DTS SECTION J REPORT

FIVEWAYS CROWS NEST

WF803-07F03(REV0)- DTS SECTION J REPORT

AUGUST 29, 2024

Prepared for:

Deicorp Project Crows Nest Pty Ltd

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Date	Revision History	Issued Revision	Prepared By (initials)	Instructed By (initials)	Reviewed & Authorised by (initials)
August 29, 2024	Initial.	0	CT	SWR	TH

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EXECUTIVE SUMMARY

This report is in relation to the National Construction Code (NCC) 2019 Amendment 1 Section J compliance assessment of the non-residential retail, commercial and office tenancies of the subject development located at 391/423 Pacific Highway, Crows Nest. The report is based on the Deemed to Satisfy (DTS) method of verification and on the architectural drawings prepared by the project architect Turner, received August 2024. If there are changes to the design/configuration of the proposed non-residential tenancy (e.g. type of use, wall-glazed areas etc.) a reassessment the insulation and glazing thermal specification requirements may be required. Furthermore, there is an alternative assessment available to that can further refine the recommendations, known as the JV3 Verification method.

A summary of the DTS insulation and glazing thermal specification requirements of the non-residential retail, commercial and office tenancies are indicated in the following tables:

Roof & Ceiling Construction	Minimum Total R-value (Direction of Heat Flow)
Roof or ceiling that is part of the envelope (areas exposed to outdoor environment or unconditioned spaces)	**3.7 (Downward)**

Floor Construction (areas exposed to outdoor environment or unconditioned spaces)	Minimum Total R-value (Direction of Heat Flow)
Floor without an in-slab heating or cooling system (areas exposed to outdoor environment or unconditioned spaces)	**2.0 (Upward)***
Floor with an in-slab heating or cooling system (areas exposed to outdoor environment or unconditioned spaces)	**3.25 (Downward)***

The wall-glazing construction of the non-residential tenancies are comprised of a glazing component and a wall component. The glazing component is also further categorised as "Display Glazing" or "Non-Display Glazing" each with their own glazing thermal specification requirements. "Display Glazing" is defined as 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. As such it is only applicable to Class 6 retail tenancies that may be considered to for shopfront/showroom type of us.

A review of the architectural drawings does not indicate if the retail and commercial tenancies can be considered to be a shopfront/showroom type directly adjacent to a walkway or footpath. As such it has been **assumed that all the retail tenancies are to be of non-shopfront/showroom type (Non-Display Glazing)**.

If, however the glazing of the retail and commercial tenancy is not used to display retail goods in a shop or showroom (e.g. a café or restaurant), then the maximum allowable glazed system thermal specifications for "Non-Display Glazing" can be determined by two calculation methods.

Display Glazing – Retail Tenancies (assuming all retail tenancies are shopfront /showroom type of use)

The maximum allowable glazing thermal specifications for the Display Glazing Component and the minimum Total R-value component for the Wall Component of the Wall-Glazing Construction assuming all retail tenancies are shopfront/showroom type of use are summarised as follows:

Maximum Allowable Thermal Specifications for the Display Glazing Component
(Class 6 Retail Tenancies assuming shopfront/showroom type of use)

Display Glazing Component (shop/showroom excluding those in café or restaurants or the like)	Maximum Allowable
Maximum Allowable Total System U-value	**5.8**
Maximum Allowable Total System SHGC	**0.81**

Minimum Total R-value Requirement of the Wall Component
(Class 6 Retail Tenancies assuming shopfront/showroom type of use)

Wall Component of the "Display Glazing" Wall-Glazing Construction	Minimum Total R-value
For walls with no glazing along the "Display Glazing" wall-glazing construction	**1.4**
If the solid wall is greater than 80% of the "Display Glazing" wall-glazing construction	**1.4**
If the solid wall is less than 80% of the "Display Glazing" wall-glazing construction	**1.0**

Non-Display Glazing – Retail and Commercial Tenancies (Class 6 Building)

For the Non-Display Wall-Glazing Construction along the envelope of the retail and commercial tenancies (assumed to be non-shopfront/showroom type of use), the following minimum Total R-value for the Wall Component have been assumed for this assessment:

Minimum Total R-value Requirement of the Wall Component on EACH Aspect
(Of the "Non-Display Glazing" Wall-Glazing Construction)

Wall Component of the "Display Glazing" Wall-Glazing Construction	Minimum Total R-value
Eastern Aspect Wall-glazing constructions	**1.4**
Northern Aspect Wall-glazing constructions	**1.4**
Southern Aspect Wall-glazing constructions	**1.4**
Western Aspect Wall-glazing constructions	**1.4**

Note the glazing thermal specifications are based on detailed insulation minimum Total R-value requirements of the wall construction as indicated in the Non-Display wall-glazing construction table above. The glazing thermal specifications can be adjusted if the minimum Total R-value of the wall construction is increased.

For the Non-Display Glazing within the retail and commercial tenancies (assumed to be non shopfront/showroom type of use) within the subject development, the maximum allowable glazed system thermal specifications can be determined by two calculation methods.

The first method involves assessing the wall-glazing construction facing a single aspect. Hence individual maximum allowable total Non-Display glazed system U-value and SHGC are provided for each applicable cardinal aspect (North, South, East or West).

The second method involves assessing together the wall-glazing construction facing multiple aspects. Hence a singular maximum allowable total Non-Display glazed system U-value and SHGC is provided for ALL the applicable aspects.

The maximum allowable total Non-Display glazed system U-value and SHGC based on both calculation methodologies are summarised in the following table for the retail and commercial tenancies (assumed to be non shopfront/showroom type of use) of the development:

Method 1 – Maximum Allowable Glazing Thermal Specifications for the Non-Display Glazing on EACH Aspect (Of the "Non-Display Glazing" Wall-Glazing Construction)

Non-Display Glazing	Maximum Allowable Total System U-value	Maximum Allowable Total System SHGC
Eastern Single Aspect	5.80	0.82
Northern Single Aspect	5.80	0.98
Southern Single Aspect	5.80	0.90
Western Single Aspect	5.80	0.74

Method 2 – Maximum Allowable Glazing Thermal Specifications for ALL Non-Display Glazing (Of the "Non-Display Glazing" Wall-Glazing Construction)

Non-Display Glazing	Maximum Allowable
Maximum Allowable Total System U-value (Multiple Aspects)	6.74
Maximum Allowable Total System SHGC (Multiple Aspects)	0.77
Air-con Energy Value (Reference Case)	419.33
Air-con Energy Value (Proposed Case)	414.30

Non-Display Glazing – Office Tenancies (Class 5 Building)

For the Non-Display Wall-Glazing Construction along the envelope of the office tenancies (assumed to be non-shopfront/showroom type of use), the following minimum Total R-value for the Wall Component have been assumed for this assessment:

Minimum Total R-value Requirement of the Wall Component on EACH Aspect
(Of the "Non-Display Glazing" Wall-Glazing Construction)

Wall Component of the "Display Glazing" Wall-Glazing Construction	Minimum Total R-value
Eastern Aspect Wall-glazing constructions	**1.4**
Northern Aspect Wall-glazing constructions	**1.4**
Southern Aspect Wall-glazing constructions	**1.4**
Western Aspect Wall-glazing constructions	**1.4**

Note the glazing thermal specifications are based on detailed insulation minimum Total R-value requirements of the wall construction as indicated in the Non-Display wall-glazing construction table above. The glazing thermal specifications can be adjusted if the minimum Total R-value of the wall construction is increased.

For the Non-Display Glazing within the office tenancies (assumed to be non shopfront/showroom type of use) within the subject development, the maximum allowable glazed system thermal specifications can be determined by two calculation methods.

The first method involves assessing the wall-glazing construction facing a single aspect. Hence individual maximum allowable total Non-Display glazed system U-value and SHGC are provided for each applicable cardinal aspect (North, South, East or West).

The second method involves assessing together the wall-glazing construction facing multiple aspects. Hence a singular maximum allowable total Non-Display glazed system U-value and SHGC is provided for ALL the applicable aspects.

The maximum allowable total Non-Display glazed system U-value and SHGC based on both calculation methodologies are summarised in the following table for the office tenancies (assumed to be non shopfront/showroom type of use) of the development:

Method 1 – Maximum Allowable Glazing Thermal Specifications for the Non-Display Glazing on EACH Aspect (Of the "Non-Display Glazing" Wall-Glazing Construction)

Non-Display Glazing	Maximum Allowable Total System U-value	Maximum Allowable Total System SHGC
Eastern Single Aspect	5.80	0.62
Northern Single Aspect	5.53	0.49
Southern Single Aspect	5.80	0.68
Western Single Aspect	5.80	0.58

Method 2 – Maximum Allowable Glazing Thermal Specifications for ALL Non-Display Glazing (Of the "Non-Display Glazing" Wall-Glazing Construction)

Non-Display Glazing	Maximum Allowable
Maximum Allowable Total System U-value (Multiple Aspects)	6.31
Maximum Allowable Total System SHGC (Multiple Aspects)	0.56
Air-con Energy Value (Reference Case)	351.81
Air-con Energy Value (Proposed Case)	346.10

CONTENTS

1 BUILDING CLASSIFICATION AND CLIMATE ZONE

The building application for the residential and non-residential component of the subject development site is described as follows in Table1 below:

Table 1 Building Classification

Building Area	Building Classification	Conditioned Space
Residential Building	Class 2	Yes
Commercial/Office Building	Class 5	Yes
Retail Building	Class 6	Yes
Carpark	Class 7a	No

The subject development is located in Crows Nest, and as such falls under Climate Zone 5 as per North Sydney Council boundary indicated in Figure 1 below:

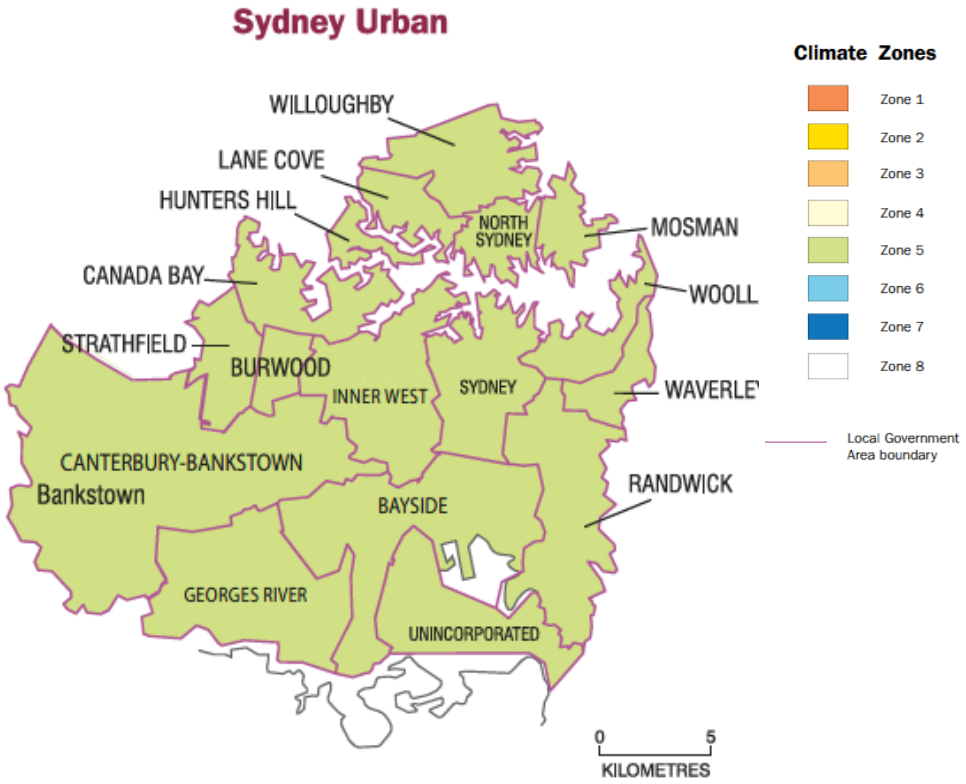


Figure 1: Diagram of Sydney Climate Zones

2 DEEMED TO SATISFY SECTION J PROVISIONS FOR ENERGY EFFICIENCY IN NSW

The objective of the NCC Section J is to reduce the greenhouse gas emissions through the efficient use of energy. Section J states that a building; including its services, must have features to the degree necessary to facilitate this efficient use of energy. Section J comprises of nine parts, J1 to J9, which focus on separate aspects of energy efficiency that are described as follows:

- Part J1 – Energy Efficiency Performance Requirements
- Part J2 – Energy Efficiency
- Part J3 – Elemental provisions for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building
- Part J4 - Building Fabric
- Part J5 - Building Sealing
- Part J6 - Air-Conditioning and Ventilation Systems
- Part J7 - Artificial Lighting and Power
- Part J8 – Heated Water Supply and Swimming Pool and Spa Pool Plant
- Part J9 – Energy Monitoring and On-site Distributed Energy Resources

In New South Wales, for a Class 3 and 5 to 9 building, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, the performance requirement J1P1 is satisfied by complying with the following:

- Part J4 - Building Fabric
- Part J5 - Building Sealing
- Part J6 - Air-Conditioning and Ventilation Systems
- Part J7 - Artificial Lighting and Power
- Part J8 – Heated Water Supply and Swimming Pool and Spa Pool Plant
- J9D3 – Facilities for Energy Monitoring

For a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, the performance requirement J1P1 is satisfied by complying with the following:

- J3D5 and J3D6 – for thermal breaks
- J4D3 for general thermal construction
- J3D10(3), J3D10(5) and J3D10(6) for floor edge insulation

For a Class 2 or Class 4 part of a building, the performance requirement J1P6, J1P7 and J1P4 is satisfied by complying with the following:

- Part J5 - Building Sealing
- Part J6 - Air-Conditioning and Ventilation Systems
- J8D2 – Heated water Supply
- J9D3 – Facilities for Energy Monitoring
- J9D4 – Facilities for electric vehicle charging equipment
- J9D5 – Facilities for solar photovoltaic and battery systems

3 SOLE-OCCUPANCY UNIT COMPONENT – CLASS 2 OR CLASS 4 PART OF A BUILDING

The following Section J assessment covers the relevant components to sole occupancy units in a Class 2 building or a Class 4 part of a building and complements the BASIX report prepared for the subject development.

3.1.1 Part J3D5: Roof thermal breaks of a sole-occupancy unit

- A roof that
    - Has metal sheet roofing directly 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 raters or metal battens,
- Must have a thermal break, consisting of a material with an R-value of greater than or equal to R0.2, installed between the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens.
    - Note that this requirement do not apply to roofs constructed using insulated sandwich panels.

3.1.2 Part J3D6: Wall thermal breaks of a sole-occupancy unit

- A metal-framed wall that forms part of the building envelope must have a thermal break, consisting of a material with an R-value of greater than or equal to R0.2, installed at all points of contact between the external cladding and the metal frame if the wall
    - Does not have a wall lining or has a wall lining that is fixed directly to the same metal frame; and
    - Is clad with weatherboards, fibre-cement or the like, or metal sheeting fixed to a metal frame.
    - Note that this requirement do not apply to roofs constructed using insulated sandwich panels.

3.1.3 Part J3D10(3): Floors of a sole-occupany unit

- A concrete slab-on-ground with an in-slab or in-screed heating or cooling system must have insulation with an R-value at least 1.0 installed around the vertical edge of its perimeter.

3.1.4 Part J3D10(5): Floors of a sole-occupany unit

- Insulation required by Part J3D10(3) above must be water resistant, and be continuous from the adjacent finished level to a depth of not less than 300mm or for at least the full depth of the vertical edge of the concrete slab-on-ground.

3.1.5 Part J3D10(6): Thermal Construction - General

- Insulation required by Part J3D10(3) does not apply to an in-screed heating or cooling system used solely in a bathroom, amenity area or the like.

3.1.6 Part J4D3: Thermal Construction - General

- The building is to ensure the insulation; reflective, bulk, etc., installation requirements are in accordance with the NCC provisions of J4D3 as well as the following:
    - Where required, insulation must comply with AS/NZ 4859.1
    - Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36.
    - The required Total R-value and Total System U-Value, including allowance for thermal bridging, must be
        - Calculated in accordance with AS/NZS 4859.2 for a roof or floor; or
        - Determined in accordance with Specification 37 for wall-glazing construction or
        - Determined in accordance with Specification 39 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.
    - Note that "Where required" is deemed to refer to "Where a development consent specifies that insulation is to be provided as part of the development"

4 NON-RESIDENTIAL COMPONENT

The following Deemed to Satisfy Section J assessment covers the NSW Variations for the "non-sole-occupancy units/Class 2 common area" retail, commercial and office tenancies of the subject development.

4.1 Part J4: Building Fabric

4.1.1 Part J4D2: Application of Part

Applicable to building elements forming the envelope of a Class 3 and Class 5 to 9 building.

Part J4D3 applies to building elements forming the envelope of a sole-occupancy unit in a Class2 building and a Class 4 part of a building. Note that this only applies to thermal insulation in a sole-occupancy unit in a Class 2 building and a Class 4 part of a building where a development consent specifies that the insulation is to be provided as part of the development.

For the purposes of Section J, envelope is defined as parts of a building's fabric that separate a conditioned space or habitable room from the exterior of the building or a non-conditioned space

4.1.2 Part J4D3: Thermal Construction - General

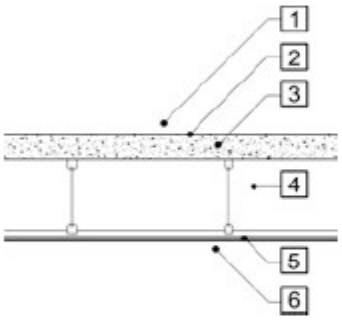
- The building is to ensure the insulation; reflective, bulk, etc., installation requirements are in accordance with the NCC provisions of J4D3 as well as the following:
    - Where required, insulation must comply with AS/NZ 4859.1
    - Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36.
    - The required Total R-value and Total System U-Value, including allowance for thermal bridging, must be
        - Calculated in accordance with AS/NZS 4859.2 for a roof or floor; or
        - Determined in accordance with Specification 37 for wall-glazing construction or
        - Determined in accordance with Specification 39 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.
    - Note that "Where required" is deemed to refer to "Where a development consent specifies that insulation is to be provided as part of the development"

4.1.3 Part J4D4: Roof and Ceiling Construction

- A roof or ceiling that is part of the envelope, must achieve the Total R-Value greater than or equal to the following for the various climate zones:

Climate Zone	Total R-Value greater than or equal to	Direction of heat flow
1 to 5	R3.7	Downward
6	R3.2	Downward
7	R3.7	Upward
8	R4.8	Upward

- Note in climate zones 1 to 7, the solar absorptance of the upper surface of a roof must not be more than 0.45.
- The proposed development is located in Climate Zone 5 hence a Total R-value of 3.7 or greater is to be achieved within the new roof areas of the various retail and commercial tenancies exposed to outdoor air above or unconditioned spaces.
- **For example**, a typical 100mm thick Concrete roof construction has a Total R-value of approximately R0.58.

Roof construction description	Item	Item description	*R-Value* Unventilated	
			Up	Down
(g) 100 mm solid concrete roof to 5° – 10 mm plaster, suspended ceiling – Applied external waterproof membrane  	**1.**	Outdoor air film (7 m/s)	0.04	0.04
	2.	Waterproof membrane, rubber synthetic (4 mm, 961 kg/m^3)	0.03	0.03
	3.	Solid concrete, (100 mm, 2400 kg/m^3)	0.07	0.07
	4.	Ceiling airspace (100 mm to 300 mm, non-reflective)	0.15	0.22
	5.	Plasterboard, gypsum (10 mm, 880 kg/m^3)	0.06	0.06
	6.	Indoor air film (still air)	0.11	0.16
		Total R-Value	0.46	0.58

Notes:

1. The *R-Value* of an item, other than an airspace, air film or air cavity, may be increased in proportion to the increased thickness of the item.
2. The *Total R-Value* of a form of construction may be increased by the amount that the *R-Value* of an individual item is increased.
3. Where an airspace is filled, the *R-Value* listed for the airspace must be deducted from the *Total R-Value* of the roof construction.
4. For information on a roof space that is considered to be ventilated, see **Specification J1.2, Clause 2(d)**.

- Hence an additional R3.12 insulation is required to comply with the NCC requirements provided a ceiling cavity airspace is still maintained. Note that this increases to R3.34 if there is not a ceiling airspace available as the airspace has its own R-value component. Note that this insulation would need to factor in thermal bridging and thermal break that is dependant on the ceiling construction detail (e.g. if the insulation is included within stud framing etc.)
- If a different roof/ceiling construction is to be implemented, then the required additional roof/ceiling insulation would vary depending on the roof/ceiling constructions effectiveness in reducing heat transfer.

4.1.4 Part J4D5: Roof Lights

- Not applicable as there are no roof lights proposed within the non-residential retail and commercial component of the subject development.

4.1.5 Part J4D6: Walls and glazing

The wall-glazing construction of the non-residential tenancies (sole-occupancy units) are comprised of a glazing component and a wall component. The glazing component is also further categorised as "Display Glazing" or "Non-Display Glazing" each with their own glazing thermal specification requirements.

- The wall components of a wall-glazing construction must achieve a minimum Total R-value of the following in a Class 5, 6, 7, 8 or 9b building or 9a building other than a ward area:

Wall-Glazing Construction in a Class 2 common area, Class 5, 6, 7, 8, 9b or 9a building	Minimum Total R-value
Where the wall is less than 80% of the wall-glazing construction	1.0
Where the wall is 80% or more of the wall-glazing construction in Climate zone 1	2.4
Where the wall is 80% or more of the wall-glazing construction in Climate zones 2 to 8	1.4

- The wall components of a wall-glazing construction must achieve a minimum Total R-value of the following in a Class 3, 9c or 9a ward area:

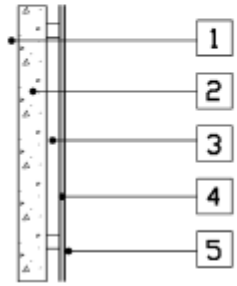
Wall-Glazing Construction in a Class 3, 9c or 9a ward area	Minimum Total R-value
Where the wall is less than 80% of the wall-glazing construction	1.0
Where the wall is 80% or more of the wall-glazing construction in Climate zones 1 or 3	3.3
Where the wall is 80% or more of the wall-glazing construction in Climate zones 2 to 5	1.4
Where the wall is 80% or more of the wall-glazing construction in Climate zones 4, 6 or 7	2.8
Where the wall is 80% or more of the wall-glazing construction in Climate zone 8	3.8

- For the purpose of this DTS Section J Assessment of the non-residential tenancies, the minimum Total R-value to be achieved in the wall component of the "wall-glazing construction is summarised as follows:

Wall-glazing Construction Aspect ("Non-Display Glazing" Wall-Glazing Construction)	Minimum Total R-value to be achieved in the wall component
Eastern Aspect	1.4
Northern Aspect	1.4
Southern Aspect	1.4
Western Aspect	1.4

- **For example**, a 125mm Concrete wall construction with an airspace as indicated below has a Total R-value of approximately R0.48 as shown below.

(d) 125 mm solid reinforced concrete (dense weight) – 10 mm internal plaster on battens or furring channels



1.	Outdoor air film (7 m/s)	0.04
2.	125 mm minimum solid reinforced concrete (See Note 3)	0.09
3.	Airspace (20 mm to 40 mm non-reflective and unventilated)	0.17
4.	Plasterboard, gypsum (10 mm, 880 kg/m^3)	0.06
5.	Indoor air film (still air)	0.12
	Total R-Value	0.48

- If the wall is in Climate Zone 5, forms part of a Class 6 building (e.g. retail tenancy) and the minimum total R-value to be achieved is R1.4. The additional minimum wall insulation required to comply with the NCC requirements are summarised as follows:
    - An additional minimum R0.92 wall insulation is required to comply with the NCC requirements:
    - If there is no cavity airspace, the minimum wall insulation required is increased to R1.09.
    - Note that the insulation above would need to factor in thermal bridging and thermal break that is dependant on the wall construction detail (e.g. if the insulation is included within stud framing etc.)
- The specifier is to ensure the minimum total R-value is satisfied, and if a different wall construction is to be implemented, the required additional wall insulation would vary depending on the wall constructions effectiveness in reducing heat transfer.

- The Total System U-value of a wall-glazing construction, including wall-glazing construction which wholly or partly forms the envelopment internally, must not be greater than as follows:

Wall-Glazing Construction Type	Total System U-value (must not be greater than)
, Class 5, 6, 7, 8 or 9b building or 9a building other than a ward area	2.0
Class 3, 9c or 9a ward area in Climate zones 1, 3, 4, 6 or 7	1.1
Class 3, 9c or 9a ward area in Climate zones 2 or 5	2.0
Class 3, 9c or 9a ward area in Climate zone 8	0.9
Display Glazing (shop/showroom directly adjacent to walkway or footpath, excluding those in café or restaurants or the like)	5.8

- The solar admittance of externally facing wall-glazing construction, excluding wall-glazing construction which is wholly internal, must not be greater than the following Table NSW J4D6b below for a Class 5, 6, 7, 8 or 9b building, or 9a building other than a ward area:

Climate Zone	Eastern Aspect Solar Admittance	Northern Aspect Solar Admittance	Southern Aspect Solar Admittance	Western Aspect Solar Admittance
1	0.12	0.12	0.12	0.12
2	0.13	0.13	0.13	0.13
3	0.16	0.16	0.16	0.16
4	0.13	0.13	0.13	0.13
5	0.13	0.13	0.13	0.13
6	0.13	0.13	0.13	0.13
7	0.13	0.13	0.13	0.13
8	0.20	0.20	0.42	0.36

- The solar admittance of externally facing wall-glazing construction must not be greater than the following Table NSW J4D6c below in a Class 3, 9c or 9a ward area:

Climate Zone	Eastern Aspect Solar Admittance	Northern Aspect Solar Admittance	Southern Aspect Solar Admittance	Western Aspect Solar Admittance
1	0.07	0.07	0.10	0.07
2	0.10	0.10	0.10	0.10
3	0.07	0.07	0.07	0.07
4	0.07	0.07	0.07	0.07
5	0.10	0.10	0.10	0.10
6	0.07	0.07	0.07	0.07
7	0.07	0.07	0.08	0.07
8	0.08	0.08	0.08	0.08

- The Total system SHGC of Display Glazing must not be greater than 0.81 divided by the applicable shading factor specified in S37C7.
- The Total System U-value and solar admittance of a wall-glazing construction must be calculated in accordance with Specification 37.
- Glazing can be categorised as "Display Glazing" or 'Non-Display Glazing" each with their own glazing thermal specification requirements.
- "Display Glazing" is defined as 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.
- "Non-Display Glazing" is all other glazing that does fall under the definition of "Display Glazing".
- A review of the architectural drawings does not indicate if the retail and commercial tenancies can be considered to be a shopfront/showroom type directly adjacent to a walkway or footpath. As such it has been **assumed that all the retail tenancies are to be of non-shopfront/showroom type (Non-Display Glazing)**.
- If, however the glazing of the retail and commercial tenancy is not used to display retail goods in a shop or showroom (e.g. a café or restaurant), then it will be considered to be "Non-Display Glazing".
- The Display Glazing thermal specifications for the retail tenancies; assuming all are shopfront/showroom type of use, are summarised as follows:

Display Glazing (shop/showroom excluding those in café or restaurants or the like)	Maximum Allowable
Maximum Allowable Total System U-value	5.8
Maximum Allowable Total System SHGC	0.81

- For the Non-Display Glazing; assuming all the retail tenancies will **not** be shopfront/showroom type of use, the maximum allowable glazed system thermal specifications can be determined by two calculation methods detailed below.
- The total system U-value and solar admittance for non-display glazing must be calculated in accordance with Specification 37.
    - Specification 37 provides two methodologies to calculate the total system u-value and solar admittance of non-display glazing based on a single aspect (Method 1) or multiple aspect (Method 2) basis.

- The calculated results based on Method 1 or 2 are summarised as follows:
- Method 1 – Single Aspect
    - The northern aspect is at or within 45° of true north; and
    - The eastern aspect is at or within 45° of true east; and
    - The southern aspect is at or within 45° of true south; and
    - The western aspect is at or within 45° of true west
- Method 2 – Multiple Aspects

Non-Display Glazing – Retail and Commercial Tenancies (Class 6 Building)

- Method 1 – Single Aspect

Non-Display Glazing (Single Aspect)	Maximum Allowable Total System U-value	Maximum Allowable Total System SHGC
Eastern Single Aspect	5.80	0.62
Northern Single Aspect	5.53	0.49
Southern Single Aspect	5.80	0.68
Western Single Aspect	5.80	0.58

- Method 2 – Multiple Aspects

Non-Display Glazing (Multiple Aspects)	Maximum Allowable
Maximum Allowable Total System U-value (Multiple Aspects)	6.31
Maximum Allowable Total System SHGC (Multiple Aspects)	0.56
Air-con Energy Value (Reference Case)	351.81
Air-con Energy Value (Proposed Case)	346.10

Non-Display Glazing – Office Tenancies (Class 5 Building)

- Method 1 – Single Aspect

Non-Display Glazing (Single Aspect)	Maximum Allowable Total System U-value	Maximum Allowable Total System SHGC
Eastern Single Aspect	5.80	0.62
Northern Single Aspect	5.53	0.49
Southern Single Aspect	5.80	0.68
Western Single Aspect	5.80	0.58

- Method 2 – Multiple Aspects

Non-Display Glazing (Multiple Aspects)	Maximum Allowable
Maximum Allowable Total System U-value (Multiple Aspects)	3.51
Maximum Allowable Total System SHGC (Multiple Aspects)	0.29
Air-con Energy Value (Reference Case)	167.13
Air-con Energy Value (Proposed Case)	161.88

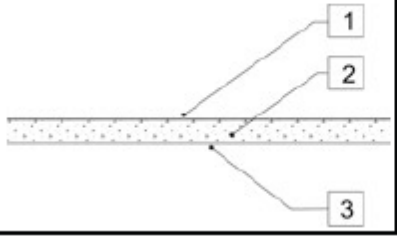
- The glazed area calculations along the various aspects of the non-residential tenancies; based on the architectural drawings, are detailed in Appendix A of this report.
- Note the glazing thermal specifications are based on detailed insulation minimum **Total R-values of R1.4 specified** for the wall construction as indicated in the earlier "Non-Display" wall-glazing construction table. The glazing thermal specifications may be adjusted if the minimum Total R-value of the wall construction is increased.

4.1.6 Part J4D7: Floors

- The new floor of the non-residential tenancies must achieve the minimum Total R-value as specified in the table below:

Location	Climate Zone 1 upwards heat flow	Climate Zones 2 and 3 upwards and downwards heat flow	Climate Zones 4 to 7 downwards heat flow	Climate Zone 8 downwards heat flow
A floor without an in-slab heating or cooling system	2.0	2.0	2.0	3.5
A floor with an in-slab heating or cooling system	3.25	3.25	3.25	4.75

- A slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-value of R2.0, except for those in climate zone 8 or a Class 3, Class 9a ward area or Class 9b in climate zone 7 that has a floor area to floor perimeter ratio of less than or equal to 2.
- A floor must be insulated around the vertical edge of its perimeter with insulation having an R-value greater than or equal to R1.0 when the floor is:
    - A concrete slab-on-ground in climate zone 8; or
    - Has an in-slab or in-screed heating or cooling system, except where used sole in a bathroom, amenity area of the like.
    - Note insulation for concrete slab-on-ground above must be water resistant and be continuous from the adjacent finished ground level to a depth of not less than 300mm or the full dept of the vertical edge of the concrete slab-on-ground.
- The non-residential retail, commercial and office tenancies have floor areas that located above the unconditioned carpark space or the outdoor environment. Hence the floor construction is to achieve a minimum Total R-value of R2.0 (without in-slab heating or cooling system) or R3.25 (with in-slab heating or cooling system).
- **For example**, a typical 150mm suspended Concrete slab construction above outdoor air **without an in-slab heating or cooling system**; as indicated below has a Total R-value of approximately R0.30 as shown below.

(c) Solid concrete suspended slab 	1.	Indoor air film (still air)	0.11	0.16
	2.	Solid concrete (150 mm, 2400 kg/m^3)	0.10	0.10
	3.	Outdoor air film (7 m/s)	0.04	0.04
		Total R-Value	0.25	0.30

- A minimum Total R-value of R2.0 is to be achieved, hence an additional minimum R1.7 floor insulation is required to comply with the NCC requirements.

4.3 Part J5: Building Sealing

4.3.1 Part J5D2: Application of Part

Applicable to elements forming the envelope of a Class 2 to 9 building other than:

- A building in climate zones 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler or
- a permanent building opening, in a space where a gas appliance is located that is necessary for the safe operation of a gas appliance, or
- in a Class 3 or Class 5 to 9 building, a building or space where the mechanical ventilation required by Part F6 provides sufficient pressurisation to prevent infiltration, or
- parts of buildings that cannot be fully enclosed

4.3.2 Part J5D3: Chimneys and Flues

- Not applicable as there are no chimneys/flues within the retail or commercial tenancies.

4.3.3 Part J5D4: Roof lights

- Not applicable as there are no roof lights within the retail or commercial tenancies.

4.3.4 Part J5D5: Windows and Doors

- A door, openable window or the like must be sealed when forming part of the envelope or in climate zones 4 to 8.
- The abovementioned requirement does not apply if the window or glazed door system complies with AS2047 and is a fire/smoke door or a roller shutter door/grille/security door installed for out of hours security.
- A seal to restrict air infiltration for the bottom edge of a door must be a draft protection device.
- A seal for the other edges of an door or the edges of an openable window or other such opening may be a foam or rubber compression strip, fibrous seal or the like.

- An entrance to a building, if leading to a *conditioned space* must have an airlock, *self-closing* door, rapid roller door, revolving door or the like, other than where:
    - The conditioned space has a floor area of less than 50m^2.
    - Or where a café, restaurant, open front shop or the like has
        - a 3m deep un-conditioned zone between the main entrance; including an open front, and the conditioned space; and
        - self closing doors at all other entrances to the café, restaurant, open front shop or the like.
- A loading dock entrance, if leading to a conditioned space must be fitted with a rapid roller door or the like. Note that this does not apply to a Class 2 building or a Class 4 part of a building.

4.3.5 Part J5D6: Exhaust Fans

- Exhaust fans must be fitted with a sealing device such as a self-closing damper or the like when serving a conditioned space or in climate zones 4 to 8.

4.3.6 Part J5D7: Construction of ceilings, walls and floors

- Ceilings, walls, floors and any opening such as a window frame, door frame, roof light frame or the like must be constructed to minimise air leakage in accordance with Clause (2) below when forming part of an envelope or in climate zones 4 to 8.
- Clause (2): the construction by the above must be:
    - Enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions or
    - Sealed at junctions and penetrations with close fitting architrave, skirting or cornice, or expanding foam, rubber compressible strip, caulking or the like.
- The abovementioned requirements do not apply to openings, grilles or the like required for smoke hazard management.

4.3.7 Part J5D8: Evaporative Coolers

- If evaporative coolers are installed, they must be fitted with a self-closing damper or the like when serving a heated space or in climate zones 4 to 8.

4.4 Part J6: Air Conditioning and Ventilating Systems

4.4.1 Part J6D2: Application of Part

Is not applicable to a Class 8 electricity network substation.
Part J6D10 does not apply to a Class 2 building or a Class4 part of a building.

4.4.2 Part J5.2: Air Conditioning Systems

- The mechanical consultant is to ensure the air-conditioning systems are to comply with the NCC provisions of J6D3 and outdoor air economy cycle of Table J6D3.

4.4.3 Part J5.3: Mechanical Ventilation system control

- The mechanical consultant is to ensure the mechanical ventilation systems are to comply with the NCC provisions of J6D4 and required outdoor air treatment of Table J6D4.

4.4.4 Part J6D5: Fan and Duct Systems

- The mechanical consultant is to ensure the fans, ductwork and duct components that form part of an air-conditioning or mechanical ventilation systems or any miscellaneous exhaust system comply with the NCC provisions and fan performance grade of J6D5.

4.4.5 Part J6D6: Ductwork Insulation

- The mechanical consultant is to ensure the ductwork and fittings in an air-conditioning insulation comply with AS/NZS 4859.1, the NCC provisions of J5.5 and the minimum insulation R-values of Table J6D6.

4.4.6 Part J6D7: Ductwork sealing

- The mechanical consultant is to ensure the ductwork in an air-conditioning system with a capacity of 3000 L/s or greater, not located with a capacity of 3000 L/s or greater, not located within the only or last room served by the system, must be sealed against air loss in accordance with the duct sealing requirements of AS 4254.1 and AS 4254.2 for the static pressure in the system.

4.4.7 Part J6D8: Pump Systems

- The mechanical consultant is to ensure the pumps and pipework that form part of an air-conditioning system comply with the NCC provisions of J6D8 and the maximum pipework pressure drop of Tables J6D8a to J6D8c.

4.4.8 Part J6D9: Pipework Insulation

- The mechanical consultant is to ensure insulation must be provided to piping, vessels, heat exchangers and tanks containing heating or cooling fluid, where the fluid is held at a heated or cooled temperature, that are part of an air-conditioning system, other than in appliances covered by MEPS comply with AS/NZS 4859.1, the NCC provisions of J6D9 and the minimum insulation R-values of Table J6D9a and J6D9b.

4.4.9 Part J6D10: Space heating

- The mechanical consultant is to ensure heater for air-conditioning or as part of an air-conditioning system comply with the NCC provisions of J6D10 and the maximum electric heating capacity of Table J6D10.
- An electric heater may be used for heating a bathroom in a Class 3, 9a or 9c building if the heating capacity is not more than 1.2 kW and the heater has a timer.

4.4.10 Part J6D11: Refrigerant chillers

- The mechanical consultant is to ensure the air-conditioning system refrigerant chiller must comply with MEPS and the minimum energy efficiency ratio of Tables J6D11a and J6D11b.

4.4.11 Part J6D12: Unitary air-conditioning equipment

- The mechanical consultant is to ensure the unitary air-conditioning equipment including packaged air-conditioners, split systems and variable refrigerant flow systems must comply with MEPS and the NCC provisions of J6D12.

4.4.12 Part J6D13: Heat rejection equipment

- The mechanical consultant is to ensure the heat rejection equipment comply with MEPS and the NCC provisions of J6D13 and the maximum fan motor powers allowances in Table J6D13.

4.5 Part J7: Artificial Lighting and Power

4.5.1 Part J7D2: Application of Part

The deemed to satisfy provisions of this Part do not apply to a Class 2 building or a Class 4 part of a building. J7D3, J7D4 and J7D6(1)(b do not apply to a class 8 electricity network substation.

4.5.2 Part J7D3: Artificial Lighting

- In a Class 3 or Class 5 to 9 building, the lighting consultant is to ensure the aggregate design illumination power load must not exceed the allowances obtained by multiplying the area of each space by the maximum illumination power density as detailed in Table J7D3a and its associated Table Notes.
- The aggregate design illumination power load is the sum of the design illumination power loads in each of the spaces served and where there are multiple lighting systems serving the same space, the design illumination power load is the total illumination power load of all systems or where a control system permits only one system to operate at a time based on the highest illumination power load or determined by the formula provided in J7D3(2).
- Note the abovementioned requirements do not apply to the following:
    - Emergency Lighting in accordance with Part E4,
    - Signage, display lighting with cabinet and display cases that are fixed in place
    - Lighting for accommodation within residential part of a detention centre
    - A heater where the heater also emits light such as in bathrooms
    - Lighting of a specialist process nature such as in surgical operating theatre, fume cupboard or clean workstation.

4.5.3 Part J7D4: Interior Artificial Lighting and Power Control

- The lighting consultant is to ensure the artificial lighting of a room or space must be individually operated by a switch or other control device or a combination of both.
    - An artificial lighting switch or other control device 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; and
    - For other than a single functional space such as an auditorium, theatre, swimming pool, sporting stadium or warehouses, the artificial lighting switch or other control device must:
        - Not operate lighting for an area of more than 250m^2 in a Class 5 (Office) building or 8 laboratory, or

        - Not operate lighting for an area of more than 250m^2 for a space under 2000m^2, or 1000m^2 for a space of more than 2000m^2 in a class 3, 6, 7, 8 (other than a laboratory) or 9 building.

- An occupant activated device such as a room security device, a motion detector in accordance with Specification J6, or the like, must be provided in the sole-occupancy unit of a Class 3 building.
    - The exception is other than where providing accommodation for people with a disability or the aged, to cut power to the artificial lighting, air-conditioner, local exhaust fans and bathroom heater when the sole-occupancy unit is unoccupied.
- 95% of the light fittings in a building or storey of a building; other than a Class 2/3 building or a Class 4 part of a building, of more than 250m^2, must be controlled by a time switch in according with Specification 40 or an occupant sensing device such as a security key card reader that registers a person entering and leaving the building or a motion detector in according with Specification 40.
    - Note this is not required where sudden loss of artificial lighting would cause an unsafe situation or if there is a heater that also emits light, such as in bathrooms.
- For Class 5, 6 or 8; Office type, Shop Type and Laboratory/Building used for Production spaces, of more than 250m^2, artificial lighting in a natural lighting zone adjacent to windows must be separately controlled from artificial lighting not in a natural lighting zone in the same storey except where-
    - The room containing the natural lighting zone is less than 20m^2; or
    - The room's natural lighting zone contains less than 4 luminaires; or
    - 70% or more of the luminaires in the room are in the natural lighting zone.
- Artificial lighting in a fire-isolated stairway, fire-isolated passageway or fire-isolated ramp, must be controlled by a motion detector in accordance with Specification 40.
- Artificial lighting in a foyer, corridor and other circulation spaces of more than 250W within a single zone and adjacent to windows must be controlled by a daylight sensor and dynamic lighting control device in accordance with Specification 40.
- Artificial lighting for daytime travel in the first 19m of travel in a carpark entry zone must be controlled by a daylight sensor in accordance with Specification 40.
- Note the abovementioned points do not apply to Emergency Lighting in accordance with Part E4, or where artificial lighting is needed for 24 hour occupancy such as for a manufacturing process, parts of a hospital, an airport control tower or within a detention centre.

4.5.4 Part J7D5: Interior Decorative and Display Lighting

- The lighting consultant is to ensure the interior decorative and display lighting, such as for a foyer mural or art display, must be controlled separately from other artificial lighting and by a manual switch for each area other than when the operating times of the displays are the same in a number of areas, in which case they may be combined.
- If the display lighting exceeds 1kW, it must be controlled by a time switch in accordance with Specification 40.
- Window display lighting must be controlled separately from other display lighting.

4.5.5 Part J7D6: Exterior artificial lighting

- The lighting consultant is to ensure the exterior artificial lighting attached to or directed at the façade of a building must be controlled by a daylight sensor or a time switch capable of switching on and off electrical power to the system at a pre-programmed time and on variable pre-programmed days.
- When the total exterior artificial lighting load exceeds 100W, it must use LED luminaires for 90% of the total lighting load or be controlled by a motion detector in accordance with Specification 40; or
    - When used for decorative purposes, such as façade lighting or signage lighting, it must have a separate time switch in accordance with Specification 40
- Note the abovementioned for exterior artificial lighting exceeding 100W total load does not apply to emergency lighting in accordance with Part E4, or lighting around a detention centre.

4.5.6 Part J7D7: Boiling Water and Chilled Water Storage Units

- The power supply to boiling water or chilled water storage unit must be controlled by a time switch in accordance with Specification 40.

4.5.7 Part J7D8: Lifts

- The lighting consultant is to ensure the lifts must be configured to ensure the following:
    - artificial lighting and ventilation in the car are turned off when it is unused for 15 minutes; and
    - achieve the idle and standby energy performance level and energy efficiency class as per Tables J7D8a and J7D8b.

4.5.8 Part J7D9: Escalators and moving walkways

- Escalators and moving walkways must have the ability to slow to between 0.2m/s and 0.05m/s when unused for more than 15 minutes.

4.6 Part J8: Heated Water Supply and Swimming Pool and Spa Pool Plant

4.6.1 Part J8D2: Heated Water Supply

- The hydraulic engineer is to ensure the heated water supply for food preparation and sanitary purposes must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia.

4.6.2 Part J8D3: Swimming Pool Heating and Pumping

- Not applicable as there are no swimming pools within the development.

4.6.3 Part J7.4: Spa Pool Heating and Pumping

- Not applicable as there are no spas within the development.

4.7 Part J9: Energy Monitoring and On-site Distrubuted Energy Resources

4.7.1 Part J9D2: Application of Part

The Deemed to Satisfy Provisions of this part do not apply to sole occupancy units of a Class 2 building or a Class 4 part of a building; or to a Class 8 electricity network substation. Hence it will be applicable to the carpark and common lobbies.

4.7.2 Part J9D3: Facilities for Energy Monitoring

- (1) A building or sole-occupancy unit with a floor area of more than 500m^2 must have an energy meter configured to record the time-of-use consumption of gas and electricity.
- (2) A building with a floor area of more than 2,500 m must have energy meters configured to enable individual time-of-use energy consumption data recording and in accordance with (3), of—
    - (a) air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and
    - (b) artificial lighting; and
    - (c) appliance power; and
    - (d) central hot water supply; and
    - (e) internal transport devices including lifts, escalators and travelators where there is more than one serving the building; and
    - (f) on-site renewable energy equipment; and
    - (g) on-site electric vehicle charging equipment; and
    - (h) on-site battery systems; and
    - (i) other ancillary plant.
- (3) Energy meters required by (2) must be interlinked by a communication system that collates the time-of-use energy consumption data to a single interface monitoring system where it can be stored, analysed and reviewed.
- The provisions of (2) do not apply to a Class 2 building with a floor area of more than 2,500m^2 where the total area of the common areas is less than 500m^2

4.7.3 Part J9D3: Facilities for Electric Vehicle Charging Equipment

- The mechanical/electrical consultant is to ensure the electrical distribution boards dedicated to electric vehicle charging are in accordance with Part J9D3 and Table J9D4.

4.7.4 Part J9D4: Facilities for Solar Photovoltaic and Battery Systems

- The mechanical/electrical consultant is to ensure the main electrical switchboard are in accordance with Part J9D3 (i) and at least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels, except for buildings –
    - With installed solar photovoltaic panels on at least 20% of the roof area; or an equivalent generation capacity elsewhere on-site; or
    - Where 100% of the roof area is shaded for more than 70% of daylight hours or
    - With a roof area of not more than 55m^2 or
    - Where more than 50% of the roof area is used as a terrace, carpark, roof garden, roof light or the like.

APPENDIX A NON-DISPLAY AREA AND GLAZING CALCULATIONS

The Non-Display Glazing total wall-glazing areas are summarised in the table below. Note the areas presented below is the sum total of all wall and glazing areas of each Non-Display wall-glazing construction within the applicable non-residential tenancies (i.e. excluding non-residential tenancies that are shop or showroom types with glazing used to display retail goods directly adjacent to a walkway or footpath).

Non-Display Glazing – Retail and Commercial Tenancies (Class 6 Building)

Non-Display Wall-Glazing Construction Area Summary

Aspect	Total Non-Display Wall-Glazing area (m2)	Total Non-Display Glazed Area (m2)	Total Non-Display Wall Area (m2)	Glazed to Wall Façade Ratio (%)
Eastern Single Aspect	1095.0	211.2	883.9	19.3%
Northern Single Aspect	1241.5	236.8	1004.8	19.1%
Southern Single Aspect	889.9	189.6	700.3	21.3%
Western Single Aspect	1334.7	334.2	1000.5	25.0%

The Non-Display Glazing calculations for each cardinal single aspect are summarised in the table below. Note the glazing calculations areas presented below is the sum total of all Non-Display glazing within the applicable non-residential tenancies (i.e. excluding non-residential tenancies that are shop or showroom types with glazing used to display retail goods directly adjacent to a walkway or footpath).

Non-Display Glazing Area Calculations (Along all the Eastern Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Bespoke_Food-E1-GL-E01	2.8	0.9	N	2.9	4.7	1.9
Bespoke_Food-E2-GL-E01	2.8	1	N	2.5	4.7	1.9
Bespoke_Food-E2-GL-E02	2.8	1	N	2.5	4.7	1.9
Bespoke_Food-E3-GL-MZ-E01	4.6	2.1	N	2.9	4.7	0.1
Common_Area-E6-MZ-E01	3.3	2.6	N	0	3.3	0
Food+Services_5-E4-GL-E01	2.6	1.8	N	2.6	3.2	0.6
Food+Services_5-E5-GL-E01	2.6	1	N	3.2	3.2	0.6
Food+Services_5-E6-GL-E01	2.9	1.8	N	2.5	3.5	0.6
Food+Services_6-E1-GL-E01	3.6	1.1	N	3	4.1	0.5
Gym-E1-L1-E01	2.2	3	N	0.2	2.7	0.5
Gym-E2-L1-E01	2.2	3.5	N	0.3	2.7	0.5
Gym-E4-L1-E01	2.2	2.5	N	0.3	2.7	0.5
Gym-E4-L1-E02	2.2	3.4	N	0.3	2.7	0.5
Gym-E4-L1-E03	2.2	3.4	N	0.3	2.7	0.5
Gym-E4-L1-E04	2.2	3.4	N	0.3	2.7	0.5
Gym-E4-L1-E05	2.2	3.4	N	0.3	2.7	0.5
MZ_Above_FS5-E1-MZ-E01	2.1	2.9	N	0.3	2.6	0.5
MZ_Above_FS5-E2-MZ-E01	2.1	3.4	N	0.3	2.6	0.5
Resi_Lobby-E3-GL-E01	3.8	1.85	N	2.5	4.4	0.6
Resi_Lobby-E3-GL-E02	3.8	1.85	N	2.5	4.4	0.6
Resi_Lobby-E3-GL-E03	3.8	1.85	N	2.5	4.4	0.6
Retail_5-E1-GL-E01	4.1	5.8	N	3.3	4.2	0.1
Retail_5-E1-MZ-E01	1	5.9	N	0.3	1	0
Well/Spa-E1-MZ-E01	2.2	2.4	N	0.2	2.6	0.4
Well/Spa-E1-MZ-E02	2.2	3.45	N	0.2	2.6	0.4
Wellness2-E4-MZ-E01	2.2	3.2	N	0.2	2.6	0.4
Wellness2-E4-MZ-E02	2	3.5	N	0.2	2.4	0.4
Wellness2-E4-MZ-E03	2.4	2.3	N	0.2	2.4	0
Yoga/Pilates-E4-L1-E01	2.2	3.2	N	0.2	2.7	0.5
Yoga/Pilates-E4-L1-E02	2.2	3.4	N	0.3	2.7	0.5
Yoga/Pilates-E4-L1-E03	2.2	3.5	N	0.3	2.7	0.5

Non-Display Glazing Area Calculations (Along all the Northern Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Bar/Restaurant-N1-L1-N01	2.1	3	N	0.2	2.6	0.5
Bar/Restaurant-N2-L1-N01	2.1	3.1	N	0.3	2.6	0.5
Bar/Restaurant-N2-L1-N02	2.1	3.5	N	0.3	2.6	0.5
Bar/Restaurant-N2-L1-N03	2.1	3.5	N	0.3	2.6	0.5
Common_Area-N1-L1-N01	2.9	3.7	N	0.2	3.4	0.5
Food+Services_1-N1-GL-N01	3.3	2.6	N	2.6	3.4	0.1
Food+Services_1-N3-GL-N01	3.3	2.7	N	3.3	3.4	0.1
Food+Services_1-N4-GL-N01	3.3	0.9	N	2.5	3.4	0.1
Food+Services_1-N5-GL-N01	3.3	2.1	N	3.3	3.4	0.1
Food+Services_1-N6-GL-N01	3.3	0.9	N	2.5	3.4	0.1
Food+Services_1-N7-GL-N01	3.3	2.1	N	3.3	3.4	0.1
Food+Services_1-N9-GL-N01	3.3	0.95	N	2.5	3.4	0.1
Food+Services_2-N2-GL-N01	2.9	3	N	2.6	3	0.1
Food+Services_2-N3-GL-N01	3.5	1.7	N	3.1	3.8	0.3
Food+Services_2-N4-GL-N01	2.9	3.2	N	2.6	3	0.1
Food+Services_2-N5-GL-N01	2.9	1.7	N	3.2	3	0.1
Food+Services_3-N1-GL-N01	3.2	3.3	N	2.5	3.3	0.1
Food+Services_3-N2-GL-N01	3.2	1.7	N	3.3	3.3	0.1
Food+Services_4-N1-GL-N01	3.2	2.6	N	2.5	3.3	0.1
Food+Services_4-N2-GL-N01	3.2	1.7	N	3.3	3.3	0.1
Food+Services_5-N1-GL-N01	2.6	1.1	N	3.3	3.2	0.6
Food+Services_5-N2-GL-N01	1.9	1.9	N	2.5	2.5	0.6
Food+Services_5-N3-GL-N01	2.6	1	N	3.3	3.2	0.6
Food+Services_5-N4-GL-N01	2.6	1.9	N	2.5	3.2	0.6
Food+Services_5-N5-GL-N01	2.6	0.8	N	3.3	3.2	0.6
Food+Services_5-N6-GL-N01	2.6	1.9	N	2.7	3.2	0.6
Food+Services_5-N7-GL-N01	2.6	1.1	N	3.3	3.2	0.6
Gym-N1-L1-N01	2.1	3.5	N	0.3	2.6	0.5
Gym-N1-L1-N02	2.1	3.5	N	0.3	2.6	0.5
Gym-N1-L1-N03	2.1	3.5	N	0.3	2.6	0.5
Gym-N1-L1-N04	2.1	3.4	N	0.3	2.6	0.5
Gym-N1-L1-N05	2.1	3.5	N	0.3	2.6	0.5
Gym-N1-L1-N06	2.1	3.5	N	0.3	2.6	0.5
Gym-N1-L1-N07	2.1	3	N	0.2	2.6	0.5

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Gym-N2-L1-N01	2.1	1.1	N	0	2.6	0.5
MZ_Above_FS5-N1-MZ-N01	2.1	3.1	N	0.3	2.6	0.5
MZ_Above_FS5-N1-MZ-N02	2.1	3.4	N	0.3	2.6	0.5
MZ_Above_FS5-N1-MZ-N03	2.1	3.4	N	0.3	2.6	0.5
MZ_Above_FS5-N2-MZ-N01	2.1	1.1	N	0.3	2.6	0.5

Non-Display Glazing Area Calculations (Along all the Southern Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Bespoke_Food-S2-GL-MZ-S01	4.7	5.7	N	8	4.8	0.1
Comm_Lobby-S1-GL-S01	3.4	7.5	N	6	3.4	0
Comm_Lobby-S1-MZ-S01	2.4	2	N	5.5	2.4	0
Common_Area-S4-L1-S01	2.2	2.5	N	0.1	2.7	0.5
Common_Area-S5-L1-S01	2.2	3.4	N	0.2	2.7	0.5
Food-S2-L1-S01	3.3	4.2	N	0	3.3	0
Resi_Lobby-S1-GL-S01	3.8	13.7	N	5	4.4	0.6
Retail_5-S1-GL-S01	4.1	3.6	N	12	4.2	0.1
Retail_5-S1-MZ-S01	1	3.6	N	0.3	1	0
Wellness1-S1-MZ-S01	3	3.9	N	3	3.2	0.2
Wellness2-S1-MZ-S01	2.4	5.5	N	3.8	2.4	0
Yoga/Pilates-S1-L1-S01	2.2	4.7	N	1.8	2.7	0.5

Non-Display Glazing Area Calculations (Along all the Western Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Bar/Restaurant-W2-L1-W01	2.2	3.4	N	0.3	2.7	0.5
Bar/Restaurant-W2-L1-W02	2.2	3.5	N	0.3	2.7	0.5
Bar/Restaurant-W2-L1-W03	2.2	3.4	N	0.3	2.7	0.5
Bar/Restaurant-W2-L1-W04	2.2	3	N	0.1	2.7	0.5
Bar/Restaurant-W3-L1-W01	2.2	3	N	0.2	2.7	0.5
Bespoke_Food-W1-GL-MZ-W01	4.7	2.4	N	3.2	4.8	0.1
Comm_Lobby-W1-GL-MZ-W01	6	10	N	5.5	6.4	0.4
Common_Area-W3-L1-W01	2.2	3.9	N	0.1	2.7	0.5
Common_Area-W4-L1-W01	2.2	1.1	N	0.1	2.7	0.5
Common_Area-W5-MZ-W01	3.3	2.6	N	0	3.3	0
Food+Services_1-W10-GL-W01	3.3	2.1	N	2.5	3.4	0.1
Food+Services_1-W12-GL-W01	3.3	2.6	N	2.6	3.4	0.1
Food+Services_1-W14-GL-W01	3.3	2.6	N	2.9	3.4	0.1
Food+Services_1-W5-GL-W01	3.3	0.9	N	3.2	3.4	0.1
Food+Services_1-W6-GL-W01	3.3	2.2	N	2.5	3.4	0.1
Food+Services_1-W7-GL-W01	3.3	0.9	N	3.3	3.4	0.1
Food+Services_1-W8-GL-W01	3.3	2.1	N	2.5	3.4	0.1
Food+Services_1-W9-GL-W01	3.3	0.9	N	3.3	3.4	0.1
Food-W2-L1-W01	3.3	4.3	N	0	3.3	0
Retail_1-W5-GL-W01	2.6	1.4	N	2.5	3.1	0.5
Retail_1-W6-GL-W01	3.2	1.6	N	3.3	3.8	0.6
Retail_1-W7-GL-W01	2.7	1.7	N	2.5	3.2	0.5
Retail_1-W7-GL-W02	2.7	1.7	N	2.5	3.2	0.5
Retail_2-W1-GL-W01	3.1	1.7	N	3.3	3.7	0.6
Retail_2-W2-GL-W01	2.6	1.7	N	2.5	3.2	0.6
Retail_2-W2-GL-W02	2.6	1.7	N	2.5	3.2	0.6
Retail_2-W3-GL-W01	3.1	1.7	N	3.3	3.6	0.5
Retail_2-W4-GL-W01	2.6	1.3	N	2.5	3.2	0.6
Retail_2-W4-GL-W02	2.6	1.3	N	2.5	3.2	0.6
Retail_2-W5-GL-W01	2.9	2.5	N	3.3	3.5	0.6
Retail_2-W5-GL-W02	2.9	1	N	3.3	3.5	0.6
Retail_5-W1-GL-W01	4.1	1.1	N	3.3	4.2	0.1
Retail_5-W1-MZ-W01	1	1.1	N	0.3	1	0
Wellness2-W3-MZ-W01	2.4	2.5	N	0.2	2.4	0

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Wellness2-W5-MZ-W01	2.2	2.5	N	0.2	2.6	0.4
Wellness2-W5-MZ-W02	2.2	3.5	N	0.2	2.6	0.4
Wellness2-W5-MZ-W03	2.2	3.5	N	0.2	2.6	0.4
Wellness2-W5-MZ-W04	2.2	3.5	N	0.2	2.6	0.4
Wellness2-W6-MZ-W01	2.2	3.6	N	0.2	2.6	0.4
Yoga/Pilates-W3-L1-W01	2.2	3.4	N	0.3	2.7	0.5
Yoga/Pilates-W5-L1-W01	2.2	2.5	N	0.2	2.7	0.5
Yoga/Pilates-W5-L1-W02	2.2	3.5	N	0.2	2.7	0.5
Yoga/Pilates-W5-L1-W03	2.2	3.5	N	0.2	2.7	0.5
Yoga/Pilates-W5-L1-W04	2.2	3.5	N	0.2	2.7	0.5
Yoga/Pilates-W6-L1-W01	2.2	3.5	N	0.2	2.7	0.5

Non-Display Glazing – Office Tenancies (Class 5 Building)

Non-Display Wall-Glazing Construction Area Summary

Aspect	Total Non-Display Wall-Glazing area (m2)	Total Non-Display Glazed Area (m2)	Total Non-Display Wall Area (m2)	Glazed to Wall Façade Ratio (%)
Eastern Single Aspect	444.8	94.0	350.9	21.1%
Northern Single Aspect	387.4	103.4	284.0	26.7%
Southern Single Aspect	257.4	52.5	204.9	20.4%
Western Single Aspect	457.4	105.1	352.3	23.0%

The Non-Display Glazing calculations for each cardinal single aspect are summarised in the table below. Note the glazing calculations areas presented below is the sum total of all Non-Display glazing within the applicable non-residential tenancies (i.e. excluding non-residential tenancies that are shop or showroom types with glazing used to display retail goods directly adjacent to a walkway or footpath).

Non-Display Glazing Area Calculations (Along all the Eastern Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Office_2-E2-L2-E01	2.2	3.2	N	0.2	2.7	0.5
Office_2-E2-L2-E02	2.2	3.5	N	0.3	2.7	0.5
Office_2-E2-L2-E03	2.2	3.5	N	0.3	2.7	0.5
Office_4-E1-L2-E01	2.2	3	N	0.2	2.7	0.5
Office_4-E1-L2-E02	2.2	3.5	N	0.3	2.7	0.5
Office_5-E1-L2-E01	2.9	7.6	N	0.1	3.4	0.5
Office-1-E1-L2-E01	2.2	2.4	N	0.3	2.7	0.5
Office-1-E1-L2-E02	2.2	3.4	N	0.2	2.7	0.5
Office-1-E1-L2-E03	2.2	3.4	N	0.2	2.7	0.5
Office-1-E1-L2-E04	2.2	3.4	N	0.2	2.7	0.5
Office-1-E1-L2-E05	2.2	3.4	N	0	2.7	0.5

Non-Display Glazing Area Calculations (Along all the Northern Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Office_2-N1-L2-N01	2.1	2.7	N	0.3	2.6	0.5
Office_4-N1-L2-N01	2.1	3.5	N	0.3	2.6	0.5
Office_4-N1-L2-N02	2.1	3.4	N	0.3	2.6	0.5
Office_4-N1-L2-N03	2.1	3.5	N	0.3	2.6	0.5
Office_4-N1-L2-N04	2.1	3.4	N	0.3	2.6	0.5
Office_4-N1-L2-N05	2.1	3.5	N	0.3	2.6	0.5
Office_4-N1-L2-N06	2.1	3.5	N	0.3	2.6	0.5
Office_4-N1-L2-N07	2.1	3.2	N	0.2	2.6	0.5
Office_4-N1-L2-N08	2.1	1.1	N	0	2.6	0.5
Office_5-N1-L2-N01	2.1	3	N	0.2	2.6	0.5
Office_5-N2-L2-N01	2.1	3.1	N	0.2	2.6	0.5
Office_5-N2-L2-N02	2.1	3.4	N	0.2	2.6	0.5
Office_5-N2-L2-N03	2.1	3.5	N	0.2	2.6	0.5
Office_5-N2-L2-N04	2.1	3.6	N	0	2.6	0.5
Office_5-N3-L2-N01	2.9	3.5	N	0.1	3.4	0.5

Non-Display Glazing Area Calculations (Along all the Southern Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Office_2-S1-L2-S01	2.2	4.6	N	1.8	2.7	0.5
Office_3-S2-L2-S01	3.3	4.25	N	0.1	3.3	0
Office_3-S4-L2-S01	2.2	2.4	N	0.1	2.7	0.5
Office_3-S5-L2-S01	2.2	3.6	N	0.2	2.7	0.5
Office-1-S1-L2-S01	2.2	6.9	N	0.5	2.7	0.5

Non-Display Glazing Area Calculations (Along all the Western Single Aspect)

Description of Glazing	Height (m)	Width (m)	External shading device? (Y/N)	P (m)	H (m)	G (m)
Office_2-W3-L2-W01	2.2	3.4	N	0.3	2.7	0.5
Office_2-W5-L2-W05	2.2	2.4	N	0.3	2.7	0.5
Office_2-W5-L2-W06	2.2	3.5	N	0.2	2.7	0.5
Office_2-W5-L2-W07	2.2	3.5	N	0.2	2.7	0.5
Office_2-W5-L2-W08	2.2	3.5	N	0.2	2.7	0.5
Office_2-W6-L2-W01	2.2	3.6	N	0.1	2.7	0.5
Office_3-W2-L2-W01	3.3	4.3	N	0.1	3.3	0
Office_3-W4-L2-W01	2.2	1.1	N	0.1	2.7	0.5
Office_4-W1-L2-W01	2.2	4	N	0.3	2.7	0.5
Office_5-W2-L2-W01	2.2	3.5	N	0.3	2.7	0.5
Office_5-W2-L2-W02	2.2	3.4	N	0.3	2.7	0.5
Office_5-W2-L2-W03	2.2	3.4	N	0.3	2.7	0.5
Office_5-W3-L2-W01	2.2	3	N	0.3	2.7	0.5
Office_5-W4-L2-W01	2.2	3	N	0.3	2.7	0.5