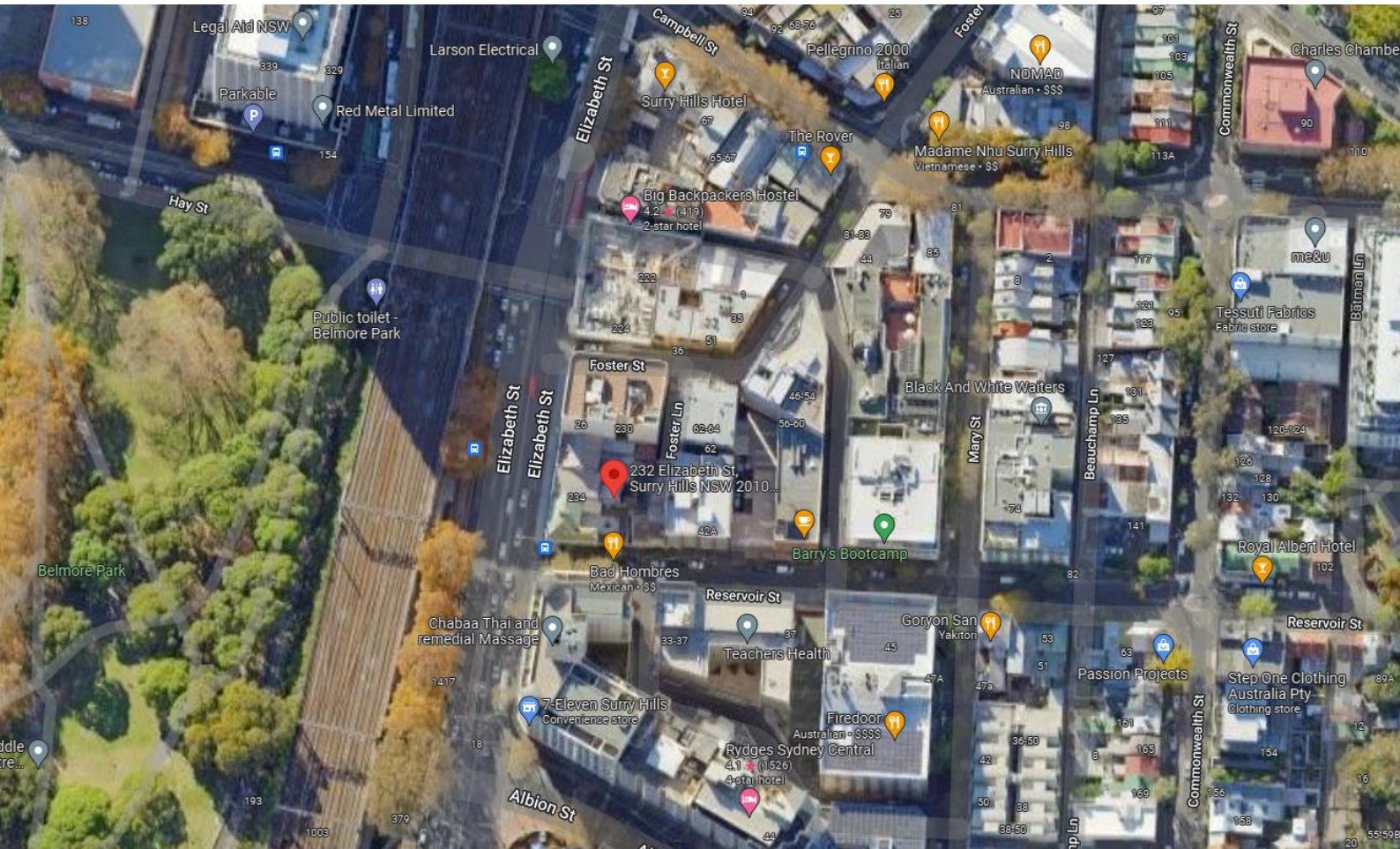


Attachment A12

Section J Assessment Report



IGS INTEGRATED
GROUP
SERVICES



232-240 Elizabeth St, Surry Hills NSW

NCC 2022 Section J Assessment Report

24th January 2024



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1. EXECUTIVE SUMMARY

IGS has been engaged to review the proposed development at 232-240 Elizabeth St, Surry Hills NSW, against the Deemed-to-Satisfy requirements for the National Construction Code 2022 provisions for energy efficiency under Section J (NCC 2022 Volume One).

This report nominates relevant NCC Section J requirements or ‘deemed to satisfy’ compliance provisions and possible areas in which alternative performance-based design solutions can be adopted where compliance with the nominated prescriptive provisions may not be practically achievable.

Subject to the satisfaction of the provisions outlined in this report, this development will comply with the requirements of Section J of NCC 2022 Volume One.

Based on our assessment, the ‘deemed to satisfy’ glazing performance requirements may be prohibitive and costly to achieve. It is therefore recommended to consider achieving the NCC glazing compliance requirements through the performance-based method of verification (i.e., J1V3 method, modelling, alternative method of verification). Based on our review, the J1V3 assessment is very likely to simplify achieving the glazing performance requirements for the development and improve glazing consistency.

The location of the development is shown in Figure 1.



Figure 1. Location – 232-240 Elizabeth St, Surry Hills NSW – Source: Google Map.

2. NATIONAL CONSTRUCTION CODE (NCC) SECTION J

Section J of the NCC sets regulations for energy efficiencies for all types of buildings with respect to the building's construction, design, and activity.

The objective of the NCC Section J is to reduce the greenhouse gas emissions. Section J requires that a building, including its services, must have features to the degree necessary that facilitate the efficient use of energy.

The NCC offers two compliance methods that differ in complexity and flexibility. The two compliance methods are:

- Deemed-to-Satisfy (DTS) Compliance
- J1V3 – Verification using a referenced building

This report provides an assessment of building according to DTS provisions. The following works were carried out in order to assess DTS compliance:

- Determine the applicable NCC Section J requirement for the climate zone and building class
- Provide recommendations to achieve compliance with DTS provisions

2.1 NCC Climate Zone

The climate zone is defined by the NCC as “an area for specific locations, having energy efficiency provisions based upon a range of similar climatic characteristics.”

The development will be located in Surry Hills NSW which is within the NCC climate zone 5 (Warm temperate). The climate zone map of the development is depicted in Figure 2.

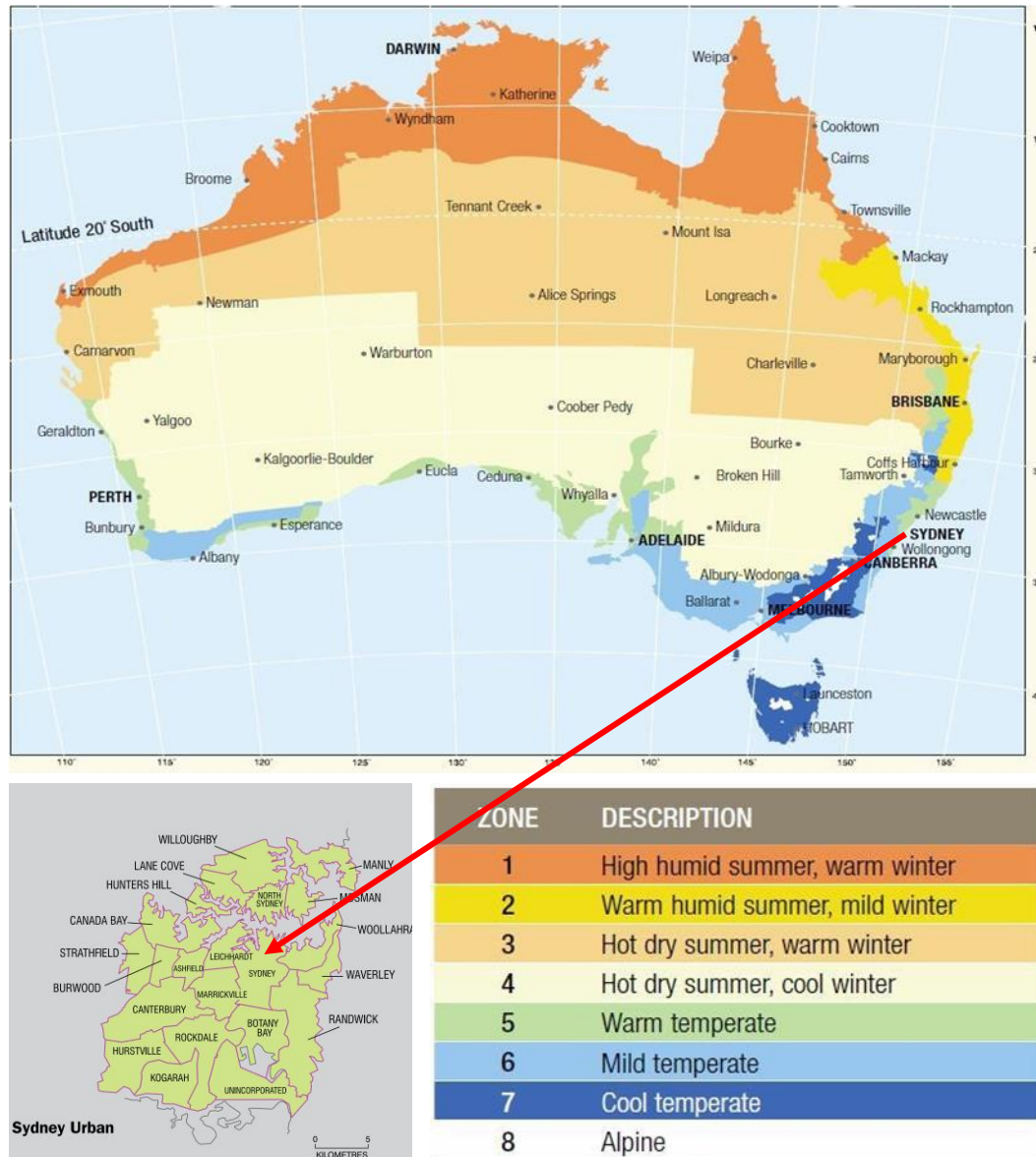


Figure 2. NCC Climate zone map.

2.2 Information Used

The assessment is based on the following architectural drawings provided by Candalepas Architecture in March 2023 (Table 1).

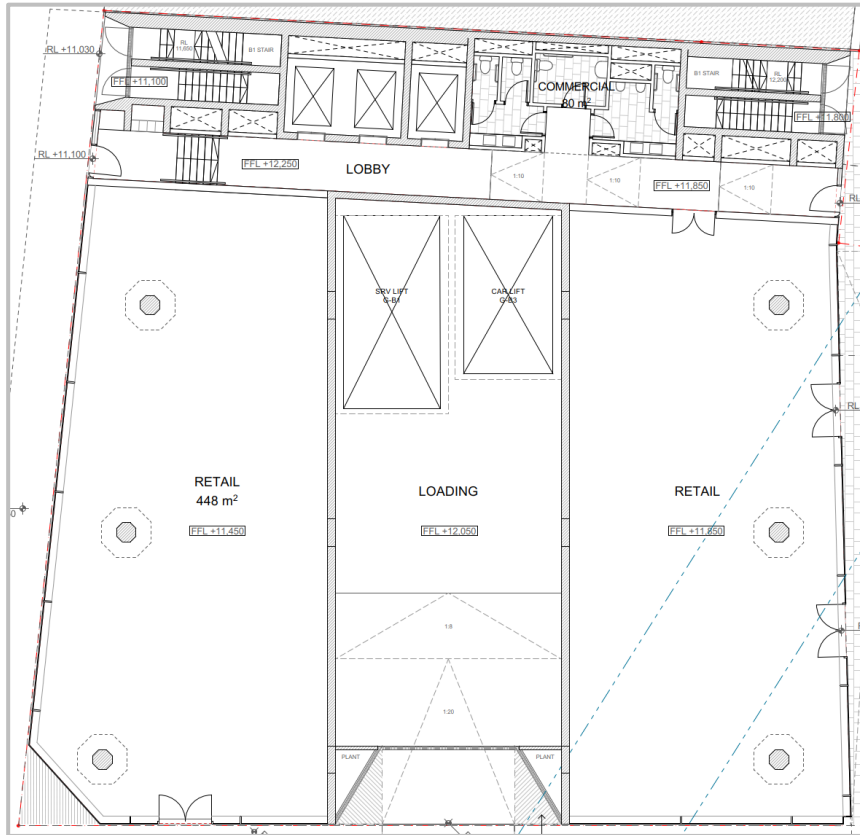
Table 1. Architectural drawings list.

Drawing Title	Drawing Number
Cover Page + Drawing List	PP 0101
Basement 3-4	PP 1001
Basement 2	PP 1002
Basement 1	PP 1003
Ground	PP 1004
Level 1	PP 1005
Level 2 - Typical Plan	PP 1006
Level 3 - Typical Plan	PP 1007
Level 8	PP 1008
Level 9	PP 1009
Roof	PP 1010
Section A	PP 1101
Section B	PP 1102
Elevation West	PP 1201
Elevation South	PP 1202
Elevation East	PP 1203
Development Calculations	PP 1801
Envelope Calculations	PP 1802

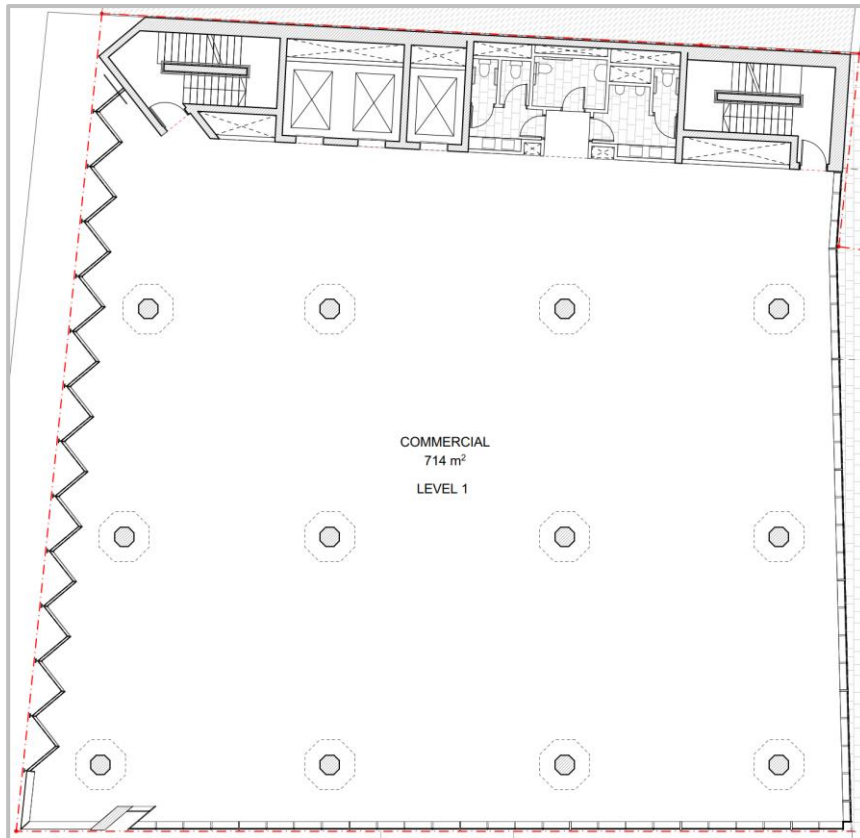
2.3 Architectural Drawings

Selected architectural drawings for the proposed development are provided below.

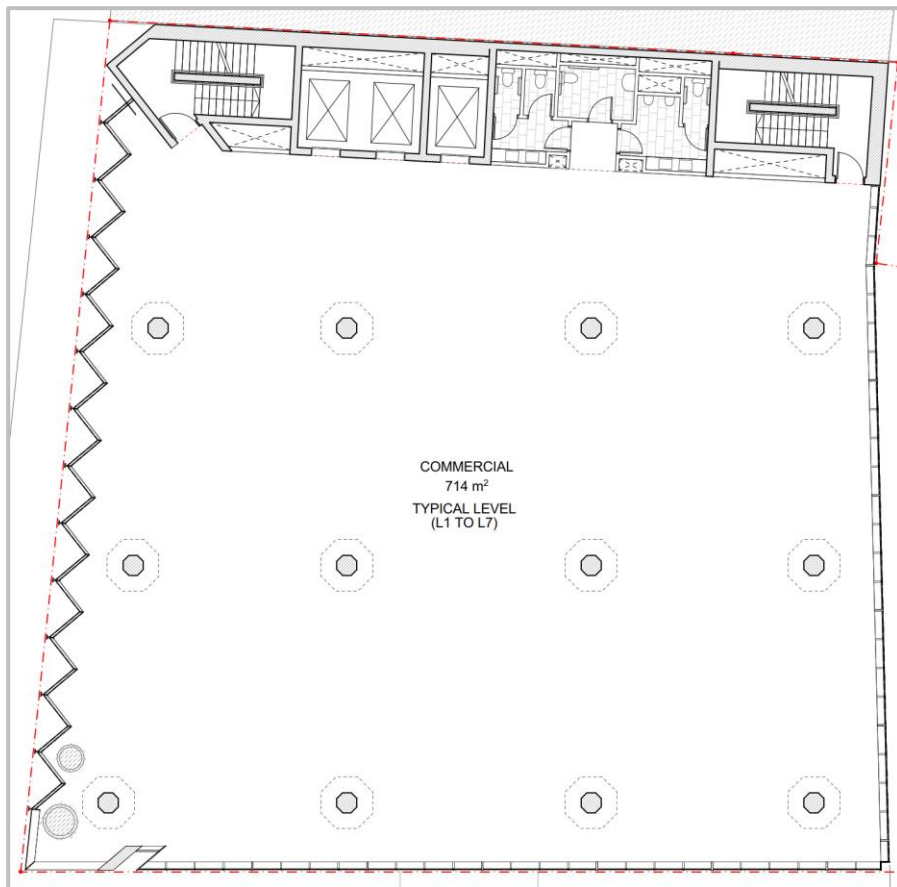
Ground - Floor Plan



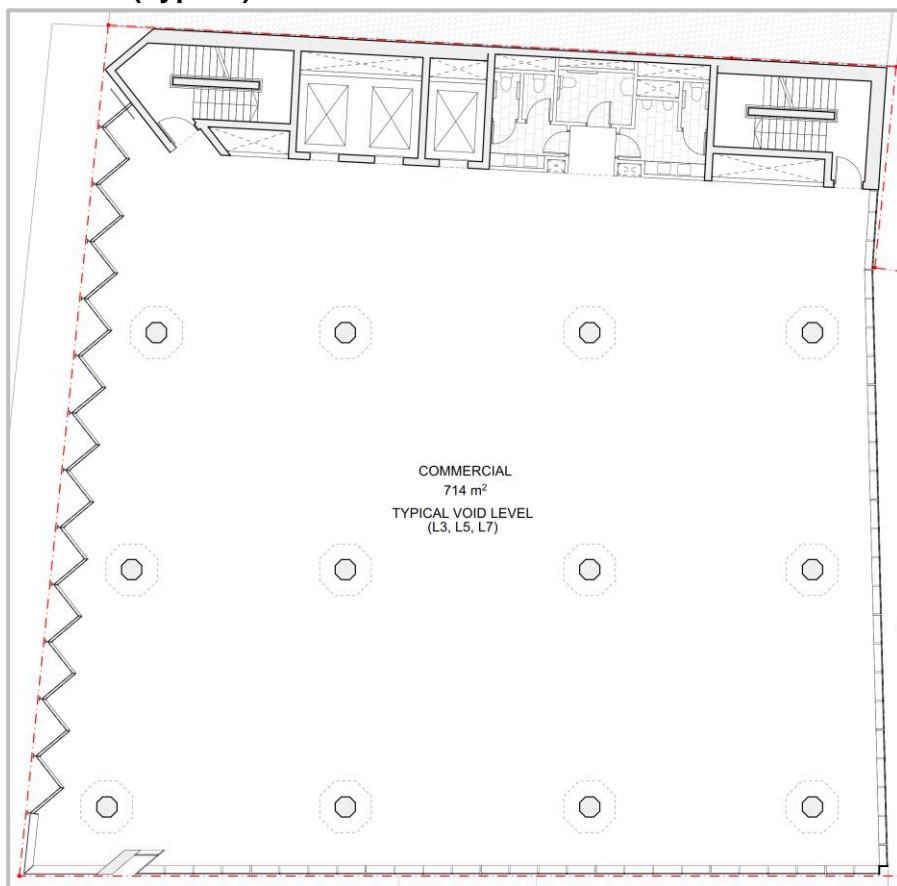
Level 1 - Floor Plan



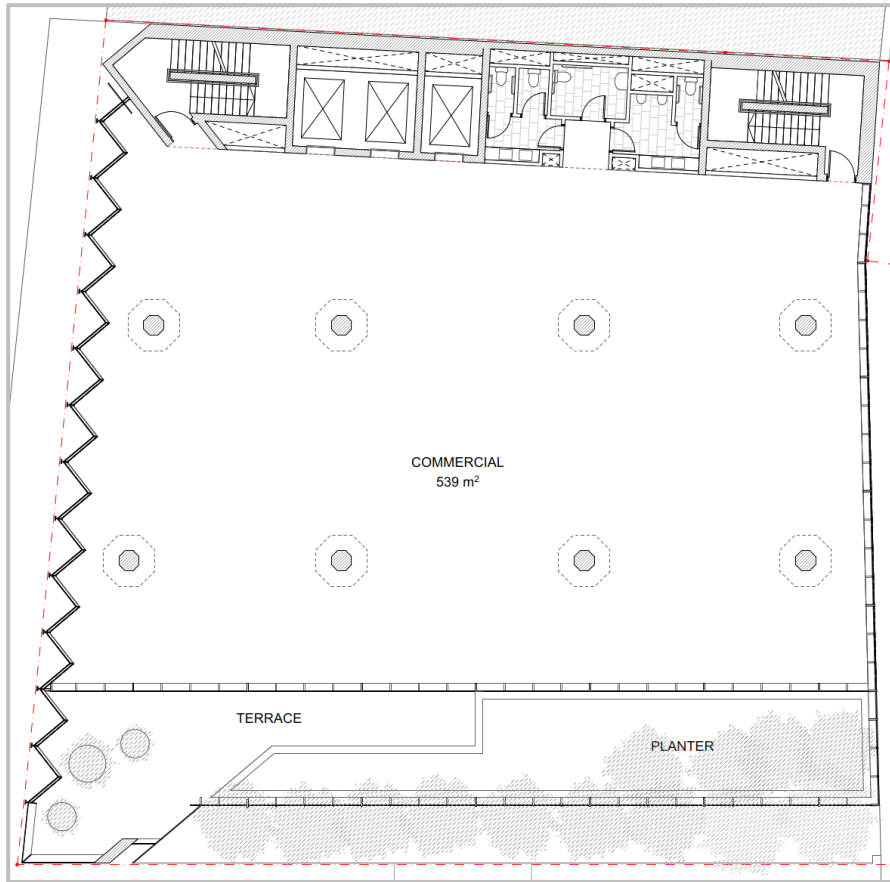
Level 2 - Floor Plan



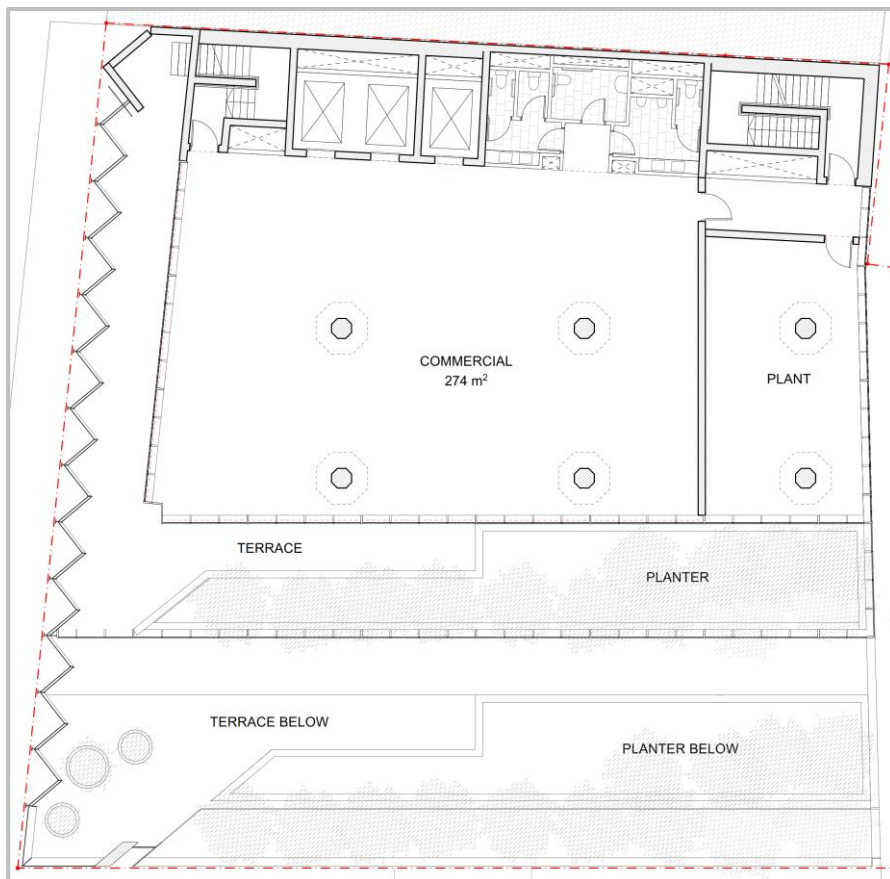
Level 3 - (Typical) Floor Plan



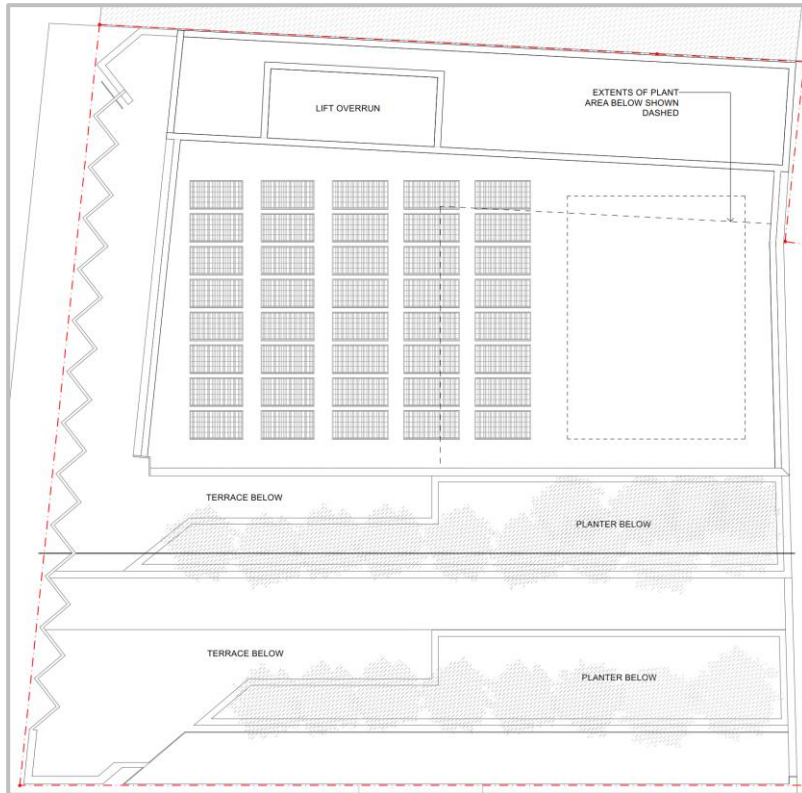
Level 8 - Floor Plan



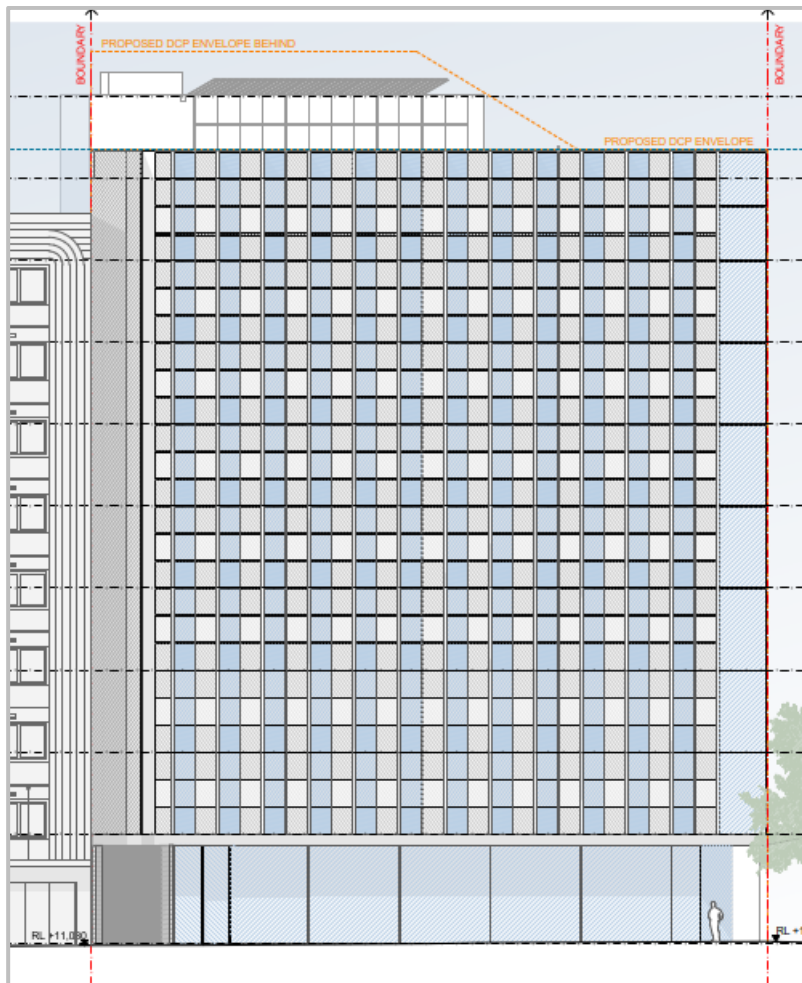
Level 9 - Floor Plan



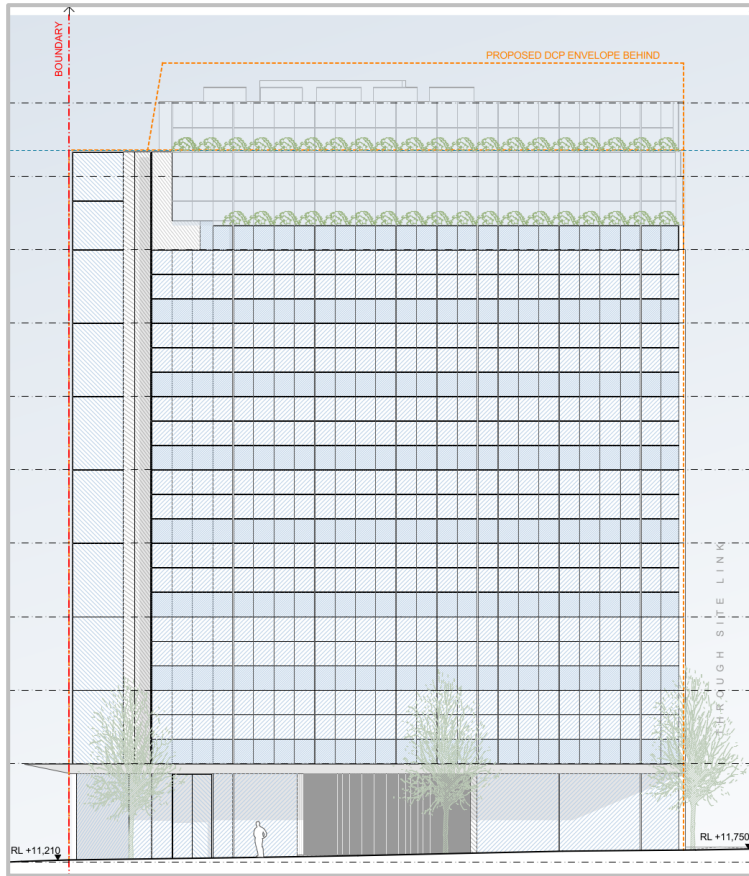
Roof Plan



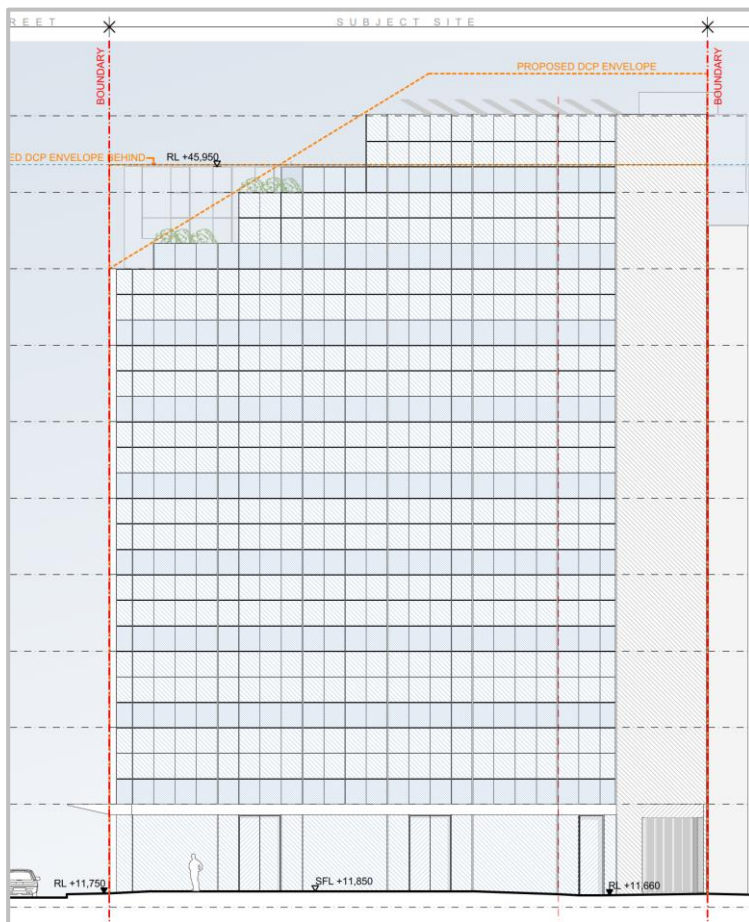
West Elevation



South Elevation

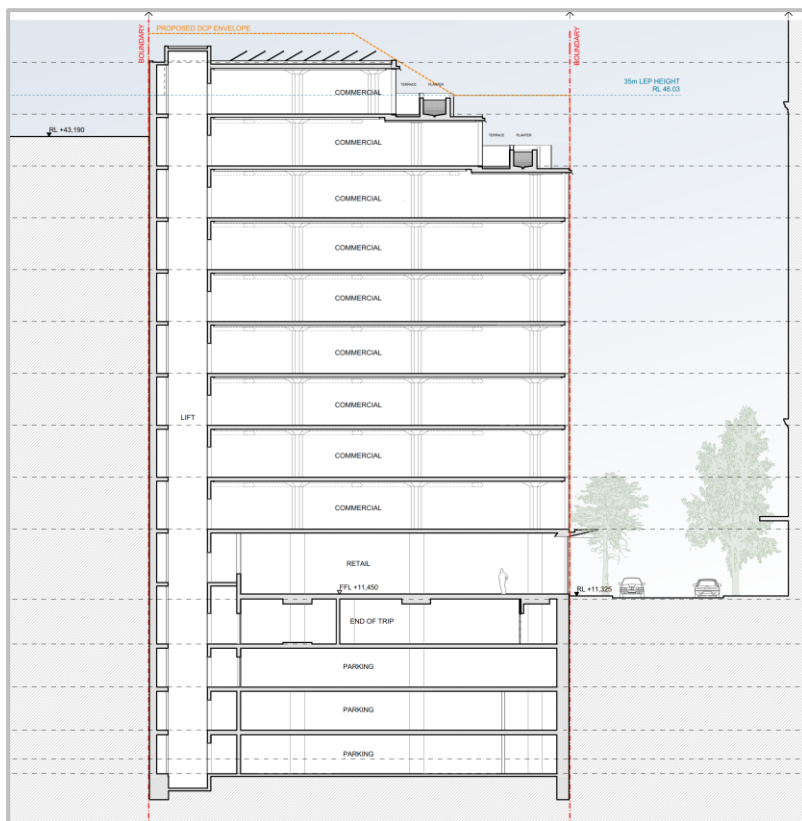


East Elevation

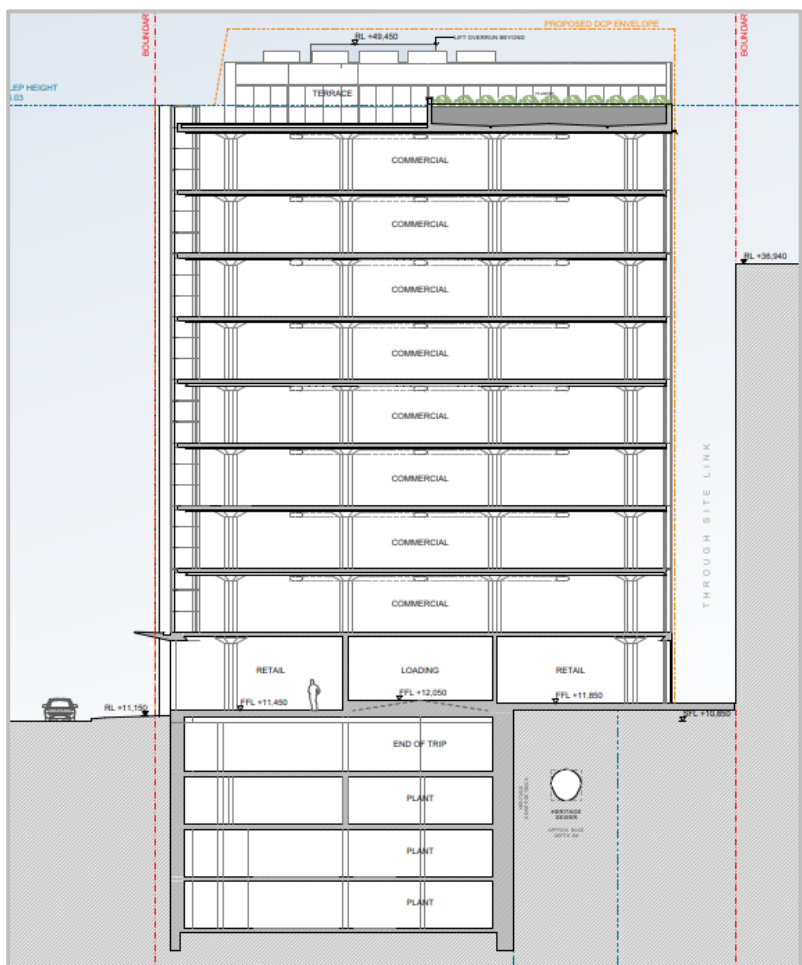




Section A



Section B



3. DEEMED-TO-SATISFY PROVISIONS

NCC 2022 requires that Class 2 to 9 buildings to achieve efficient use of energy. This requirement is defined in Volume One of the NCC 2022 under Section J and is titled “Energy Efficiency”. There are nine Deemed-to-Satisfy subsections, J1 to J9, which focus on separate aspects of energy efficiency. These are:

- 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 relates to the building fabric and minimum thermal performance for constructions according to climate zone for roofs, ceilings, roof lights, walls, glazing and floors.
- Part J5 – Building Sealing – Provisions to reduce the loss of conditioned air and restrict unwanted infiltration to a building.
- Part J6 - Air-Conditioning and Ventilation – Requirements to ensure these services are used and use energy in an efficient manner.
- Part J7 - Artificial Lighting and Power – Requirements for lighting and power to ensure energy is used efficiently within a building.
- Part J8 - Heated water supply and swimming pool and spa pool plant – Restrictions for hot water supply design except for solar systems within climate zones 1, 2 and 3.
- Part J9 - Energy monitoring and on-site distributed energy resources.

3.1 National Construction Code – General Definitions & Notes

3.1.1 Envelope

For the purposes of Section J, the building envelope is defined by the NCC as “...the 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...”. This also includes spaces which are indirectly conditioned either via exhaust/relief of conditioned air or via pressurization.

3.1.2 Glazing

The glazing definition needs to be read in conjunction with the definition of a window and roof light. It can include a glazed door. For the purposes of Section J, the glazing provides an aperture by which light and energy can flow into or from the conditioned space. Glazing includes the glass and any frame system

3.1.3 Conditioned space

A conditioned space is a space that is likely (i.e., expected) to be air-conditioned and is not limited to the space where an air-conditioning system is installed. In some cases, chilled and hot water may be reticulated through duct risers as part of the building design to enable conditioning to be provided as part of a later fit-out. A conditioned space may include a ceiling or under-floor space that is open to the conditioned space such as a space separated by only a perforated or grille ceiling or floor where the space is a supply air or return air plenum.

Notes:

- The thermal insulation and glazing performance requirements outlined in this report nominate the Section J compliance requirements only. The specified performance values therefore do not consider requirements for any other disciplines such as Acoustics, Fire, Thermal Comfort or Safety compliance. Where required, the development shall comply with any additional requirements related to other disciplines in addition to the Section J compliance requirements detailed in this report.

3.2 Part J1 – Energy efficiency performance requirements

This Part sets the thermal performance properties of building fabric, the energy efficiency of key energy using equipment and the features a building must have to facilitate the future installation of distributed energy resources.

3.3 Part J2 – Energy efficiency

This Part sets out the application of the Deemed-to-Satisfy Provisions in Parts J3 to J9.

3.4 Part J3 – Elemental provisions for a sole-occupancy unit of a Class 2 building or a Class 4 part of a building

This Part contains Deemed-to-Satisfy Provisions (elemental) for compliance with Part J1. It sets out provisions for the insulation of building fabric and the energy efficiency of domestic services of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building.

3.5 Part J4 – Building Fabric Requirements

3.5.1 Overview

Section J part J4 outlines the minimum requirements of building envelope. The envelope is defined by the NCC 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.

3.5.2 Part J4D2 – Application

The Deemed-to-Satisfy Provisions of this Part apply to building elements forming the envelope of Class 2 to 9 buildings other than J4D3(5), J4D4, J4D5, J4D6 and J4D7 which do not apply to a Class 2 sole-occupancy unit or a Class 4 part of a building. Part J4 is therefore applicable to the upgrade works.

3.5.3 J4D3 – Thermal Construction General

All insulations installed are required to meet J4D3 and AS/NZS 4859.1. Builder is required to ensure compliance, during construction.

- 1) Where required, insulation must comply with AS/NZS 4859.1 and be installed so that it—
 - (a) abuts or overlaps adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels and the like where the insulation must be against the member; and
 - (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.
- 2) Where required, reflective insulation 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; and
 - (b) the reflective insulation closely fitted against any penetration, door or window opening; and
 - (c) the reflective insulation adequately supported by framing members; and
 - (d) each adjoining sheet of roll membrane being—
 - i. overlapped not less than 50 mm; or
 - ii. taped together.
- 3) Where required, bulk insulation must be installed so that—
 - (a) it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and

- (b) in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.
- 4) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36.
- 5) 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:

The thermal insulation performance requirements outlined in this report nominate the Section J compliance requirements only. The specified performance values therefore do not consider requirements for any other disciplines such as Acoustics, Fire or Safety compliance. Where required, the development shall comply with any additional requirements related to other disciplines in addition to the Section J compliance requirements detailed in this report. All works need to comply with the minimum Section J4 requirements, Thermal bridging must be accounted for in accordance with J4D3 (5) and is the responsibility of the builder or the architect to obtain a construction build-up calculation from their insulation supplier.

3.5.4 J4D4 Roof and Ceiling Construction

For roof and ceiling constructions that form part of the building envelope of the conditioned space, NCC Section J Compliance shall be achieved with minimum total of R3.7 thermal insulation.

The solar absorptance of the upper surface of a roof must be not more than 0.45.

3.5.5 J4D5 Roof Lights

Based on the architectural drawings provided, no roof lights are proposed and therefore section J4D5 is not applicable to the development.

Under any other design conditions, the roof light must meet the criteria is summarized in Table 2 below (Table J4D5 Roof Lights – Thermal Performance of transparent and translucent elements).

Table 2 .Roof Lights.

Roof light shaft index	Total area of roof lights up to 3.5% of the floor area of the room or space	Total area of roof lights more than 3.5% and up to 5% of the floor area of the room or space
< 1.0	≤ 0.45	≤ 0.29
≥ 1.0 to < 2.5	≤ 0.51	≤ 0.33
≥ 2.5	≤ 0.76	≤ 0.49

Notes:

- The total area of a roof light serving the space as a percentage of the floor area of the space must not exceed 5%.
- Roof lights must have—
 - a total area of not more than 5% of the floor area of the room or space served; and
 - transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of—
 - for Total system SHGC, in accordance with Table J4D4; and

ii. for Total system U-Value, not more than U3.9.

- 3) The roof light shaft index is determined by measuring the distance from the centre of the shaft at the roof to the centre of the shaft at the ceiling level and dividing it by the average internal dimension of the shaft opening at the ceiling level (or the diameter for a circular shaft) in the same units of measurement.
- 4) The area of a roof light is the area of the roof opening that allows light to enter the building. The total area of roof lights is the combined area for all roof lights serving the room or space.
- 5) The performance requirements of the total glazing system (glass + frame) must be demonstrated under NFRC100-2001 conditions and based on AFRC requirements and in compliance with the NCC

3.5.6 J4D6 Walls & Glazing

The table below provides a summary of the requirements for walls and glazing to achieve compliance with a comparison to the façade calculator results. For glazing consistency identical glazing performance has been nominated for all areas. All values specifically apply to the ABCB climate zone where the site is located. The thermal calculation methodology for walls and glazing shall comply with NCC 2022 Section J requirements. The requirements of walls and glazing thermal properties are listed in Table 3.

Table 3. Walls & Glazing.

Walls	External Walls: minimum total R1.5 thermal insulation. Internal walls separating conditioned and non-conditioned zones: minimum total R1.0.
Glazing	To ensure glazing consistency, identical glazing performance has been nominated for all aspects (based on the minimum requirements): <ul style="list-style-type: none"> • Total system U-Value ≤ 3.4 • Total system SHGC ≤ 0.16

Note:

Based on our assessment, the 'deemed to satisfy' glazing performance requirements may be prohibitive and costly to achieve. It is therefore recommended to consider achieving the NCC glazing compliance requirements through the performance-based method of verification (i.e., J1V3 method, modelling, an alternative method of verification). Based on our review, the J1V3 assessment is likely to simplify achieving the glazing performance requirements for the development and improve glazing consistency.

3.5.7 J4D7 Floors

For floors without in-slab heating or cooling system except:

(a) in climate zone 8; or

(b) a Class 3, Class 9a ward area or Class 9b building in climate zone 7 that has a floor area to floor perimeter ratio of less than or equal to 2.

- There are no requirements for floor insulation for the floors which are concrete slab on ground (assuming the wall thickness is 250mm or higher).
- NCC compliance shall be achieved with a minimum total thermal insulation of R2.0 for any suspended floors separating a conditioned space from a non-conditioned space.

3.6 Part J5 – Building Sealing

Part J5 of the NCC 2022 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.

Part J5 is applicable to the development.

Clause J5D3 refers to 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.

Clause J5D4 refers to roof lights.

Clause J5D5 outlines that a seal to restrict air infiltration must be fitted to each edge of doors, openable windows or the like that separate conditioned spaces from non-conditioned spaces or external areas. This provision is not required for windows complying with Australian Standard AS2047, a fire door or smoke door; or a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.

- 1) A door, openable window or the like must be sealed—
 - (a) when forming part of the envelope; or
 - (b) in climate zones 4, 5, 6, 7 or 8.
- 2) The requirements of (1) do not apply to—
 - (a) a window complying with AS 2047; or
 - (b) a fire door or smoke door; or
 - (c) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.
- 3) A seal to restrict air infiltration—
 - (a) for the bottom edge of a door, must be a draft protection device; and
 - (b) for the other edges of a door or the edges of an openable window or other such openings, maybe a foam or rubber compression strip, fibrous seal or the like.
- 4) 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—
 - (a) where the conditioned space has a floor area of not more than 50 m²; or
 - (b) where a café, restaurant, open front shop or the like has—
 - i. a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and
 - ii. at all other entrances to the café, restaurant, open front shop or the like, self-closing doors.
- 5) A loading dock entrance, if leading to a conditioned space, must be fitted with a rapid roller door or the like.

Clause J5D6 is related to exhaust fans. An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving—

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

Clause J5D7 is related to construction of ceilings, walls and floors.

- 1) 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 (2)—
 - (a) when forming part of the envelope; or
 - (b) in climate zones 4, 5, 6, 7 or 8.
- 2) Construction required by (1) must be—
 - (a) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or
 - (b) sealed at junctions and penetrations with—

- i. close fitting architrave, skirting or cornice; or
- ii. expanding foam, rubber compressible strip, caulking or the like.

3) The requirements of (a) do not apply to openings, grilles or the like required for smoke hazard management.

Clause J5D8 is related to evaporative coolers. An evaporative cooler must be fitted with a self-closing damper or the like—

- (a) when serving a heated space; or
- (b) in climate zones 4, 5, 6, 7 or 8.

3.7 Part J6 – Air Conditioning and Ventilation Systems

Part J6 of the NCC outlines the performance requirements for air conditioning and ventilation systems to ensure these services operate in an efficient manner.

All services consultants and contractors shall design the air conditioning and ventilation systems to ensure compliance with Part J6 of the NCC Section J and all subsections associated therein.

3.8 Part J7 – Artificial Lighting and Power

Part J7 of the NCC outlines the performance requirements for illumination power density and the efficient use of lighting power and controls.

All services consultants and contractors shall design the artificial lighting systems to ensure compliance with Part J7 of the NCC Section J and all subsections associated therein with regard to power.

3.9 Part J8 – Heated water supply and swimming pool and spa pool plant

Part J8 of the NCC outlines the provisions for the energy efficient use of hot water supply systems.

Clause J8D2 of Part J8 states that a hot water supply system for food preparation or sanitary purposes must be designed and installed in accordance with Section 8 of AS/NZS 3500.4.

All services consultants and contractors shall design the Hot Water supply systems to ensure compliance with Part J8 of the NCC Section J and all subsections associated therein.

3.10 Part J9 – Facilities for Energy Monitoring and on-site distributed energy resources

Part J9 is applicable to this development.

3.10.1 J9D3 Facilities for energy monitoring

Part J9D3 of the NCC outlines the provisions of facilities for energy monitoring. Facilities for energy monitoring shall be provided in accordance with Part J9D3 of the NCC.

- (1) A building or sole-occupancy unit with a floor area of more than 500 m² must have the facility to record the time-of-use consumption of gas and electricity.
- (2) A building with a floor area of more than 2,500 m² must have energy meters configured to enable individual time-of-use energy data recording, 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 data to a single interface monitoring system where it can be stored, analysed, and reviewed.
- (4) The provisions of (2) do not apply to energy meters serving—
- (a) a Class 2 building where the total floor area of the common areas is less than 500 m²; or
 - (b) individual sole-occupancy units with a floor area of less than 2,500 m².

All services consultants and contractors shall design for access for maintenance and facilities for monitoring to ensure compliance with Part J9 of the NCC Section J and all subsections associated therein.

3.10.2 J9D4 Facilities for electric vehicle charging equipment

Part J9D4 of the NCC outlines the provisions of Facilities for electric vehicle charging equipment. Facilities for electric vehicle charging shall be provided in accordance with Part J9D3 of the NCC.

- (1) Subject to (2), a carpark associated with a Class 2, 3, 5, 6, 7b, 8 or 9 building must be provided with electrical distribution boards dedicated to electric vehicle charging—
- (a) in accordance with Table J9D4 (Table 4 of this report) in each storey of the carpark; and
 - (b) labelled to indicate use for electric vehicle charging equipment

Table 4. Electric vehicle distribution board requirement for each storey of a carpark.

Carpark spaces per storey for electric vehicles	Electrical distribution boards for electric vehicle charging per storey
0-9	0
10-24	1
25-48	2
49-72	3
73-96	4
97-120	5
121-144	6
145-168	7

- (2) Electrical distribution boards dedicated to serving electric vehicle charging in a carpark must—
- (a) be fitted with a charging control system with the ability to manage and schedule charging of electric vehicles in response to total building demand; and
 - (b) when associated with a Class 2 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 11:00 pm to 7:00 am daily; and
 - (c) when associated with a Class 5 to 9 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 9:00 am to 5:00 pm daily; and
 - (d) when associated with a Class 3 building, have capacity for each circuit to support an

electric vehicle charger able to deliver a minimum of 48 kWh from 11:00 pm to 7:00 am daily; and

- (e) be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in—
 - (i) 100% of the car parking spaces associated with a Class 2 building; or
 - (ii) 10% of car parking spaces associated with a Class 5 or 6 building; or
 - (iii) 20% of car parking spaces associated with a Class 3, 7b, 8 or 9 building; and
- (f) contain space of at least 36 mm width of DIN rail per outgoing circuit for individual sub-circuit electricity metering to record electricity use of electric vehicle charging equipment; and
- (g) be labelled to indicate the use of the space required by (f) is for the future installation of metering equipment.

Limitations

J9D4 does not apply to a stand-alone Class 7a building.

3.10.3 J9D5 Facilities for solar photovoltaic and battery systems

Part J9D5 of the NCC outlines the provisions of Facilities for solar photovoltaic and battery systems. Facilities for solar photovoltaic and battery shall be provided in accordance with Part J9D5 of the NCC.

- (1) The main electrical switchboard of a building must—
 - (a) contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for—
 - (i) a solar photovoltaic system; and
 - (ii) a battery system; and
 - (b) be sized to accommodate the installation of solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area.
- (2) At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels, except for buildings—
 - (a) with installed solar photovoltaic panels on—
 - (i) at least 20% of the roof area; or
 - (ii) an equivalent generation capacity elsewhere on-site; or
 - (b) where 100% of the roof area is shaded for more than 70% of daylight hours; or
 - (c) with a roof area of not more than 55 m²; or
 - (d) where more than 50% of the roof area is used as a terrace, carpark, roof garden, roof light or the like.

Limitations

- (1) The requirements of J9D5 (1)(a)(i) and (b) do not apply to a building with solar photovoltaic panels installed on at least 20% of the roof area.
- (2) The requirements of J9D5 (1)(a)(ii) and (b) do not apply to a building with battery systems installed.

All services consultants and contractors shall design their systems to ensure compliance with Part J9 of the NCC Section J and all subsections associated therein with regards to facilities for energy monitoring and on-site distributed energy resources.

4. DISCLAIMER

This report is prepared using the information described above and inputs from other consultants. Whilst IGS has endeavoured to ensure the information used is accurate, no responsibility or liability to any third party is accepted for any loss or damage arising out of the use of this report by any third party. Any third party wishing to act upon any material contained in this report should first contact IGS for detailed advice which will take into account that party's particular requirements.

Computer performance assessment provides an estimate of building performance. This estimate is based on a necessarily simplified and idealised version of the building that does not and cannot fully represent all the intricacies of the building once built. As a result, simulation results only represent an interpretation of the potential performance of the building. No guarantee or warranty of building performance in practice can be based on simulation results alone. IGS and its employees and agents shall not be liable for any loss arising because of, any person using or relying on the Report and whether caused by reason or error, negligent act or omission in the report. The draft assessment has been prepared based on the preliminary building services and architectural design with the view to conduct a detailed assessment once the design is further developed.

The performance of the completed building may be significantly affected by the quality of construction; the quality of commissioning, ongoing management of the building, and the way the building is operated, monitored, and maintained. Building fabric inputs require verifiable manufacturer data to confirm thermal properties.

This report is intended as a guide to assist with the application of NCC Section J. It should be read in conjunction with the NCC 2022, specific applications may vary during the design development of the project.