

WEE HUR STUDENT HOUSING

NCC Section J Report

Prepared for:

The Trust Company (Australia) Limited ATF WH Gibbons Trust
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BASIS OF REPORT

This report has been prepared by SLR Consulting Australia Pty Ltd with all reasonable skill, care and diligence, and taking account of the timescale and resources allocated to it by agreement with The Trust Company (Australia) Limited ATF WH Gibbons Trust (the Client). Information reported herein is based on the interpretation of data collected, which has been accepted in good faith as being accurate and valid.

This report is for the exclusive use of the Client. No warranties or guarantees are expressed or should be inferred by any third parties. This report may not be relied upon by other parties without written consent from SLR

SLR disclaims any responsibility to the Client and others in respect of any matters outside the agreed scope of the work.

DOCUMENT CONTROL

Reference	Date	Prepared	Checked	Authorised
610.18313-R05-v1.0	13 December 2018	Horatio Cai	Neihad Al-Khalidy	Neihad Al-Khalidy

EXECUTIVE SUMMARY

SLR Consulting Australia Pty Ltd has been engaged by The Trust Company (Australia) Limited ATF WH Gibbons Trust to assess the proposed student housing development at Redfern for compliance with the National Construction Code (NCC) 2016 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

This requirement has been defined in Volume 1 of the 2016 NCC under Section J and is titled Energy Efficiency. There are eight Deemed-to-Satisfy subsections, J1 to J8, that focus on separate aspects of energy efficiency.

- J1 - Building Fabric.
- J2 - External Glazing.
- J3 - Building Sealing.
- J5 - Air Conditioning and Ventilation Systems.
- J6 - Artificial Lighting and Power.
- J7 –Swimming Pool and Spa Pool Plant.
- J8 - Access for Maintenance and facilities for Monitoring.

The NCC currently defines the development area as climate zone 5. This report covers the NCC Section J requirements of the proposed development.

SLR recommends the following to the building fabrics to comply with NCC 2016 Section J:

- Wall insulation requirements as per Table 2 and Table 3;
- Glazing requirements as per Table 5;
- Roof, ceiling and floor construction will remain unchanged so no requirements will apply to these building fabrics.

Requirements for building sealing, air-conditioning, artificial lighting, hot water supply and access for maintenance are summarised in the body of this report.

This report has provided advice about each subsection under Section J and identified how compliance with the NCC can be achieved in regards to the proposed building. It shall remain the responsibility of the building designers to ensure that the installation meets the requirements of this report, and in turn the NCC.

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1 Introduction

SLR Consulting Australia Pty Ltd has been engaged by The Trust Company (Australia) Limited ATF WH Gibbons Trust to assess the proposed student housing development at Redfern for compliance with the National Construction Code (NCC) 2016 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

The proposed site is bounded to the east by William Lane, to the south by Margaret Street and to the west by Gibbons Street, with a future development proposed to the north. Surrounds of the site are predominantly low level buildings, with there being some higher level development close to the site to the north and west. The exiting open landscape area, carpark and train station to the northwest results in some reduced shielding through this region.

Figure 1 Aerial View of Site Location



1.1 Proposed Development Description

The proposed design consists of the following features:

- One level of basement including gym, movie room, laundry, garbage room and bike storage;
- Ground Floor (Level 1) with common area, retail unit, bike workshop and storage and office space;
- Level 2 and Level 3 with internal and external common areas, student units;
- Level 4 with internal and external common areas, student units;
- Levels 5-18 for student units; and

- Level 18 with common area.

The development comprises approximately 500 student units.

Figure 2 Representative Architectural Plan Views of Proposal



2 Building Code of Australia Energy Efficiency Requirements

Since the 2006 release of the Building Code of Australia (BCA) it is a mandatory requirement for all BCA class buildings, except Class 4 and Class 10 buildings, to achieve efficient use of energy.

This requirement has been defined in Volume 1 of the 2016 NCC under Section J and is titled *Energy Efficiency*. There are eight (7) Deemed-to-Satisfy subsections, J1 to J8, that focus on separate aspects of energy efficiency.

- J1 - Building Fabric.
- J2 - External Glazing.
- J3 - Building Sealing.
- J5 - Air Conditioning and Ventilation Systems.
- J6 - Artificial Lighting and Power.
- J7 –Swimming Pool and Spa Pool Plant.
- J8 - Access for Maintenance and facilities for Monitoring.

This report will provide advice about each subsection and identify how compliance with the NCC can be achieved for these new requirements in regards to the proposed development.

It shall remain the responsibility of the building designers to ensure that the installation meets the requirements of this report, and in turn the NCC.

2.1 Defining the Building Class

The sub classification for the proposed building is:

- Student accommodation – Class 3 building
- Retail – Class 6

2.2 Defining the Energy Efficiency Requirements

The objective of Section J from Volume 1 of the NCC defines this section as being applicable to Class 2 to 9 buildings, other than Class 7, 8 or 9b buildings that do not have conditioned space. In this instance of the proposed development, there are requirements for compliance with Section J.

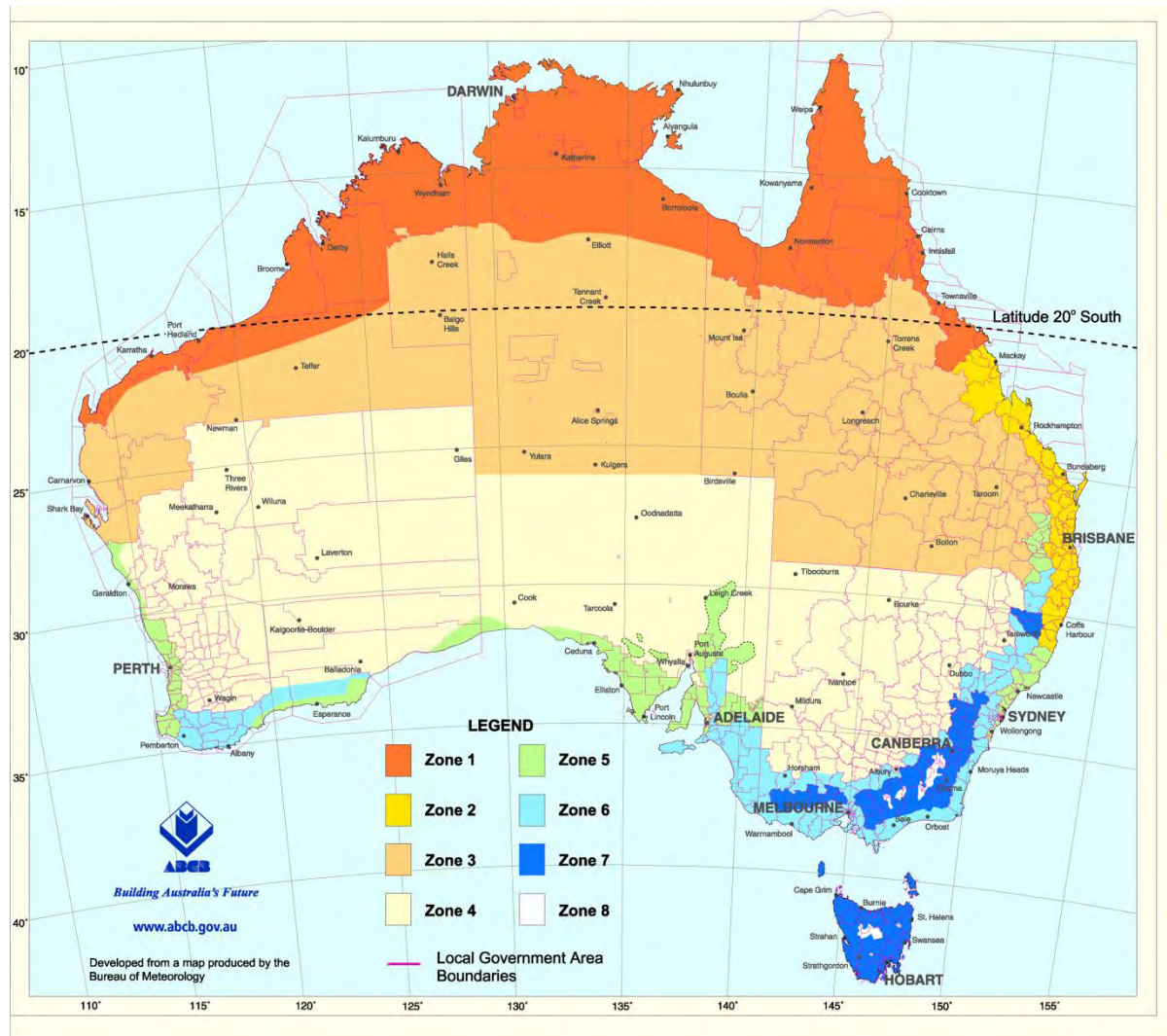
This report assumes the 2016 NCC Section J compliance for this development will be achieved through the Deemed-to-Satisfy method.

In order to achieve compliance with Section J of the 2016 NCC, the proposed development has to satisfy and achieve all requirements of every Deemed-to-Satisfy subsections.

2.3 Defining the BCA Climate

As the proposed development is situated within Sydney urban, parts of the NCC requirements will be based on these climate characteristics. The NCC currently defines the development area as climate zone 5 (shown in Figure 3).

Figure 3 Building Code of Australia Climate Zone Map



2.4 Design Documents

The report is prepared based on the architectural DA set dated 27/11/18. The mark ups drawings were used in this report is attached in Appendixes.

3 Part J1 - Building Fabric

Part J1 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of the building fabric. The purpose of this subsection is to ensure that the building fabric will provide sufficient thermal insulation to minimise heating and cooling loads placed on the building and the commensurate energy consumption HVAC systems servicing internal building spaces.

3.1 J1.1 - Application

As stated by the 2016 NCC, Part J1 applies to the proposed building.

3.2 J1.2 - General Thermal Construction

Where thermal insulation is installed in exterior envelope walls or roof of the proposed development, the insulation must comply with AS/NZS 4859.1 and be installed so that it:

- a. abuts or overlaps adjoining insulation;
- b. forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
- c. does not affect the safe or effective operation of a *service* or fitting.

Where reflective insulation is installed in exterior envelope walls or roof of the proposed aged care facility, it must be installed with:

- a. the necessary airspace to achieve the *required R-Value* between a reflective side of the *reflective insulation* and a building lining or cladding;
- b. the *reflective insulation* closely fitted against any penetration, door or *window* opening;
- c. the *reflective insulation* adequately supported by framing members; and
- d. each adjoining sheet of roll membrane being:
 - overlapped not less than 50 mm; or
 - taped together.

Where bulk insulation is installed in exterior envelope walls or roof of the proposed aged care facility, it must be installed so that:

- it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
- in ceilings where there is no bulk insulation or *reflective insulation* in the wall, it overlaps the wall member by not less than 50 mm.

3.3 J1.3 - Roof and Ceiling Insulation

The proposed development is located in climate zone 5, the roof and ceiling system that is part of the envelope must achieve the minimum Total R-value of:

Table J1.3a ROOFS AND CEILINGS - MINIMUM TOTAL R-VALUE FOR EACH CLIMATE ZONE

<i>Climate zone</i>	1, 2, 3, 4 and 5	6	7	8
Direction of heat flow	Downwards	Upwards		
Minimum <i>Total R-Value</i> for a roof or ceiling with a roof upper surface solar absorptance value of not more than 0.4	3.2	3.2	3.7	4.8
Minimum <i>Total R-Value</i> for a roof or ceiling with a roof upper surface solar absorptance value of more than 0.4 but not more than 0.6	3.7	3.2	3.7	4.8
Minimum <i>Total R-Value</i> for a roof or ceiling with a roof upper surface solar absorptance value of more than 0.6	4.2	3.2	3.7	4.8

For compliance with Table J1.3a, roof and ceiling construction is deemed to have the thermal properties listed in specification J1.3.

Where, for operational or safety reasons associated with exhaust fans, flues or recessed downlights, the area of the required ceiling is reduced, the loss of the insulation must be compensated for by increasing the R-value of the insulation in the remainder of the ceiling in accordance with Table J1.3b.

Table J1.3b ADJUSTMENT OF MINIMUM R-VALUE FOR LOSS OF CEILING INSULATION

Percentage of ceiling area uninsulated	Minimum <i>R-Value</i> of ceiling insulation <i>required</i> to satisfy J1.3(a)										
	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0	5.5	6.0
	Adjusted minimum <i>R-Value</i> of ceiling insulation <i>required</i> to compensate for loss of ceiling insulation area										
0.5% to less than 1.0%	1.0	1.6	2.2	2.8	3.4	4.0	4.7	5.4	6.2	6.9	
1.0% to less than 1.5%	1.1	1.7	2.3	2.9	3.6	4.4	5.2	6.1	7.0		
1.5% to less than 2.0%	1.1	1.7	2.4	3.1	3.9	4.8	5.8	6.8			
2.0% to less than 2.5%	1.1	1.8	2.5	3.3	4.2	5.3	6.5				
2.5% to less than 3.0%	1.2	1.9	2.6	3.6	4.6	5.9					
3.0% to less than 4.0%	1.2	2.0	3.0	4.2	5.7						
4.0% to less than 5.0%	1.3	2.2	3.4	5.0							
5.0% or more											
Not Permitted											
Note: Where the minimum <i>R-Value</i> of ceiling insulation <i>required</i> to satisfy J1.3(a) is between the values stated, interpolation may be used to determine the adjusted minimum <i>R-Value</i> .											

A roof that has metal roof sheeting fixed to metal purlins, metal rafters or metal battens and does not have a ceiling lining or has a ceiling lining fixed directly to those metal purlins, metal rafters or metal battens must have a thermal break, consisting of a material with an R-value of not less than R0.2, installed between the metal sheet roofing and its supports.

The roof/ceiling system for the exposed roof of the development is:

- Concrete Slab + Insulation + PB

Table 1 Roof R-value

Proposed System	Roofing	R-Value	R-Value Requirement	Compliance	Additional R-Value Required	Recommendations
Concrete Roof		0.58	3.2 (with a roof upper surface solar absorptance value of not more than 0.4)	No	2.62	SLR recommends R2.7 roof insulation to roof/ ceiling.
Concrete Roof		0.58	3.7 (with a roof upper surface solar absorptance value of more than 0.4 but not more than 0.6)	No	3.12	SLR recommends R3.2 roof insulation to roof/ceiling.
Concrete Roof		0.58	4.2 (with a roof upper surface solar absorptance value of more than 0.6)	No	3.62	SLR recommends R3.7 roof insulation to roof/ceiling.

Ceiling or roof insulation is required to the following areas:

- Ground – part of the retail unit below external common area
- L03 – units below external common area and units with exposed roof
- L18 Roof level

Detailed mark ups of required ceiling/roof insulation are showing in Appendix A.

3.4 J1.4 – Roof Lights

The total area of roof lights serving the room or spaces as a percentage of the floor area of the room or space must not exceed 5%. The roof lights must comply with Table J1.4 below.

Table J1.4 ROOF LIGHTS - THERMAL PERFORMANCE OF TRANSPARENT AND TRANSLUCENT ELEMENTS

Roof light shaft index (see Note 1)	Constant	Total area of <i>roof lights</i> serving the room or space as a percentage of the <i>floor area</i> of the room or space			
		Up to 2%	More than 2% to and up to 3%	More than 3% and up to 4%	More than 4% and up to 5%
Less than 0.5	Total System SHGC	Not more than 0.83	Not more than 0.57	Not more than 0.43	Not more than 0.34
	Total System U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
0.5 to less than 1.0	Total System SHGC	Not more than 0.83	Not more than 0.72	Not more than 0.54	Not more than 0.43
	Total System U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
1.0 to less than 2.5	Total System SHGC	Not more than 0.83	Not more than 0.83	Not more than 0.69	Not more than 0.55
	Total System U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4
2.5 and more	Total System SHGC	Not more than 0.83	Not more than 0.83	Not more than 0.83	Not more than 0.83
	Total System U-Value	Not more than 8.5	Not more than 5.7	Not more than 4.3	Not more than 3.4

Notes:

1. The total area of roof lights is the combine area for all roof lights serving the room or space.
2. The area of a roof light is the area of the roof opening that allows light to enter the building.
3. The thermal performance of an impermeate ceiling diffuser may be included on the total sysytem U-value and total sysytem SHGC of the roof light.

No roof lights have been proposed for the building, therefore this section is not applicable.

3.5 J1.5 – Walls

Table J1.5a of Part J1.5 of the 2016 NCC requires each part of an external wall of building located in climate zone 5 to:

- (i) achieve a minimum *Total R-Value* of 2.8 for external wall; and
- The minimum Total R-Value in (i) is reduced for a wall with a surface density of not less than 220 kg/m², by 0.5; and
- The minimum Total R-Value in (i) is reduced for a wall that is— facing the south orientation as described in Figure J2.3 of par J2.4 , by 0.5
- (ii) achieve a minimum *Total R-Value* of 1.8 for envelope wall other than external wall.

For internal wall between conditioned and unconditioned area such as service riser, lift shaft, toilets and FHR wall, they need to achieve a minimum of Total R-value of 1.8.

The proposed external and internal wall systems are:

- Concrete wall (Concrete + Airspace + PB)

R-value of the proposed wall systems and recommendations

Table 2 External Wall R-value

Proposed System	Wall	R-Value	R-Value Requirement	Compliance	Additional R-Value Required	Recommendations
Concrete wall		0.48	2.8	No	2.32	SLR recommends R2.4 wall insulation into the wall system.
Concrete wall (South facing)		0.48	2.3	No	1.82	SLR recommends R2.0 wall insulation into the wall system.

Table 3 Internal Wall R-value

Proposed System	Wall	R-Value	R-Value Requirement	Compliance	Additional R-Value Required	Recommendations
Concrete wall		0.48	1.8	No	1.32	SLR recommends R1.4 wall insulation into the wall system.

Detailed mark ups of required wall insulation are showing in Appendix B.

3.6 J1.6 - Floors

External floor must achieve the total R-value specified in Table J1.6.

Table J1.6 FLOORS — MINIMUM TOTAL R-VALUE

Location	Climate zone							
	1	2	3	4	5	6	7	8
Direction of heat flow	Upwards	Downwards and upwards		Downwards				
(a) A slab on ground:								
(i) Without an in-slab or in-screed heating or cooling system	Nil	Nil	Nil	Nil	Nil	Nil	1.0	2.0
(ii) With an in-slab or in-screed heating or cooling system	1.25	1.25	1.25	1.25	1.25	1.25	1.25	2.25
(b) A suspended floor without an in-slab or in-screed heating or cooling system where the non-conditioned space is—	1.0	1.0	Nil	Nil	1.0	1.0	1.5	2.5
(i) enclosed; and								
(ii) where mechanically ventilated by not more than 1.5 air changes per hour.								
(c) A suspended floor with an in-slab or in-screed heating or cooling system where the non-conditioned space is—	1.25	1.25	1.25	1.25	1.25	1.25	1.75	2.75
(i) enclosed; and								
(ii) where mechanically ventilated by not more than 1.5 air changes per hour								
(d) For other than (a), (b) or (c)	2.0	2.0	2.0	2.0	2.0	2.0	2.0	3.5
Note: A subfloor space with not more than 150% of the required subfloor ventilation is considered enclosed.								

The proposed floor system is as described below:

- Suspended concrete floor

Table 4 summarises the R-values of the proposed floor systems, and the recommendations to achieve compliance.

Table 4 Floor Systems Summary and Recommendations

Proposed System	R-Value	R-Value Requirement	Compliance	Additional R-Value Required	Recommendations
Concrete Slab	0.3	2.0	No	1.7	SLR recommends an insulation of R1.7 to concrete slab.

Floor insulation is required to the following areas:

- Ground – part of the retail unit, office, meeting room and reception/common/games above enclosed unconditioned spaces
- Ground – part of the bike repair/storage room above cinema
- L02 – units above bike repair/storage, plant rooms, common corridors and outside air
- L04 – part of the study area and DDA studio expose to outside air
- L05 – part of the units' floor expose to outside air

4 Part J2 – External Glazing

Part J2 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of external glazing. The purpose of this subsection is to ensure that building glazing will provide sufficient thermal insulation, and be appropriately shaded, to minimize heating and cooling loads placed on the building and the commensurate energy consumption of HVAC systems servicing internal building spaces.

4.1 J2.4 – Glazing

The glazing elements of a building must be assessed separately in accordance with orientation.

The glazing for the conditioned areas has been calculated using the glazing calculators attached in Appendix C. The calculator shows the minimum glazing performance to meet the requirements for the proposed building of Part J2. The values shown in the glazing calculator are whole of window values.

To achieve NCC Section J compliance, the glazing of the proposed student accommodation building is to be as recommended in **Table 5** below.

Table 5 Glazing Thermal Ratings Recommendations

Space Description	Orientation	Glazing IDs	U-Value (NFRC)*	SHGC (NFRC)*
Retail	N	As per Glazing calculator	≤ 6.3	≤ 0.46
Retail	W	As per Glazing calculator	≤ 6.3	≤ 0.46
Office	W	As per Glazing calculator	≤ 5.0	≤ 0.30
Meeting	W	As per Glazing calculator	≤ 5.0	≤ 0.30
Entrance	W	As per Glazing calculator	≤ 5.0	≤ 0.30
Games	W	As per Glazing calculator	≤ 5.0	≤ 0.30
Games	E	As per Glazing calculator	≤ 6.3	≤ 0.20
Quiet area	S	As per Glazing calculator	≤ 3.6	≤ 0.73
Lounge	S	As per Glazing calculator	≤ 3.6	≤ 0.73
Lounge	E	As per Glazing calculator	≤ 6.3	≤ 0.20
Units	N	As per Glazing calculator	≤ 6.4	≤ 0.36
Units	E	As per Glazing calculator	≤ 6.4	≤ 0.35
Units	S	As per Glazing calculator	≤ 6.4	≤ 0.73
Units	W	As per Glazing calculator	≤ 2.0	≤ 0.26
L02-L03 Dinning	N	As per Glazing calculator	≤ 6.4	≤ 0.36
L02-L03 Terrace	W	As per Glazing calculator	≤ 2.0	≤ 0.26
L04 Study	W	As per Glazing calculator	≤ 2.1	≤ 0.17
DDA studio	N	As per Glazing calculator	≤ 6.4	≤ 0.62
L18 Common area	W	As per Glazing calculator	≤ 4.9	≤ 0.30

Notes:

- a) A shading device is a shutter, blind, vertical or horizontal building screen with blades, battens or slats, which:
 - (i) is capable of restricting at least 80% of summer solar radiation; and
 - (ii) if adjustable, is operated automatically in response to the level of solar radiation.
- b) The U-value and SHGC are NFRC values for the window assembly values, not the glass only values. This is taken from <http://www.wers.net/Certified-Products-Commercial>
- c) Alternative glazing may be used subject to recalculation in glazing calculator.

5 Part J3 – Building Sealing

Part J3 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance for building sealing. The purpose of this subsection is to ensure that additional heating and cooling loads will not be introduced through building leakage.

5.1 J3.1 – Application

Building sealing is applicable to the conditioned spaces within the building.

5.2 J3.2 – Chimneys and Flues

The chimney or flue of an open solid-fuel burning appliance must be provided with a damper or flap that can be closed to seal the chimney or flue.

5.3 J3.3 – Roof Lights

(a) A roof light must be sealed, or capable of being sealed, when serving—

- (i) a conditioned space; or
- (ii) a habitable room in climate zones 4, 5, 6, 7 or 8.

(b) A roof light required by (a) to be sealed, or capable of being sealed, must be constructed with—

- (i) an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or
- (ii) a weatherproof seal; or
- (iii) a shutter system readily operated either manually, mechanically or electronically by the occupant.

5.4 J3.4 – External Windows and Doors

The Part J3.4 of the NCC Section J requirements will apply to the development.

Part J3.4 of the 2016 NCC requires that a seal to restrict air infiltration must be fitted to each edge of an external door, openable external window or the like when serving a conditioned space. This requirement does not apply to:

- a window complying with AS 2047; or
- a fire door; or
- a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.

The seal may be a foam or rubber compressible strip, fibrous seal or the like.

Main entrances to a building if leading to a conditioned space, must have an airlock, self-closing door or revolving door excluding:

- where the conditioned space is less than 50m²; or
- where a café, restaurant, open front shop or the like has a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and all other entrances to the café, restaurant, open front shop or the like, have self-closing doors.

5.5 J3.5 – Exhaust Fans

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

5.6 J3.6 – Construction of Roofs, Walls and Floors

For all conditioned spaces, the roofs, *external walls*, external floors and any opening including all *windows* and doors must be constructed to minimise air leakage. The conditioned spaces include all spaces within the proposed building where the environment is likely, by the intended use of the space, to be controlled by *air-conditioning*.

The construction *required* will be:

- a. enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or
- b. sealed by caulking, skirting, architraves, cornices or the like.

5.7 J3.7 – Evaporative coolers

Due to the absence of evaporative coolers within the proposed development there are no requirements to be met on this part.

6 Part J5 - Air Conditioning and Ventilation Systems

Part J5 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's air conditioning and ventilation systems. The purpose of this subsection is to ensure that conditioned air (when required) is generated, controlled and supplied to the building in an energy efficient manner. This subsection also ensures that ventilation and exhaust systems are efficient, while also keeping the wasted conditioned air to a minimum.

The mechanical services engineer should ensure that the proposed air-conditioning systems for the development comply with the following sections.

6.1 J5.2 - Air-Conditioning and Ventilation Systems

6.1.1 Air Conditioning Unit or Ventilation System

The air-conditioning unit or system serving the conditioned spaces is to comply with the following performance requirements.

An air-conditioning unit or system must:

- Be capable of -
 - being inactivated when the building served is not occupied; and
 - Closing the dampers when the air-conditioning unit or system is inactivated (only where the a/c unit or system has motorized outside air and return dampers).
- Have any supply and return ductwork sealed and insulated in accordance with **Specification J5.2**;
- Be designed so that the total fan power of the air-conditioning supply air and return air fans in the building, divided by the floor area served by those fans is, in accordance with **Table 6**, except for the following need not comply with this requirement:
 - The power for an energy reclaiming system that preconditions outdoor air.
 - The power for process related components such as high efficiency particulate air filters.
 - Fans in un-ducted air-conditioning units with a supply air of less than 1000 L/s.

Table 6 Copy of Table J5.2 - Maximum Fan Power

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

For more than 400 W/m² internal load:-

- a. in a building of not more than 500 m² floor area, use 0.09W of fan power for each watt of internal load; and
 - b. in a building of more than 500 m² floor area, use 0.12W of fan power for each watt of internal load.
-

6.1.2 Mechanical Ventilation System

This subsection of J5.2 applies all components of the proposed development as all spaces are to be mechanically ventilated. The mechanical ventilation systems are to comply with the following performance requirements.

A mechanical ventilation system must:

- Be capable of being deactivated when the building or part of the building served by that system is not occupied; and
- When serving a conditioned space-
 - Not provide mechanical ventilation in excess of the minimum quantity required by part F4 of the NCC for a mechanical ventilation system, where relevant, by more than 20% other than where there is-
 - Additional unconditioned outside air supplied to provide free cooling or to balance process exhaust as from a health-care building or laboratory; or
 - additional exhaust ventilation needed to balance the required mechanical ventilation; or
 - an energy reclaiming system that preconditions outsider air.
 - Where the number of square metres per person is 1 or less as specified in NCC section D1.13 and the air flow rate is more than 1000 L/s, have-
 - An energy reclaiming system that preconditions outsider air; or
 - The ability to automatically modulate the mechanical ventilation required by Part F4 in proportion to the number of occupants; and
- When the mechanical ventilation is provided by means other than an air-conditioning system and the air flow rate is more than 1000 L/s-
 - Have a fan power to air flow rate ratio of 0.65 W/ (L/s) without filters or 0.98 W/ (L/s) with filters for a general mechanical ventilation system.

6.2 J5.3 - Time Switch

Part J5.3 applies to the proposed development where applicable. Power supply must be controlled by a time switch for:

- air-conditioning system of more than 10 kW_r; or
- ventilation system with an air flow rate of more than 1000 L/s; or
- heating system of more than 10 kW_{heating}.

The requirements for time switch do not apply to a building where air-conditioning or ventilation is needed 24hour occupancy such as manufacturing process or emergency services.

The time switch must be capable of –

- Switching on and off electric power to systems –
 - at variable pre-programmed times and on variable pre-programmed days.
 - limiting the period the system is switched on to 2 hours beyond the time for when the building is occupied.
- Being overridden by a manual switch for a period of up to 2 hours, after which the time switch must resume control.

6.3 J5.4 - Heating and Cooling System

A. Systems that provide heating or cooling for air-conditioning systems must:

- Have any piping, vessels, heat exchangers or tanks containing heated or chilled fluid, other than hose with insulation levels covered by Minimum Energy Performance Standards (MEPS), insulated in accordance with **NCC Specification J5.4**.
- Where water is circulated by pumping at greater than 2 L/s -
 - Be designed so that the total of the pump power to the pump is in accordance with **Table 7**; and

Table 7 Copy of Table J5.4a - Maximum Pump Power

Cooling or heating load (W/m ² of the floor area of the conditioned space)	Maximum pump power(W/m ² of the floor area of the conditioned space)		
	Chilled water	Condenser water	Heating water
Up to 100	1.3	0.9	1.0
101 to 150	1.9	1.2	1.3
151 to 200	2.2	2.2	1.7
201 to 300	4.3	3.0	2.5
301 to 400	5.0	3.6	3.5
More than 400	5.6	5.6	3.6

- Have the pump capable of varying its speed in response to varying load when it is rated at more than 3 kW of pump power, except where the pump is needed to run at full speed for safe or efficient operation; and.
- If the system contains more than one water heater used for heating the building, chiller or coil, it must be capable of stopping the flow of water to those not operating.

B. A heater -

- For heating a space via water, such as a boiler in an air-conditioning system must achieve a thermal efficiency complying with **Table 8** when tested in accordance with BS 7190. and use reticulated gas where it is available at the allotment boundary; and

Table 8 Minimum Thermal Efficiency of a Water Heater

Fuel Type	Rated Capacity (kW _{heating})	Minimum Gross Thermal Efficiency (%)
Gas	Not More than 750	80
	More than 750	83
Oil	All capacities	80

- For heating a space other than via water, must be:
 - A solar heater; or
 - A gas heater; or
 - An oil heater if reticulated gas is not available at the allotment boundary; or
 - A heat pump heater; or
 - A solid fuel burning heater; or
 - A heater using reclaimed heat from another process such as reject heat from refrigerant plant; or
 - A combination of a. and f.; and

C. Packaged air-conditioning equipment with a capacity of not less than 65 kW_r, including a split unit and a heat pump, must have an energy efficiency ratio complying with **Table 9** when tested in accordance with AS/NZS 3823.1.2 at test condition T1.

Table 9 Minimum Energy Efficiency Ratio for Packaged Air-Conditioning Equipment

Equipment	Minimum Energy Efficiency Ratio (W _r /W _{input power})	
	65 kW _r to 95 kW _r Capacity	More than 95 kW _r Capacity
Air-Conditioner -- Cooling	2.7	2.8
Heat Pump -- Cooling	2.6	2.7

D. A refrigerant chiller up to 350 kW_r capacity must have an energy efficiency ratio complying with **Table 10** when determined in accordance with ARI 550/590.

Table 10 Minimum Energy Efficiency Ratio

Equipment	Minimum energy efficiency ratio	
	For full load operation	For integrated part load
Water cooled chiller	4.2	5.2
Air cooled or evaporative cooled chiller	2.5	3.4

- E. An air cooled condenser fan motor, other than part of package air-conditioning equipment or that is part of a Liquid Chilling Package, using vapour compression cycle, must not use more than 42 W of fan power for each kW of heat rejected from the refrigerant when determined in accordance with ARI 460.
- F. The fan of a cooling tower must not use more than:
- If the propeller or axial fan, 310 W of motor shaft power for each L/s of cooling water circulated; and
 - If a centrifugal fan, 590 W of motor shaft power for each L/s of cooling water circulated.
- G. the fan of a closed circuit cooler that is part of an air-conditioning system must not use more than:
- if a propeller or axial fan, 500 W of fan power for each L/s of cooled fluid circulated; and
 - if a centrifugal fan, 670 W of fan power for each L/s of cooled fluid circulated.
- H. the fan of an evaporative condenser that is part of an air-conditioning system must not use more than:
- if a propeller or axial fan, 18 W of fan power for each kW of heat rejected; and
 - if a centrifugal fan, 22 W of fan power for each kW of heat rejected.
- I. The spray water pump of a closed circuit cooler or evaporative condenser that is part of an air-conditioning system must not use more than 150 W of pump power of each L/s of spray water circulated.

6.4 J5.5 - Miscellaneous Exhaust Systems

A miscellaneous exhaust system with an air flow rate of more than 1000 L/s, that is associated with equipment having a variable demand must:

- Have the means for the operator to reduce the energy used, such as by variable speed fan, and stop motor when the system is not needed.
- Be designed to minimize the exhausting of conditioned air.

Part J5.5 does not apply:

- Where additional exhaust ventilation is needed to balance the required outside air to ventilation; or
- Where air flow must be maintained for safe operation.

7 Part J6 – Artificial Lighting and Power

Part J6 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's artificial lighting and power. The purpose of this subsection is to ensure that efficient lighting systems are installed to maintain required lighting levels while keeping energy consumption to a minimum. This subsection also ensures that effective lighting control is utilised to reduce wasted energy consumption.

7.1 J6.1 – Application

As stated by the 2016 NCC, Part J6 applies to all classes of buildings with the exception of sole-occupancy units of a Class 2 or Class 4 part of a building. Part J6 therefore applies to the proposed development.

7.2 J6.2 – Interior Artificial Lighting

There is a requirement for the proposed building that the artificial lighting must not exceed the maximum lamp power density in **Table 11**, except that in a bathroom, dressing rooms or the like, an average artificial *light source efficacy* of not less than 40 Lumens/W may be used.

Table 11 Maximum Lamp Power Density

Location	Maximum Power Density (W/m ²)	Lamp
Dormitory of Class 3 building used for sleeping and study	9	
Office	9	
Retail	22	
Restaurant	18	
Kitchen and food preparation area	8	
Within public corridors	8	
Service areas such as plant rooms or store rooms	5	
Employees' work areas such as reception areas	9	
General purpose learning areas and tutorial rooms	8	
Toilet, locker room, staff room ,rest room	6	

The maximum illuminance power density may be increased by multiplying by any adjustment factor provided in NCC Table J6.2b which provides adjustment factors based on methods of controlling the lighting systems, such as motion detectors, dimming systems and room properties.

7.3 J6.3 - Interior Artificial Lighting and Power Control

A light switch must be located in a visible position in the room or space being switched, or in an adjacent room or space from where the lighting being switched is visible. The light switch must not operate lighting within an area of more than 250 m².

These lighting and power control requirements do not apply to Emergency Lighting in accordance with Part E4, NCC Volume One.

7.4 J6.4 - Interior Decorative and Display Lighting

Any interior/ lighting for display or decorative purposes, such as the illumination of foyer murals, must be separately controlled from other artificial lighting.

Each group of decorative/display lighting must be controlled by a manual light switch.

7.5 J6.5 - Artificial Lighting around the Perimeter of the Building

Artificial lighting around the perimeter of a building will be controlled by a time switch or daylight sensor complying with Section J6 lighting controls requirements.

A time switch needs to abide by the specification set out in the 2016 NCC. Switching on and off electric power to systems at variable pre-programmed times and on variable pre-programmed days.

When the total perimeter lighting load exceeds 100W, it must have an average light source efficacy of not less than 60 Lumens/W or be controlled by a motion detector in accordance with Specification J6 and when used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification J6.

7.6 J6.6 - Boiling Water and Chilled Water Storage Units

Power supply to a boiling water or chilled water storage unit must be controlled by a time switch in accordance with Specification J6.

8 Part J7 - Hot Water Supply

Part J7 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's hot water supply system. The purpose of this subsection is to ensure that efficient hot water units and systems are installed.

8.1 J7.2 - Heated water supply

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.

9 Part J8 - Access for Maintenance

Part J8 of the 2016 NCC contains the requirements of the Deemed-to-Satisfy compliance of a building's access to services for maintenance. The purpose of this subsection is to ensure that access can be gained to all services that will require regular maintenance. Maintenance to these services will ensure that reduction in efficiency over time is kept to a minimum.

9.1 J8.1 - Application

As stated by the 2016 NCC, Part J8 applies to a Class 5 building. Part J8 therefore applies to the proposed development.

9.2 J8.2 - Access for maintenance

Access must be provided to all plant, equipment and components of services that rely on maintenance to continue to perform including:

- (a) adjustable or motorised shading devices;
- (b) time switches and motion detectors;
- (c) room temperature thermostats;
- (d) plant thermostats such as on boilers or refrigeration units;
- (e) motorised air dampers and control valves;
- (f) reflectors, lenses and diffusers of light fittings;
- (g) heat transfer equipment; and
- (h) plant that receives a concession under JV3(b) for the use of energy obtained from:
 - i. an on-site renewable energy source; or
 - ii. another process as reclaimed energy

9.3 J8.3 Facilities for energy monitoring

(a) A building or sole-occupancy unit with a floor area of more than 500 m² must have the facility to record the consumption of gas and electricity.

(b) A building with a floor area of more than 2,500 m² must have the facility to record individually the energy consumption of:

- i. air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans;
- ii. artificial lighting;
- iii. appliance power;
- iv. central hot water supply;
- v. internal transport devices including lifts, escalators and travelators where there is more than one serving the building; and
- vi. other ancillary plant.

10 Conclusion

SLR Consulting Australia Pty Ltd has been engaged by The Trust Company (Australia) Limited ATF WH Gibbons Trust to assess the proposed student housing development at Redfern for compliance with the National Construction Code (NCC) 2016 provisions for Energy Efficiency under Section J. The objective of the NCC Section J is to reduce greenhouse gas emissions by efficiently using energy in buildings.

This report has provided advice about each subsection under Section J and identified how compliance with the NCC can be achieved in regards to the proposed building. It shall remain the responsibility of the building designers to ensure that the installation meets the requirements of this report, and in turn the NCC.

APPENDIX A

NCC 2016 Roof and Ceiling Insulation Requirements



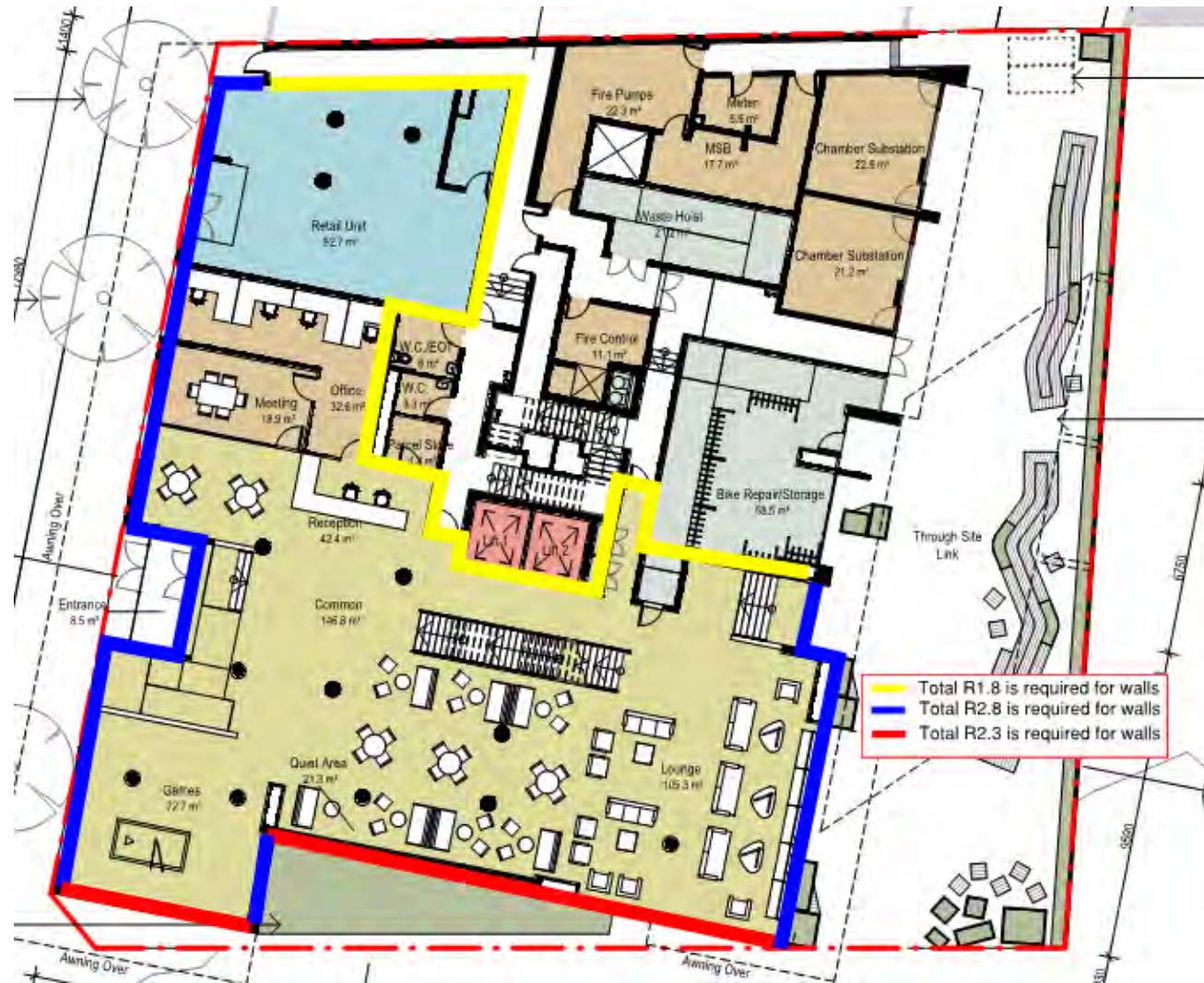


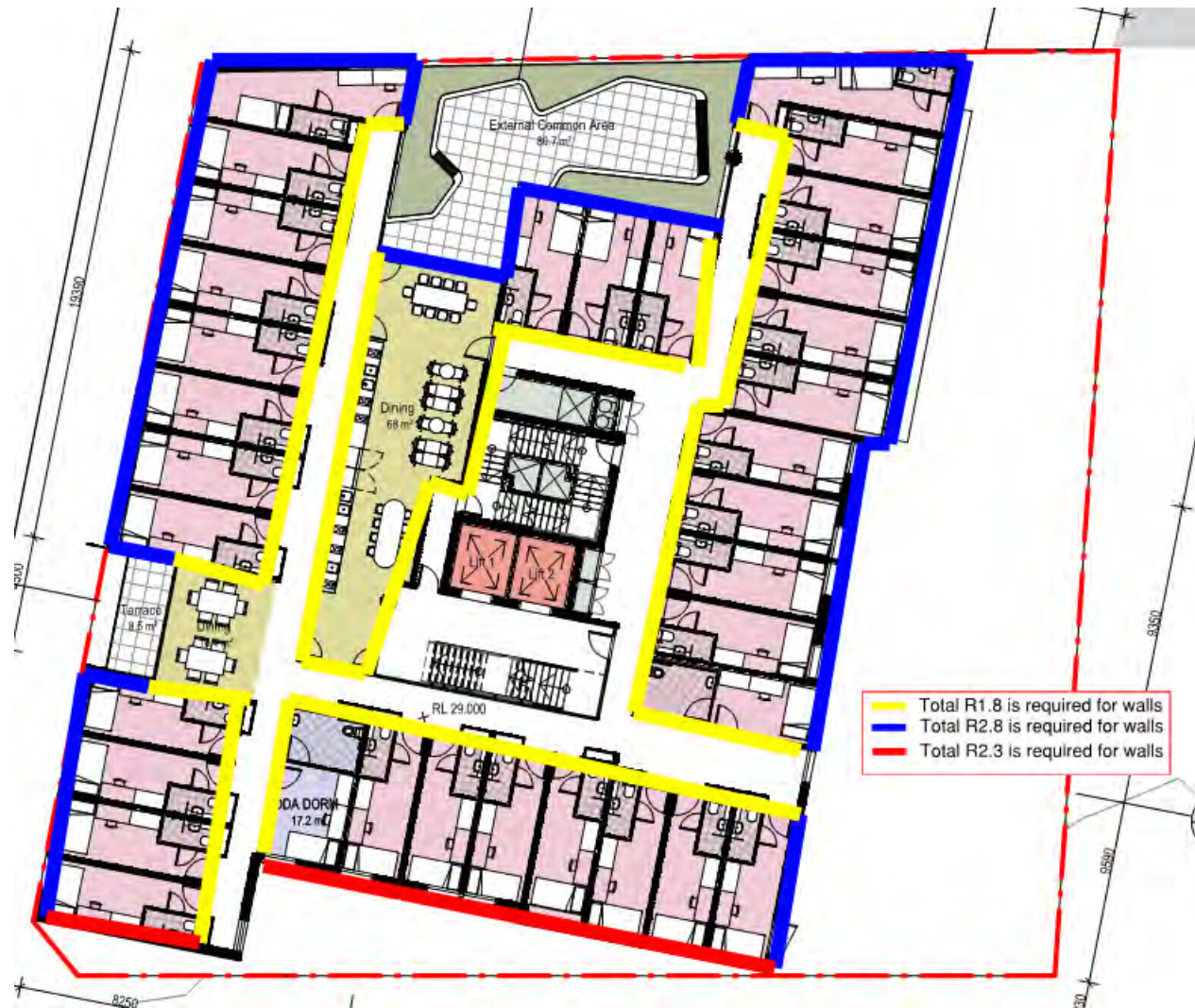


APPENDIX B

NCC 2016 Wall Insulation Requirements











APPENDIX C

NCC 2016 Glazing Calculator DTS Requirements

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

Building name/description

Wee Hur Student Housing

Application

shop display

Climate zone

5

Storey

Ground L01

Facade areas

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	6.72m²						29.6m²		
Option B									
Glazing area (A)	6.21m²						16.8m²		

Number of rows preferred in table below 10 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)						
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m²)	Element share of % of allowance used
1	Retail	N		3.65	1.70		6.3	0.46	1.400	3.650	0.38	0.00	0.87	0.63	6.21	100% of 98%
2	Retail	W		2.50	2.00		6.3	0.46	2.500	2.500	1.00	0.00	0.35	0.44	5.00	26% of 80%
3	Retail	W		1.10	2.00		6.3	0.46				0.00	1.00	1.00	2.20	19% of 80%
4	Retail	W		2.70	3.00		6.3	0.46	2.500	2.700	0.93	0.00	0.41	0.47	8.10	43% of 80%
5	Retail	W		0.50	3.00		6.3	0.46				0.00	1.00	1.00	1.50	13% of 80%
6																
7																
8																
9																
10																

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

Building name/description

Wee Hur Student Housing

Application

Class 3

Climate zone

5

Storey

Ground L01

Facade areas

N	NE	E	SE	S	SW	W	NW	Internal
		71.9m²		81.6m²		128m²		

Option A

Option B

Glazing area (A) 31.5m² 35.8m² 46.8m²

Number of rows preferred in table below

20 (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	
	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	
ID																	
1											ROW SKIPPED (OK if intentional)						
2											ROW SKIPPED (OK if intentional)						
3											ROW SKIPPED (OK if intentional)						
4											ROW SKIPPED (OK if intentional)						
5											ROW SKIPPED (OK if intentional)						
6	Office	W		2.35	2.50		5.0	0.30	2.500	2.350	1.06	0.00	0.31	0.42	5.88	11% of 99%	
7	Office	W		0.50	2.50		5.0	0.30				0.00	1.00	1.00	1.25	4% of 99%	
8	Meeting	W		2.35	2.50		5.0	0.30	2.500	2.350	1.06	0.00	0.31	0.42	5.88	11% of 99%	
9	Meeting	W		0.50	2.50		5.0	0.30				0.00	1.00	1.00	1.25	4% of 99%	
10	Entrance	W		2.85	4.50		5.0	0.30	2.500	2.850	0.88	0.00	0.44	0.48	12.83	25% of 99%	
11	Entrance	W		1.10	4.50		5.0	0.30				0.00	1.00	1.00	4.95	15% of 99%	
12	Games	W		2.35	5.20		5.0	0.30	2.500	2.350	1.06	0.00	0.31	0.42	12.22	23% of 99%	
13	Games	W		0.50	5.20		5.0	0.30				0.00	1.00	1.00	2.60	8% of 99%	
14	Games	E		2.95	2.50		6.3	0.20				0.00	1.00	1.00	7.38	26% of 97%	
15	Quiet area	S		3.00	10.25		3.6	0.73				0.00	1.00	1.00	30.75	87% of 99%	
16	Lounge	S		2.25	2.25		3.6	0.73	2.500	2.800	0.89	0.55	0.91	0.85	5.06	13% of 99%	
17	Lounge	E		2.20	2.10		6.3	0.20	2.500	2.800	0.89	0.60	0.87	0.78	4.62	13% of 97%	
18	Lounge	E		2.20	4.30		6.3	0.20	2.500	2.800	0.89	0.60	0.87	0.78	9.46	26% of 97%	
19	Lounge	E		4.00	2.50		6.3	0.20				0.00	1.00	1.00	10.00	36% of 97%	
20																	

page 1 of 2

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

Building name/description

Gibbon St, Redfern

Application

Class 3

Climate zone

5

Storey

2

Facade areas

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	41.5m ²		133m ²		93.8m ²		111m ²		
Option B									
Glazing area (A)	24m ²		28m ²		14.1m ²		39.1m ²		

Number of rows preferred in table below

38 (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 (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m ²)	Element share of % of allowance used
1	L2-N-R1	N		2.95	2.07		6.4	0.36				0.00	1.00	1.00	6.11	63% of 97%
2	L2-N-R2	N		1.59	1.20		6.4	0.36	0.211	1.708	0.12	0.12	0.99	0.96	1.90	18% of 97%
3	L2-N-R3	N		1.59	1.20		6.4	0.36	0.211	1.708	0.12	0.12	0.99	0.96	1.90	18% of 97%
4	L2-N-Dining	N		2.95	4.76		6.4	0.36	3.525	3.021	1.17	0.07	0.00	0.25	14.04	1% of 97%
5	L2-E-R1	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
6	L2-E-R2	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
7	L2-E-R3	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
8	L2-E-R4	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
9	L2-E-R5	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
10	L2-E-R6	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
11	L2-E-R7	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
12	L2-E-R8	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
13	L2-E-R9	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
14	L2-E-R10	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
15	L2-E-R11	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
16	L2-E-R12	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
17	L2-E-R13	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
18	L2-S-R1	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
19	L2-S-R2	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
20	L2-S-R3	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
21	L2-S-R4	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%

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GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)						
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (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
22	L2-S-R5	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
23	L2-S-R6	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
24	L2-S-R7	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
25	L2-W-R1	W		1.69	1.22		2.0	0.26				0.00	1.00	1.00	2.06	5% of 100%
26	L2-W-R2	W		1.69	1.24		2.0	0.26				0.00	1.00	1.00	2.10	5% of 100%
27	L2-W-R3	W		1.69	1.23		2.0	0.26				0.00	1.00	1.00	2.07	5% of 100%
28	L2-W-R4	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.11	5% of 100%
29	L2-W-R5	W		1.69	1.24		2.0	0.26				0.00	1.00	1.00	2.09	5% of 100%
30	L2-W-R6	W		1.69	1.22		2.0	0.26				0.00	1.00	1.00	2.06	5% of 100%
31	L2-W-R7	W		1.69	1.93		2.0	0.26				0.00	1.00	1.00	3.25	8% of 100%
32	L2-W-R8	W		1.69	1.20		2.0	0.26				0.00	1.00	1.00	2.02	5% of 100%
33	L2-W-R9	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.11	5% of 100%
34	L2-W-R10	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.10	5% of 100%
35	L2-W-R11	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.10	5% of 100%
36	L2-W-R12	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.11	5% of 100%
37	L2-W-Terrace	W		2.93	4.42		2.0	0.26				0.00	1.00	1.00	12.94	33% of 100%
38	L2-E-R14	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%

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Report from L03.xlsx

printed 05-12-2018

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

Building name/description

Gibbon St, Redfern

Application

Class 3

Climate zone

5

Storey

3

Facade areas

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	41.5m ²		133m ²		93.8m ²		111m ²		
Option B									
Glazing area (A)	24m ²		28m ²		14.1m ²		37.1m ²		

Number of rows preferred in table below

37 (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 (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m ²)	Element share of % of allowance used
1	L3-N-R1	N		2.95	2.07		6.4	0.36	2.750	3.132	0.88	0.18	0.71	0.44	6.11	28% of 50%
2	L3-N-R2	N		1.59	1.20		6.4	0.36	0.211	1.708	0.12	0.12	0.99	0.96	1.90	35% of 50%
3	L3-N-R3	N		1.59	1.20		6.4	0.36	0.211	1.708	0.12	0.12	0.99	0.96	1.90	35% of 50%
4	L3-N-Dining	N		2.95	4.76		6.4	0.36	3.525	3.021	1.17	0.07	0.00	0.25	14.04	1% of 50%
5	L3-E-R1	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
6	L3-E-R2	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
7	L3-E-R3	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
8	L3-E-R4	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
9	L3-E-R5	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
10	L3-E-R6	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
11	L3-E-R7	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
12	L3-E-R8	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
13	L3-E-R9	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
14	L3-E-R10	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
15	L3-E-R11	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
16	L3-E-R12	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
17	L3-E-R13	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%
18	L3-S-R1	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
19	L3-S-R2	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
20	L3-S-R3	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
21	L3-S-R4	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%

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Report from L03.xlsx

printed 05-12-2018

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 (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
22	L3-S-R5	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
23	L3-S-R6	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
24	L3-S-R7	S		1.68	1.20		6.4	0.73				0.00	1.00	1.00	2.01	14% of 66%
25	L2-W-R1	W		1.69	1.24		2.0	0.26				0.00	1.00	1.00	2.10	6% of 95%
26	L2-W-R2	W		1.69	1.23		2.0	0.26				0.00	1.00	1.00	2.07	6% of 95%
27	L2-W-R3	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.11	6% of 95%
28	L2-W-R4	W		1.69	1.24		2.0	0.26				0.00	1.00	1.00	2.09	6% of 95%
29	L2-W-R5	W		1.69	1.22		2.0	0.26				0.00	1.00	1.00	2.06	6% of 95%
30	L2-W-R6	W		1.69	1.93		2.0	0.26				0.00	1.00	1.00	3.25	9% of 95%
31	L2-W-R7	W		1.69	1.20		2.0	0.26				0.00	1.00	1.00	2.02	5% of 95%
32	L2-W-R8	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.11	6% of 95%
33	L2-W-R9	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.10	6% of 95%
34	L2-W-R10	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.10	6% of 95%
35	L2-W-R11	W		1.69	1.25		2.0	0.26				0.00	1.00	1.00	2.11	6% of 95%
36	L2-W-Terrace	W		2.93	4.42		2.0	0.26				0.00	1.00	1.00	12.94	35% of 95%
37	L3-E-R14	E		1.70	1.18		6.4	0.35				0.00	1.00	1.00	2.00	7% of 92%

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Report from L04.xlsx

printed 05-12-2018

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

Building name/description: **Gibbon St, Redfern** Application: **Class 3** Climate zone: **5**

Storey: **4**

Facade areas

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	82.1m²		69.5m²		89.4m²		94.9m²		
Option B									
Glazing area (A)	7.54m²		17.9m²		15.8m²		76.6m²		

Number of rows preferred in table below: **21** (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	L4-N-Corridor	N		1.58	1.14		6.4	0.73	0.211	1.708	0.12	0.13	0.99	0.96	1.80	26% of 77%
2	L4-N-DDA Studio G1	N		1.60	1.24		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.98	24% of 77%
3	L4-N-DDA Studio G2	N		1.59	1.23		6.4	0.62	0.211	1.708	0.12	0.12	0.99	0.96	1.96	24% of 77%
4	L4-N-R1	N		1.59	1.13		6.4	0.73	0.211	1.708	0.12	0.12	0.99	0.96	1.79	26% of 77%
5	L4-E-R1	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
6	L4-E-R2	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
7	L4-E-R3	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
8	L4-E-R4	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
9	L4-E-R5	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
10	L4-E-R6	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
11	L4-E-R7	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
12	L4-E-R8	E		1.80	1.25		6.4	0.35	0.261	1.704	0.15	-0.09	0.94	0.90	2.24	13% of 99%
13	L4-S-R1	S		1.60	1.26		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	2.01	13% of 77%
14	L4-S-R2	S		1.60	1.25		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	2.00	13% of 77%
15	L4-S-R3	S		1.60	1.42		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	2.26	14% of 77%
16	L4-S-R4	S		1.60	1.43		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	2.29	14% of 77%
17	L4-S-R5	S		1.60	1.30		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	2.07	13% of 77%
18	L4-S-R6	S		1.60	1.25		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	1.99	13% of 77%
19	L4-S-R7	S		1.60	1.07		6.4	0.73	0.446	1.700	0.26	0.10	0.96	0.94	1.71	11% of 77%
20	L4-S-R8	S		1.60	0.92		6.4	0.73	1.477	1.700	0.87	0.10	0.83	0.75	1.48	9% of 77%
21	L4-W-Study	W		2.93	26.13		2.1	0.17	2.733	2.930	0.93	-0.00	0.40	0.46	76.61	100% of 99%

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Report from L18.xlsx

printed 05-12-2018

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

Building name/description

Gibbon St, Redfern

Application

Class 3

Climate zone

5

Storey

L18

Facade areas

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	86.5m ²		92.8m ²		92.3m ²		95.8m ²		
Option B									
Glazing area (A)	11.2m ²		18.6m ²		18.4m ²		25.7m ²		

Number of rows preferred in table below

35 (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 (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m ²)	Element share of % of allowance used
1	L10-N-Corridor-G1	N		1.60	2.34		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	3.75	33% of 100%
2	L10-N-Corridor-G2	N		1.60	1.15		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.83	16% of 100%
3	L10-N-Corridor-G3	N		1.60	1.15		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.85	16% of 100%
4	L10-N-DDA Studio- G1	N		1.60	1.22		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.95	17% of 100%
5	L10-N-DDA Studio- G2	N		1.60	1.17		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.87	17% of 100%
6	L10-E-R1	E		1.58	1.30		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.04	11% of 99%
7	L10-E-R2	E		1.58	1.25		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.97	11% of 99%
8	L10-E-R3	E		1.58	1.46		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.30	12% of 99%
9	L10-E-R4	E		1.58	1.43		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.25	12% of 99%
10	L10-E-R5	E		1.58	1.44		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.27	12% of 99%
11	L10-E-R6	E		1.58	1.42		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.24	12% of 99%
12	L10-E-R7	E		1.58	1.31		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.06	11% of 99%
13	L10-E-R8	E		1.58	1.04		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.64	9% of 99%
14	L10-E-R9	E		1.58	1.14		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.80	10% of 99%
15	L10-S-R1	S		1.58	1.30		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.04	11% of 87%
16	L10-S-R2	S		1.58	1.26		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.99	11% of 87%
17	L10-S-R3	S		1.58	1.40		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.21	12% of 87%
18	L10-S-R4	S		1.58	1.41		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.23	12% of 87%
19	L10-S-R5	S		1.58	1.41		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.23	12% of 87%
20	L10-S-R6	S		1.58	1.42		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.24	12% of 87%
21	L10-S-R7	S		1.58	1.33		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.10	11% of 87%

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Report from L18.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
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
22	L10-S-R8	S		1.58	1.00		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.57	9% of 87%
23	L10-S-R9	S		1.58	1.14		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.80	10% of 87%
24	L10-W-Common Area- G1	W		1.61	1.25		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.02	8% of 100%
25	L10-W-Common Area- G2	W		1.61	1.30		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.08	8% of 100%
26	L10-W-R3	W		1.61	1.29		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.07	8% of 100%
27	L10-W-R4	W		1.61	1.28		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.06	8% of 100%
28	L10-W-R5	W		1.61	1.05		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	1.68	7% of 100%
29	L10-W-R6	W		1.61	1.28		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.05	8% of 100%
30	L10-W-R7	W		1.61	1.27		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.04	8% of 100%
31	L10-W-R8	W		1.61	1.25		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.01	8% of 100%
32	L10-W-R9	W		1.61	1.45		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.33	9% of 100%
33	L10-W-R10	W		1.61	1.42		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.27	9% of 100%
34	L10-W-R11	W		1.61	1.28		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.05	8% of 100%
35	L10-W-R12	W		1.61	1.91		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	3.07	12% of 100%

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Report from Typical Floor.xlsx

printed 05-12-2018

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

Building name/description

Gibbon St, Redfern

Application

Class 3

Climate zone

5

Storey

Typical

Facade areas

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	86.5m ²		92.8m ²		92.3m ²		95.8m ²		
Option B									
Glazing area (A)	11.2m ²		18.6m ²		18.4m ²		26.8m ²		

Number of rows preferred in table below

35 (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 (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S _H)	Cooling (S _C)	Area used (m ²)	Element share of % of allowance used
1	L10-N-Corridor-G1	N		1.60	2.34		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	3.75	33% of 100%
2	L10-N-Corridor-G2	N		1.60	1.15		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.83	16% of 100%
3	L10-N-Corridor-G3	N		1.60	1.15		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.85	16% of 100%
4	L10-N-DDA Studio- G1	N		1.60	1.22		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.95	17% of 100%
5	L10-N-DDA Studio- G2	N		1.60	1.17		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.87	17% of 100%
6	L10-E-R1	E		1.58	1.30		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.04	11% of 99%
7	L10-E-R2	E		1.58	1.25		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.97	11% of 99%
8	L10-E-R3	E		1.58	1.46		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.30	12% of 99%
9	L10-E-R4	E		1.58	1.43		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.25	12% of 99%
10	L10-E-R5	E		1.58	1.44		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.27	12% of 99%
11	L10-E-R6	E		1.58	1.42		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.24	12% of 99%
12	L10-E-R7	E		1.58	1.31		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.06	11% of 99%
13	L10-E-R8	E		1.58	1.04		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.64	9% of 99%
14	L10-E-R9	E		1.58	1.14		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.80	10% of 99%
15	L10-S-R1	S		1.58	1.30		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.04	11% of 87%
16	L10-S-R2	S		1.58	1.26		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.99	11% of 87%
17	L10-S-R3	S		1.58	1.40		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.21	12% of 87%
18	L10-S-R4	S		1.58	1.41		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.23	12% of 87%
19	L10-S-R5	S		1.58	1.41		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.23	12% of 87%
20	L10-S-R6	S		1.58	1.42		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.24	12% of 87%
21	L10-S-R7	S		1.58	1.33		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.10	11% of 87%

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Report from Typical Floor.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
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
22	L10-S-R8	S		1.58	1.00		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.57	9% of 87%
23	L10-S-R9	S		1.58	1.14		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.80	10% of 87%
24	L10-W-R1	W		1.61	1.40		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.24	8% of 77%
25	L10-W-R2	W		1.61	1.42		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.28	9% of 77%
26	L10-W-R3	W		1.61	1.47		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.36	9% of 77%
27	L10-W-R4	W		1.61	1.47		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.36	9% of 77%
28	L10-W-R5	W		1.61	1.05		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	1.68	6% of 77%
29	L10-W-R6	W		1.61	1.28		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.05	8% of 77%
30	L10-W-R7	W		1.61	1.27		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.04	8% of 77%
31	L10-W-R8	W		1.61	1.25		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.01	8% of 77%
32	L10-W-R9	W		1.61	1.45		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.33	9% of 77%
33	L10-W-R10	W		1.61	1.42		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.27	8% of 77%
34	L10-W-R11	W		1.61	1.28		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	2.05	8% of 77%
35	L10-W-R12	W		1.61	1.91		2.0	0.26	0.261	1.708	0.15	0.10	0.98	0.96	3.07	11% of 77%

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

Building name/description: **Gibbon St, Redfern**

Application: **Class 3**

Climate zone: **5**

Storey: **L18**

Facade areas:

	N	NE	E	SE	S	SW	W	NW	Internal
Option A	86.5m²		92.8m²		92.3m²		95.8m²		
Option B									
Glazing area (A)	11.2m²		18.6m²		18.4m²		25.7m²		

Number of rows preferred in table below: **35** (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	L18-N-Corridor-G1	N		1.60	2.34		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	3.75	33% of 100%
2	L18-N-Corridor-G2	N		1.60	1.15		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.83	16% of 100%
3	L18-N-Corridor-G3	N		1.60	1.15		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.85	16% of 100%
4	L18-N-DDA Studio- G1	N		1.60	1.22		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.95	17% of 100%
5	L18-N-DDA Studio- G2	N		1.60	1.17		6.4	0.62	0.211	1.708	0.12	0.11	0.99	0.96	1.87	17% of 100%
6	L18-E-R1	E		1.58	1.30		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.04	11% of 99%
7	L18-E-R2	E		1.58	1.25		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.97	11% of 99%
8	L18-E-R3	E		1.58	1.46		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.30	12% of 99%
9	L18-E-R4	E		1.58	1.43		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.25	12% of 99%
10	L18-E-R5	E		1.58	1.44		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.27	12% of 99%
11	L18-E-R6	E		1.58	1.42		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.24	12% of 99%
12	L18-E-R7	E		1.58	1.31		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	2.06	11% of 99%
13	L18-E-R8	E		1.58	1.04		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.64	9% of 99%
14	L18-E-R9	E		1.58	1.14		6.4	0.41	0.261	1.704	0.15	0.13	0.98	0.97	1.80	10% of 99%
15	L18-S-R1	S		1.58	1.30		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.04	11% of 87%
16	L18-S-R2	S		1.58	1.26		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.99	11% of 87%
17	L18-S-R3	S		1.58	1.40		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.21	12% of 87%
18	L18-S-R4	S		1.58	1.41		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.23	12% of 87%
19	L18-S-R5	S		1.58	1.41		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.23	12% of 87%
20	L18-S-R6	S		1.58	1.42		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.24	12% of 87%
21	L18-S-R7	S		1.58	1.33		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	2.10	11% of 87%
22	L18-S-R8	S		1.58	1.00		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.57	9% of 87%

page 1 of 2

Report from L18.xlsx

printed 10-12-2018

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 (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	
23	L18-S-R9	S		1.58	1.14		6.4	0.73	0.297	1.700	0.17	0.12	0.98	0.97	1.80	10% of 87%	
24	L18-W-Common Area- G1	W		1.61	1.25		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.02	8% of 100%	
25	L18-W-Common Area- G2	W		1.61	1.30		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.08	8% of 100%	
26	L18-W-R3	W		1.61	1.29		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.07	8% of 100%	
27	L18-W-R4	W		1.61	1.28		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.06	8% of 100%	
28	L18-W-R5	W		1.61	1.05		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	1.68	7% of 100%	
29	L18-W-R6	W		1.61	1.28		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.05	8% of 100%	
30	L18-W-R7	W		1.61	1.27		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.04	8% of 100%	
31	L18-W-R8	W		1.61	1.25		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.01	8% of 100%	
32	L18-W-R9	W		1.61	1.45		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.33	9% of 100%	
33	L18-W-R10	W		1.61	1.42		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.27	9% of 100%	
34	L18-W-R11	W		1.61	1.28		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	2.05	8% of 100%	
35	L18-W-R12	W		1.61	1.91		4.9	0.30	0.261	1.708	0.15	0.10	0.98	0.96	3.07	12% of 100%	

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