43
1	11. Sensory room	18.87	52.84	18.87
1	9. Counselling 2	19.26	53.93	19.26
1	10. Counselling 4	18.87	52.84	18.87
1	20. Records	4.97	13.92	4.97
1	15. Counselling 1	18.18	50.90	18.18
1	8. Counselling 3	20.26	56.72	20.26
1	2. Co-ordinator/Passages	108.33	303.32	108.33
2	7. Staff break-out	20.86	59.44	20.86
2	1. Void space	0.00	538.74	0.00
2	12. Booking 4	11.48	32.72	11.48
2	6. Passages	47.23	134.62	47.23
2	11. Booking 2	12.60	42.10	12.60
2	10. LE SS Office	13.40	44.75	13.40
2	9. Passage	13.65	38.90	13.65
2	4. Staff quiet area	73.31	324.76	73.31
2	8. LE PS Office	13.74	39.14	13.74
2	2. PS LE Staff	98.40	327.43	98.40
2	5. Consulting	49.70	218.77	49.70

Level	Zone	Area (m²)	Volume (m³)	Treated Area (m²)
2	3. SS LE Staff	97.91	370.08	97.91
		1037.80		1037.80

Walls

Total System R-values of all walls include the effects of thermal bridging, which are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006 (as per J4D3 Thermal Construction — General (5)) or are stated values.

For the purpose of the Reference Building, the wall total system R-value of the wall-glazing construction has been calculated in accordance with J4D6 Walls and Glazing and Specification 37 Calculation of U-Value and solar admittance.

Proposed	Title	Class	R-Value (m²K°/W)	Area (m²)
Exposed to Unconditioned	Concept	5	2.60	51.54
External	Concept	5	2.60	398.96
Reference	**Title**	**Class**	**R-Value (m²K°/W)**	**Area (m²)**
Exposed to Unconditioned	Concept	5	2.60	51.54
External	Concept	5	2.60	398.96

Roofs

Total system R-values of all roofs include the effects of thermal bridging are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006 (as per J4D3 Thermal Construction — General (5)) or are stated values.

For the purpose of the Reference Building, the roof total system R-value has been assumed in accordance with J4D4 Roof and ceiling construction.

Proposed	Title	Class	R-Value (m²K°/W)	Area (m²)
External	Concept	5	1.30	5.22
Top	Concept	5	1.30	479.33
Reference	**Title**	**Class**	**R-Value (m²K°/W)**	**Area (m²)**
External	Concept	5	3.20	5.22
Top	Concept	5	3.20	479.33

Ceilings

Proposed	Title	Class	R-Value (m²K°/W)	Area (m²)
Exposed to Unconditioned	Concept	5	1.30	106.96
Reference	**Title**	**Class**	**R-Value (m²K°/W)**	**Area (m²)**
Exposed to Unconditioned	Concept	5	3.20	106.96

Floors

Total system R-values of all floors include the effects of thermal bridging are calculated in accordance with AS/NZS 4859.2, NZ 4214:2006 and Section 3.5 of CIBSE Guide A (as per J4D3 Thermal Construction — General (5)) or are stated values

For the purpose of the Reference Building, the floor total system R-value has been assumed in accordance with J4D7 Floors.

Proposed	Title	Class	R-Value (m²K°/W)	Area (m²)
Bottom	Concept	5	2.00	585.52
External	Concept	5	0.20	6.08
Reference	**Title**	**Class**	**R-Value (m²K°/W)**	**Area (m²)**
Bottom	Concept	5	2.00	585.52
External	Concept	5	2.00	6.08

Windows

Total system U-values of all windows include the effects of thermal bridging at the frame, which are calculated in accordance with ISO 15099, as per J4D3 Thermal Construction — General (5).

For the purpose of the Reference Building, the glazing total system U-value and solar admittance of the wall-glazing construction has been calculated in accordance with J4D6 Walls and Glazing and Specification 37 Calculation of U-Value and solar admittance.

Proposed	Title	Class	U-value	SHGC	Area (m²)
External	Concept	5	6.70	0.55	132.64
Reference	**Title**	**Class**	**U-value**	**SHGC**	**Area (m²)**
External	Concept	5	5.80	0.54	132.64

Skylights

Proposed	Title	Class	U-value	SHGC	Area (m²)
External	Concept	5	6.00	0.60	1.92
Reference	**Title**	**Class**	**U-value**	**SHGC**	**Area (m²)**
External	Concept	5	3.90	0.45	1.92

Opaque Doors

Proposed	Title	Class	R-Value (m²K°/W)	Area (m²)
External	Concept	5	0.30	18.40
Reference	**Title**	**Class**	**R-Value (m²K°/W)**	**Area (m²)**
External	Concept	5	0.30	18.40

Glazed Doors

Proposed	Title	Class	U-value	SHGC	Area (m²)
External	Concept	5	6.70	0.75	13.52
Reference	**Title**	**Class**	**U-value**	**SHGC**	**Area (m²)**
External	Concept	5	5.80	0.54	13.52

Climate

The climate file AUS_NSW_Albury.AP.958960_TMYx.2007-2021, located at Albury.AP, NSW AUS, was used for simulations. This file was sourced from Climate.OneBuilding, an online repository collated from public sources. http://www.climate.onebuilding.org/.

Renewables

Photovoltaic systems have been nominated for the Proposed Building. They have been placed in the model and are subject to shading from the building, the surrounding site, and from self-shading.

Title	Height (m)	Area (m²)	Surf. Fraction	Efficiency	System Size (kW)
PV system	0.0	34.0	0.9	0.2	7.0

Occupants

Occupant density (m²/person) are stipulated in each thermal zone, subject to the

function and purpose of the space. Internal heat gains for the Reference and Proposed Reference Building occupant densities are identical.

Space	Building Class	Activity
Default	5	Office

Lighting

Lighting power density (W/m²) is stipulated in each thermal zone, subject to the function and purpose of the space. Internal heat gains for the Reference and Proposed Reference Building equipment density have been nominated as identical.

Space	Building Class	Space
Default	5	Office

Equipment

Equipment density (W/m²) are stipulated in each thermal zone, subject to the function and purpose of the space. Internal heat gains for the Reference and Proposed Reference Building equipment density are identical.

Space	Building Class	Space
Default	5	Office

Air-Conditioning

As a fabric only assessment, air-condition equipment and mechanical ventilation rates for the Reference and Proposed Building are identical. Minimum mechanical ventilation is required as per Part F6P3 Outdoor air supply.

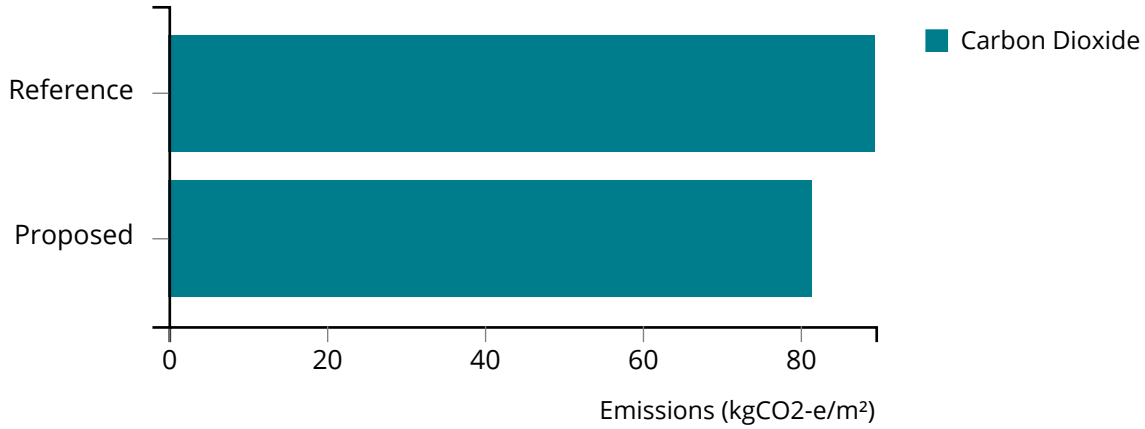
Thermostat Details

Space	Building Class	Space
Default	5	Office

Detailed Results

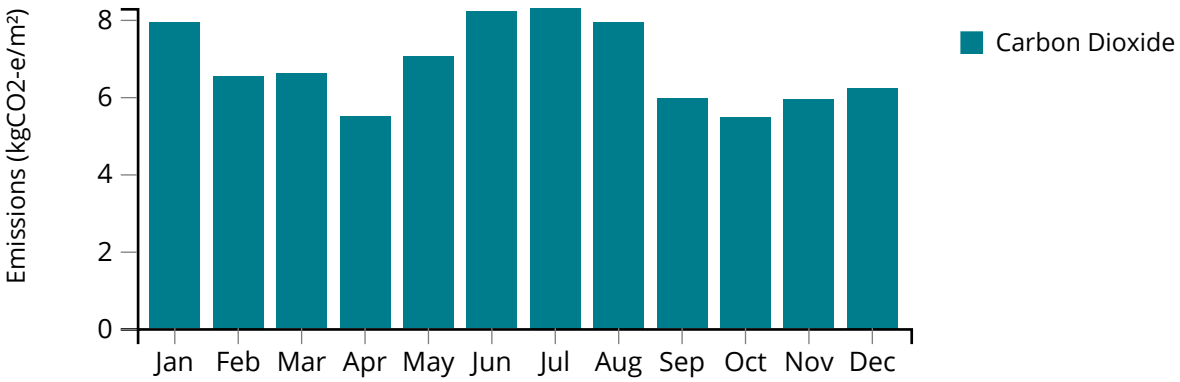
Building Emissions

To meet the acceptance criteria, annual Supplied Energy emissions must be less than **89.55** kgCO2-e/m². Based on a treated floor area of 1037.80 m², the simulated building achieved **81.47** kgCO2-e/m², **meeting** the acceptance criteria.



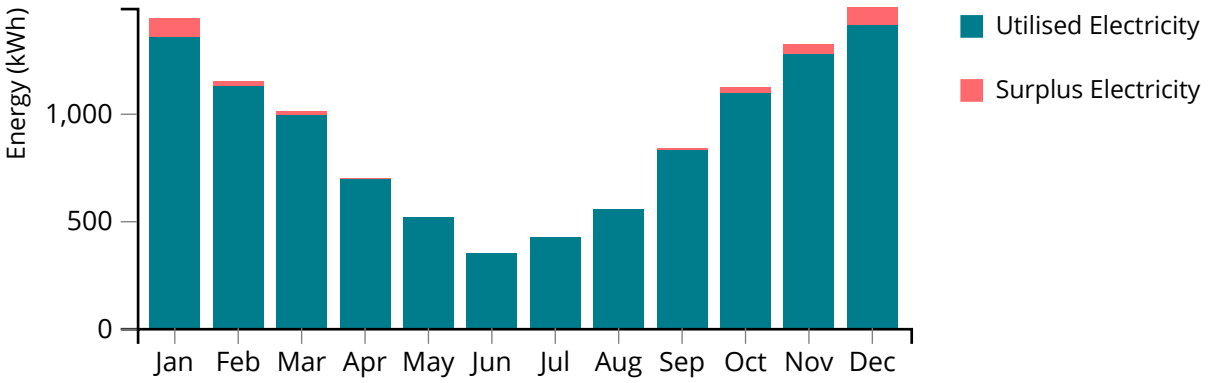
Greenhouse gas emission factors have been nominated as **279.00** kilogram / GJ for electricity , and **51.53** kilogram / GJ for natural gas.

Proposed



Meter	Emissions (kgCO2-e)	Emissions (kgCO2-e/m²)
Emissions	84545.29	81.47

Sources of renewable energy have been nominated for the building. Only the Utilised Electricity is considered against the Electricity Demand of the Building, while Surplus Electricity is not.



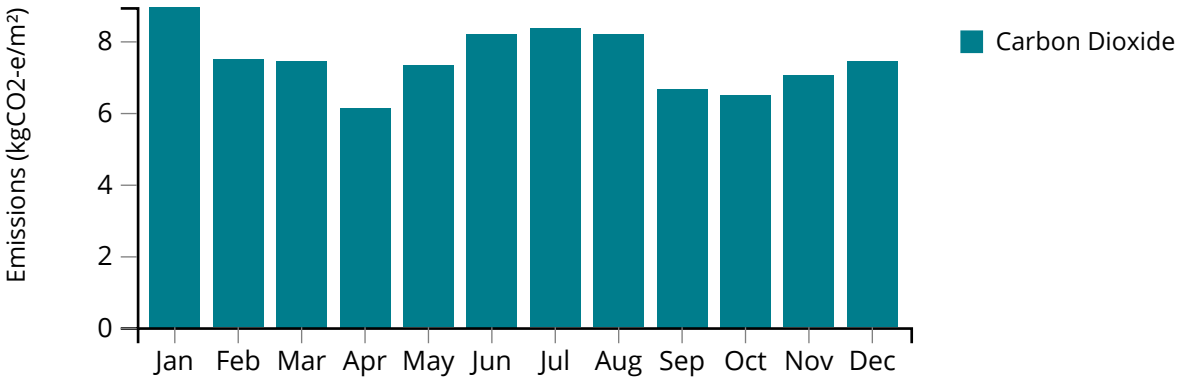
Energy	kWh
Produced Electricity	10887.8
Utilised Electricity	10605.7
Purchased Electricity	84174.9
Surplus Electricity	282.0

Electricity Purchased

Period	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Jan	8170.43	7.87	43.34	30 Jan 15:00
Feb	6741.01	6.50	44.23	10 Feb 16:00
Mar	6808.48	6.56	31.00	20 Mar 16:45
Apr	5663.62	5.46	35.85	27 Apr 07:15
May	7255.15	6.99	43.94	31 May 08:15
Jun	8471.27	8.16	44.69	12 Jun 08:15
Jul	8562.26	8.25	45.76	17 Jul 09:15
Aug	8187.23	7.89	44.32	7 Aug 08:30
Sep	6147.63	5.92	38.91	11 Sep 07:30
Oct	5639.63	5.43	36.06	2 Oct 07:15
Nov	6107.73	5.89	33.76	20 Nov 15:00
Dec	6420.46	6.19	36.03	22 Dec 16:00
Total	84174.92	81.11	45.76	17 Jul 09:15

Gas Demand
The simulated building did not include Gas Demand.

Reference
The Reference Building simulated results are shown below, which sets the acceptance criteria threshold.



Meter	Emissions (kgCO2-e)	Emissions (kgCO2-e/m²)
Emissions	92930.20	89.55

Electricity Purchased

Period	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Jan	9231.07	8.89	44.05	30 Jan 14:30
Feb	7720.88	7.44	45.18	10 Feb 15:00
Mar	7682.33	7.40	32.54	20 Mar 16:30
Apr	6326.27	6.10	33.99	27 Apr 07:15
May	7554.08	7.28	41.44	31 May 08:15
Jun	8449.23	8.14	42.72	12 Jun 08:15
Jul	8613.93	8.30	44.38	17 Jul 09:15
Aug	8447.27	8.14	42.68	7 Aug 09:15
Sep	6873.58	6.62	38.30	11 Sep 08:15
Oct	6694.47	6.45	35.43	2 Oct 07:15
Nov	7262.68	7.00	35.68	20 Nov 15:00
Dec	7667.31	7.39	38.30	22 Dec 16:00

Period	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Total	92523.10	89.15	45.18	10 Feb 15:00

Gas Demand

The simulated building did not include Gas Demand.

Thermal Comfort (PMV)

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

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

A total area of 1037.80 m² across 33 zones were assessed, where zones of **96.10** % area achieved the conditions, **meeting** the acceptance criteria.

Level	Zone	Area (m²)	Assessed (Hrs)	Pass (Hrs)	Ratio	Pass
1	21. Lift	4.20	2340	2315	98.93	✓
1	8. Counselling 3	20.26	2340	2335	99.79	✓
1	15. Counselling 1	18.18	2340	2322	99.23	✓
1	20. Records	4.97	2340	2318	99.06	✓
1	10. Counselling 4	18.87	2340	2337	99.87	✓
1	9. Counselling 2	19.26	2340	2322	99.23	✓
1	11. Sensory room	18.87	2340	2338	99.91	✓
1	14. D.O.W.B - SS	18.43	2340	2286	97.69	✖
1	12. D.O.W.B - PS	18.65	2340	2307	98.59	✓
1	13. Chaplain	18.43	2340	2308	98.63	✓
1	2. Co-ordinator/Passages	108.33	2340	2332	99.66	✓
1	6. Staff toilets	25.27	2340	2338	99.91	✓
1	19. Bath	5.74	2340	2330	99.57	✓
1	3. Untitled	40.83	2340	2327	99.44	✓
1	4. Booking 1	31.17	2340	2320	99.15	✓
1	16. Speech OT 1	18.11	2340	2320	99.15	✓
1	18. Cleaners	5.75	2340	2321	99.19	✓
1	17. Airlock	8.19	2340	2084	89.06	✖
1	1. Display area	134.54	2340	2324	99.32	✓

Level	Zone	Area (m²)	Assessed (Hrs)	Pass (Hrs)	Ratio	Pass
1	5. WCs	26.56	2340	2336	99.83	✓
1	7. Learning leaders	20.93	2340	2331	99.62	✓
2	3. SS LE Staff	97.91	2340	2321	99.19	✓
2	5. Consulting	49.70	2340	2333	99.70	✓
2	2. PS LE Staff	98.40	2340	2310	98.72	✓
2	8. LE PS Office	13.74	2340	2226	95.13	✖
2	4. Staff quiet area	73.31	2340	2330	99.57	✓
2	9. Passage	13.65	2340	2327	99.44	✓
2	10. LE SS Office	13.40	2340	2336	99.83	✓
2	6. Passages	47.23	2340	2338	99.91	✓
2	12. Booking 4	11.48	2340	2333	99.70	✓
2	1. Void space	0.00	2340	2334	99.74	✓
2	7. Staff break-out	20.86	2340	2321	99.19	✓
2	11. Booking 2	12.60	2340	2337	99.87	✓
					Pass	✓

Level	Zone	Area (m²)	<-1	-1 to -0.5	-0.5 to 0	0 to 0.5	0.5 to 1	>1
1	21. Lift	4.20	20.0	133.0	850.0	1183.0	149.0	5.0
1	5. WCs	26.56	0.0	34.0	938.0	852.0	512.0	4.0
1	1. Display area	134.54	0.0	28.0	701.0	962.0	633.0	16.0
1	17. Airlock	8.19	0.0	43.0	557.0	600.0	884.0	256.0
1	18. Cleaners	5.75	12.0	98.0	828.0	1160.0	235.0	7.0
1	16. Speech OT 1	18.11	8.0	58.0	798.0	1152.0	312.0	12.0
1	4. Booking 1	31.17	8.0	57.0	801.0	1125.0	337.0	12.0
1	3. Untitled	40.83	2.0	33.0	865.0	988.0	441.0	11.0
1	19. Bath	5.74	5.0	58.0	894.0	1059.0	319.0	5.0

Level	Zone	Area (m²)	<-1	-1 to -0.5	-0.5 to 0	0 to 0.5	0.5 to 1	>1
1	6. Staff toilets	25.27	2.0	39.0	859.0	945.0	495.0	0.0
1	7. Learning leaders	20.93	0.0	32.0	662.0	761.0	876.0	9.0
1	13. Chaplain	18.43	0.0	32.0	624.0	749.0	903.0	32.0
1	12. D.O.W.B - PS	18.65	0.0	32.0	612.0	758.0	905.0	33.0
1	14. D.O.W.B - SS	18.43	0.0	12.0	557.0	772.0	945.0	54.0
1	11. Sensory room	18.87	0.0	8.0	403.0	1215.0	712.0	2.0
1	9. Counselling 2	19.26	7.0	50.0	797.0	1131.0	344.0	11.0
1	10. Counselling 4	18.87	0.0	8.0	457.0	1276.0	596.0	3.0
1	20. Records	4.97	16.0	95.0	817.0	1233.0	173.0	6.0
1	15. Counselling 1	18.18	7.0	46.0	776.0	1142.0	358.0	11.0
1	8. Counselling 3	20.26	2.0	28.0	728.0	1172.0	407.0	3.0
1	2. Co-ordinator/ Passages	108.33	0.0	31.0	797.0	909.0	595.0	8.0
2	7. Staff break-out	20.86	8.0	62.0	884.0	994.0	381.0	11.0
2	1. Void space	0.00	5.0	180.0	998.0	636.0	520.0	1.0
2	12. Booking 4	11.48	1.0	24.0	745.0	952.0	612.0	6.0
2	6. Passages	47.23	0.0	48.0	824.0	724.0	742.0	2.0
2	11. Booking 2	12.60	0.0	29.0	919.0	653.0	736.0	3.0
2	10. LE SS Office	13.40	0.0	26.0	915.0	648.0	747.0	4.0
2	9. Passage	13.65	4.0	51.0	888.0	995.0	393.0	9.0
2	4. Staff quiet area	73.31	2.0	41.0	894.0	775.0	620.0	8.0
2	8. LE PS Office	13.74	0.0	45.0	642.0	663.0	876.0	114.0
2	2. PS LE Staff	98.40	0.0	50.0	732.0	680.0	848.0	30.0
2	5. Consulting	49.70	0.0	14.0	635.0	1027.0	657.0	7.0
2	3. SS LE Staff	97.91	0.0	46.0	891.0	649.0	735.0	19.0

Building Class 5

Method Two

AC Energy Threshold	110.50
U-Value Threshold (W/m².K)	2.00
Reference Window U-Value (W/m².K)	5.80
Reference Window SHGC	0.54
Reference Wall R-Value (m².K/W)	2.60
Total Area (m²)	596.66
Window-Wall Ratio	0.24

Method One - North Aspect

Reference Window U-Value (W/m².K)	5.80
Reference Window SHGC	0.70
Reference Wall R-Value (m².K/W)	2.60
Solar Admittance Threshold	0.13
U-Value Threshold (W/m².K)	2.00
Solar Admittance Weighting	2.12
Aspect Area (m²)	140.23
Window-Wall Ratio	0.19

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	0.0	5.80	0.54	7.20	1.05	0.30	2.10	0.70
Concept	0.0	5.80	0.54	6.00	1.05	1.40	2.00	0.94
Concept	0.0	5.80	0.54	0.81	1.05	3.90	4.80	1.00
Concept	0.0	5.80	0.54	1.98	1.05	3.90	5.00	1.00
Concept	0.0	5.80	0.54	4.18	1.95	1.20	2.30	0.85
Concept	0.0	5.80	0.54	0.94	1.95	1.20	3.30	0.83
Concept	0.0	5.80	0.54	1.93	1.05	0.90	3.00	0.92
Concept	0.0	5.80	0.54	3.86	1.95	1.20	3.30	0.83

Method One - East Aspect

Reference Window U-Value (W/m².K)	5.18
Reference Window SHGC	0.49
Reference Wall R-Value (m².K/W)	2.60
Solar Admittance Threshold	0.13
U-Value Threshold (W/m².K)	2.00
Solar Admittance Weighting	1.62
Aspect Area (m²)	175.52
Window-Wall Ratio	0.34

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	90.0	5.80	0.54	7.35	0.00	0.00	0.00	1.00
Concept	90.0	5.80	0.54	23.40	1.00	0.30	2.10	0.72
Concept	90.0	5.80	0.54	18.72	1.00	0.30	2.90	0.78
Concept	90.0	5.80	0.54	2.55	1.00	3.90	4.50	1.00
Concept	90.0	5.80	0.54	7.14	2.70	0.90	3.00	0.61

Method One - West Aspect

Reference Window U-Value (W/m².K)	5.73
Reference Window SHGC	0.51
Reference Wall R-Value (m².K/W)	2.60
Solar Admittance Threshold	0.13
U-Value Threshold (W/m².K)	2.00
Solar Admittance Weighting	1.67
Aspect Area (m²)	198.71
Window-Wall Ratio	0.30

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	270.0	5.80	0.54	13.32	1.00	0.20	2.00	0.66

Title	Heading (°)	U-value (W/m²K°)	SHGC	Area (m²)	P (m)	G (m)	H (m)	SC
Concept	270.0	5.80	0.54	21.60	1.00	0.30	2.10	0.72
Concept	270.0	5.80	0.54	1.50	1.90	3.90	4.50	0.97
Concept	270.0	5.80	0.54	8.80	1.90	3.90	5.00	0.97
Concept	270.0	5.80	0.54	7.14	3.45	3.90	6.00	0.93
Concept	270.0	5.80	0.54	7.73	1.90	3.90	6.00	0.99

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Efficient Homes

Appendix B

ABCB

Non-residential Lighting

National Construction Code

Calculator

Building name/description	Classification
28 DRAGE RD, WEST WODONGA	Class 5

Number of rows preferred in table below: 35 *(as currently displayed)*

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design illumination power load	Space	Illuminance: Designed lux level	Illuminance: Recommended lux level	Adjustment factor 1: Adjustment factor 1	Adjustment factor 1: Dimming % area	Adjustment factor 1: Illuminance turndown	Adjustment factor 2: Adjustment factor 2	Adjustment factor 2: Dimming % area	Adjustment factor 2: Illuminance turndown	Light colour adjustment factors: Light colour adjustment factor 1	Light colour adjustment factors: Light colour adjustment factor 2	SATISFIES PART J7D3: System illumination power load allowance	SATISFIES PART J7D3: Lighting system share of % of aggregate allowance used
1	Display area	135.0 m²			W	Entry lobby from outside the building									a) CRI ≥ 90	c) CCT ≥ 4500 K	1227 W	#DIV/0!
2	Airlock	8.0 m²			W	Entry lobby from outside the building											72 W	#DIV/0!
3	Cleaners	5.6 m²			W	Service area, cleaner's room and the like											8 W	#DIV/0!
4	Lit	3.8 m²			W	Lit cars											11 W	#DIV/0!
5	Staff Toilets	25.0 m²			W	Toilet, locker room, staff room, rest room and the like											75 W	#DIV/0!
6	Student waiting/Passage	68.0 m²			W	Corridors											340 W	#DIV/0!
7	Centre Co-ordinator	22.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											99 W	#DIV/0!
8	Passage	13.0 m²			W	Corridors											65 W	#DIV/0!
9	Booking 1	30.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											135 W	#DIV/0!
10	#1 Speech P.OT	17.5 m²			W	Office - artificially lit to an ambient level of 200 lx or more											79 W	#DIV/0!
11	Counselling 1	17.5 m²			W	Office - artificially lit to an ambient level of 200 lx or more											79 W	#DIV/0!
12	Counselling 2	17.5 m²			W	Office - artificially lit to an ambient level of 200 lx or more											79 W	#DIV/0!
13	Counselling 3	18.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											81 W	#DIV/0!
14	Counselling 4	18.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											81 W	#DIV/0!
15	Sensory room	18.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											81 W	#DIV/0!
16	First Aid	40.0 m²			W	Toilet, locker room, staff room, rest room and the like											120 W	#DIV/0!
17	Bath	5.5 m²			W	Toilet, locker room, staff room, rest room and the like											17 W	#DIV/0!
18	Records	4.0 m²			W	Storage											6 W	#DIV/0!
19	WCs	25.0 m²			W	Toilet, locker room, staff room, rest room and the like											75 W	#DIV/0!
20	Learning leaders	20.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											90 W	#DIV/0!
21	Chaplain	18.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											81 W	#DIV/0!
22	D.O.W.B - PS	18.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											81 W	#DIV/0!
23	D.O.W.B - SS	18.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											81 W	#DIV/0!
24																	ROW SKIPPED (OK if intentional)	
25	Stair/Passage	43.0 m²			W	Corridors											215 W	#DIV/0!
26	LE PS office	13.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											59 W	#DIV/0!
27	Booking 2	12.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											54 W	#DIV/0!
28	Staff break-out	20.0 m²			W	Toilet, locker room, staff room, rest room and the like											60 W	#DIV/0!
29	Staff quiet area	72.0 m²			W	Toilet, locker room, staff room, rest room and the like											216 W	#DIV/0!
30	PS LE Staff	97.0 m²			W	Toilet, locker room, staff room, rest room and the like											291 W	#DIV/0!

ABCB

Non-residential Lighting

National Construction Code

Calculator

Building name/description	Classification
28 DRAGE RD, WEST WODONGA	Class 5

Number of rows preferred in table below: 35 *(as currently displayed)*

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design illumination power load	Space	Illuminance: Designed lux level	Illuminance: Recommended lux level	Adjustment factor 1: Adjustment factor 1	Adjustment factor 1: Dimming % area	Adjustment factor 1: Illuminance turndown	Adjustment factor 2: Adjustment factor 2	Adjustment factor 2: Dimming % area	Adjustment factor 2: Illuminance turndown	Light colour adjustment factors: Light colour adjustment factor 1	Light colour adjustment factors: Light colour adjustment factor 2	SATISFIES PART J7D3: System illumination power load allowance	SATISFIES PART J7D3: Lighting system share of % of aggregate allowance used
31	Consulting	48.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											216 W	#DIV/0!
32	SS LE Staff	97.0 m²			W	Toilet, locker room, staff room, rest room and the like											291 W	#DIV/0!
33	Passage	13.0 m²			W	Corridors											65 W	#DIV/0!
34	LE SS Office	13.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											59 W	#DIV/0!
35	Booking 4	11.0 m²			W	Office - artificially lit to an ambient level of 200 lx or more											50 W	#DIV/0!

Total: W

Total: 4639 W

if inputs are valid ✓

Appendix C

Wall Systems

	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation		Unventilated					
Material	Fibre-cement	Glass wool	Gypsum plasterboard				
Thickness (mm)	8	108	13				
Conductivity (W/mK)	0.250	0.040	0.170				
Framing Material		Timber					
Metal Frame, Web Thickness (mm)							
Metal Frame, Flange Width (mm)							
Framing Area %		10.0%					
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m².K/W)	0.03	2.35	0.08	0	0	0	0
Wall Construction	Lightweight+ R2.5		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)				0.03
						Internal Surface Resistance (still air, on a wall)	0.12
						System R-Value (m².K/W)	2.61
						System U-Value (W/m².K)	0.38

Wall Systems

	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation		Unventilated					
Material	Concrete block - 190mm dense or 90mm dense solid	Airspace - non-reflective	Glass wool	Gypsum plasterboard			
Thickness (mm)	90	40	108	13			
Conductivity (W/mK)	1.100		0.040	0.170			
Framing Material			Timber				
Metal Frame, Web Thickness (mm)							
Metal Frame, Flange Width (mm)							
Framing Area %			10.0%				
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m².K/W)	0.08	0.00	2.54	0.08	0	0	0
Wall Construction	Block + R2.7		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)				0.03
						Internal Surface Resistance (still air, on a wall)	0.12
						System R-Value (m².K/W)	2.85
						System U-Value (W/m².K)	0.35

Wall Systems

	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation		Unventilated					
Material	Fibre-cement	Glass wool	Gypsum plasterboard				
Thickness (mm)	8	108	13				
Conductivity (W/mK)	0.250	0.040	0.170				
Framing Material		Timber					
Metal Frame, Web Thickness (mm)							
Metal Frame, Flange Width (mm)							
Framing Area %		10.0%					
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m².K/W)	0.03	2.35	0.08	0	0	0	0
Wall Construction	Lightweight + R2.7		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)				0.03
						Internal Surface Resistance (still air, on a wall)	0.12
						System R-Value (m².K/W)	2.61
						System U-Value (W/m².K)	0.38