ENERGY EFFICIENCY EVALUATION
SECTION 'J' OF NCC
for

PROPOSED SHOP / OFFICE
162 ALMA ROAD PADSTOW NSW 2211
LOT 2, DP 22610

Sustainable Energy Engineering Consultants

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CONTENT

AUTHOR QUALIFICATION:

Dr. Saad Odeh has PhD in Mechanical Engineering in Energy and Thermal Systems from UNSW.

- Accredited Assessor in Thermal Performance of Buildings.
- Accredited Home Sustainability Assessor.
- Member of ABSA - Australian Building Sustainability Association.
- Member of the Institution of Engineers Australia

1. INTRODUCTION

The proposed project is a shop/ office development at 162 Alma road Padstow. The north façade of the factory deviated from the true north line by 9° toward the West. The Climate Zone of this postcode is **Climate Zone 5** found from the ABCB interactive climate zone map at
https://www.abcb.gov.au/resources/climate-zone-map**.**

The total area of this site is 241.5 m^2 which comprises:

- Ground floor area (excl. stairs 15 m^2) 89.4 m^2 –
- Mezzanine/ storage 60.0 m^2
- Proposed 2 commercial car spaces.

This work is classified as a **Class 6** development defined by National Construction Code NCC 2022 Volume 1 as "A Class 6 building is a shop or other building used for the sale of goods by retail or the supply of services direct to the public".

Definition

Envelope, for the purposes of Section J in Volume One, means the parts of a building's *fabric* that separate a *conditioned space* or *habitable room* from (a)the exterior of the building; or (b)a non-*conditioned space.*

This Report addresses only matters relevant to Section 'J' "Energy Efficiency" in Volume 1 of NCC 2022 pertaining to a Class 6 building.
The project is assessed using the Deemed to Satisfy provisions of NCC 2022 and building plans provided by Colin De Lore & Assoc. Pty Ltd (Appendix 1).

2. SUMMARY OF PROVISIONS TO COMPLY WITH SECTION 'J' – NCC 2022.

2.1 J4 BUILDING FABRIC :

2.1.1 **J4D3 Thermal construction** — The builder must ensure that the Insulation materials and installation comply with AS/NZS 4859.2

2.1.2 **J4D4 Roof and ceiling construction**, A roof or ceiling must achieve a Total R-Value greater than or equal to **R3.7** for the downward direction of heat flow; and the **solar absorptance** of the upper surface of a roof must be not more than **0.45.**

Verification of the provision:
The floor plan shows that there is a dwelling in the 1st floor of the building above the whole ceiling of the shop. Therefore, **insulation is not required above the shop ceiling**.
Mezzanine/ storage: The floor plan shows that Flat concrete roof is above the ceiling.
Table S36C2c in NCC volume one shows that for concrete 190mm thickness The R value is equal to (0.19/1.1 = **0.17**). Also Table S36C2l shows that for downward direction of heat flow and roof space between 100 mm to ≤ 300 mm with reflective space has an R-value of 1.3.
To achieve the minimum R3.7 of the provision, a minimum **roof insulation of R-value 2.3 is required** for the ceiling of the Mezzanine.

2.1.3 **J4D5 Roof lights**
No rooflights for the shop in this building.

2.1.4 **J4D6 Walls and glazing**
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 U2.0.
Wall components of a wall-glazing construction must achieve:
(a) A minimum total R-Value of R1.0 where the wall is less than 80% of the area of the wall-glazing construction or,
(b) A minimum total R-value of R1.4 where the wall is 80% or more of the area of the wall-glazing construction as specified in the value specified in table J4D6a,
(c) Maximum wall-glazing construction solar admittance 0.13 as specified in table J4D6b.

(d) The glazing system to be chosen must have characteristics as per the specifications given by the facade calculator of NCC in Appendix 2.

Verification of the provision:

The external walls of this project are 280mm double brick thickness. Table S36C2c of specification 36 gives the thermal conductivity of Clay brick: 3.25 kg equals to **0.65** W/m.K. The R-value of the double brick wall of thickness 110mm is **R** = (0.11 /0.65) x 2 **= 0.4** m^2. K/W. Add to this the R-value of air film with outer anti -glare emittance of 0.08 (Table S36C2i) **R = 1.1** m^2. K/W. Therefore, the total R of the double brick wall is **R = 1.5 m^2. K/W**.

The provided plans show that the southern (shop entrance) and northern (mezzanine) wall-glazing constructions have less than 80% wall, therefore, no need for insulation for these walls. However, since the unit **above the shop requires R 1.5** for the external walls it is recommended to add it as well to the shop walls.

To pass the provision the southern shop glazing must be double glazed of U= 3.1 W/m^2.K and SHGC= 0.27 to pass the Facade calculator as shown in Appendix 2.

2.1.5 **J4D7 Floors**

A floor must achieve the Total R-Value specified in Table J4D7. A floor without an in-slab heating or cooling system must achieve a total R-value equal to 2.

Verification of the provision:

The proposed floor for the development is a 200 mm concrete slab.

Table S36C2c gives K for solid concrete 1.44 (W/m. K), which makes R-value equals = 0.2/1.44 = 0.14 m^2. K/W, and for the floor cover of Vinyl tiles = 0.012/0.79= 0.015 m^2. K/W

Therefore, the total floor **R =0.155** m^2. K/W .

Table S39C2b of soil in contact with the floor at ratio 2 and wall thickness 270mm gives an average **R = 1.3** m^2. K/W.

Therefore, **insulation R= 0.6 for the ground floor is required.**

2.2 J5 Building sealing

2.2.1 **J5D4 and J5D5 roof lights and windows and doors,** A roof light, a door, an openable window, or the like must be sealed, or capable of being sealed when serving a conditioned space.

2.2.2 **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.

2.2.3 **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 air leakage.

Verification of the provision

Compliance is met by fitting a seal to restrict air infiltration to each edge of a door, and windows in the office.

Compliance is met if a self-closing damper for the exhaust fans if they are installed in the kitchen.

The builder is to ensure compliance, during construction.

2.3 J6 Air-conditioning and ventilation

2.3.1 **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.

2.3.2 **J6D4 Mechanical ventilation system control-**

A mechanical ventilation system must be capable of being deactivated when the building or part of the building served by that system is not occupied.

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.

Verification of the provision:

There is no specification of the air conditioning and ventilation system on the reviewed plans.

Compliance is met If **the conditioning system and exhaust system are capable of being deactivated** when the building is unattended.

2.4 **J7 Artificial lighting and power**

2.4.1 **J7D3** - 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.

Verification of the provision:

The provided plans have no lighting information, however, NCC light calculator was used to estimate the illumination power load allowance for each zone in the development as shown in Appendix 3. **The total lighting power required in this development was found equal to 862 Watts**.

2.5 **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.

Verification of the provision: The plumber is to ensure compliance, during installation.

2.6 **J9 Energy monitoring and on-site distributed energy resources**

2.6.1 **J9D3** Facilities for energy monitoring –

A building or sole-occupancy unit with a floor area of more than 500 m^2 must have energy meters configured to record the time-of-use consumption of gas and electricity.

Verification of the provision

As per the provided plan in appendix (1) the total floor area (GFL) is 150 m^2, therefore **energy meter** for gas and electricity is not required.

2.6.2 **J9D4** Facilities for electric vehicle charging equipment,

a- A car park associated with a Class 6 building must be provided with electrical distribution boards dedicated to electric vehicle charging.

b- Have the 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.

c- Must be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in 10% of car parking spaces.

Verification of the provision

As per the provided plan in Appendix (1) the development has 2 car parking spots. Therefore, the development **requires an electric circuit infrastructure for 1 electric vehicle charger**.

2.6.3 **J9D5** Facilities for solar photovoltaic and battery systems

a- The main electrical switchboard of a building must contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labeled to indicate the use of each space for a solar photovoltaic system and a battery system.

b- At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels.

Verification of the provision

As per the provided plan in appendix (1) the development roof area is 190 m^2 and it is clear. Excluding the two skylights the remaining area is more than 20%.

The electrician is to consider the solar PV system's future requirement in the switchboard.

3. CERTIFICATE OF SECTION J COMPLIANCE

The above review of section J shows that the proposed shop complies with NCC energy efficiency provisions if the recommendations noted in the following table are fulfilled.

Certificate of Section J compliance

Section	Compliance requirements
J4	
	Minimum insulation of R-value 1.5 must be added to the external walls.
	All building glazing on the north, and south sides must have the following specifications: **North** **Single glazed, U= 5.80** (W/m².K)**, SHGC= 0.56** **South** **Double glazed, U= 3.1** (W/m².K), **SHGC= 0.27**
J5	**Sealing to each edge of the external doors and windows in the building is required.** **Any exhaust fans have self-closing dampers.**
J6	**The A/C system is capable of being deactivated when the air-conditioned space is unattended.**
J7	**Not to exceed illumination power (862 W) as in Appendix 3.**
J8	**J8D2 - The plumber is to ensure compliance, during the installation of the heated water supply.**
J9	**Electric circuit infrastructure for 1 electric vehicle charger is required.**
	The electrician is to consider **the solar PV system's future requirement in the switchboard.**

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22 /02/ 2025

Appendix 1 – Development plans

SHOP/OFFICE & RESIDENCE

162 ALMA ROAD PADSTOW NSW 2211

SITE AREA: 241.5m²

DRAWING REGISTER:

DA01	COVER SHEET
DA02	SITE PLAN
DA03	DEMOLITION PLAN
DA04	PROPOSED FLOOR PLANS
DA05	PROPOSED MEZZANINE
DA06	GROSS FLOOR AREA PLANS
DA07	STREET ELEVATIONS
DA08	LONG ELEVATIONS
DA09	SECTION

LEGEND:

----	DEMOLISHED
CONC	CONCRETE
CPT	CARPET
CR	CEMENT RENDER
EW	EXISTING WINDOW
EX RL	EXISTING RELATIVE LEVEL
FC	FIBRE CEMENT SHEET
FFL	FINISHED FLOOR LEVEL
P	PRIMARY DWELLING
PB	PLASTERBOARD
PT	PAINT FINISH
RL	RELATIVE LEVEL
S	SECONDARY DWELLING
SL	SKYLIGHT
TIM	TIMBER
TL	TILES
W	WINDOW

PROPOSED AREA CALCULATIONS

GFA	GROUND (excl. STAIR 15m²)	89.4m²
	MEZZANINE/STORAGE	60.0m²
	FIRST (excl. LIGHT WELL)	145.5m²
	TOTAL	294.9m²
PROPOSED FSR	1.22:1	

OPEN SPACE AREA

PROPOSED	REAR TERRACE	32.7m²
	FRONT BALCONY	11.7m²
	TOTAL	44.4m²

PARKING

CBDOP REQ.		3
PROPOSED	COMMERCIAL (89.4m²/40)	2
	RESIDENTIAL	2
	TOTAL	4

1 DA01 LOCATION MAP

GENERAL NOTES:

1. BUILDERS AND CONTRACTORS SHALL VERIFY JOB DIMENSIONS BEFORE ANY WORK COMMENCES. ALL SHOP DRAWINGS SHALL BE SUBMITTED TO THE PROPRIETOR AND MANUFACTURE SHALL NOT COMMENCE PRIOR TO THE RETURN OF APPROVED SHOP DRAWINGS.
2. FIGURED DIMENSIONS TAKE PRECEDENCE OVER SCALED.
3. THE ARCHITECT DOES NOT WARRANT NOR TAKES ANY RESPONSIBILITY FOR THE ACCURACY OR OTHERWISE OF THE INFORMATION PROVIDED BY OTHER CONSULTANTS WHICH HAS BEEN USED IN THE PREPARATION OF THESE DRAWINGS. THESE DRAWINGS ARE COPYRIGHT COLIN DE LORE & ASSOCIATES.
4. REFER TO ENGINEERS DOCUMENTS FOR ALL STRUCTURAL WORK. ALL STRUCTURAL WORK TO BE CERTIFIED BY A REGISTERED STRUCTURAL ENGINEER.
5. ALL ITEMS FOR DEMOLITION TO BE SHOWN ON DEMOLITION PLAN.
6. ALL STAIR RISER HEIGHTS TO COMPLY WITH BCA.
7. ALL NEW DOWNPIPES TO CONNECT TO EXISTING STORMWATER LINES.
8. WET AREAS SHALL BE WATERPROOFED TO AS 3740.
9. CONVENTIONED WALL/ROOF SYSTEM TO AS 1684.
10. ALL WORKS TO COMPLY WITH LOCAL COUNCIL REQUIREMENTS, AUSTRALIAN STANDARDS AND NATIONAL CONSTRUCTION CODE.
11. ALL GROUND LINES ARE APPROXIMATE. EXTENT OF FILL AND BATTER WILL BE DETERMINED ONE SITE. SEDIMENT BARRIERS ARE TO BE CUSTOMISED SITE SPECIFIC.

DO NOT SCALE OFF THIS DRAWING BEFORE USING FIGURED DIMENSIONS - VERIFY ALL DIMENSIONS ON SITE. RESOLVE ALL DISCREPANCIES WITH ARCHITECT BEFORE PROCEEDING.

THIS DRAWING IS FOR THE PURPOSE OF COUNCIL APPROVAL AND AS SUCH, IS NOT SUITABLE FOR CONSTRUCTION.

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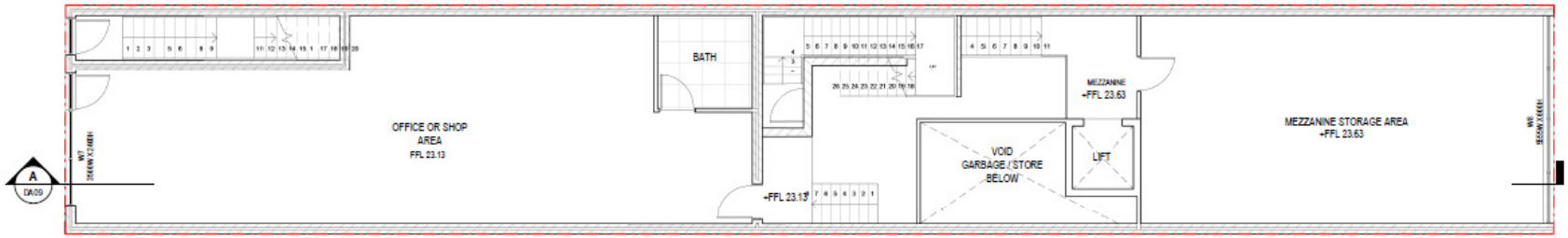
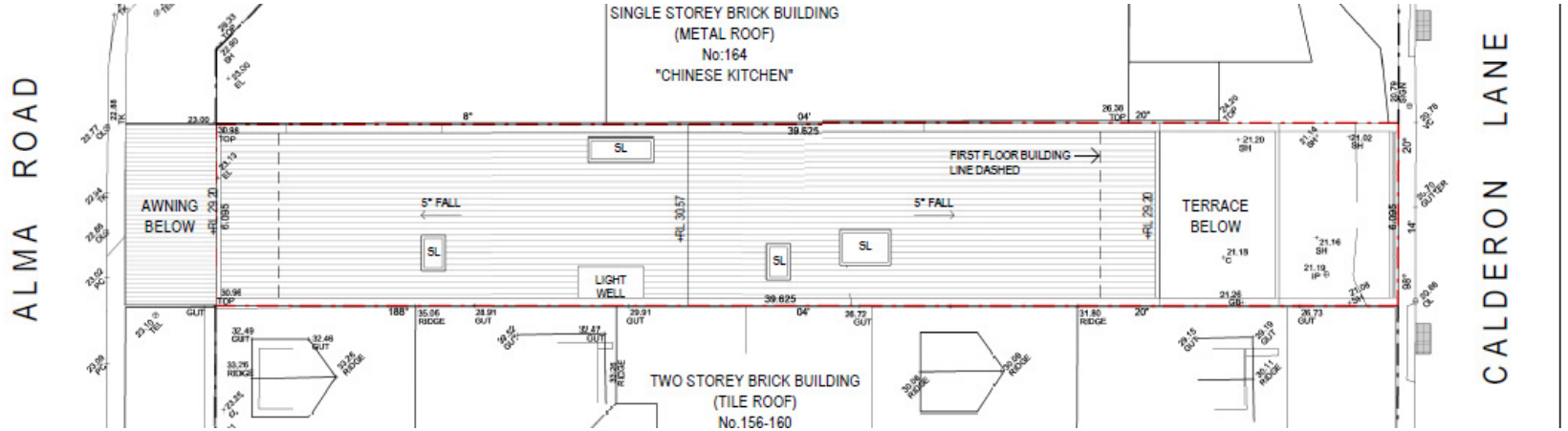
MOBILE: 0411 544 320
EMAIL: colindelore2@optusnet.com.au

REV	DESCRIPTION	DATE
A	ADDED MEZZANINE	07/11/2023
B	ADDED LIFT	17/11/2023
C	ADDED MEZZANINE WINDOWS	09/01/2024
D	FOR DA	18/03/2024

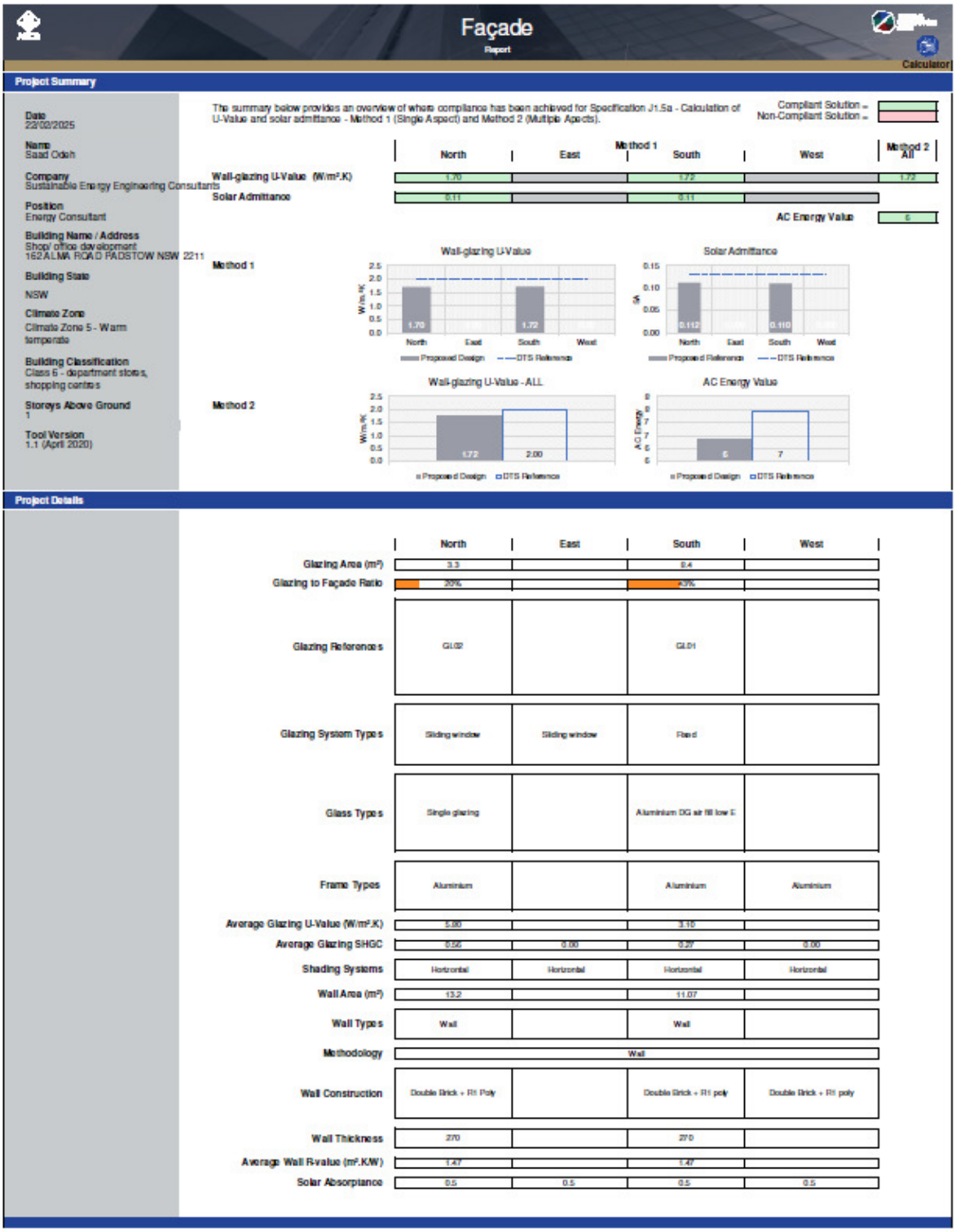
CLIENT: MR & MRS RIBEIRO
SHEET: COVER SHEET
NORTH POINT
PROJECT: SHOP / OFFICE & RESIDENCE
162 ALMA ROAD PADSTOW NSW 2211
DATE: MAR 2023 REV: D
SCALE @ A3: 1 : 1 JOB NO.: 2022/106
DWG NO.: DA01



1 DA05 MEZZANINE
SCALE: 1 : 100



5. Appendix 2- Façade report



Façade
Report
Calculator

Project Summary

Date
22/02/2025

Name
Saad Odeh

Company
Sustainable Energy Engineering Consultants

Position
Energy Consultant

Building Name / Address
Shop/ office development
162 ALMA ROAD PADSTOW NSW 2211

Building State
NSW

Climate Zone
Climate Zone 5 - Warm temperate

Building Classification
Class 6 - department stores, shopping centres

Storeys Above Ground
1

Tool Version
1.1 (April 2020)

The summary below provides an overview of where compliance has been achieved for Specification J1.5a - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Aspects).

Compliant Solution –
Non-Compliant Solution –

Method 1

	North	East	South	West	Method 2 All
Wall-glazing U-Value (W/m².K)	1.70		1.72		1.72
Solar Admittance	0.11		0.11		
AC Energy Value					6

Method 1

Method 2

Project Details

	North	East	South	West
Glazing Area (m²)	3.3		8.4	
Glazing to Façade Ratio	20%		43%	
Glazing References	GL02		GL01	
Glazing System Types	Sliding window	Sliding window	Fixed	
Glass Types	Single glazing		Aluminium DG air fill low E	
Frame Types	Aluminium		Aluminium	Aluminium
Average Glazing U-Value (W/m².K)	5.80		3.15	
Average Glazing SHGC	0.56	0.00	0.27	0.00
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal
Wall Area (m²)	13.2		11.07	
Wall Types	Wall		Wall	
Methodology	Wall			
Wall Construction	Double Brick + R1 Poly		Double Brick + R1 poly	Double Brick + R1 poly
Wall Thickness	270		270	
Average Wall R-value (m².K/W)	1.47		1.47	
Solar Absorptance	0.5	0.5	0.5	0.5

6. Appendix 3 – Lighting Calculator

ABCB

Non-residential Lighting

National Construction Code

Calculator

Building name/description	Classification
PROPOSED SHOP / OFFICE -162 ALMA ROAD PADSTOW NSW 2211	Class 9b

Number of rows preferred in table below: 4 *(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: Dimming % area	Adjustment factor 1: Illuminance turndown	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
							These columns do not represent a requirement of the NCC and are suggestions only.		Adjustment factors			Adjustment factors						
1	Shop area	81.0 m²	46 m	3.0 m	5 W	Office - artificially lit to an ambient level of 200 lx or more											521 W	41% of 1%
2	Bath	6.3 m²	9 m	3.0 m	3 W	Toilet, locker room, staff room, rest room and the like											33 W	27% of 1%
3	Stairs	21.0 m²	29 m	3.0 m	2 W	Corridors											181 W	18% of 1%
4	Mezzanine storage	59.0 m²	32 m	3.0 m	2 W	Storage											127 W	14% of 1%

Total: 11 W

Total: 862 W

If inputs are valid ✓