efficient LIVING

Section J Report – NCC 2016

Mixed Use Development

A+ Design Group

To be built at **56-60 Burns Bay Road, Lane Cove**

Document Control

Issue	File Ref	Description	Author	Checked	Date
A	19-0333	Section J Deemed-to-Satisfy assessment and report	FT		06/05/19
B	19-0333	Section J Deemed-to-Satisfy assessment and report	FT		09/05/19

Sustainable Building Consultants
p. 02 9970 6181 **e.** admin@efficientliving.com.au **w.** efficientliving.com.au

Prepared For	Architectural Documents
A+ Design Group Client Address: 89 Chandos Street, St Leonards, NSW 2065, Australia Contact : Arturo Alvial Phone : 0490 087 972 Email : arturoa@aplusdg.com.au	Dwg No. A2.03, A2.05, A2.06, A3.01, A3.02, A3.03, A3.04, A3.05, A3.06, A3.07, A3.08, A3.09, A4.01, A4.02, A4.03, A5.01, A5.02, A6.01, A6.02, A9.01

Prepared By	Additional Supporting Documentation
Efficient Living 13/13 Lagoon St, NARRABEEN NSW 2101 Contact: Frank Tian Phone: 02 9970 6181 Email: frank@efficientliving.com.au	N/A

This report has been prepared in accordance with the agreed scope of works between Efficient Living and A+ Design Group. At all times Efficient Living has acted with due diligence and employed all reasonable skill and care in the preparation of this report. The information contained within is based upon the documents and information, accepted in good faith as being true and accurate, provided by the Client, architects and consultants. Should subsequent amendments occur to the documents referenced this report may require an update or else non-compliance with the NCC Section J may result.

Executive Summary

Efficient Living has been engaged by A+ Design Group to determine what measures are required for the proposal to meet Section J Deemed-to-Satisfy requirements of the 2016 National Construction Code (NCC). The proposal consists of three (3) retail tenancies and one (1) supermarket located at 56-60 Burns Bay Road, Lane Cove.

A summary of the key requirements are as follows:

- The roof and ceiling construction(s) that form part of the building envelope are required to have a minimum Total R-Value of **R3.7**
- The roof and ceiling construction(s) upper surface solar absorbance must be between 0.4 and 0.6
- Any required roof/ceiling insulation will not be reduced by more than 0.5% of the total insulation area through any form of penetration
- All external walls that form part of the building envelope are required to have a minimum Total R-Value of **R2.8**
- All external floors that form part of the building envelope are required to have a minimum Total R-Value of **R2.0**
- All glazing installed shall comply with the following values, these values must be total window system values and not glass only values

Ground North: None	Ground East: None	Ground South: U-Value: **5.5** (equal to or less than) SHGC: **0.79** (equal to or greater than)	Ground West: U-Value: **6.5** (equal to or less than) SHGC: **0.79** (equal to or less than)
Level 2 North: U-Value: **6.5** (equal to or greater than) SHGC: **0.79** (equal to or less than)	Level 2 East: None	Level 2 South: U-Value: **6.5** (equal to or less than) SHGC: **0.79** (equal to or greater than)	Level 2 West: None

Table of contents

Introduction

Efficient Living has been engaged by A+ Design Group to determine what measures are required for the proposal to meet the 2016 National Construction Code (NCC) Section J requirements via *Deemed-to-Satisfy Provisions*. The Objective of Section J is to reduce greenhouse gas emissions at 56-60 Burns Bay Road, Lane Cove, NSW and is therefore located within *Climate zone* 5 of the NCC.

Community space is not in the

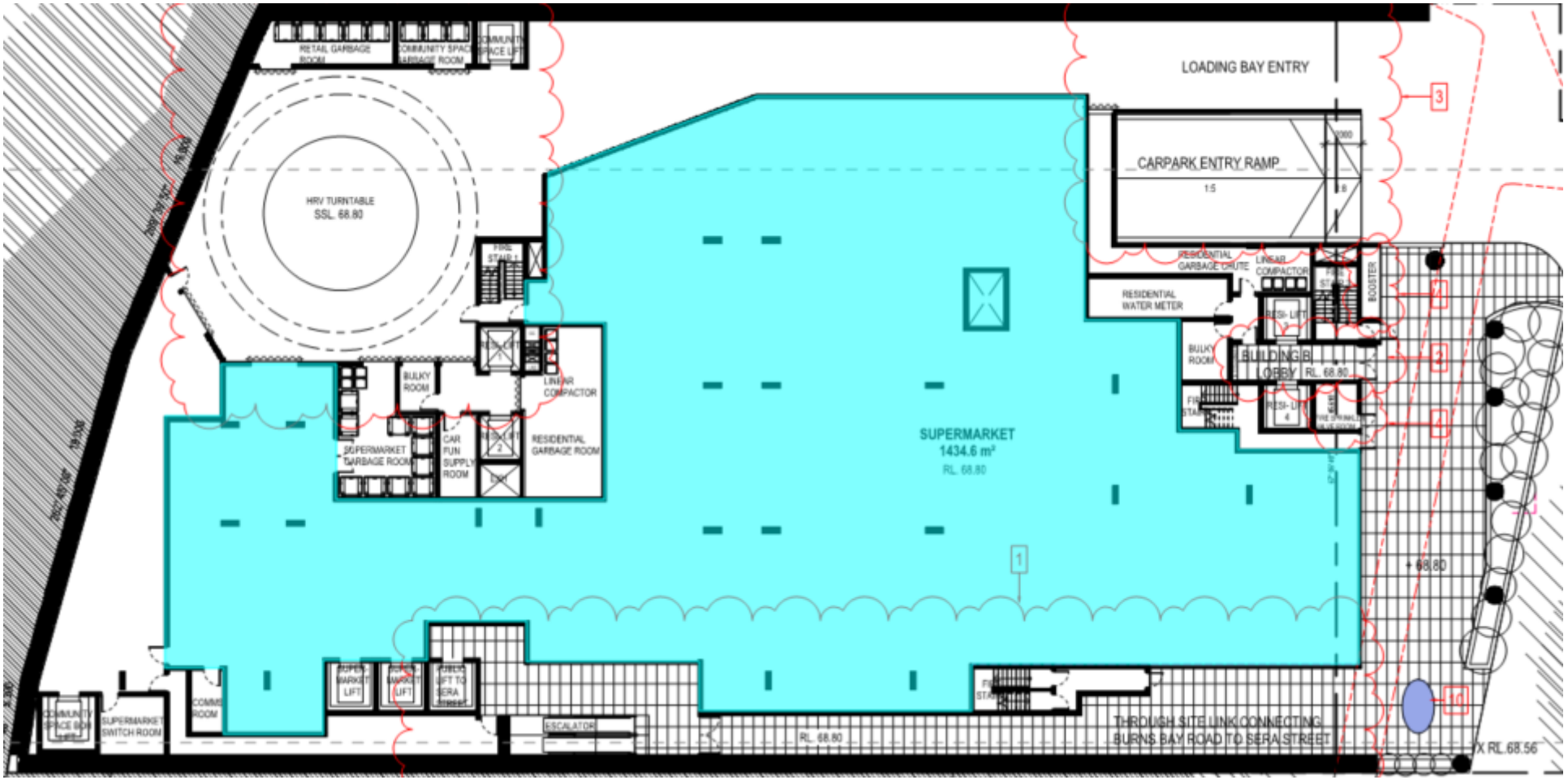
The proposal consist of mixed use development. The residential portion of the proposal has not been assessed in this report as it is covered by BASIX. The proposal dictates the follow NCC classes are applicable:

- Class 6 – Ground level supermarket and Level 3 retails
- Class 7a – Basement level 1-3
- Class 2 – Ground and levels 1 - 4 - NOT ASSESSED
- Community spare on level 1 is residential part – NOT ASSESSED

In the report that follows items located within the shaded column "Required action(s) for compliance" are the requirements that must be adhered to, to ensure compliance. The comments to the right explains these specifications in greater detail to help the reader better understand how each particular requirement has been reached. It should be understood that this report is a design report only and confirmation of the final built compliance is outside of the agreed scope of works. This report should be used as reference to ensure final built compliance and if construction is consistent with the referenced plans and specifications contained within this report Section J compliance shall be achieved.

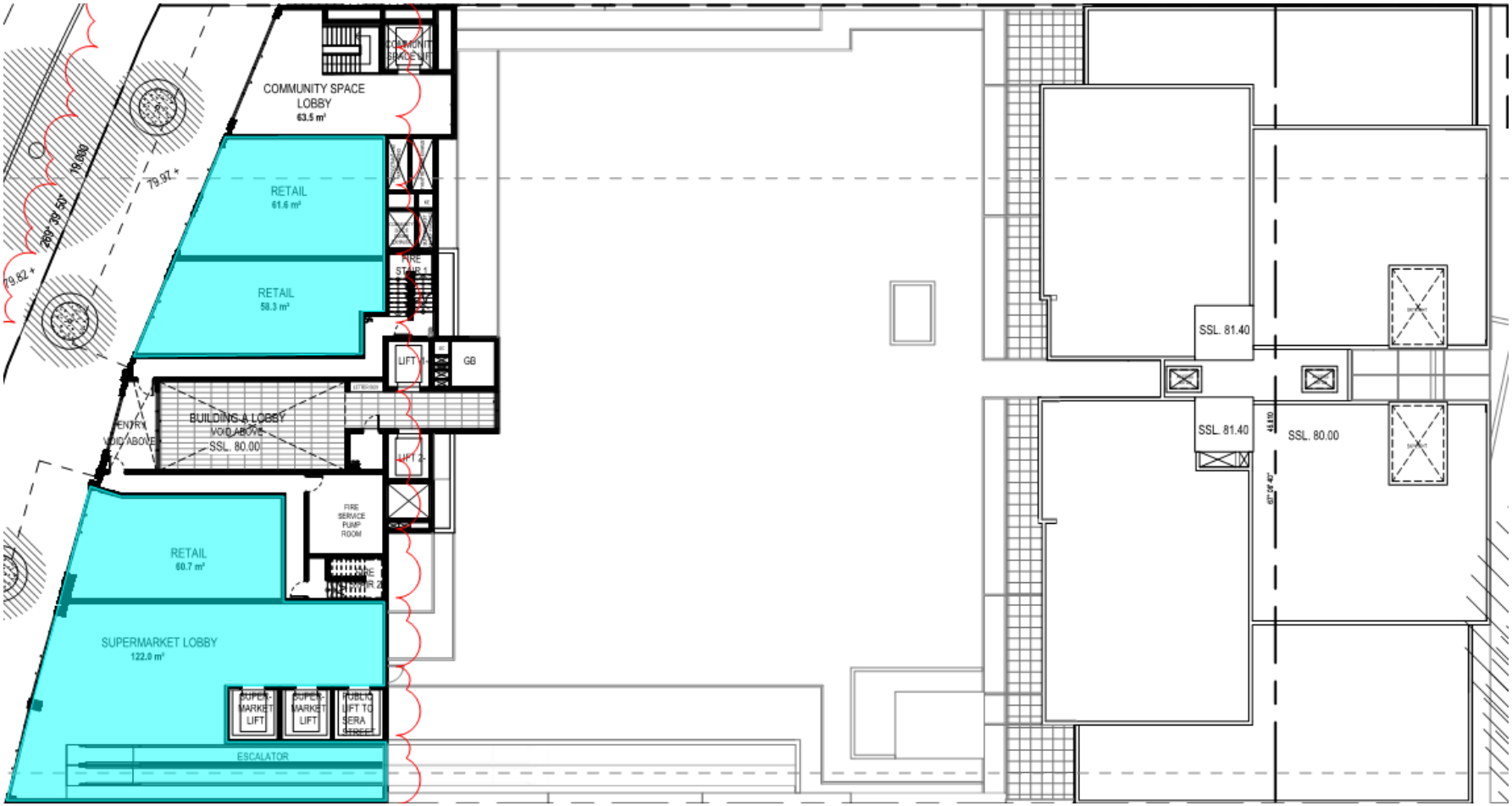
Project Reference

The drawing below indicates the intended distinction between conditioned and unconditioned space with conditioned areas shown as blue. As such the **envelope** for the purpose of Section J, and **J1, J2** and **J3** in particular, is defined by the border of the area shown in blue below. Further advice can be provided if required.



Areas of Conditioned Space – Ground

Note: This page would be best viewed if printed in colour



Areas of Conditioned Space – Level 3
Note: This page would be best viewed if printed in colour

Clause	System	Required action(s) for compliance	Comments
NSW Part J(A)1 – Building Fabric			
Part J1 – Building Fabric			
J1.1	Application Of Part	See details below	Applicable to conditioned areas only
J1.2	Thermal construction	**Install:** All insulation as per AS/NZS 4859.1 and comments	Insulation to be installed in compliance with AS/NZS 4859.1 • adjoining insulation must abut / overlap and butt up against studs, joists, noggins, etc. • it must form a continuous barrier. • it must not interfere with the safe operation of services or fittings. Reflective insulation must be installed with: • the necessary airspace to achieve the required R-Value between the reflective side of the insulation and the building lining or cladding • the reflective insulation closely fitted against any penetration, door or window opening • the reflective insulation adequately supported by framing members • each adjoining sheet must either overlap not less than 50mm or be taped together 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 in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50mm

<table>
<tr><th>Clause</th><th>System</th><th>Required action(s) for compliance</th><th>Comments</th></tr>
<tr><td>J1.3</td><td>Roof and Ceiling
Concrete roof/ceiling with various thickness and additional insulation for floor insulation concession and no loss of insulation for ceiling penetrations.</td><td>Ensure:
The required areas of insulation are not reduced through any form of penetration by more than 0.5% of the total ceiling area.

1. Install:
A minimum of R3.08 bulk insulation in each area where unconditioned space is over

Or

1. Ensure:
Total R-value of the above mentioned areas is equal to R3.7 through the use of a reflective insulation or the like.</td><td>No loss of insulation through ceiling penetrations calculations have been completed in regards to the below. It is therefore assumed that any lighting installed will not impact on the required ceiling/roof insulation. If ceiling/roof insulation is impacted by the installation of new lighting a loss of insulation calculation will need to be completed.

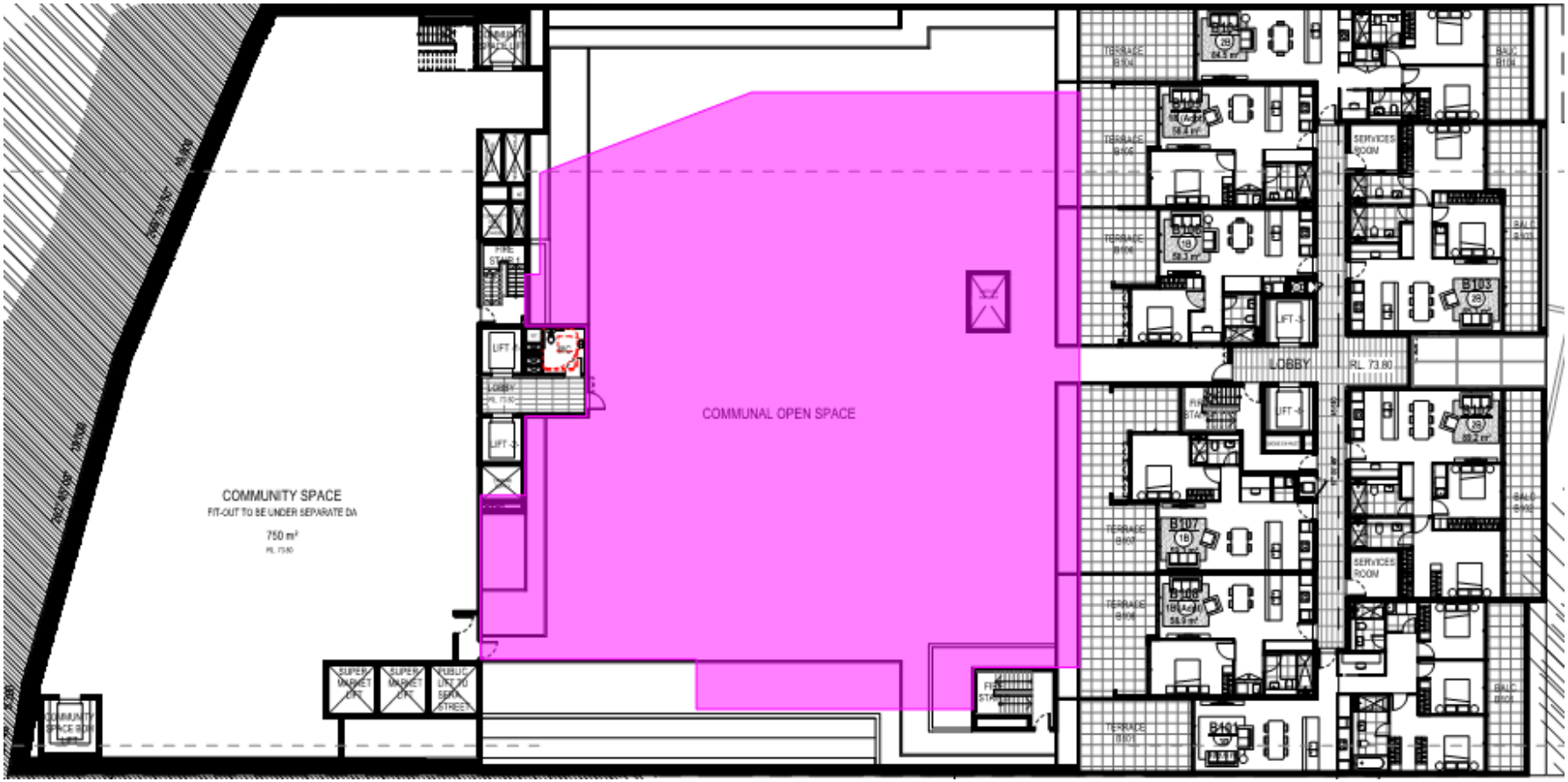
The below calculation assumes that the roof airspace is not completely occupied with insulation and a minimum of 30mm of airspace will remain. If this is not the case then an additional R0.22 will be required.

*The concession in J1.6(b) has been used in this assessment, as such the required Total R-Value for the roof and ceiling construction has increased by R0.75, ie. R3.95

1. Concrete roof where terraces or flat roof is over
<table>
<tr><td>Component</td><td>R-Value</td></tr>
<tr><td>Outdoor air film (7m/s)</td><td>0.04</td></tr>
<tr><td>Solid concrete, (min 200mm, 2400 kg/m^3)</td><td>0.14</td></tr>
<tr><td>Roof airspace (unventilated, non-reflective)</td><td>0.22</td></tr>
<tr><td>Plasterboard, gypsum (10mm, 880 kg/m^3)</td><td>0.06</td></tr>
<tr><td>Indoor air film (still air)</td><td>0.16</td></tr>
<tr><td>Total</td><td>0.62</td></tr>
<tr><td>3.7* (Required Total R-Value) – 0.62 = 3.08</td><td></td></tr>
<tr><td>Additional insulation required</td><td>3.08</td></tr>
</table>
There are multiple slab thicknesses where roof is above conditioned areas; 200mm is the minimum. The R-Value of the concrete is directly related to the thickness of the slab, with a thicker slab having a higher R-Value. As such all roof areas will comply with the requirements for J1.3 with the above levels of insulation.
Other thicknesses that are noted have the following R-Value:
600mm – R0.42; 910mm – R0.63; 890mm – R0.62; 840mm – R0.58; 510mm – R0.35
These values can be exchanged with the value for 200mm where applicable and as a result the level of insulation may be reduced:

***The figures for additional roof & ceiling insulation given above are calculated with the understanding that the roof colour (roof & balcony tiles) will be medium, ie. with a solar absorptance of between 0.4 and 0.6. if the roof colour should have a solar absorptance of less than 0.4 the required R-value can be decreased by R0.5. If the solar absorptance is greater than 0.6 the required R-value will need to be increased by R0.5.

Refer to markup below re location of required insulation</td></tr>
<tr><td>J1.4</td><td>Roof Lights</td><td>None</td><td>No roof lights proposed to conditioned space</td></tr>
</table>



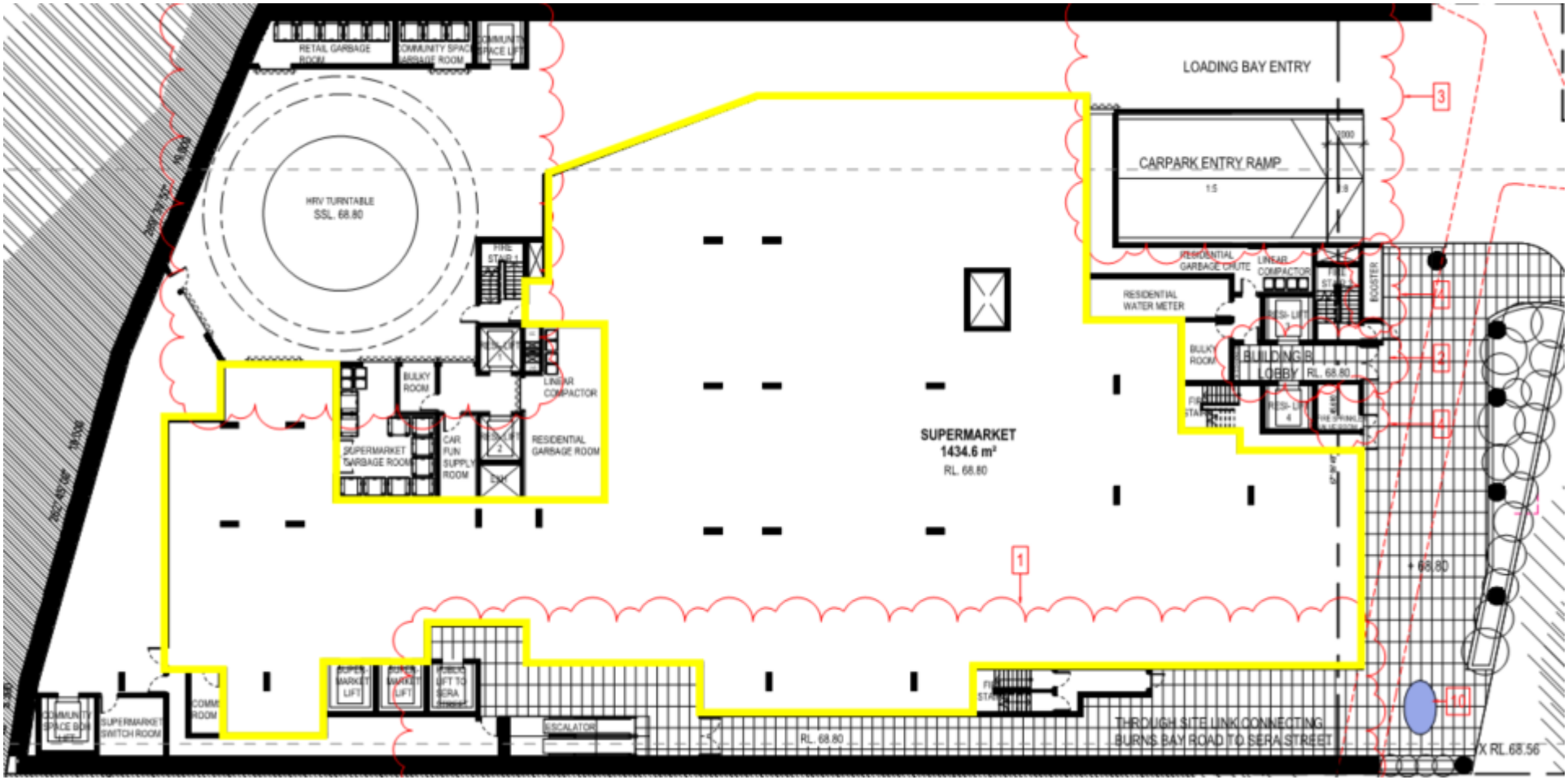
Areas of required roof/ceiling insulation – Level 1
Note: This page would be best viewed if printed in colour

Clause	System	Required action(s) for compliance	Comments
J1.5	Walls	1. Install: Minimum **R2.44** bulk insulation to solid concrete walls. Or 1. Ensure: Total R-value of **R2.8** is achieved through the use of a reflective insulation or the like.	1. Solid Concrete walls with internal plasterboard

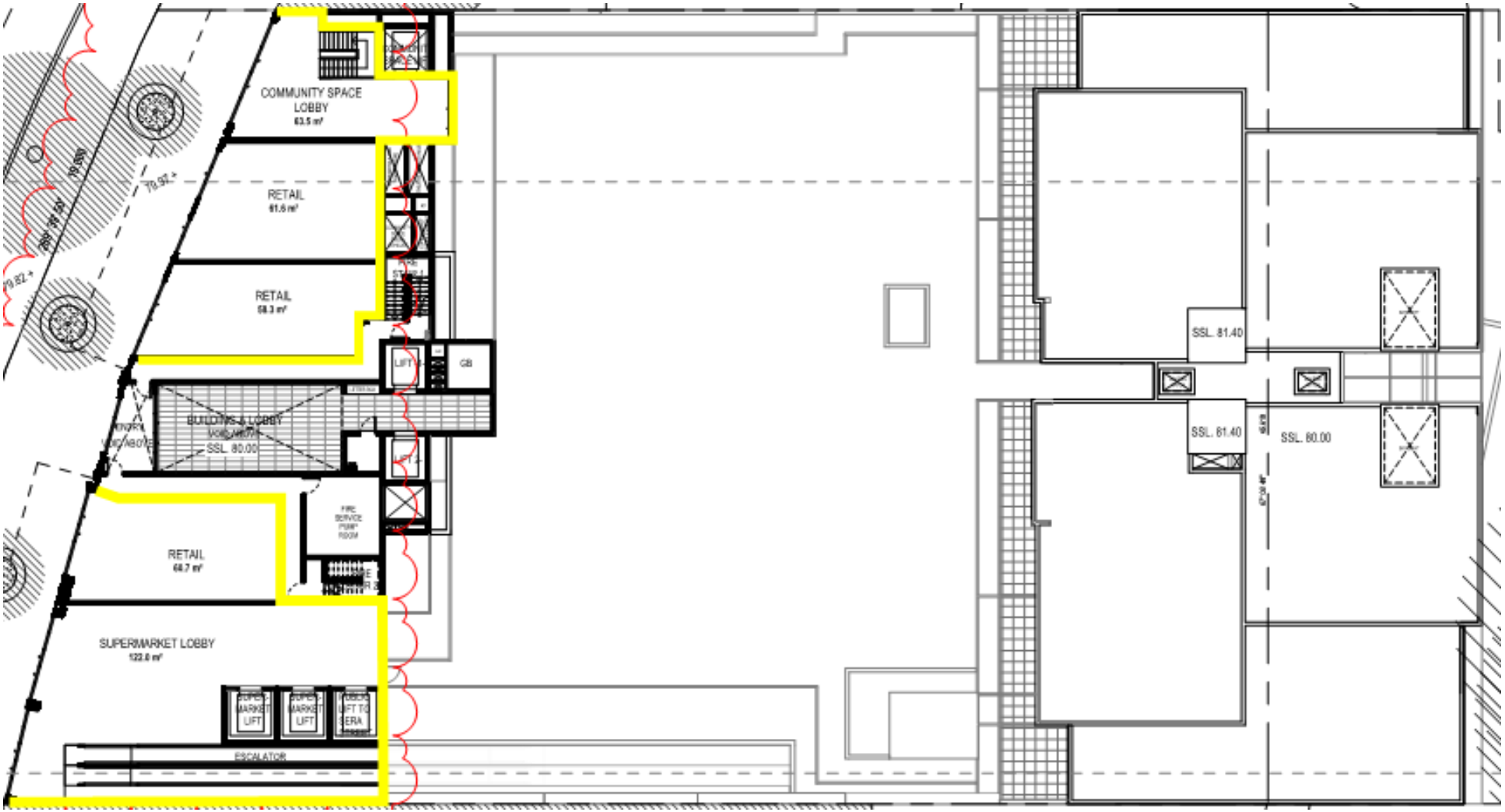
Component	R-Value
Outdoor air film (7m/s)	0.04
Solid concrete panel	0.14
Airspace (90mm non-reflective and unventilated)	0.17
Plasterboard, gypsum (10mm, 880 kg/m³)	0.06
Indoor air film (still air)	0.12
Total	**0.53**
0.53 – 0.17 (airspace) = 0.36	
2.8 (Required Total R-Value) – 0.36 = 2.44	
Additional insulation required	**2.44**

***** The likely range of these product R-Values for lightweight cladding is minimal (0.00 – 0.03). Therefore metal cladding has been used in the calculation so a consistent insulation can specified to all walls and compliance is ensured for all proposed cladding materials.

External walls that have lightweight cladding fixed to a metal frame and have a wall lining fixed directly to the same metal frame must have a thermal break installed as per **J1.5(c)**.



Areas of required wall insulation – Ground level
Note: This page would be best viewed if printed in colour



Areas of required wall insulation – Level 3
Note: This page would be best viewed if printed in colour

<table>
<tr><th>Clause</th><th>System</th><th>Required action(s) for compliance</th><th>Comments</th></tr>
<tr><td>J1.6</td><td>Floors</td><td>1. Install
Minimum R1.57 bulk insulation to suspended concrete floor

OR

2. Ensure
Total R-value of R2.0 is achieved through the use of a reflective insulation or the like</td><td>1. Suspended Concrete floor with enclosed unconditioned areas below
<table><tr><th>Component</th><th>R-Value</th></tr><tr><td>Indoor air film (still air)</td><td>0.16</td></tr><tr><td>Solid Concrete (150mm, 2400 Kg/m³)</td><td>0.10</td></tr><tr><td>Floor covering</td><td>0.01</td></tr><tr><td>Indoor air film (still air)</td><td>0.16</td></tr><tr><td>Total</td><td>0.43</td></tr><tr><td>2.0 (Required Total R-Value) - 0.43 = 1.57</td><td></td></tr><tr><td>Additional insulation required</td><td>1.57</td></tr></table>
The R-Value of the concrete is directly related to the thickness of the slab, with a thicker slab having a higher R-Value. As such, all floor areas will comply with the requirements for J1.6 with the above levels of insulation.

For example other thicknesses have the following R-Values:
200mm – R0.14, 250mm- R0.17, 300mm – R0.21; 500mm – R0.35; 600mm – R0.42; 900mm – R0.62
These values can be exchanged with the value for 150mm if applicable (e.g. transfer slab or similar) and as a result the level of insulation may be reduced.

Further advice on suitable insulation can be provided if required.

Refer to mark-up regarding the location of required insulation</td></tr>
</table>

Areas of required floor insulation – Ground Level (Basement 1 Reflected Ceiling View)
Note: This page would be best viewed if printed in colour

Clause	System	Required action(s) for compliance	Comments
Part J2 – Glazing			
J2.1	Application Of Part	See details below	Applicable to conditioned areas only
J2.2	***** Blank Clause		
J2.3	***** Blank Clause		
J2.4	Glazing	**Ensure:** That all windows referenced comply with required U-Value and SHGC as per glazing calculator and noted in comments. All values nominated are total window system values, not glass only values	Refer to 'Glazing Calculator' below for reference. U-values and SHGC must be equal to or less/greater than values below as indicated. **Ground floor:** South glazing: U-Value: 5.5 or lower SHGC: 0.79 or lower West glazing: U-Value: 6.5 or lower SHGC: 0.79 or lower **Second floor:** South glazing: U-Value: 6.5 or lower SHGC: 0.79 or higher North glazing: U-Value: 6.5 or lower SHGC: 0.79 or lower **Refer to mark-up for location of required glazing**
J2.5	Shading	**Ensure:** All awnings and shading structures to be installed as per plans and elevations referenced.	Refer to 'Glazing Calculator' attached. For shading devices to be considered they will need to have the ability to restrict a minimum of 80% summer solar radiation. Furthermore, if they are adjustable they will need to operate automatically in response to the level of solar radiation.

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

HELP

Building name/description: 56-60 Burns Bay Road, Lane Cove

Application: shop display

Climate zone: 5

Storey: Ground

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A					75m²		312m²		
Option B									n/a
Glazing area (A)					*60m²*		*132m²*		

Number of rows preferred in table below: 3 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading	Multipliers		Size	Outcomes
ID	Description (optional)	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)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Supermarket South	S		5.00	12.00		5.5	0.79	10.000	5.000	2.00	0.00	0.64	0.54	60.00	100% of 100%
2	Supermarket West	W		5.00	16.90		6.5	0.79	5.000	5.000	1.00	0.00	0.35	0.44	84.50	69% of 69%
3	Supermarket West	W		5.00	9.50		6.5	0.79	Device		2.00	0.00	0.00	0.26	47.50	31% of 69%

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.

if inputs are valid

Dts Glazing calculator – Ground Level

Note: This page would be best viewed if printed in colour

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

HELP

Building name/description: 56-60 Burns Bay Road, Lane Cove

Application: shop display

Climate zone: 5

Storey: Level 3

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A	93.6m²				37.2m²				
Option B									n/a
Glazing area (A)	*65.7m²*				*10.9m²*				

Number of rows preferred in table below: 5 *(as currently displayed)*

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	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)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	Retail 1	N		3.10	2.70		6.5	0.79	3.100	3.100	1.00	0.00	0.00	0.28	8.37	13% of 53%
2	Retail 2	N		3.10	4.30		6.5	0.79	3.100	3.100	1.00	0.00	0.00	0.28	13.33	20% of 53%
3	Retail 3	N		3.10	4.70		6.5	0.79	3.100	3.100	1.00	0.00	0.00	0.28	14.57	22% of 53%
4	Supermarket lobby	N		3.10	9.50		6.5	0.79	3.100	3.100	1.00	0.00	0.00	0.28	29.45	45% of 53%
5	Supermarket Escalator	S		3.10	3.50		6.5	0.79	3.100	3.100	1.00	0.00	0.74	0.64	10.85	100% of 44%

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.

if inputs are valid

Dts Glazing calculator – Level 3

Note: This page would be best viewed if printed in colour

Clause	System	Required action(s) for compliance	Comments
Part J3 – Building Sealing			
J3.1	Application Of Part	See details below	Applicable to conditioned areas only
J3.2	Chimneys and Flues	**None**	No new chimneys or flues
J3.3	Roof Lights	**Ensure:** Proposed skylights are sealed or capable of being sealed by a weatherproof seal	There are three options for compliance with **J3.3**, these are: A roof light required […] to be sealed, or capable of being sealed, must be constructed with – (i) an imperforate ceiling diffusers or the like installed at the ceiling or internal lining level; or (ii) a weatherproof seal; or (iii) a shutter system readily operated either manually, mechanically or electronically by the occupant. It has been assumed that the proposed skylights will be fitting with weatherproof seals and therefore they will be compliant with **J3.3**. If however there is no seal provided either option (i) or (iii) will be required.
J3.4	Windows and Doors	**Confirm:** Evidence that windows comply with AS 2047 else comply with J3.4. **Ensure:** Entrance doors have a self-closing mechanism installed. Doors to be sealed as per J3.4 (c). Any other doors that form part of the external fabric of the development must also be sealed as per **J3.4 (c)**	Window supplier to provide verification that all glazing is sealed to comply with AS 2047 or BCA **J3.4**. Required door seals – from **J3.4(c)** (i) for the bottom edge of an external swing door, must be a draft protection device; and (ii) for the other edges of an external 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 Entrance doors to be self-closing doors. The requirements for seals do not apply to fire doors or smoke doors, roller shutter door, roller shutter grille or other security door or device installed only for out of hours security.
J3.5	Exhaust Fans	**Ensure:** Any new exhaust fans, located within conditioned areas indicated in the project reference, are fitted with a sealing device such as a self-closing damper or the like	**J3.5** is applicable to any proposed exhaust fans located in conditioned areas. The project reference on pages 6-8 indicates what areas have been considered conditioned for the purposes of Section J and this report. As such any exhaust fans installe in these areas are subject to **J3.5.**
J3.6	Roof, Walls and Floors	**Install:** Ensure all new construction forming elements are installed in accordance with **J3.6(b)**	Construction forming elements of the envelope or external fabric must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking, skirting, architraves, cornices or the like. These requirements do not apply to smoke hazard management openings.
J3.7	Evaporative Cooler	None	No new or altered evaporative coolers to be installed.
Part J4 - **** Blank Part**			

Clause	System	Required action(s) for compliance	Comments
Part J5 – Air Conditioning and Ventilation Systems			
J5.1	Application Of Part	See details below	Applicable to all areas
J5.2	Air conditioning systems	**Ensure:** Any air-conditioning system(s) are capable of being deactivated when the building or part of the building served by that system is not occupied. **Install:** An efficiency device to ensure any air-conditioning system(s) serving a sole-occupancy unit will not operate when the external door (i.e. leading to the outside, not into another conditioned space) are opened for more than a minute **Ensure:** Any air-conditioning system(s) that serve more than one air-conditioning zone or area with different heating or cooling needs comply with the requirements listed in comments **Ensure:** Any motorized outside air and return dampers close when an air-conditioning system is deactivated	Refer to Mechanical Design Certificate to ensure compliance Any air-conditioning system(s) that serve 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 – o for a fixed supply air rate, a 7.5 K rise in temperature; and o 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
J5.3	Mechanical ventilation systems	**Ensure:** Any mechanical ventilation system(s) are capable of being deactivated when the building or part of the building served by that system is not occupied. **When serving a conditioned space** **Ensure:** 1. Any system does not exceed the minimum outdoor air quantity required by **Part F4**, where relevant, by more than 20%; and 2. Have an energy reclaiming system that preconditions outside air; or 3. Have the ability to automatically modulate the mechanical ventilation required be **Part F4** in proportion to the number of occupants **Ensure:** Fans of a mechanical ventilation system(s) listed above comply with **Specification J5.2a**	Refer to Mechanical Design Certificate to ensure compliance. The requirements of **J5.3(a)(i)** (or those to the left excluding the requirements for fans and time switches) must not adversely affect smoke hazard management measures required by **Part E2**; and ventilation required by **Part E3** and **Part F4** The requirements of "1." Do not apply where: • Additional unconditioned outside air is supplied for free cooling or to balance process exhaust; or • Additional exhaust ventilation is needed to balance the mechanical ventilation as required by the NCC; or • An energy reclaiming system preconditions all the outside air

Clause	System	Required action(s) for compliance	Comments
		Install: A time switch in accordance with **Specification J6** to any mechanical ventilation system(s) with an air flow rate of more than 1000 L/s.	The requirements for a time switch do not apply to a building where mechanical ventilation is needed for 24 hour occupancy; and Where a mechanical ventilation system serves: • only one sole-occupancy unit in a Class 2 or 3 building; or • a Class 4 part of a building; or • only one sole-occupancy unit in a Class 9c building; or
J5.4	Miscellaneous exhaust systems	**Confirm:** Whether any miscellaneous exhaust systems are associated with equipment that have a variable demand and have an air flow rate of more than 1000L/s; if so **Install:** A variable speed fan or the like; and **Ensure:** That it is capable of stopping the motor when the system is not needed.	Refer to Mechanical Design Certificate to ensure compliance. These requirements do not apply when additional exhaust ventilation is required for NCC compliance to balance the outside air for ventilation. These requirements do not apply to any systems in any sole-occupancy unit in a Class 2, 3 or 9c building and Class 4 part of building

Clause	System	Required action(s) for compliance	Comments
Part J6 – Artificial Lighting			
J6.1	Application Of Part	See details below	Applicable to all areas
J6.2	Interior Artificial Lighting	**Install:** Lighting that does not to exceed Illumination Power Load Allowance for each space type specified in the comments as per **Table J6.2.a** **Or** **Ensure:** The aggregate design illumination power load does not exceed the sum of the allowances	For all new 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 J6.2a**. Please see below for a summary of the relevant maximum illumination power density for each habitable area. **Allowable maximum illumination power density** **Space** / **Maximum W/m²** / **Space** / **Maximum W/m²** Dormitory of a Class 3 building used for sleeping and study / **9 W/m²** / Dormitory of a Class 3 building used for sleeping only / **6 W/m²** Kitchen and food preparation areas / **8 W/m²** / Sole occupancy unit of a Class 3 building / **5 W/m²** Toilet, locker room, staff room or the like / **6 W/m²** / Office / **7 W/m²** Entry lobby from outside the building / **15 W/m²** / Plant areas / **5 W/m²** Communal lounge areas / **10 W/m²** / Corridors / **8 W/m²** Storage areas / **8 W/m²** If lighting will not comply with the W/m² detailed above an ABCB Lighting calculator can be completed and adjustment factors considered in order to ensure compliance. No loss of insulation through ceiling penetrations has been completed in regards to the ceiling where roof is above. It is therefore assumed that any lighting installed will not impact on the ceiling/roof insulation. If ceiling/roof insulation is impacted by the installation on new lighting a loss of insulation calculation will need to be completed. These requirements to not apply for: 1. Emergency lighting in accordance with **Part E4** 2. Signage and display lighting within cabinets and display cases that are fixed in place. 3. A heater where the heater also emits light, such as in bathrooms

Clause	System	Required action(s) for compliance	Comments
J6.3	Interior artificial lighting and power control	**Install:** Lighting controls or switches within each room, in visible locations. **Install:** Occupant activated devices as per comments, to cut power to lighting and other services when the sole-occupancy units are unoccupied. **Install:** Controls to prevent most of the lighting (95%) being left on 24 hours a day. This can be a time switch or occupancy sensor. **Ensure:** That lighting controls or switches on do not operate lighting for an area of more than those specified in the comments, where applicable.	Artificial lighting of a room or space is to be individually switched or operated. These switches or devices 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 Sole-occupancy units, except for those rooms specifically for people with a disability or the aged, are to have an occupant sensing device such as a card reader, motion detector in accordance with **Specification J6** or the like installed to cut power to lighting, air-conditioner and exhaust fans when these rooms are unoccupied. This requirement is only applicable to sole-occupancy units. Further advice can be given on suitable devices if desired. For any non-residential building that exceeds 250m² 95% of light fittings need to be controlled by either a time switch in accordance with **Specification J6**, a security card reader or motion detector in accordance with **Specification J6** Other than in a single functional space, lighting controls or switches within each room, cannot operate lighting for an area of more than: (a) 250m² for a space of less than 2000m²; or (b) 1000m² for a space of more than 2000m²; See Appendix A for 'Specification J6'. These requirements do not apply to emergency lighting in accordance with **Part E4**
J6.4	Interior decorative and display lighting	**Ensure (If applicable):** All new interior decorative lighting must be controlled by a manual switch and switched separately from occupancy lighting (although all decorative lighting can be on one switch collectively if operating times are the same). **Ensure:** Any new window display lighting is controlled separately from all other display lighting.	If installing lighting for the display of art work / photographs or the like, it must be controlled by a manual switch and operated separately from other artificial lighting. This display lighting can be combined on one switch if the operating times for the display lighting are the same in a number of areas. If the display lighting exceeds 1kW in total then it must have a time switch in accordance with **Specification J6**. See Appendix A for 'Specification J6'. Any window display lighting to be separately switched from other display lighting.
J6.5	Artificial lighting around the perimeter of a building	**Install (If applicable):** Daylight sensor or time switches to any proposed perimeter lighting. **Ensure:** Any façade or signage lighting has a separate time switch in accordance with **Specification J6**	If installing artificial lighting around the perimeter of the building, it is to be controlled by a daylight sensor or time switch with pre-programmable times. If total perimeter lighting load exceeds 100W it must 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***

Clause	System	Required action(s) for compliance	Comments
			Lighting that is used for decorative purposes, such as façade lighting or signage lighting must have a separate time switch in accordance with **Specification J6**. See Appendix A for 'Specification J6'. *these requirements do not apply to emergency lighting in accordance with **Part E4**
J6.6	Boling water and chilled water storage units	**Install (if applicable):** Time switch in accordance with **Specification J6**	Any boiling water or chilled water storage unit must be controlled by a time switch in accordance with **Specification J6.** See Appendix A for 'Specification J6' if required
Part J7 – Hot water supply			
J7.1	*****Blank Clause		
J7.2	Hot water supply	**Ensure:** Any new heated water supply system for food preparation must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia	Part B2 of NCC Volume Three – Plumbing Code of Australia explains the requirements for a variety of hot water systems including solar heater, heat pump heater, gas water heater, electric resistance water heater and wood fired thermosiphon water heater. Electric resistance water heater are heavily restricted and should be avoided. For all the relevant requirements refer to Part B2 of NCC Volume Three. Further information can be provided if required.
J7.3	Swimming Pool Heating and Pumping	**None**	No proposed swimming pool
J7.4	Spa Pool Heating & Pumping	**None**	No proposed spa.
Part J8 – Access for maintenance			
J8.1	Application Of Part	See details below	Applicable to all areas assessed in this document
J8.2	**** Blank Clause		
J8.3	Facilities for energy monitoring	**Ensure:** Compliance with the provisions of BCA **J8.3;** as such **Install:** The appropriate facilities to record the consumption of gas and electricity.	The proposal has been found to be over 500m^2 but under 2500m^2; Therefore compliance with **J8.3(a)** is required.
J8.3	Facilities for energy monitoring	**Ensure:** Compliance with the provisions of BCA **J8.3;** as such **Install:** The appropriate facilities to record the consumption of gas and electricity.	The proposal has been found to be over 500m^2 but under 2500m^2; Therefore compliance with **J8.3(a)** is required.

SPECIFICATION J5.2a - FANS

1. Scope

This Specification contains the requirements for fans used as part of an *air-conditioning* system or a mechanical ventilation system.

2. Application

(a) This Specification does not apply to—

(i) fans in unducted *air-conditioning* systems with a supply air capacity of less than 1000 L/s; or

(ii) the power for a fan in an energy reclaiming system that preconditions outside air; or

(iii) the power for process related components.

(b) Compliance with this Specification must not adversely affect—

(i) smoke hazard management measures *required* by Part E2; and

(ii) ventilation *required* by Part E3 and Part F4.

3. Air-conditioning system fans

(a) An *air-conditioning* system must be designed so that the *fan motor power* of—

(i) the supply and return air fans as a combined total is in accordance with Table 3a; and

(ii) the fan in a cooling tower, closed circuit cooler or an evaporative condenser is in accordance with Table 3b; and

(iii) the fan in an air-cooled condenser does not use more than 42 W of *fan motor power* for each kW of heat rejected from the refrigerant, when determined in accordance with AHRI 460.

(b) The requirements of (a)(iii) do not apply to the fan of an air-cooled condenser that is part of—

(i) a refrigerant chiller in an *air-conditioning* system that complies with the energy efficiency ratios in Specification J5.2e; or

(ii) packaged *air-conditioning* equipment that complies with the energy efficiency ratios in Specification J5.2e.

Table 3a MAXIMUM FAN MOTOR POWER – SUPPLY AND RETURN AIR FANS

***Air-conditioning* sensible heat load (W/m^2 of the *floor area* of the *conditioned space*)**	**Maximum *fan motor power* (W/m^2 of the *floor area* of the *conditioned space*)**	
	For an *air-conditioning* system serving not more than 500 m^2	**For an *air-conditioning* system serving more than 500 m^2**
Up to 100	5.3	8.3
101 to 150	9.5	13.5
151 to 200	13.7	18.3
201 to 300	22.2	28.0
301 to 400	30.7	37.0
More than 400	See Note	

Note:	Where the *air-conditioning* sensible heat load is more than 400 W/m^2, the maximum *fan motor power* must be determined—	
	(a)	in a building of not more than 500 m^2 *floor area*, using 0.09 W of *fan motor power* for each Watt of *air-conditioning* sensible heat load; and
	(b)	in a building of more than 500 m^2 *floor area*, using 0.12 W of *fan motor power* for each Watt of *air-conditioning* sensible heat load.

Table 3b MAXIMUM FAN MOTOR POWER – COOLING TOWER, CLOSED CIRCUIT COOLER AND EVAPORATIVE CONDENSERS

Type of fan	**Maximum *fan motor power* per L/s of cooling fluid circulated**		**Maximum *fan motor power* per kW of heat rejected**
	Cooling tower	**Closed circuit cooler**	**Evaporative condenser**
Propeller or axial	310 W	500 W	18 W
Centrifugal	590 W	670 W	22 W
Note:	The cooling fluid circulated may be refrigerant, chilled water, brines or glycol mixtures.		

4. Mechanical ventilation system fans

(a) When the air flow rate of a mechanical ventilation system is more than 1000 L/s, the system must—

(i) have a *fan motor power* to air flow rate ratio in accordance with—

(A)for general mechanical ventilation systems, Table 4a; or

(B)for *carpark* mechanical ventilation systems, Table 4b; and

(ii) for *carpark* exhaust, when serving a *carpark* with more than 40 vehicle spaces, have an atmospheric contaminant monitoring system in accordance with AS 1668.2.

(b) The requirements of (a) do not apply to—

(i) a mechanical ventilation system that is part of an *air-conditioning* system; or

(ii) the power for a miscellaneous exhaust system complying with J5.4; or

(iii) a *sole-occupancy unit* in a Class 2 building or a Class 4 part of a building.

Table 4a MAXIMUM FAN MOTOR POWER TO AIR FLOW RATE RATIO – GENERAL MECHANICAL VENTILATION SYSTEMS

Filtration	**Maximum *fan motor power* to air flow rate ratio (W/(L/s))**
With filters	0.98
Without filters	0.65

Table 4b MAXIMUM FAN MOTOR POWER TO AIR FLOW RATE RATIO – CARPARK MECHANICAL VENTILATION SYSTEMS

Filtration	**Maximum *fan motor power* to air flow rate ratio (W/(L/s))**		
	Air flow rate (L/s)		
	1,000 to less than 5,000	**5,000 to 50,000**	**More than 50,000**
With filters	0.78	1.12	1.81
Without filters	0.52	0.74	1.2

SPECIFICATION J5.2b - DUCTWORK INSULATION AND SEALING

1. Scope

(a) This Specification contains the requirements for the sealing and insulating of supply and return ductwork and fittings used in an *air-conditioning* system.

(b) For the purposes of this Specification, fittings—

(i) include passive components of a ductwork system; and

(ii) exclude active components such as air-handling unit components.

2. Sealing of ductwork

(a) Ductwork in an *air-conditioning* system must be sealed against air loss in accordance with the duct sealing requirements of AS 4254 Parts 1 and 2 for the static pressure in the system.

(b) The requirements of (a) do not—

(i) apply to ductwork located within the only or last room served by the system; and

(ii) include the air leakage testing requirements of clause 2.2.4 of AS 4254.2.

3. Insulation of ductwork and fittings

(a) Ductwork and fittings in an *air-conditioning* system must be provided with insulation—

(i) complying with AS/NZS 4859.1; and

(ii) having a material *R-Value* not less than—

(A)that specified in Table 3; or

(B)1.0, for flexible ductwork with a length to an outlet or from an inlet of not more than 3 m.

(b) Insulation must—

(i) be protected against the effects of weather and sunlight; and

(ii) be installed so that it—

(A)abuts adjoining insulation to form a continuous barrier; and

(B)maintains its position and thickness, other than at flanges and supports; and

(iii) when conveying cooled air—

(A)be protected by a vapour barrier on the outside of the insulation; and

(B)where the vapour barrier is a membrane, be installed so that adjoining sheets of the membrane—

(aa)overlap by 50 mm; and

(bb)are bonded or taped together.

(c) The requirements of (a) do not apply to—

(i) ductwork and fittings located within the only or last room served by the system; or

(ii) fittings that form part of the interface with the *conditioned space*; or

(iii) return air ductwork in, or passing through, a *conditioned space*; or

(iv) ductwork for outside air and exhaust air associated with an *air-conditioning* system; or

(v) the floor of an in-situ air-handling unit; or

(vi) packaged *air-conditioning* equipment complying with MEPS; or

(vli) flexible fan connections.

Table 3 DUCTWORK AND FITTINGS - MINIMUM MATERIAL R-VALUE

Location of ductwork and fittings	***Climate zone***	
	1, 2, 3, 4, 5, 6 and 7	**8**
Within a *conditioned space*	1.2	1.6
Where exposed to direct sunlight	3.0	3.4
All other locations	2.0	2.4

SPECIFICATION J5.2c - PIPING, VESSEL, HEAT EXCHANGER AND TANK INSULATION

1. Scope

(a) This Specification contains the requirements for the insulating of *piping*, vessels, heat exchangers and tanks containing heating fluids or cooling fluids used in an *air-conditioning* system.

(b) For the purposes of this Specification—

(i) heating fluids include heated water, steam and condensate; and

(ii) cooling fluids include refrigerant, chilled water, brines and glycol mixtures, but do not include condenser cooling water.

2. Insulation

(a) *Piping*, vessels, heat exchangers and tanks must be provided with insulation—

(i) complying with AS/NZS 4859.1; and

(ii) for heated or chilled water *piping*, having a material *R-Value* not less than that specified in Table 2a; and

(iii) for refrigerant, steam or condensate *piping*, having a material *R-Value* not less than that specified in Table 2b; and

(iv) for vessels, heat exchangers or tanks, having a material *R-Value* not less than that specified in Table 2c.

(b) Insulation must—

(i) be protected against the effects of weather and sunlight; and

(ii) be able to withstand the temperatures within the *piping*, vessel, heat exchanger or tank.

(c) Insulation provided to *piping*, vessels, heat exchangers or tanks containing cooling fluid must be protected by a vapour barrier on the outside of the insulation.

(d) The requirements of (a) and (b) do not apply to *piping*—

(i) located within the only or last room served by the system; or

(ii) encased within a concrete slab or panel which is part of a heating or cooling system; or

(iii) supplied as an integral part of a piece of plant; or

(iv) inside an air-handling unit, fan-coil unit or the like.

Table 2a WATER PIPING - MINIMUM MATERIAL R-VALUE

Type of water *piping*		**Minimum material *R-Value***
Heated water *piping* of all diameters		1.5
Chilled water *piping* with nominal diameters not more than 40 mm		1.0
Chilled water *piping* with nominal diameters more than 40 mm but not more than 80 mm		1.5
Chilled water *piping* with nominal diameters more than 80 mm		2.0
Notes:		
1.	*Piping required* to be insulated includes all supply and return *piping*, chilled water supply *piping* within 500 mm of the connection to the *air-conditioning* system and pressure relief *piping* within 500 mm of the connection to the *air-conditioning* system.	
2.	The *required* minimum material *R-Value* may be halved—	
	(a)	for *piping* with nominal diameters not more than 40 mm, for the last 750 mm adjoining items of plant; and
	(b)	for *piping* penetrating a structural member; and
	(c)	for supply and return chilled water *piping* located internally, if the chilled water supply temperature is more than 14ÂºC.

Table 2b REFRIGERANT, STEAM AND CONDENSATE PIPING— MINIMUM MATERIAL R-VALUE

Temperature range	**Nominal pipe size**				
	15 mm to 40 mm	**41 mm to 80 mm**	**81 mm to 125 mm**	**126 mm to 150 mm**	**151 mm to 200 mm**
Refrigerant not more than 2°C	1.3	1.7	2.0	2.0	2.7
Refrigerant more than 2°C but not more than 20°C	1.0	1.5	2.0	2.0	2.0
Steam and condensate not more than 120°C	1.0	1.0	1.3	1.3	1.3
Steam more than 120°C	1.5	1.5	1.5	1.8	2.1

Table 2c VESSELS, HEAT EXCHANGERS AND TANKS – MINIMUM MATERIAL R-VALUE

Content of vessel, heat exchanger or tank	**Minimum material *R-Value***
Refrigerant, brine or glycol that is not more than 2°C	2.7
Refrigerant or chilled water that is more than 2°C but not more than 20°C	1.8
Heated water	1.4
Steam	2.5

SPECIFICATION J5.2d - SPACE HEATING

1. Scope

This Specification contains the requirements for heaters used for *air-conditioning* or as part of an *air-conditioning* system.

2. Heaters

(a) A heater used for *air-conditioning* must be—

(i) a solar heater; or
(ii) a gas heater; or
(iii) an oil heater, but only if reticulated gas is not available at the allotment boundary; or
(iv) a heat pump heater; or
(v) a solid-fuel burning heater; or
(vi) a heater using reclaimed heat from another process such as reject heat from a refrigeration plant; or
(vii) an electric heater if—

(A) the heating capacity is not more than—
(aa) 10 W/m^2 of the *floor area* of the *conditioned space* in *climate zone* 1; or
(bb) 40 W/m^2 of the *floor area* of the *conditioned space* in *climate zone* 2; or
(cc) the value specified in Table 2a where reticulated gas is not available at the allotment boundary; or

(B) the annual energy consumption for heating is not more than 15 kWh/m^2 of the *floor area* of the *conditioned space* in *climate zones* 1 to 5; or

(C) the in-duct heater complies with J5.2(a)(i)(B)(cc); or

(viii) any combination of (i) to (vii).

(b) An electric heater may be used for heating a bathroom in a Class 3 building or Class 9c building if the heating capacity is not more than 1.2 kW.

(c) A fixed space heating appliance installed outdoors must be capable of automatic shutdown.

(d) A water heater, such as a boiler, that is used as part of an *air-conditioning* system must—

(i) achieve a thermal efficiency complying with Table 2b when tested in accordance with BS 7190; and

(ii) use reticulated gas where it is available at the allotment boundary.

Table 2a MAXIMUM ELECTRIC HEATING CAPACITY

Floor area of the conditioned space	Climate zone				
	3	4	5	6	7
	W/m2 of floor area				
Not more than 500 m^2	50	60	55	65	70
More than 500 m^2	40	50	45	55	60

Table 2b MINIMUM THERMAL EFFICIENCY OF A WATER HEATER

Fuel type	Rated capacity ($kW_{heating}$)	Minimum gross thermal efficiency (%)
Gas	Not more than 750	80
	More than 750	83
Oil	All capacities	80

SPECIFICATION J5.2e - ENERGY EFFICIENCY RATIOS

1. Scope

(a) This Specification contains the requirements for the energy efficiency ratios of—

(i) refrigerant chillers used as part of an *air-conditioning* system; and

(ii) packaged *air-conditioning* equipment.

2. Energy efficiency ratios

(a) An *air-conditioning* system refrigerant chiller with a capacity not more than 350 kWr must have an energy efficiency ratio complying with Table 2a when determined in accordance with AHRI 550/590.

Table 2a MINIMUM ENERGY EFFICIENCY RATIO FOR REFRIGERANT CHILLERS

Equipment	Minimum energy efficiency ratio (Wr/Winput power)	
	For full load operation	For integrated part load
Water cooled chiller	4.2	5.2
Air cooled or evaporatively cooled chiller	2.5	3.4

(b) Package *air-conditioning* equipment with a capacity of not less than 65 kWr, including a split unit and a heat pump, must have a minimum energy efficiency ratio when cooling complying with Table 2b when tested in accordance with AS/NZS 3823.1.2 at test condition T1.

Table 2b MINIMUM ENERGY EFFICIENCY RATIO FOR PACKAGED AIR-CONDITIONING EQUIPMENT

Equipment	Minimum energy efficiency ratio ($W_r/W_{input\ power}$)	
	65 kWr to 95 kWr capacity	More than 95 kWr capacity
Air-conditioner — cooling	2.70	2.80
Heat pump — cooling	2.60	2.70

SPECIFICATION J6 - LIGHTING AND POWER CONTROL DEVICES

1. Scope

This Specification contains the requirements for lighting and power control devices including timers, time switches, motion detectors and daylight control devices.

2. Lighting timers

A lighting timer must—

(a) be located within 2 m of every entry door to the space; and

(b) have an indicator light that is illuminated when the artificial lighting is off; and

(c) not control more than—

(i) an area of 100 m^2 with a single push button timer; and

(ii) 95% of the lights in spaces of area more than 25 m^2; and

(d) be capable of maintaining the artificial lighting—

(i) for not less than 5Â minutes and not more than 15 minutes unless it is reset; and

(ii) without interruption if the timer is reset.

3. Time switch

(a) A time switch must be capable of switching on and off electric power at variable pre-programmed times and on variable pre-programmed days.

(b) A time switch for internal lighting must be capable of being overridden by—

(i) a means of turning the lights on, either by—

(A) a manual switch or an occupant sensing device that on sensing a person's presence, overrides the time switch for a period of up to 2 hours, after which there is no further presence detected, the time switch must resume control; or

(B) an occupant sensing device that overrides the time switch upon a person's entry and returns control to the time switch upon the person's exiting, such as a security card reader; and

(ii) a manual "off" switch.

(c) A time switch for external lighting must be capable of—

(i) limiting the period the system is switched on to between 30 minutes before sunset and 30 minutes after sunrise is determined or detected including any pre-programmed period between these times; and

(ii) being overridden by a manual switch or a security access system for a period of up to 30 minutes, after which the time switch must resume control.

(d) A time switch for boiling water and chilled water storage units must be capable of being overridden by a manual switch or a security access system that senses a person's presence, overrides for a period of up to 2 hours, after which if there is no further presence detected, the time switch must resume control.

4. Motion detectors

(a) In a Class 2, 3 or 9c *aged care building* other than within a *sole-occupancy unit*, a motion detector must—

(i) be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and

(ii) be capable of detecting a person before they are 1Â m into the space; and

(iii) other than within a *sole-occupancy unit* of a Class 3 building, not control more than—

(A) an area of 100 m^2; and

(B) 95% of the lights in spaces of area more than 25 m^2; and

(iv) be capable of maintaining the artificial lighting when activated—

(A) for not less than 5 minutes and not more than 15 minutes unless it is reset; and

(B) without interruption if the motion detector is reset by movement.

(b) In a Class 5, 6, 7, 8, 9a or 9b building, a motion detector must—

(i) be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and

(ii) be capable of detecting—

(A) a person before they have entered 1 m into the space; and

(B) movement of 500 mm within the useable part of the space; and

(iii) not control more than—

(A) in other than a *carpark*, an area of 500 m^2 with a single sensor or group of parallel sensors; and

(B) 75% of the lights in spaces using high intensity discharge; and

(iv) be capable of maintaining the artificial lighting when activated—

(A) for a maximum of 30 minutes unless it is reset; and

(B) without interruption if the motion detector is reset by movement; and

(v) not be overridden by a manual switch to permanently leave the lights on.

(c) When outside a building, a motion detector must—

(i) be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and

(ii) be capable of detecting a person within a distance from the light equal to—

(A) twice the mounting height; or

(B) 80% of the ground area covered by the light's beam; and

(iii) not control more than five lights; and

(iv) be operated in series with a photoelectric cell or astronomical time switch so that the light will not operate in daylight hours; and

(v) be capable of maintaining the artificial lighting when the switch is on for a maximum of 10 minutes unless it is reset; and

(vi) have a manual override switch which is reset after a maximum period of 4 hours.

5. Daylight sensor and dynamic lighting control device

(a) A daylight sensor and dynamic control device for artificial lighting must—

(i) for switching on and off—

(A) be capable of having the switching level set point adjusted between 50 and 1000 Lux; and

(B) have—

(aa) a delay of more than 2 minutes; and

(bb) a differential of more than 100 Lux for a sensor controlling high pressure discharge lighting, and 50 Lux for a sensor controlling other than high pressure discharge lighting; and

(ii) for dimmed or stepped switching, be capable of reducing the power consumed by the controlled lighting in proportion to the incident daylight on the working plane either—

(A) continuously down to a power consumption that is less than 50% of full power; or

(B) in no less than 4 steps down to a power consumption that is less than 50% of full power.

(b) Where a daylight sensor and dynamic control device has a manual override switch, the manual override switch must not be able to switch the lights permanently on or bypass the lighting controls.