BCA Section J Deemed to Satisfy Compliance Report

2019

Arthur Neave - Cnr Parks and Albert Street, Werrington NSW

Proposed community hall refurbishment

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Building Code of Australia Volume 1 - 2019

Arthur Neave - Cnr Parks and Albert Street, Werrington NSW

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1.0 INTRODUCTION

The National Construction Code (NCC) is a performance-based code containing all Performance Requirements for the construction of buildings in Australia. It is a set of technical design and construction provisions for buildings which is an initiative of the COAG. It is produced and maintained by the ABCB on behalf of the Australian Government and each State and Territory government. As a performance-based code, it sets the minimum required level for the safety, health, amenity, accessibility and sustainability of certain buildings. A building solution will comply with the NCC if it satisfies the Performance Requirements, which are the mandatory requirements of the NCC.

Energy efficiency means improving the performance of services and systems that directly consume energy (such as lighting, air-conditioning and heating) and having greater control over the way that heat flows into and out of the building through its fabric.

The building sector is one of the fastest growing GHG emissions sources. Energy used in buildings accounts for more than 20% of all energy-related GHG emissions. Improving the energy efficiency of buildings therefore represents one of the biggest opportunities to reduce GHG emissions in Australia. The use of renewable or low GHG intensity fuels can also reduce the GHG emission rate.

For the purposes of the NCC energy efficiency requirements, "energy" is the electricity (taken both from the electricity grid and generated onsite), gas, oil or other fuels used in buildings for heating, cooling or ventilation, for lighting or heated water supply or to operate other building services.

Burning coal, natural gas and other fuels to produce electricity releases GHG's into the atmosphere unless the source is one of the few considered renewable sources. Renewable sources include photovoltaic (solar) cells, hydroelectric and wind driven generators. Even these sources will be responsible for emissions at some part of their life cycle. The NCC recognises low-emitting energy sources through its Performance Requirements, Verification Methods and DTS Provisions. Since most of the energy consumed in buildings comes from GHG emitting sources, reducing energy use will also reduce emissions and their unwanted impacts.

NCC allows on-site renewable energy sources and re-claimed energy from another process to be deducted from the annual GHG emissions of the proposed building. This means that the "annual greenhouse gas emissions" are the sum of the GHG emissions drawn annually from the electrical grid, the gas network or fuel brought in by road transport and not the total of the energy consumed by the services that use energy.

To obtain this concession, the renewable energy must be used and generated on-site. This means that electricity purchased as GreenPower® for example does not comply with the concession as it is grid distributed. Energy that is exported to the grid cannot be used as part of this concession. A performance-based study like JV3 alternative solution using computer modelling is required in order to calculate the effect of on-site renewable energy source to improve the energy efficiency performance of a building.

The energy efficiency requirements are generally based on eight broadly defined climate regions, termed the NCC climate zones. The energy efficiency requirements will vary from location to location depending upon the climate zone. Each climate zone will have similar thermal requirements irrespective of the State or Territory where the building is located.

Three options are available to demonstrate compliance with the Performance Requirements of the NCC:

- A Performance Solution,
- A DTS Solution, or
- A combination of a Performance Solution and a DTS Solution.

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 list all the necessary provisions and upgrades in order for the development to comply with the requirements of the section J. The scope of this report is limited to the design documentation referenced in Section 2 of this report and only covers Section J of the BCA 2019 provisions.

1.1 DEFINITIONS

The term **Proposed Development** in this report refers to proposed community hall refurbishment at Arthur Neave - Cnr Parks and Albert Street, Werrington NSW.

Rapid roller door means a door that opens and closes at a speed of not less than 0.5 m/s.

A **colour rendering index (CRI)** is a quantitative measure of the ability of a light source to reveal the colours of various objects faithfully in comparison with an ideal or natural light source. Light sources with a high CRI are desirable in colour-critical applications.

The Kelvin based **CCT (Correlated Colour Temperature)**, is a scale used in lighting to measure the colour temperature of a luminaire. The lower the number, the warmer the light will be and the higher the number the more cool and blue the light will appear. A typical incandescent bulb has a colour temperature between 2700K and 3000K. The sun at noon on a clear day produces a light of approximately 5500K.

1.2 REFERENCED DOCUMENTS

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

- National Construction Code Series, Volume 1, Building Code of Australia 2019, Class 2 to Class 9 Buildings.
- NCC 2019 Guide to BCA Volume One, Release date: May 2019
- Handbook: Energy Efficiency NCC Volume One, Publish date: Jun 2019 Print version: 6.0
- Architectural Plans provided by "Designcorp Architects Pty Ltd" and received by Eco Certificates Consultants at 17/04/2020.
- Email correspondence and response to information request received from the architects of the Proposed Development.

1.3 PROPOSED DEVELOPMENT DETAILS

The Proposed Development is in BCA Climate Zone 6 according to BCA Climate Map for NSW. It is considered a class 9b building according to the BCA standard classification being a community hall.

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

External Walls: new cavity brick external walls.

Roof and Ceiling: no new roof and ceiling elements proposed.

Internal Walls: no new internal envelope walls proposed.

Floors: no new envelope floor elements proposed.

Windows: Standard Aluminium frame single glazed windows and glazed doors assumed for new windows.

Skylights: no skylights proposed.

Air Conditioning System: no design plans provided.

Lighting System: no design plans provided.

2.0 BCA SECTION J DEEMED TO SATISFY COMPLIANCE PROVISIONS

This section analyses the current elements of the of Proposed Development design against the Deemed to Satisfy 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 DTS requirements.

A summary note of these provisions is provided in the Conclusion Section of this report that can be incorporated into specification blocks of architectural plans and, as a result, be easily referenced and followed 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 and not only the narrative of the Conclusion Section.

2.1 Part J 1 – Building Fabric

GENERAL NOTES

The Deemed-to-Satisfy Provisions of PartJ1 apply to building elements that form part of the envelope, where the envelope separates a conditioned space or habitable room from the exterior of the building or a non-conditioned space. This includes roofs, walls, glazing and floors as per the definition of "fabric" in the BCA.

An essential aspect of energy efficiency for a building is to ensure that the building is constructed in a manner that provides an adequate level of comfort for occupants so that they feel less need for artificial heating or cooling. This can be achieved by creating a thermally effective building envelope. This also means that when artificial heating or cooling is needed, the envelope will be more effective at retaining the conditioned air due to the thermal barrier between the internal and external (non-conditioned) environment. This is even more important in a commercial building that is likely to be air-conditioned for much of the time.

The intent of the building fabric DTS Provisions in Part J1 is to ensure that the construction around the conditioned spaces has a sufficient level of thermal performance to ensure energy is not used unnecessarily due to the influence of the external environment.

INSULATION

Insulation is to be fitted tightly to each side of framing members but need not be continuous over the framing member. The insulation requirements are calculated for parts of the roof, walls or floor that are clear of any framing members.

The provisions also state that the installation of insulation should not interfere with the safety or performance of domestic services and fittings such as heating flues, recessed light fittings, transformers for low voltage lighting, gas appliances and general plumbing and electrical components. This includes providing appropriate clearance as detailed in relevant legislation and referenced standards such as for electrical, gas and fuel oil installations.

For reflective insulation to achieve its tested R-Value, the airspace adjoining the insulation needs to be a certain width. Reflective 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. Reflective insulation must closely fit against any penetration or door or window opening and must be supported by a wall frame. Overlapping of reflective insulation should be at least 50 mm, otherwise it must be taped together. This aligns with the requirements of Standard AS/NZS 4200, the standard covering the installation of pliable building membranes.

The R-Value of bulk insulation is reduced if it is compressed. The allocated space for bulk insulation is therefore to allow the insulation to be installed so that it maintains its correct thickness unless exempted such as at wall studs. Some reflective insulation is also bonded to bulk, board or other insulation, providing enhanced performance of the composite system. The term "bulk insulation" includes glass fibre, wool, cellulose fibre, polyester and polystyrene foam. These materials tend to have a high percentage of air voids within the insulation that are fundamental to their ability to limit heat flow. The thermal performance of bulk insulation depends 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 of the need to retain the air pockets within the material. 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 tested R-Value.

The requirement recognises that the practical limitations of maintaining the position and thickness of bulk insulation where it is likely to be compressed between cladding, supporting members, water pipes and electrical cabling. In these instances, compression of the bulk insulation may occur but should be limited where possible.

A thermal bridge, also called a cold bridge or heat bridge, is an area or component of the fabric which has higher thermal conductivity than the surrounding materials, creating a path of least resistance for heat transfer. Thermal bridges can significantly reduce the thermal performance of a facade, increasing energy use from a building's heating and cooling systems. To address this problem, a thermal break may be provided by materials such as timber or expanded polystyrene strips, plywood or bulk insulation. Reflective insulation alone is not suitable for use as a thermal break because it requires an adjoining air space to achieve the specified R-Value.

To ensure the performance of materials is correctly validated, test reports complying with AS/NZS 4859.1 should be provided in accordance with Part A5 of NCC Volume One and this documentation forms an integral part of the building approval. This standard specifies the testing criteria for insulation including both reflective and bulk insulation products.

Manufacturer's data sheets 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.

WALLS AND GLAZING

For energy flow through the envelope, glazing is often the greatest path of heat transfer and, possibly, of infiltration, making it a critical element in achieving energy efficiency.

Wall-glazing construction means the combination of wall and *glazing* components comprising the *envelope* of a building, excluding

1. Display glazing
2. Opaque non glazed openings such as doors, vents, penetrations and shutters

The Total System U-Value and Total System SHGC of glazing must account for the combined effect of the glass and frame. The measurement of the Total System U-Value and Total System SHGC is specified in the Technical Protocols and Procedures Manual for Energy Rating of Fenestration Products of the AFRC (Australian Fenestration Rating Council).

In summer, sunlight radiates through the glazing, bringing unwanted heat into the interior. However, in winter, solar heat gains through the glazing can contribute effectively to the energy efficiency of a building where heating is desired. This is less important in non-residential commercial buildings where internal heat loads from lighting, appliances, equipment and people can be high enough to require little or no additional heating in most climates. It is recognised that for most commercial buildings in most *climate zones*, the predominate mode is cooling. Therefore, there is a greater emphasis on Total System SHGC over *Total System U-Value* in the section J provisions.

The winter sun appears lower on the horizon at any time of day than the summer sun at the same time. Between the lowest winter position and the highest summer position, there is a difference of about 47°. For unshaded glazing, the angle of the sun's rays onto the glass will affect the amount of solar heat gain transmitted through the glass. The sharper the angle (closer to 90° from the horizontal), the greater the reflectance from the surface of the glass, which results in less solar heat gain.

Generally, during the summer months, glazing facing the East and West receives the largest amount of solar gain, while glazing facing the North or South receives the least solar gain. This is in relation to the higher sun position on the horizon during the summer months, limiting the amount of solar heat transmitted through the North and South facing glazing.

Generally, during the winter months, glazing facing the North is the largest source of solar gain. Glazing facing the East and West still provide gains, however they are less than that of those available from the North due to the lower sun position during winter months. The South facing orientation provides negligible heat gains during the winter months when they are most desirable.

Orientation however is not directly important for conductance. Whether glazing faces North, South, East or West, the same amount of heat loss is calculated to occur because the loss depends on the air temperature inside the building compared to the air temperature outside, which is assumed to be similar in all directions. Good orientation however, can compensate for heat lost through conduction by providing offsetting solar gains.

The presence of shading projections and devices reduces the level of thermal performance required for glazing. However, to be effective, shading projections and devices must restrict a significant proportion of solar radiation. The projection must extend horizontally on both sides of the glazing for the same distance.

The external shading devices such as shutters, blinds, vertical or horizontal building screens with blades, battens or slats are required to restrict the amount of summer solar radiation that reaches the glazing by 80% or more. Additionally, the device must operate automatically in response to the level of solar radiation if adjustable, as devices operated manually are considered less likely to be used efficiently. Vertical shading is commonly used, however often does not meet the DTS requirements and therefore does not receive the available shading multipliers. Vertical shading provides great benefits, particularly on East and West facing facades as the sun angles are low. Therefore, vertical shading could form the basis of a

Performance JV3 Solution if they are unable to restrict the amount of summer solar radiation that reaches the glazing by 80% or more. The 80% figure acknowledges that while a device may be capable of providing 100% shade during summer, some leakage of solar radiation may occur at the sides of the device. Generally, close fitting blinds or horizontal screens that extend either side of the glazing by the same projection distance should sufficiently restrict the amount of summer solar radiation that reaches the glazing at the sides of the device. The shading projection for walls is measured from the wall face whereas for glazing the projection is measured from the glass face.

Display glazing means *glazing* used to display retail goods in a shop or showroom directly adjacent to a walkway or footpath, but not including that used in a café or restaurant.

Spandrel panels refer to the *opaque* part of a façade in curtain wall constructions which is commonly adjacent to, and integrated with, *glazing*. As per glazing, the thermal performance of a spandrel panel relates to the whole assembly, including the frame, the edge of the spandrel panel that has reduced thermal properties due to the frame, and the centre of the spandrel panel. When insulation is added in a spandrel panel, it is often added along the backside of the panel between the structural parts of the frame. Spandrel panels are typically poor for thermal bridging as the frames are generally made from highly conductive materials that allow heat to transfer from the outside into the building. Often insulation is installed on the backside of the panel, however, this does not limit the thermal bridging through the frame.

APPLICABLE PART J1 DTS PROVISIONS

	Building Element	Energy Efficiency Provisions	Corresponding BCA Clause
1	For the new external cavity brick walls of the Proposed Development	install minimum R 2.0 m^2.k/w insulation to provide a wall system with total thermal resistance of R 2.65 m^2.k/w.	Part J1.5(a) and Part J1.5(d)
2	For new west facing windows and glazed doors	install windows with Total System U-value no more than 4.5 W/m^2.k and SHGC no more than 0.67	Part J1.5(c)
3	For all other new glazed envelope elements	install windows with Total System U-value no more than 5.8 W/m^2.k and SHGC no more than 0.76	Part J1.5(c)

2.2 PART J 3 –BUILDING SEALING

GENERAL NOTES

The intent of this part is to restrict the unintended leakage of outdoor air into the building and loss of conditioned air from the building. In addition to unnoticed air leakage, drafts caused by poorly sealed external openings and construction gaps can affect building occupants' sense of comfort, causing them to increase their use of heating and air-conditioning. Leakage of humid air into an air-conditioned building can increase energy use for dehumidification.

Roof lights that are openable must be sealed when closed in order to restrict the loss of conditioned air to the outside environment. It is assumed that most of the habitable rooms in residential type buildings in the cooler climate zones will be heated by installed or portable heaters. However, if anon-habitable room is conditioned, either cooled or heated, then it must also be sealed. For the hotter climate zones, the roof-lights need be sealed only if conditioning is being installed.

There are three options for achieving an effective seal of a roof light;

1. An imperforate (secondary) diffuser installed at the ceiling level or the internal lining level. In cathedral ceilings, the diffuser can be installed at the lower edge of the *roof light* shaft opening. The diffuser is typically an *opaque* sheet of plastic used to reduce the glare from the *roof light*.
2. A weatherproof seal can be installed. The seal could be a foam or rubber compression strip or the like.
3. A shutter system with easily accessible operating mechanism can be installed that is operated either manually, electronically or mechanically.

An external door opening to a conditioned space must have a device to prevent significant amounts of conditioned air being continuously lost. This only applies to conditioned spaces greater than 50 m^2. Devices that maybe installed to comply with this requirement may include an airlock, self-closing door, or revolving door. Provisions for people with a disability should also be considered when selecting the device.

Reasonable judgement is required when applying sealing to windows and doors, i.e. the seal must be durable with no gaps between a conditioned and non-conditioned space.

There are a couple of exemptions to these requirements, such as for roller shutter doors or the like, that are used for out of-hours security purposes only, i.e. when conditioning is not operating. Another exemption has been granted for the main entrance to a café, restaurant or open front shop that has a 3^m non-conditioned zone. Where staff are carrying trays of food or drink it may be unsafe to require an airlock, self-closing door or sliding door.

The sealing of "miscellaneous" exhaust fans, such as smaller fans used for domestic kitchen exhaust as well as sealing of roofs, walls and floors applies to the same spaces and in the same climate zones as described for rooflights. The provisions do not apply to smoke exhaust fans and the like.

Similarly to exhaust fans, an evaporative cooler represents a large opening in the building envelope. This opening needs sealing when the evaporative cooler is not in use, such as in the winter when a heating system maybe operating.

Like fans, evaporative coolers must have self-closing dampers to prevent loss of heated air in those climates where heating may be needed in the winter. Typically, this would occur in climate zones 4, 5, 6, 7 and 8. However, dampers are also required in any climate zone if the space served by the evaporative cooler has a heating system, even if the space is non-habitable. This is because heated air would otherwise leak through the unsealed cooler or its ductwork.

Should a loading dock lead to a conditioned space, it must be fitted with a rapid roller door.

The exhaust fans are essentially openings in the insulated envelope, through which conditioned air will escape when they are not operating. Accordingly, the requirement is to restrict the extent of air leakage from intermittently operating fans. This can be achieved by strip damper systems that are readily available for most fan types. Alternatively, a filter system, like that used in kitchen range hoods is acceptable as they significantly restrict the flow of air when the fan is not operating.

If the fan was operating as part of the *air-conditioning* system, such as a control return air fan, an additional damper would not be required but, if one is already there for other purposes, it must close on shut down

For sealing of walls, floors and ceiling In most instances, conventional internal fixing and finishing procedures will be sufficient to comply with the required seal, provided the linings are close fitting and trimmed by skirtings, architraves, cornices and the like .A reasonable interpretation of "close fitting" would be having a gap less than that between a closed window or door and the associated frame, which is typically 2 mm.

It is noted that some lining systems, such as plasterboard, require gaps to allow for movement of sheeting. In such instances, skirtings will be required to seal the wall and floor junctions where a fitted floor is installed and there are gaps between the subfloor and internal space. However, if the floor was a concrete slab or platform particleboard flooring then no gap would exist between the internal and external spaces and sealing is not necessary. Where it is not possible to have close fitting junctions or penetrations, expanding foam, caulking, rubber compressible strip etc. may be used to seal the gap.

APPLICABLE PART J3 DTS PROVISIONS

	Building Element	Energy Efficiency Provisions	Corresponding BCA Clause
1	All new openable windows and external doors of the conditioned areas of the Proposed Development except for fire doors, smoke doors and roller shutter doors, roller shutter grille or other security door or device installed only for out-of-hours security if any	provide air seals on all edges or provide windows complying with AS 2047 The air seals can be a foam or rubber compression strip, fibrous seal or the like	Part J3.4 (a & b& c)
2	New 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
8	New walls, windows frames and doors frames 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 at junctions and penetrations by close fitting architrave, skirting, cornice, expanding foam, rubber compressible strip, caulking or the like. These requirements do not apply to openings, grilles or the like required for smoke hazard management.	Part J3.6

2.3 Part J 5 – Air Conditioning and Ventilation Systems

No design plans provided

2.4 Part J 6 – Artificial Lighting and Power

GENERAL NOTES

The NCC requirements for artificial lighting and power are designed to curb unreasonable energy use in lighting systems, and the power to certain equipment, including vertical transport for nearly all building classifications.

Research indicates that lighting is estimated to be responsible for 26% of the electricity used in an office building. Lighting inefficiencies have a compounding effect in warmer climates because the extra electrical load for lighting may translate to waste heat that increases the load on the air-conditioning system. Additionally, power consumption of lifts and escalators can be excessive if inefficient systems are in place or if they are not configured to save energy when not in use.

The requirements of this part do not apply to Class 8electricity network substations. The safety of workers requires manual lighting controls for inspection and maintenance activities of hazardous high voltage equipment.

These requirements also do not apply to the following:

1. Emergency lighting provided in accordance with Part E4.
2. Signage, display lighting within cabinets and display cases that are fixed in place.
3. Lighting for accommodation within the residential part of a detention centre.
4. A heater where the heater also emits light, such as in bathrooms.
5. Lighting of a specialist process nature such as in a surgical operating theatre, fume cupboard or clean workstation.
6. Lighting of performances such as theatrical or sporting.
7. Lighting for the permanent display and preservation of works of art or objects in a museum or gallery other than for retail sale, purchase or auction.
8. Lighting installed solely to provide photosynthetically active radiation for indoor plant growth on green walls and the like.

These are explained below:

Due to the defined terms lamp power density and illumination power density, the requirements only apply to permanently wired artificial lights. Therefore, portable lamps and lights connected by plugs to general electricity power outlets are exempt.

Emergency lighting as required by NCC Volume One Part E4 is exempt, as life safety takes precedence over energy efficiency. Lighting associated with signage, lighting within display cabinets, and lighting for cases that are fixed in place are all exempt. This concession applies to both external and internal signage and, includes lighting that highlights signs. Regarding display cases, the lighting must be within the fixed cabinet or display case to be exempted, but this cabinet does not necessarily need to be enclosed.

Lighting installed in the accommodation areas of detention centres such as jails and remand centres are also exempt as lighting requirements may differ due to safety reasons. Accommodation should be interpreted as the area specifically set aside for the detainees. Ancillary areas, such as staff common rooms and administrative areas do not receive this concession.

Lighting used for heating, such as a bathroom using heat radiated from special purpose lamps to warm room occupants are exempt. In simple terms, a higher number of watts means more heat is radiated. The use of such a system should be nominated on the building approval documents.

Lighting used for a specialised process such as lighting used for specific medical procedures, lighting in a fume cupboard or clean workstation are usually separate from the general overhead lighting and are often built into specialised equipment. Therefore, they are exempt.

Lighting used for performances such as theatrical or sporting events, which are often separately switched from any general overhead lighting, are also exempt.

Lighting used for the permanent display and preservation of works of art or objects in a museum or gallery other than those for retail sale, purchase or auction are exempt, as these lights are used to facilitate and enhance the viewing of the works of art.

Lighting installed solely to provide photosynthetically active radiation for indoor plant growth on green walls and the like often requires specific light intensities and colours to support different plant growth. Therefore, they are exempt.

BUILDINGS EXCEPT FOR SOLE-OCCUPANCY UNITS OF CLASS 2 BUILDINGS OR A CLASS 4 PART

Where lamp power density or illumination power density maybe used for sole-occupancy units in Class 2buildings or a Class 4 part of a building, only illumination power density (IPD) can be used to measure compliance for all other applications.

Lighting in non-residential commercial buildings is progressively moving towards the use of LED lamps for general lighting and for special lighting. At present other lamps are available, but because of the shift to LED lamps for general lighting, the illumination power density levels in Part J6 reflect this newer technology. The aggregated design illumination load is the maximum load in the lamp's operational cycle.

Performance Solutions, developed to the satisfaction of the local building control authority, can be used for spaces that have complex or specific lighting needs. Alternatively, energy saved by more efficient building services or through the installation of on-site renewable energy systems may also be used to increase the allowances for lighting, again subject to the approval of the local building control authority.

The illumination power density may be increased for small rooms and a further series of adjustment factors have been included in part J6 that allow credit for additional energy control devices or to allow the use of high Colour Rendition Lights.

Occupancy sensors represent an efficient way of tailoring the lighting to the usage of the space. The fewer lights that are controlled by an individual sensor the greater the energy saved, however, there is less cost saving on the energy to offset the cost of the sensor. Therefore, there is a graduated scale of adjustment factors for the area of lights controlled.

Section J requires that an occupant activated device be installed in a sole-occupancy unit of a Class 3building, based on the likelihood that guests may not switch off the power when leaving the room. This power includes the lighting, air-conditioning, exhaust fans and bathroom heating when the room is not occupied. The control device is not detailed so the requirements can be met by various systems such as a security device like a room key slot at the door, a motion detector, or any device or system that can monitor the occupancy of the unit. For the purpose of applying this provision, occupancy should be taken as the physical presence of people in the room rather than having someone registered or checked into the unit.

The intent of lift energy efficiency provision is to ensure lifts that are expected to have high frequency usage are the most efficient. A lower energy rating has been allowed for dedicated goods lifts, i.e. a lift used for carrying goods or materials and in which only the attendant and the persons required to load and unload are intended (or permitted) to travel. This is in recognition that these lifts have different requirements than passenger lifts.

The control devices include lighting timers, motion detectors, daylight sensors and dynamic lighting control devices.

The factors that can be applied to the maximum illumination power density are

1. Room Aspect Ratio
2. A maximum of two control devices
3. Colour Rendering Index (CRI) and Correlated colour temperature (CCT) adjustment factors

The adjustment factors are applied to the illumination power density allowance for a space. This means that, if a designer selects a less efficient light source or luminaire, compliance can still be achieved by including a supplementary control device such as an occupancy sensor or photoelectric device.

Occupancy sensors represent an efficient way of tailoring the lighting to the functional needs of the space. The fewer lights that are controlled by an individual sensor, the greater the potential energy saved, however there is less cost saving on the energy to offset the cost of each sensor. Therefore, there is a graduated scale of adjustment factors for the area of lights controlled.

Motion detectors turn on lighting in response to movement and are therefore applicable in areas that are not constantly occupied such as toilets and change rooms.

Programmable dimming systems are where pre-selected scenes or levels are automatically selected by the time of day, photoelectric cell or occupancy sensor. Examples of buildings or spaces where this may be beneficial are university buildings and classrooms. Timetables enable occupancy to be pre-determined and for lighting to be switched on in these times.

Fixed dimming is where lights are controlled to a level and that level cannot be adjusted by the user. For example, where drivers are factory set to a dimmed output to limit the light output.

Lumen depreciation dimming occurs over the lifespan of the light source. Put simply, lighting gets dimmer over time. LED or fluorescent lighting fixtures have much longer lifespans than other lighting fixtures. Therefore, illumination power density adjustment factors do not apply to tungsten, halogen or other incandescent sources to encourage the use of more efficient lighting sources.

The illumination power density adjustment factor for two stage sensor equipped lights with minimum power of 30 percent of peak power refers to both sensors integrated into the lighting system and standalone sensors as part of the lighting control system.

Daylight sensors turn off lighting when sufficient natural light from a window or roof light is present. Sensors for artificial lights located adjacent to roof lights are to be located at the discretion of the electrical engineer/lighting designer.

Dynamic dimming systems are where the lighting level is varied automatically by a photoelectric cell to either proportionally compensate for the availability of daylight or the lumen depreciation of the lamps.

LIGHT COLOUR ILLUMINATION POWER DENSITY ADJUSTMENT FACTOR

The maximum illumination power density may be increased by dividing it by the illumination power density adjustment factor. There are two possible adjustments for light colour, one regarding CRI and one regarding CCT.

CRI is the measurement of how colours look under a light source when compared with sunlight and is measured from 0-100. A CRI of 100 means that the colours appear the same as they would under sunlight. For lighting with a CRI greater than or equal to 90, the maximum illumination power density will increase once divided by the adjustment factor of 0.9.

CCT defines the colour appearance and is defined in degrees Kelvin. A warm light is approximately 3500 K and below, moving to brighter, whiter and 'cooler' as the degrees increase. A warmer light is favoured in the DTS requirements and therefore has more power allowance.

If tuneable luminaires achieve both ≤3500 K and ≥4500, the ≤3,000 K adjustment factor would be appropriate. The intent is to prevent designers using cool/blue-tinge daylight luminaires to achieve energy efficiencies. Tuneable luminaires are top of the range and most preferable. Therefore, they should be rewarded for the capacity achieving≤3,500 K and not penalised for the capacity being ≥4,500 K.

Energy efficiency measures for lifts prescribe both operational and standby/idle lift operation energy efficiency measures. A lower energy rating has been allowed for dedicated goods lifts. This is in recognition that these lifts have different requirements to passenger lifts. Dedicated goods lifts are lifts used for carrying goods or materials and in which only the attendant and the persons required to load and unload are intended (or permitted) to travel. Lifts that are intended as passenger lifts, that occasionally carry goods or materials do not fall under this category.

LIGHTING AND POWER CONTROL DEVICES

Compliance with the requirements of this specification should be verified and substantiated by manufacturer's data sheets during the building approval process. Verification would be like current approval processes for emergency lighting where details of the intended systems form an integral part of the approval process and approved documentation.

TIMERS

A lighting timer is installed so that artificial lighting needed only for transiting between occupied parts of a building will operate on demand before turning off automatically after a reasonable time has passed.

The provisions specify that a timer switch needs to be available within 2 m of every entry door and visible when the space is not artificially lit. The area controlled by a single push button timer is limited to 100 m^2 to avoid wasteful energy use. Even so, at least 5% of lights in areas larger than 25 m^2 must operate separately from the timer to allow a constant low level of lighting for people to enter the space safely. The 5% of lighting that can remain active can usually be achieved by an exit sign or similar fitting. The percentage applies to numbers of lights and not to the energy used or illumination produced by the lighting.

TIME SWITCHES

Time switches are intended to turn off the power automatically. They must be programmed to accommodate the needs of the specific occupancy. However, the program must be capable of turning off the system after normal occupation has finished.

The term 'normal occupation' would, for example, also include suitable allowance for after-hours cleaning and other building functions outside the traditional 9am to 5pm operation of business premises.

MOTION DETECTORS

Motion detectors have many advantages over other control devices. For example, a person entering a space does not need to find the button to switch on the lights. The motion detector requirements for lighting include movement sensing means, detection thresholds, maximum areas that an individual detector can control, maximum number of lights that can be controlled by a detector, how long they can operate the lights after activation, and override facilities.

DAYLIGHT SENSOR AND DYNAMIC LIGHTING CONTROL DEVICES

The daylight and dynamic lighting sensors are designed to respond to changes in the illumination levels within a designated area.

The following control devices must comply with Specification listed in the Conclusion section of this report "LIGHTING AND POWER CONTROL DEVICES REQUIREMENTS":

1. Lighting timers.
2. Motion detectors.
3. Daylight sensors and dynamic lighting control devices.

A maximum of two illumination power density adjustment factors for a control device can be applied to an area. The adjustment factor does not apply to tungsten, halogen or other incandescent sources. The illumination power density adjustment factor is only applied to lights controlled by daylight sensors between 8:00 AM and 7:00 PM.

APPLICABLE PART J6 DTS PROVISIONS

	Building Element	Energy Efficiency Provisions	Corresponding BCA Clause
1	For the lighting electrical power of internal areas of the Proposed Development	maximum design power allowed is 2882 Watts.	Part J6.2 (b)
2	For all the lighting of all internal areas of the Proposed Development	every room must be individually operated by a switch or other control devices or both.	Part J6.3 (a)
3	All light switches or other control devices of the Proposed Development	must be located in the same room being switched or in an adjacent room or space from where 90% of the lighting being switched is visible.	Part J6.3 (c)(i)
4	For at least 95% of the light fittings in the building	install a time switch 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.	Part J6.3 (d)
5	Interior decorative and display lighting if installed for the Proposed Development,	must be separately controlled from other artificial lighting and by a manual switch for each area (other than when the operating times of the display are the same in a number of areas such as in a museum, art gallery or the like) and a time switch if the display lighting exceeds 1kW.	Part J6.4(a)
6	Windows display lighting if installed	must be controlled separately from other display lighting.	Part J6.4(b)
7	Exterior artificial lighting attached to or directed at the facade of a building	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.	J6.5 (a) (i)
8	If the exterior artificial lighting above exceeds 100 W of power unless for emergency lighting	use LED luminaires for 90% of the total lighting load or use motion sensors for the light control. Install a separate time switch if it is used for decorative purposes such as façade or signage lighting.	J6.5 (a) (ii)
9	If installing boiling water or chilled water storage unit,	install a time switch for the power supply.	Part J6.6

2.5 Part J 7 – Heated Water Supply and Swimming pool and spa pool plant

GENERAL NOTES

A heated water supply system is a significant user of energy in a building and, although there is only limited data on pools and spas, their energy use is also significant.

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

2.6 Part J 8 – Facilities for Energy Monitoring

Not applicable to the scope of Proposed Development.

3.0 SUMMARY AND CONCLUSIONS

Considering the design elements nominated on the Proposed Development provided by "Designcorp Architects Pty Ltd" 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 2016, Energy Efficiency;

1. For new external cavity brick walls of the Proposed Development install additional R 2.0 m^2.k/w insulation to provide a wall system with total thermal resistance of R 2.65 m^2.k/w.
2. For new west facing windows and glazed doors, install windows with Total System U-value no more than 4.5 W/m^2.k and SHGC no more than 0.67
3. For all other new glazed envelope elements of the Proposed Development, install windows with Total System U-value no more than 5.8 W/m2.k and SHGC no more than 0.76
4. Installed insulation must comply with AS/NZS 4859.1 and be installed in such a way to meet the following requirements:
   a. 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.
   b. 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.

c. 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. In a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.

d. 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 50 mm or tapped together. It must be closely fitted against any penetration, door or window opening.

5 For all new openable windows and external doors of the conditioned areas of the Proposed Development except for fire doors, smoke doors and roller shutter doors, roller shutter grille or other security door or device installed only for out-of-hours security if any, provide air seals on all edges or provide windows complying with AS 2047. The air seals can be a foam or rubber compression strip, fibrous seal or the like.

6 New exhaust fans of the conditioned areas of the Proposed Development if any, must be equipped with a self-closing damper or similar.

7 New walls, windows frames and doors frames 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 at junctions and penetrations by close fitting architrave, skirting, cornice, expanding foam, rubber compressible strip, caulking or the like. These requirements do not apply to openings, grilles or the like required for smoke hazard management.

8 For the lighting electrical power of internal areas of the Proposed Development maximum design power allowed is 2882 Watts.

9 For all the lighting of all internal areas of the Proposed Development every room must be individually operated by a switch or other control devices or both

10 All light switches or other control devices of the Proposed Development must be located in the same room being switched or in an adjacent room or space from where 90% of the lighting being switched is visible.

11 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 lighting and power control devices requirements section of this report immediately after this conclusion.

12 For at least 95% of the light fittings in the building install a time switch 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.

13 Interior decorative and display lighting if installed for the Proposed Development, must be separately controlled from other artificial lighting and by a manual switch for each area (other than when the operating times of the display are the same in a number of areas such as in a museum, art gallery or the like) and a time switch if the display lighting exceeds 1kW.

14 Windows display lighting if installed must be controlled separately from other display lighting.

15 Exterior artificial lighting attached to or directed at the facade of a building 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.

16 If the exterior artificial lighting above exceeds 100 W of power unless for emergency lighting use LED luminaires for 90% of the total lighting load or use motion sensors for the light control. Install a separate time switch if it is used for decorative purposes such as façade or signage lighting.

17 If installing boiling water or chilled water storage unit, install a time switch for the power supply.

LIGHTING AND POWER CONTROL DEVICES REQUIREMENTS

LIGHTING TIMERS REQUIREMENTS

1. must be located within 2 m of every entry door to the space; and
2. have an indicator light that is illuminated when the artificial lighting is off; and
3. not control more than
   a. an area of 100 m^2 with a single push button timer; and
   b. 95% of the lights in spaces of area more than 25 m^2; and
4. be capable of maintaining the artificial lighting
   a. for not less than 5 minutes; and
   b. for not more than 12 hours if the timer is reset.

TIME SWITCH REQUIREMENTS

1. A time switch must be
   a. capable of switching on and off electric power at variable pre-programmed times and on variable pre-programmed days; and
   b. configured so that the lights are switched off at any time the space is designated to be unoccupied.
2. A time switch for internal lighting must be capable of being overridden by—
   a. a means of turning the lights on, either by—
      i. a manual switch, remote control 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 if there is no further presence detected, the time switch must resume control; or
      ii. 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 or remote control; and

   b. a manual "off" switch.

3. A time switch for external lighting must be—
   a. configured to limit 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
   b. capable of being overridden by a manual switch, remote control or a security access system for a period of up to 8 hours, after which the time switch must resume control.
4. A time switch for boiling water or 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

MOTION DETECTOR REQUIREMENTS

1. In a Class 2, 3 or 9c residential care building other than within a sole-occupancy unit, a motion detector must—
   a. be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
   b. be capable of detecting a person before they are 1 m into the space; and
   c. other than within a sole-occupancy unit of a Class 3 building, not control more than—
      i. an area of 100 m2; and
      ii. 95% of the lights in spaces of area more than 25 m2; and
   d. be configured so that the lights are turned off when the space is unoccupied for more than 15 minutes; and
   e. be capable of being overridden by a manual switch only enabling the lights to be turned off.
2. In a Class 5, 6, 7, 8, 9a or 9b building, a motion detector must—
   a. be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
   b. be capable of detecting—
      i. a person before they have entered 1 m into the space; and
      ii. movement of 500 mm within the useable part of the space; and
   c. not control more than—
      i. in other than a car park, an area of 500 m2 with a single sensor or group of parallel sensors; and
      ii. 75% of the lights in spaces using high intensity discharge; and

   d. be configured so that the lights are turned off when the space is unoccupied for more than 15 minutes; and
   e. be capable of being overridden by a manual switch that only enables the lights to be turned off.

3. When outside a building, a motion detector must—
   a. be capable of sensing movement such as by pressure, infra-red, ultrasonic or microwave detection or by a combination of these means; and
   b. be capable of detecting a person within a distance from the light equal to—
      i. twice the mounting height; or
      ii. 80% of the ground area covered by the light's beam; and
   c. not control more than five lights; and
   d. be operated in series with a photoelectric cell or astronomical time switch so that the light will not operate in daylight hours; and
   e. be configured so that the lights are turned off when the area is unoccupied for more than 15 minutes; and
   f. have a manual override switch which is reset after a maximum period of 4 hours.
4. When in a fire-isolated stairway, fire-isolated passageway or fire-isolated ramp, a motion detector must—
   a. be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
   b. be capable of detecting—
      i. movement of 500 mm within the useable part of the space; and
      ii. a person before they have entered 1 m into the space; and
   c. be configured so that the lights dim to a 30% peak power or less when the space is unoccupied for more than 15 minutes.

DAYLIGHT SENSOR AND DYNAMIC LIGHTING CONTROL DEVICE REQUIREMENTS

1. A daylight sensor and dynamic control device for artificial lighting must—
   a. for switching on and off—
      i. be capable of having the switching level set point adjusted between 50 and 1000 lux; and
      ii. have—
         1. a delay of more than 2 minutes; and

2. 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

b. 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—

i. continuously down to a power consumption that is less than 50% of full power; or

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

2. 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.

4.0 APPENDIX

This section of the report demonstrates the results of employing BCA Calculators for Facade elements like walls and windows, Lighting Power, Loss of Ceiling Insulation Table and other referenced calculations and plans in this report.

As per Clause A2.2 (a) of the Building Code of Australia, we recommend that a site inspection is undertaken by the assessors of this Report prior to the issue of an occupation certificate by the certifying authority. This is to ascertain complete compliance with the Building Code of Australia and its regulatory standards during the construction phase of the Proposed Development. Thorough assessment will be made by the inspector to assist the development in securing compliance certification from the relevant PCA or Council Authority.

Façade

Report

Calculator

Project Summary

Date
30/04/2020

Name
Manuel Basiri

Company
Eco Certificates Pty Ltd

Position
Assessor

Building Name / Address
Arthur Neave - Cnr Parks And Albert Street, Werrington
0

Building State
NSW

Climate Zone
Climate Zone 6 - Mild temperate

Building Classification
Class 9b - public halls, function rooms or the like

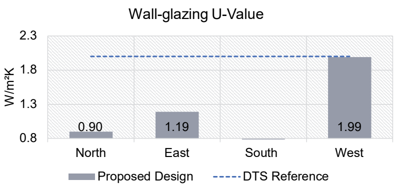
Storeys Above Ground
1

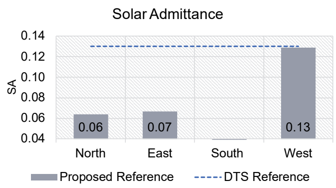
The summary below provides an overview of where compliance has been achieved for Specification J1.5a - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Apects).

Compliant Solution =
Non-Compliant Solution =

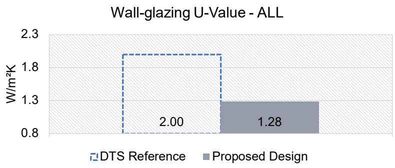
	Method 1 North	Method 1 East	Method 1 South	Method 1 West	Method 2 All
Wall-glazing U-Value (W/m².K)	0.90	1.19	0.53	1.99	1.28
Solar Admittance	0.06	0.07	0.02	0.13	
AC Energy Value					27

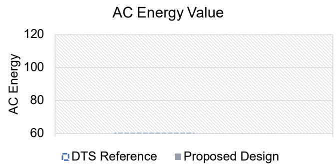
Method 1





Method 2





Project Details

	North	East	South	West
Glazing Area (m²)	7.12	14.56	1.84	48.4
Glazing to Façade Ratio	10%	15%	3%	39%
Glazing References	T 1 - 5.8 0.76 +	T 1 - 5.8 0.76 +	T 1 - 5.8 0.76 +	T 2 - 4.5 0.67 +
Glazing System Types	0 +	0 +	0 +	0 +
Glass Types	0 +	0 +	0 +	0 +
Frame Types	0 +	0 +	0 +	0 +
Methodology	WERS (Default module size)			
Average Glazing U-Value (W/m².K)	5.80	5.80	5.80	4.50
Average Glazing SHGC	0.76	0.76	0.76	0.67
Shading Systems				
Wall Area (m²)	66.6	82.23	64.76	75.13
Wall Types	Wall +	Wall +	Wall +	Wall +
Methodology	0			
Wall Construction	Cavity masonry (90mm glass wool + timber studs) +	Cavity masonry (90mm glass wool + timber studs) +	Cavity masonry (90mm glass wool + timber studs) +	Cavity masonry (90mm glass wool + timber studs) +
Wall Thickness	300 +	300 +	300 +	300 +
Average Wall R-value (m²K/W)	2.65	2.65	2.65	2.65
Solar Absorptance				

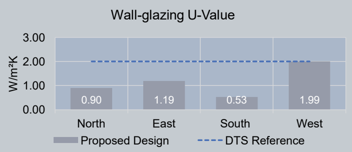
Façade (beta)

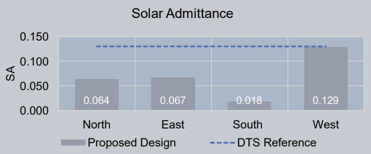
Wall Glazing Areas + Results

User Input | Active Row - All Inputs Required | User Dropdown | **Calculator**

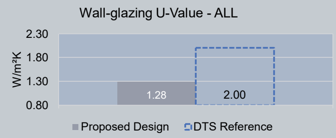
Results — **Class 9b - public halls, function rooms or the like** — **Climate Zone 6 - Mild temperate**

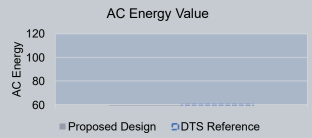
Method 1





Method 2





Wall Glazing Area

Compliant Solution =
Non-Compliant Solution =

North	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)
1	T 1 - 5.8 0.76			3.56		T2 - Cavity Brick	66.6	70
2	T 1 - 5.8 0.76			1.74	N-2			2
3								0
4								0
5								0
6								0

	Result	Target
Wall-glazing U-Value (W/m².K)	0.90	2.00
Solar Admittance	0.064	0.130

Glazing Area (m²)	7.12
Wall Area (m²)	66.6
Glazing to Façade Ratio	10%
Average Glazing U-Value (W/m².K)	5.80
Average Glazing SHGC	0.76
Average Wall R-Value (m²K/W)	2.65

East	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)
1	T 1 - 5.8 0.76			3.64	E-1	T2 - Cavity Brick	82.23	86
2	T 1 - 5.8 0.76			25.2	E-2			25
3	T 1 - 5.8 0.76			1.93	E-3			2
4	T 1 - 5.8 0.76			1.76	E-4			2
5								0
6								0

	Result	Target
Wall-glazing U-Value (W/m².K)	1.19	2.00
Solar Admittance	0.067	0.130

Glazing Area (m²)	14.56
Wall Area (m²)	82.23
Glazing to Façade Ratio	15%
Average Glazing U-Value (W/m².K)	5.80
Average Glazing SHGC	0.76
Average Wall R-Value (m²K/W)	2.65

South	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)
1	T 1 - 5.8 0.76			1.84	S-1	T2 - Cavity Brick	64.76	67
2								0
3								0
4								0
5								0
6								0

	Result	Target
Wall-glazing U-Value (W/m².K)	0.53	2.00
Solar Admittance	0.018	0.130

Glazing Area (m²)	1.84
Wall Area (m²)	64.76
Glazing to Façade Ratio	3%
Average Glazing U-Value (W/m².K)	5.80
Average Glazing SHGC	0.76
Average Wall R-Value (m²K/W)	2.65

West	Glazing Reference	Height (m)	Width (m)	Glazing Area (m²)	Shading Reference	Wall Reference	Wall Area (m²)	Total Area (m²)
1	T 2 - 4.5 0.67			12.1	W-1	T2 - Cavity Brick	75.13	87
2	T 2 - 4.5 0.67			16.4	W-2			16
3	T 2 - 4.5 0.67			9.18	W-3			9
4	T 2 - 4.5 0.67			1.45	W-4			1
5								0
6								0

	Result	Target
Wall-glazing U-Value (W/m².K)	1.99	2.00
Solar Admittance	0.129	0.130

Glazing Area (m²)	48.4
Wall Area (m²)	75.13
Glazing to Façade Ratio	39%
Average Glazing U-Value (W/m².K)	4.50
Average Glazing SHGC	0.67
Average Wall R-Value (m²K/W)	2.65

Reference Building

Include shading?

	Method 1					Method 2		
	Glazing to Façade Ratio	Wall U-Value (W/m².K)	Glazing U-Value (W/m².K)	Shading Multiplier	SHGC	Wall U-Value (W/m².K)	Glazing U-Value (W/m².K)	SHGC
North	10%	0.38	5.80	0.870	0.81	0.38	5.80	0.33
East	15%	0.38	5.80	0.584	0.81			
South	3%	0.38	5.80	0.860	0.81			
West	39%	0.38	4.52	0.491	0.68			

ABCB

Non-residential Lighting

Class 3 and 5-9 buildings

National Construction Code

Main Menu | Help | Multiple Lighting Systems Calculator

Calculator

Building name/description	Classification
Arthur Neave - Cnr Parks and Albert Street, Werrington NSW	Class 9b

Number of rows preferred in table below 14 *(as currently displayed)*

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Illuminance: Designed Lux Level	Illuminance: Recommended Lux Level	Adjustment Factor One: Adjustment Factor One	Adjustment Factor One: Dimming % Area	Adjustment Factor One: Illuminance Turndown	Adjustment Factor Two: Adjustment Factor Two	Adjustment Factor Two: Dimming % Area	Adjustment Factor Two: Illuminance Turndown	Light Colour Adjustment Factors: Light Colour Adjustment Factor One	Light Colour Adjustment Factors: Light Colour Adjustment Factor Two	SATISFIES PART J6.2: System Illumination Power Load Allowance	SATISFIES PART J6.2: Lighting System Share of % of Aggregate Allowance Used
1	Ground Floor Main Hall	170.8 m²	57 m	4.0 m	1 W	Auditorium, church and public hall											1821 W	7% of 0%
2	Ground Floor Hall Kitchen	19.8 m²	18 m	4.0 m	1 W	Kitchen and food preparation area											134 W	7% of 0%
3	Ground Floor Hall Male WC	14.4 m²	15 m	4.0 m	1 W	Toilet, locker room, staff room, rest room and the like											74 W	7% of 0%
4	Ground Floor Hall Accessible WC	5.4 m²	9 m	4.0 m	1 W	Toilet, locker room, staff room, rest room and the like											29 W	7% of 0%
5	Ground Floor Hall Female WC	18.0 m²	18 m	4.0 m	1 W	Toilet, locker room, staff room, rest room and the like											93 W	7% of 0%
6	Ground Floor Hall Storage	15.9 m²	16 m	4.0 m	1 W	Storage											41 W	7% of 0%
7	Ground Floor Office	65.7 m²	36 m	4.0 m	1 W	Office - artificially lit to an ambient level of 200 lx or more											455 W	7% of 0%
8	Ground Floor Office Storage 1	6.4 m²	10 m	4.0 m	1 W	Storage											18 W	7% of 0%
9	Ground Floor Hall Chair Storage	10.0 m²	14 m	4.0 m	1 W	Storage											27 W	7% of 0%
10	Ground Floor Hall Cleaners Closet	4.2 m²	8 m	4.0 m	1 W	Service area, cleaner's room and the like											11 W	7% of 0%
11	Ground Floor Office Corridor	10.3 m²	17 m	4.0 m	1 W	Corridors											95 W	7% of 0%
12	Ground Floor Office WC	6.1 m²	10 m	4.0 m	1 W	Toilet, locker room, staff room, rest room and the like											33 W	7% of 0%
13	Ground Floor Office Storage 2	5.6 m²	10 m	4.0 m	1 W	Storage											15 W	7% of 0%
14	Ground Floor Office Accessible WC	6.6 m²	10 m	4.0 m	1 W	Toilet, locker room, staff room, rest room and the like											36 W	7% of 0%

Illuminance: These columns do not represent a requirement of the NCC and are suggestions only

Adjustment Factors | Adjustment Factors

Total 14 W

Total 2882 W

if inputs are valid ✔