NOURA AL HAZZOURI
ABN 80 873 399 711

12 Daphne Avenue
Bankstown NSW 2200
mob: 0405 600 600
email: noura.h@optusnet.com.au

Project: **Proposed Industrial Warehouse**

5 Warren Avenue
Bankstown NSW 2200

Report: **Energy Efficiency Evaluation**
Section J of NCC 2022

Date: **Issue A: 17/12/2024**

Noura Al Hazzouri

CONTENTS

1. INTRODUCTION

This report has been prepared for the proposed **industrial warehouse** located at **5 WARREN AVENUE BANKSTOWN 2200.**

This report represents the findings from the design assessment of the proposed Development against the Deemed-To-Satisfy (DTS) requirements of Section J of the NCC 2022, volume 1, Energy Efficiency.

Section J of the NCC was introduced to set minimum energy efficiency measures for the various classifications of building types while still maintaining acceptable internal environmental conditions for occupants. The measures were designed to reduce the use of artificial heating and cooling, improve the energy performance of lighting, conditioning and ventilation, and reduce energy loss through air leakage.

This report should be read in conjunction with all relevant plans and specifications and any supplementary regulatory information as nominated further within the body of this report. For example, where specific architectural drawings or specification are nominated, these documents are to be consulted in accordance with this design compliance report.

The scope of this report sets out the proposed design parameters by which the building will be demonstrate design compliance with the NCC Section J – Energy Efficiency provisions.

2. REFERENCED DOCUMENTS

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

1. Section 'J' of Volume 1 of NCC 2022
2. Architectural plans provided by **Ridge Designs**
   - 1.01 proposed site plan
   - 2.101 proposed ground floor plan
   - 2.102 proposed mezzanine floor plan
   - 2.201 warehouse 1- Ground floor plan
   - 2.202 warehouse 1- mezzanine plan
   - 2.301 warehouse 2- Ground floor plan
   - 2.302 warehouse 2- mezzanine plan
   - 3.01 warehouse 1- elevations
   - 3.02 warehouse 2- elevations
   - 4.01 Sections

3. PROPOSED DEVELOPMENT

The Proposed **industrial warehouse with basement** in this report is **5 Warren Avenue BANKSTOWN NSW 2200.**

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

External Walls: Concrete walls

Internal Walls: framed walls

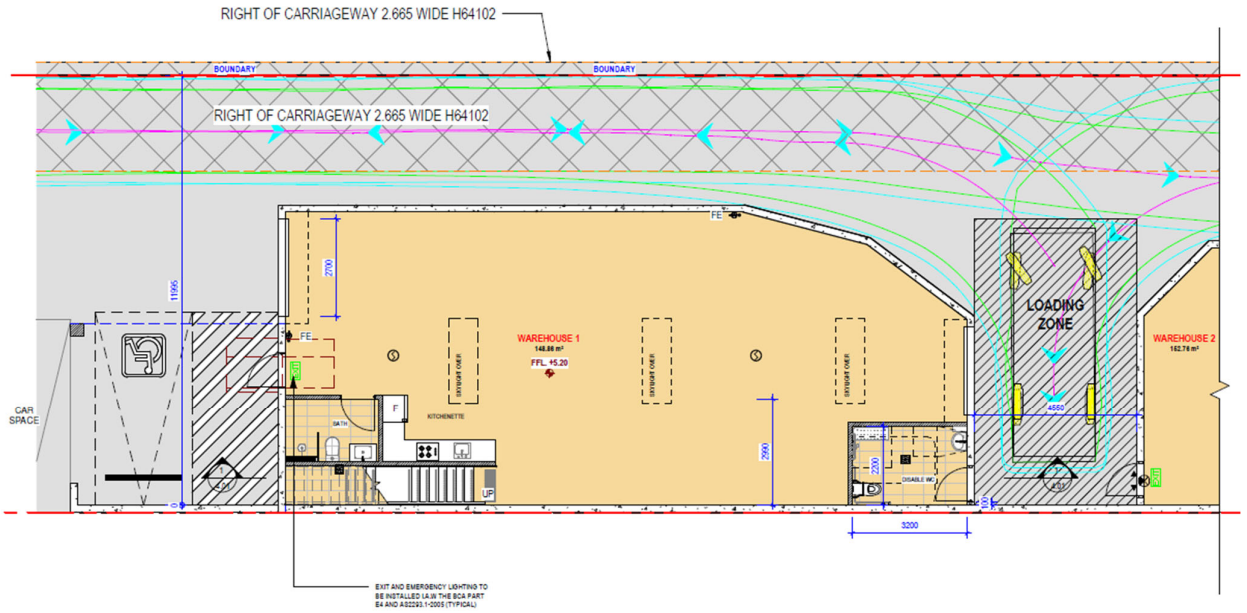
Floor: Concrete Slab

Roof and Ceiling: colorbond roof

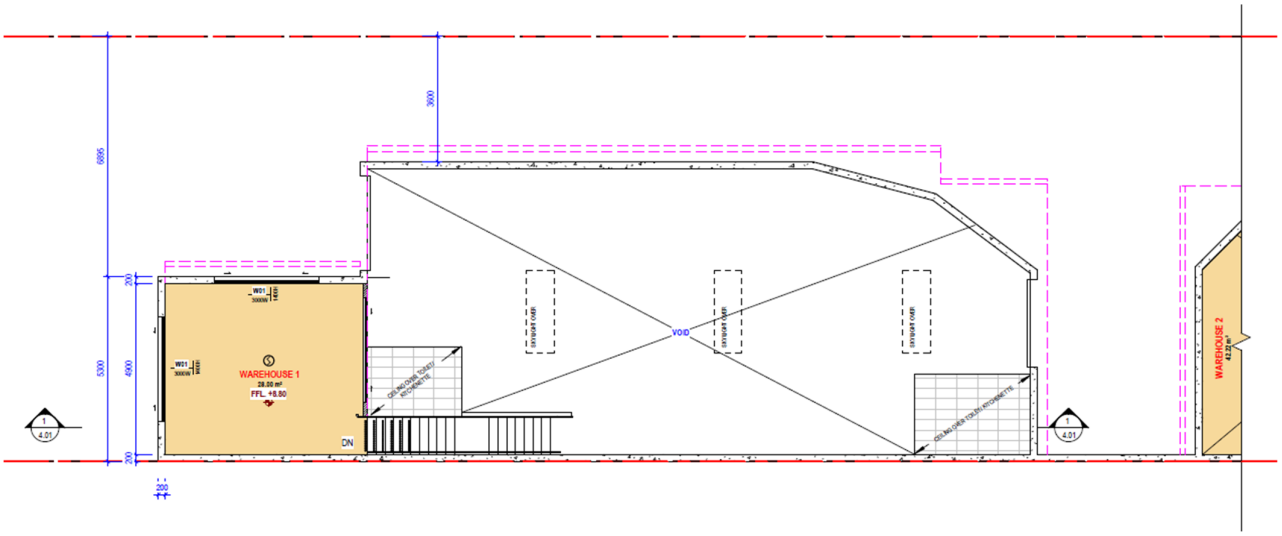
Windows and doors: Aluminium framed

4. SCOPE OF REPORT

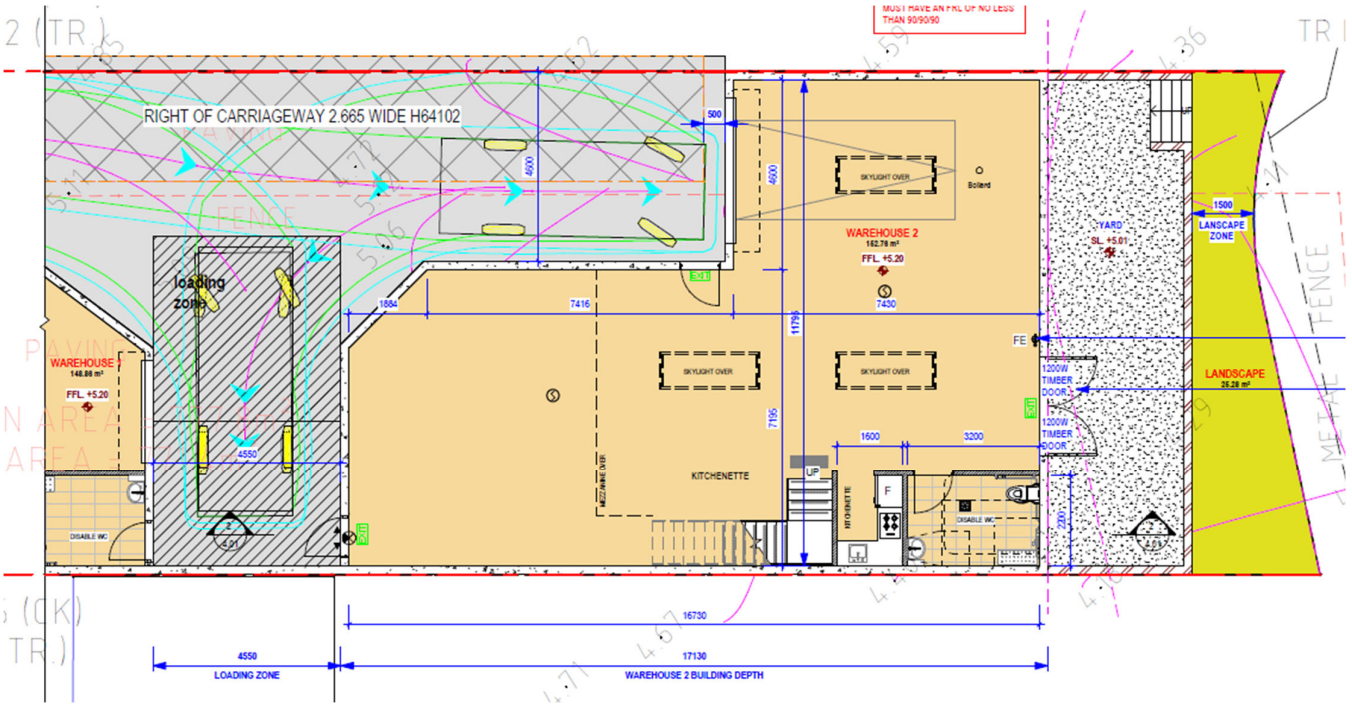
This Section J report covers the project as indicated on the floor plans:



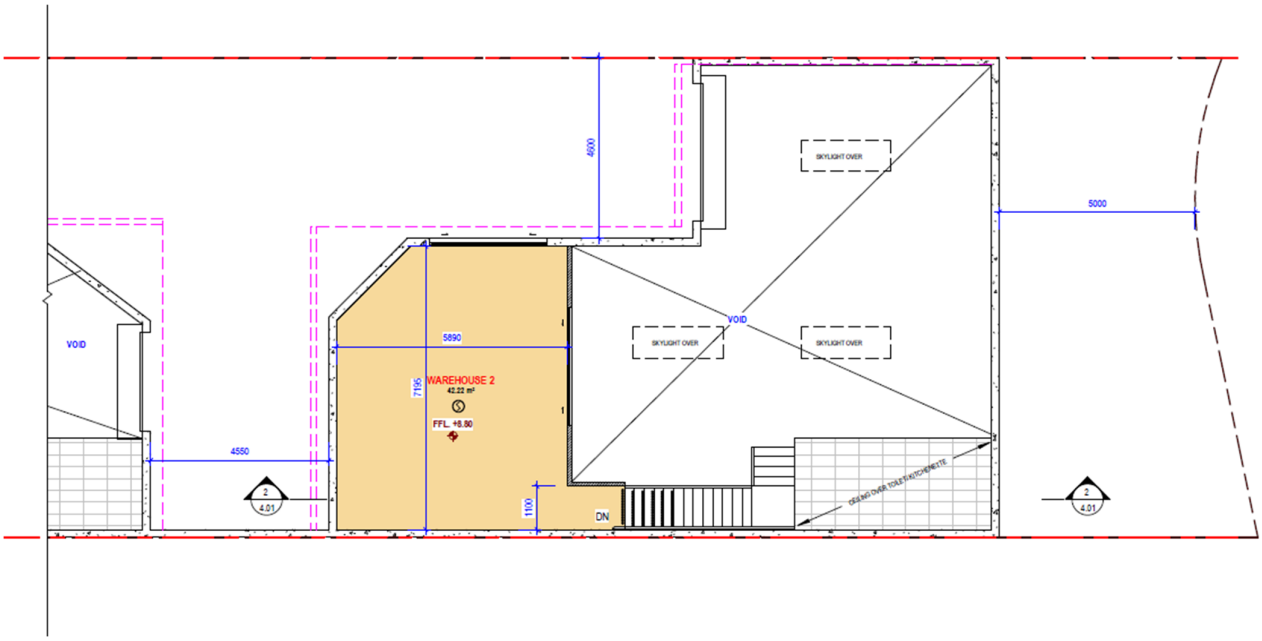
Warehouse 1-ground floor plan



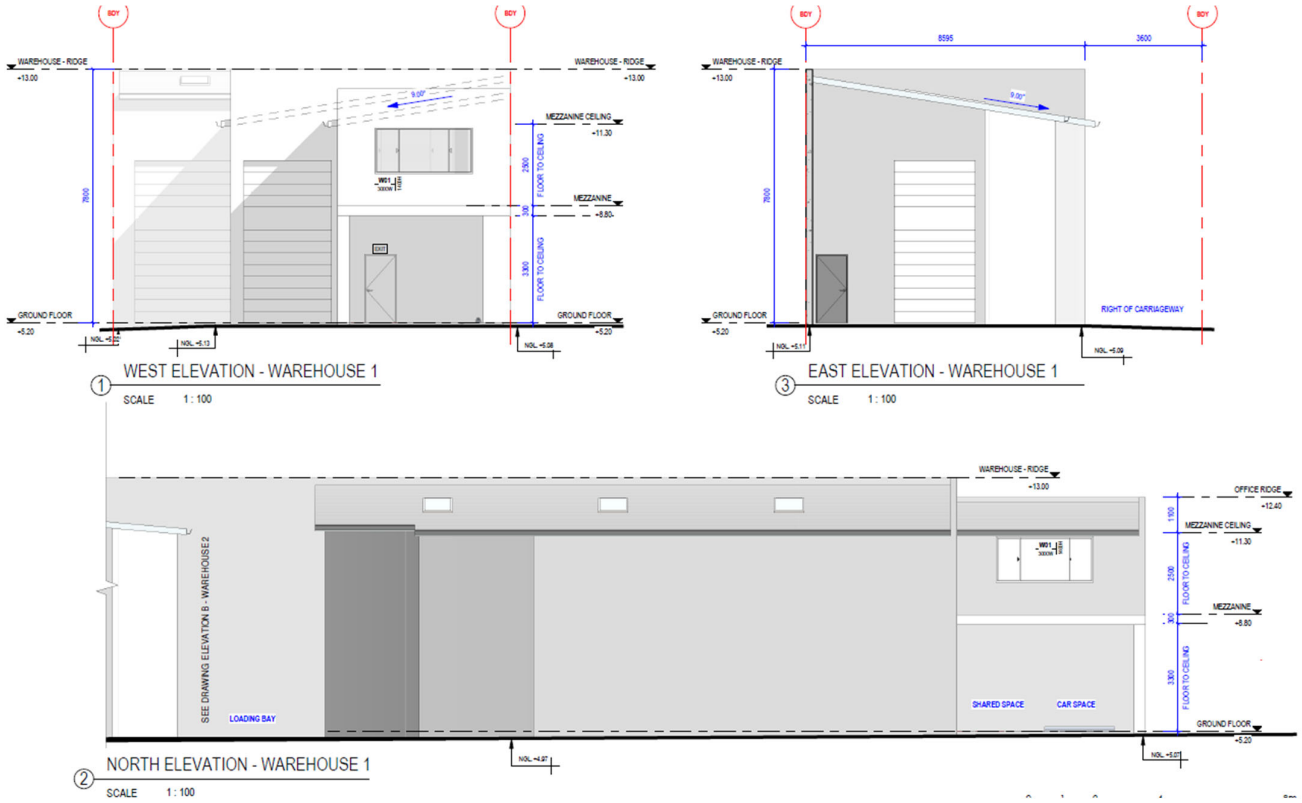
Warehouse 1-mezzanine plan



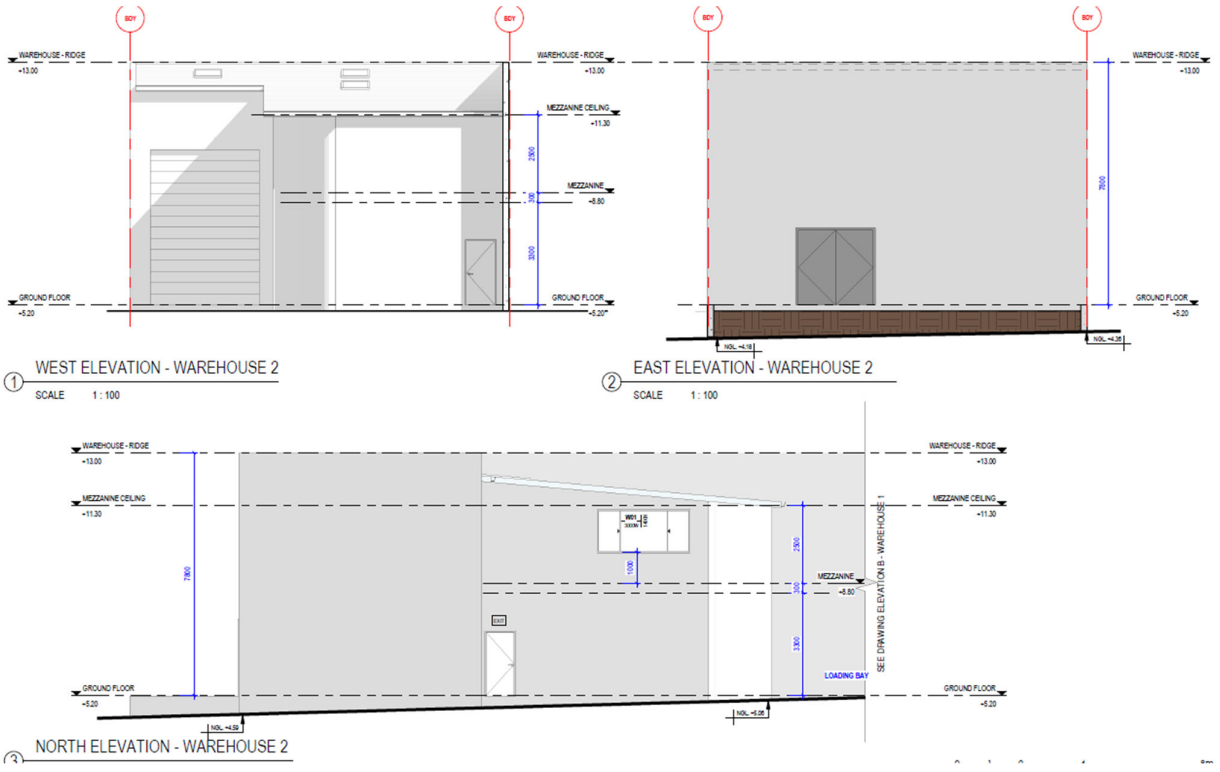
Warehouse 2-ground floor plan



Warehouse 2-mezzanine plan



Warehouse 1-elevations



Warehouse 2-elevations

5. PROJECT CLASSIFICATION AND CLIMATE ZONE

Building Class and Use: Class5-office (mezzanine), Class 7b-Warehouse/Storage (GF)

NCC Climate zone: 5 Light Green. As noted on https://ncc.abcb.gov.au

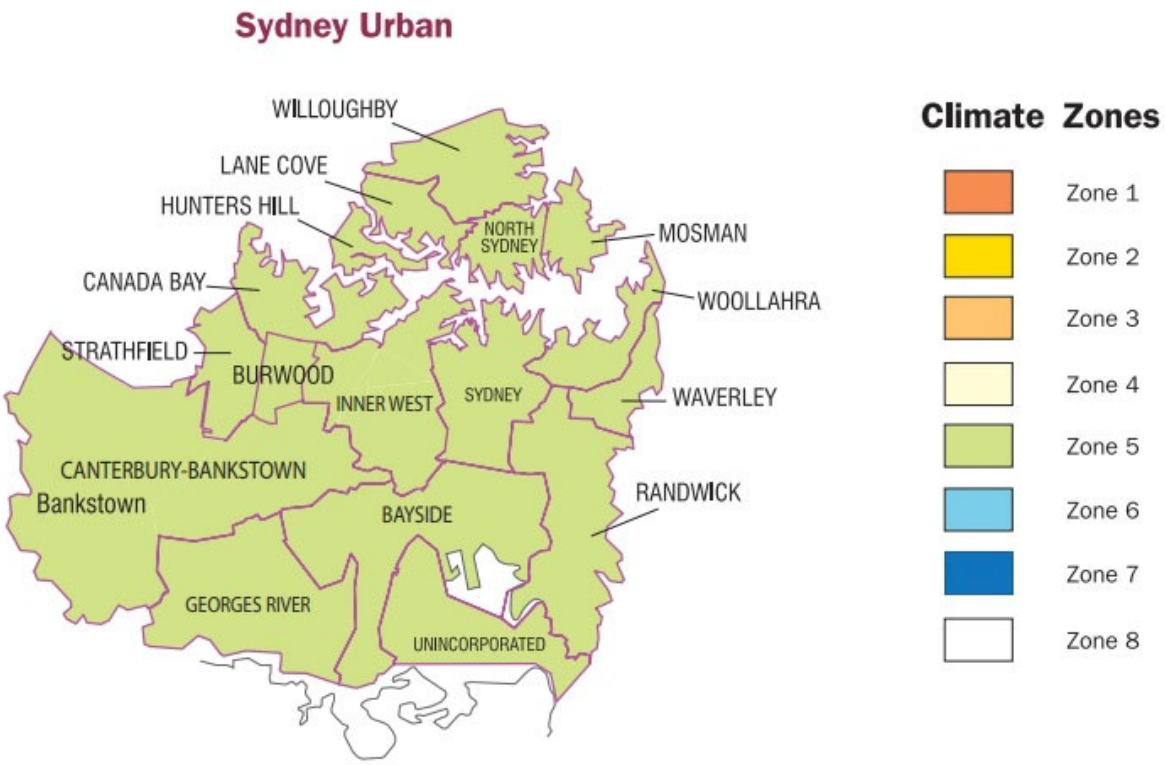


Image 1: NCC Climate Zones – Sydney Surrounds. Source www.abcb.gov.au

Climate Characteristics of Zone 5

Warm Temperature

- Moderate diurnal (day-night) temperature range near cost to high diurnal range inland
- Four distinct seasons: Summer and Winter can exceed human comfort range; Spring and Autumn are ideal for human comfort.
- Mild winters with low humidity
- Hot to very hot summers with low to moderate humidity
- Widely variable solar access and cooling breeze directions and patterns.

This is an uncommon zone in that it includes a more diverse range of climatic conditions than other zones. This diversity is evident in the hours of sunlight and directions of cool breezes.

6. DETAILED REPORT OF PROVISIONS TO COMPLY

This section analyses the current elements of the proposed design against provisions of section J - energy efficiency.

1. Part J4 – BUILDING FABRIC (warehouse 1 and 2 mezzanine only)

The Deemed-to-Satisfy Provisions of this Part apply to building elements forming the envelope of a class 2to 9 building.

J4D2 **Application** - All new parts of the building envelope need to comply.

Building Envelope

The building envelope for the purpose of Section J is bound by the external walls, floor and roof of the **proposed industrial warehouse.**

J4D3 **Thermal Construction General** - Builder is to ensure compliance, during construction.

- Insulation must comply with AS/NZS 4859.1.
- Insulation must abut or overlap adjoining insulation other than at supporting members such as studs, noggings, joists, furring channels where the insulation must be against the member.
- Insulation must form a continuous barrier with ceilings, walls, bulkheads, floors or the like that contribute to the thermal barrier.
- Insulation must not affect the safe or effective operation of a service or fitting.
- Reflective insulation must be installed with the necessary airspace between the reflective side of the insulation and the lining or cladding.
- Reflective insulation must be installed closely against any penetration, door or window opening.
- Each adjoining sheet of roll membrane being overlapped not less than 50mm or taped together.
- Bulk insulation must be installed so that it maintains its position and thickness, other than when it is compressed between cladding and supporting members, water pipes, electrical cabling or the like.
- When selecting insulation caution should be taken to clearly identify the total R-value of the installed roofing and ceiling system or wall system.

J4D4 **Roof & Ceiling Construction**

(1)In this climate zone, the minimum total R-value is R3.70 (downward direction of heat flow).

The roof and ceiling system is a metal roof with plasterboard ceiling which requires additional insulation to achieve a minimum total R-value of R3.70 (downwards).

Roof & Ceiling Element	R- Value (Unventilated- Down)
Outside air film	0.04
Metal roof	0.00
Reflective Blanket	2.16 minimum
Reflective Airspace	1.28
Plasterboard	0.06
Internal air film	0.16
Total R-value	**3.70 minimum**

Compliance:

•Install 100mm R2.30 reflective insulating blanket or equivalent in the ceiling cavity, giving a total 'R-value' of R3.84(downwards), which exceeds the required minimum of R3.70.

(2) In this Climate zone the solar absorptance of the upper surface of a roof must be no more than 0.45 (light coloured roof).

Compliance :

• Installing a light coloured roof with a solar absorptance of 0.45 or less.

The following table is provided by "Colorbond" to describe their range of roof colours according to the Section J requires. It is reproduced here as a guide.

Colour	Solar Absorptance
Classic Cream™	0.32
Surfmist®	0.32
Paperbark®	0.42
Evening Haze®	0.43
Shale Grey™	0.43
Sandbank®	0.46
Dune®	0.47
Windspray®	0.58
Pale Eucalypt®	0.60

J4D5 Roof lights – not applicable

J4D6 Walls-glazing construction

(1) The total system U-value for the Wall-glazing construction must not be greater than U-value 2.0
(2) The total system U-value for display glazing must not be greater than U-value 5.8.
(3) The total system U-value for wall-glazing construction must be calculated in accordance with Specification J1.5a.
(4) Wall components must achieve a minimum total R-value of R1.0 where the wall area is less than 80% of the total wall-glazing area, and in accordance with Table J1.5a where the wall area is 80% or more of the total wall-glazing area.
(5) The solar admittance of externally facing wall-glazing construction must not be greater than that specified in Table J1.5b, namely 0.13 for this climate zone.
(6) The solar admittance of a wall-glazing construction must be calculated in accordance with Specification J1.5a.
(7) The total system SHGC of Display glazing must not be greater than 0.81 divided by the shading multiplier specified in Specification J1.5a.

In this project, new walls have to achieve a minimum R-value of R1.4.

Concrete walls with internal plasterboard lining

Wall Element	R- Value
Outside air film	0.04
Concrete	0.10
30mm R1.3 PIR board	1.30
airspace in metal frame	0.16
Plasterboard	0.06
Internal air film	0.12
Total R-value	1.78

Compliance:
• Adding 30mm R1.3 PIR type insulation with plasterboard, giving a ***total 'R-value' of R1.78.***

New stud walls of the mezzanine area that adjoin the non-conditioned spaces (warehouse area)

Wall Element	R- Value
Internal air film	0.12
Cladding/lining	0.06
Reflective air-gap	0.66
R2.0 Wall batts with metal frame	0.62
Plasterboard/lining	0.06
Internal air film	0.12
Total R-value	1.64

Compliance can be met by:

- *adding R2.0 wall batts in a steel frame and a reflective wall wrap with an air gap to the cladding/lining on battens/tophats, giving a* ***total 'R-value' of R1.64.***

Glazing – Method 2 – Refer appendix D.
Compliance:
• Installing the new office windows with a characteristic equal to or less than a U-value of 7.0 and a SHGC-value of 0.59, which can be achieved with tinted single glazing.

J4D7 Floors

(1) A floor must achieve a minimum Total R-Value of R2.0

The suspended steel floor requires additional insulation where it is above an unconditioned space to achieve a minimum total R-value of R2.0.

Floor Element	R- Value
Indoor air film	0.16
Steel frame	0.15
Additional insulation	1.63 minimum
FC sheet	0.02
Outdoor air film	0.04
Total R-value	2.0 minimum

Compliance:

- *Adding a 40mm R1.9 PIR board product or equivalent to the steel floor, giving a* ***total 'R-value' of R2.27,*** *which exceeds the required minimum of R2.0.*

2. Part J5 – BUILDING SEALING

J5D2 Application

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

(a) A building in climate zones 1, 2, 3 and 5 where the only means of air conditioning is by using an evaporative cooler.

(b) A permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance.

(c) A building or space where the mechanical ventilation required provides sufficient pressurisation to prevent infiltration.

J5D3 Chimneys and Flues – not applicable

J5D4 Roof Lights – not applicable

J5D5 Windows and doors

All external doors and windows must either have seals to restrict air infiltration or the windows must comply with AS 2047. (fire and smoke doors, roller shutter door or grills are exempt).

A seal for the bottom edge of a swing door must be a draft protection device and for other edges of an external door and openable windows may be a foam or rubber compression strip fibrous seal or the like.

An entrance to a building must have an airlock, self-closing door, revolving door or the like, where the conditioned space has a floor area greater than 50m2.

Compliance:

• *The new entry doors* ***must be self-closing*** *or interlocked to ensure the air-conditioning system is inactive when these doors are open.*

J5D6 Exhaust fans

All exhaust fans fitted in a conditioned space must have a sealing device such as a self-closing damper or the like.

Compliance:

- *Any new exhaust fans to have self-closing dampers, including miscellaneous exhaust fans*

J5D7 Construction of roofs, walls and floors

Roofs, walls and floors and any opening such as a window or door must be constructed to minimise air leakage by:

- Enclosed or internal lining systems that are close fitting at ceiling, wall and floor *junctions* or
- Sealed by caulking, skirting, architraves, cornices or the like.

3. Part J6 – A/C & VENTILATION SYSTEMS

General provisions include:

J6D3 Air-conditioning system control

(a) An air-conditioning system –

i. must be capable of being deactivated when the building or part of a building served by that system is not occupied; and

ii. when serving more than one air-conditioning zone or area with different heating or cooling needs, must—

(A) thermostatically control the temperature of each zone of area;

(B) not control the temperature by mixing actively heated air and actively cooled air; and

(C) limit reheating to not more than—

(aa) for a fixed supply air rate, a 7.5 K rise in temperature; and

(bb) for a variable supply air rate, a 7.5 K rise in temperature at the nominal supply air rate but increased or decreased at the same rate that the supply air rate is respectively decreased or increased; and

iii. which provides the required mechanical ventilation, other than in climate zone 1 or where dehumidification control is needed, must have an outdoor air economy cycle, if the total air flow rate of any airside component of an air-conditioning system capacity is greater than or equal to 2000l/s; and

iv. which contains more than one water heater, chiller or coil, must be capable of stopping the flow of water to those not operating; and

v. with an airflow of more than 1000L/s, must have a variable speed fan when its supply air quantity is capable of being varied; and

vi. when serving a sole-occupancy unit in a class 3 building, must not operate when any external door of the sole-occupancy unit that opens to a balcony or the like, is open for more than one minute; and

vii. must have the ability to use direct signals from the control components responsible for the delivery of comfort conditions in the building to regulate the operation of central plant; and

viii. must have a control dead band of no less than $2^{o}C$, except where a smaller range is required for specialised applications; and

ix. must be provided with balancing dampers and balancing values that ensure the maximum design air or fluid flow is achieved but not exceeded by more than 15% above design at each component or group of components

x. must ensure that each independently operating space of more than $1000m^2$ and every separate floor of the building has provision to terminate airflow independently of the remainder of the system sufficient to allow for different operating times; and

xi. when deactivated, must close any motorised outdoor air or return

air damper that is not otherwise being actively controlled.

(b) When two or more air-conditioning systems serve the same space they must use control sequences that prevent the systems from operating in opposing heating and cooling modes.

(c) Time switches –

(i) A time switch must be provided to control –
(A) an air-conditioning system of more than 2 kWr; and
(B) a heater of more than 1 kWheating used for air-conditioning.

(ii) The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days

(iii) The requirements of (i) and (ii) do not apply to –
(A) an air-conditioning system that serves—
(aa) only one sole-occupancy unit in a Class 2 or 3 building; or
(bb) a Class 4 part of a building; or
(cc) only one sole-occupancy unit in a Class 9c building;or
(B) a building where air-conditioning is needed for 24 hour occupancy.

Compliance:

- *Ensure any new A/C System has the ability to be inactive when the area is not occupied.*
- *Ensure any new A/C System greater than 2kWr has a 7 day time switch installed.*

J6D4 Mechanical ventilation systems control

(1) A mechanical ventilation system, including one that is part of an air-conditioning system, except where the mechanical system serves only one sole-occupancy unit in a Class 2 building or serves only a Class 4 part of a building, must—

(i) be capable of being deactivated when the building or part of the building served by that system is not occupied; and

(ii) when serving a conditioned space

(A) where in the outdoor air flow is greater than 500 L/s, have

(aa) an energy reclaiming system that preconditions outdoor air at a minimum sensible heat transfer effectiveness of 60%; or

(bb) demand control ventilation in accordance with AS 1668.2 if appropriate to the application; and

(B) not exceed the minimum outdoor air quantity required by Part F4 by more than 20%, except where –

(aa) additional unconditioned outdoor air is supplied for free cooling; or

(bb) additional mechanical ventilation is needed to balance the required exhaust; or

(cc) an energy reclaiming system preconditions all the outside air.

(iii) For an airflow of more than 1000L/s, have a variable speed fan unless the downstream airflow is required by Part F4 to be constant.

(2) Exhaust Systems – An exhaust system with an air flow rate of more than 1000L/s must be capable of stopping the motor when the system is not needed, except for an exhaust system in a sole-occupancy unit in a Class2,3 or 9c building.

(3) Carpark exhaust systems – Carpark exhaust systems must have a control system in accordance with 4.11.2 or 4.11.3 of AS 1668.2

(4) Time switches –

(i) A time switch must be provided to a mechanical ventilation system with an air flow rate of more than 1000 L/s

(ii) The time switch must be capable of switching electric power on and off at variable pre-programmed times and on variable pre-programmed days

(iii) The requirements of (i) and (ii) do not apply to –

(C) A mechanical ventilation system that serves—

(aa) only one sole-occupancy unit in a Class 2, 3 or 9c building; or

(bb) a Class 4 part of a building; or

(D) a building where air-conditioning is needed for 24 hour occupancy.

Compliance:

- *Ensure any new Mechanical Ventilation system has the ability to be inactive when the area is not occupied.*
- *Ensure any new Mechanical Ventilation system greater than 1000L/s is controlled by a time switch.*

J6D5 Fan systems

(a) Fans, ductwork and duct components that form part of an air-conditioning system or mechanical ventilation system must separately comply with (b), (c), (d) and (e) or achieve a lower fan motor input power per flowrate than when combining (b), (c), (d) and (e).

Clauses J5.4 (b), (c), (d) and (e) are included in appendix B

J6D6 Ductwork insulation

(i) Ductwork and fitting in an air-conditioning system must be provided with insulation.

i. Complying with A/S/NZS 4859.a, and

ii. Have an insulation R-value greater than or equal to

- R1.0 flexible ductwork
- The same as connecting duct work for cushion boxes
- R1.20 within a conditioned space
- R3.0 where exposed to direct sunlight
- R2.0 all other locations

(ii) Insulation must

i. Be protected against the effects of weather and sunlight, and

ii. Be installed so that it abuts joining insulation to form a continuous barrier and maintains it position and thickness

iii. When conveying cooled air be protected by a vapour barrier on the outside of the insulation.

(iii) These requirements do not apply to:

- Ductwork or fittings located in the last room served, or
- Return air ductwork passing in a conditioned space, or
- Ductwork for outside or exhaust air, or
- The floor of an in-situ air-handling unit, or
- Packaged air-conditioning equipment complying with MEPS, or
- Flexible fan connectors

J6D7 Ductwork sealing

Ductwork in an air-conditioning system 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 of the system.

J6D8 Pump systems

(a) Pumps and pipe work that form part of an air-conditioning system must separately comply with (b), (c) and (d) or achieve a lower pump motor input power per flowrate than when combining (b), (c) and (d).

Clauses J5.7 (b), (c) and (d) are included in appendix B

J6D9 Pipework insulation

(a) 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, must be provided with insulation.

(i) Complying with AS/NZS 4859.1, and

(ii) Have an insulation in accordance with Table J5.8a and J5.8b below

Table J5.8a -Piping

Fluid temp range	Min R-value Nom Pipe <40mm	Min R-value Nom Pipe 40-80 mm	Min R-value Nom Pipe 80-150mm	Min R-value Nom Pipe >150mm
Low Temp Chilled <2oC	1.3	1.7	2.0	2.7
Chilled 2oC -20oC	1.0	1.5	2.0	2.0
Heated 30oC -85oC	1.7	1.7	1.7	1.7
High Temp hated >85oC	2.7	2.7	2.7	2.7

Table J5.8b – Vessels, heat exchangers and tanks

Fluid temp range	Min R-value Nom Pipe <40mm
Low Temp Chilled <2°C	2.7
Chilled 2°C -20°C	1.8
Heated 30°C -85°C	3.0
High Temp heated >85°C	3.0

(b) Insulation must

(i) Be protected against the effects of weather and sunlight, and

(ii) Be able to withstand the temperatures within the piping, vessel, heat exchanger or tank.

(c) These requirements do not apply to piping, vessels or heat exchangers

- located in the last room served and downstream of the control device for the regulation of heating or cooling service to that room, or
- encased within a concrete slab or panel which is part of the heating or cooling system, or
- supplied as an integral part of a chiller, boiler or unitary air-conditioner, or
- inside an air-handling unit, fan-coil unit, or the like.

J6D10 Space Heating

(1) A Heater used for air-conditioning or as part of an air-conditioning system must be-

(a) A solar heater; or

(b) A gas heater; or

(c) A heat pump heater; or

(d) A heater using reclaimed heats from another process such as reject heat from a refrigeration plant; or

(e) An electric heater if_

(i) The heater capacity is not more than-

A. 10 W/m2 of the floor area of the conditioned space in climate zone 1; or

B. 40 W/m2 of the floor area of the conditioned space in climate zone 2;

C. In this climate zone <500m2 – 65W/m2 or >500m2 – 55W/m2; or

(ii) The annual energy consumption of the heating is not more than 15 kWh/m2 of the floor area of the conditioned space in climate zones 1,2,3,4 and 5; or

(iii) The in-duct heater complies with J5.2(a)(ii)(C); or

(f) Any combination of (i) to (v).

(2) An electric heater may be used for heating a bathroom in a class 2,3,9a or 9c building if the heating capacity is not more than 1.2 kW and the heater has a timer.

(3) A fixed heating or cooling appliance that moderates the temperature of an outdoor space must be configured to automatically shut down when-

(a) There are no occupants in the space served; or

(b) A period of one hour has elapsed since the last activation of the heater; or

(c) The space served has reached a design temperature.

(4) A gas water heater, that is used as part of an air-conditioning system, must-

(a) If rated to consume 500MJ/hour of gas or less, achieve a minimum gross thermal efficiency of 86%; or

(b) If rated to consume more than

J6D11 Refrigerant chillers – Refer appendix B

J6D12 Unitary air-conditioning equipment

Any new air-conditioning system 65kWr or less must comply with MEPS, and any new air-conditioning system greater than 65kWr must have a minimum energy efficiency ratio of 4.0 Wr/ $_{\text{input power}}$ for water cooled and 2.9 Wr/W$_{\text{input power}}$ for air cooled

Compliance:

- *Certification by a mechanical engineer if any new air-conditioner is greater than 65kWr*

J6D13 Heat rejection equipment – Refer appendix B

4. Part J7 – ARTIFICIAL LIGHTING & POWER

J7D3 Artificial lighting

(b)All artificial lighting for the whole building must not exceed the aggregated maximum Illumination Power Density (IPD) specified in Table J7D3a.(refer Appendix A)

Compliance:

- *Do not exceed the "Max. Lighting Wattage" for any new lighting in each of the areas in the lighting calculations table in Appendix A.*
- *The maximum internal lighting wattage for the whole building must not exceed* ***4,791 watts.***

(c) The lighting limits do not apply to the following:

- Emergency Lighting
- Signage and display lighting
- A heater where it emits light
- Lighting for a specialised process nature
- Lighting for performances such as theatrical or sporting
- Lighting of permanent displays in museums or galleries
- Lighting installed solely to provide Photosynthetically active radiation for plant growth

J7D4 Interior artificial lighting and power control

(1) Artificial lighting of a room or space must be individually operated by a switch or other control device.

(3) An artificial lighting switch must:

(i) Be located in a visible position in the room being switched or in an adjacent room or space from where 90% of the lighting being switched is visible;

(ii) for other than a single function space such as an auditorium, theatre or sporting stadium, not operate lighting for an area greater than 250m^2 if in a Class 5 or Class 8 building, or.

(iii) not operate lighting for an area greater than 250m^2 for a space up to 2000m^2 or up to 1000m^2 for a space greater than 2000m^2

(4) 95% of artificial lighting in a building or storey of a building, other than a Class 2 or 3 building or a Class 4 part, of more than 250m^2 must be controlled by:

(i) A time switch in accordance with Specification J6; or

(ii) An occupant sensing device such as a security key card reader or a motion detector in accordance with Specification J6.

Compliance:

- *Time switch(s) or motion detector(s) or security card reader(s) must be installed to control at least 95% of the lighting in the building.*

(9)These lighting requirements do not apply to Emergency lighting requirements or where lighting is required for 24 hours occupancy situations.

(10) The requirements of (d) do not apply to the following:

(i) Artificial lighting in a space where the sudden loss of artificial lighting would cause an unsafe situation such as in a patient care area in a Class 9a building or in a Class 9c aged care building.

(ii) A heater where the heater also emits light, such as in bathrooms.

J7D5 Interior decorative and display lighting

(1) Interior decorative and display lighting, such as for a foyer mural or art display, must be controlled:

(i) Separately from other artificial lighting; and

(ii) By a manual switch for each area other than when the operating times of the displays are the same in a number of areas such as in a museum, art gallery or the like, in which case they may be combined; and

(iii) By a time switch in accordance with Specification J6 where display lighting exceeds 1 kW.

(2) Window display lighting must be controlled separately from other display lighting.

Compliance:

- *Decorative or display lighting must be controlled separately from general lighting manually and by a time switch in accordance with specification J6 if the lighting exceeds 1kW*

J7D6 External artificial lighting

(a) External artificial lighting attached to or directed at the façade of a building, must:
  (i) Be controlled by either a daylight sensor or a time switch that is capable of switching on and off electric power to the system at variable pre-programmed times and on variable pre-programmed days; and
  (ii) When the total perimeter lighting load exceeds 100W, use LED luminaires for 90% of the total lighting load, or be controlled by a motion detector in accordance with Specification J6, or when used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with Specification J6.

(b) The requirements of (a)(ii) do not apply to the following:
  (i) Emergency lighting in accordance with Part E4.
  (ii) Lighting around a detention centre.

Compliance:

- *External perimeter lighting must be controlled by either a daylight sensor or a time switch in accordance with specification J6, and have a light source efficiency of not less than 60 lumens/watt if the lighting exceeds 100 watts.*

NOTE:

- For smaller rooms a greater Illumination Power Density can be achieved by using a Motion Detector.
- All areas have had the Room Aspect Ration applied.
- For stairwells and corridors the provisions of Part E4 override this Section.

J7D7 Boiling water & chilled water storage units

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

J7D8 Lifts

Lifts must be configured to ensure the lighting and ventilation in the car are turned off when unused for 15 minutes, and achieve the ideal and standby energy performance level of 2 for rated load less than 800kg, 3 for 801kg to 2000kg, 4 for 2001kg to 4000kg, 5 for greater than 4000kg, and achieve the energy efficiency class C for usage categories 1 to4 and Energy Class D for usage categories greater than 5, or energy class d for dedicated goods lifts.

Compliance:

- *Ensure the lift lighting and ventilation is turned off when the lift is unused for more than 15 minutes*

J7D9 Escalators and moving walkways – not applicable

5. Part J8 - HEATED WATER SUPPLY,SWIMMING POOL,SPA POOL

J8D2 Heated water Supply

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

6. PART J9-FACILITIES FOR ENERGY MONITORING

J9D3 Facilities for Energy Monitoring

(1) A building with a floor area greater than 500m^2 must have an energy meter to record time-of-use consumption of gas and electricity.

(2) A building with a floor area greater than 2500m^2 must have energy meters to record time-of-use energy consumption of air-conditioning plant, artificial lighting, appliance power, central hot water supply, internal transport devices, and other ancillary plant.

(3) Energy meters required by (b) 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.

(4) the provision of (b) do not apply to a Class 2 Building with a floor of more than 2500m^2 where the total area of common areas is less the 500m^2

Compliance:

- *The tenancy is less than 500* m^2

J9D4 Facilities for Electric vehicle charging equipment – N/a

(1) A carpark associated with a Class 2, 3, 5, 6, 7b, or 9 building must be provided with electrical distribution boards dedicated to electric vehicle charging –
(a) In accordance with Table J9D4 in each storey of the carpark, and
(b) Labelled to indicate use for electric vehicle charging equipment.

(2) Electrical distribution boards dedicated to serving electric vehicle charging 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) For class 2 buildings, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12kWh from 11:00pm to 7:00am daily; and
(c) For Class 5 to 9 buildings, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12kWh from 9:00am to 5:00pm daily; and
(d) For Class 3 buildings, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 48kWh from 11:00pm to 7:00am daily; and
(e) Be sized to support the future installation of a 7kW (32A) type 2 electric vehicle charge in
(i) 100% of the car parking spaces associated with a Class 2 building; or
(ii) 10% of the car parking spaces associated with a Class 5 or 6 building; or
(iii) 20% of the car parking spaces associated with a Class 3, 7b, 8 or 9 building; and
(f) Contain space of at least 36mm 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.

Compliance:

- *if more than 9 electric vehicle carpark spaces are being installing, then a dedicated electrical distribution board is required for electric vehicle carpark spaces.*
- *the installed switchboards must be fitted with charging control system to manage and schedule charging*

- *The capacity for each circuit must deliver a minimum 12kWh from 11pm to 7am daily for class 2, 12kWh from 9:00am to 5:00pm daily for class 5 to 9, and 48kWh from 11pm to 7am daily for class 3*
- *Installing the switchboard with capacity*
- *For a future 7kW (32A) type 2 electric vehicle charge 100% of the spaces in class 2, 10% of the spaces in Class 5 & 6, 20% of the spaces for class 3,7b, 8 or 9.*
- *For at least 36mm width DIN rail per outgoing circuit for individual subcircuit electricity metering to record electricity use of electric vehicle charging equipment*
- *Be labelled to indicate the space is for future use*

Table J9D4: 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

Table Notes

Where there are more than 168 *carpark* spaces per *storey*, one additional distribution board must be provided for each additional 24 spaces or part thereof.

J9D5 Facilities for Solar Photovoltaic and Battery Systems

(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 the 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 55m2; or

(d) Where more than 50% of the roof area is used as a terrace, carpark, roof garden, roof light or the like.

Compliance:

- *Installing the main switchboard*
  - *with at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for a solar photovoltaic system and a battery system*
  - *with a size to accommodate the installation of solar photovoltaic panels at maximum output on at least 20% of the building roof area.*
- *Leaving at least 20% of the roof area clear for solar photovoltaic panels.*

SUMMARY OF COMPLIANCE REQUIRMENTS

In addition to the information provided in the drawings, the following measures are required to comply with Section J of the NCC 2022, volume 1. The detailed report includes all supporting information.

PART J4 – BUILDING FABRIC – mezzanine floor only

Compliance:

Metal roof

•Installing 100mm R2.30 reflective insulating blanket or equivalent in the ceiling cavity, giving a total 'R-value' of R3.84(downwards), which exceeds the required minimum of R3.70.

• Installing a light coloured roof with a solar absorptance of 0.45 or less.

Concrete walls with internal plasterboard lining

*•adding R2.0 wall batts in a steel frame and a reflective wall wrap with an air gap to the cladding/lining on battens/top hats, giving a **total 'R-value' of R1.64.***

New stud walls of the mezzanine area that adjoin the non-conditioned spaces (warehouse area)

*• Adding 30mm R1.3 PIR type insulation with plasterboard, giving a **total 'R-value' of R1.78.***

External Glazing

*• Installing the new office windows with a characteristic equal to or less than a **U-value of 7.0 and a SHGC-value of 0.59**, which can be achieved with tinted single glazing.*

New suspended floor (mezzanine)

*•Adding a 40mm R1.9 PIR board product or equivalent to the concrete slab, giving a **total 'R-value' of R2.20,** which exceeds the required minimum of R2.0.*

PART J5 - BUILDING SEALING - ground and first floor

Compliance:

• The new entry doors must be self-closing or interlocked to ensure the air-conditioning system is inactive when these doors are open.

• Any new exhaust fans to have self-closing dampers, including "miscellaneous exhaust fans".

PART J6 - A/C & VENTILATION SYSTEMS

Compliance:

• Ensure any new A/C System has the ability to be inactive when the area is not occupied.

• Ensure any new A/C System greater than 2kWr has a 7 day time switch installed.

• Certification by a mechanical engineer if any new air-conditioner is greater than 65kWr.

• Ensure any new Mechanical Ventilation system greater than 1000L/s is controlled by a time switch.

PART J7- ARTIFICIAL LIGHTING & POWER

Compliance:

*• Do not exceed the "Max. Lighting Wattage" for any new lighting in each of the areas in the lighting calculations table in **Appendix A.***

*• The maximum internal lighting wattage for the whole building must not exceed **4,791 watts.***

*• Time switch(s) or motion detector(s) or security card reader(s) must be installed to control at least **95%** of the lighting in the building.*

• Decorative or display lighting must be controlled separately from general lighting manually and by a time switch in accordance with specification J6 if the lighting exceeds 1kW

• External perimeter lighting must be controlled by either a daylight sensor or a time switch in accordance with specification J6, and have a light source efficiency of not less than 60 lumens/watt if the lighting exceeds 100watts.

• Ensure the lift lighting and ventilation is turned off when the lift is unused for more than 15 minutes

Appendices

APPENDIX A - TABLE OF MAXIMUM ILLUMINATION POWER DENSITY

Space	Maximum illumination power density ($W/m^{2)}$
Auditorium, church and public hall	8
Board room and conference room	5
Car park - general	2
Car park - entry zone (first 20 m of travel)	11.5
Common rooms spaces and corridors	4.5
Control room, switch room, and the like	3
Corridors	5
Courtroom	4.5
Entry lobby	9
Health-care - Children's ward	4
Health-care - examination room	4.5
Health-care - patient ward	2.5
Health-care - all patient care	2.5
Kitchen and food preparation area	4
Laboratory	6
Library - stack and shelving	2.5
Library - reading room	4.5
Museum and gallery - circulation, cleaning and service lighting	2.5
Office - artificially lit to an ambient level of 200 lux or more	4.5
Office - artificially lit to an ambient level of less than 200 lux	2.5
Plant room	4
Restaurant, café, bar, hotel lounge and a space for the serving and consumption of food or drinks	14
Retail space including a museum and gallery whose purpose is the sale of objects	14
School - general purpose learning area	4.5
Storage with shelving no higher than 75% of the height of the aisle lighting	1.5
Service area, locker room, staff room, cleaner's room, rest room and the like	1.5
Toilet, locker room, staff room, rest room and the like	3
Wholesale storage and display area	4

Notes:

1. In areas not listed above, the maximum *illumination power density* is:
   a) For an illuminance of less than 80 Lux, 2 W/m^2
   b) For an illuminance of less than 80 to 160 Lux, 2.5 W/m^2
   c) For an illuminance of less than 160 to 240 Lux, 3 W/m^2
   d) For an illuminance of less than 240 to 320 Lux, 4.5 W/m^2
   e) For an illuminance of less than 320 to 400 Lux, 6 W/m^2
   f) For an illuminance of less than 400 to 600 Lux, 10 W/m^2
   g) For an illuminance of less than 600 to 800 Lux, 11.5 W/m^2

J5.4 Fan systems

Guide

(a) Fans, ductwork and duct components that form part of an air-conditioning system or mechanical ventilation system must—

(i) separately comply with (b), (c), (d) and (e); or

(ii) achieve a fan motor input power per unit of flowrate lower than the fan motor input power per unit of flowrate achieved when applying (b), (c), (d) and (e) together.

(b) **Fans —**

(i) Fans in systems that have a static pressure of not more than 200 Pa must have an efficiency at the full load operating point not less than the efficiency calculated with the following formula:

$\eta_{min} = 0.13 \times \ln(p) - 0.3$

where—

η_{min} = the minimum *required* system static efficiency for installation type A or C or the minimum *required* system total efficiency for installation type B or D; and

p = the static pressure of the system (Pa); and

ln = natural logarithm.

(ii) Fans in systems that have a static pressure above 200 Pa must have an efficiency at the full load operating point not less than the efficiency calculated with the following formula:

$\eta_{min} = 0.85 \times (a \times \ln(P) - b + N) / 100$

where—

η_{min} = the minimum *required* system static efficiency for installation type A or C or the minimum *required* system total efficiency for installation type B or D; and

P = the motor input power of the fan (kW); and

N = the minimum performance grade obtained from Table J5.4a; and

a = regression coefficient a, obtained from Table J5.4b; and

b = regression coefficient b, obtained from Table J5.4c; and

ln = natural logarithm.

(iii) The requirements of (i) and (ii) do not apply to fans that need to be explosion proof.

Table J5.4a Minimum fan performance grade

Fan type	Installation type A or C	Installation type B or D
Axial — as a component of an air handling unit or fan coil unit	46.0	51.5
Axial — other	42.0	61.0
Mixed flow — as a component of an air handling unit or fan coil unit	46.0	51.5
Mixed flow – other	52.5	65.0
Centrifugal forward-curved	46.0	51.5
Centrifugal radial bladed	46.0	51.5
Centrifugal backward-curved	64.0	64.0

Notes to Table J5.4a

Notes to Table J5.4a :

(1) **Installation type A** means an arrangement where the fan is installed with free inlet and outlet conditions.

(2) **Installation type B** means an arrangement where the fan is installed with a free inlet and a duct at its outlet.

(3) **Installation type C** means an arrangement where the fan is installed with a duct fitted to its inlet and with free outlet conditions.

(4) **Installation type D** means an arrangement where the fan is installed with a duct fitted to its inlet and outlet.

Table J5.4b Fan regression coefficient a

Fan type	Fan motor input power < 10 kW	Fan motor input power ≥ 10 kW
Axial	2.74	0.78
Mixed flow	4.56	1.1
Centrifugal forward-curved	2.74	0.78
Centrifugal radial bladed	2.74	0.78
Centrifugal backward-curved	4.56	1.1

Table J5.4c Fan regression coefficient b

Fan type	Fan motor input power < 10 kW	Fan motor input power ≥ 10 kW
Axial	6.33	1.88
Mixed flow	10.5	2.6
Centrifugal forward-curved	6.33	1.88
Centrifugal radial bladed	6.33	1.88
Centrifugal backward-curved	10.5	2.6

c) **Ductwork —**

(i) The pressure drop in the index run across all straight sections of rigid ductwork and all sections of flexible ductwork must not exceed 1 Pa/m when averaged over the entire length of straight rigid duct and flexible duct. The pressure drop of flexible ductwork sections may be calculated as if the flexible ductwork is laid straight.

(ii) Flexible ductwork must not account for more than 6 m in length in any duct run.

(iii) The upstream connection to ductwork bends, elbows and tees in the index run must have an equivalent diameter to the connected duct.

(iv) Turning vanes must be included in all rigid ductwork elbows of 90° or more acute than 90° in the index run except where—

(A) the inclusion of turning vanes presents a fouling risk; or

(B) a long radius bend in accordance with AS 4254.2 is used.

d) **Ductwork components in the index run —**

(i) The pressure drop across a coil must not exceed the value specified in Table J5.4d.

Table J5.4d Maximum coil pressure drop

Number of rows	Maximum pressure drop (Pa)
1	30
2	50
4	90
6	130
8	175
10	220

(ii) A high efficiency particulate arrestance (HEPA) air filter must not exceed the higher of—

(A) a pressure drop of 200 Pa when clean; or

(B) the filter design pressure drop when clean at an air velocity of 1.5 m/s.

(iii) Any other air filter must not exceed—

(A) the pressure drop specified in Table J5.4e when clean; or

(B) the filter design pressure drop when clean at an air velocity of 2.5 m/s.

Table J5.4e Maximum clean filter pressure drop

Filter minimum efficiency reporting value	Maximum pressure drop (Pa)
9	55
11	65
13	95
14	110

J5.7 Pump systems

Guide

(a) **General —** Pumps and pipework that form part of an *air-conditioning* system must either—

(i) separately comply with (b), (c) and (d); or

(ii) achieve a pump motor power per unit of flowrate lower than the pump motor power per unit of flowrate achieved when applying (b), (c) and (d) together.

(b) **Circulator pumps —** A glandless impeller pump, with a rated hydraulic power output of less than 2.5 kW and that is used in closed loop systems must have an energy efficiency index (EEI) not more than 0.27 calculated in accordance with European Union Commission Regulation No. 622/2012.

(c) **Other pumps —** Pumps that are in accordance with Articles 1 and 2 of European Union Commission Regulation No. 547/2012 must have a minimum efficiency index (MEI) of 0.4 or more when calculated in accordance with European Union Commission Regulation No. 547/2012.

(d) **Pipework —** Straight segments of pipework along the index run, forming part of an *air-conditioning* system—

(i) in pipework systems that do not have branches and have the same flow rate throughout the entire pipe network, must achieve an average pressure drop of not more than—

(A) for constant speed systems, the values nominated in Table J5.7a; or

(B) for variable speed systems, the values nominated in Table J5.7b; or

(ii) in any other pipework system, must achieve an average pressure drop of not more than—

(A) for constant speed systems, the values nominated in Table J5.7c; or

(B) for variable speed systems, the values nominated in Table J5.7d.

(e) the requirements of (d) do not apply—

(i) to valves and fittings; or

(ii) where the smallest pipe size compliant with (d) results in a velocity of 0.7 m/s or less at design flow.

Table J5.7a Maximum pipework pressure drop - Non-distributive constant speed systems

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
Not more than 20	400	400
25	400	400
32	400	400
40	400	400
50	400	350
65	400	350
80	400	350
100	400	200
125	400	200
150 or more	400	200

Table J5.7b Maximum pipework pressure drop - Non-distributive variable speed systems

Nominal pipe diameter (mm)	Maximum pressure drop in systems operating 5000 hours/annum or less (Pa/m)	Maximum pressure drop in systems operating more than 5000 hours/annum (Pa/m)
Not more than 20	400	400
25	400	400
32	400	400
40	400	400
50	400	400
65	400	400
80	400	400
100	400	300
125	400	300
150 or more	400	300

J5.10 Refrigerant chillers

Guide

An *air-conditioning* system refrigerant chiller must comply with *MEPS* and the full load operation energy efficiency ratio and integrated part load energy efficiency ratio in Table J5.10a or Table J5.10b when determined in accordance with AHRI 551/591.

Table J5.10a Minimum energy efficiency ratio for refrigerant chillers - Option 1

Chiller type	Full load operation (W_r / $W_{input\ power}$)	Integrated part load (W_r / $W_{input\ power}$)
Air-cooled chiller with a capacity ≤ 528 kWr	2.985	4.048
Air-cooled chiller with a capacity > 528 kWr	2.985	4.137
Water-cooled positive displacement chiller with a capacity ≤ 264 kWr	4.694	5.867
Water-cooled positive displacement chiller with a capacity > 264 kWr but ≤ 528 kWr	4.889	6.286
Water-cooled positive displacement chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.334	6.519
Water-cooled positive displacement chiller with a capacity > 1055 kWr but ≤ 2110 kWr	5.800	6.770
Water-cooled positive displacement chiller with a capacity > 2110 kWr	6.286	7.041
Water-cooled centrifugal chiller with a capacity ≤ 528 kWr	5.771	6.401
Water-cooled centrifugal chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.771	6.519
Water-cooled centrifugal chiller with a capacity > 1055 kWr but ≤ 1407 kWr	6.286	6.770
Water-cooled centrifugal chiller with a capacity > 1407 kWr	6.286	7.041

Table J5.10b Minimum energy efficiency ratio for refrigerant chillers - Option 2

Chiller type	Full load operation (W_r / $W_{input\ power}$)	Integrated part load (W_r / $W_{input\ power}$)
Air-cooled chiller with a capacity ≤ 528 kWr	2.866	4.669
Air-cooled chiller with a capacity > 528 kWr	2.866	4.758
Water-cooled positive displacement chiller with a capacity ≤ 264 kWr	4.513	7.041
Water-cooled positive displacement chiller with a capacity > 264 kWr but ≤ 528 kWr	4.694	7.184
Water-cooled positive displacement chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.177	8.001
Water-cooled positive displacement chiller with a capacity > 1055 kWr but ≤ 2110 kWr	5.633	8.586
Water-cooled positive displacement chiller with a capacity > 2110 kWr	6.018	9.264
Water-cooled centrifugal chiller with a capacity ≤ 528 kWr	5.065	8.001
Water-cooled centrifugal chiller with a capacity > 528 kWr but ≤ 1055 kWr	5.544	8.001
Water-cooled centrifugal chiller with a capacity > 1055 kWr but ≤ 1407 kWr	5.917	9.027
Water-cooled centrifugal chiller with a capacity > 1407 kWr	6.018	9.264

J5.11 Unitary air-conditioning equipment Guide

Unitary *air-conditioning* equipment including packaged air-conditioners, split systems, and variable refrigerant flow systems must comply with *MEPS* and for a capacity greater than or equal to 65 kWr—

(a) where water cooled, have a minimum energy efficiency ratio of 4.0 W_r / $W_{input\ power}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power; or

(b) where air cooled, have a minimum energy efficiency ratio of 2.9 W_r / $W_{input\ power}$ for cooling when tested in accordance with AS/NZS 3823.1.2 at test condition T1, where input power includes both compressor and fan input power.

J5.12 Heat rejection equipment Guide

(a) The motor rated power of a fan in a cooling tower, closed circuit cooler or evaporative condenser must not exceed the allowances in Table J5.12.

(b) The fan in an air-cooled condenser must have a motor rated power of not more than 42 W for each kW of heat rejected from the refrigerant, when determined in accordance with AHRI 460 except for—

(i) a refrigerant chiller in an *air-conditioning* system that complies with the energy efficiency ratios in J5.10; or

(ii) packaged air-conditioners, split systems, and variable refrigerant flow *air-conditioning* equipment that complies with the energy efficiency ratios in J5.11.

Table J5.12 Maximum fan motor power - Cooling towers, closed circuit coolers and evaporative condensers

Type	Cooling tower maximum fan motor input power (W/kW $_{rej}$)	Closed circuit cooler maximum fan motor input power (W/kW $_{rej}$)	Evaporative condenser maximum fan motor input power (W/kW $_{rej}$)
Induced draft	10.4	16.9	11.0
Forced draft	19.5	Note	11.0

Note to Table J5.12

Note to Table J5.12: A closed circuit, forced draft cooling tower must not be used.

Appendix C

This appendix contains the requirements for lighting and power control devices including timers, time switches, motion detectors and daylight control devices, consistent with Specification 40 in the NCC.

S40C2 Lighting timers

A lighting timer must-

(a) Be located within 2m of every entry door to the space; and

(b) Have an indicator light that is illuminated when the artificial lighting is off; and

(c) not control more than 100m2 with a single push button and 97% of the lights in spaces more than 25m2; and

(d) be capable of maintaining the artificial lighting for no less than 5 minutes and no more than 12 hours.

S40C3 Time switch

(1) A time switch must be capable of switching on and off electric power at variable pre-programmed times and on variable pre-programmed days

(2) A time switch for internal lighting must be capable of being overridden by

- a means of turning the lights on
  - o by a manual switch or occupant sensing device for a period of 2 hours after which the time switch must resume control or
  - o an occupant sensing device that overrides the time switch upon a person's entry and returns control to the time switch on the person's exit (eg security card reader), and
- a manual "off" switch

(3) A time switch for external lighting must be capable of

- Limiting the period the system is switched on to between 30 minutes before sunset and 30 minutes after sunrise is determined or detected including any pre-programming period between these times, and
- Being overridden by a manual switch or a security access system for a period of up to 30 minutes, after which the time switch must resume control.

(4) A time switch for boiling water and chilled water storage units must be capable of being overridden by a manual switch or a security access system that senses a person's presence, overrides for a period of up to 2 hours, after which if there is no further presence detected, the time switch must resume control.

S40C4 Motion Detectors

(2) In a Class 5, 6, 7, 8, 9a or 9b building, a motion detector must:

(a) Be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
(b) Be capable of detecting a person before they have entered 1 m into the space; and
(c) Not control more than an area of 100m2 and 95% of the lights in spaces more than 25m2; and
(d) Be configured so that the lights are turned off when the space is unoccupied for more than 15 minutes; and
(e) Be capable of being overridden by a manual switch only enabling the lights to be turned off.

(3) When outside a building, a motion detector must:

(a) Be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
(b) Be capable of detecting a person within a distance of twice the mounting height or 80% of the ground area covered by the lights beam, and
(c) Not control more than 5 lights and
(d) Be operated in series with a photoelectric cell or astronomical time switch so that the lights will not operate in daylight hours, and
(e) Be configured so that the lights are turned off when the space is unoccupied for more than 15 minutes, and
(f) Have a manual override switch which is reset after a maximum period of 4 hours.

(4) When in a fire-isolated stairway, fire-isolated passageway or fire-isolated ramp, a motion detector must:
(a) Be capable of sensing movement such as by infra-red, ultrasonic or microwave detection or by a combination of these means; and
(b) Be capable of detecting movement of 500mm within the useable part of the space and a person before they have entered 1m unto the space; and
(c) Be configured so that the lights dim to a 30% peak power or less when the space is unoccupied for more than 15 minutes.

S40C5 Daylight sensor and dynamic lighting control device

(1) A daylight sensor and dynamic lighting control device for artificial lighting must:
(a) For switching on and off, be capable of having the switching level set point adjusted between 50 and 10000 lux; and have a delay of more than 2 minutes or a differential of more than 50 lux, and
(b) For dimming or stepped switching, be capable of reducing the power consumed by the controlled lighting in proportion to the incident daylight on the working plane either continuously down or in no less than 4 steps down to a power consumption that is less than 50% of full power.

(2) Where a daylight sensor and dynamic control device has a manual override switch, the manual override switch must not be able to switch the lights permanently on or bypass the lighting controls.

APPENDIX D – WALL-GLAZING CONSTRUCTION

NCC 2019 Facade calculator

Project Name	5 Warren Avenue Bankstown NSW 2200					
Building Class	5	Class 2,3,5,6,7,8,9a, 9c, ward				
Climate Zone	5	Storey	mezzanine			
Wall+glazing U-value max limit	2.0					

	N	E	S	W
Solar Admittance max limit	0.13	0.13	0.13	0.13
Proposed wall R-value	1.40	1.40	1.40	1.40

	Method 1				Method 2	
	N	E	S	W	Combined	
Wall+glazing area	38.4	38.4	30.0	34.2	141.0	
Glazing area	8.4	8.4	0.0	4.2	21.0	
wall area percentage	78%	78%	100%	88%	85%	
Proposed Wall U-value	0.71	0.71	0.71	0.71	0.71	
Proposed Wall+Glazing U-value	2.09	2.09	0.71	1.49		1.65
Proposed Wall+Glazing Solar Admit	0.129	0.087	0.000	0.072		
Reference combined SHGC Energy Value						19.97
Proposed combined SHGC Energy Value						17.05

Element	Facing	Height	Width	Area	U-value	SHGC	P (device or int)	H
mezzanine 1 w1	n	1.40	3.00	4.2	7.00	0.59		
mezzanine 1 w1	w	1.40	3.00	4.2	7.00	0.59		
mezzanine 1 internal window	e	1.40	3.00	4.2	7.00	0.59	device	
mezzanine 2 W1	n	1.40	3.00	4.2	7.00	0.59		
mezzanine 2 int window	e	1.40	3.00	4.2	7.00	0.59	device	
				0.0				
				0.0				
				0.0				
				0.0				

APPENDIX E - LIGHTING CALCULATIONS TABLE on the following page

Non-residential Lighting

Class 3 and 5-9 buildings

Main Menu | Help | Multiple Lighting Systems Calculator

Calculator

Building name/description	Classification
5 Warren Avenue BANKSTOWN NSW 2200	Class 5

Number of rows preferred in table below 7 *(as currently displayed)*

ID	Description	Floor area of the space	Perimeter of the space	Floor to ceiling height	Design Illumination Power Load	Space	Illuminance: Designed Lux Level	Illuminance: Recommended Lux Level	Adjustment Factor One: Adjustment Factor One	Adjustment Factor One: Dimming % Area	Adjustment Factor One: Illuminance Turndown	Adjustment Factor Two: Adjustment Factor Two	Adjustment Factor Two: Dimming % Area	Adjustment Factor Two: Illuminance Turndown	Light Colour Adjustment Factors: Light Colour Adjustment Factor One	Light Colour Adjustment Factors: Light Colour Adjustment Factor Two	SATISFIES PART J6.2: System Illumination Power Load Allowance	SATISFIES PART J6.2: Lighting System Share of % of Aggregate Allowance Used
							These columns do not represent a requirement of the NCC and are suggestions only		Adjustment Factors			Adjustment Factors						
1	mezzanine 1	28.0 m²	21 m	2.5 m	185 W	Office - artificially lit to an ambient level of 200 lx or more											185 W	**4% of 100%**
2	Unit 1	138.0 m²	57 m	7.4 m	2036 W	Entry lobby from outside the building											2036 W	**42% of 100%**
3	unit1 bath	4.7 m²	9 m	3.3 m	25 W	Toilet, locker room, staff room, rest room and the like											25 W	**1% of 100%**
4	unit 1 disabled WC	7.0 m²	11 m	3.3 m	38 W	Toilet, locker room, staff room, rest room and the like											38 W	**1% of 100%**
5	unit 2 dsiable WC	7.0 m²	11 m	3.3 m	38 W	Toilet, locker room, staff room, rest room and the like											38 W	**1% of 100%**
6	unit 2	152.0 m²	56 m	7.4 m	2206 W	Entry lobby from outside the building											2206 W	**46% of 100%**
7	mezzanine 2	42.0 m²	25 m	2.5 m	263 W	Office - artificially lit to an ambient level of 200 lx or more											263 W	**5% of 100%**

Total	4791 W

Total	4791 W

if inputs are valid ✓