# SECTION J ENERGY EFFICIENCY REPORT BROJECT NAME: St Pauls A

St Pauls Anglican - Ministry Centre

**ADDRESS:** 

Street Carlingford NSW 2118

Moseley Street and Vickery

**CLIENT:** 

St Pauls Anglican

DOCUMENT CONTROL

#### DTS ENERGY EFFICIENCY DECLARATION

Pursuant to NCC A2.2 (vi) this report relies on supplied documentation for assessment with regards to adopting measures contributing to deemedto-satisfy of designed and built deliverables. This report documents the energy efficiency assessment undertaken on the proposed building work described herein to confirm compliance with the Section J – Energy Efficiency Provisions of the National Construction Code Volume One – Class 2 to Class 9 Buildings. It is our opinion that this project can be constructed to satisfy the requirements of the National Construction Code.



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# 1 - Introduction

The term Proposed Development in this report refers to Proposed St Pauls Anglican - Ministry Centre at Moseley Street and Vickery Street Carlingford NSW 2118.

This report presents the findings from the design assessment of the Proposed Development against the Deemed-to-Satisfy (DTS) requirements of Section J of the Building Code of Australia 2019, ENERGY EFFICIENCY.

The purpose of this report is to provide an assessment of the design plans and documentation for the Proposed Development and to satisfy the requirements of Local Government Area of the development for issuance of Construction Certificate for construction operations in the development site.

The scope of this report is limited to the design documentation referenced in Section 2 of this report and only covers Section J of BCA 2019 provisions.

# 2 - Referenced Documents

The following documents and design plans have been referenced in compilation of this report:

- 1. National Construction Code Series, Volume 1, Building Code of Australia 2019, Class 2 to Class 9 Buildings.
- 2. Architectural Plans listed below provided by "Derek Bebbington" and received by Certified Energy at 08/11/2021 12/11/2021.
  - DA00, Cover Sheet, Rev P03- Dated 08/11/2021.
  - DA01, Site Plan, Rev P03- Dated 08/11/2021.
  - DA02, Proposal Level 1, Rev P03- Dated 08/11/2021.
  - DA03, Proposal Level 2, Rev P03- Dated 08/11/2021.
  - DA04, Elevations, Rev P03- Dated 08/11/2021.
  - DA05, Section, Rev P03- Dated 08/11/2021.
  - Sk06, Elevation Dated 12/11/2021.
- 3. Email correspondence and response to information request received from James Stuart for the Proposed Development.

# 3 – Proposed Development

The Proposed Development in this report is construction of a two-storey building named "St Pauls Anglican - Ministry Centre" located at Moseley Street and Vickery Street Carlingford NSW 2118.

The development is a class 5 &b 9 building in BCA Climate Zone 5 according to BCA Climate Map for NSW.

The following construction elements are being proposed in the building design according to architectural plans and design documents referenced in this report:

Roof and Ceiling: Metal cladded roof.

External Walls: Brick veneer

Internal Walls: Plasterboard on studs.

Floors: Concrete slab on ground and suspended concrete slab.

Windows: Standard Aluminium framed windows.

Skylights: As per design plans provided.

Air Conditioning System: No design plans provided.

Lighting System: No design plans provided.

# 4 - Scope of Report (Building Envelope)

"<u>Envelope</u>", for the purposes of Section J, means the parts of the buildings fabric that separate a conditioned space or habitable room from-

- » the exterior of the building; or
- » 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.

#### **Conditioned Space Note:**

Legend: Building Envelope and scope of this report



Figure 1 - Building Envelope - Ground Floor Plan



Figure 2 - Building Envelope - Ground Floor Plan



Figure 3– Building Envelope - Sections

# 5 - Project Classification and Climate Zone

## BUILDING CLASS 5 & 9b



CLIMATE	COLOUR	SUBURB
ZONE 5	GREEN	CARLINGFORD

## **Climate Characteristics of Zone 5**

#### Warm Temperate

- Moderate diurnal (day-night) temperature range near coast to high diurnal range inland
- Four distinct seasons: summer and winter can exceed human comfort range, spring and autumn are ideal for human comfort
- Mild winters with low humidity
- · Hot to very hot summers with low to moderate humidity
- · Widely variable solar access and cooling breeze directions and patterns

## Key Design Objectives

Minimising heating and cooling energy use should be a primary design objective

# 6 - NCC Section J Compliance Provisions

This section analyses the current elements of the of Proposed Development design against provisions of Section J of the Building Code of Australia 2019, Energy Efficiency. In case of a non-complying element, advisory notes are provided to bring the building in compliance with Section J requirements.

A summary note of these provisions is provided in **Section 7-Conclusions** of this report that can be incorporated into specification blocks of architectural plans and, as a result, be deployed during construction. It is however the responsibility of the entity responsible for the submission of the design plans and documents to the council to ascertain each and every element of this report is clearly referenced and reflected on the submitted plans and documents.

## 6.1 – Part J1 Building Fabric

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part		
J1.	3 Roof and ceiling construction				
1	Metal cladding roof and plasterboard ceiling of the Proposed Development	Install minimum R3.22 m <sup>2</sup> .K/W insulation OR Provide a roof and ceiling system with total performance of R3.7 m <sup>2</sup> .K/W	Part J1.3(a) and Material Properties from Specification - J1.2		
2		The solar absorptance of the upper surface of the roof should not exceed 0.45	Part J1.3(b)		
J1.4	4 Roof lights	_			
3	Roof lights of the Proposed Development	Total roof light area should not exceed the 5% of total floor area.	Part 1.4(a)		
		Install roof lights with Total System U-value no more than 3.9 W/m².K and SHGC no more than 0.45	Part 1.4(b)		
J1.	5 Walls and Glazing				
4	External brick veneer walls of the Proposed Development	Install minimum R1.32 m <sup>2</sup> .K/W insulation OR Provide a wall-glazing construction system that not exceed the U-value of U2.0 W/ m <sup>2</sup> .K	Part 1.5(a), Façade Calculator and Material Properties from Specification - J1.2		
5	Plasterboard on stud internal walls adjacent to unconditioned spaces	Install minimum R1.26 m <sup>2</sup> .K/W insulation or provide an internal wall system with total performance of R1.83 m <sup>2</sup> .K/W.	Part 1.5(a), Façade Calculator and Material Properties from Specification - J1.2		
	All display glazing	Install windows with Total System U-value no more than 5.8 W/m².K	Part 1.5(b)		
6	All floor elevation windows GF	Install windows with Total System U-value no more than 5.2 W/m <sup>2</sup> .K and SHGC no more than 0.40	Part 1.5(a) and Façade Calculator		
7	All floor elevation windows FF	Install windows with Total System U-value no more than 5.8 W/m <sup>2</sup> .K and SHGC no more than 0.40 (North and South) and 0.26 (East)	Part 1.5(a) and Façade Calculator		
J1.	J1.5 Floors				
8	Concrete slab on ground.	No additional insulation required or provide a suspended slab system with total performance of R2.0 m <sup>2</sup> .K/W.	Part J1.6(a)(i) and Table J1.6 considering the material properties from specification - J1.2		
9	Suspended concrete slab.	Install minimum R1.20 m <sup>2</sup> .K/W insulation or provide a suspended slab system with total performance of R2.0 m <sup>2</sup> .K/W.	Part J1.6(a)(i) and Table J1.6 considering the material properties from specification - J1.2		

## 6.1.1 – Building Fabric Breakdown

	Metal Roof	R value [m²K/W]
1	Outdoor air film (7m/s)	0.03
2	Metal cladding	0.00
3	Roof airspace	0.21
4	Bulk insulation	-
5	Plasterboard gypsum (13mm, 880kg/m <sup>3</sup> )	0.08
6	Indoor air film	0.16
	Default System R value	R0.48
	Total system R value required	R3.7
	Additional insulation required for compliance	R3.22

	Brick Veneer	R value [m <sup>2</sup> K/W]
1	Outdoor air film	0.03
2	Masonry (115mm, 1950kg/m³)	0.15
3	Airspace (20 to 40mm)	0.17
4	Bulk insulation	-
5	Plasterboard gypsum (10mm, 880kg/m <sup>3</sup> )	0.06
6	Indoor air film	0.12
	Default System R value	R0.53
	Total system R value required (with factored thermal bridging)	R1.85
	Additional insulation required for compliance (with factored thermal bridging) *	R1.32

	Plasterboard on stud	R value [m <sup>2</sup> K/W]
1	Indoor air film	0.12
2	Plasterboard gypsum (13mm, 880kg/m <sup>3</sup> )	0.08
3	Airspace (20 to 40mm)	0.17
4	Bulk insulation	-
5	Plasterboard gypsum (13mm, 880kg/m <sup>3</sup> )	0.08
6	Indoor air film	0.12
	Default System R value	R0.57

Total system R value required (with factored thermal bridging)	R1.83
Additional insulation required for compliance (with factored thermal bridging) *	R1.26

	Concrete Slab on Ground	R value [m <sup>2</sup> K/W]
1	Indoor air film	0.16
2	Concrete floor slab (700mm)	0.48
3	Bulk insulation	-
4	Ground thermal resistance	1.68
	Default System R value	R2.32
	Total system R value required	R2.0
	Additional insulation required for compliance	•

	Suspended Concrete Slab	R value [m²K/W]
1	Indoor air film	0.16
2	Concrete floor slab (300mm)	0.20
3	Bulk insulation	-
4	Airspace	0.22
5	Plasterboard gypsum (10mm, 880kg/m <sup>3</sup> )	0.06
6	Indoor air film	0.16
	Default System R value	R0.80
	Total system R value required	R2.0
	Additional insulation required for compliance	R1.20

\*Alternatively, minimising the effect of thermal bridging without altering the existing wall thickness can be done via:

- Provide a thermal break to the metal stud Replace metal stud with less conductive type, such as timber.

## 6.3 - Part J3 Building Sealing

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
		Roof light in a conditioned space or habitable room in climate zone 4 to 8; must be sealed or capable of being sealed, and must be constructed with either;	
1	Roof lights	<ul> <li>An imperforate ceiling diffuser or the like installed at the ceiling or internal lining level, or</li> <li>A weatherproof seal, or</li> <li>A shutter system readily operated either manually, mechanically or electronically by the occupant.</li> </ul>	Part J3.3
2	Each edge of a door, all openable windows, or the like forming part of the envelope of a conditioned space	Provide air seals on all edges or provide windows complying with AS2047 for the Proposed Development except for fire doors, smoke doors, roller shutter doors roller shutter grille or other security door or device installed only for out-of- hours security	Part J3.4 (a)(b)
3	Entry doors to the building which leads to conditioned spaces greater than 50m <sup>2</sup>	Provide self-closing mechanism, revolving door or similar system	Part J3.4(d)
4	Exhaust fans of the conditioned areas of the Proposed Development if any	Must be equipped with a self-closing damper or similar	Part J3.5
5	Roofs, ceilings, walls, floors, windows frame, door frame and roof light frame of the conditioned areas of the Proposed Development	Must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions OR be sealed by caulking, skirting, architraves, cornices or similar elements unless required for smoke hazard management	Part J3.6
6	Evaporative coolers	All evaporative coolers serving heated space or, habitable room/public area in climate zones 4 to 8, must be fitted with a self-closing damper or the like	Part J3.7

## 6.4 – Part J5 Air-Conditioning and Ventilation Systems

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
1	No design plans provided	N/A	N/A

## 6.5 - Part J6 Artificial Lighting and Power

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part			
1	Lighting electrical power of the Proposed Development	Maximum design power allowed is 9996 Watts	Part J6.2			
2	Artificial light switch or other lighting control devices of Proposed Development	Artificial lighting of a room or space must be individually operated by a switch or other control device. An artificial lighting switch must be located in a visible position.	Part J6.3c			
3	Artificial lighting control for space greater than 250m <sup>2</sup>	95% of the light fittings must be controlled by a time switch in accordance with Specification J6 or an occupant sensing device such as a security key card reader that registers a person entering and leaving the building or a motion detector in accordance with Specification J6.	Part J6.3(d)			
4	Windows display lighting if installed	Part J6.4(b)				
5	External lighting of the Proposed Development if installed	Must be controlled by either a daylight sensor or a time switch which is capable of being pre- programmed for different times of the day on variable days. *	Part J6.5 (a)(i)			
6	If the total perimeter lighting load of the Proposed Development exceeds 100 Watts	Provide average light source efficacy not less than 60 Lumens/Watt or control with a motion detector device in accordance with Specification J6 except when providing emergency lighting in accordance with Part E4 of the BCA 2011. *	Part J6.5 (a)(ii)			
7	Façade lighting or signage lighting of the Proposed Development if installed	Must be provided with a separate time switch in accordance with Specification J6. *	Part J6.5a(ii)(C)			

# 6.6 – Part J7 Hot Water Supply and Swimming Pool and Spa Pool Plant

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part			
1	Hot water supply of the Proposed Development	Must be designed and installed in accordance with section 8 of AS/NZS 3500.4	Part J7.2			

## 6.7 – Part J8 Access for Maintenance and Facilities for Monitoring

	Building Element	Energy Efficiency Provisions	Corresponding BCA Part
1	For the Proposed Development with a floor area of more than 500 $m^2$	Provide facilities to record gas and electricity consumption	Part J8.3(a)

# 7 - Conclusions

Considering the design elements nominated on the Proposed Development provided by Derek Bebbington the following can be concluded for the Proposed Development to meet the Deemed to Satisfy requirements of Section J of the Building Code of Australia 2019 – Amendment 1, Energy Efficiency;

#### Part J1 – Building Fabric:

#### Roof & Ceiling:

- Install minimum R3.22 m<sup>2</sup>.K/W insulation or provide a ceiling and roof system with total performance of R3.7 m<sup>2</sup>.k/w for the roof of Proposed Development on top of conditioned areas.
- » All the upper surfaces of the roof should not exceed the solar absorptance of 0.45.

#### Roof lights:

- » Total roof light area should not exceed the 5% of total floor area.
- » Install roof lights with Total System U-value no more than 3.9 W/m<sup>2</sup>.K and SHGC no more than 0.45

#### Walls:

- » Install minimum R1.32 m<sup>2</sup>.K/W insulation OR Provide an external brick veneer wall system with total performance of R1.85 m<sup>2</sup>.K/W
- » Install minimum R1.26 m<sup>2</sup>.K/W insulation OR Provide an internal plasterboard wall system with total performance of R1.83 m<sup>2</sup>.K/W
- » Alternatively, minimising the effect of thermal bridging without altering the existing wall thickness can be done via:
  - Provide a thermal break to the metal studs.
  - Replace metal stud with less conductive type, such as timber.

#### Glazing:

» Provide the following minimum performance requirements for doors & windows of conditioned areas, adjacent to unconditioned spaces.

- All Ground floor elevation windows; Install windows with Total System U-value no more than 5.2 W/m2.K and SHGC no more than 0.40

• All First floor elevation windows; Install windows with Total System U-value no more than 5.8 W/m2.K and SHGC no more than 0.40 (North and South) and 0.26 (East)

#### Flooring:

- » No additional insulation required OR provide a concrete on ground flooring system with total performance of R2.0 m2.K/W.
- » Install minimum R1.20 m2.K/W insulation OR provide a suspended concrete slab flooring system with total performance of R2.0 m2.K/W.

Insulations:

» Installed insulation must comply with AS/NZS 4859.1 and be installed in such a way to meet the following requirements:

• The insulation must abut or overlap adjoining insulation other than at supporting members such as studs, noggins, joists, furring channels and the like where the insulation must be against the member.

• The installed insulation must form a continuous barrier with ceiling, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier while does not affect the safe and effective operation of a service or fitting.

• The bulk insulation must maintain its position and thickness other than when it is compressed between cladding and supporting members, water pipes, electrical cabling or the like.

• Reflective insulation must be installed with the necessary airspace to achieve the required R Value and be adequately supported by framing members. Each adjoining sheet of role membrane must be overlapped by not less than 50mm or tapped together. It must be closely fitted against any penetration, door or window opening.

#### Part J3 – Building Sealing:

- » Roof lights in a conditioned space or habitable room in climate zone 4 to 8; must be sealed or capable of being sealed, and must be constructed with either; an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level, or a weatherproof seal, or a shutter system readily operated either manually, mechanically or electronically by the occupant.
- Provide air seals on all edges or provide windows complying with AS 2047 for all external doors and openable windows of the Proposed Development servicing conditioned areas except fire doors, smoke doors, roller shutter doors roller shutter grille or other security door or device installed only for out-of-hours security.
- » Provide self-closing mechanism, revolving door or similar system to conditioned spaces greater than 50m<sup>2</sup>
- » Exhaust fans of the Proposed Development serving conditioned areas must be equipped with a self-closing damper or similar.
- » Roofs, ceilings, walls, floors, windows frame, door frame and roof light frame of conditioned areas of the Proposed Development must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions OR be sealed by caulking, skirting, architraves, cornices or similar elements unless required for smoke hazard management.
- » Air infiltration seal for bottom edge of external swing doors of the Proposed Development must be a draft protection device and for other edges of an external door or the edges of an openable window or other such openings may be a foam or rubber compression strip, fibrous seal or the like.
- » All evaporative coolers serving heated space or, habitable room/public area in climate zones 4 to 8, must be fitted with a self-closing damper or the like.

#### Part J5 – Air Conditioning & Ventilation:

» Has not assessed as design details not provided.

#### Part J6 – Artificial Lighting & Power:

- » Maximum design lighting power allowed for the Proposed Development is 9996 Watts.
- » Artificial lighting of a room or space must be individually operated by a switch or other

control device. An artificial lighting switch must be located in a visible position. Artificial light switch or other lighting control devices of the Proposed Development must control lighting of no more than 250 m<sup>2</sup> of area.

- » For space greater than 250m<sup>2</sup>, 95% of the light fittings must be controlled by a time switch in accordance with Specification J6 or an occupant sensing device such as a security key card reader that registers a person entering and leaving the building or a motion detector in accordance with Specification J6.
- » Windows display lighting if installed must be controlled separately from other display lighting.
- » External lighting of the Proposed Development if installed must be controlled by either a daylight sensor or a time switch which is capable of being pre-programmed for different times of the day on variable days.
- » Façade lighting or signage lighting of the Proposed Development if installed must be provided with a separate time switch.
- » All lighting and power control devices of the Proposed Development including timers, time switches, motion detectors and daylight control devices must follow the guidelines and specifications outlined in Appendix D Artificial Lighting and Power Notes of this report.

#### Part J7 – Heater Water Supply & Swimming Pool & Spa Pool Plant:

» Hot water supply of the Proposed Development must be designed and installed in accordance with section 8 of AS/NZS 3500.4

#### Part J8 – Facilities for Energy Monitoring:

» For the Proposed Development provide facilities to record gas and electricity consumption.

# 8 - Appendix

This section of the report demonstrates the results of employing BCA Calculators for Glazing, Lighting Power, and other referenced calculations and plans in this report.

## 8.1 – Appendix A – Façade Calculator



АВСВ Façade 個 Report Calcula Project Summary The summary below provides an overview of where compliance has been achieved for Specification J1.5a -Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Apects). Compliant Solution = Non-Compliant Solution = Date 19/11/2021 Method 1 Method 2 All Name Ishan Jain North Ι East South I West Wall-glazing U-Value (W/m².K) 1.95 1.77 2.03 2.00 Company Certified Energy 2.17 Solar Admittance 0.05 0.06 0.10 0.08 Position ESD Consuultant AC Energy 56 Building Name / Address St Pauls Anglican Moseley Street and Vickery Street Carlingford NSW 2118 Method 1 Wall-glazing U-Value Solar Admittance 2.5 0.15 **Building State** 2.0 ¥.1.5 ₩ 1.0 0.10 NSW ¥s 0.05 Climate Zone 0.5 Climate Zone 5 - Warm 0.0 0.00 temperate North East South West North East South Wes Proposed Design ----- DTS Reference Proposed Reference ----- DTS Reference Building Classification Wall-glazing U-Value - ALL AC Energy Value Class 5 - office building 2.5 150 Storeys Above Ground Method 2 2.0 ¥ 1.5 ₩ 1.0 AC Ever So 50 Tool Version 1.1 (April 2020) 0.5 0.0 2.00 107 0 ■Proposed Design ©DTS Reference 

Project Details

	North	East	South	West		
Glazing Area (m <sup>2</sup> )	35.96	19.6704	43.91	37.5		
Glazing to Façade Ratio	28%	20%	32%	29%		
Glazing References	Ext Win W1 N Ext Win W2-4 N Ext Door D1,D3 N Ext Win W5 N Ext Win W9 N	ExtWin W6-7,D2 E ExtWin W8 E	Ext Door D4-5 S Ext Win W10 S Ext Win W11 S Ext Win W12 S	Ext Door D6 W Ext Win W19 W Ext Win W13-17 W Ext Win W18 W Ext Win W20 W		
Glazing System Types	Fixed Casement	sement Fixed Casement C		Casement Fixed		
Glass Types	Single glazing	Single glazing	Single glazing	Single glazing		
Frame Types	Aluminium	Aluminium	Aluminium	Aluminium		
Average Glazing U-Value (W/m <sup>2</sup> .K)	5.20	5.20	5.20	5.20		
Average Glazing SHGC	0.40	0.40	0.40	0.40		
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal		
Wall Area (m²)	94.25	78.0596	91.52	89.9		
Wall Types	Wali	Wall	Wall	Wall		
Methodology			Wall			
Wall Construction	Ext Brick wall Int Plasterboard	Ext Brick wall Int Plasterboard Existing Walls	Ext Brick wall Int Plasterboard	Ext Brick wall Int Plasterboard		
Wall Thickness	0	0	0	0		
Average Wall R-value (m <sup>2</sup> .K/W)	1.40	1.10	1.40	1.40		
Solar Absorptance	0.6	0.6	0.6	0.6		
-						

АВСВ Façade 個 Report Calcul Project Summary The summary below provides an overview of where compliance has been achieved for Specification J1.5a -Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Apects). Compliant Solution = Non-Compliant Solution = Date 15/11/2021 Method 1 Method 2 | All Name Shubham Kadam North Ι East South I West Wall-glazing U-Value (W/m².K) 2.83 1.59 0.71 1.94 Company Certified Energy Solar Admittance 0.12 0.04 0.08 Position ESD Consultant AC Energy 48 Building Name / Address St Pauls Anglican Moseley Street and Vickery Street Carlingford NSW 2118 Method 1 Wall-glazing U-Value Solar Admittance 3.0 2.5 ¥ 2.0 ≝ 1.5 1.0 0.15 **Building State** 0.10 NSW 5 0.05 Climate Zone 0.5 0.04 0.71 Climate Zone 5 - Warm 0.00 temperate North East South West North East South West Proposed Design ----- DTS Reference Proposed Reference ----- DTS Reference Building Classification Wall-glazing U-Value - ALL AC Energy Value Class 9b - schools 2.5 80 Storeys Above Ground Method 2 2.0 ¥ 1.5 ₩ 1.0 /6 60 Jau 40 Tool Version 1.1 (April 2020) ¥ 20 0.5 0.0 2.00 59 0 ■Proposed Design ©DTS Reference ■Proposed Design □DTS Reference

Project Details

	North	East	East South			
Glazing Area (m <sup>2</sup> )	57.834	17.28	46.074	0		
Glazing to Façade Ratio	42%	16%	34%	0%		
Glazing References	Ext Win W1-7 N Ext Win W8 N Ext Win W10-11 N N S Ext Windows	ExtWin W9 E ExtWin 23 E	Ext Win W12 S Ext Win W13- 17 S Ext Win 24 S N S Ext Windows			
Glazing System Types	Fixed Casement	Fixed Casement	Fixed Casement			
Glass Types	Single glazing	Single glazing	Single glazing			
Frame Types	Aluminium	Aluminium	Aluminium	Aluminium		
Average Glazing U-Value (W/m <sup>2</sup> .K)	5.80	5.80	5.80			
Average Glazing SHGC	0.40	0.26	0.40	0.00		
Shading Systems	Horizontal Device	Horizontal Device	Horizontal Device	Horizontal Device		
Wall Area (m²)	81.426	93.27	88.896	125.07		
Wall Types	Wall	Wall	Wall	Wall		
Methodology			Wall			
Wall Construction	Ext Brick veneer wall Int Stud Plasterboard	Ext Brick veneer wall Int Stud Plasterboard Existing Walls	Ext Brick veneer wall Int Stud Plasterboard	Ext Brick veneer wall Int Stud Plasterboard		
Wall Thickness	0	0	0	0		
Average Wall R-value (m <sup>2</sup> .K/W)	1.40	1.24	1.40	1.40		
Solar Absorptance	0.6	0.6	0.6	0.6		

## 8.2 – Appendix B – Lighting Calculator



Class 3 and 5-9 buildings

Main Menu

ABCE

Multiple Lighting Systems Caloulator

Help

Building name/description Classification St Pauls Carlingford Ministry Centre, Moseley St and Vickery St, Carlingford, NSW Class 5 Number of rows preferred in table below 39 (as currently displayed) Light Colour Adjustment Adjustment Factor Two SATISFIES PART J6.2 Adjustment Factor One Illuminance Factors Floor Floor to area of Perimeter of the Description ceiling Designed Recommended Adjustment Adjustment Design the space Factor One Illumination Lux Level Factor Two height Lux Level Space Lighting System space Light Colour Light Colour System Illumination Power Load Share of % of Dimming Illuminance Dimming Illuminance Adjustment Adjustment Power Load These columns do not Adjustment Factors Adjustment % Area Turndown % Area Turndown Aggregate Factors represent a requirement of the Factor One Factor Two Allowance Allowance Used NCC and are suggestions only Office - artificially lit to an ambient 9.1 m<sup>2</sup> 12 m 2.9 m 1 W 69 W 3% of 0% 1 L1 Office 1 level of 200 lx or more Office - artificially lit to an ambient 2 L1 Office 2 9.2 m<sup>2</sup> 12 m 2.9 m 1 W 69 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 3 13 m 2.9 m 1 W L1 Office 3 10.6 m<sup>a</sup> 81 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 4 12 m 2.9 m 1 W L1 Office 4 9.0 m<sup>2</sup> 69 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 5 L1 Office 5 9.0 m<sup>2</sup> 12 m 2.9 m 1 W 69 W 3% of 0% level of 200 ix or more Office - artificially lit to an ambient 6 2.9 m 1 W 11 Office 6 90 m<sup>2</sup> 12 m 3% of 0% 69 W level of 200 lx or more Office - artificially lit to an ambient 7 L1 Office 7 9.0 m<sup>2</sup> 12 m 2.9 m 1 W 69 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 3% of 0% 8 L1 Office 8 9.0 m<sup>2</sup> 12 m 2.9 m 1 W 69 W level of 200 lx or more Office - artificially lit to an ambient 9 L1 Office 9 9.0 m<sup>2</sup> 12 m 2.9 m 1 W 69 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient level of 200 lx or more 10 L1 Office 10 9.0 m<sup>2</sup> 12 m 2.9 m 1 W 69 W 3% of 0% Office - artificially lit to an ambient 11 L1 Office 11 90 m<sup>2</sup> 12 m 29m 1 W 69 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 12 L1 Office 12 9.0 m² 12 m 2.9 m 1 W 69 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 13 L1 Meeting 13.6 m<sup>a</sup> 15 m 2.9 m 1 W 100 W 3% of 0% level of 200 lx or more Office - artificially lit to an ambient 14 L1 Reactor 16.3 m<sup>2</sup> 16 m 2.9 m 1 W 118 W 3% of 0% level of 200 lx or more 1 W 15 L1 Board room 2.9 m 28.8 m<sup>3</sup> 22 m Board room and conference room 222 W 3% of 0% Service area, cleaner's room and the 16 L1 Utilities 15.2 m³ 16 m 2.9 m 1 W 38 W 3% of 0% like 23.4 m<sup>3</sup> 2.9 m 1 W Kitchen and food preparation area 147 W 3% of 0% 17 L1 Kitchen 20 m Toilet, locker room, staff room, rest 1 W 18 L1 WC 12.8 m<sup>3</sup> 16 m 2.9 m 63 W 3% of 0% room and the like School - general purpose learning 19 L1 year 9 Room 30.0 m<sup>2</sup> 22 m 2.9 m 1 W 205 W 3% of 0% areas and tutorial rooms 20 L1 Year 10 Room 29.1 m<sup>2</sup> School - general purpose learning 22 m 2.9 m 1 W 198 W 3% of 0% areas and tutorial rooms L1 Munchkins School -- general purpose learning 21 52.2 m<sup>3</sup> 29 m 2.9 m 1 W 331 W 3% of 0% room areas and tutorial rooms 22 10 m 2.9 m 1 W 6.6 m<sup>3</sup> 17 W 3% of 0% L1 DrgID Storage 2.9 m 1 W 23 28 W L1 Lift 5.2 m<sup>2</sup> 9 m Lift cars 3% of 0% 42 m 2.9 m 1 W 24 L1 Foyer 59.0 m<sup>3</sup> Corridors 3% of 0% 171 m 25 322.7 m<sup>3</sup> 2.9 m 1 W 2242 W 3% of 0% L1 Corrido Corridors School - general purpose learning 26 L2 7 Year Room 102.5 m<sup>2</sup> 40 m 3.3 m 1 W 607 W 3% of 0% areas and tutorial rooms



Calculator

National Construction Non-residential Lighting

Class 3 and 5-9 buildings

Main Menu

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ABCB

Multiple Lighting Systems Calculator

Help

	Building name/description							Classification									
			St Pauls (	Carlingford	Ministry Centre	, woseley St and vickery St,	Carlingford, NSVV				Class 5						
	Number	of rows p	preferred in table	below	39	(as currently displayed)											
		Floor		Eleor to			Illuminance	Adjustr	ment Facto	r One	Adjustn	nent Factor	Two	Light Colour Fac	Adjustment tors	SATISFIES	PART J6.2
	Description	area of the space	Perimeter of the space	ceiling height	Design Illumination Power Load	Space	Designed Recommended Lux Level Lux Level These columns do not represent a requirement of the NCC and are suggestions only	Adjustment Factor One Adjustment Factors	Dimming % Area	Illuminance Turndown	Adjustment Factor Two Adjustment Factors	Dimming % Area	Illuminance Turndown	Light Colour Adjustment Factor One	Light Colour Adjustment Factor Two	System Illumination Power Load Allowance	Lighting System Share of % of Aggregate Allowance Used
ID																	
27	L2 8 Year Room	102.5 m²	41 m	3.3 m	1 W	School - general purpose learning areas and tutorial rooms										615 W	3% of 0%
28	L2 9 Year Room	150.5 m²	49 m	3.3 m	1 W	School - general purpose learning										836 W	3% of 0%
29	L2 Breakout	33.7 m²	26 m	3.3 m	1 W	School - general purpose learning										241 W	3% of 0%
30	L2 WC	13.3 m <sup>2</sup>	16 m	3.3 m	1 W	Toilet, locker room, staff room, rest										69 W	3% of 0%
31	12 Store 1	4.0 m <sup>2</sup>	15 m	33m	1.W	room and the like			_							11 W	2% of 0%
32	12 Store 2	2.3 m <sup>2</sup>	9 m	3.3 m	1 W	Storage			_							6W	3% of 0%
33	L2 Store 3	7.0 m <sup>2</sup>	28 m	3.3 m	1 W	Storage										21 W	3% of 0%
34	L2 3-6 Year Room1	42.4 m <sup>2</sup>	27 m	3.3 m	1 W	School - general purpose learning areas and tutorial rooms										289 W	3% of 0%
35	L2 3-6 Year Room2	69.0 m²	33 m	3.3 m	1 W	School - general purpose learning areas and tutorial rooms										438 W	3% of 0%
36	L2 3-6 Year Room3	33.0 m²	22 m	3.3 m	1 W	School - general purpose learning areas and tutorial rooms										229 W	3% of 0%
37	L2 3-6 Year Room4	35.3 m²	24 m	3.3 m	1 W	School - general purpose learning										245 W	3% of 0%
38	L2 Store 4	10.2 m <sup>3</sup>	13 m	3.3 m	1 W	Storage										26 W	3% of 0%
39	L2 Foyer	172.2 m <sup>2</sup>	137 m	3.3 m	1 W	Corridors										1367 W	3% of 0%
			[	Total	39 W										Total	9996 W	

if inputs are valid

National Construction Code

Calculator

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THIS LIGHTING CALCULATOR

By accessing or using this calculator, you agree to the billowing. While care has been fasten in the preparation of this calculator, it may not be complete or up-to-date. You can ensure that you are using a complete and up-bodate version by checking the Australian Building Codes Board, the Commonwealth of Australian and Biales and Terr tories of Australian and Diales and Terr tories of Australian and Diales and Terr tories of Australian Building Codes Board, the Commonwealth of Australian Building Codes Board, the Commonwealth of Australian and Biales and Terr tories of Australian and Diales and Terr tories of Australian Building Codes Board, the Commonwealth of Australian and Building Codes Board, the Commonwealth of Australian Australian Australian Sub Commonwealth of Australian Building Codes Board, the Commonwealth of Australian Building Codes Board, the Commonwealth of Australian Building Codes Board and tories of this publication or any information water and by the Commonwealth by the Commonwealth of Australian Building Codes Board and tories of this publication or any information water and austrace and austrace (Terr tories for Australian Building Codes Board and tories for any puppeer or completeness of this publication or any information water and australian and water and austrace (Terr tories for Australian Building Codes Board and tories for any puppeer or completeness of this publication or any information sources, and a i such representations and water and eastrace and eastrace (Terr tories for Australian Building Codes Board and tories for Board and tories for any puppeer or completeness of this publication or any information so

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## 8.3 – Appendix C – Insulation Mark-Up

LEGEND

- R1.85 EXTERNAL BRICK VENEER WALLS
- R1.83 INTERNAL PLASTERBOARD WALLS
- R3.7 METAL ROOF
- R2.0 CONCRETE SLAB ON GROUND
- R2.0 SUSPENDED CONCRETE SLAB



Figure 4 - Insulation Mark-Up - Ground Floor Plan



Figure 5 - Insulation Mark-Up - Ground Floor Plan



Figure 6- Insulation Mark-Up - Sections

## 8.4 – Appendix D – Artificial Lighting & Power Notes

- 1- 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<sup>2</sup> 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 5 minutes and not more than 15 minutes unless it is reset; and
    - ii. without interruption if the timer is reset.
- 2- Time switch;
  - a. A time switch must be capable of switching on and off electric power at variable preprogrammed 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
      - 1. 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
      - 2. 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.
- 3- 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
      - 1. an area of 100 m<sup>2</sup>; and
      - 2. 95% of the lights in spaces of area more than 25 m<sup>2</sup>; and
    - iv. be capable of maintaining the artificial lighting when activated
      - 1. for not less than 5 minutes and not more than 15 minutes unless it is reset; and
      - 2. 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

- 1. a person before they have entered 1 m into the space; and
- 2. movement of 500 mm within the useable part of the space; and
- ii. not control more than
  - 1. in other than a carpark an area of 500 m<sup>2</sup> with a single sensor or group of parallel sensors; and
  - 2. 75% of the lights in spaces using high intensity discharge; and
- iii. be capable of maintaining the artificial lighting when activated
  - 1. for a maximum of 30 minutes unless it is reset; and
  - 2. without interruption if the motion detector is reset by movement; and
- iv. 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
    - 1. twice the mounting height; or
    - 2. 80% of the ground area covered by the light's beam; and
      - ii. not control more than five lights; and
      - iii. be operated in series with a photoelectric cell or astronomical time switch so that the light will not operate in daylight hours; and
      - iv. be capable of maintaining the artificial lighting when the switch is on for a maximum of 10 minutes unless it is reset; and
      - v. have a manual override switch which is reset after a maximum period of 4 hours.
- 4- 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
      - 1. be capable of having the switching level set point adjusted between 50 and 1000 Lux; and
      - 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; and
      - 3. 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
        - 5- continuously down to a power consumption that is less than 50% of full power; or
        - 6- in no less than 4 steps down to a power consumption that is less than 50% of full power.
  - a. 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.

# 9 - Disclaimer

#### **Recommendations:**

Based on the information available on the supplied drawings and data, I am of the opinion that there is nothing that should prevent this project from compliance with the requirements of the Building Code of Australia.

This report is based on details available at the time of writing. Selected contractors and other parties contributing to the scope of the works should confirm that their supplied work will be in compliance with the BCA/NCC. It is advisable that this confirmation be requested prior to the commencement of construction. Final certification of BCA/NCC compliance at completion of works should be obtained to aid final certifier's approval.

#### Dimensions:

The dimensions used in this report are scaled from the supplied project documents. There may be some minor variation between the scaled dimensions, the dimensions on the window schedule and the actual dimensions on site.

Completed by:



Ishan Jain

B.Arch M.ArchSc (Sustainable Design)

