



NCC Section J Report

Commercial Space

**68A Queenscliff Rd
QUEENSCLIFF NSW 2096**

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1 (final)

4 June 19

A handwritten signature in blue ink that reads "Bruce Carr".

Version

Date

Approved by

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1 INTRODUCTION

This report assesses the proposed commercial development for its compliance with Section J energy efficiency provisions of the 2016 National Construction Code (NCC) – Volume 1. These provisions will apply to all new (and altered) construction work.

This report will detail the measures required to achieve compliance and will be required as part of the submission to the council or the consent authority for the Construction Certificate application.

2 APPLICATION

The Section J Deemed-to-Satisfy (DTS) provisions of 2016 (Volume One) have been applied for the assessment of this project. The DTS provisions consist of 7 Parts and apply to the commercial space on the ground floor of this mixed-use development.

This report is concerned with the following parts:

- Part J1: Building Fabric
- Part J2: Glazing
- Part J3: Building Sealing
- Part J6: Artificial Lighting and Power
- Part J7: Hot Water Supply
- Part J8: Access for Maintenance

The following sections will not form part of this report, as they will require the expertise of specialist service consultants:

- Part J5: Air-conditioning and Ventilations Systems

(Note: Part J4 has been removed from NCC since 2010)

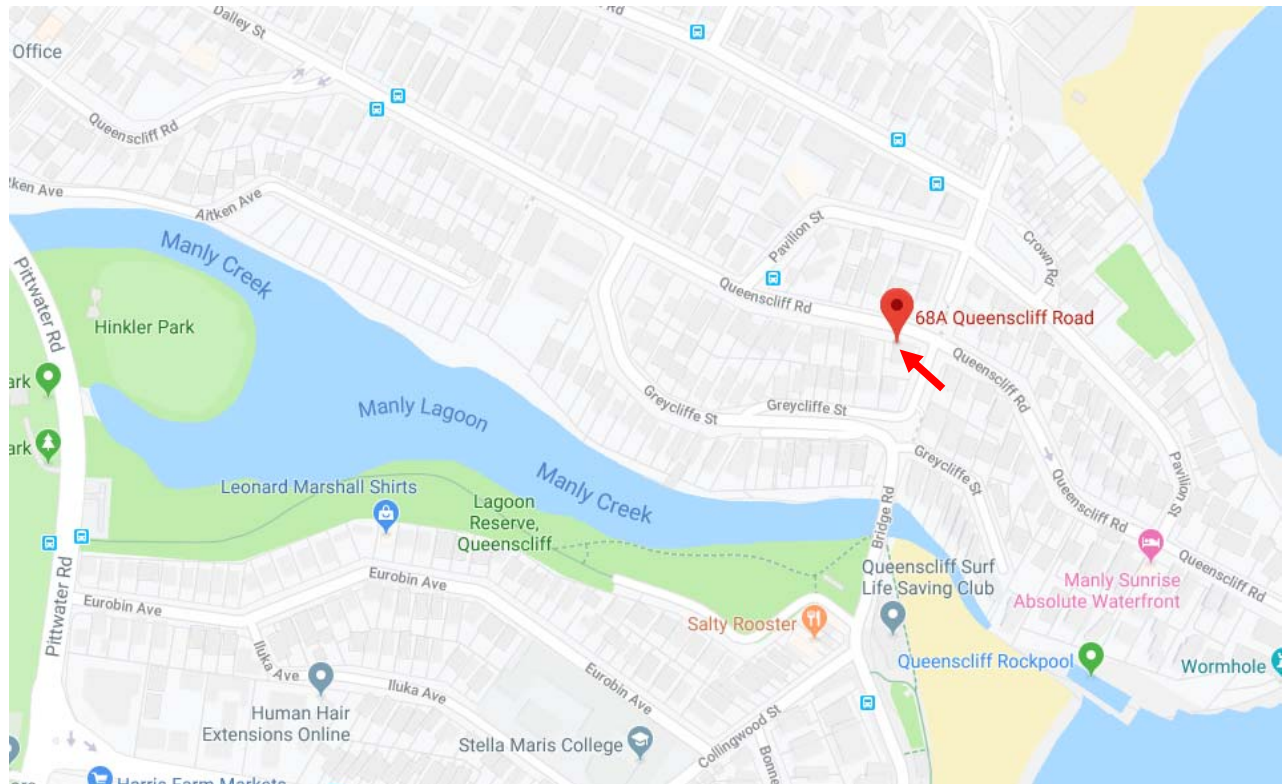
3 BUILDING DETAILS

The title, address and location details for the project are as follows:

Project: Retail Space

Address: 68A Queenscliff Rd QUEENSCLIFF NSW 2096

Authority: Northern Beaches Council



Climate zone: 5 ('Warm Temperate')

Description: 2 new commercial spaces of 85.8m² and 26 m² respectively on the ground floor of a mixed-use development are being constructed. The commercial space will be used for retail purposes. There is also a basement level directly below for parking and services but this will not be conditioned. 5 Class 2 residential units are located above from levels 1 to 2. There will be glazing on the north, east and south facades. As the space will be conditioned, the glazing and external (envelope) walls are required to comply with the NCC.

Building class: **Class 6:** "a shop or other building for the sale of goods by retail or the supply of services direct to the public..."

References: **a) Plans:**

Classic Plans (in collaboration with) Nexus Architecture Pty Ltd

Drawing #: 040/19.

Date: 07/02/19 Issue A

b) National Construction Code 2016 Vol. 1

4 SUMMARY AND CERTIFIER CHECK:

Below is a summary of the energy efficiency actions required to meet the requirements of the NCC Details are available in each relevant section.

Element	Insulation Requirements	Action	Certifier Check
Ceiling	Insulation is required in the portion of the ground floor concrete ceiling (SE corner) below the L1 balconies above.	Add minimum insulation of R2.62 to ceiling	
External Walls	Insulation is required in the external 'envelope' walls: Cavity Brick (Rendered):	Install min. R1.6 insulation	
Walls: (dividing conditioned & non-conditioned space)	Insulation is required in the plastered single skin brick (see figure 5.1 for walls indicated in blue)	Install minimum insulation of R1.43	
Floor	Insulation is required in the suspended concrete <u>ground</u> floor (above the non-conditioned and ventilated basement carpark)	Install minimum insulation of R1.7	
External Glazing	Ground: S: Single glazed clear (7.0/0.70) N & E: Single glazed low-e (7.7/0.36)	Ensure that a certificate of compliance is supplied with the windows	

J3: Building Sealing

Sealing of new doors and windows is required. Refer to the relevant sections below for details.

J5: Air Conditioning and Ventilation Systems:

Refer to the design and installation requirements of the Mechanical Engineer or trade contractor's specifications.

J6: Artificial Lighting and Power:

See Section 10 further requirements on interior lighting and control.

J7: Hot Water Supply and J8: Accesses for Maintenance

Hot water system to be installed in accordance with Part B2 of NCC Volume 3 – Plumbing Code of Australia.

J8: A building or sole occupancy unit with a floor area of more than 500 m² must have the facility to record the consumption of gas and electricity.

Following is the detail of each part of Section J of the NCC:

Parts J1 – J3 are applicable only to NEW or ALTERED building works forming part of the external envelope around conditioned areas and the envelope separating the conditioned space from un-conditioned space.

5 PART J1: BUILDING FABRIC

The NCC Part J1 is concerned with the following 4 provisions:

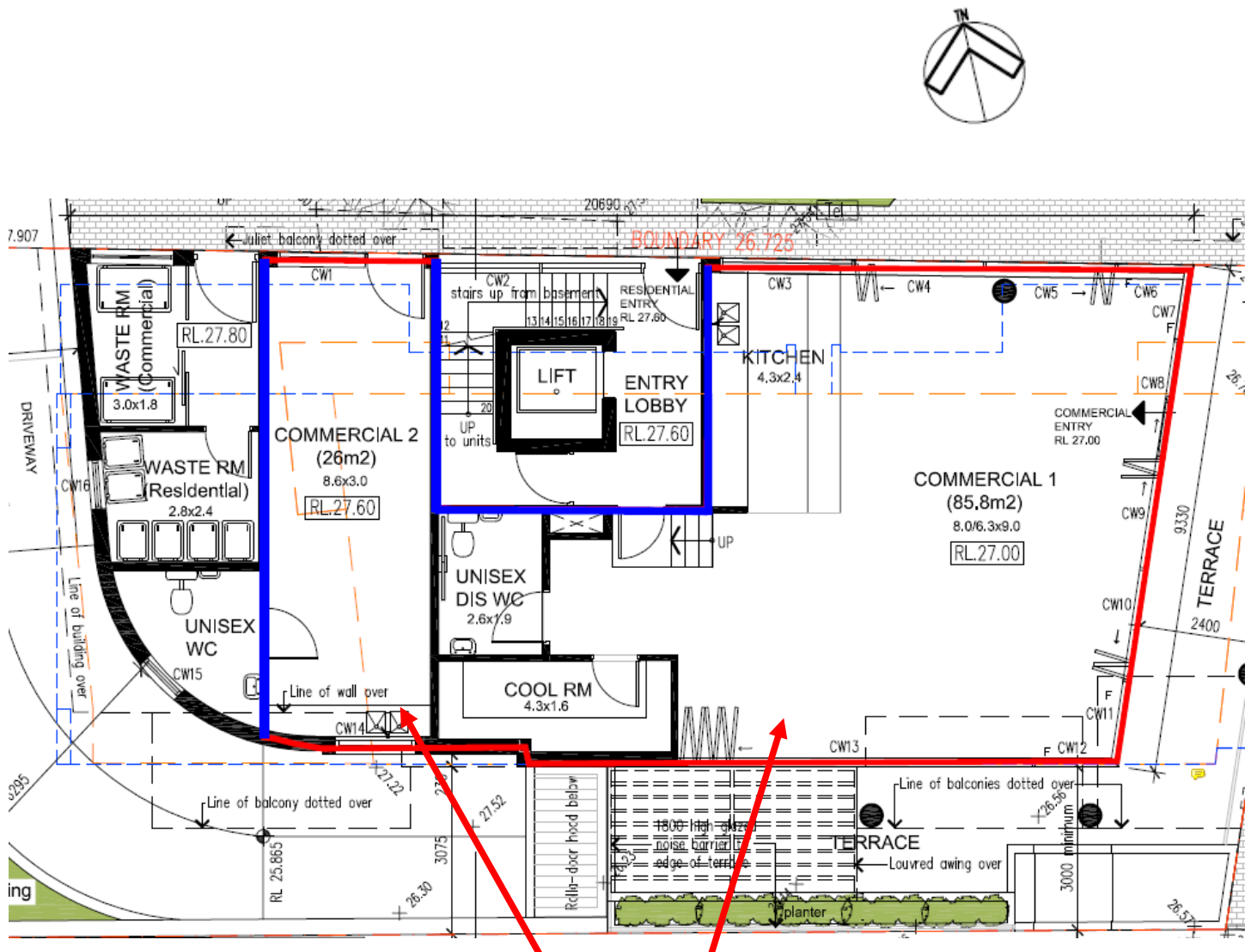
- J1.3 – Roof and ceiling construction
- J1.4 – Roof lights
- J1.5 – Walls
- J1.6 – Floors

The provisions in Part J1 apply to the conditioned spaces in the proposed development. The NCC uses the term 'envelope' to demarcate the conditioned space from non-conditioned space and the exterior of the building. A space is deemed to be conditioned if the air contained will be actively heated or cooled by an air-conditioning service (see definitions at the end of this report).

The diagram below shows the building envelope (Figure 5.1). This is the boundary between the conditioned and non-conditioned zones (or outdoor space).

Figure 5.1 (Floor Plan):

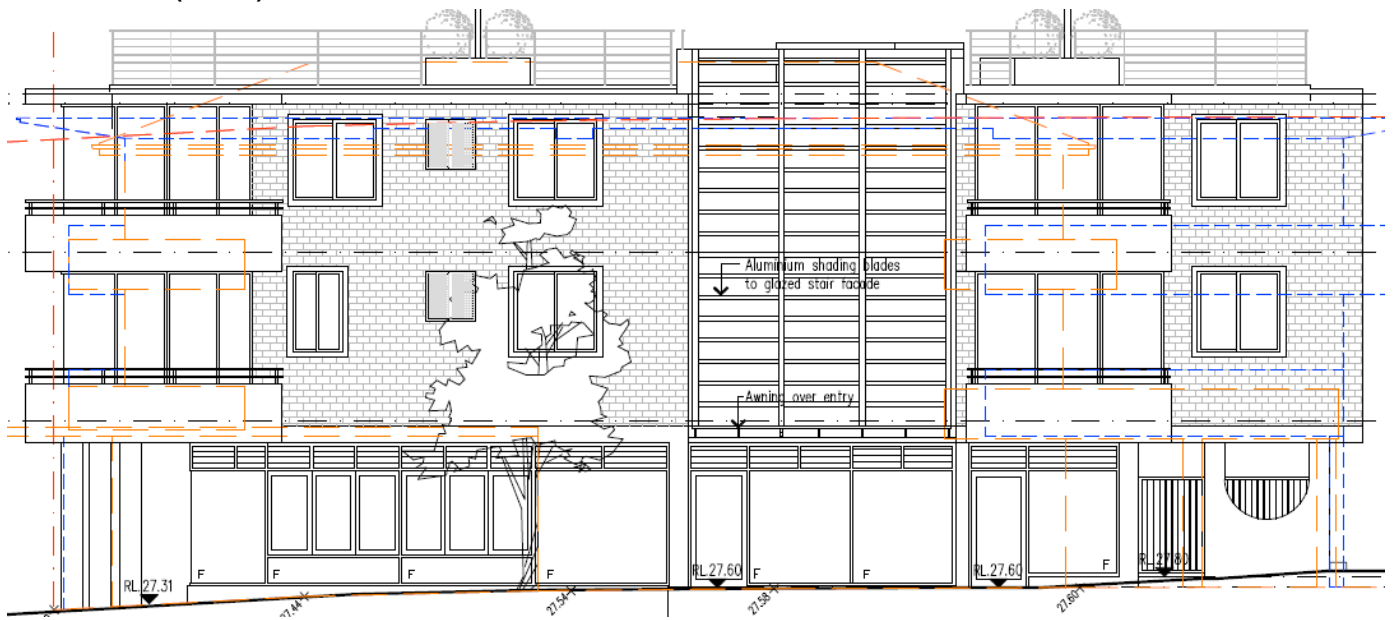
Ground Level:



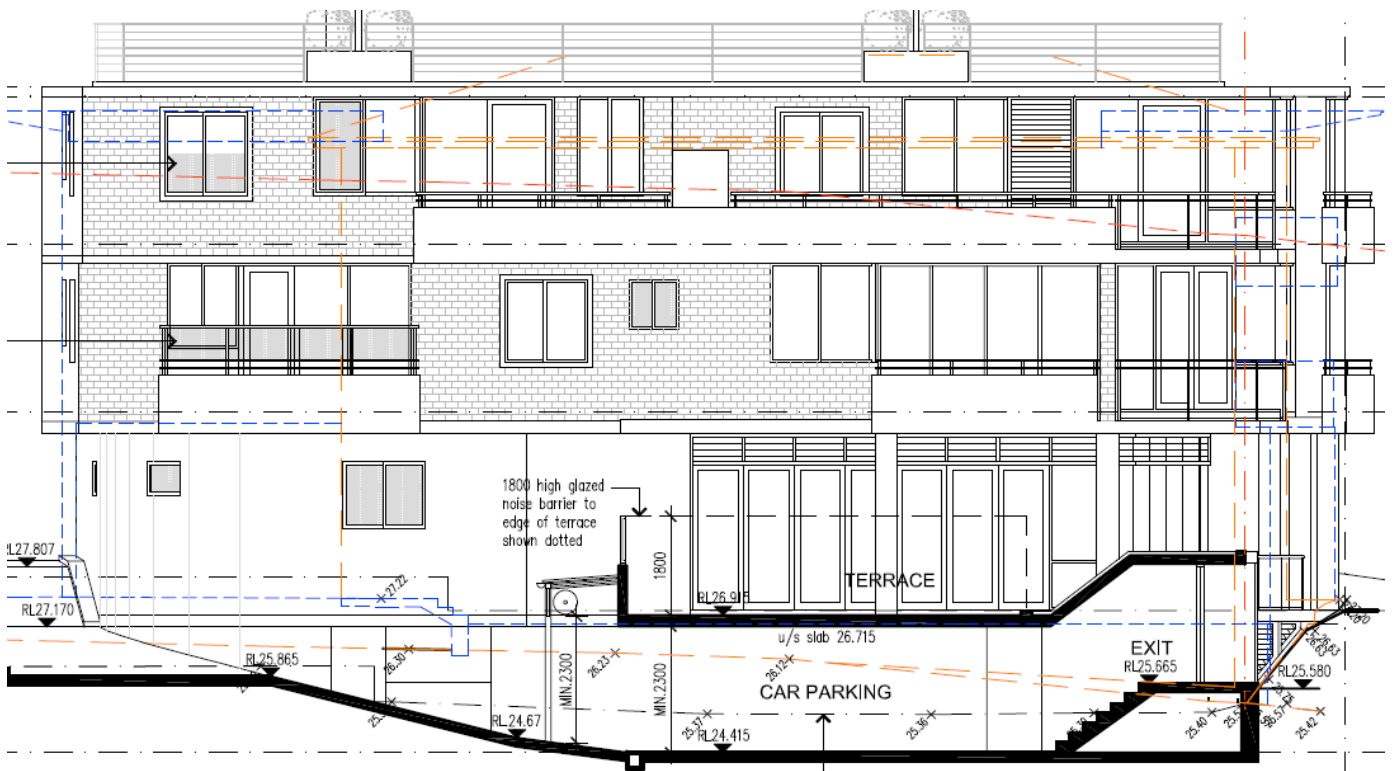
Conditioned
Zones

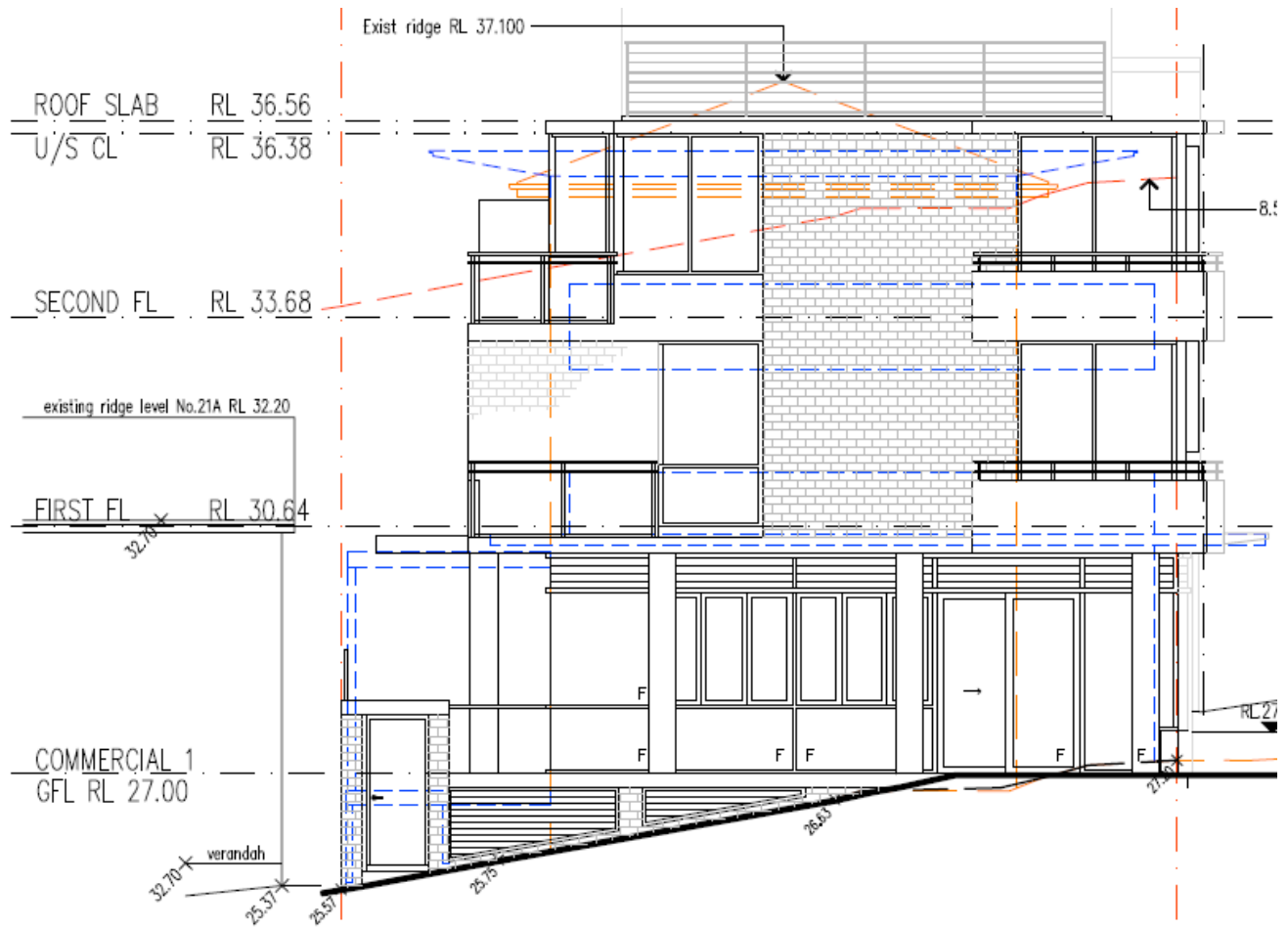
Figure 5.2 (Elevations):

Elevation (North):



Elevation (South):



Elevation (East):

5.1 J1.3: ROOF AND CEILING CONSTRUCTION

5.1.1 Roof and ceiling insulation requirement

A building's roof & ceiling in climate zone 5 is required to achieve a minimum total R-value of 3.2 in the downward direction with a solar absorbance value of not more than 0.4 (light).

A portion of the commercial space on the on the ground floor on the SE corner has a ceiling below the concrete tiled balcony of the units above.

According to Figure 2 in specification J1.3 of the NCC, the typical R-Value for a concrete roof to 5 degrees with a suspended ceiling under is 0.58.

This means that additional insulation that achieves a minimum R-Value of 2.62 (3.2-0.58) in the downward direction is required to be installed in the ceiling below the balcony. The remaining portion of the ceiling is below conditioned space directly above and therefore is not required to be insulated.

Roof Type: Concrete roof to 5 degrees with a suspended ceiling under		R-Value (heat flow direction: downwards)
1	Outdoor air film (7m/s)	0.04
2	Waterproof membrane, rubber synthetic	0.03
3	Solid concrete (100mm, 2400 kg/m ³)	0.07
4	Ceiling air space (100mm to 300mm, non-reflective)	0.22
5	Plasterboard (10mm)	0.06
6	Indoor air film (still air)	0.16
Total R-Value		0.58

Table 5.1a:

R-Value for Roof & Ceiling Construction	Insulation R-Value Requirements	Action to Achieve Compliance
0.58	3.2 required: Additional insulation needed is: $3.2 - 0.58 = \mathbf{2.62}$	Add minimum insulation of R2.62 to ceiling below balconies above

The insulation requirement in the table above assumes there will be no reduction in the added insulation to accommodate exhaust fans, flues or an insulation free area required for recessed downlights.

However, if such a reduction is necessary for the reasons above, the remaining insulation R-Value must be increased to compensate for this loss. The table below shows the adjusted figure for the required insulation, dependant on the percentage of insulation free area.

Percentage of ceiling area uninsulated	0.5% to less than 1.0%	1.0% to less than 1.5%	1.5% to less than 2.0%	2.0% to less than 2.5%	2.5% to less than 3.0%	3.0% to less than 4.0%	4.0 % to less than 5.0%	5.0% or more
Adjusted minimum required insulation to be added	2.8	2.9	3.1	3.3	3.6	4.2	5.0	Not permitted

5.2 J1.4: ROOF LIGHTS

5.1.1 Roof light performance requirement

This section of the NCC is not applicable as there are no roof lights being installed directly over the conditioned zones.

5.3 J1.5: WALLS: NEW EXTERNAL WALLS.

5.3.1 Requirement

Each part of an external wall that is part of the envelope must satisfy Table J1.5 of the NCC. The 'envelope' of a building separates a conditioned space or habitable room from the **exterior** of the building or a non-conditioned space.

The **external** walls of this building are indicated in Figure 5.1 with a **red** line. These walls therefore need to comply with the NCC and are required to reach a minimum R-Value of **2.8** in climate zone 5.

The external walls will be constructed of cavity masonry, rendered internally

Wall type: Cavity masonry – 20mm to 50mm cavity, rendered internally		R-Value
1	Outdoor air film (7m/s)	0.04
2	Masonry (110mm clay brick: 1690 kg/m ³)	0.17
3	Masonry cavity & air space (20mm to 50mm, non-reflective and unventilated)	0.17
4	Masonry (110mm clay brick: 1690 kg/m ³)	0.17
5	10mm Render	0.02
6	Indoor air film (still air)	0.12
Total R-Value		0.69

The following options in table 5.3a below will achieve compliance:

Table 5.3a:

Insulation Provided by Construction	Required R-Value	#Reduced by R0.5	Required Action to Achieve Compliance
0.69	2.8 Required. Additional R-Value is $2.8 - 0.69 = 2.1$	$2.1 - 0.5 = 1.6$	Add minimum insulation of R1.6

NB: The minimum *Total R-Value* is reduced for a wall with a surface density of not less than 220 kg/m² by 0.5. As this wall is cavity brick wall, this is greater than 220 kg/m².

5.4 J1.5: WALLS: WALLS OTHER THAN AN EXTERNAL WALL

5.3.1 Requirement:

This part of the NCC is for walls that separate a conditioned space from a non-conditioned space **excluding an external wall**. These walls are indicated in Figure 5.1 with a **blue** line and need to comply with the NCC.

Walls that separate conditioned from non-conditioned spaces in climate zone 5, where the adjacent non-conditioned space (ie. Entry lobby, WC and waste rooms) has ventilation of more than 1.5 air changes per hour of outside air during occupied hours are required to reach a minimum R-Value of **1.8**.

The internal party walls will be constructed of plastered single skin brick.

Wall type: Plastered Brick		<i>R-Value</i>
1	Outdoor air film	0.04
2	10mm Render	0.02
3	Masonry (110mm clay brick: 1690 kg/m ³)	0.17
4	10mm Render	0.02
5	Indoor air film (still air)	0.12
Total R-Value		0.37

The following options in table 5.3a below will achieve compliance:

Table 5.3a:

Insulation Provided by Construction	Required R-Value	Required Action to Achieve Compliance
0.37	R1.8 Required. Additional R-Value is $1.8 - 0.37 = 1.43$	Install minimum insulation of R1.43

5.5 J1.6: FLOORS

5.5.1 Floor insulation requirement

Table J1.6 of NCC shows the minimum total R-Value for floors of conditioned spaces.

The ground floor commercial space contains a concrete suspended floor directly above the non-conditioned and open basement car park. As per the NCC (Table J1.6), a suspended concrete floor without an in-slab heating or cooling system where the non-conditioned space is mechanically ventilated by more than 1.5 air changes per hour is required to achieve a **R-Value of 2.0** in the downwards direction in climate zone 5.

Floor type: Suspended Concrete Slab		R-Value
1	Indoor air film	0.16
2	Solid Concrete (150mm, 2400 kg/m ²)	0.10
3	Outdoor air film	0.04
Total R-Value		0.30

The following options in table 5.3a below will achieve compliance:

Table 5.3a:

Insulation Provided by Construction	Required R-Value	Required Action to Achieve Compliance
0.30	R2.0 Required. Additional R-Value is $2.0 - 0.30 = 1.7$	Addition of R1.7 Insulation.

6 PART J2: GLAZING

6.1 Glazing calculator

The NCC Volume 1 glazing calculator (last issued with 2014) has been used to demonstrate compliance of the glazing with Section J.

The glazing calculator spreadsheets below show the maximum area of glass that can be used on each façade, the type of glass and the shading devices that have been included in the calculations.

Level	Orientation	Minimum Requirements (incl. frame)		Shading Devices	#Typical Glazing
		U-Value	SHGC		
Ground	N, E	7.7	0.36	None	Aluminium single glazed low-e
	S	7.0	0.70	None	Aluminium single glazed clear

The glazing description is indicative only and may vary depending on the chosen manufacturer & supplier.

***The glazing manufacturer must provide performance data to show that the selected glazing complies with the values in the table through the WERS certification.**

NB: The following links to the WERS website provides information on the window manufacturers which are certified under WERS and the energy rating of each of their glazing products: <http://www.wers.net/>

NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)

Building name/description

Commercial Space - 68A Queenscliff Rd Queenscliff NSW 2096

Application

shop display

Climate zone

5

Storey

Ground Floor

Facade areas

N

36.7m²

NE

E

SE

S

48.6m²

SW

W

NW

internal

Option A

Option B

Glazing area (A)

29.2m²29.3m²27.7m²

n/a

Number of rows preferred in table below

14 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS										SHADING		CALCULATED OUTCOMES OK (if inputs are valid)						
ID	Glazing element	Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes		
		Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	PI/H	G (m)	Heating (SH)	Cooling (SC)	Area used (m²)	Element share of % of allowance used		
W1	Fixed - Commercial 2	N		2.40	1.64		7.7	0.36	0.500	2.400	0.21	0.00	0.96	0.80	3.94	11% of 98%		
W1	Door - Commercial 2	N		2.58	1.10		7.7	0.36	0.500	2.580	0.19	0.00	0.96	0.82	2.84	8% of 98%		
W3	Commercial 1	N		2.58	2.43		7.7	0.36	0.000			0.00	1.00	1.00	6.27	24% of 98%		
W4	Commercial 1	N		2.58	2.44		7.7	0.36	0.000			0.00	1.00	1.00	6.30	24% of 98%		
W5	Commercial 1	N		2.58	2.44		7.7	0.36	0.000			0.00	1.00	1.00	6.30	24% of 98%		
W6	Commercial 1	N		2.58	1.37		7.7	0.36	0.500	2.580	0.19	0.00	0.96	0.82	3.52	10% of 98%		
W7	Commercial 1	E		3.21	1.31		7.7	0.36	2.800	3.210	0.87	0.00	0.35	0.46	4.21	13% of 83%		
W8	Commercial 1	E		3.21	2.20		7.7	0.36	2.400	3.210	0.75	0.00	0.48	0.52	7.06	24% of 83%		
W9	Commercial 1	E		3.21	2.08		7.7	0.36	2.400	3.210	0.75	0.00	0.48	0.52	6.66	23% of 83%		
W10	Commercial 1	E		3.21	2.08		7.7	0.36	2.400	3.210	0.75	0.00	0.48	0.52	6.66	23% of 83%		
W11	Commercial 1	E		3.21	1.48		7.7	0.36	2.400	3.210	0.75	0.00	0.48	0.52	4.73	16% of 83%		
W12	Commercial 1	S		3.21	1.48		7.0	0.70	1.200	3.210	0.37	0.00	0.88	0.82	4.73	17% of 99%		
W13	Commercial 1	S		3.21	6.58		7.0	0.70	0.000			0.00	1.00	1.00	21.12	77% of 99%		
W14	Commercial 1	S		1.20	1.50		7.0	0.70	1.400	1.700	0.82	0.50	0.84	0.76	1.80	6% of 99%		

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters. While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all. Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

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if inputs are valid



7 PART J3: BUILDING SEALING

7.3 J3.4: EXTERNAL WINDOWS AND DOORS

A seal to restrict air infiltration must be fitted to each edge of a new door, openable window or the like forming part of the envelope of a conditioned space or the external fabric of a habitable room or public area.

Above requirements do not apply to:

- a) Windows complying with AS2047 (Windows in Buildings – Selection and Installation) or
- b) A fire door or smoke door or
- c) A roller shutter door, roller shutter grill or other security or device installed only for out-of-hours security

The seal on the bottom of an external swing door must be a draft protection device and for the other edges of an external door or edges of an openable window may be foam or rubber compression strip, fibrous seal or the like.

As per Clause J3.4d, an entrance to a building, if leading to a conditioned space must have an air lock, self-closing door, revolving door or the like. If the floor space of the conditioned space where the entrance door leads is less than 50m², then this clause does not apply.

7.4 J3.5: EXHAUST FANS

As required by F4.5 of Volume 1 NCC, each “sanitary compartment, bathroom or shower” must have natural ventilation or mechanical ventilation or an air-conditioning system complying with AS 1668.2 and AS/NZS 3666.1.

A miscellaneous exhaust fan, such as a bathroom or domestic kitchen 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 zone 5.

7.5 J3.6: CONSTRUCTION OF ROOFS, WALLS AND FLOORS

Roofs, 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 when forming part of the envelope or the internal fabric of a habitable room or a public area in climate zones 4 to 8. This must be constructed by::

- enclosing by internal lining systems that are close fitting at ceiling, wall and floor junctions or,
- sealed by caulking, skirting, architraves, cornices or the like.

Penetrations for wiring, piping etc forming part of the building envelope must also be sealed against air leakage.

8 PART J4

This part is blank as it was removed by the NCC in a previous version.

9 PART J5: AIR CONDITIONING AND VENTILATION SYSTEMS

Refer to the Mechanical Engineer’s documentation for compliance requirements for air-conditioning.

10 PART J6: ARTIFICIAL LIGHTING AND POWER

J6.2 Artificial Lighting

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 adjusted 'illumination power density' (IPD) – see last column below for the total maximum Watts allowable. This excludes any emergency lighting, signage or display cabinet lighting.

Table A:

Commercial Zones	Level	Unadjusted IPD	Area (per unit)	Adjusted IPD	*Control Factor	#Max Power (W) Per Room
Commercial 1 - Retail	Ground	22	80.40	31.1	1.0	2,499
Commercial 2 - Retail	Ground	22	25.70	34.9	1.0	897
Unisex Disabled WC	Ground	6	5.00	10.8	1.0	54
Cool Room	Ground	8	6.80	14.3	1.0	97
Unisex WC	Ground	6	5.30	10.6	1.0	56
Waste Room - Commercial	Ground	6	9.00	10.2	1.0	92

J 6.3 INTERIOR ARTIFICIAL LIGHTING AND CONTROL

Artificial lighting of a room or space must be individually operated by a switch or other control device. An artificial lighting switch must be located in a visible position, in the room or space being switched or in an adjacent room or space from where the lighting being switched is visible.

95% of the light fittings in a building or storey of a building (other than a Class 2 or 3) of more than 250 m² must be controlled by a time switch in accordance with Specification J6 or, an occupant sensing device such as a security key card reader that registers when a person is entering or leaving the building; or with a motion detector.

J6.4 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 an area, in which case they may be combined.
- By a time switch in accordance with Specification J6 where the display exceeds 1Kw.

J6.5 ARTIFICIAL LIGHTING AROUND THE PERIMETER OF A BUILDING

This provision specifies that artificial lighting to the perimeter of a building must be controlled by a daylight sensor or a time switch.

When the total perimeter lighting load exceeds 100W, have an average light source efficacy of not less than 60 lumens/W, or be controlled by a motion detector in accordance with Specification J6.

When used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification J6.

11 PART J7: HOT WATER SUPPLY

If a new hot water system is being installed for food preparation or sanitary purposes, other than a solar hot water system, then it must be designed and installed in accordance with Part B2 of NCC Volume 3 – Plumbing Code of Australia.

12 PART J8: FACILITIES FOR ENERGY MONITORING

12.1 J8.3: FACILITIES FOR ENERGY MONITORING

A building or sole occupancy unit with a floor area of more than 500 m² must have the facility to record the consumption of gas and electricity.

A building with a floor area of more than 2,500 m² must have the facility to record individually the energy consumption of:

- a) Air conditioning plant
 - b) Artificial lighting
 - c) Appliance power
 - d) Central hot water supply &
 - e) Internal transport devices including lifts, escalators and travelators where there is more than one serving the building &
 - f) Other ancillary plant
-

13 DEFINITIONS

The following definitions from the 2016 NCC are relevant to this Section J Report:

Envelope

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 including -
 - (i) the floor of a rooftop plant room, lift-machine room or the like; and
 - (ii) the floor above a carpark or warehouse; and
 - (iii) the common wall with a carpark, warehouse or the like.

Habitable room

Means a room used for normal domestic activities, and:

- (a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but
- (b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Conditioned space

Means a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning, but does not include:

- (a) a non-habitable room of a Class 2 building or Class 4 part of a building in which a heater with a capacity of not more than 1.2 kW or 4.3 MJ/hour provides the air-conditioning; or
- (b) a space in a Class 6, 7, 8 or 9b building where the input power to an air-conditioning system is not more than 15 W/m² or 15 J/s.m² (54 KJ/hour.m²)
- (c) a lift shaft

Air-conditioning

A service that actively cools or heats the air within a space, but does not include a service that directly cools or heats cold rooms, hot rooms or; maintains specialised conditions for equipment or processes, where this is the main purpose of the service.

Bulk Insulation

Has a high resistance to the flow of heat by conduction. It includes Fibreglass, Rockwool, Glass Wool, Polyester, expanded or extruded polystyrene or other similar materials.

R-Value (m². K/W)

Means the thermal resistance of a component calculated by dividing its thickness by its thermal conductivity.

End of report