



NCC Volume 1 Section J Energy Efficiency Review

For The

Proposed Refurbishment Work To Miramare Gardens – Function Centre

Located At

**48 Myoora Road,
Terrey Hills NSW 2084**

**Revision 4
March 2019**

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1. Introduction

Peter O'Donnell & Associates Pty Ltd has been commissioned to prepare an Energy Efficiency Report for the proposed refurbishment works to Miramare Gardens Function Centre at 48 Myoora Road, Terrey Hills, NSW in accordance with the conditions set out in Section J of the National Construction Code 2016 Volume 1 (NCC).

1.1 Methodology

The aim of this review is to compare the current preliminary design for the proposed refurbishment building works with the requirements of NCC Volume 1 2016 section J requirements and to make recommendations where the current design does not meet these requirements. This review does not cover the existing building which is not changed by the proposed refurbishment works.

This proposed redevelopment is located in Terrey Hills, which is a suburb located in North Eastern Sydney in the Northern Beaches Council area therefore this report will discuss the relevant Deemed-to-Satisfy Provisions within section J of the NCC Volume 1 for a class 9b building classifications in climate zone 5.

The process has been an interactive one to ensure that a comprehensive and complementary package of solutions is implemented into the final building proposal.

1.2 Sources Of Information

The analyses conducted as part of this review is based on the following documentation provided to Peter O'Donnell & Associates by Squillace Architects & Interior Designers.

Draw #	Title	Author	Rev #	Issue Date
DA-001	Architectural - Cover Sheet, Drawing List, Site Location Plan	Squillace	P4	4/2/2019
DA-002	Architectural - Site Analysis Plan	Squillace	P4	4/2/2019
DA-030	Architectural - Existing Lower Ground Floor Plan & Demolition Plan	Squillace	P4	4/2/2019
DA-031	Architectural - Existing Ground Floor Plan & Demolition Plan	Squillace	P4	4/2/2019
DA-099	Architectural - Floor Plan Lower Ground Level	Squillace	P4	4/2/2019
DA-100	Architectural - Floor Plan Ground Level	Squillace	P4	4/2/2019
DA-102	Architectural - Roof Plan	Squillace	P4	4/2/2019
DA-201	Architectural - Elevations Sheet 1	Squillace	P4	4/2/2019
DA-202	Architectural - Elevations Sheet 2	Squillace	P4	4/2/2019
DA-203	Architectural - Elevations Sheet 3	Squillace	P4	4/2/2019
DA-204	Architectural - Elevations Sheet 4	Squillace	P4	4/2/2019
DA-205	Architectural - Elevations Sheet 5	Squillace	P4	4/2/2019
DA-301	Architectural - Section Sheet 1	Squillace	P4	4/2/2019
DA-600	Architectural - Landscape Open Plan	Squillace	P4	4/2/2019
A-1031	Architectural - RFC – Part A	Squillace	P2	20/2/2019
A-1032	Architectural - RFC – Part B	Squillace	P2	20/2/2019
A-1033	Architectural - RFC – Part C	Squillace	P2	20/2/2019
WD940	Architectural - Lighting Schedule	Squillace	P2	
M1.01	Mechanical Services - Cover Sheet, Legend & Notes	ACOR Consultants	P1	8/3/19
M2.01	Mechanical Services - Demolition Layout	ACOR Consultants	P1	8/3/19
M2.02	Mechanical Services - Air Conditioning & Ventilation Layout	ACOR Consultants	P1	8/3/19
M2.03	Mechanical Services - Roof Platform Layout	ACOR Consultants	P1	8/3/19
M2.04	Mechanical Services - Water & Air Schematic Diagrams and Details	ACOR Consultants	P1	8/3/19
M3.01	Mechanical Services Equipment Schedules	ACOR Consultants	P1	8/3/19

Note: No design calculations have been undertaken in this analysis. All design figures and equipment selection have been taken from the project drawings, listed above.

2. Building Thermal Properties

2.1 Building Fabric

The refurbishment works of this building does not have any proposed new walls or roof areas in the external facade. The only work to be completed on the external façade is cosmetic finishes to existing walls, therefore NCC volume 1 section J1 does not apply to this proposed refurbishment work.

2.2 External Glazing

The current proposed refurbishment works requires existing window to be replaced. These replaced windows were evaluated in reference to the requirements of the NCC Volume 1 section J2 glazing calculations. The table below outlines the recommended glazing selections, which has been added to the current design to meet the required NCC Volume 1 section J2 standards.

Windows	Window Shading Changes	Recommended Glazing Properties	
		U-Value	SHGC
D01-GF, D02-GF, W02-GF, W03-GF, W04-GF, W05-GF		3.1	0.36
W01-GF	Operable shading device is installed to the external part of the window in accordance to NCC Volume 1 Section J2.5(b)	3.1	0.36
W01-LG, W02-LG, W03-LG, W04-LG, D01-LG, D02-LG, D03-LG, D04-LG, D05-LG, D03-GF,		5.6	0.36
W06-GF, W07-GF, W08-GF, W09-GF, W10-GF,	Operable shading device is installed to the external part of the window in accordance to NCC Volume 1 Section J2.5(b)	5.6	0.36

All the building overhangs and eaves are to remain as per drawings except where mention in the above table. All operable pergolas are to operate automatically in response to the level of solar radiation.

Refer to the Appendix 1 for NCC Volume 1 glazing calculator output and calculation assumptions.

2.3 Building Sealing

The sealing of the proposed building refurbishment works has been compared against requirements set out in section J3 of the NCC Volume 1. The table below outlines recommendations which should be in place with the current building refurbishment works to lift the current design to the minimum requirement of this section, where needed.

NCC Volume 1 Clause	Project Performance Requirement	Current Design Details	Required Changes
J3.1 - Application	Air Conditioned parts of the building in climate zone 5 applies for this section.		
J3.2 - Chimneys & Flues	Not Applicable	No chimneys or flues located in the project	
J3.3 - Roof Lights	Not Applicable	Old roof lights to be removed and no new roof lights located in the air condition parts of the building	
J3.4 - External Windows & Doors	Weather seal all new external opening to air condition space including Windows to comply with AS2047 and doors to be sealed with foam, fibrous seal or compressed rubber and the bottom edge of the external swing doors must be fitted with a draft protection device. The entry doors to the building must have self-closing device installed.	Included in current design	No further action required
J3.5 - Exhaust Fans	Not Applicable	No new bathroom and kitchen exhaust fans to be installed within the project. Existing exhaust system are to remain the same and do not form part of this refurbishment work.	
J3.6 - Construction of roofs, wall & floor	Mechanically heated and cooled rooms to have internal lining system to be close fitting to ceiling wall and floor junctions including sealing by caulking, skirting, architraves, cornices etc	This should be included in the original building	Check the current status of these seals and remediated where needed
J3.7 - Evaporative Coolers	Not Applicable	No evaporative coolers in this project	

3. Building Services

3.1 Air Conditioning & Ventilation Systems

The following new mechanical systems have been included in the proposed alteration to the existing air condition and ventilation system within the building:

- 6 off new air handling units (AHU) to be installed in the Main Function Room (each unit has total cooling capacity of 73kw and air flow of 3,400 l/s).
- 3 off new reverse cycle package air conditioning system to service Entry / Bar area and lower ground (LG) Lobby (each unit has total cooling capacity of approximately 90kw and air flow of 5,000 l/s).
- 1 off new gas fired heating hot water boiler (thermal capacity of 225kW, hot water flow rate of 3.05 l/s and maximum natural gas consumption 1150 MJ/hr).
- 1 off hot water circulation pump with flow rate of 3.5 l/s at estimated pressure head of 120 kPa.
- Minimum replacement of existing chilled and heating water pipework.
- Minimum replacement of existing air diffusers and ductwork.

All other air conditioning and ventilation equipment is to remain the same as the original systems. (Include chillers, chilled water pumps, exhaust system and air supply systems).

The table below shows the general requirements of NCC Volume 1 section J5 for the proposed new mechanical systems within the development. (The requirements table below must not adversely affect the proposed redeveloped building to satisfy Part E2, Part E3 and Part E4 of NCC Volume 1.)

NCC Volume 1 Clause Number and description (only applicable options are shown where alternatives exist)		Project Performance
J5 - Air Conditioning and Ventilation		
J5.2	(a)i)A) Air Conditioning systems must be capable of being de-activated when building or part of building they serve is unoccupied.	The air conditioning Air Handling Units and Package Units are to be controlled to be turned on/off as desired. Chillers, boilers and circulating pumps are to be program to be switched off when not required.
	(a)i)B) Air Conditioning systems serving multiple heating and cooling zones.	All air conditioning system serving multiple heating and cooling zones are to comply with Section J5.2(a)(i)(B) of NCC Volume 1
	(a)i)C) Air Conditioning systems requiring outdoor air economy cycle.	All new air handling units and package air conditioning units having a capacity over 35kW _r will be required to have an outdoor air economy cycle. This economy cycle controls should take into account minimum fresh air requirements for all areas of the building.
	(a)i)D) Air conditioning systems with multiple water heaters, chillers or coils.	Mechanical schematic drawing show isolation valves on all major new air conditioning equipment so they can be isolated when not required.
	(a)i)E) Air conditioning systems which supply variable air quantities.	Where applicable air handling units which supply variable air quantities must have variable speed fans.
	(a)i)F) Class 3 interlock with doors etc	Not Applicable for development.
	(a)ii) Motorised outside air and return air dampers to close on deactivation	All motorised dampers on air handling units and package air conditioning units must automatically close when this equipment is not operating.
	(b) Air Conditioning System Fans	New air conditioning fans must comply with Specification J5.2a of NCC Volume 1
	(c) Pumped heating and Cooling systems	The heating water pump must comply with table J5.2 in section J5.2 of NCC Volume 1
J5.3	(d) Air Conditioning and Heating System's Insulation	Ductwork Insulation must comply with Specification J5.2b of NCC Volume 1 All new pipework, vessel, heat exchanges and tanks containing heating or cooling fluids will need to be insulation in accordance with Specification J5.2c of NCC Volume 1 except where this is covered by the systems MEPS.
	(e) Space Heating	Heating strategy and equipment must comply with Specification J5.2d of NCC Volume 1
	(f) Energy Efficiency Ratio for new package air conditioning units with capacity over 65kW _r	New package air conditioning units must comply with table 2b in Specification J5.2e of NCC Volume 1
J5.4	(g) Times Switches (new air conditioning /heating system with capacity over 10kW)	Currently new air conditioning and ventilation system controls are not specified – These system need to be controlled by a time clock in accordance NCC Volume 1 J6 Specification
J5.3	Mechanical Ventilation System within Air Condition and/or Heated Space	Not applicable as all ventilation fans are part of the air conditioning's air handling units and package units which is specified J5.2 of this table.
J5.4	Miscellaneous Exhaust Systems >1000L/s	No applicable systems proposed.

3.2 Artificial Lighting & Power

The table below shows the results of the comparison between the current proposed preliminary refurbishment lighting design and NCC Volume 1 section J6 requirements.

NCC Volume 1 Clause Number and description (only applicable options are shown where alternatives exist)		Project Performance
J6 - Artificial Lighting		
J6.2	(a) Class 2 or Part 4 SOU Lamp Power Density or Illumination Power Load (requires electronic ballasts etc) (b) Other Classes - Illumination Power Load	(a) Not applicable (b) Complies based on all the assumptions detailed in the “Interior Artificial Lighting - Illumination Power Load Calculation” section in Appendix 2 of this report have been met. – The proposed design illumination power load with all the assumption included is 27.8kW which is less than the combined Illumination Power Load allowance for the building’s internal lighting systems of 27.9kW. (refer to the results table at the end of this report for details)
J6.3	- (a) Each room to have light switch or other control device. - (b) Class 3 Occupant activated device - (c) i) – suitable location for switch - (c) ii) Light switch should not operate more than 250m ²	a) None Shown – these lighting controls need to be met. b) Not applicable c) i) None Shown – these lighting controls need to be met. c) ii) None Shown – these lighting controls need to be met.
	- (d) Time switch or occupancy sensors to be included for 95% of lighting fittings in areas over 250m ²	None shown – for areas over 250m ² 95% of the lighting will be required to be controlled by a Time switch or occupancy sensors in accordance NCC Volume 1 J6 Specification
	- (e) Class 5, 6 & 8 >250m ² Separate switching for Lighting adjacent to windows	Not applicable
J6.4	Decorative and display lighting. Separate controls for each zone and Time switch for >1kW	None shown – If Included at a later date this lighting’s controls will be required to be separated from all other lighting. If this lighting’s power load is >1kW then this lighting will need to be controlled by a time clock to NCC Volume 1 J6 Specification.
J6.5	- (i) External Perimeter Lighting be controlled by daylight sensor or time switch	None shown – Perimeter lighting shall be time-switch and/or daylight sensor controlled as per NCC Volume 1 specifications.
	- (ii) Perimeter Light source efficacy >= 60Lumens/W or motion sensor controlled	External perimeter lighting consists of LED lamps which complies with a light source efficacy >60L/W as per NCC Volume 1 specifications.
	- (iii) Decorative façade or signage lighting to have separate time switch	None shown – If Included at a later date this lighting will be required to be controlled by a time clock to NCC Volume 1 J6 Specification.
J6.6	Boiling Water Units (BWU) and Chilled Water Units (CWU) to be controlled by a time switch	None shown – If Included at a later date these units will be required to be controlled by a time clock in accordance NCC Volume 1 J6 Specification

3.3 Hot Water Supply, Swimming Pool And Spa Pool Plant

The redevelopment work on the building does not include any changes to the existing hot water system therefore this section of the NCC Volume 1 Section J does not apply.

There are no swimming pools or spas located within this proposed building development therefore this section of the NCC does not apply.

3.4 Access For Maintenance And Facilities For Monitoring

The paragraphs below shows the results of the comparison between the current proposed building services maintenance access and energy monitoring compared NCC Volume 1 section J8 requirements.

Maintenance

Adequate maintenance access for the building services are to be included in drawings for this project as required by this section in the NCC Volume Section J. All future stages of the design and construction for this project, should take into account and maintaining suitable maintenance access for all building services (including existing services that are not being altered by this proposed refurbishment works). This maintenance access is to be shown on all future relevant drawings and documents from this stage onwards. These building services included but are not limited to the lighting, power system, ventilation, air conditioning, hot water, etc.

Monitoring Facilities

The buildings must have the facilities to record the consumption of gas and electricity. However as the proposed refurbishment work floor area is not more than 2,500m² therefore individual building services will not be required to be monitored separately.

Appendix 1 – Glazing Calculations

Report from Miramare Gardens (new numbering system) - CalculatorGlazingVolOne2014.xlsx

printed 14/02/2019

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

Building name/description

Miranare Gardens Function Centre - 48 Myoora Rd, Terrey Hills, NSW, 2084

Application

other

Climate zone

5

Storey

Lower Ground

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		66m ²		141m ²		420m ²		285m ²	
Option B									n/a
Glazing area (A)	20.7m ²	89.4m ²	201m ²	165m ²					

Number of rows preferred in table below

26 (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	D02-GF	SE		2.60	5.20		3.1	0.36	2.200	4.300	0.51	1.70	0.97	0.94	13.52	15% of 100%	
2	D01-GF	SE		2.70	4.00		3.1	0.36	2.400	4.500	0.00	1.80	1.00	1.00	10.80	12% of 100%	
3	W05-GF	SE		3.00	6.00		3.1	0.36				0.00	1.00	1.00	18.00	20% of 100%	
4	W04-GF	SE		3.00	6.80		3.1	0.36				0.00	1.00	1.00	20.40	23% of 100%	
5	W03-GF	SE		3.00	4.50		3.1	0.36				0.00	1.00	1.00	13.50	15% of 100%	
6	W02-GF	SE		3.00	4.40		3.1	0.36				0.00	1.00	1.00	13.20	15% of 100%	
7	W01-GF	NE		3.00	5.00		3.1	0.36	device		2.00	0.00	0.00	0.20	15.00	18% of 58%	
8	Exist NE01	NE		1.10	1.60		6.6	0.70				0.00	1.00	1.00	1.76	25% of 58%	
9	Exist NE02	NE		1.10	3.60		6.6	0.70				0.00	1.00	1.00	3.96	57% of 58%	
10	D05-LG	NW		5.20	22.10		5.6	0.36	14.200	5.100	2.78	-0.10	0.00	0.21	114.92	43% of 27%	
11	W02-LG,D03-LG,D04-LG	NW		5.20	6.40		5.6	0.36	21.900	5.100	4.29	-0.10	0.00	0.21	33.28	12% of 27%	
12	D03-GF	NW		2.60	6.60		5.6	0.36	1.500	3.200	0.47	0.60	0.98	0.90	17.16	45% of 27%	
13	W04-LG	SW		5.20	1.70		5.6	0.36	6.700	5.200	1.29	0.00	0.52	0.44	8.84	4% of 89%	
14	W03-LG	SW		5.20	4.80		5.6	0.36	10.700	5.200	2.06	0.00	0.39	0.34	24.96	12% of 89%	
15	D02-LG	SW		5.20	1.70		5.6	0.36	3.300	5.200	0.63	0.00	0.73	0.63	8.84	4% of 89%	
16	W01-LG	SW		5.20	4.80		5.6	0.36	3.300	5.200	0.63	0.00	0.73	0.63	24.96	12% of 89%	
17	D01-LG	SW		2.50	4.60		5.6	0.36	9.700	2.500	3.88	0.00	0.39	0.34	11.50	5% of 89%	
18	W10-GF	SW		3.20	6.00		5.6	0.36	device		2.00	0.00	0.39	0.34	19.20	9% of 89%	
19	W09-GF	SW		3.20	4.70		5.6	0.36	device		2.00	0.00	0.39	0.34	15.04	7% of 89%	
20	Exist SW 04	SW		1.30	4.80		6.6	0.70				0.00	1.00	1.00	6.24	5% of 89%	
21	W08-GF	SW		3.20	7.28		5.6	0.36	device		2.00	0.00	0.39	0.34	23.30	11% of 89%	

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Report from Miramare Gardens (new numbering system) - CalculatorGlazingVolOne2014.xlsx

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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	
	Description	Option A	Option B	Height	Width	Area	Total System U-Value	Total System SHGC	P	H	P/H	G	Heating	Cooling	Area used	Element share	
ID	(optional)	facades	facades	(m)	(m)	(m²)	(AFRC)	(AFRC)	(m)	(m)		(m)	(S _H)	(S _C)	(m²)	% of allowance used	
22	W07-GF	SW		3.30	7.40		5.6	0.36	device		2.00	0.00	0.39	0.34	24.42	11% of 89%	
23	W06-GF	SW		3.30	7.40		5.6	0.36	device		2.00	0.00	0.39	0.34	24.42	11% of 89%	
24	Exist SW 01	SW		0.50	5.40		6.6	0.70				0.00	1.00	1.00	2.70	2% of 89%	
25	Exist SW 02	SW		0.50	3.30		6.6	0.70				0.00	1.00	1.00	1.65	1% of 89%	
26	Exist SW 03	SW		1.10	4.70		6.6	0.70				0.00	1.00	1.00	5.17	4% of 89%	

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

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

if inputs are valid



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Glazing Calculations

The table above shows the results of the Australian Building Code Board (ABCB) Glazing Calculator which is based on NCC Volume 1 Section J2 requirements. These results compare the proposed refurbished glazing thermal properties and external shading effects to meet the requirements of the NCC Volume 1 section J2 glazing calculations. This calculation is based on the following assumptions:

- All existing external glazing elements, which will be kept, are assumed to have thermal properties similar to clear glazing in standard aluminium frames with a U-Value 6.6 and SHGC(AFRC) 0.7
- The glazing calculations have only been performed on facades and levels of the building where existing glazing is to be replaced.
- The glazing calculation have assumed that the building is single storey on the north western and south western facades where there are proposed new glazing elements which extend over two stories levels of the building.

Appendix 2 – Lighting Power Density Calculations

Main Menu
LIGHTING CALCULATOR FOR USE WITH J6.2(b) VOLUME ONE (First issued with NCC 2014)
Multiple Lighting Systems Calculator
Help screen

Building name/description
Miramare Gardens Function Centre - 48 Myoora Rd, Terrey Hills, NSW, 2084

Classification
Class 9b

Number of rows preferred in table below 15 (as currently displayed)

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Adjustment Factor One			Adjustment Factor Two			OVERALL DESIGN PASSES			
							Adjustment Factor One	Dimming Percentages		Design Lumen Depreciation Factor	Adjustment Factor Two	Dimming Percentages		Design Lumen Depreciation Factor	System Illumination Power Load Allowance	Lighting System Share of % of Aggregate Allowance Used
							Adjustment Factors	% Area	% of full power	Adjustment Factors	% Area	% of full power	Adjustment Factors			
1	Main Function Room	1,060.1 m²	136.6 m²	6.3 m²	18356 W	Auditorium, church and public hall								11649 W	66% of 99%	
2	Main Function Room Bar (large)	17.7 m²	20.0 m²	2.9 m²	217 W	Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks								532 W	1% of 99%	
3	Main Function Room Bar (small)	10.1 m²	13.4 m²	2.9 m²	134 W	Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks								310 W	0% of 99%	
4	Bar Lounge	234.8 m²	65.0 m²	3.1 m²	1890 W	Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks								4746 W	7% of 99%	
5	Entry	85.6 m²	52.6 m²	3.1 m²	1122 W	Entry lobby from outside the building								1666 W	4% of 99%	
6	Reception	10.6 m²	14.2 m²	3.1 m²	56 W	Entry lobby from outside the building								279 W	0% of 99%	
7	GF Function Room	196.9 m²	66.6 m²	3.1 m²	2639 W	Auditorium, church and public hall								2431 W	10% of 99%	
8	Lobby	266.2 m²	102.6 m²	6.3 m²	2703 W	Auditorium, church and public hall								4434 W	10% of 99%	
9	Office Meeting Room	13.0 m²	14.9 m²	3.1 m²	36 W	Office - artificially lit to an ambient level of less than 200 lx								154 W	0% of 99%	
10	Main Office	63.3 m²	53.6 m²	3.1 m²	173 W	Office - artificially lit to an ambient level of less than 200 lx								670 W	1% of 99%	
11	Office 1	11.6 m²	13.6 m²	3.1 m²	36 W	Office - artificially lit to an ambient level of less than 200 lx								137 W	0% of 99%	
12	Office 2	6.9 m²	9.7 m²	3.1 m²	36 W	Office - artificially lit to an ambient level of less than 200 lx								103 W	0% of 99%	
13	Office 3	9.9 m²	13.6 m²	3.1 m²	56 W	Office - artificially lit to an ambient level of less than 200 lx								119 W	0% of 99%	
14	Office 4	11.0 m²	14.2 m²	3.1 m²	56 W	Office - artificially lit to an ambient level of less than 200 lx								133 W	0% of 99%	
15	Office 5	11.0 m²	14.2 m²	3.1 m²	56 W	Office - artificially lit to an ambient level of less than 200 lx								133 W	0% of 99%	
Total						27762 W	Total						27920 W			

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE LIGHTING CALCULATOR

The Lighting Calculator has been developed by the ABCB to assist in developing a better understanding of lighting energy efficiency parameters. While the ABCB believes that the Lighting Calculator, if used correctly, will produce accurate results, the calculator 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 Lighting Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

if inputs are valid

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Interior Artificial Lighting - Illumination Power Load Calculation

The table above shows the results of the NCC Volume 1 Section J6.2(b) Illumination Power Load Calculations. This table compares the Proposed Lighting Design Illuminated Power Load to the NCC Volume 1 Section J6.2(b) Illumination Power Load Maximum Allowance. This calculation is based on the following assumptions:

- The light fitting numbers and locations are based on what is shown on the preliminary architectural reflected ceiling plan drawing and lighting schedule.
- The Lighting Wattage Calculations Table below shows how the total lighting power for each area has been determined.
- Light fitting types LT8 (Main Function Room), LT8 (Foyer) & LT9 (GF Function Room) did not have any wattages assigned therefore a maximum allowable wattage has been shown in the table below so this light power density calculation will meet the requirements NCC Volume 1 Section J6.2.
- All proposed internal light fittings wattages shown on the lighting schedule includes power losses in lighting control gear, ballasts, transformers and drivers.
- The artificial ambient lighting levels are assumed to be designed to be less than 200 lx in office area.
- All internal light fittings are to be controlled by manual light switches located within the same space as the light fittings they control.

Lighting Wattage Calculations Table

location	Architectural Light Fitting Reference	Number Off Fitting	Wattage per fitting (w or w/m)	Length Of Strip Lighting (m)	Wattage Per Fitting Type	Total Lighting Wattage Per Location (w)
Main Function Room	LT04	18	20.0	28.0	10,080.0	18,358.4
	LT06	25	80.0		2,000.0	
	LT08	18	272.0		4,896.0	
	LT10	72	19.2		1,382.4	
Main Function Room Bar (large)	LT04	1	20.0	7.0	140.0	216.8
	LT01	4	19.2		76.8	
Main Function Room Bar (small)	LT04	1	20.0	3.8	76.0	133.6
	LT01	3	19.2		57.6	
Bar Lounge	LT01	12	19.2		230.4	1,890.4
	LT03	39	10.0		390.0	
	LT04	1	20.0	43.5	870.0	
	LT11	10	40.0		400.0	
Entry	LT01	7	19.2		134.4	1,122.4
	LT04	1	20.0	27.4	548.0	
	LT11	11	40.0		440.0	
Reception	LT01	3	19.2		57.6	57.6
GF Function Room	LT09	6	272.0		1,632.0	2,839.0
	LT01	13	19.2		249.6	
	LT04	1	20.0	47.9	957.4	
Lobby	LT04	1	20.0	68.5	1,370.4	2,703.0
	LT08	3	425.0		1,275.0	
	LT01	3	19.2		57.6	
Office Meeting Room	LT01	2	19.2		38.4	38.4
Main Office	LT01	9	19.2		172.8	172.8
Office 1	LT01	2	19.2		38.4	38.4
Office 2	LT01	2	19.2		38.4	38.4
Office 3	LT01	3	19.2		57.6	57.6
Office 4	LT01	3	19.2		57.6	57.6
Office 5	LT01	3	19.2		57.6	57.6