

If a building becomes architecture, then it is art. Clearly, if a building is not functionally and technically in order, then it isn't architecture either – it's just a building.
Arne Jacobsen

Mechanical Engineering
Lighting Design
Sustainable Design
Electrical Engineering

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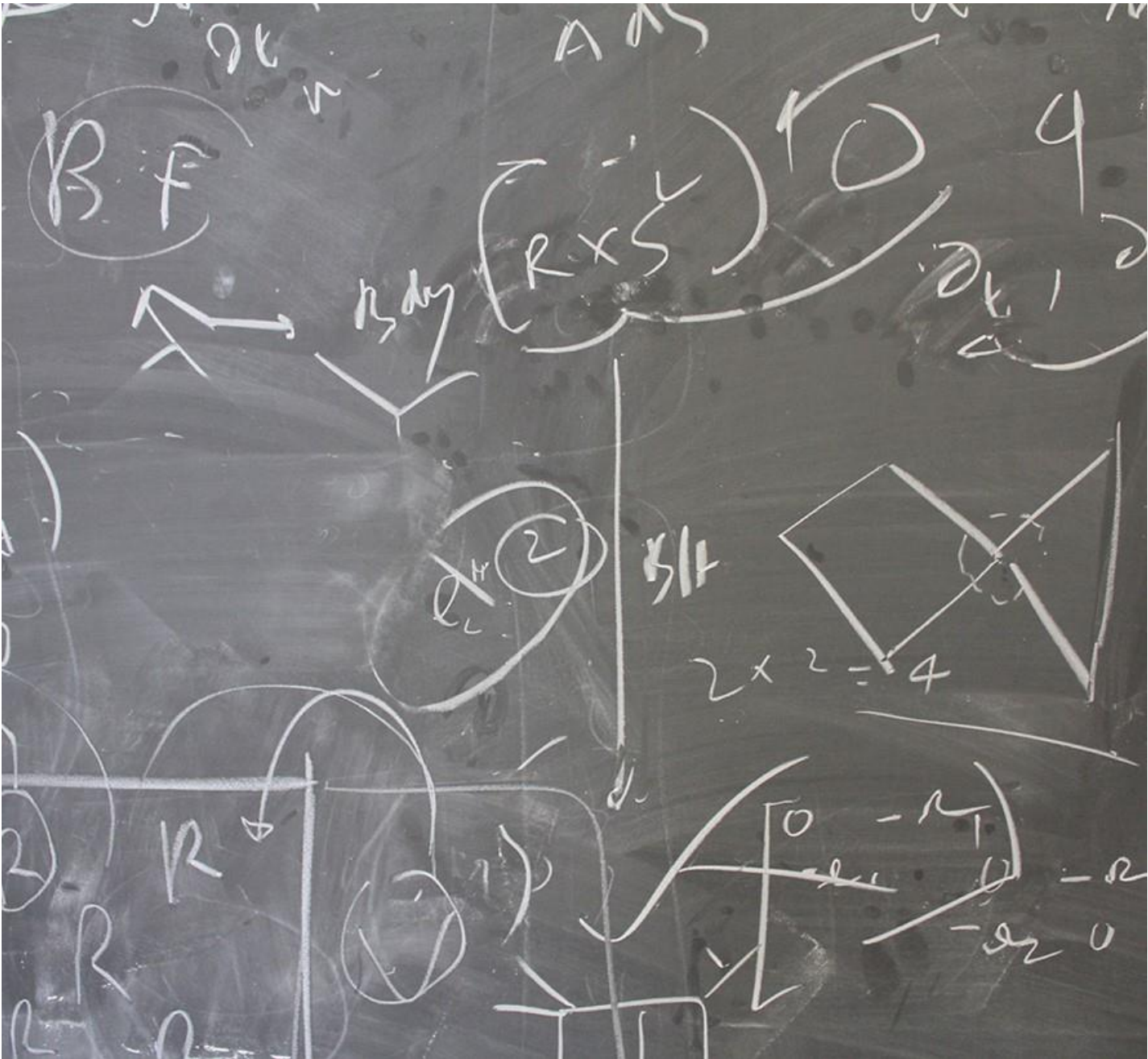
SUSTAINABILITY

STEENSEN VARMING



Sutherland Public School Hall

NCC (2022) Section-J Report



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1.0 Executive Summary

This report has been prepared by Steensen Varming, for the proposed Sutherland Public School Hall (SPSH) development. The purpose of the report is to present the assessment conducted on the proposed architectural design against the compliance requirements of Section-J (Energy Efficiency) of the National Construction Code 2022 (NCC 2022). This report outlines the minimum performance requirements for the proposed building envelope, in accordance with the 'Deemed to Satisfy' (DTS) approach of Section-J NCC 2022.

The objective of Section-J of NCC 2022 is to reduce greenhouse gas emissions by efficiently using energy in buildings. To achieve this objective, buildings must meet or exceed the minimum performance requirements outlined in Section-J. This report will specifically focus on the building envelope requirements of the 2022 NCC Section-J, Parts J1 to J5. (It is assumed that the relevant members of the design team will ensure compliance with the other component parts of Section-J6 to J9 and hence this report does not include details of these sub-sections).

1.1 Rationale for suggested compliance approach

In terms of the building envelope elements (external walls, roofs, ceilings, roof lights, external glazing, and floors) reviewed within this report, a simplistic compliance approach with the prescribed DTS requirements of the NCC has been deemed suitable. Compliance with the DTS requirements of Section-J is necessary, not only to ensure suitable energy performance characteristics for statutory compliance, but also because any departure from a DTS approach would bring with it the need to demonstrate compliance with the intent of Section-J, via alternative verification methods.

1.2 Scope

Within the NCC 2022, it is a requirement for Class 2 to 9 buildings to achieve efficient use of energy. This requirement is defined in Volume 1 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:

- J1 – Energy efficiency Performance requirements
- J2 - Energy efficiency
- J3 - N/A
- J4 - Building Fabric
- J5 - Building Sealing
- J6 - Air Conditioning and Ventilation Systems
- J7 - Artificial Lighting and Power
- J8 - Heated Water Supply and swimming pool and spa pool plant
- J9 – Energy monitoring and on-site distributed Energy resources

This report provides advice on sub-sections J1 to J5 and will identify how compliance with the NCC 2022 can be achieved via the DTS pathway. It is assumed that the relevant design professionals will ensure compliance with the relevant

section of the code for their own disciplines, as Steensen Varming will ours.
Demarcations of responsibilities are taken as follows:

- J1 – BKA Architecture in consultation with Steensen Varming
- J2 – BKA Architecture in consultation with Steensen Varming
- J3 – N/A
- J4 – BKA Architecture in consultation with Steensen Varming
- J5 – BKA Architecture in consultation with Steensen Varming
- J6 – Mechanical services consultant
- J7 – Lighting services consultant
- J8 – Hydraulics services consultant
- J9 – Electrical services consultant

1.3 Basis of assessment

This report has been prepared based on the following architectural drawings prepared by BKA Architecture :

Sr. No.	Drawing Numbers/ Package	Issue	Revision	Date of Issue
1	SD set Site Plan	Issue for coordination 18.11.24	05	18/11/2024
2	SD Set Roof Plan	Issue for coordination 18.11.24	07	18/11/2024
3	SD Set Elevations	Issue for coordination 18.11.24	07	18/11/2024

2.0 Minimum performance DTS requirements

The current Section-2 of this report presents a summary of the minimum performance requirements of Part J4 Building Fabric, in accordance with a DTS solution. Further details of Parts J1 to J5 are presented in Sections 4 to 7.

2.1 Proposed solution

In accordance with the DTS approach for Section-J, the following Table-1 presents a summary of the minimum thermal performance requirements for the project. The location and extent of each of the elements noted in Table-1 are indicated on Thermal markups prepared for the project, using the architectural drawings. Refer to Appendix B: Thermal markups.

Table 1 - Part J-4 Building Fabric assessment summary.

Section-J Sub-sections	Construction Element	NCC Section-J DTS Minimum Requirement	EFSG/Greenstar Requirement (DTS +10%)
PART J4D4 Roofs/Ceiling constructions	Roof Constructions *	R-Value: 3.2	R-Value: 3.52
PART J4D6 Walls and Glazing	Walls	R-Value: 1.4	R-Value: 1.4
	Internal Walls	R-Value: 1.4	R-Value: 1.4
	Glazing	U-Value: 5.8 SHGC: 0.81	U-Value: 5.8 SHGC: 0.81
	Roof skylights	No skylights	No skylights
PART J4D7 Floors	Slab on ground	R-Value: 2.0**	R-Value: 2.2**
	Suspended floor above or below a non-conditioned space	R-Value: 2.0	R-Value: 2.2

Since the WWR is quite low for the project hall and extensive shading, in order to meet the performance requirement of 10% better than the NCC DTS provision, the glazing solution of U-Value of 5.8 W/m²K and an SHGC of 0.81 would suffice.

NOTE:

1. *Roof overhang beyond the building line is not required to meet the minimum performance requirements
2. Both internal and external walls that form part of the 'Thermal boundary' need to comply with Part J4D6
3. The thermal performance values from table above are applicable only for walls are glazing that are a part of the project's thermal boundary.

4. The performance values noted in the above table are total system R-values (i.e. for the entire construction assembly) and whole window (glazing and framing) system U-values.
5. **It is noted that the project sits on the ground and the ground floor slab has no in-slab heating or cooling system, thus considered to meet the requirement of R-2.2 for slab-on-ground insulation.

2.2 Air-tightness barrier

Part J1P1(e) of NCC 2022 Section-J relates to “the sealing of the building envelope against air leakage”. This is applicable to Class 2 to 9 buildings located in Climate zones 4, 5, 6, 7 and 8. It is therefore applicable to the Sutherland Public School Hall (SPHS) project as it is in Climate zone 5 and is classified as Class 9b.

According to NCC requirements; 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. An air-tightness barrier should be allowed for in the architectural design, and the specific location and performance of the air-tightness barrier should be finalised in consultation with the façade engineers.

3.0 Classification

3.1 Building classification

As per the advice received from BCA Certifiers, the proposed project of SPHS, is classified as Class 9b, as 'sports venue or the likes' space category.

3.2 Basis of assessment

The image below highlights the extent of project boundary marked in red outline and with the total area for which the DTS assessment is being conducted.

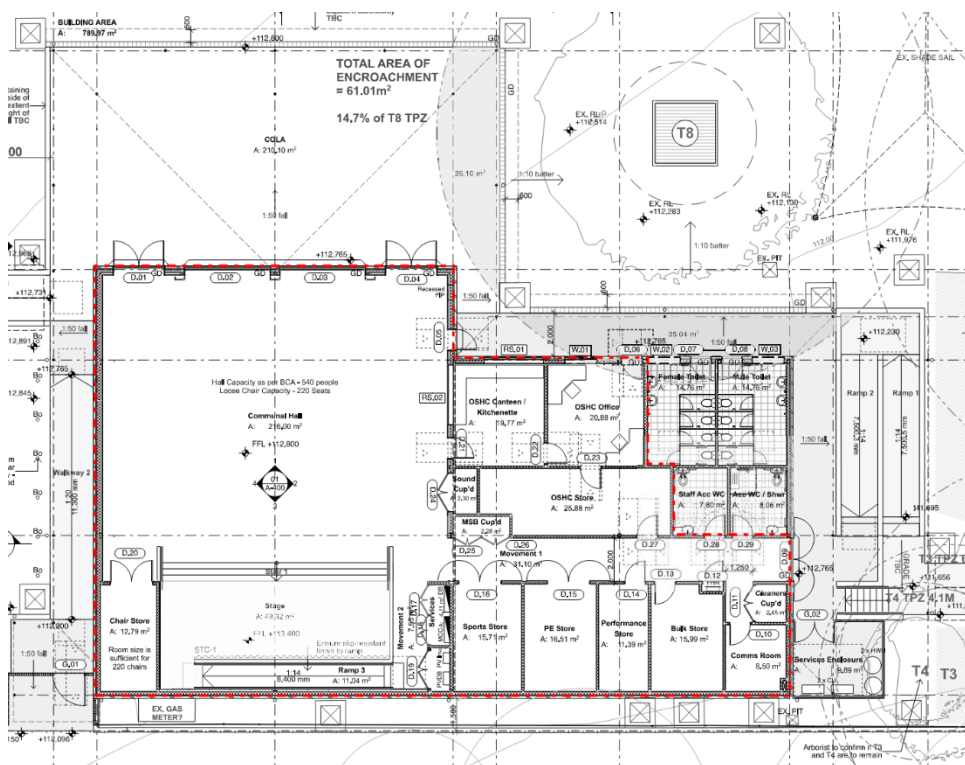


Figure 1- Ground Floor plan for multi-purposae hall for Sutherland Public School Hall

3.3 Climate zone classification

The climate zone is defined by the NCC 2022 as an area for specific locations, having energy efficiency provisions based upon a range of similar climatic characteristics. According, to Figure A and Table 3 of the Definition schedule of NCC 2022, Sutherland is in Climate Zone 5.

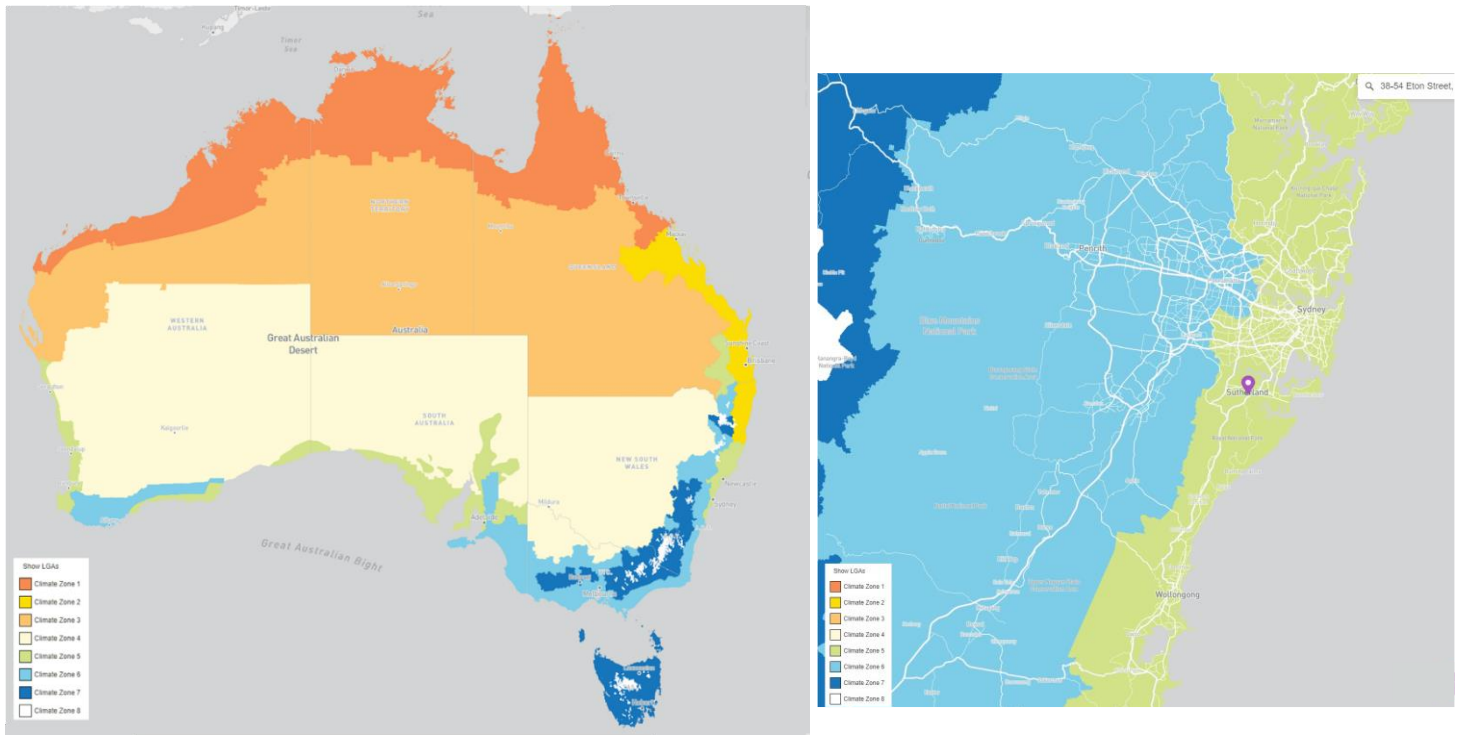


Figure 2: Climate Zone Classification Map marking Sutherland in Zone 5.
(Source: Climate Zone Map | ABCB)

4.0 Part J-1

Part J1 outlines the objectives of Section J of NCC 2022. The objectives are to:

- (a) reduce energy consumption and energy peak demand; and
- (b) reduce greenhouse gas emissions; and
- (c) improve occupant health and amenity.

The above objectives must be satisfied by addressing the performance requirements of J1P1 and J1P4, applicable to the SPHS classification of Class 9b.

4.1 Performance requirements – Energy Efficiency

4.1.1 J1P1 Energy use

A building, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, including its services, must have features that facilitate the efficient use of energy appropriate to —

- (a) the function and use of the building; and
- (b) the level of human comfort required for the building use; and
- (c) solar radiation being—
 - (i) utilised for heating; and
 - (ii) controlled to minimise energy for cooling; and
- (d) the energy source of the services; and
- (e) the sealing of the building envelope against air leakage; and
- (f) for a conditioned space, achieving an hourly regulated energy consumption, averaged over the annual hours of operation, of not more than—
 - (i) for a Class 6 building, 80 kJ/m².hr; and
 - (ii) for a Class 5, 7b, 8 or 9a building other than a ward area, or a **Class 9b school**, 43 kJ/m².hr; and
 - (iii) for all other building classifications, 15 kJ/m².hr.

4.1.2 J1P4 Renewable energy and electric vehicle charging

A building must have features that facilitate the future installation of on-site renewable energy generation and storage and electric vehicle charging equipment.

To be addressed in the electrical services design documentation.

4.1.3 J1 Provisions that are not applicable

Provisions J1P2 and J1P3 are applicable only to a sole-occupancy unit of a Class 2 building or a Class 4 part of a building. Not applicable to the current project, that is classified as Class 9b.

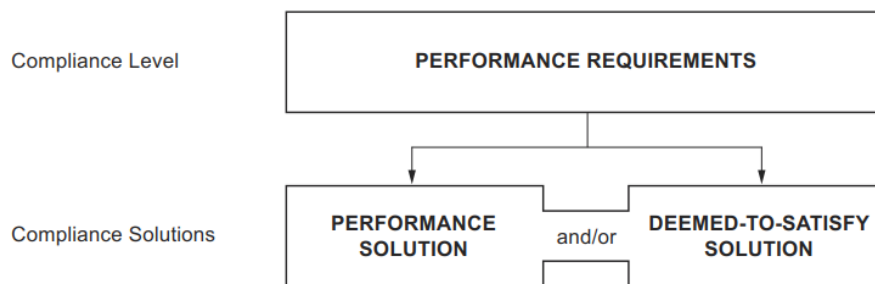
4.2 Proposed Compliance approach

As per Part A2 of NCC 2022, compliance with the NCC is achieved by complying with:

- (a) the Governing Requirements of the NCC; and
- (b) the Performance Requirements.

Performance Requirements are satisfied by one of the following:

- (a) Performance Solution.
- (b) Deemed-to-Satisfy Solution.
- (c) A combination of (a) and (b).



NOTE 1:

For this project, the requirements of J1P1 and J1P4 have been addressed in the current design via a DTS pathway:

- For the building envelope: DTS requirements are noted in this document.
- For the renewable energy and electric vehicle charging refer to Electrical services documentation and specifications, in conjunction with the architectural drawings.

5.0 Part J-2 Energy efficiency

This Part sets out the application of the Deemed-to-Satisfy Provisions of Part J2.

5.1 Part J2D1 – Deemed-to-Satisfy Provisions

(1) Where a Deemed-to-Satisfy Solution is proposed, Performance Requirements J1P1 to J1P4 are satisfied by complying with—

- (a) J2D2; and
- (b) J3D2 to J3D15; and
- (c) J4D2 to J4D7; and
- (d) J5D2 to J5D8; and
- (e) J6D2 to J6D13; and
- (f) J7D2 to J7D9; and
- (g) J8D2 to J8D4; and
- (h) J9D2 to J9D5.

5.2 Part J2D2 – Application of Section-J

(1) For a Class 2 to 9 building, other than a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, Performance Requirement J1P1 is satisfied by complying with—

- (a) Part J4, for the building fabric; and
- (b) Part J5, for building sealing; and
- (c) Part J6, for air-conditioning and ventilation; and
- (d) Part J7, for artificial lighting and power; and
- (e) Part J8, for heated water supply and swimming pool and spa pool plant; and
- (f) J9D3, for facilities for energy monitoring.

6.0 Part J-4 Building Fabric requirements

6.1 Part J4D2– Application

As stated in the NCC 2022, in NSW, the DTS provisions of Part J4 apply to the building elements forming the envelope of a Class 2 to 9 building. Part J4 therefore applies to the SPHS project, that is comprised of spaces classified as Class 9b.

6.2 Part J4D3 – Thermal construction – General

6.2.1 DTS requirements

- a) Where required, thermal insulation must comply with AS/NZS 4859.1 and be installed so that it:
 - i. 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
 - ii. forms a continuous barrier with ceilings, walls, bulkheads, floors or the like that inherently contribute to the thermal barrier; and
 - iii. does not affect the safe or effective operation of a service or fitting.
- b) Where reflective insulation is to be installed in the wall and roof, the reflective insulation must be installed with –
 - i. the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
 - ii. the reflective insulation closely fitted against any penetration, door or window opening; and
 - iii. the reflective insulation adequately supported by framing members; and
 - iv. each adjoining sheet of roll membrane being –
 - A. overlapped not less than 50 mm; or
 - B. taped together.
- c) Where required, bulk insulation must be installed so that –
 - i. it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
 - ii. in a ceiling, where there is no bulk insulation or reflective insulation in the wall beneath, it overlaps the wall by not less than 50 mm.
- d) Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification 36.
- e) The required Total R-Value and Total System U-Value, including allowance for thermal bridging, must be
 - i. calculated in accordance with AS/NZS 4859.2 for a roof or floor; or
 - ii. determined in accordance with Specification 37 for wall-glazing construction; or

- iii. determined in accordance with Specification 39 or Section 3.5 of CIBSE Guide A for soil or sub-floor spaces.

6.2.2 Proposed construction

All constructions including walls, window-glazing, ceilings, floors and roof developed by BKA Architecture, must meet the criteria laid out in the sections J4D2 to J4D7, in order to meet the minimum performance requirements prescribed in NCC 2022 Section-J.

6.3 Part J4D4 – Roof and ceiling construction

6.3.1 DTS requirements

- a) A roof or ceiling must achieve a Total R-Value greater than or equal to:
 - i. in climate zones 1, 2, 3, 4 and 5, **R3.7 for a downward direction of heat flow; and**
 - ii. in climate zone 6, R3.2 for a downward direction of heat flow; and
 - iii. in climate zone 7, R3.7 for an upward direction of heat flow; and
 - iv. in climate zone 8, R4.8 for an upward direction of heat flow.
- b) In climate zones 1, 2, 3, 4, 5, 6 and 7, the solar absorptance of the upper surface of a roof must be not more than 0.45.

6.3.2 Proposed roof and ceiling construction.

Architectural drawings documented by BKA Architecture have been reviewed, to identify the location and extent of roof and ceiling constructions that need to meet the thermal performance requirement of J4D4 (Refer: Marked-up plans in Appendix-B of this report).

6.4 Part J4D5 – Roof lights

6.4.1 DTS requirements

Roof lights must have:

- (a) a total area of not more than 5% of the floor area of the room or space served; and
- (b) transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance of—
 - (i) for Total system SHGC, in accordance with Table J4D5; and
 - (ii) for Total system U-Value, not more than U3.9.

Table J4D5: Roof lights – Total system SHGC

Roof light shaft index ^{Note 1}	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

Table J4D5 Notes:

- 1) 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.
- 2) The area of a roof light is the area of the roof opening that allows light to enter the building.
- 3) The total area of roof lights is the combined area for all roof lights serving the room or space.

6.4.2 Proposed roof light constructions

As per the current architectural design, there are no roof lights proposed for this project. Hence, J4D5 requirements are not applicable to the project.

6.5 Part J4D6 – Wall and Glazing

6.5.1 DTS requirements

- a) The Total System U-Value of wall-glazing construction must not be greater than:
 - (i) for a Class 2 common area, a Class 5, 6, 7, 8 or **9b building** or a Class 9a building other than a ward area, **U2.0**; and
 - (ii) for a Class 3 or 9c building or a Class 9a ward area—
 - A. in climate zones 1, 3, 4, 6 or 7, U1.1; or
 - B. in climate zones 2 or 5, U2.0; or
 - C. in climate zone 8, U0.9.
- b) The Total System U-Value of display glazing must not be greater than U5.8.
- c) The Total System U-Value of wall-glazing construction must be calculated in accordance with Specification 37.
- d) Wall components of a wall-glazing construction must achieve a minimum Total R-Value of—
 - (i) where the wall is less than 80% of the area of the wall-glazing construction, R1.0; or
 - (ii) where the wall is 80% or more of the area of the wall-glazing construction, the value specified in Table J4D6a.

Table J4D6a: Minimum wall Total R-Value - Wall area 80% or more of wall-glazing construction area

Climate zone	Class 2 common area, Class 5, 6, 7, 8 or 9b building or a Class 9c building other than a ward area	Class 3 or 9c building or Class 9a ward area
1	2.4	3.3
2	1.4	1.4
3	1.4	3.3
4	1.4	2.8
5	1.4	1.4
6	1.4	2.8
7	1.4	2.8
8	1.4	3.8

- e) The solar admittance of externally facing wall-glazing construction must not be greater than—
- (i) for a Class 2 common area, a Class 5, 6, 7, 8 or 9b building or a Class 9a building other than a ward area, the values specified in Table J4D6b; and
 - (ii) for a Class 3 or 9c building or a Class 9a ward area, the values specified in Table J4D6c.
- f) The solar admittance of a wall-glazing construction must be calculated in accordance with Specification 37.
- g) The Total system SHGC of **display glazing must not be greater than 0.81** divided by the applicable shading factor specified in S37C7.

Table J4D6b: Maximum wall-glazing construction solar admittance - Class 2 common area, Class 5, 6, 7, 8 or 9b building or Class 9a building other than a ward area

Climate zone	Eastern aspect solar admittance	Northern aspect solar admittance	Southern aspect solar admittance	Western aspect solar admittance
1	0.12	0.12	0.12	0.12
2	0.13	0.13	0.13	0.13
3	0.16	0.16	0.16	0.16
4	0.13	0.13	0.13	0.13
5	0.13	0.13	0.13	0.13
6	0.13	0.13	0.13	0.13
7	0.13	0.13	0.13	0.13
8	0.2	0.2	0.42	0.36

Table J4D6c: Maximum wall-glazing construction solar admittance - Class 3 or 9c building or Class 9a ward area

Climate zone	Eastern aspect solar admittance	Northern aspect solar admittance	Southern aspect solar admittance	Western aspect solar admittance
1	0.07	0.07	0.10	0.07
2	0.10	0.10	0.10	0.10
3	0.07	0.07	0.07	0.07
4	0.07	0.07	0.07	0.07
5	0.10	0.10	0.10	0.10
6	0.07	0.07	0.07	0.07

Energy efficiency

J4D6

Climate zone	Eastern aspect solar admittance	Northern aspect solar admittance	Southern aspect solar admittance	Western aspect solar admittance
7	0.07	0.07	0.08	0.07
8	0.08	0.08	0.08	0.08

6.5.2 Proposed wall and glazing construction

Wall-glazing construction, for the purposes of Section-J in Volume One, means the combination of wall and glazing components comprising the envelope of a building, excluding—

- (a) display glazing; and
- (b) opaque non-glazed openings such as doors, vents, fenestration and shutters.

For the SPHS project, the glazing and wall construction have been analysed and the performance requirements for each have been identified and presented in Appendix A.

- For the glazing elements, the facade contractor must ensure that the total system values (frame + glass) are in accordance with the minimum performance values noted in Appendix-A.
- Proposed wall constructions documented by BKA Architecture should meet and exceed the DTS requirements. Location and extent of wall insulation is indicated in Appendix-B of this report.

6.6 Part J4D7 – Floors

6.6.1 NCC requirements

- a) A floor must achieve the Total R-Value specified in Table J4D7.
- b) For the purposes of (a), a slab-on-ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-Value of R2.0, except—
 - (i) in climate zone 8; or
 - (ii) 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.
- c) A floor must be insulated around the vertical edge of its perimeter with insulation having an R-Value greater than or equal to 1.0 when the floor—
 - (iii) is a concrete slab-on-ground in climate zone 8; or
 - (iv) has an in-slab or in-screed heating or cooling system, except where used solely in a bathroom, amenity area or the like.
- d) Insulation required by (b) for a concrete slab-on-ground must—
 - (i) be water resistant; and
 - (ii) be continuous from the adjacent finished ground level—
 - A. to a depth not less than 300 mm; or
 - B. for the full depth of the vertical edge of the concrete slab-on-ground.

Table J4D7: Floors – Minimum Total R-Value

Location	Climate zone 1 — upwards heat flow	Climate zones 2 and 3 — upwards and downwards heat flow	Climate zones 4, 5, 6 and 7 — downwards heat flow	Climate zone 8 — downwards heat flow
A floor without an in- slab heating or cooling system	2.0	2.0	2.0	3.5
A floor with an in-slab heating or cooling system	3.25	3.25	3.25	4.75

Table notes:

- For calculating the Total R-Value of a floor, the sub-floor and soil R-Value must be calculated in accordance with Specification 39 or Section 3.5 of CIBSE Guide A.

6.6.2 Proposed floor construction

Refer to Appendix-B for thermal markups indicating the location and extent of the floor constructions that are required to achieve compliance with J4D7.

7.0 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.

7.1.1 J5D2 - Application

As stated by the 2022 NCC, Part J5D applies to Class 2 to 9 buildings in climate zone 6. Part J5, therefore applies to the proposed project.

7.1.2 J5D3 - Chimneys and Flues

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

7.1.3 J5D4- Roof Lights

The Part J5D4 of the NCC Section-J requirements is not applicable to the proposed project, as there are no Roof lights.

7.1.4 J5D5– Windows and doors

The Part J5D5 of the NCC Section-J 2022 requirements is applicable to the proposed project. The requirements stated below, should be included in the architectural specifications.

- a) A door, openable window or the like must be sealed:
 - (i) when forming part of the envelope; or
 - (ii) in climate zones 4, 5, 6, 7 or 8.
- b) The requirements of (a) do not apply to:
 - (i) a window complying with AS 2047; or
 - (ii) a fire door or smoke door; or
 - (iii) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.
- c) A seal to restrict air infiltration:
 - (i) for the bottom edge of a door, must be a draft protection device; and
 - (ii) for the other edges of a door or the edges of an openable window or other such opening, may be a foam or rubber compression strip, fibrous seal or the like.
- d) 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:

- (i) where the conditioned space has a floor area of not more than 50 m²;
or
- (ii) where a café, restaurant, open front shop or the like has:
 - A. a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and
 - B. at all other entrances to the café, restaurant, open front shop or the like, self-closing doors.
- e) A loading dock entrance, if leading to a conditioned space, must be fitted with a rapid roller door or the like.

7.1.5 J5D6 – Exhaust fans

Exhaust fans when serving any conditioned space within the SPS project, must be fitted with a sealing device such as a self-closing damper or the like, so as to comply with Part J5D6. Mechanical services consultant must include this requirement within the mechanical services specification.

- a) An exhaust fan must be fitted with a sealing device such as a self-closing damper or the like when serving—
 - (i) a conditioned space; or
 - (ii) a habitable room in climate zones 4, 5, 6, 7 or 8.

7.1.6 J5D7 – Construction of ceilings, walls and floors

- a) 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 (b):
 - (i) when forming part of the envelope; or
 - (ii) in climate zones 4, 5, 6, 7 or 8.
- b) Construction required by (a) must be—
 - (i) enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or
 - (ii) sealed at junctions and penetrations with—
 - A. close fitting architrave, skirting or cornice; or
 - B. expanding foam, rubber compressible strip, caulking or the like.
- c) The requirements of (a) do not apply to openings, grilles or the like required for smoke hazard management.

7.1.7 J5D8 – 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

8.0 Other Section-J requirements

8.1 Part J6 - Air Conditioning and Ventilations Systems

Mechanical services consultant to ensure compliance with Part J6 of the NCC 2022 and all subsections associated therein.

8.2 Part J7 – Artificial Lighting and Power

Electrical services consultant to provide a design solution compliant to Part J7 of the NCC 2022 and all subsections associated therein with regards to power.

8.3 Part J8 - Heated water supply and swimming pool and spa pool plant

Where applicable, the hydraulic services consultant and the Pool Engineer must provide a design solution compliant to Part J8 of the 2022 NCC.

8.4 Part J9 – Energy monitoring and on-site distributed energy resources

Where applicable, the electrical consultant must provide a design solution compliant to Part J9 of the NCC 2022 contains the requirements of the Deemed-to-Satisfy compliance for monitoring of Energy use and facilitate easy retrofit of renewable energy and electric vehicle charging equipment.

8.4.1 J9D2 - Application

As stated by the 2022 NCC, Part J9 applies to Class 2 to 9 buildings in climate zone 6. Part J9, therefore applies to the proposed SPHS project.

8.4.2 J9D3 Facilities for energy monitoring

- (a) A building or sole-occupancy unit with a floor area of more than 500 m² must have energy meters configured to record the time-of-use consumption of gas and electricity.
- (b) 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 (c), of—

- (i) air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and
- (ii) artificial lighting; and
- (iii) appliance power; and
- (iv) central hot water supply; and
- (v) internal transport devices including lifts, escalators and moving walkways where there is more than one serving
- (vi) the building; and on-site renewable energy equipment; and
- (vii) on-site electric vehicle charging equipment; and
- (viii) on-site battery systems; and
- (ix) other ancillary plant.

(c) Energy meters required by (b) 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.

(d) The provisions of (a) do not apply to energy meters serving—

- (i) a Class 2 building where the total floor area of the common areas is less than 500 m²; or
- (ii) individual sole-occupancy units with a floor area of less than 2 500 m².

8.4.3 J9D4 Facilities for electric vehicle charging equipment.

(a) Subject to (b), 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—

- (i) in accordance with Table J9D4 in each storey of the carpark; and
- (ii) labelled to indicate use for electric vehicle charging equipment.

(b) Electrical distribution boards dedicated to serving electric vehicle charging in a carpark must—

- (i) 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
- (ii) 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
- (iii) 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
- (iv) 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
- (v) be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in—
 - A. 100% of the car parking spaces associated with a Class 2 building; or
 - B. 10% of car parking spaces associated with a Class 5 or 6 building; or

- C. 20% of car parking spaces associated with a Class 3, 7b, 8 or 9 building; and
- (vi) 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
- (vii) be labelled to indicate the use of the space required by (vi) is for the future installation of metering equipment.

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

8.4.4 J9D5 Facilities for solar photovoltaic and battery systems

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

9.0 Appendix-A Section-J assessment calculations

9.1 Appendix-A Wall and window area summary

After identifying the building's thermal envelope (Appendix B) a wall and window area calculation was conducted. A summary of these calculations for wall and window areas is included in the table below. The areas presented below formed the basis of Section-J DTS Assessment.

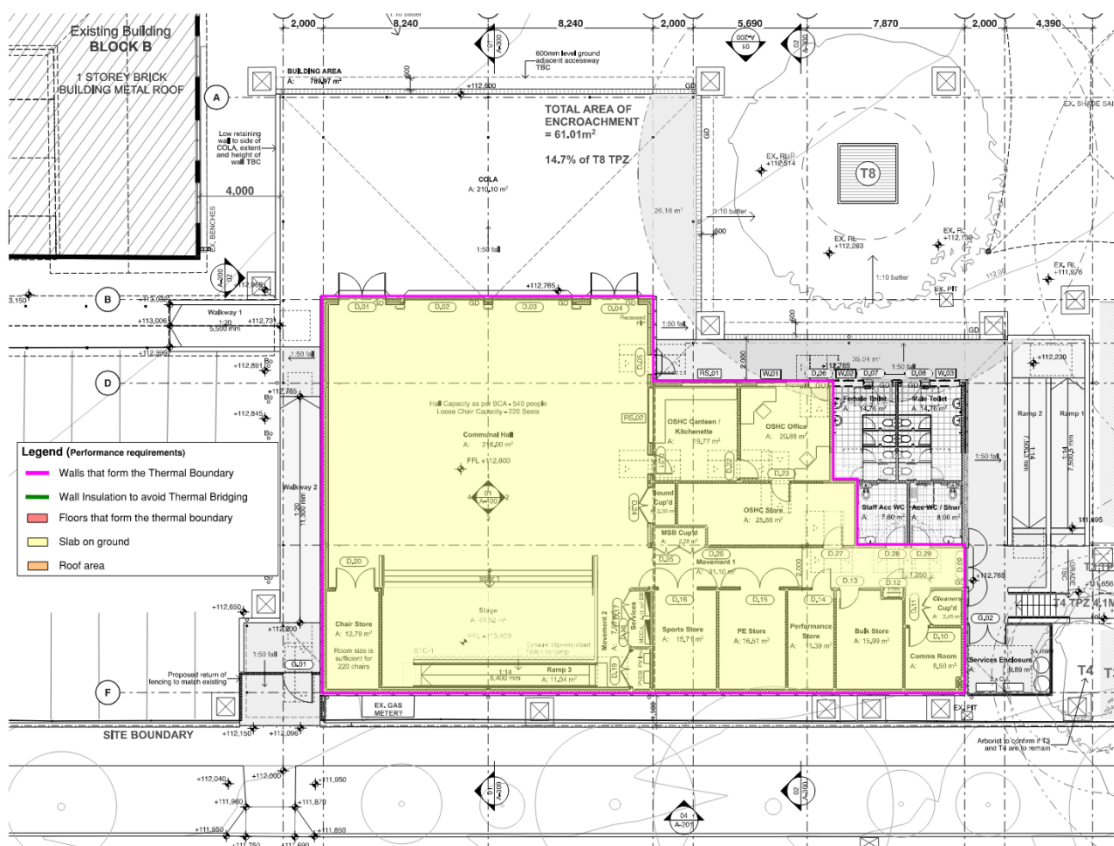
Wall & Window Areas				
Orientation	Total Wall Area (m ²)	Total Window Area (m ²)	Effective Wall Area (m ²)	WWR (%)
North	126.8	1.4	125.4	1.1%
South	92.8	1.4	91.4	0.9%
East	155.1	15.9	139.2	10.3%
West	176.4	0	176.4	0%

The areas noted above for walls and windows for each orientation formed the basis for the DTS assessment. Areas for both walls and windows were input in the Section-J DTS calculator to determine the project's thermal performance requirements, as summarised in Table 1 under section 2.1 of this report.

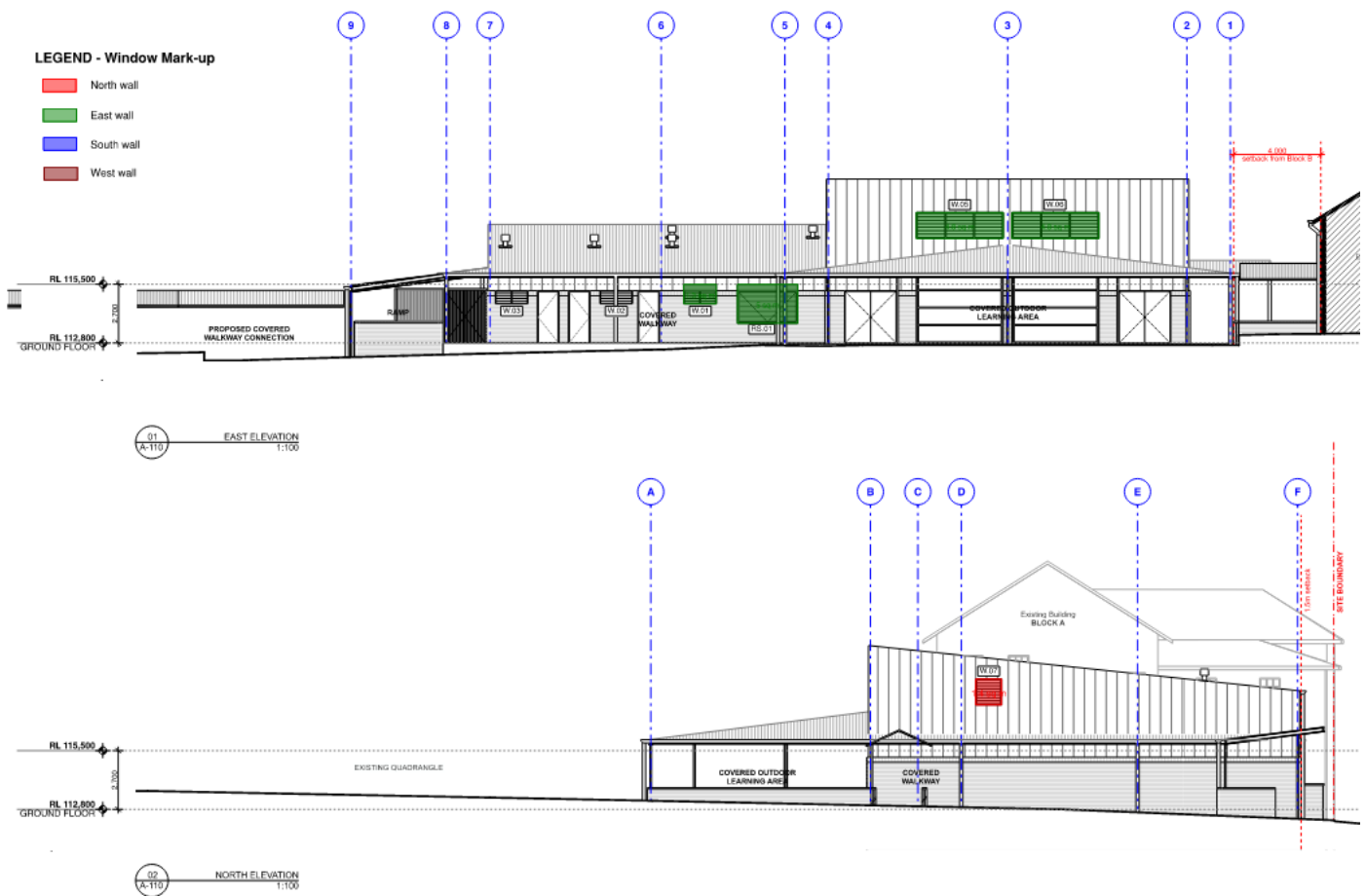
9.2 Appendix-B Thermal Lines for opaque construction

The Appendix-B provides mark-ups of thermal lines which indicate thermal insulation location and type, for the opaque and transparent construction components of the Thermal Envelope (i.e., Roof, floors, windows and walls).

GROUND FLOOR PLAN



9.3 Appendix-C Elevation Drawings with Glazing Markup



LEGEND - Window Mark-up

- North wall
- East wall
- South wall
- West wall

