'Section J' REPORT

Building Code of Australia 'Deemed-To-Satisfy' Compliance Section J Report

For a Proposed Mixed Residential/Commercial Development

At:
7-13 Norfolk Street
LIVERPOOL

Prepared for
Eagle Developments & Cardile Developments

November, 2015

Prepared by

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1 EXECUTIVE SUMMARY

This Report has been prepared by suitably qualified and experienced personnel and shows compliance with the Building Code of Australia (BCA) Volume 1, 'Deemed to Satisfy' (DTS) Provisions for Section J.

The Report further describes and refers to parts of the BCA which leads to the conclusion that the subject building if constructed with the recommendations contained in this report will meet the DTS Provisions of Section J of the BCA.

In NSW, Class 2 buildings are subject to a BASIX assessment which is a web based planning tool designed to assess the potential performance of certain residential buildings against a range of sustainability indices including thermal comfort and energy.

Commitments made under BASIX become a Condition of the relevant development Consent.

The provisions of Section J are therefore designed to compliment requirements that arise under BASIX and which are implemented via a development Consent.

This report will be divided into Parts A & B. Part A will relate to Section J for the Retail and Commercial component part of the building and Part B will relate to the residential component of the building.

2 PURPOSE OF REPORT

The purpose of this report is to:

A. Complete a DTS compliance assessment in reference to Section J of the BCA in respect of the subject building.

B. Advise of any areas of non-compliance of the building in respect to the DTS provisions of Section J of the BCA.

C. Provide a Report covering compliance of the building with the relevant provisions of the BCA in respect to the DTS provisions contained in Section J.

3 PROPERTY

The premises, the subject to this Report is known as 7-13 Norfolk Street, Liverpool (Cnr Castlereagh Street).

4 BASIS OF ASSESSMENT

The assessment has been carried out using:

A. Drawing Nos: 15011 AP04(P4) to AP12(P4), AP15(P1), AP11(P1) and AP12(P1) dated 30th July, 2015, drawn by Mosca Pserras Architects.

B. The Building Code of Australia 2015 and the NSW Appendices where applicable.

The referenced plans indicate that the Conditioned spaces for the commercial areas are the 2 ground floor commercial tenancies and the commercial lobby (excluding the lift) and the large commercial tenancy

(excluding the fire isolated stairways and the commercial service room) on level 1 while Part B of the report relates to all the residential units.

5 ASSESSMENT

5.1 Building Class & Climate Zone

The proposed building has a Class 2, 5 & 7a classification as determined by Part A3 of the BCA. It is the Class 5 part of the building that is subject to all parts of Section J however, the report is divided into Parts A & B. Part A provides assessment of the Class 5 portion of the building against all the requirements of Section J, while Part B provides assessment for the Class 2 portion against Sections J1, J3, J5 and J6.

The climate zone designated in Table A1.1 of the BCA is climate Zone 6.

5.2 Definitions Pursuant to Part A1 of the BCA

'*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 or Class 4 part of a building in which a heater with a capacity of not more than 1.2kw provides the air-conditioning, or

b) A space in a Class 6, 7, 8 or 9b building where the input energy to an air-conditioning system is not more than 15w/m^2.

'Envelope' 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 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.

5.3 Description of Development

The proposed mixed use residential/commercial development comprises basement carparking, 2 commercial tenancies and a large commercial and residential lobby with associated service rooms at ground level, a large commercial tenancy at the 1st floor level and a further 23 floors of residential units above.

The external walls of the commercial tenancies will be glass and concrete block work while the floors and roof will be reinforced concrete. The internal walls surrounding the commercial tenancies at the ground and 1st floor level will also be concrete block work.

6 PART A – COMMERCIAL COMPONENT OF BUILDING - PART J1 - BUILDING FABRIC

6.1 J1.2 Thermal Construction General

This clause contains a broad range of general requirements that apply to the building fabric. An important aspect of J1.2 is the testing needed to ensure the validity of the insulation products. Information received by the ABCB indicates that some insulation products may not have been tested in accordance with AS/NZS 4859.1 and the stated insulation levels on some manufacturer's literature may not be achievable. In most jurisdictions, the approval of insulation performance ultimately resides with the Building Control Authority, and this discretionary power should be exercised with care.

In order to ensure the performance of materials is correctly validated, test reports complying with the appropriate standard should be provided in accordance with part A2 of the BCA and this documentation forms an integral part of the building approval.

The 2002 edition of AS/NZS 4859.1 did not contain standard assumptions for calculating the R-Value benefit of reflective insulation so suppliers may use different criteria. For example, the assumption may be that the surface is free of dust while in practice it may be used in a dusty environment under a tiled roof. In the absence of a standard set of assumptions, the Building Control Authority may need to review each certificate for relevance to the application.

6.2 Subclause J1.2 (a) - Integrity of the Insulation

Subclause J1.2 (a) requires any insulation, when installed in a building, to form a consistent and continuous barrier with ceilings, walls bulkheads and floors. This is important as any gaps within the barrier will allow heat in or out, which will undermine the effectiveness of the overall energy efficiency measures.

However, it is recognised that certain gaps are essential, especially adjoining services and light fittings where the close proximity of insulation may create a fire hazard.

A key aspect of this Clause is the recognition that certain structural elements of the building (e.g. framing) contribute to achieving the required levels of thermal efficiency. For this reason, it is acceptable that wall insulation closely fit within a wall frame to achieve the desired overall level of performance for the wall. The wall elements, in conjunction with the insulation, are deemed to achieve the required level of performance.

Another part of this Clause worth noting is the reference to AS/NZS 4859.1. This Standard specifies the testing criteria for insulation including both reflective and bulk insulation. In broad terms, the Standard requires the manufacturer to provide a data sheet, which explains the thermal performance and the installation requirements of the product.

The manufacturer's data sheet should be utilised by both building designers and building surveyors as documentary evidence of the performance of the insulation and may be required to form part of the building approval documentation.

6.3 Subclause J1.2 (b) - Reflective Insulation

Insulating performance is achieved by the ability of the reflective insulation to "reflect" heat at one surface and not transmit it at another, combined with the insulating qualities of the thin air films adjacent to the reflective insulation. Some reflective insulation is also bonded to bulk or board insulation providing enhanced performance.

Accordingly, the reflectivity value and the presence of an airspace are critical, because without this airspace the reflection will not occur.

The other issue to consider is that generally, reflective insulation has a dull or anti-glare (painted side) and a shiny silver side. Both sides will achieve a degree of reflectivity. However, the shiny side is the most effective.

From an Occupational Health and Safety point of view, the dull coloured side is installed facing outwards to prevent eye injury, which could occur if the high reflectivity from the silver side was on the outside.

Note that reflective insulation has an overlap requirement of 50 mm. This is different to the Standard AS 4120 (the standard for the installation of wall wraps) requirements. Standard AS 4120 addresses wall sarking, and requires the achievement of a certain degree of water proofing. However, reflective insulation under Section J of the BCA is not installed -for waterproofing and only requires a small overlap to maintain a reflective capacity.

6.4 Subclause J1.2 (c) - Bulk Insulation

Subclause J1.2 (c) provides a list of requirements for bulk insulation. The term, bulk insulation, includes glass fibre, wool, cellulose fibre, polyester and polystyrene. These materials tend to have a high percentage of air voids that retard heat movement.

The thermal performance of bulk insulation is dependent on the material retaining the depth specified by the manufacturer, in accordance with the required test results. The depth of the insulation is critical because the air pockets within the material trap and retard heat flow. If the insulation is compressed it will lose some of these air pockets as the fibre contact increases, which in turn, will reduce its capacity to achieve the design R-Value.

Design alert: Insulation materials used in a Class 2 to 9 building must also comply with Clause C1.10 of the BCA for fire hazard properties. This may require the insulation used in these building to be of negligible fire hazard by complying with the non-combustibility, flammability, spread of flame and smoke development requirements of the Clause. The performance of the insulation used should be validated by test reports and these reports should form part of the building approval documentation.

6.5 Specification J1.2

This specification provides a list of common construction materials and their associated thermal performance. The values have been developed after extensive consultation with industry experts and reflect agreed values based on the latest scientific test information.

Other values for materials may be acceptable. However, these should be validated by supporting information as prescribed in A2.2. In other instances, references from reputable engineering texts such as those published by ASHRAE (American Society of Heating, Refrigerating and Air-Conditioning Engineers) and AIRAH (Australian Institute of Refrigeration, Air-Conditioning and Heating) would also be reliable and suitable as evidence for compliance with the BCA.

6.6 Roof & Ceiling Construction part J1.3

6.6.1 Application of Part J1.3

Clause J1.3 specifies that for a roof and ceiling that is part of the envelope, must achieve the Total R-Value specified in Table J1.3 for the direction of heat flow.

Table J1.3(a) states that for climate Zone 6, insulation generally, must achieve a minimum Total R-Value of R3.2 for a roof and ceiling, not withstanding the roof upper surface solar absorptance value of the roof.

The direction of heat flow indicated in the BCA is downward.

6.6.2 Assessment of Construction (Roof & Ceiling To the Ground Floor Commercial Tenancies and the Commercial Lobby and the 1st Floor Office Tenancy)

Plans reveal that part of the ground floor commercial tenancy G01 is below open balconies or open concrete slabs on level 2, similarly the 1st floor commercial tenancy 101 is below open balconies or non conditioned areas on level 2.

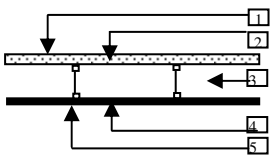
It is these areas that are not below conditioned areas that require compliance with J1.3.

6.6.3 Opinion

Table J1.3(a) shows DTS options for roof and ceiling construction under the provisions of the BCA. Compliance with the requirements of J1.3 (a), is obtained by materials complying with relevant standards as noted in Specification J1.3 as well as methods used during construction and installation.

A roof and ceiling in climate Zone 6 is required to achieve a minimum Total R-Value of R3.2 to meet the DTS requirements of the BCA.

6.6.4 Roof and Ceiling Construction – For Those Small Sections of the Commercial Tenancies G01 and 101 That are Not Directly Below a Conditioned Area

Roof construction description	Item	Item Description	R-Value Down
Solid concrete roof, 10mm plaster, suspended ceiling 	1	Outdoor air film (7m/s)	0.04
	2	Solid Concrete Slab	0.18
	3	Ceiling airspace (100mm to 300mm non-reflective)	0.22
	4	Plasterboard, gypsum (10mm 880kg/m^3	0.06
	5	Indoor air space	0.16
		Total R-Value	**0.66**

6.6.5 Compliance for Roof and Ceiling (To Those Small Sections of the Ceilings to the Commercial Tenancies G01 and 101 That are Not Directly Below a Conditioned Area)

Insulation of minimum R2.54 within the roof/ceiling of those parts of the commercial tenancies mentioned above will enable the commercial tenancies to comply with Part J1.3.

NOTE 1: As the remaining parts of G01, all of G02 and the commercial lobby and remaining parts of 101 are below conditioned areas, they do not require compliance with J1.3.

6.7 Roof Lights J1.4

J1.4 is not applicable to this development.

6.8 Walls Part J1.5

6.8.1 Application

The construction of walls including both external and internal walls that are part of the envelope is a major contributing factor in the overall thermal performance of the building.

Each part of an external wall that is part of the envelope must satisfy one of the requirements outlined in Table J1.5(a) except opaque non-glazed openings in external walls such as doors, vents, penetrations, shutters or glazing..

Table J1.5(a) for external walls require a total R-Value of R2.8 however, Table J1.5(a) allows the Total R-value of the external wall to be reduced in the following circumstances:

(i) For a wall with a surface density of not less than 220kg/m^2 by R0.5.

(ii) For a wall that has a south orientation as described in figure J2.3 by R0.5, or

(iii) Shaded with a projection shade angle in accordance with Figure J1.5 of:

  (a) 30° to not more than 60° by R0.5, or
  (b) more than 60° by R1.0.

The internal walls under Table J1.5b(b) requires an R-Value of R1.8.

6.8.2 Assessment for Construction for both External & Internal Walls Surrounding the Ground Floor Commercial Tenancies, the Commercial Lobby and the 1st Floor Office Tenancy

Drawings indicate that the external walls surrounding the ground and 1st floor conditioned areas will be concrete block and glass while the internal walls surrounding the conditioned areas on both levels will also be concrete block. Glass will be dealt with in Part J7.0 of this report.

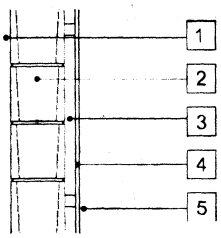
Both the external and internal walls on their own will not comply with J1.5 and will require insulation while the external walls receive a reduction due to density and both the external and internal walls receive a reduction for Spec. J1.5.

6.8.3 Opinion

Table J1.5(a) and J1.5 (b) shows DTS options for external and internal wall construction under the provisions of the BCA.

Compliance with Table J1.5(a) and J1.5(b) for climate Zone 6 is obtained by materials complying with relevant standards as noted in Specification J1.5 as well as methods used during construction and installation.

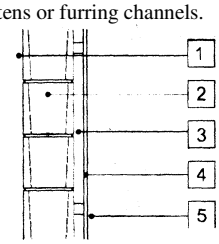
6.8.4 Wall Description – Spec J1.5 (Concrete Block External Walls Surrounding the Commercial Tenancies at Both Ground and 1st Floor Levels)

Wall Construction Description	Item	Item Description	R-Value
Concrete block with internal plaster on battens or furring channels. 	1	Outdoor air film (7m/s)	0.04
	2	190mm concrete block	0.13
	3	Airspace (20 mm to 35 mm, non-reflective and unventilated)	0.17
	4	Plasterboard, gypsum (10mm, 880 kg/m^3)	0.06
	5	Indoor air film (still air)	0.12
		Total R-Value	**0.52**

6.8.5 Compliance for External Concrete Block Walls Surrounding the Commercial Tenancies and Commercial Lobby at Ground & 1st Floor Levels

Allowing a reduction of R0.52 for Spec. J.15 and a further R0.5 reduction for density the external concrete block walls surrounding the commercial tenancies require insulation of minimum R1.78 to comply with J1.5.

6.8.6 Wall Description – Spec J1.5 (Internal Concrete Block Walls Surrounding Commercial Tenancies at Ground & 1st Floor Levels)

Wall Construction description	Item	Item Description	R-Value
Concrete block with internal plaster on battens or furring channels. 	1	Indoor air film (7m/s)	0.12
	2	190mm concrete block	0.13
	3	Airspace (20mm to 35mm, non-reflective and unventilated)	0.17
	4	Plasterboard, gypsum (10mm, 880 kg/m3)	0.06
	5	Indoor air film (still air)	0.12
		Total R-Value	**0.60**

NOTE: The outdoor air film is substituted for an indoor air film.

6.8.7 Compliance for Internal Concrete Block Walls Surrounding Commercial Areas

Insulation within the internal concrete block walls surrounding the ground and 1st floor tenancies of minimum R1.20 will allow the internal walls to comply with Table J1.5b(b) of Part J1.5.

6.9 Floors Part J1.6

6.9.1 Application

A floor that is part of the envelope of a building including a floor above or below a carpark must achieve the total R-Value specified in J1.6.

In Climate Zone 6 the total R-Value of Table J1.6 may be reduced by R0.5 provided R0.75 is added to the total R-Value required for the ceiling.

Table J1.6(b) requires a suspended floor slab without an in-slab heating or cooling system where the non-conditioned space is enclosed and where mechanically ventilated by not more than 1.5 air changes/hour to have an R-Value of R1.0 however if it cannot meet (b) above J1.6(d) requires the floor to have an R-Value of R2.0.

6.9.2 Assessment for Construction

Drawings indicate that the ground floor for the commercial tenancies and the commercial lobby is above a basement carpark that is enclosed however no advice has been received regarding the number of air changes/hour required for ventilation of the basement carpark.

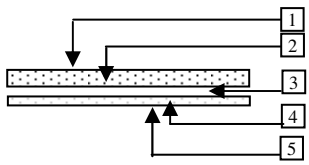
Accordingly, the slab requires an R-Value of R2.0 in accordance with Table J1.6(d) of Section J.

6.9.3 Opinion

Table J1.6(d) requires a minimum R2.0 to the suspended concrete floor at the ground floor level below the 2 commercial tenancies and the commercial lobby.

Compliance with Table J1.6(d) for Climate Zone 6 is obtained by materials complying with the relevant standards as noted in Spec. J1.6 as well as methods used during construction and installation.

6.9.4 Floor Description – Spec. J1.6 (Concrete Floor Below the Commercial Tenancies and the Commercial Lobby

Floor Construction Description	Item	Item Description	R-Value Unventilated	
260 solid concrete floor 10mm suspended plasterboard ceiling 	1	Indoor air film	0.11	0.16
	2	Solid concrete	0.18	0.18
	3	Air Gap	0.15	0.22
	4	Fibre Cement or Similar	0.03	0.03
	5	Indoor air fill	0.11	0.16
		Total R- Value	**0.58**	**0.75**

NOTE: Outdoor airfilm changed to indoor airfilm

6.9.5 Compliance for Concrete Floor Below the 2 Commercial Tenancies and the Commercial Lobby at the Ground Floor Level

The concrete floor to the 2 tenancies and the commercial lobby receives an R0.75 reduction in accordance with Spec J1.6(d). Insulation of minimum R1.25 is required for the ground floor slab beneath the 2 commercial tenancies and the commercial lobby.

7 EXTERNAL GLAZING PART J2.0

7.1 External Glazing

7.1.1 Application

The DTS Provisions of the BCA are covered in J2.1 which applies to elements forming the envelope of a building other than a sole occupancy unit of a Class 2 building.

7.1.2 Assessment of Construction

J2.4 Glazing – Method 2 states that glazing must be assessed separately for each storey and for each orientation of the subject building.

Assessment (Method 2 – DTS) is facilitated under the BCA to determine compliance with DTS using the BCA 'Glazing Calculator' developed by the Australian Building codes Board (ABCB) and provided on the ABCB website. This is the form of a Microsoft Excel spreadsheet.

7.1.3 Opinion

A Glazing system that achieves the minimum specifications as outlined in Annexure 1 of this Report will achieve compliance.

These generic window values for the total U-Value and Solar Heat Gain Co-efficient (SHGC) are from the National Fenestration Rating Council (NFRC) and can be supplied by most window manufacturers in Australia.

7.1.4 Compliance

The external glazing for the commercial tenancies and commercial lobby at ground floor and 1st floor level will comply with Part J2.0 of the BCA if it meets the total U-Value and SHGC figures as depicted in Annexure 1.

8 BUILDING SEALING PART J3.0

8.1 Building Sealing

8.1.1 Application of Part J3.1

The DTS Provisions of the BCA are covered in J3.1 and apply to elements forming the envelope of a Class 2 to 9 building, other than:

a) a building in climate zones 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler; or
b) a permanent building ventilation opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance; or
c) a building or space where the mechanical ventilation required by Part F4 provides sufficient pressurization to prevent infiltration.

8.1.2 Assessment of Construction [Building Sealing]

The proposed development is located in Climate Zone 6 as per table A1.1 '*Climate Zones for Thermal Design*' and is required to comply with Part J3.0.

8.1.3 Opinion and Compliance

The building is required to comply with the provisions of the BCA J3.0 for parts J3.2, J3.4, J3.5, J3.6 and J3.7 inclusive,

J3.2	No chimneys or flues to conditioned spaces are indicated on the referenced drawing set for the new work, therefore compliance is not required for the subject building.
J3.4(a)	A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like forming part of the envelope of a conditioned space.
J3.4(b)	These requirements do not apply to a window complying with AS.2047, or a fire or smoke door or a roller shutter door, roller shutter grille or other security door or device installed only for out of hours security.
J3.4(c)	A seal required by (a) above for the bottom edge of an external swing door must be a draft protection device and for the other edges of an external door or the edges of an openable window the seal may be a foam or rubber compression strip, fibrous seal or the like.
J3.4(d)	The main entry door to each ground floor commercial tenancy and the commercial lobby shall be a self-closing door with a draft protection device added as required by J3.4(c) unless they are fire doors.

J3.5 A miscellaneous exhaust fan, such as a bathroom or domestic kitchen exhaust, must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space.

J3.6 Roofs, walls, floors and any opening such as a window, door or the like within the conditioned areas must be constructed to minimize air-leakage when forming part of the envelope of the external fabric of a conditioned space.

Construction as required by J3.6 must be either by enclosure of internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking skirting, architraves, cornices or the like.

J3.7 An evaporative cooler must be fitted with a self-closing damper of the like when serving a heated space.

9 AIR MOVEMENT PART J4

Part J4 is not applicable to this building.

10 AIR-CONDITIONING AND VENTILATION SYSTEM – PART J5

10.1 J5.2 Air-Conditioning Systems

(a) **Control:**

(i) An air-conditioning system

(A) must be capable of being deactivated when the building or part of a building served by that system is not occupied; and

(B) when serving more than one air-conditioning zone or area with different heating or cooling needs, must:

(aa) thermostatically control the temperature of each zone or area; and

(bb) not control the temperature by mixing actively heated air and actively cooled air; and

(cc) limit reheating to not more than:

(AA) for a fixed supply air rate, a 7.5 K rise in temperature; and

(BB) for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and

(C) which provides the required mechanical ventilation, other than in process- related applications where humidity control is needed, must have an outdoor air economy cycle:

(aa) in Climate Zones 2 or 3, when the air-conditioning system capacity is more than 50 kWr; or

(bb) in Climate Zones 4, 5, 6, 7 or 8, when the air-conditioning system capacity is more than 35 kWr; and

(D) which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and

(E) except for a packaged air-conditioning system, must have a variable speed fan when its supply air quantity is capable of being varied; and

(F) when serving a sole occupancy unit in a Class 3 building, must not operate when any external door of the sole occupancy unit that opens to a balcony or the like, is open for more than one minute.

(ii) When an air-conditioning system is deactivated, any motorised outside air and return dampers must close.

(iii) Compliance with (i) must not adversely affect

(A) smoke hazard management measures required by Part E2, and

(B) ventilation required by Part E3 and Part F14.

(b) **Fans** Fans of an air-conditioning system must comply with Specification J5.2a.

(c) **Pumps**

(i) An air-conditioning system, where water is circulated by pumping at more than 2 L/s, must be designed so that the maximum pump power to the pump complies with Table J5.2.

(ii) An air-conditioning system pump that is rated at more than 3 kW of pump power and circulates water at more than 2 L/s must be capable of varying its speed in response to varying load.

(iii) A spray water pump of an air-conditioning system's closed circuit cooler or evaporative condenser must not use more than 150 W of pump power for each L/s of spray water circulated.

Table J5.2 MAXIMUM PUMP POWER

Cooling or heating load (W/m2 of the floor area of the conditioned space)	**Maximum pump power (W/m^2 of the of the floor area of the conditioned space)**		
	Chilled water	Condenser water	Heating water
Up to 100	1.3	0.9	1.0
101to150	1.9	1.2	1.3
151 to 200	2.2	2.2	1.7
201 to 300	4.3	3.0	2.5
301 to 400	5.0	3.6	3.2
More than 400	5.6	*5.6*	3.6
Note: Values do not include any motor losses.			

(d) **Insulation**

(i) The ductwork of an air-conditioning system must be insulated and sealed in accordance with Specification J5.2b.

(ii) Piping, vessels, heat exchangers and tanks containing heating or cooling fluid that are part of an air-conditioning system, other than those with insulation levels covered by MEPS, must be insulated in accordance with Specification J5.2c.

(e) **Space heating** - A heater used for air-conditioning or as part of an air-conditioning system must comply with Specification J5.2d.

(f) **Energy efficiency ratios**

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

(ii) Packaged air-conditioning equipment, must comply with Specification J5.2e.

(g) **Time switches**

(i) A time switch complying with Specification J6 must be provided to control

(A) an air-conditioning system of more than 10 kWr; and

(B) a heater of more than 10 kW heating used for air-conditioning

(ii) The requirements of (i) do not apply to:

(A) an air-conditioning system that serves

(aa) only one sole occupancy unit in a Class 2 or 3 building; or

(bb) Class 4 part of a building; or

(cc) only one sole occupancy unit in a Class 9c building; or

(B) a building where air-conditioning is needed for 24 hour occupancy.

10.2 J5.3 Mechanical Ventilation Systems

(a) **Control**

(i) A mechanical ventilation system, including one that is part of an air-conditioning system, except where the mechanical system serves only one sole occupancy unit in a Class 2 building or serves only a Class 4 part of a building, must

(A) be capable of being deactivated when the building or part of the building served by that system is not occupied; and

(B) when serving a conditioned space:

(aa) not exceed the minimum outdoor air quantity required by Part F4, where relevant, by more than 20%; and

(bb) in other than Climate Zone 2, where the number of square metres per person is not more than 1 as specified in D1.13 and the air flow rate is more than 1000 L/s, have

(AA) an energy reclaiming system that preconditions outside air; or

(BB) the ability to automatically modulate the mechanical ventilation required by Part F4 in proportion to the number of occupants.

(ii) The requirements of (a)(i)(B)(aa) do not apply where

(A) additional unconditioned outside air is supplied for free cooling or to balance process exhaust; or

(B) additional exhaust ventilation is needed to balance the required mechanical ventilation; or

(C) an energy reclaiming system preconditions all the outside air.

(iii) Compliance with (a)(i) must not adversely affect

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

(B) ventilation required by Part E3 and Part F4.

(b) **Fans** - Fans of a mechanical ventilation system covered by must (a) comply with Specification J5.2a.

(c) **Time switches**

(i) A time switch complying with Specification J6 must be provided to control a mechanical ventilation system with an air flow rate of more than 1000 Us.

(ii) The requirements of (i) do not apply to;

(A) a mechanical ventilation system that serves

(aa) only one sole occupancy unit in a Class 2 or 3 building; or

(bb) a Class 4 part of a building; or

(cc) only one sole occupancy unit in a Class 9c building; or

(B) a building where mechanical ventilation is needed for 24 hour occupancy.

11 ARTIFICIAL LIGHTING & POWER – PART J6

11.1 Artificial Lighting & Power

11.1.1 J6.2

In a Class 5 and 7a building, for artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the illumination power density in Table J6.2(a) and the aggregate design illumination power load is the sum of the design illumination power loads in each of the spaces served. (See Annexure 2 for Table J6.2(a) showing the max. illumination power density requirement for the different areas).

In determining the design illumination power load the following must be used:

(i) Where there are multiple lighting systems serving the same space;
  A. the total illumination power load of all systems; or
  B. for a control system that permits only one system to operate at a time, the design illumination power load is;
    a. based on the highest illumination power load; or
    b. determined by the formula:

$$[H \times T/2 + P \times (100 - T/2)] / 100$$

Where:
H = the highest illumination power load; and
T = the time for which the maximum illumination power load will occur, expressed as a percentage; and
P = the predominant illumination power load.

(ii) The requirements above do not apply to emergency lighting or lighting of a specialist process nature such as in an operating theatre, fume cupboard or clean workstation.

11.1.2 J6.3 – Interior Artificial Lighting and Power

(i) Artificial lighting of a room or space must be individually operated by a switch or other control device.
(ii) An artificial lighting switch must:
  A. Be located in a visible position;
    a. In the room or space being switched; or
    b. In an adjacent room or space from where the lighting being switched is visible; and

The requirements of (i) and (ii) above do not apply to Emergency lighting in accordance with Part E4.

11.1.3 J6.5

Artificial lighting around the perimeter of a building must be

(i) Controlled by either a daylight sensor or a time switch that is capable of switching on and off electric power to the system at

variable pre-programmed times and on variable pre-programmed days, and

(ii) when the total perimeter lighting load exceeds 100w.
   A. have an average light source efficacy of not less than 60 lumens/w, or
   B. be controlled by a motion detector in accordance with Spec J6, and
   C. when used for decorative purposes such as façade lighting or signage lighting have a separate time switch in accordance with Spec. J6.

(iii) The requirements of (ii)(A) and (B) do not apply to Emergency lighting in accordance with Part E4.

11.1.4 Specification J6.3 – Time Switch

A time switch must be capable of:-

(i) Switching on and off electric power to systems:
   A. at variable pre-programmed times and on variable pre-programmed days, and
   B. limiting the period the system is switching on to 2 hours beyond the time for which the building is occupied: and

(ii) Being overridden by a manual switch for a period of up to 2 hours, after which the time switch must resume control.

11.1.5 Specification J6.4 – Motion Detectors

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 person before they have entered 1 m into the space, and movement of 500mm within the useable part of the space; and

(iii) Not control more than, in other than a carpark, an area of 500m2 with a single sensor or group of parallel sensors and 75% of the lights in spaces using high intensity discharge; and

(iv) Be capable of maintaining the artificial lighting when activated for a minimum of 5 minutes and a maximum of 30 minutes unless it is reset, and without interruption if the motion detector is reset by movement; and

(v) Have a manual override switch which enable the lighting to that area, or a greater area, to be turned off, and is not capable of switching the lights permanently on.

11.1.6 Specification J6.5 - Daylight sensor and dynamic lighting control device

A daylight sensor and dynamic lighting 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 a delay of more than 2 minutes and 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.

Have a manual override switch which enables the lighting in an area to be turned off but is not able to switch the lights permanently on or bypass the lighting controls

12 HEATED WATER SUPPLY – PART J7.0

Any heated water supply system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC, Volume 3, Plumbing Code of Australia.

13 FACILITIES FOR ENERGY MONITORING - PART J8

13.1 J8.3 - Facilities for Energy Monitoring

(a) A building or sole-occupancy unit with a floor area of more than 500m^2 must have the facility to record the consumption of gas and electricity.

(b) A building with a floor area of more than 2,500m^2 must have the facility to record individually the energy consumption of:

- (i) Air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and
- (ii) Artificial lighting; and
- (iii) Appliance power; and
- (iv) Central hot water supply; and
- (v) Internal transport devices including lifts, escalators and travelators where there is more than one serving the building ; and
- (vi) Other ancillary plant.

(c) The provisions of (b) do not apply to a Class 2 building with a floor area of more than 2,500m^2 where the total area of the common areas is less than 500m^2.

14 PART B – RESIDENTIAL COMPONENTS - PART J1

14.1 J1

The DTS requirements only apply where the Consent specifies that insulation is to be provided as part of the development.

14.2 Part J1.2

Thermal insulation in the Class 2 building must comply with the provisions of J1.2 except that the reference in Clause J1.2 to '*where required*' is deemed to refer to '*where a dev elopement Consent specifies that insulation is to be provided as part of the Development*'

15 BUILDING FABRIC – THERMAL CONSTRUCTION GENERAL

15.1 J1.2 Thermal Construction General

If insulation is required to any external walls, ceilings and the ground floor slab of the residential units by BASIX, the requirements of J1.0 are applicable. See Part 6 of this Report for the requirements of installing insulation within the building.

16 BUILDING SEALING PART J3.0

16.1 Building Sealing

16.1.1 Application of Part J3.1

The DTS Provisions of the BCA are covered in J3.1 and apply to elements forming the envelope of a Class 2 to 9 building other than:

a) a building in climate zones 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler; or
b) a permanent building ventilation opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance; or
c) a building or space where the mechanical ventilation required by Part F4 provides sufficient pressurization to prevent infiltration.

16.1.2 Compliance

The residential units are required to comply with the provisions of the Building Code of Australia J3.0 for Parts J3.4, J3.5, J3.6 and J3.7 inclusive.

J3.4(a) A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like forming part of the external fabric of a habitable room or public area.

J3.4(b) These requirements of (a) above do not apply to a window complying with AS.2047, or a fire or smoke door or a roller shutter door, roller shutter grille or other security door or device installed only for out of hours security.

J3.4(c) A seal required by (a) above for the bottom edge of a swing door must be a draft protection device and 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.

J3.4(d) The 2 main external doors to the ground floor residential lobby off the open corridor shall be self-closing doors.

J3.5 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 habitable room.

J3.6 Roofs, walls, floors and any opening such as a window, door or the like within the conditioned areas must be constructed to minimize air-leakage when forming part of the envelope of the external fabric of a conditioned space.

Construction as required by J3.6 must be either by enclosure of internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking skirting, architraves, cornices or the like.

J3.7 An evaporative cooler must be must be fitted with a self-closing damper or the like when serving a heated space or a habitable room.

17 AIR-CONDITIONING AND VENTILATION SYSTEM – PART J5

17.1 J5.2 Air-Conditioning Systems

(a) **Control:**

(i) An air-conditioning system

(A) must be capable of being deactivated when the building or part of a building served by that system is not occupied; and

(B) when serving more than one air-conditioning zone or area with different heating or cooling needs, must:

(aa) thermostatically control the temperature of each zone or area; and

(bb) not control the temperature by mixing actively heated air and actively cooled air; and

(cc) limit reheating to not more than:

(AA) for a fixed supply air rate, a 7.5 K rise in temperature; and

(BB) for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and

(C) which provides the required mechanical ventilation, other than in process- related applications where humidity control is needed, must have an outdoor air economy cycle:

(aa) in Climate Zones 2 or 3, when the air-conditioning system capacity is more than 50 kWr; or

(bb) in Climate Zones 4, 5, 6, 7 or 8, when the air-conditioning system capacity is more than 35 kWr; and

(D) which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and

(E) except for a packaged air-conditioning system, must have a variable speed fan when its supply air quantity is capable of being varied; and

(F) when serving a sole occupancy unit in a Class 3 building, must not operate when any external door of the sole occupancy unit that opens to a balcony or the like, is open for more than one minute.

(ii) When an air-conditioning system is deactivated, any motorised outside air and return dampers must close.

(iii) Compliance with (i) must not adversely affect

(A) smoke hazard management measures required by Part E2, and

(B) ventilation required by Part E3 and Part F14.

(b) **Fans** Fans of an air-conditioning system must comply with Specification J5.2a.

(c) **Pumps**

(i) An air-conditioning system, where water is circulated by pumping at more than 2 L/s, must be designed so that the maximum pump power to the pump complies with Table J5.2.

(ii) An air-conditioning system pump that is rated at more than 3 kW of pump power and circulates water at more than 2 L/s must be capable of varying its speed in response to varying load.

(iii) A spray water pump of an air-conditioning system's closed circuit cooler or evaporative condenser must not use more than 150 W of pump power for each L/s of spray water circulated.

Table J5.2 MAXIMUM PUMP POWER

Cooling or heating load (W/m2 of the floor area of the conditioned space)	**Maximum pump power (W/m^2 of the of the floor area of the conditioned space)**		
	Chilled water	Condenser water	Heating water
Up to 100	1.3	0.9	1.0
101to150	1.9	1.2	1.3
151 to 200	2.2	2.2	1.7
201 to 300	4.3	3.0	2.5
301 to 400	5.0	3.6	3.2
More than 400	5.6	*5.6*	3.6
Note: Values do not include any motor losses.			

(d) **Insulation**

(i) The ductwork of an air-conditioning system must be insulated and sealed in accordance with Specification J5.2b.

(ii) Piping, vessels, heat exchangers and tanks containing heating or cooling fluid that are part of an air-conditioning system, other than those with insulation levels covered by MEPS, must be insulated in accordance with Specification J5.2c.

(e) **Space heating** - A heater used for air-conditioning or as part of an air-conditioning system must comply with Specification J5.2d.

(f) **Energy efficiency ratios**

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

(ii) Packaged air-conditioning equipment, must comply with Specification J5.2e.

(g) **Time switches**

(i) A time switch complying with Specification J6 must be provided to control

(A) an air-conditioning system of more than 10 kWr; and

(B) a heater of more than 10 kW heating used for air-conditioning

(ii) The requirements of (i) do not apply to:

(A) an air-conditioning system that serves

(aa) only one sole occupancy unit in a Class 2 or 3 building; or

(bb) Class 4 part of a building; or

(cc) only one sole occupancy unit in a Class 9c building; or

(B) a building where air-conditioning is needed for 24 hour occupancy.

18 ARTIFICIAL LIGHTING & POWER – PART J6

18.1 Artificial Lighting & Power

In the sole occupancy units the lamp power density or illumination power density of artificial lighting must not exceed:

a) Within the sole occupancy units of, $5W/m^2$, and
b) On a verandah or balcony of the units $4W/m^2$.

18.2 Adjustment Factor

The illumination power density above may be increased by dividing it by the illumination power density adjustment factor for a control device in Table J6.2b. See Annexure 3 for Table J6.2b.

18.3 Design of Illumination Power Density

When designing the illumination power density the power of the proposed installation must be used rather than nominal allowances for exposed batten holders or luminaires.

18.4 Halogen Lamps

Halogen lamps must be separately switched from fluorescent lamps.

19 CONCLUSION

This report provides an assessment of the Deemed-To-Satisfy requirements of Section J of the Building Code of Australia.

Should the recommendations contained in this report be adopted into the building during construction, the development will comply with the Deemed-To-Satisfy requirements of Section J.

19.1 NOTE: Summary of Recommendations

19.1.1 PART A – Class 5

1. J1.2(a) Any insulation must be installed so that it abuts or overlaps adjoining insulation, forms a continuous barrier with ceilings, walls, bulkheads, floors or the like and does not affect the safe or effective operation of a service or fitting.
2. J1.2(b) Reflective insulation must be installed to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding. It must be closely fitted against any penetration, door or window opening, adequately supported and overlapped not less than 50mm or taped together.
3. J1.2(c) Bulk insulation must be installed so that it maintains its position and thickness and in a ceiling where there is no bulk or reflective insulation in the wall beneath, it overlaps the wall by not less than 50mm.
4. Provide insulation of minimum R2.54 within parts of the roof/ceiling of tenancies G01 and 101 that are not directly below a conditioned area.
5. Provide insulation of a minimum of R1.78 to the external concrete block walls of the 2 ground floor tenancies and the commercial lobby and the 1st floor commercial tenancy.
6. Provide insulation to the internal concrete block walls surrounding the ground and 1st floor tenancies and the ground floor commercial lobby of min. R1.20.
7. Provide insulation of minimum R1.25 to the ground floor slab beneath the 2 ground floor commercial tenancies and the commercial lobby.
8. Provide glazing to the commercial windows and glass doors of the conditioned areas that have the U-Value and SHGC values as nominated in Annexure 1 of this report.
9. Provide seals to all openable windows and doors within the commercial areas as mentioned in 8.1.3 of this report.
10. The main entry door to each ground floor commercial tenancy and the commercial lobby shall be self-closing doors with a draft protection device attached to the bottom edge of the door unless they are fire doors or sliding doors.
11. All internal linings to the commercial areas shall be close fitting at the junction of the ceiling, wall and floors or sealed by caulking skirting, architraves cornices or the like.

12. Any air-conditioning and ventilation system must comply with the requirements outlined in Heading 10.0.
13. Lighting and Power shall comply with the requirements outlined in Heading 11.0 and Annexure 2.
14. Any heated water system for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC, Volume 3, Plumbing Code of Australia.
15. Provide facilities to record the consumption of gas and electricity as required by Section J8.3(a).
16. A building with a floor area of more than 2,500m^2 must have the facility to record individually the energy consumption of:
    (i) Air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and
    (ii) Artificial lighting; and
    (iii) Appliance power; and
    (iv) Central hot water supply; and
    (v) Internal transport devices including lifts, escalators and travelators where there is more than one serving the building ; and
    (vi) Other ancillary plant.

    NOTE: The provisions in 15 above do not apply to a Class 2 building with a floor area of more than 2,500m^2 where the total area of the common areas is less than 500m^2.
17. Any miscellaneous exhaust fan such as a bathroom or domestic kitchen exhaust within the 2 tenancies must be fitted with a sealing device such as a self-closing damper of the like when serving a conditioned space.
18. Any evaporative cooler must be fitted with a self-closing damper or the like when serving a heated space within the retail and commercial tenancies.

19.1.2 PART B – Class 2

1. If insulation is required to be provided by BASIX to any external walls, ceilings and the ground floor slab of the residential units it must be installed as mentioned in Clause 6 on Pages 8, 9 and 10 of this Report.
2. Provide seals to all openable windows and doors forming the external fabric of a habitable room or public area within the residential units except smoke or fire doors or a window complying with AS.2047.
3. Any external swing doors within the sole occupancy units other than a fire door shall have a draft protection device attached to the bottom edge of the door.
4. The two main external doors to the ground floor residential lobby off the open corridor shall be self closing doors.
5. Any miscellaneous exhaust fan such as a bathroom or domestic kitchen exhaust within the sole occupancy units must be fitted with a self-closing damper or the like.
6. Any air-conditioning systems shall comply with the requirements outlined in Heading 17.

7. Lighting and Power shall comply with the requirements outlined in Heading 18 and Annexure 2.
8. An evaporative cooler must be fitted with a self-closing damper or the like when serving a heated space.
9. All internal linings to the units shall be close fitting at the junction of the ceiling, wall and floors or sealed by caulking skirting, architraves cornices or the like.

20 ANNEXURE 1 - Window Schedule

Ground Floor (1 of 2)

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

Building name/description: **7-13 Norfolk St, LIVERPOOL NSW.**

Application: **other**

Climate zone: **6**

Storey: **G**

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		90m²		200m²			130m²		
Option B									n/a
Glazing area (A)		*44.9m²*		*154m²*			*96.6m²*		

Number of rows preferred in table below: **17** *(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	WC01	SE		3.80	11.15		1.5	0.60	*2.400*	7.600	*0.00*	*3.80*	*1.00*	*1.00*	42.37	29% of 96%
2	AC01	SE		3.80	1.20		1.5	0.60	*2.400*	7.600	*0.00*	*3.80*	*1.00*	*1.00*	4.56	3% of 96%
3	WC02	SE		3.30	2.40		1.5	0.60	*2.400*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	7.92	5% of 96%
4	WC02	SE		3.30	2.40		1.5	0.60	*2.400*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	7.92	5% of 96%
5	AC01	SE		3.80	1.20		1.5	0.60	*2.400*	7.600	*0.00*	*3.80*	*1.00*	*1.00*	4.56	3% of 96%
6	WC03	SE		3.30	3.60		1.5	0.60	*2.400*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	11.88	8% of 96%
7	WC04	NE		3.30	4.90		7.0	0.65	device		2.00	0.00	0.00	0.28	16.17	36% of 100%
8	AC01	NE		3.30	1.20		7.0	0.65	device		2.00	0.00	0.00	0.28	3.96	9% of 100%
9	WC05	NE		3.30	7.50		7.0	0.65	device		2.00	0.00	0.00	0.28	24.75	55% of 100%
10	WC06	W		3.30	3.39		1.5	0.15	*4.850*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	11.19	12% of 99%
11	WC07	W		3.30	7.20		1.5	0.15	*4.850*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	23.76	25% of 99%
12	WC07	W		3.30	7.20		1.5	0.15	*4.850*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	23.76	25% of 99%
13	WC07	W		3.30	7.20		1.5	0.15	*4.850*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	23.76	25% of 99%
14	WC08	W		3.30	4.29		1.5	0.15	*4.850*	7.600	*0.00*	*4.30*	*1.00*	*1.00*	14.14	15% of 99%
15	AC02	SE		3.80	4.40		1.5	0.60	*2.400*	7.600	*0.00*	*3.80*	*1.00*	*1.00*	16.72	12% of 96%
16	WC10	SE		4.10	7.10		1.5	0.60	2.400	4.000	0.60	-0.10	0.70	0.64	29.11	17% of 96%
17	WC11	SE		4.10	7.01		1.5	0.60	2.400	4.000	0.60	-0.10	0.70	0.64	28.74	17% of 96%

Ground Floor (2 of 2)

Report from Norfolk St 7 - 13 (Ground).xlsx *printed 4/11/2015*

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 (m^2)	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 (m^2)	Element share of % of allowance used
IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR																*if inputs are valid*

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.

page 2 of 2

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

Building name/description: **7-13 Norfolk St, LIVERPOOL NSW.**

Application: **other**

Climate zone: **6**

Storey: **1**

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		90m²		288m²			130m²		
Option B									n/a

Glazing area (A) ..... *46.2m²* ..... *195m²* *99.6m²*

Number of rows preferred in table below: **17** *(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	WC15	SE		3.40	11.15		1.5	0.60	2.400	3.800	0.63	0.40	0.80	0.74	37.91	19% of 75%
2	WC16	SE		3.40	3.60		1.5	0.60	2.400	3.800	0.63	0.40	0.80	0.74	12.24	6% of 75%
3	WC17	SE		3.40	7.20		1.5	0.60	2.400	3.800	0.63	0.40	0.80	0.74	24.48	12% of 75%
4	WC18	NE		3.40	4.90		7.0	0.63	device		2.00	0.00	0.00	0.28	16.66	36% of 99%
5	WC19	NE		3.40	1.20		7.0	0.63	device		2.00	0.00	0.00	0.28	4.08	9% of 99%
6	WC20	NE		3.40	7.50		7.0	0.63	device		2.00	0.00	0.00	0.28	25.50	55% of 99%
7	WC21	W		3.40	3.39		1.5	0.15	4.850	3.800	1.28	0.40	0.49	0.48	11.52	12% of 90%
8	WC22	W		3.40	7.20		1.5	0.15	4.850	3.800	1.28	0.40	0.49	0.48	24.48	25% of 90%
9	WC22	W		3.40	7.20		1.5	0.15	4.850	3.800	1.28	0.40	0.49	0.48	24.48	25% of 90%
10	WC22	W		3.40	7.20		1.5	0.15	4.850	3.800	1.28	0.40	0.49	0.48	24.48	25% of 90%
11	WC23	W		3.40	4.31		1.5	0.15	4.850	3.800	1.28	0.40	0.49	0.48	14.64	15% of 90%
12	WC24	SE		2.70	7.50		1.5	0.60	2.400	3.800	0.63	1.10	0.91	0.87	20.25	11% of 75%
13	WC25	SE		2.70	4.40		1.5	0.60	2.400	3.800	0.63	1.10	0.91	0.87	11.88	6% of 75%
14	WC26	SE		3.80	7.00		1.5	0.60	2.400	3.800	0.63	0.00	0.69	0.63	26.60	14% of 75%
15	WC26	SE		3.80	7.00		1.5	0.60	2.400	3.800	0.63	0.00	0.69	0.63	26.60	14% of 75%
16	WC26	SE		3.80	7.00		1.5	0.60	2.400	3.800	0.63	0.00	0.69	0.63	26.60	14% of 75%
17	WC27	SE		3.40	2.53		1.5	0.60	2.400	3.800	0.63	0.40	0.80	0.74	8.62	4% of 75%

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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 (m^2)	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 (m^2)	Element share of % of allowance used

if inputs are valid

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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21 ANNEXURE 2 – Power Density for Specific Areas

Table J6.2a MAXIMUM ILLUMINATION POWER DENSITY	
Space	**Maximum illumination power density($W/m^{2)}$)**
Auditorium, church and public hall	10
Board room and conference room	10
Carpark – general	6
Carpark - entry zone (first 20 m of travel)	25
Common rooms, spaces and corridors in a Class 2 building	8
Control room, switch room, and the like	9
Corridors	8
Courtroom	12
Dormitory of a Class 3 building used for sleeping only	6
Dormitory of a Class 3 building used for sleeping and study	9
Entry lobby from outside the building	15
Health-care - children's ward	10
Health-care - examination room	10
Health-care - patient ward	7
Health-care - all patient care areas including corridors where cyanosis lamps are used	13
Kitchen and food preparation area	8
Laboratory - artificially lit to an ambient level of 400 Ix or more	12
Library = stack and shelving area	12
Library - reading room and general areas	10
Lounge area for communal use in a Class 3 building or Class 9c aged care building	10
Museum and gallery - circulation, cleaning and service lighting	8
Office – artificially lit to an ambient level of 200 Ix or more	9
Office – artificially lit to an ambient level of less than 200 !x	7
Plant room	5
Restaurant, café bar, hotel lounge and a space for the serving and consumption of food or drinks	18
Retail space including a museum and gallery whose purpose is the sale of objects	22
School - general purpose learning areas and tutorial rooms	8
Sole-occupancy unit of a Class 3 building	5
Sole-occupancy unit of a Class 9c aged care building	7
Storage with shelving no higher than 75% of the height of the aisle lighting	8
Storage with shelving higher than 75% of the of the aisle lighting	10
Service area, cleaner's room and the like	5
Toilet, locker room, staff room, rest room and the like	6
Wholesale storage and display area	10

Notes:

1. In areas not listed above, the maximum illumination power density is:

   (a) For an illuminance of not more than 80 Ix, 7.5 W/m^2
   (b) For an illuminance of more than 80 Ix and not more than 160 Ix, 9 W/m^2
   (c) For an illuminance of more than 160 !x and not more than 240 Ix, 10 W/m^2
   (d) For an illuminance of more than 240 Ix and not more than 320 Ix ,11 W/m^2
   (e) For an illuminance of more than 320 !x and not more than 400 Ix, 12 W/m^2
   (f) For an illuminance of more than 400 Ix and not more than 480 Ix, 13 W/m^2
   (g) For an illuminance of more than 480 Ix and not more than 540 Ix, 14 W/m^2
   (h) For an illuminance of more than 540 Ix and not more than 620 Ix, 15 W/m^2.

2. For illuminance levels greater than 620 Ix, the average light source efficacy must not be less than 80 Lumens/W.

22 ANNEXURE 3 - ILLUMINATION POWER DENSITY ADJUSTMENT FACTOR FOR A CONTROL DEVICE

TABLE J6.2b

Item	Description	Illumination power density adjustment factor
Lighting timer in accordance with Specification J6	For corridor lighting	0.7
Motion detector in accordance with J6	a) Where i) at least 75% of the area of a space is controlled by one or more motion detectors; or ii) an area of less than 200 m2 is switched as a block by one or more detectors	0.9
	b) Where up to 6 lights are switched as a block by one or more detectors.	0.7
	c) Where up to 2 lights are switched as a block by one or more detectors.	0.55
Manual dimming system (Note 1)	a) Where at least 75% of the area of a space, in other than a *sole-occupancy unit* of a Class 2 building or a Class 4 part, it controlled by manually operated dimmers.	0.95
	b) Where at least 75% of the area of a space, in a *sole-occupancy unit* of a Class 2 building or a Class 4 part, is controlled by manually operated dimmers.	0.85
Programmable dimming system (Note 2)	Where at least 75% of the area of a space is controlled by programmable dimmers.	0.85
Dynamic dimming system (Note 3)	Automatic compensation for lumen depreciation:	The design lumen depreciation factor of not less than:- i) for fluorescent lights, 0.9; or ii) for high pressure discharge lights, 0.8
Fixed dimming (Note 4)	Where at least 75% of the area is controlled by fixed dimmers that reduce the overall lighting level and the power consumption of the lighting.	% of full power to which the dimmer is set divided by 0.95.

Daylight sensor and dynamic lighting control device in accordance with **Specification J6** - dimmed or stepped switching of lights adjacent *windows*	a) Lights within the space adjacent to *windows* other than *roof lights* for a distance from the *window* equal to the depth of the floor to window head height.	0.5 (Note 5)
	b) Lights within the space adjacent to *roof lights.*	0.6 (Note 5)

Notes:

1. Manual dimming is where lights are controlled by a knob, slider or other mechanism or where there are pre-selected scenes that are manually selected.
2. Programmed dimming is where pre-selected scenes or levels are automatically selected by the time of day, photoelectric cell or occupancy sensor.
3. Dynamic dimming is where the lighting level is varied automatically by a I photoelectric cell to either proportionally compensate for the availability of daylight or the lumen depreciation of the lamps.
4. Fixed dimming is where lights are controlled to a level and that level cannot be adjusted by the user.
5. The *illumination power density* adjustment factor is only applied to lights controlled by that item. This adjustment factor does not apply to tungsten halogen or other incandescent sources.
6. A maximum of two other *illumination power density* adjustment factors for a control device can be applied to an area. Where more than one *illumination power density* adjustment factor (other than for room aspect) apply to an area, they are to be combined using the following formula:

   A x (B+[(1-B)/2])

   Where:

   A is the lowest applicable *illumination power density* adjustment factor; and
   B is the second lowest applicable *illumination power density* adjustment factor.