



## **NCC BCA 2016 SECTION J ASSESSMENT**



**THE ROBERTSON HOTEL  
ROBERTSON**

**PREPARED FOR  
XPACE DESIGN GROUP**

**DATE: 19<sup>TH</sup> MARCH 2020**

**OUR REFERENCE: 191149-A**

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A	9 <sup>th</sup> March 2020	DA Application
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## INTRODUCTION

### GENERAL

The objective of NCC BCA 2016 Volume 1 Section J is to reduce greenhouse gas emissions by efficiently using energy. This report has been prepared to show how the new building works of the Robertson Hotel including restaurant, museum/gallery and New Modern Wing, located at 1 Fountandale Road, Robertson can meet the requirements of the NCC BCA 2016 Volume 1 Section J. By incorporating the recommendations of this report the building and its services can be capable of efficiently using energy. This report shall be read in conjunction with the Australian Building Codes Board (ABCB) National Construction Code (NCC) 2016 Volume 1.

**This assessment is for all new building work including fabric and services. The new building work should not reduce the existing building's level of energy efficiency.**

### PROJECT DESCRIPTION

The project is the development of a new modern wing, restaurant, function room, ecovilla reception, Museum, healing centre and community leisure and health centre.

### BUILDING CLASSIFICATION

Class 3 – New Modern Wing, Ecovilla Reception

Class 6 – Restaurant, Function Room, Museum, Healing Centre and Community Leisure and Health Centre

### CLIMATE ZONE

Zone 6

## ARCHITECTURAL DOCUMENTATION

The following architectural documentation from **XPACE** was used for this assessment.

Project No.	Drawing No.	Description	Rev	Date
18x015	1.05	Southern Section Level 3	-	18.03.2020
18x015	1.06	Southern Section Level 4	-	18.03.2020
18x015	1.07	Southern Section Level 5	-	18.03.2020
18x015	1.08	Southern Section Level 6	-	18.03.2020
18x015	1.09	Southern Section Level 7	-	18.03.2020
18x015	1.10	Northern Section Level 1	-	18.03.2020
18x015	1.11	Northern Section Level 2	-	18.03.2020
18x015	1.18	Northern Section Level 3	-	18.03.2020
18x015	2.01	Site Sections Proposed	-	18.03.2020
18x015	2.02	Site Elevations Proposed	-	18.03.2020
18x015	2.03	Site Elevations Proposed	-	18.03.2020
18x015	2.04	Site Elevations Proposed	-	18.03.2020
18x015	2.05	Site Elevations Proposed	-	18.03.2020
18x015	2.06	Site Elevations Proposed		18.03.2020

## PERFORMANCE REQUIREMENTS

### JP1

A building, including its services, must have, to the degree necessary, features that facilitate the efficient use of energy appropriate to—

- a. the function and use of the building and services; and
- b. the internal environment; and
- c. the geographic location of the building; and
- d. the effects of nearby permanent features such as topography, structures and buildings; and
- e. solar radiation being—
  - i. utilised for heating; and
  - ii. controlled to minimise energy for cooling; and
- f. the sealing of the building envelope against air leakage; and
- g. the utilisation of air movement to assist heating and cooling; and
- h. the energy source of the services.

### JP2

This clause has deliberately been left blank.

### JP3

Heating such as for a conditioned space must, to the degree necessary, obtain energy from—

- i. a source that has a greenhouse gas intensity that does not exceed 100 g CO<sub>2</sub>-e/MJ of thermal energy load; or
- j. an on-site renewable energy source; or
- k. another process as reclaimed energy.

## APPLICATION OF SECTION J

Performance Requirements JP1 and JP3 are satisfied by complying with—

- b. for reducing the heating or cooling loads, **Part J1, J2 and J3**
  - l. for air-conditioning and ventilation, Part J5; and
  - m. for artificial lighting and power, Part J6; and
  - n. for heated water supply, Part J7; and
  - o. for facilities for energy monitoring, **Part J8**.

## INTERPRETATION

The following are some useful explanations of terms used throughout this report. These descriptions are taken from the NCC BCA.

**Envelope**, for the purposes of Section J, means the parts of a building's fabric that separate a conditioned space or habitable room from—

- a. the exterior of the building; or
- b. a non- conditioned space including—
  - i. the floor of a rooftop plant room, lift-machine room or the like; and
  - ii. the floor above a carpark or warehouse; and
  - iii. the common wall with a carpark, warehouse or the like.

**Conditioned space** means a space within a building, including a ceiling or under-floor supply air plenum or return air plenum, where the environment is likely, by the intended use of the space, to have its temperature controlled by air-conditioning, but does not include—

- a. a non- habitable room of a Class 2 building or Class 4 part of a building in which a heater with a capacity of not more than 1.2 kW or 4.3 MJ/hour provides the air-conditioning; or
- b. a space in a Class 6, 7, 8 or 9b building where the input energy to an air-conditioning system is not more than 15 W/m<sup>2</sup> or 15 J/s.m<sup>2</sup> (54 KJ/hour.m<sup>2</sup>) or
- c. a lift shaft

**Habitable Room** means a room used for normal domestic activities, and—

- a. includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room, home theatre and sunroom; but
- b. excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

## COMPLIANCE REQUIREMENT

Building Element	DTS FABRIC
Roof and Ceiling	<b>Total R3.2</b> - Concrete roof (200mm Solid Concrete + R2.55 Insulation + 10mm Plasterboard)
External Roof (Solar Absorptance)	<b>Medium</b> ( $0.4 < SA < 0.6$ )
External Walls	<b>Total R2.8</b> - Concrete panel wall (150mm Concrete panels + R2.31 Insulation + 10mm Plasterboard)  <b>Total R2.3</b> - South facing walls (150mm Concrete panels + R1.81 Insulation + 10mm Plasterboard)
External Walls (Solar Absorptance)	<b>Medium</b> ( $0.4 < SA < 0.6$ )
Internal Walls	<b>No Insulation required</b> - All Internal Concrete panel Walls between two adjacent conditioned spaces (150mm Concrete panels + No Insulation + 10mm Plasterboard)  <b>Total R1.8</b> - Concrete panel walls adjacent to lobbies, lifts, stairwells and any other non-conditioned space (150mm Concrete panels + R1.23 Insulation + 10mm Plasterboard)
Floor	<b>No Insulation required</b> - Concrete Slab on Ground (200mm Concrete slab)  <b>Total R2.0</b> - Suspended Concrete Slab for New Modern Wing Level 4 (200mm Concrete Slab + R1.66 Insulation)
Glazing	<u><b>Level 3 Function + Healing Centre Room</b></u> <b>North</b> – U-value of 7.0, SHGC value of 0.60  <u><b>Museum</b></u> <b>North</b> – U-value of 7.0, SHGC value of 0.70 <b>West</b> – U-value of 2.3, SHGC value of 0.30 <b>South</b> – U-value of 5.5, SHGC value of 0.70  <u><b>Restaurant</b></u> <b>North</b> – U-value of 7.2, SHGC value of 0.30 <b>South</b> – U-value of 3.2, SHGC value of 0.74 <b>West</b> – U-value of 2.4, SHGC value of 0.22 <b>East</b> – U-value of 4.3, SHGC value of 0.30  <u><b>Modern Wing Level 4-5</b></u> <b>South East</b> – U-value of 1.6, SHGC value of 0.60 <b>North East</b> – U-value of 6.0, SHGC value of 0.65  <u><b>Level 4 Function Room + Restaurant</b></u> <b>North</b> – U-value of 7.0, SHGC value of 0.32 <b>South</b> – U-value of 3.2, SHGC value of 0.70 <b>East</b> – U-value of 1.9, SHGC value of 0.10  <u><b>Modern Wing Level 6-7</b></u> <b>South East</b> – U-value of 1.6, SHGC value of 0.60 <b>East</b> – U-value of 1.9, SHGC value of 0.10 <b>South</b> – U-value of 2.3, SHGC value of 0.59 <b>North East</b> – U-value of 6.0, SHGC value of 0.65

	<p><b><u>Ecovillas Reception Ground Level</u></b>  <b>South East</b> – U-value of 1.3, SHGC of 0.55  <b>North West</b> – U-value of 2.2, SHGC of 0.11  <b>South West</b> – U-value of 5.7, SHGC of 0.62</p> <p><b><u>Ecovillas Reception Level 1</u></b>  <b>South East</b> – U-value of 1.8, SHGC of 0.50  <b>North West</b> – U-value of 4.0, SHGC of 0.33  <b>South West</b> – U-value of 6.5, SHGC of 0.25</p> <p><b><u>Community Leisure and Health Centre</u></b>  <b>Ground Floor North</b> – U-value of 8.0, SHGC of 0.25  <b>Level 1 North</b> – U-value of 8.0, SHGC of 0.24</p> <p><b>Skylights serving Conference Area –</b>  U-value - not more than 5.7  SHGC - not more than 0.57</p>
Services	DTS compliant systems

## BUILDING ENVELOPE

The building envelope is shown in Figure 1-6 below.

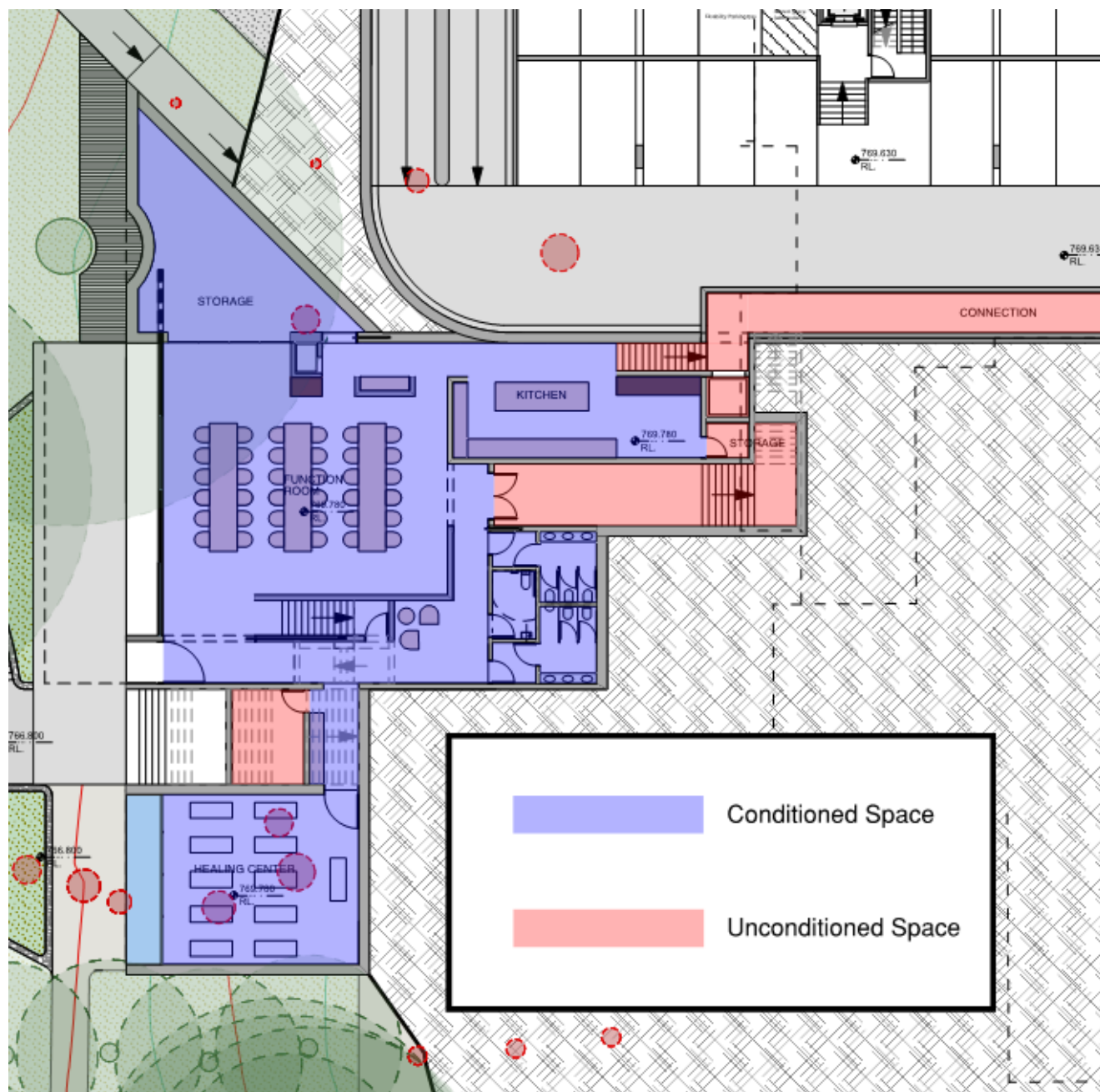


Figure.1 Function Room and Healing Centre layout

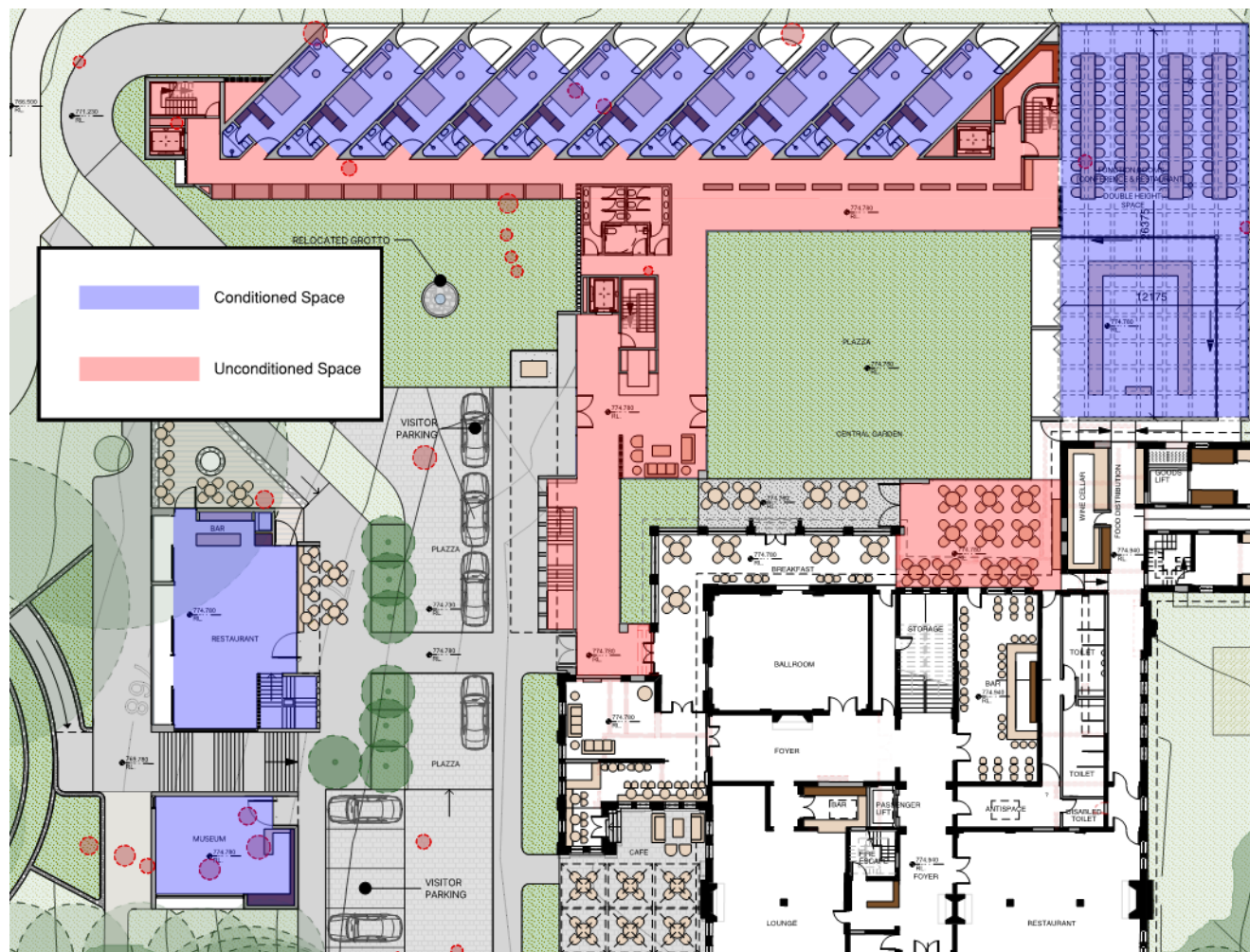


Figure.2 Level 4 New Modern Wing, Function Room, Restaurant and Museum layout

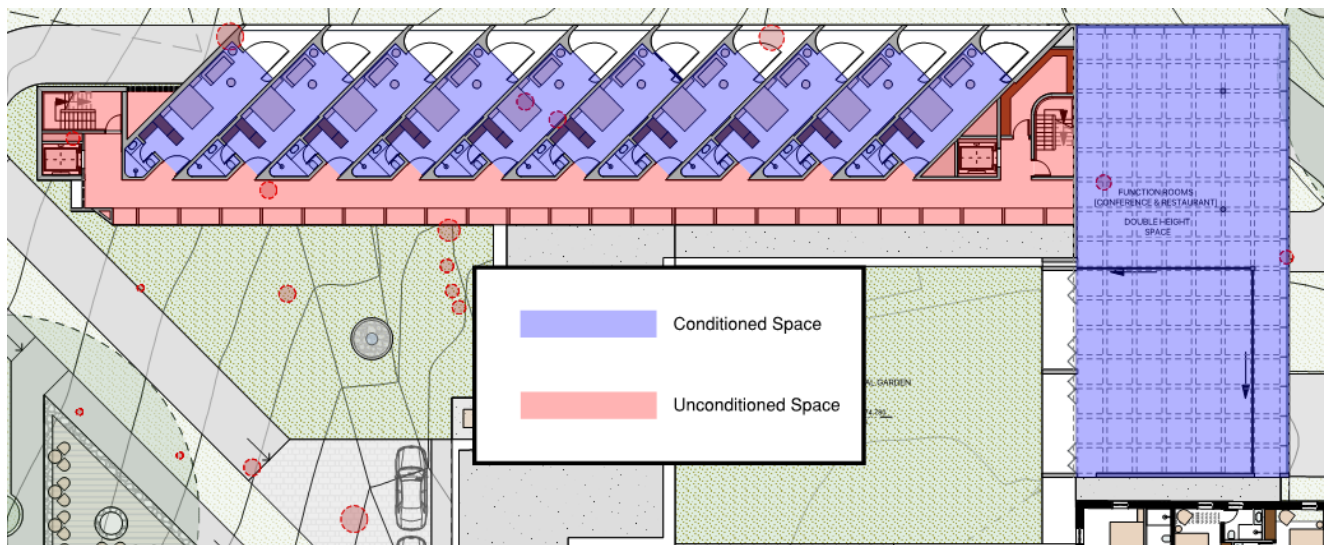


Figure.3 Level 5 New Modern Wing layout

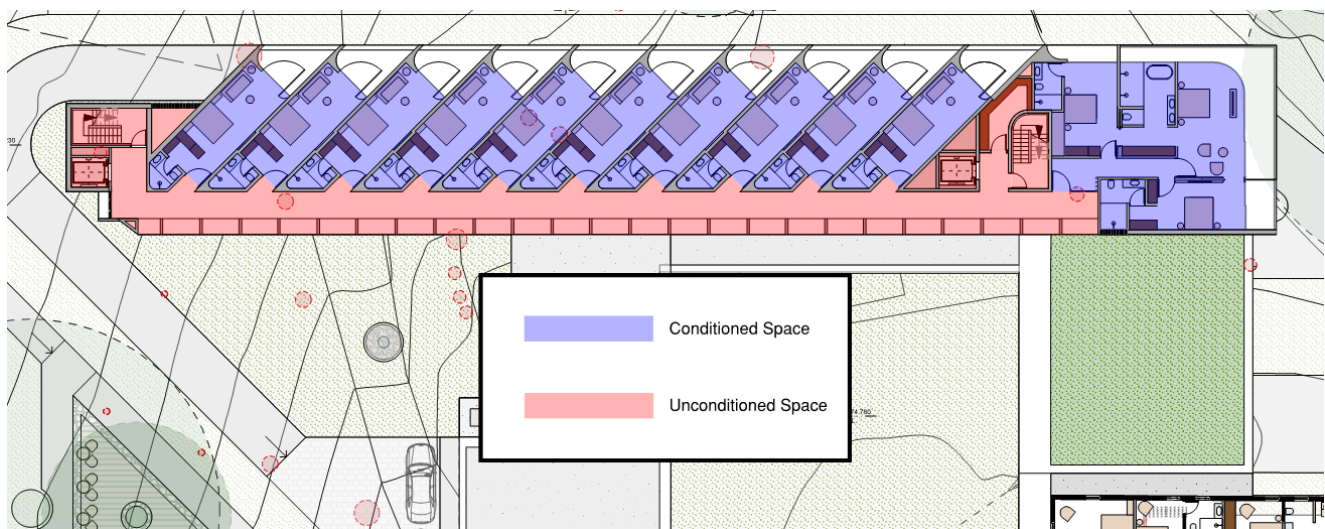


Figure.4 Level 6 and 7 New Modern Wing layout

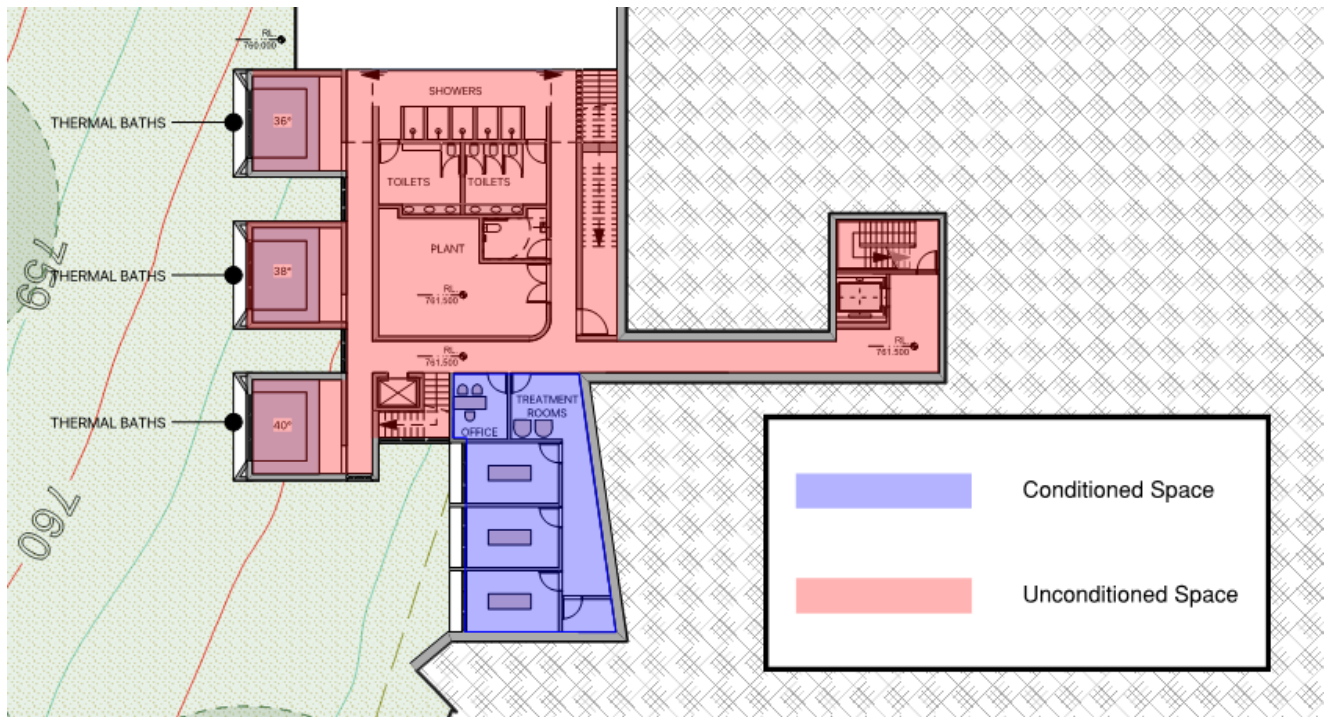


Figure 5. Community Leisure and Wellness Centre Ground Floor

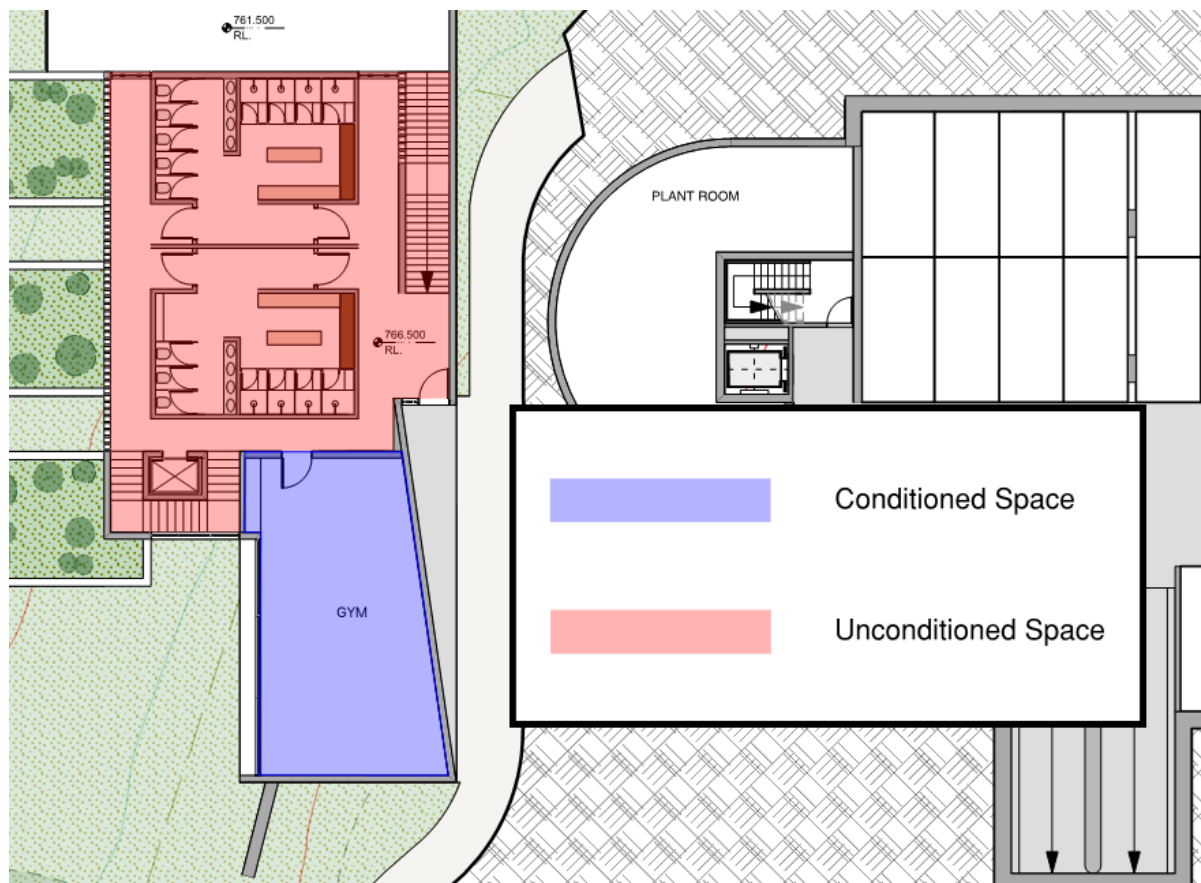


Figure 6. Community Leisure and Wellness Centre Ground Floor

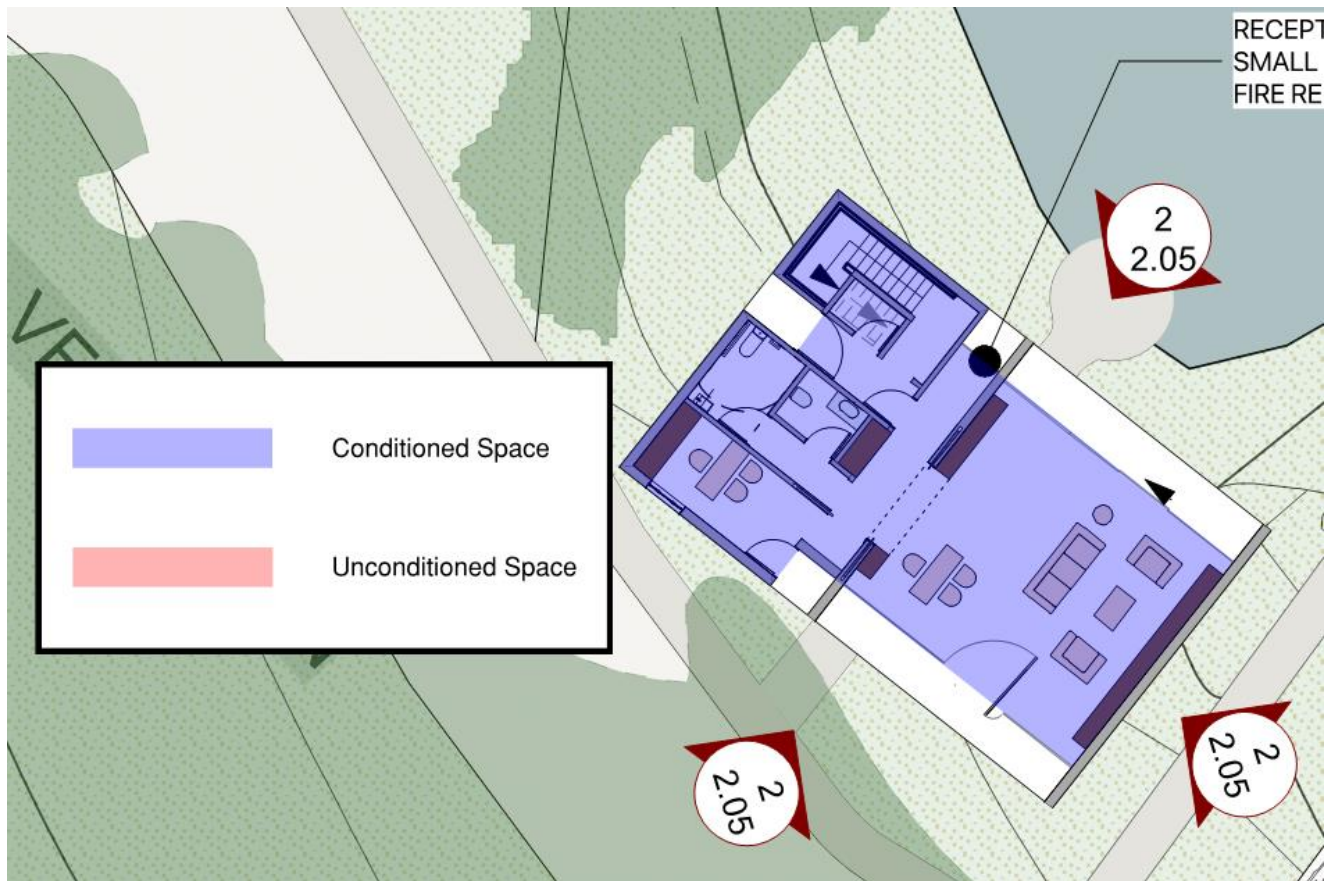


Figure 7 Ecovilla Reception (Ground Level)

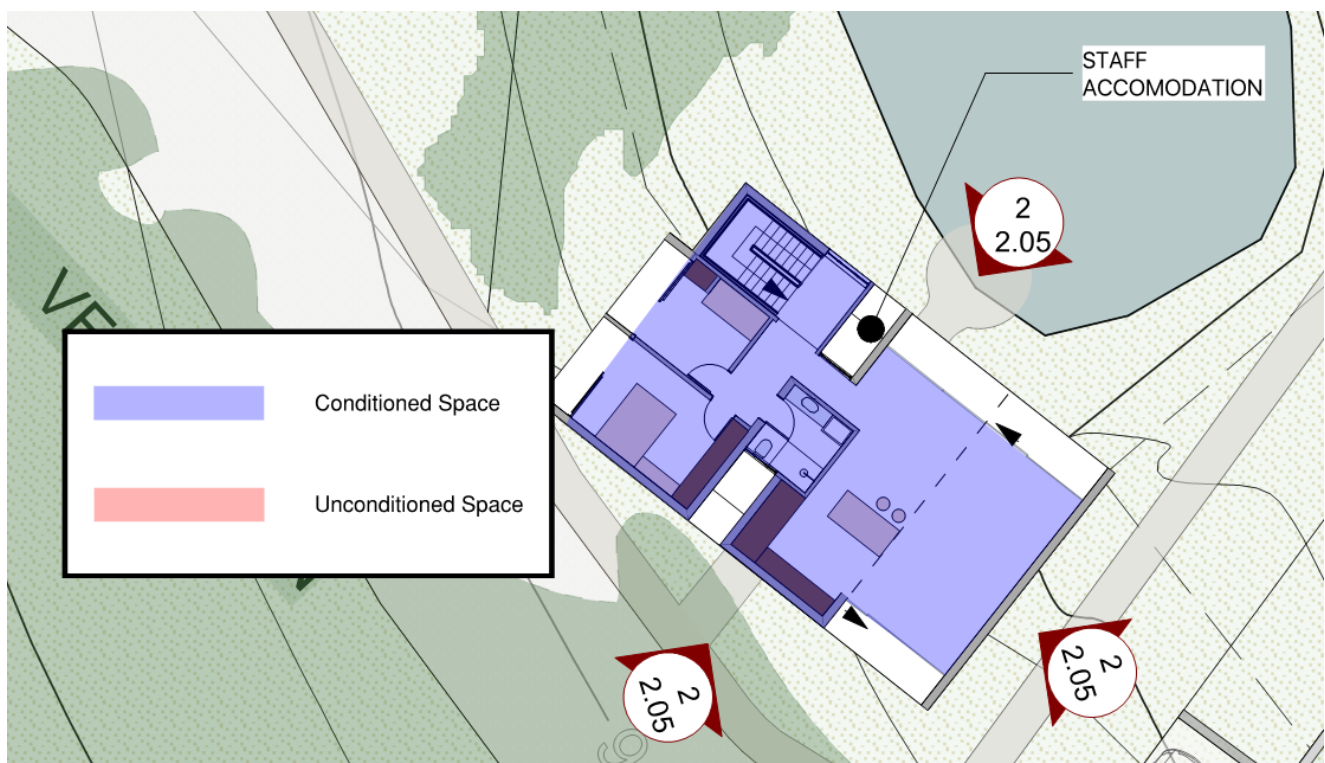


Figure 8 Ecovilla Reception (Level 1)

## PART J1 - BUILDING FABRIC

### J1.1 APPLICATION OF PART

The deemed to satisfy provisions of Part J1 Building Fabric apply to building elements forming the envelope of the building.

**All existing walls, roof and floor that remain will not need to be upgraded to Section J requirements. The fabric (walls, roof and floor) on the envelope that is new need only comply with this Part. Where the new work provides access to the existing roof cladding, wall cladding or wall lining, insulation should be added where practical to comply with this Part.**

### J1.2 THERMAL CONSTRUCTION

- a. Where required, 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
- p. Where required, reflective insulation must be installed with—
  - iv. the necessary airspace to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
  - v. the reflective insulation closely fitted against any penetration, door or window opening; and
  - vi. the reflective insulation adequately supported by framing members; and
  - vii. each adjoining sheet of roll membrane being—
    - I. overlapped not less than 50 mm; or
    - II. taped together.
- q. Where required, bulk insulation must be installed so that—
  - viii. it maintains its position and thickness, other than where it is compressed between cladding and supporting members, water pipes, electrical cabling or the like; and
  - ix. 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.
- r. Roof, ceiling, wall and floor materials, and associated surfaces are deemed to have the thermal properties listed in Specification J1.2.

### J1.3 ROOF AND CEILING CONSTRUCTION

- a. A roof or ceiling that is part of the envelope must achieve the Total R-Value specified in Table J1.3a (summarized below) for the direction of heat flow.

A roof or ceiling that is part of the envelope, regardless of the roof upper surface solar absorptance value, must achieve a minimum total **R-Value of 3.2 downwards**.

- b. Roof and ceiling construction is deemed to have the thermal properties listed in specification J1.3.

Concrete Roof		Minimum R-Value of ceiling insulation required to satisfy J1.3(a)
Layer	Layer Description	R Value
1	Outdoor Air Film (7m/s)	0.04
2	Waterproof Membrane	0.03
3	200mm Solid Concrete	0.14
4	Ceiling Airspace (non-reflective)	0.22
5	10mm Plasterboard	0.06
6	Indoor Air Film (still air)	0.16
<b>Roof Construction Total</b>		<b>0.65</b>
Additional Insulation required		2.55
<b>Minimum Total R-Value required</b>		<b>3.2</b>

*Any roof or ceiling that differs from the above must achieve the minimum R-Values as listed in J1.3(a).*

- c. Where for operational or safety reasons associated with exhaust fans, flues or recessed downlights, the area of required ceiling insulation is reduced, the loss of insulation must be compensated for by increasing the R-Value of the insulation in the remainder of the ceiling in accordance with below;

Percentage of ceiling area uninsulated	Minimum R-Value of ceiling insulation required to satisfy J1.3(a)
	<b>R3.2</b>
0.5% to less than 1.0%	3.64
1.0% to less than 1.5%	3.92
1.5% to less than 2.0%	4.26
2.0% to less than 2.5%	4.64
2.5% to less than 3.0%	5.12
3.0% or more	Not permitted

- d. A thermal break, consisting of a material with an R-Value of not less than R0.2, must be installed between the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens if the metal sheet roofing is fixed to metal purlins, metal rafters, or metal battens and there is no ceiling lining or the ceiling lining is fixed directly to those metal purlins, metal rafters or metal battens.

## J1.4 ROOF LIGHTS

Roof lights, including any associated shaft and diffuser, that form part of the envelope;

- a. If not required for compliance with Part F4, must have a U-value and SHGC of not more than—
  - ii. 5.7 and 0.57 respectively for the skylights servicing the conference area.
- b. If required for compliance with Part F4, must—
  - i. Have an area not more than 150% of the minimum area required by F4.6; and
  - ii. Have transparent and translucent elements, including any imperforate ceiling diffuser, with a combined performance U-value of not more than 2.9 and SHGC of not more than 0.29.

## J1.5 WALLS

- a. Each part of an external wall that is part of the envelope, must achieve a **minimum Total R-value of 2.8**. The Total R-value is reduced:
  - I. For a wall that is facing south orientation as described in Figure 2 Orientation Sectors, by **0.5**; or
  - II. Shaded with a projection shade angle in accordance with Figure 3 of 30 degrees to not more than 60 degrees, by **0.5**.
- b. Any wall, other than an external wall, that is part of the envelope with the adjacent non-conditioned space enclosed, must achieve a **minimum Total R-Value 1.8**.
- c. A thermal break, consisting of a material with an R-Value of not less than R0.2, must be installed between any lightweight cladding (weatherboards, fibre-cement or metal sheeting) and its supporting metal frame if the lightweight cladding is fixed to the metal frame and there is no wall lining or the wall lining is fixed directly to the metal frame.
- d. Wall construction is deemed to have the thermal properties listed in specification J1.5.

External Wall – Concrete Panel			
Layer	Layer Description	R Value	R Value - South Facing Wall
1	Outdoor Air Film (7m/s)	0.04	0.04
2	150mm Concrete Panel	0.10	0.10
3	Unventilated Non-Reflective Airspace	0.17	0.17
5	10mm Plasterboard	0.06	0.06
6	Indoor Air Film (still air)	0.12	0.12
Wall Construction Total		<b>0.49</b>	<b>0.49</b>
Additional insulation needed		2.31	1.81
Minimum Total R-Value required		<b>2.8</b>	<b>2.3</b>

Internal Wall – Concrete Panel		
Layer	Layer Description	R Value
1	Indoor Air Film (still air)	0.12
2	150mm Concrete Panel	0.10
3	Unventilated Non-Reflective Airspace	0.17
5	10 mm Plasterboard	0.06
6	Indoor Air Film (still air)	0.12
Wall Construction Total		0.57
Additional insulation needed		1.23
Minimum Total R-Value required		1.8

*Any walls that differ from the above must achieve the minimum R-Values as listed in J1.5(a).*

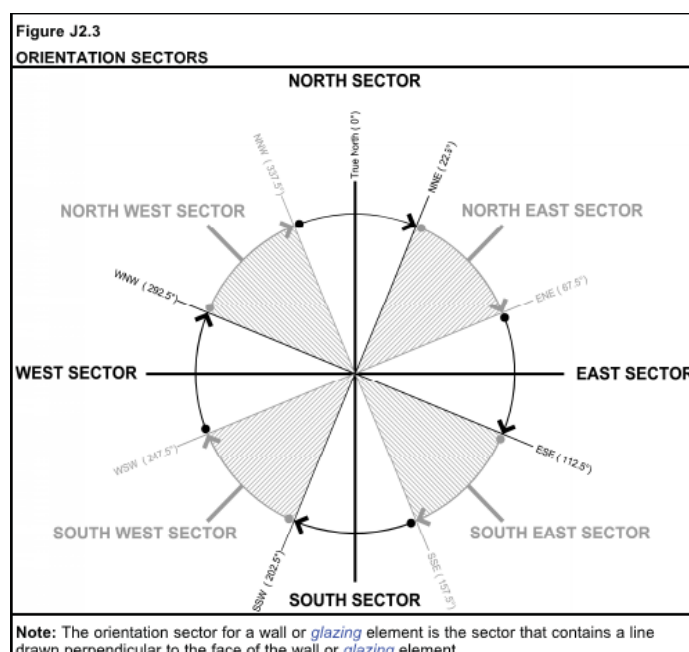


Figure 2. Orientation Sectors

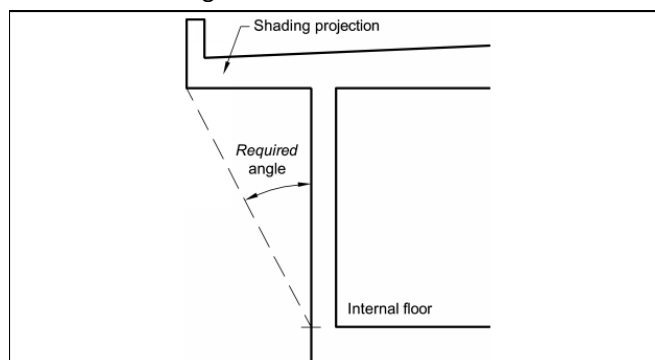


Figure 3. Measurement of Protection For Wall Shading

## J1.6 FLOORS

- a. Any new slabs on ground do not require any insulation. Any new suspended floors over air or unconditioned areas, whether timber or concrete, need to achieve a minimum **Total R Value of 2.0**.
- b. Not applicable
- c. Not applicable
- d. Not applicable
- e. Not applicable
- f. Floor insulation is deemed to have thermal properties listed in Specification J1.6. It is assumed the subfloor is enclosed.

Concrete Slab on Ground		
Layer	Layer Description	R-Value
1	Indoor Air Film (still air)	0.16
2	200mm Concrete Slab	0.14
3	Ground Thermal Resistance	-
<b>Floor Construction Total</b>		<b>0.30</b>
No additional insulation needed		

Suspended Concrete Slab		
Layer	Layer Description	R-Value
1	Indoor Air Film (still air)	0.16
2	200mm Concrete Slab	0.14
3	Outdoor Air Film (7 m/s)	0.04
<b>Floor Construction Total</b>		<b>0.34</b>
Additional insulation needed		1.66
<b>Minimum Total R-Value required</b>		<b>2.0</b>

***Any floor that differs from the above must achieve the minimum R-Values as listed in J1.6(a).***

## PART J2 – GLAZING

### J2.1 APPLICATION OF PART

The deemed to satisfy provisions of Part J2 Glazing apply to building elements forming the envelope of the building. The envelope of the building is the elements (glazing) that separates the conditioned spaces and the exterior of the building. See Figure 1 for glazing envelope. Any glazing located in the envelope must comply with the following sections.

**All existing glazing that remains need not comply with Section J requirements. Only new glazing must comply with the following sections.**

### J2.2

This clause has deliberately been left blank.

### J2.3

This clause has deliberately been left blank.

### J2.4 GLAZING

All new glazing elements forming the envelope can meet the requirements of J2.4 by providing glazing that meets the conductance (U-Value) and solar heat gain (SHGC) performance requirements summarized below. The glazing spreadsheet calculator developed by the Australian Building Codes Board (ABCB) has been used to determine the glazing requirements.

Level 3 Healing Centre + Function Room				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
N	All	7.0	0.60	e.g. Single Glazed Clear

Museum				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
N	All	7.0	0.70	e.g. Single Glazed Clear
W	All	2.3	0.30	e.g. Double Glazed Low E Tint
S	All	5.5	0.70	e.g. Single Glazed Low E Clear

Restaurant				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
N	All	7.2	0.30	e.g. Single Glazed Tint
W	All	2.4	0.22	e.g. Double Glazed Low E Tint
S	All	3.2	0.74	e.g. Double Glazed Low E Clear
E	All	4.3	0.30	e.g. Single Glazed Low E Tint

Modern Wing Level 4-5				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
SE	Room's Glazing	1.6	0.60	e.g. Triple Glazed Argon Filled Tint
NE	All	6.0	0.65	e.g. Single Glazed Clear

Level 4 Function Room and Restaurant				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
N	All	7.0	0.32	e.g. Single Glazed Tint
S	All	3.2	0.70	e.g. Double Glazed Clear
E	All	1.9	0.10	e.g. Triple Glazed Argon Filled Tint

Modern Wing Level 6-7				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
SE	Room's Glazing	1.6	0.60	e.g. Triple Glazed Argon Filled Tint
E	Corner Suite Room	1.9	0.10	e.g. Triple Glazed Argon Filled Tint
S	Corner Suite Room	2.3	0.59	e.g. Double Glazed Low E Tint
NE	All	6.0	0.65	e.g. Single Glazed Clear

Community Leisure and Wellness Centre				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
N	Ground Floor – Offices	8.0	0.25	e.g. Single Glazed Tint
N	Level 1 – Gym	8.0	0.24	e.g. Single Glazed Tint

Ecovilla Reception Ground Floor				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
SE	All	1.3	0.55	e.g. Triple Glazed Argon Filled Clear
NW	All	2.2	0.11	e.g. Triple Glazed Argon Filled Tint
NE	All	5.7	0.62	e.g. Double Glazed Argon Filled Clear

Ecovilla Reception Level 1				
Facade	Window Reference	Window U-Value (W/m <sup>2</sup> .K) NFRC	Window SHGC NFRC	Possible Glazing Type
SE	All	1.8	0.50	e.g. Triple Glazed Argon Filled Clear
NW	All	4.0	0.33	e.g. Single Glazed Low E Tinted
NE	All	6.5	0.25	e.g. Single Glazed Tinted

\*Refer to Appendix A for Glazing Calculator. Examples of possible glazing systems can be found at [www.wers.net](http://www.wers.net).

**Note:** the above are listed to demonstrate possible glazing systems that will meet the requirements of Section J. The actual glazing systems installed must achieve equal to or lower U-Value and SHGC values as listed in the glazing table above.

## J2.5 SHADING

All shading entered in the calculations for J2.4 is as per the architectural drawings referenced and satisfies the requirements of J2.5.

## **PART J3 – BUILDING SEALING**

### **J3.1 APPLICATION OF PART**

If the air conditioning or ventilation system provides sufficient outside air to pressurize the space and prevent infiltration then **Part J3 is not applicable.**

By not applying Part J3 outside air infiltration will occur whenever the ventilation systems are not operating and will put additional load on the air conditioning systems during start up. It is our recommendation to apply the deemed to satisfy provisions of Part J3 to satisfy the intent of Section J.

The deemed to satisfy provisions of Part J3 Building Sealing apply to building elements forming the envelope of the building. The envelope of the building is the fabric and elements that separates the conditioned spaces to the exterior of the building. See Figure 1 for building envelope details.

### **J3.2 CHIMNEYS AND FLUES**

Not applicable

### **J3.3 ROOF LIGHTS**

The roof window / skylights must be sealed, or capable of being sealed. It must be constructed with -

- a. An imperforate ceiling diffuser or the like installed at ceiling level; or
- b. A weatherproof seal; or
- c. A shutter system readily operated either manually, mechanically or electronically by the occupant

### **J3.4 WINDOWS AND DOORS**

- a. A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like that is part of the building envelope.
- a. The requirements of (a) do not apply to a window complying with AS2047, a fire door or smoke door, or a roller shutter, roller shutter grille or other security door or device installed only for out-of-hours security.
- b. A seal required by (a) for the bottom edge of an external swing door, must be a draft protection device and for the other edges of an external 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.
- c. Any entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, revolving door or the like, other than where the conditioned space has a floor area of not more than 50m<sup>2</sup>.

### **J3.5 EXHAUST FANS**

All toilet and kitchen exhaust fans must be fitted with a sealing device such as a self-closing damper or the like.

### **J3.6 CONSTRUCTION OF ROOF, FLOORS AND WALLS**

- a. Roofs, 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)

- b. Construction required by (a) must be enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions or sealed by caulking, skirting, architraves, cornices or the like.
- c. The requirements of (a) do not apply to openings, grilles and the like required for smoke hazard management.

### **J3.7 EVAPORATIVE COOLERS**

Not applicable

## **PART J4**

This Part has deliberately been left blank.

## **PART J5 – AIR CONDITIONING AND VENTILATION SYSTEMS**

The air conditioning and ventilation systems compliance with this part shall be demonstrated by a design statement from the mechanical services consultant.

## **PART J6 – ARTIFICIAL LIGHTING AND POWER**

The lighting and power systems compliance with this part shall be demonstrated by a design statement from the electrical services consultant.

## **PART J7 – HEATED WATER SUPPLY AND SWIMMING POOL AND SPA POOL PLANT**

The heated water supply compliance with this part shall be demonstrated by a design statement from the hydraulic services consultant.

## **PART J8 – FACILITIES FOR ENERGY MONITORING**

### **J8.1 APPLICATION OF PART**

The deemed to satisfy provisions of Part J8 Facilities for Energy Monitoring apply to this building.

### **J8.2**

This clause has been deliberately been left blank.

### **J8.3 FACILITIES FOR MONITORING ENERGY**

- a. The building must have the facility to record the consumption of gas and electricity.
- b. The building must have the facility to record individually the energy consumption of –
  - i. Air conditioning plant including heating and 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
- c. Not applicable

## CONCLUSION

This report demonstrates an assessment based on the Section J Deemed-to-Satisfy (DTS) method to specify the building fabrics requirements for all the new building works of the restaurant, museum/gallery and modern wing. By incorporating the recommendations of this report, the new extension of Robertson Hotel, can achieve compliance with the NCC BCA 2016 Volume 1 Section J.

There is however an alternative solution, known as the JV3 Alternative Verification Method, that can be applied if the glazing and insulation solutions by the DTS method are not desirable.

## APPENDIX A – GLAZING CALCULATOR

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

Building name/description

Application

Climate zone

Storey

N	NE	E	SE	S	SW	W	NW	internal
156m <sup>2</sup>								
								n/a

Option A  
 Option B  
 Glazing area (A) 71.9m<sup>2</sup>

Number of rows preferred in table below 4 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	Restaurant	N		4.50	12.00		7.0	0.60	3.000	3.700	0.81	-0.80	0.29	0.40	54.00	68% of 100%
2	Restaurant door	N		4.50	1.50		7.0	0.60	1.000	4.500	0.22	0.00	0.94	0.80	6.75	17% of 100%
3	Healing Centre	N		1.50	7.40		7.0	0.60	1.000	1.500	0.67	0.00	0.51	0.46	11.10	15% of 100%
4																

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

Building name/description: **Museum**

Application: **other**      Climate zone: **6**

Storey: **Level 4**

Facade areas		N	NE	E	SE	S	SW	W	NW	internal
Option A		30.8m <sup>2</sup>				34.5m <sup>2</sup>		43.7m <sup>2</sup>		
Option B										n/a
Glazing area (A)		2.96m <sup>2</sup>	7.4m <sup>2</sup>			22.2m <sup>2</sup>				

Number of rows preferred in table below: **3** (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	North	N		3.70	0.80		7.0	0.70				0.00	1.00	1.00	2.96	100% of 62%
2	West	W		3.70	6.00		2.3	0.30	1.000	3.700	0.27	0.00	0.86	0.82	22.20	100% of 99%
3	South	S		3.70	2.00		5.5	0.70	2.000	3.700	0.54	0.00	0.82	0.75	7.40	100% of 98%

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**NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)**
[HELP](#)

Building name/description  
**Restaurant**

Application  
**other**

Climate zone  
**6**

Storey  
**Level 4**

Facade areas  

N	NE	E	SE	S	SW	W	NW	internal
<b>55.5m<sup>2</sup></b>		<b>36.3m<sup>2</sup></b>		<b>54.8m<sup>2</sup></b>		<b>36.3m<sup>2</sup></b>		
n/a								

Option A

Option B

Glazing area (A)

53.7m<sup>2</sup>

13.4m<sup>2</sup>

39.8m<sup>2</sup>

17.4m<sup>2</sup>

Number of rows preferred in table below

**8** (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	Restaurant	N		3.70	14.50		7.2	0.30	1.000	2.300	0.43	-1.40	0.78	0.61	53.65	100% of 100%
2	Restaurant Entry	S		3.70	8.70		3.2	0.74	2.000	3.700	0.54	0.00	0.82	0.75	32.19	84% of 99%
3	Stairs	S		3.70	1.80		3.2	0.74	0.200	3.700	0.05	0.00	0.98	0.97	6.66	13% of 99%
4	Highlight	S		0.40	2.25		3.2	0.74	0.300	0.400	0.75	0.00	0.76	0.69	0.90	3% of 99%
5	Fixed Glazing	W		3.70	4.70		2.4	0.22				0.00	1.00	1.00	17.39	100% of 100%
6	Door	E		3.70	1.50		4.3	0.30	1.500	3.700	0.41	0.00	0.78	0.72	5.55	39% of 100%
7	Highlight	E		0.40	5.75		4.3	0.30	0.300	0.400	0.75	0.00	0.53	0.53	2.30	14% of 100%
8	To Balcony	E		3.70	1.50		4.3	0.30	0.300	3.700	0.08	0.00	0.96	0.95	5.55	47% of 100%

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

HELP

Building name/description  
**Modern Wing Level 4 and 5**

Application  
**Class 3**

Climate zone  
**6**

Storey  
**Level 4&5**

Facade areas

ABCB N	NE	E	SE	S	SW	W	NW	internal
	<b>13.8m<sup>2</sup></b>		<b>90.2m<sup>2</sup></b>					
								n/a

Option A  
Option B

Glazing area (A) ..... **1.6m<sup>2</sup>** ..... **59.8m<sup>2</sup>**

Number of rows preferred in table below **5** (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	Balcony Glazed Door	SE		2.60	23.00		1.6	0.60	2.000	2.600	0.77	0.00	0.64	0.57	59.80	100% of 100%
2											ROW SKIPPED (OK if intentional)					
3	Highlight	NE		0.40	4.00		6.0	0.65				0.00	1.00	1.00	1.60	100% of 100%
4																
5																

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if inputs are valid

✓

**NCC VOLUME ONE GLAZING CALCULATOR (first issued with NCC 2014)**
[HELP](#)

Building name/description  
**Function Conference Restaurant**

Application  
**other**

Climate zone  
**6**

Storey  
**Level 4**

Facade areas									
N	NE	E	SE	S	SW	W	NW	internal	
<b>73.8m<sup>2</sup></b>		<b>71.4m<sup>2</sup></b>		<b>152m<sup>2</sup></b>					
Glazing area (A) 55.9m <sup>2</sup> ..... 59.9m <sup>2</sup> ..... 127m <sup>2</sup>									

Number of rows preferred in table below **6** (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	Glazing	N		4.70	11.90		7.0	0.32	1.800	4.700	0.38	0.00	0.83	0.65	55.93	100% of 97%
2											ROW SKIPPED (OK if intentional)					
3	Curtain Wall	S		4.70	27.00		3.2	0.70	0.100	4.700	0.02	0.00	0.99	0.99	#####	100% of 100%
4											ROW SKIPPED (OK if intentional)					
5	Curtain Wall	E		4.70	12.75		1.9	0.10	0.100	4.700	0.02	0.00	0.99	0.99	59.93	100% of 99%
6																

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

Building name/description  

New Modern Wing Level 6 and 7

Application  

Class 3

Climate zone  

6

Storey  

Level 6&7

Facade areas
 

N	NE	E	SE	S	SW	W	NW	internal
	13.8m²	31.7m²	94.1m²	27.6m²				
								n/a

Glazing area (A) ..... 1.6m²   20.5m²   59.8m²   18.7m²

Number of rows preferred in table below   **8** (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (SH)	Cooling (SC)	Area used (m²)	Element share of % of allowance used
1	Balcony Glazed Door	SE		2.60	23.00		1.6	0.60	2.000	2.600	0.77	0.00	0.64	0.57	59.80	100% of 96%
2											ROW SKIPPED (OK if intentional)					
3	Fixed Glazing	E		2.60	4.70		1.9	0.10	1.000	2.600	0.38	0.00	0.79	0.73	12.22	55% of 88%
4	Curved Glazed	E		2.60	3.20		1.9	0.10				0.00	1.00	1.00	8.32	45% of 88%
5											ROW SKIPPED (OK if intentional)					
6	Suite	S		2.60	7.20		2.3	0.60	2.400	2.600	0.92	0.00	0.72	0.66	18.72	100% of 92%
7											ROW SKIPPED (OK if intentional)					
8	Highlight	NE		0.40	4.00		6.0	0.65				0.00	1.00	1.00	1.60	100% of 100%

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

HELP

Building name/description

Community Leisure and Health Centre

Application

other

Climate zone

6

Storey

Ground

Facade areas

N	NE	E	SE	S	SW	W	NW	internal
21.7m <sup>2</sup>								
								n/a

Option A

Option B

Glazing area (A) 18.2m<sup>2</sup>

Number of rows preferred in table below

4 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)						
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A	Option B	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m²)	Element share of % of allowance used
		facades	facades													
1	Offices	N		2.70	6.75		8.0	0.25	0.600	2.700	0.22	0.00	0.94	0.80	18.23	100% of 100%
2																
3																
4																

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

HELP

Building name/description

Community Leisure and Health Centre

Application

other

Climate zone

6

Storey

Level 1

Facade areas

N	NE	E	SE	S	SW	W	NW	internal
21.7m <sup>2</sup>								
								n/a

Option A

Option B

Glazing area (A) 18.9m<sup>2</sup>

Number of rows preferred in table below

4 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
Description (optional)		Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	Gym	N		2.70	7.00		8.0	0.24	0.600	2.700	0.22	0.00	0.94	0.80	18.90	100% of 100%
2																
3																
4																

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

HELP

Building name/description  
**Ecovillas Reception**

Application  
**Class 3**

Climate zone  
**6**

Storey  
**Ground**

Facade areas

Option A	Option B	SE	SW	NW	internal
		42.4m <sup>2</sup>	23.7m <sup>2</sup>	42.6m <sup>2</sup>	
Glazing area (A)		32.1m <sup>2</sup>		3.6m <sup>2</sup>	32.7m <sup>2</sup>

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

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS								SHADING		CALCULATED OUTCOMES OK (if inputs are valid)						
Glazing element		Facing sector		Size		Performance		P&H or device		Shading		Multipliers		Size	Outcomes	
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m <sup>2</sup> )	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (SH)	Cooling (Sc)	Area used (m <sup>2</sup> )	Element share of % of allowance used
1	Sliding Door	SE		3.00	7.50		1.3	0.55	1.200	3.000	0.40	0.00	0.79	0.74	22.50	67% of 100%
2	Fixed Glazing	SE		3.00	1.20		1.3	0.55				0.00	1.00	1.00	3.60	13% of 100%
3	Stairs	SE		3.00	2.00		1.3	0.55				0.00	1.00	1.00	6.00	21% of 100%
4											ROW SKIPPED (OK if intentional)					
5	Entry	NW		3.00	9.40		2.2	0.11	1.200	3.000	0.40	0.00	0.80	0.67	28.20	83% of 99%
6	Fixed Glazing Office	NW		3.00	1.50		2.2	0.11				0.00	1.00	1.00	4.50	17% of 99%
7											ROW SKIPPED (OK if intentional)					
8	Office Entry	SW		3.00	1.20		5.7	0.62				0.00	1.00	1.00	3.60	100% of 100%
9																
10																

**IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR**

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if inputs are valid

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

Building name/description  
**Ecovillas Reception**

Storey  
**Level 1**

Facade areas

N	NE	E	SE	S	SW	W	NW	internal
	36.2m²		56.8m²				46.2m²	
Option A								
Option B								n/a

Glazing area (A) ..... 18.9m² ..... 26.7m² ..... 12.7m²

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

Application  
**Class 3**

Climate zone  
**6**

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS									SHADING		CALCULATED OUTCOMES OK (if inputs are valid)					
Glazing element		Facing sector		Size			Performance		P&H or device		Shading		Multipliers		Size	Outcomes
ID	Description (optional)	Option A facades	Option B facades	Height (m)	Width (m)	Area (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S <sub>H</sub> )	Cooling (S <sub>C</sub> )	Area used (m²)	Element share of % of allowance used
1	Triangle	SE				17.60	1.8	0.50				0.00	1.00	1.00	17.60	65% of 100%
2	Fixed Glazing	SE		3.25	1.20		1.8	0.50	device		2.00	0.00	0.37	0.39	3.90	16% of 100%
3	Stairs	SE		3.25	1.60		1.8	0.50				0.00	1.00	1.00	5.20	19% of 100%
4											ROW SKIPPED (OK if intentional)					
5	Balcony	NW				8.80	4.0	0.33				0.00	1.00	1.00	8.80	77% of 100%
6	Bathroom	NW		3.25	1.20		4.0	0.33	device		2.00	0.00	0.00	0.29	3.90	23% of 100%
7											ROW SKIPPED (OK if intentional)					
8	Bedrooms	NE		3.25	5.80		6.5	0.25	1.000	3.250	0.31	0.00	0.87	0.77	18.85	100% of 100%
9																
10																

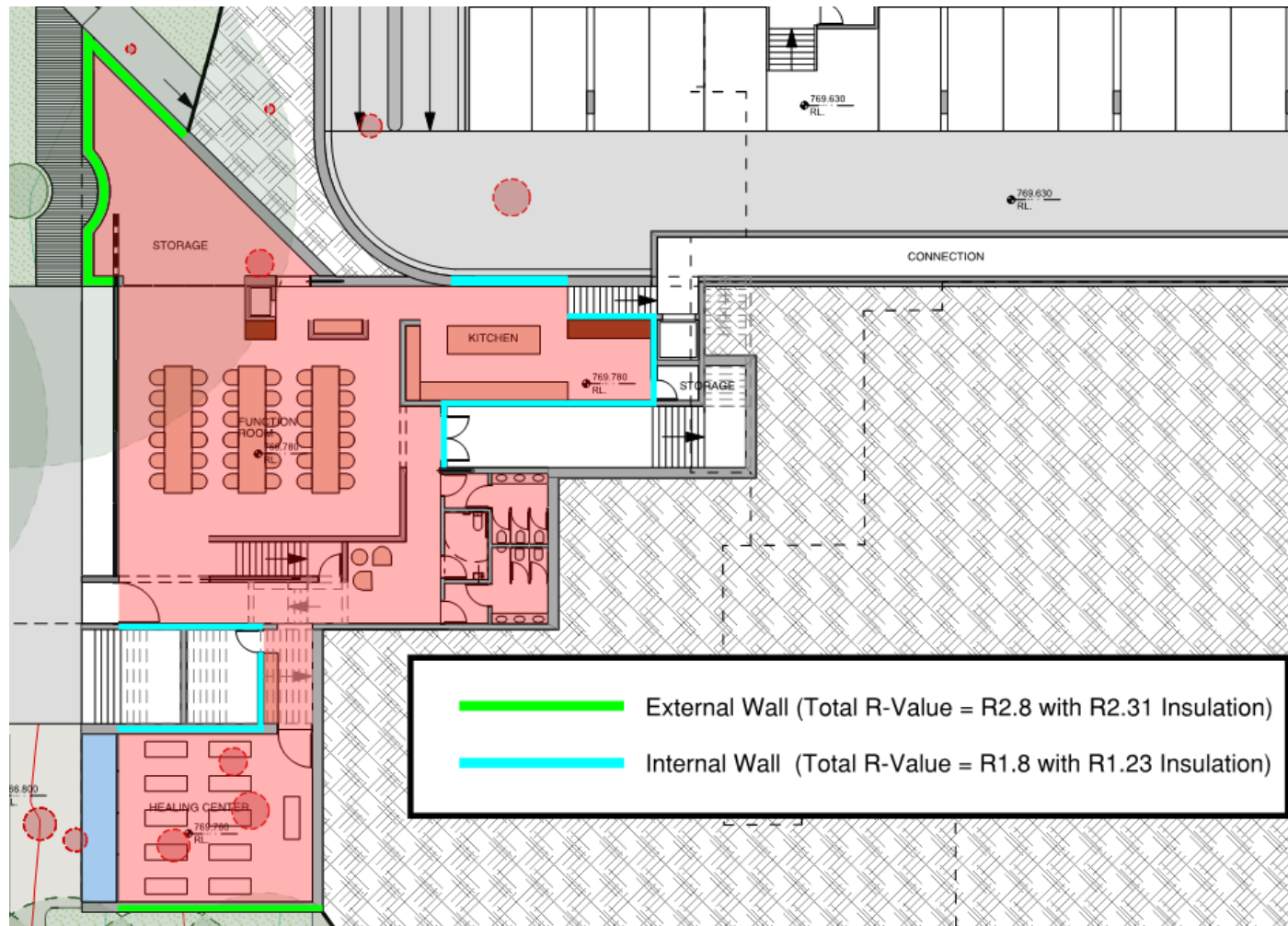
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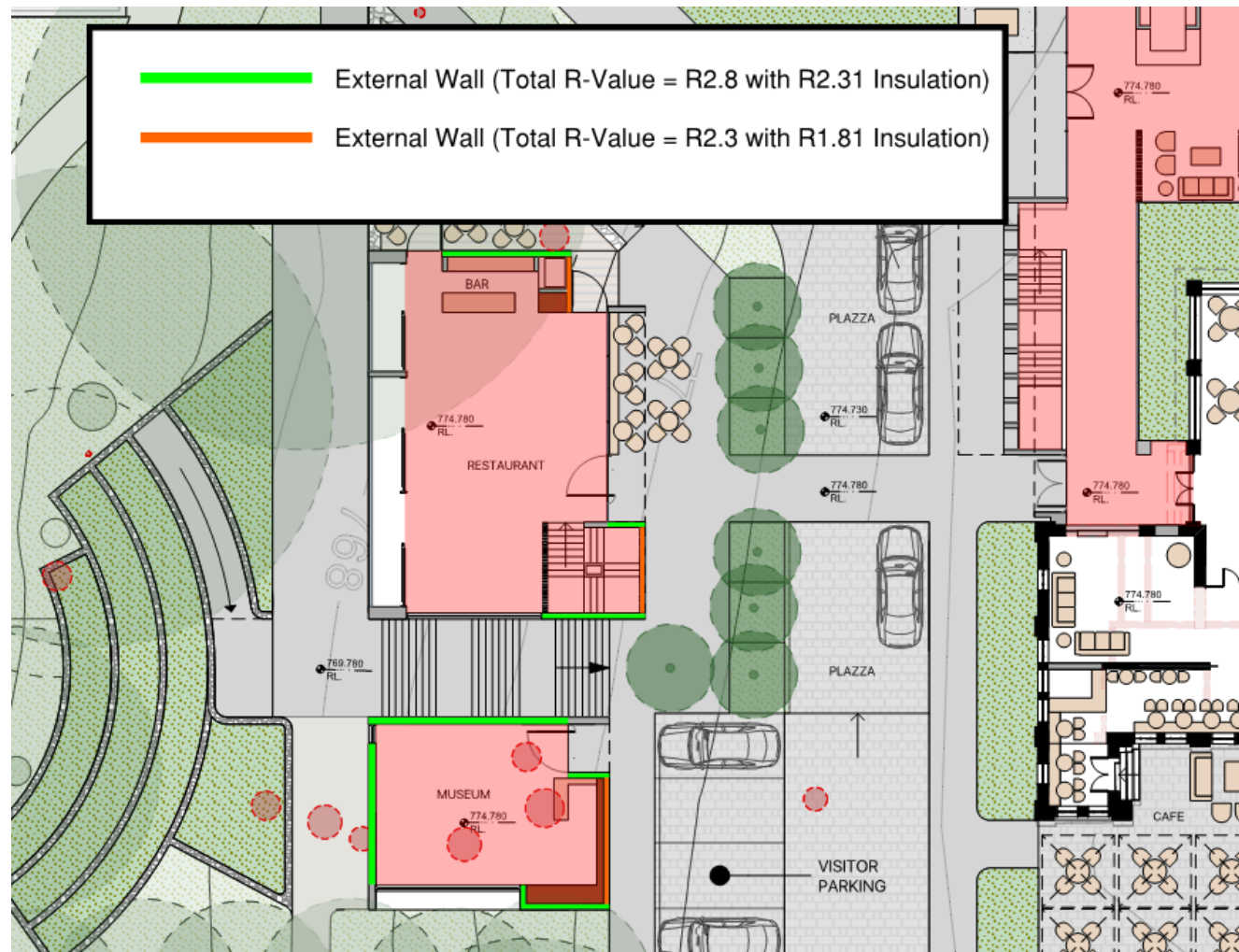
if inputs are valid

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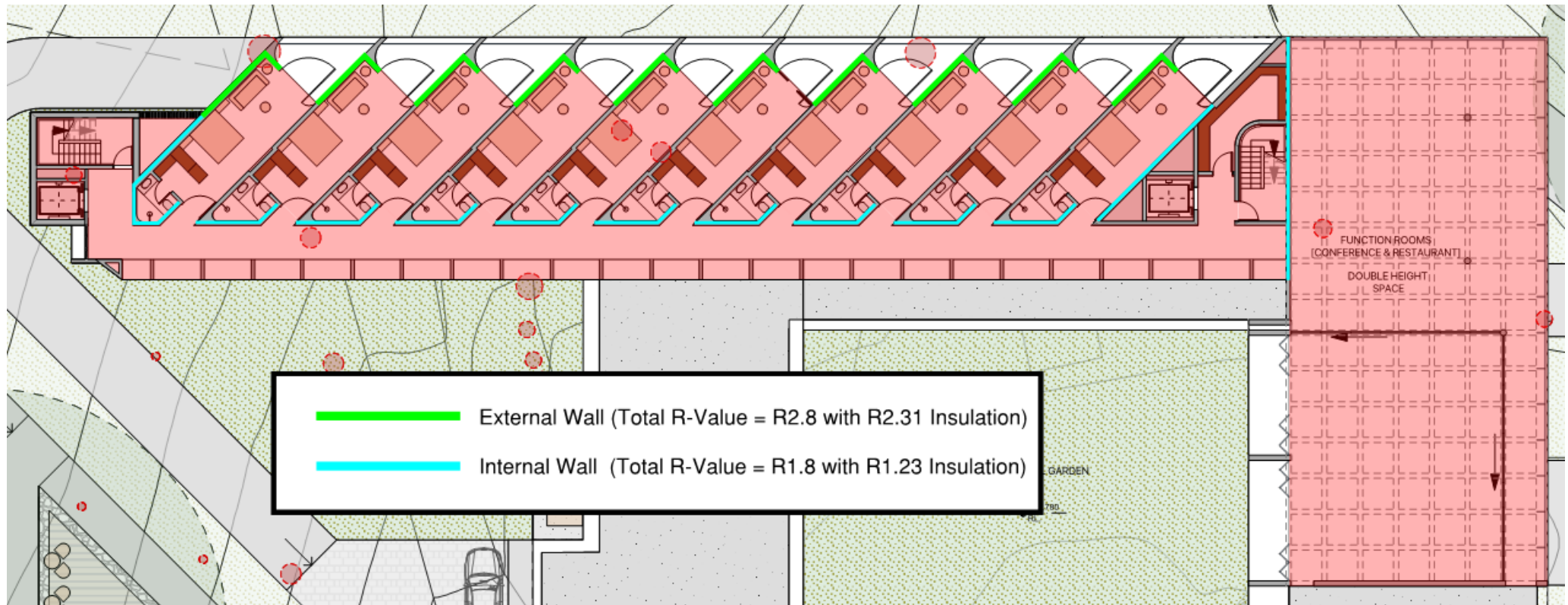
## APPENDIX B – BUILDING FABRIC MARK-UP



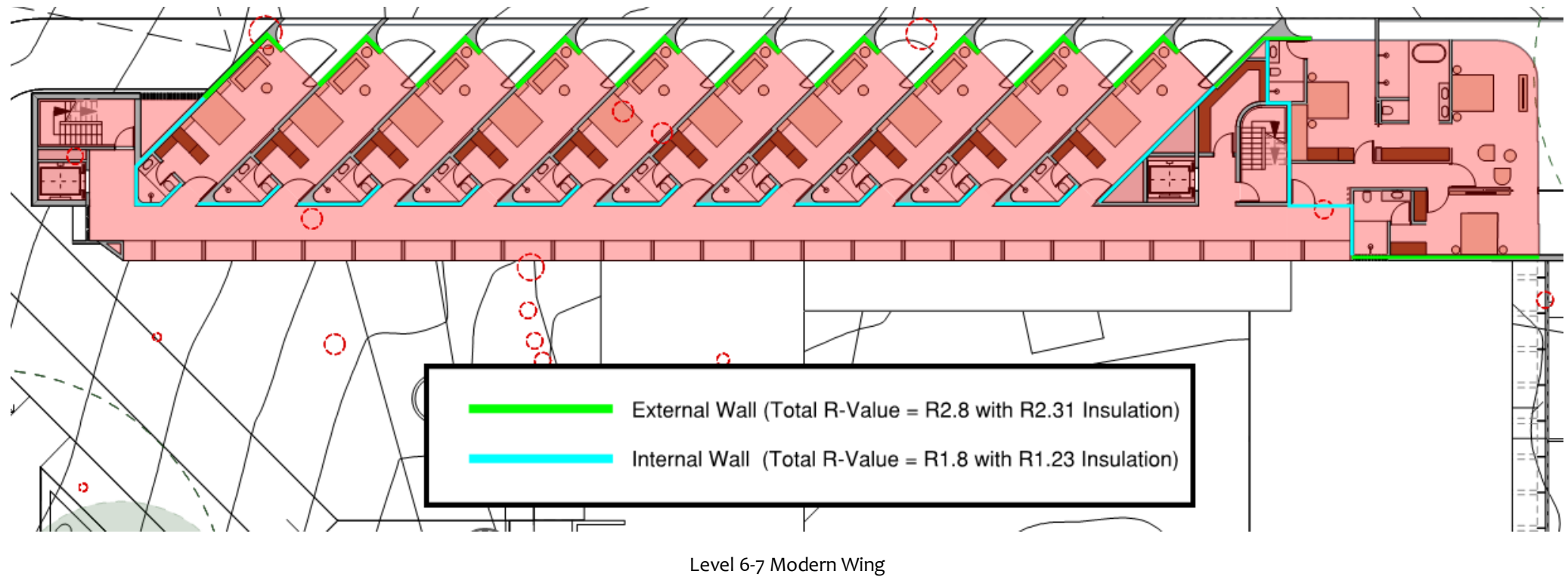
Level 3 Function Room and Healing Centre

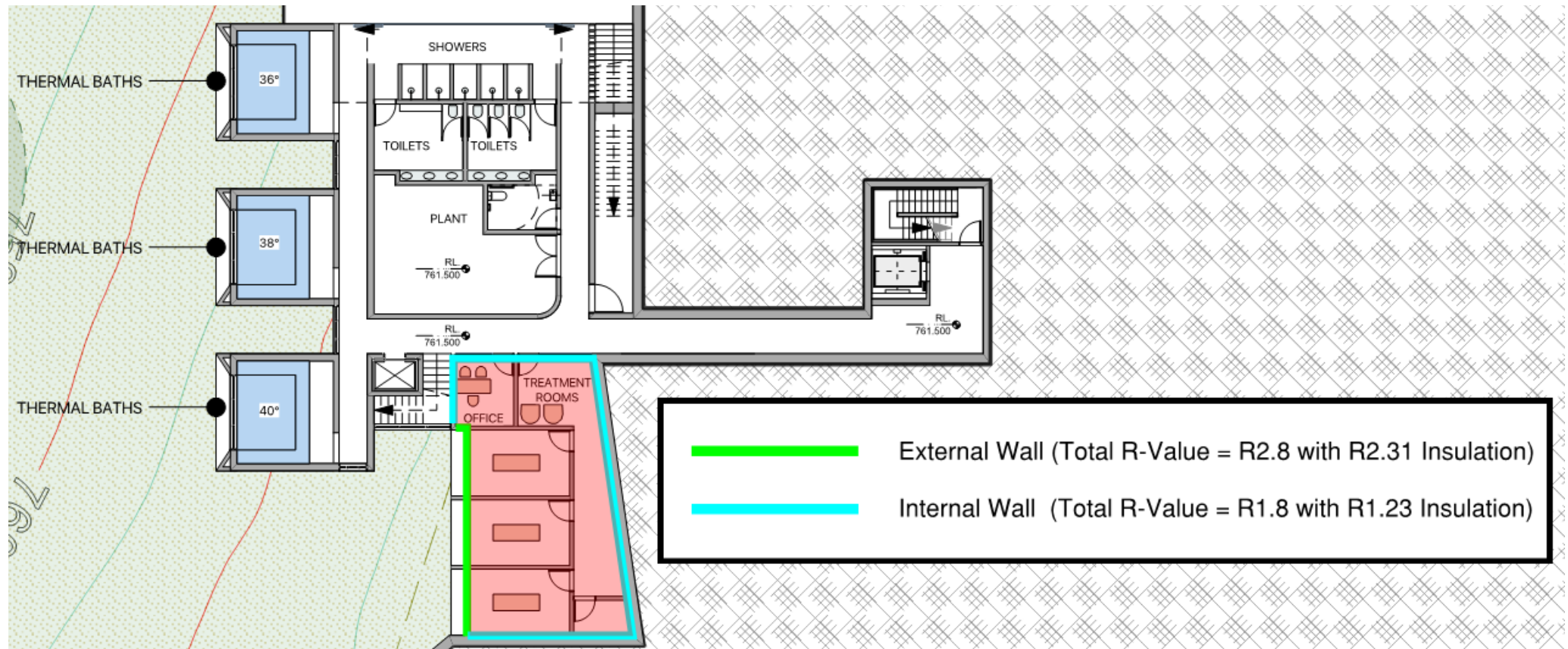


Level 4. Museum and Restaurant

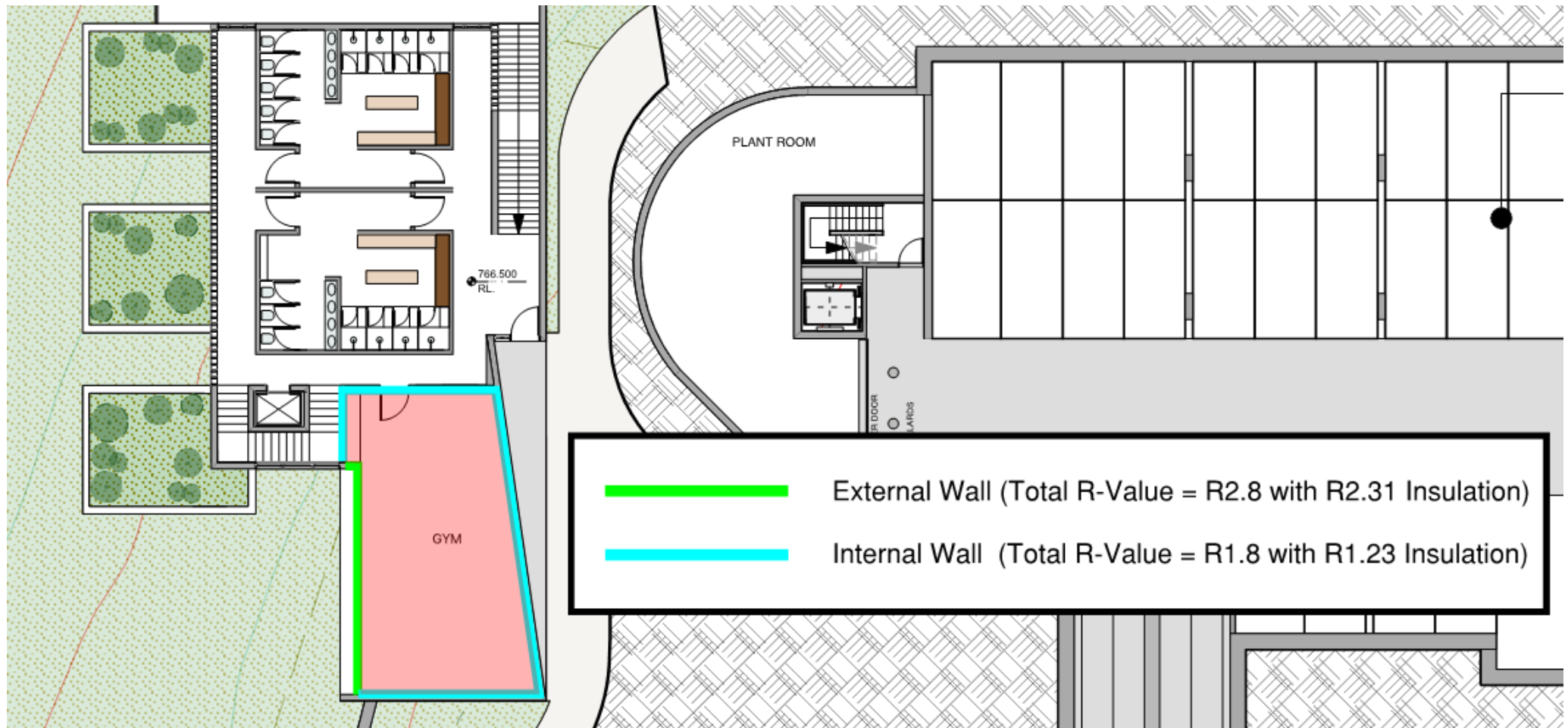


Level 4-5 Modern Wing

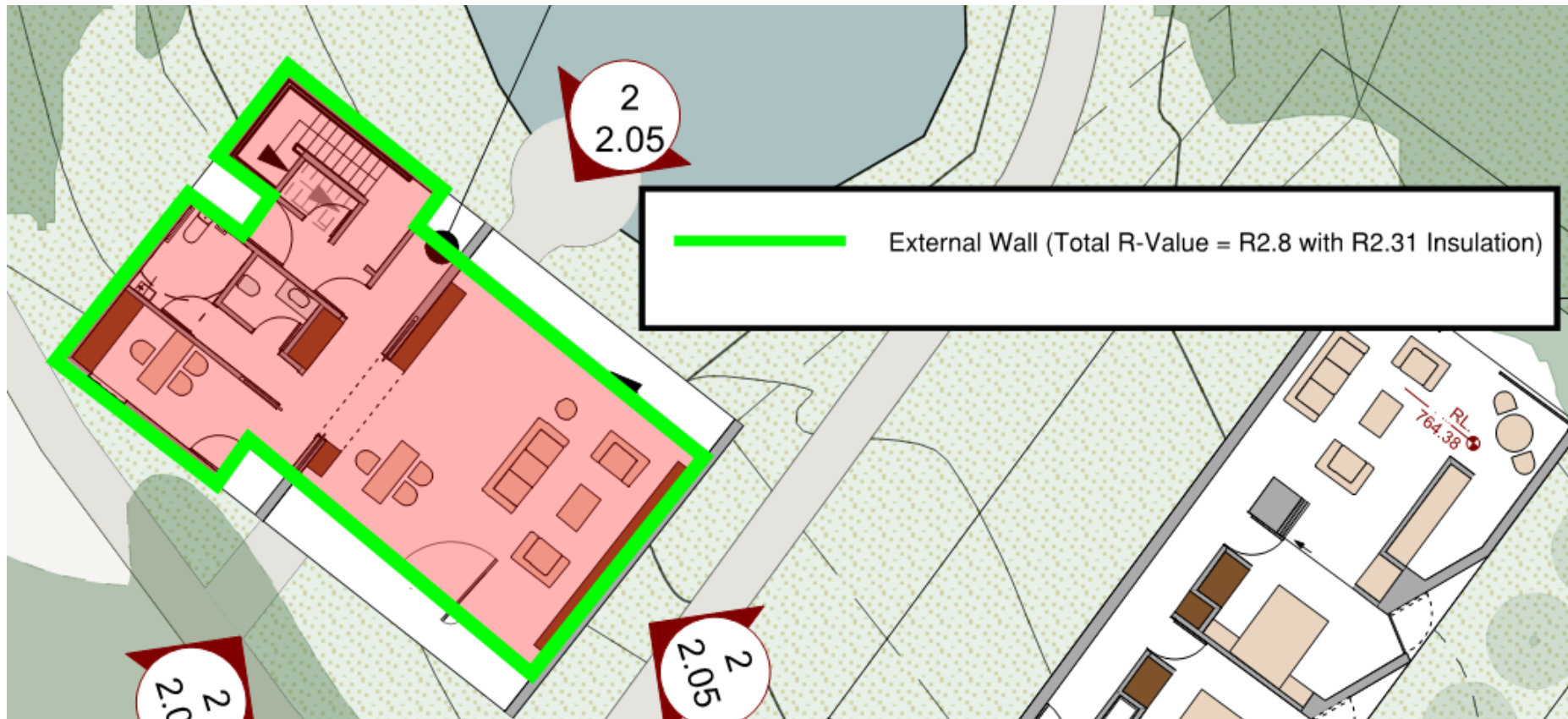




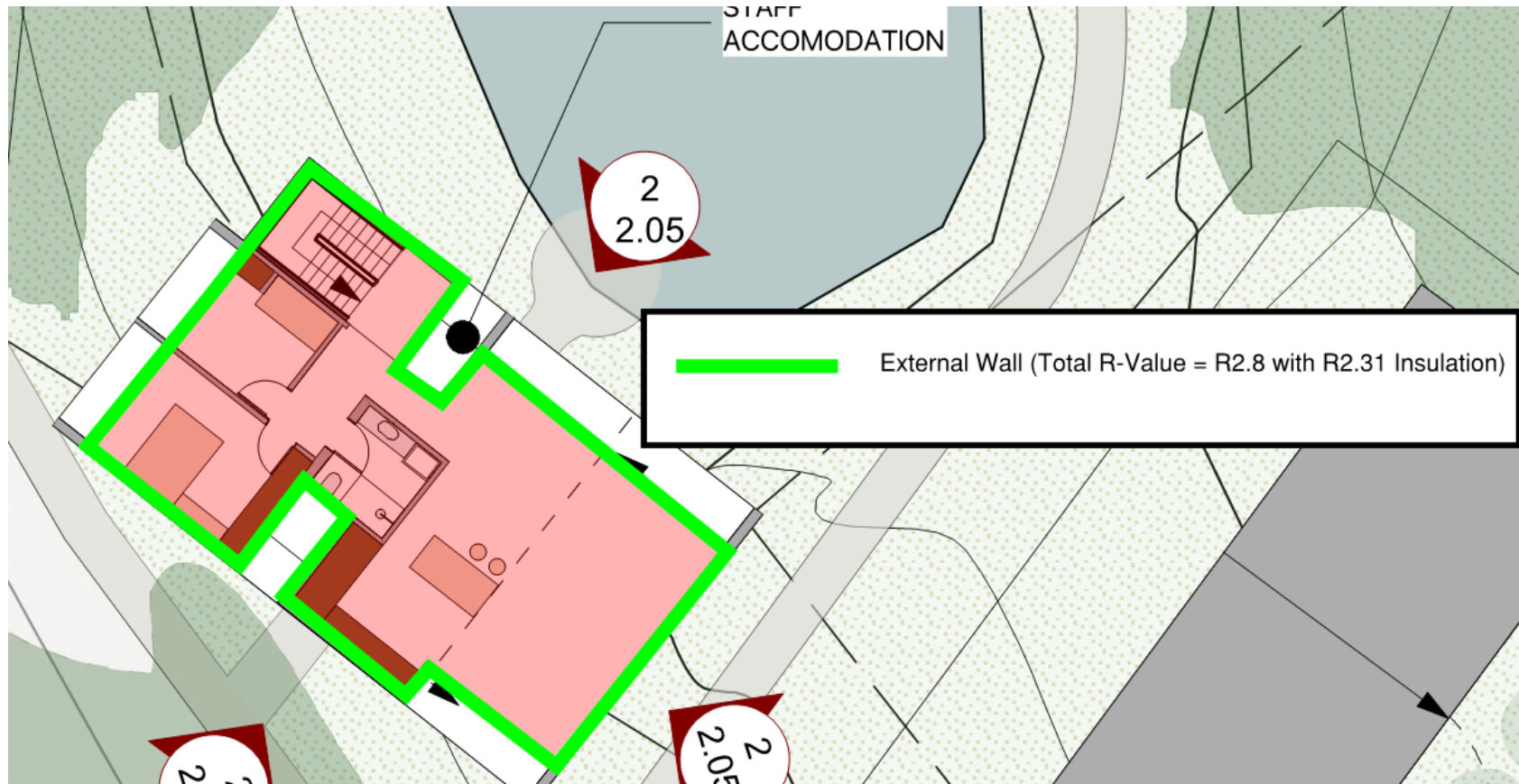
Community Leisure and Wellness Centre Ground Floor



Community Leisure and Wellness Centre First Floor

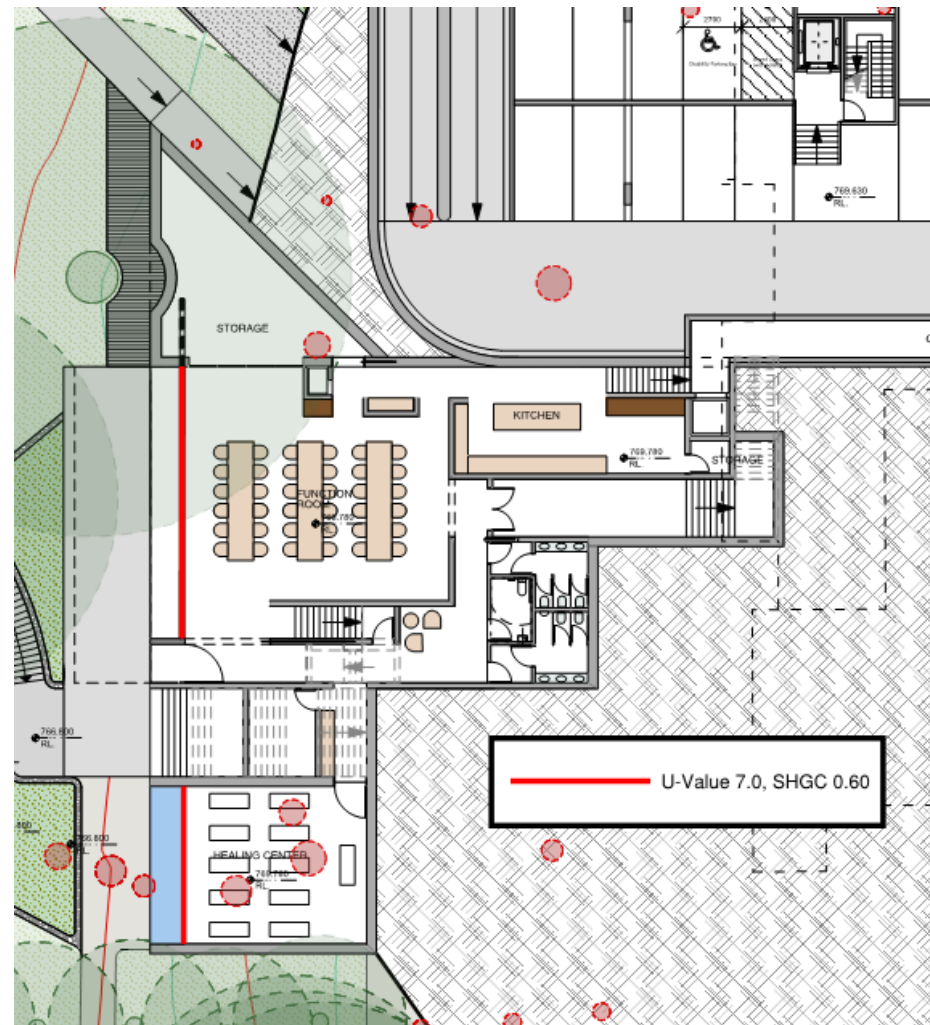


Ecovillas Reception (Ground Level)

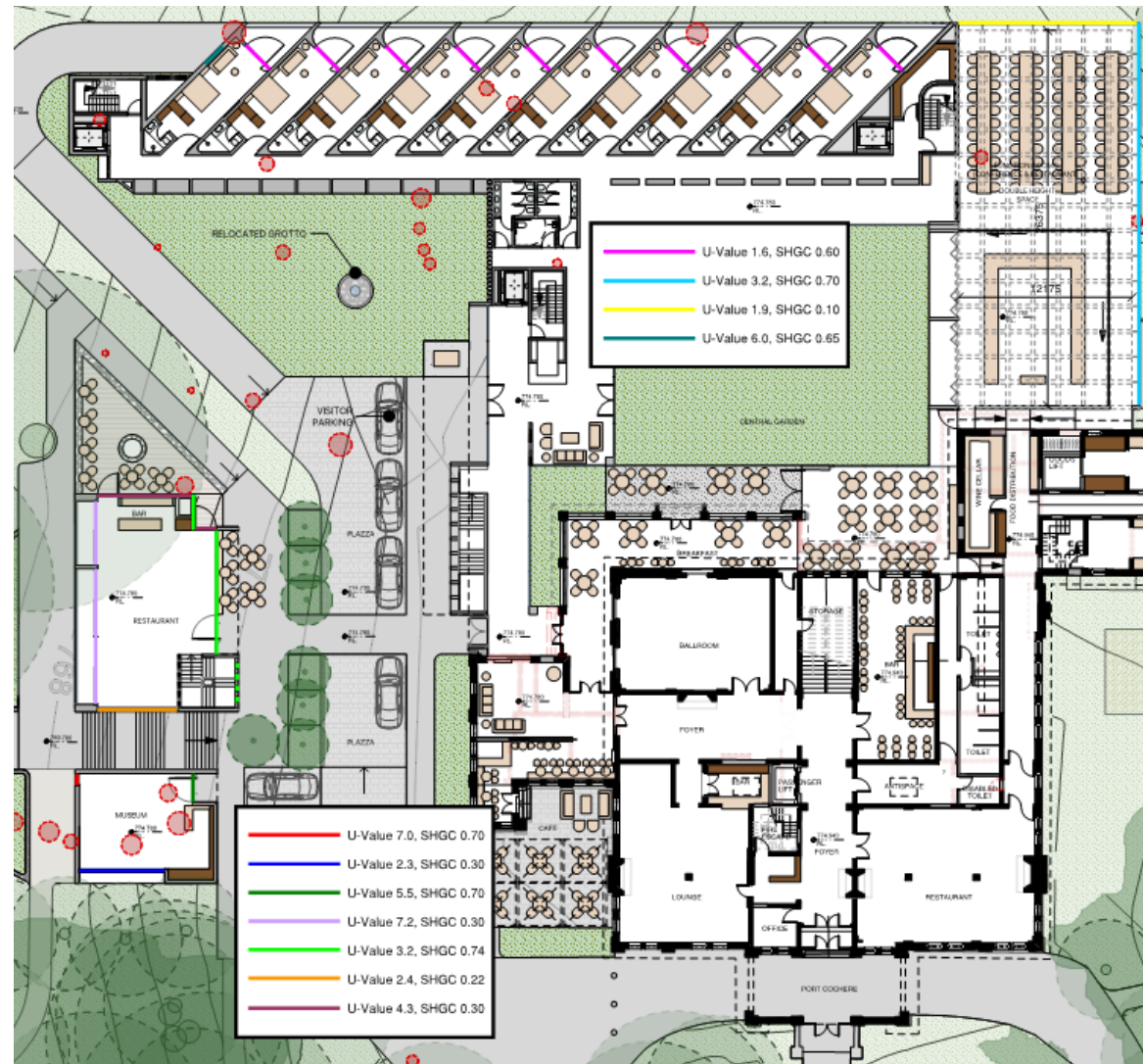


Ecovillas Reception (Level 1)

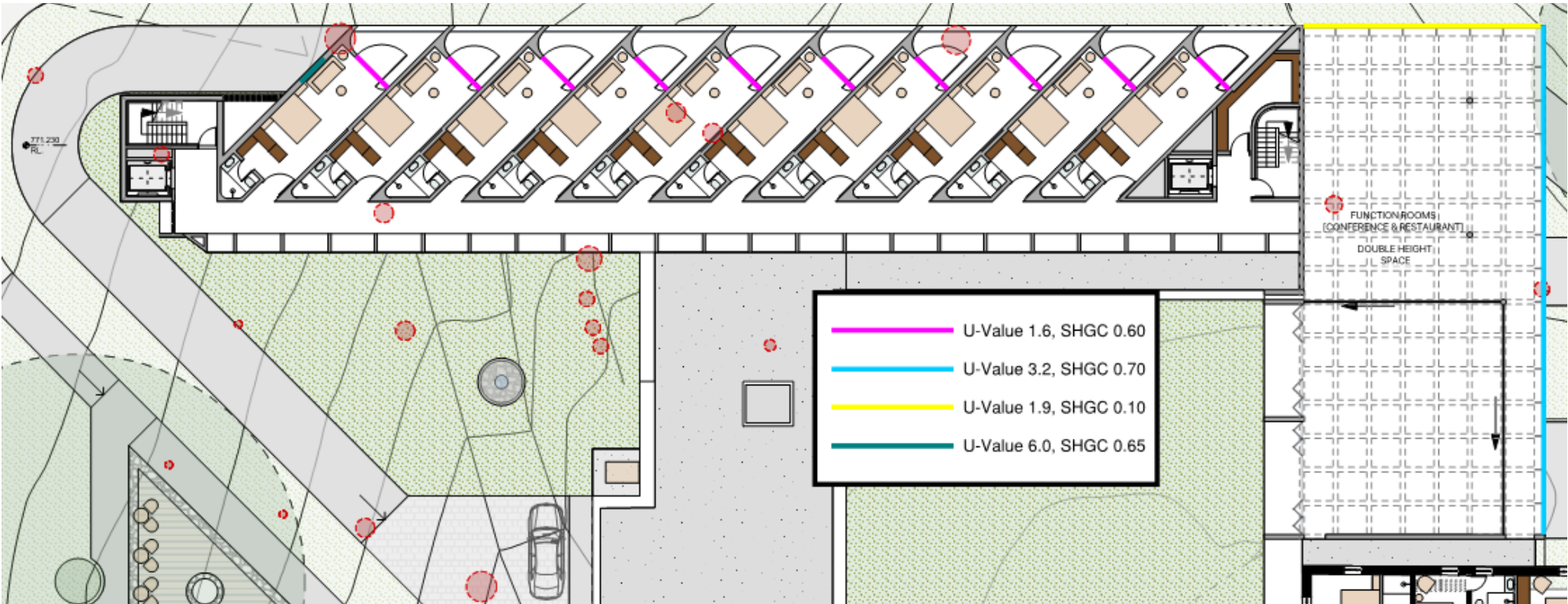
## APPENDIX C – GLAZING MARK-UP



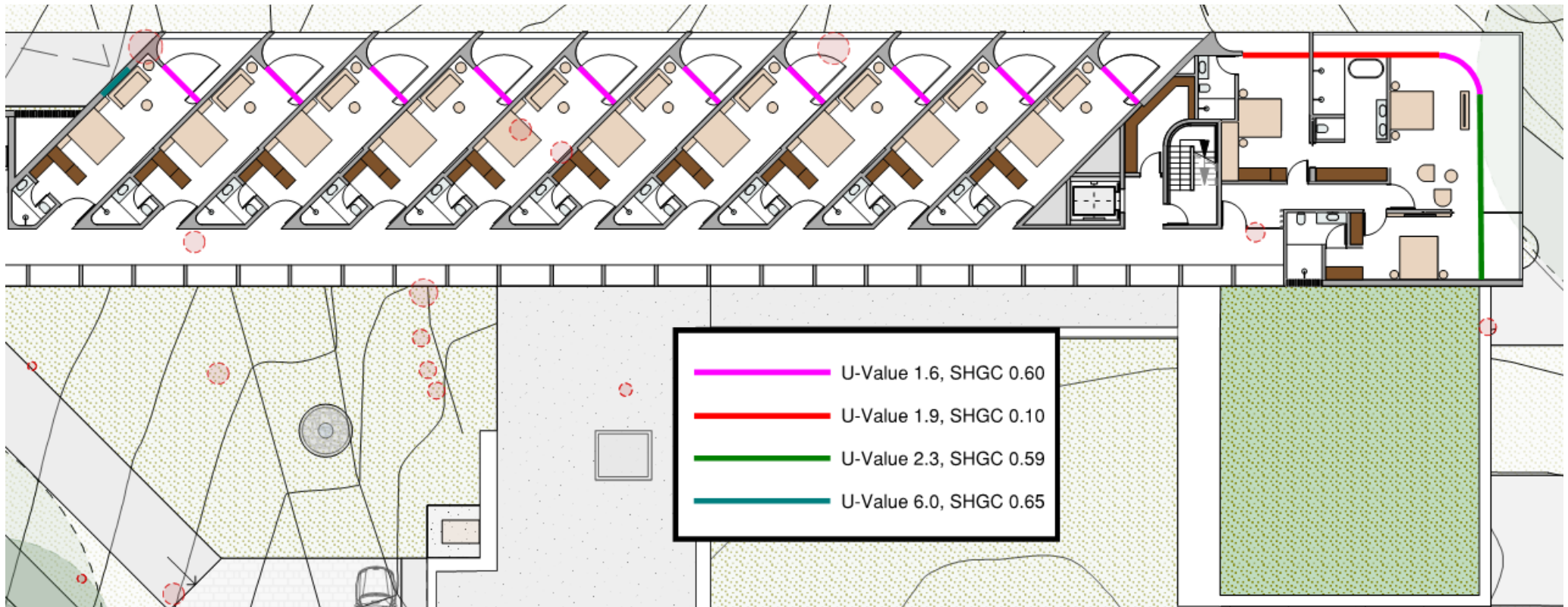
Level 3 Function Room and Health Centre



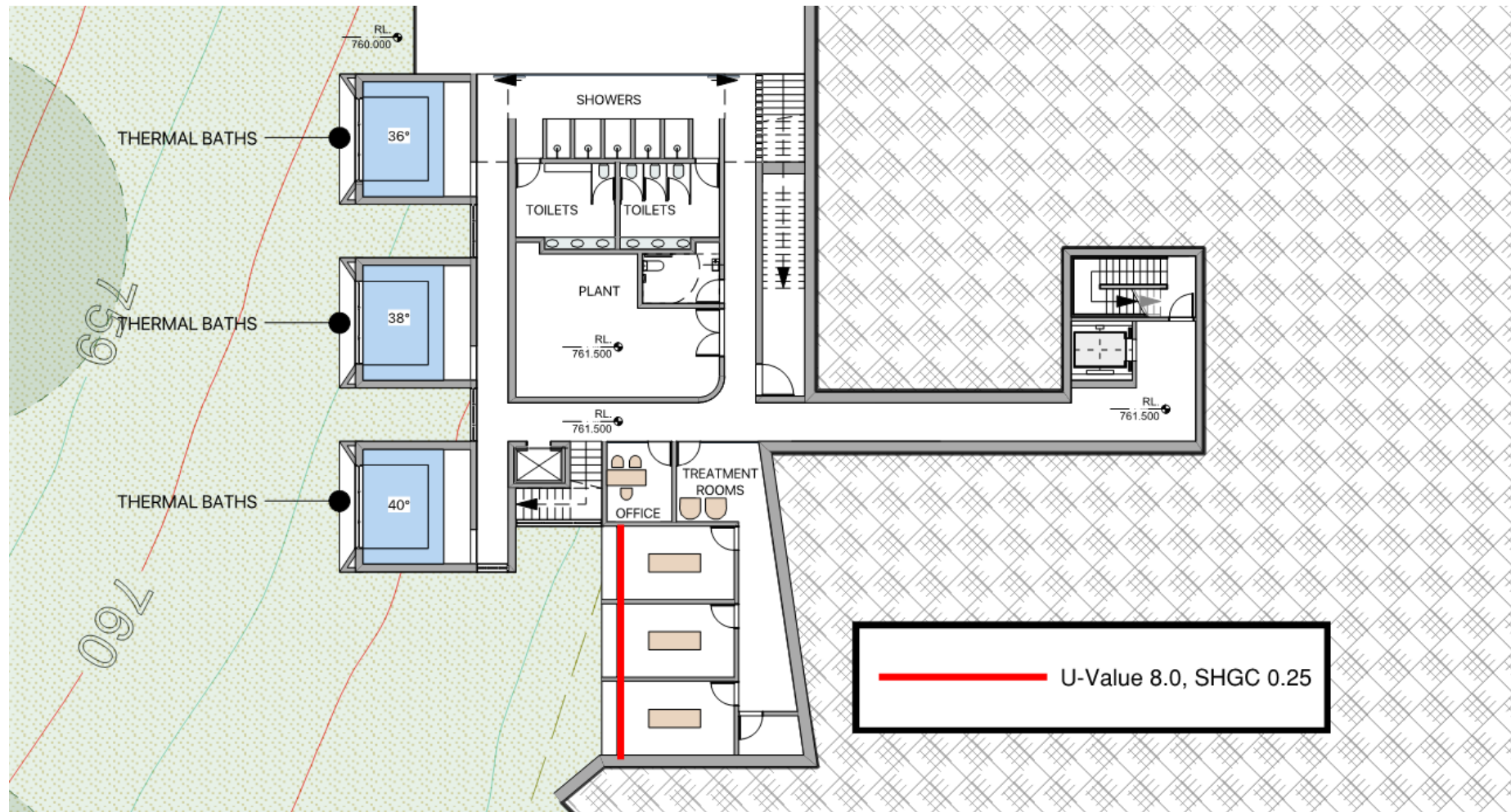
Level 4 Overall



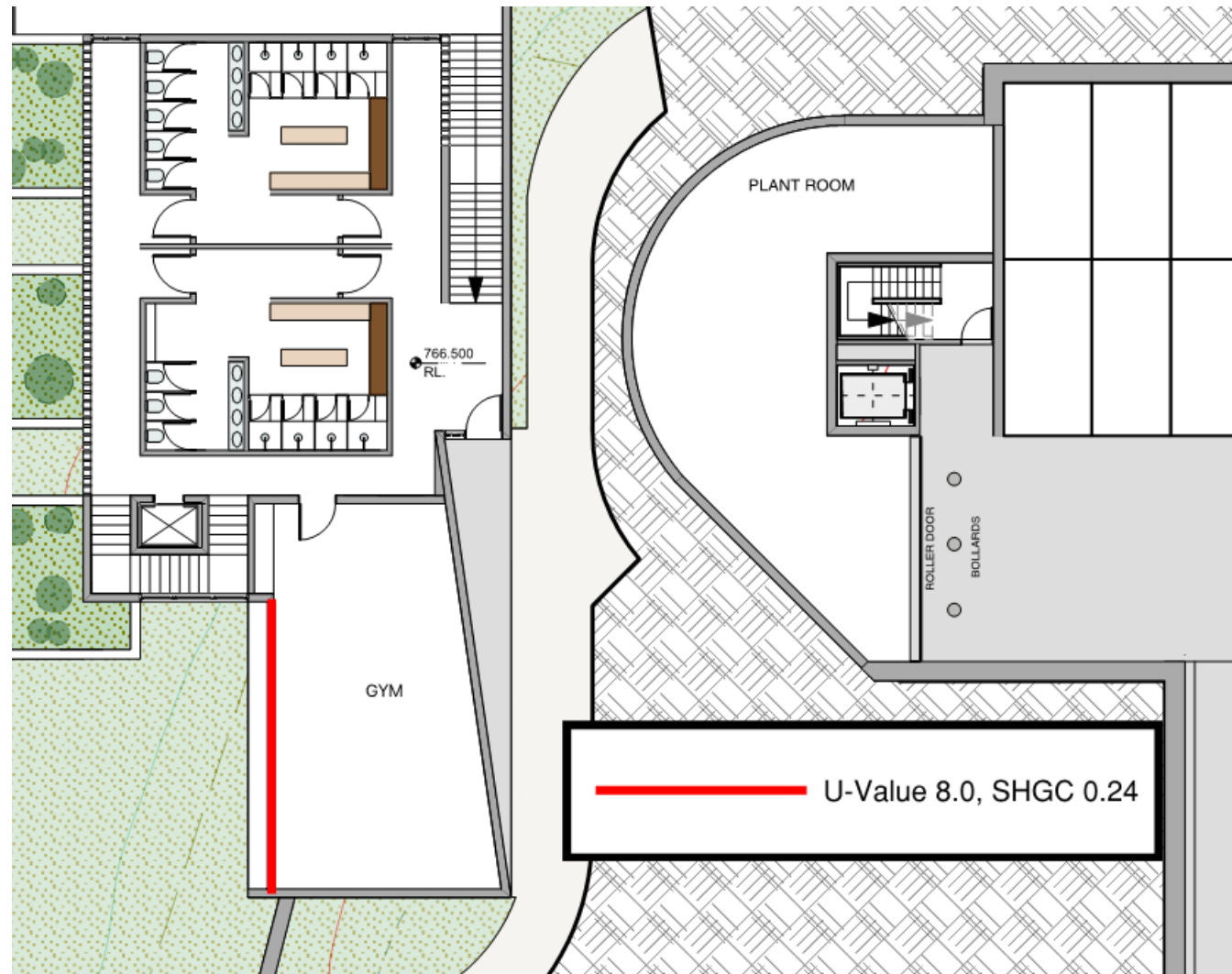
Level 4 and 5 Modern Wing

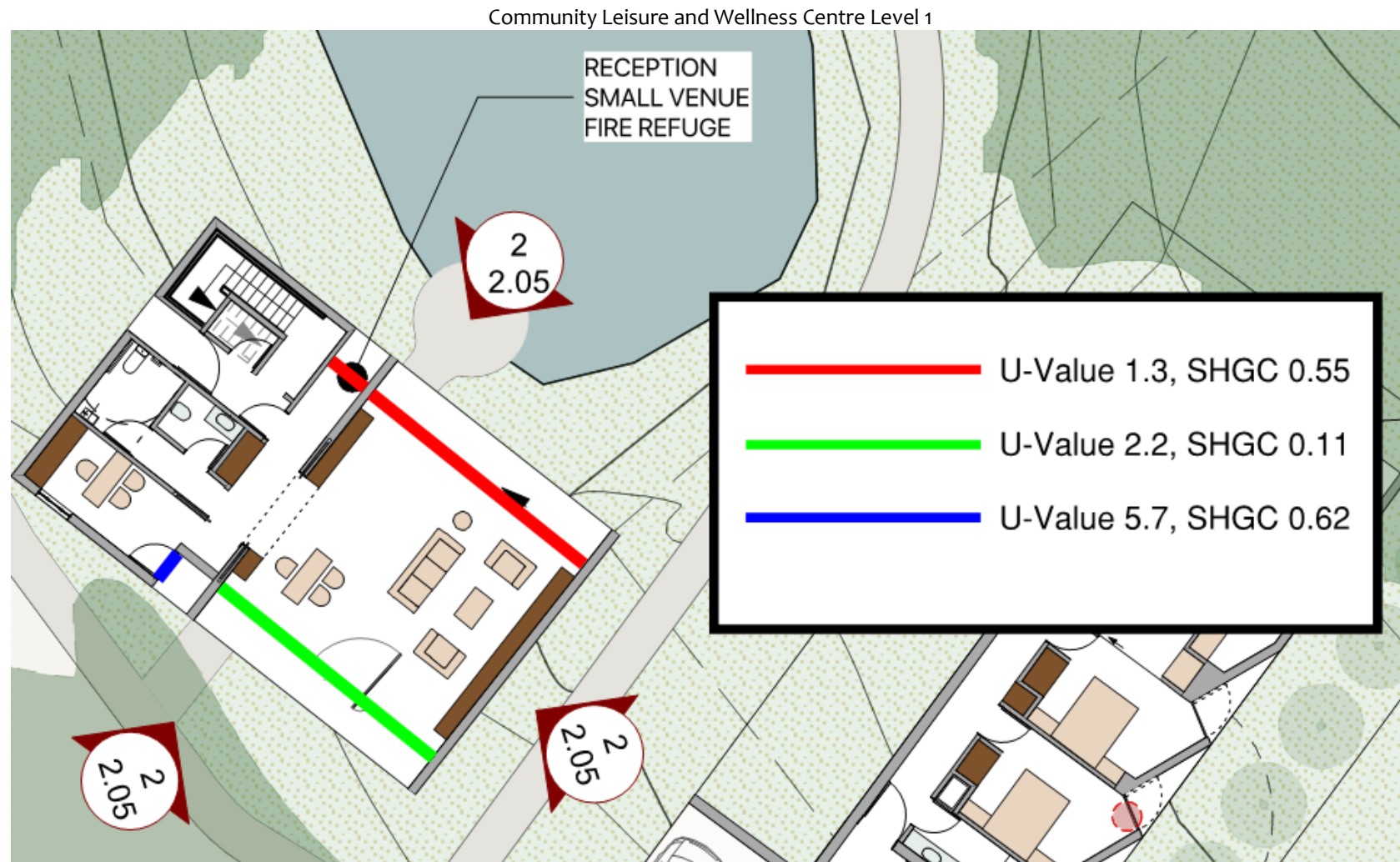


Level 6 and 7 Modern Wing

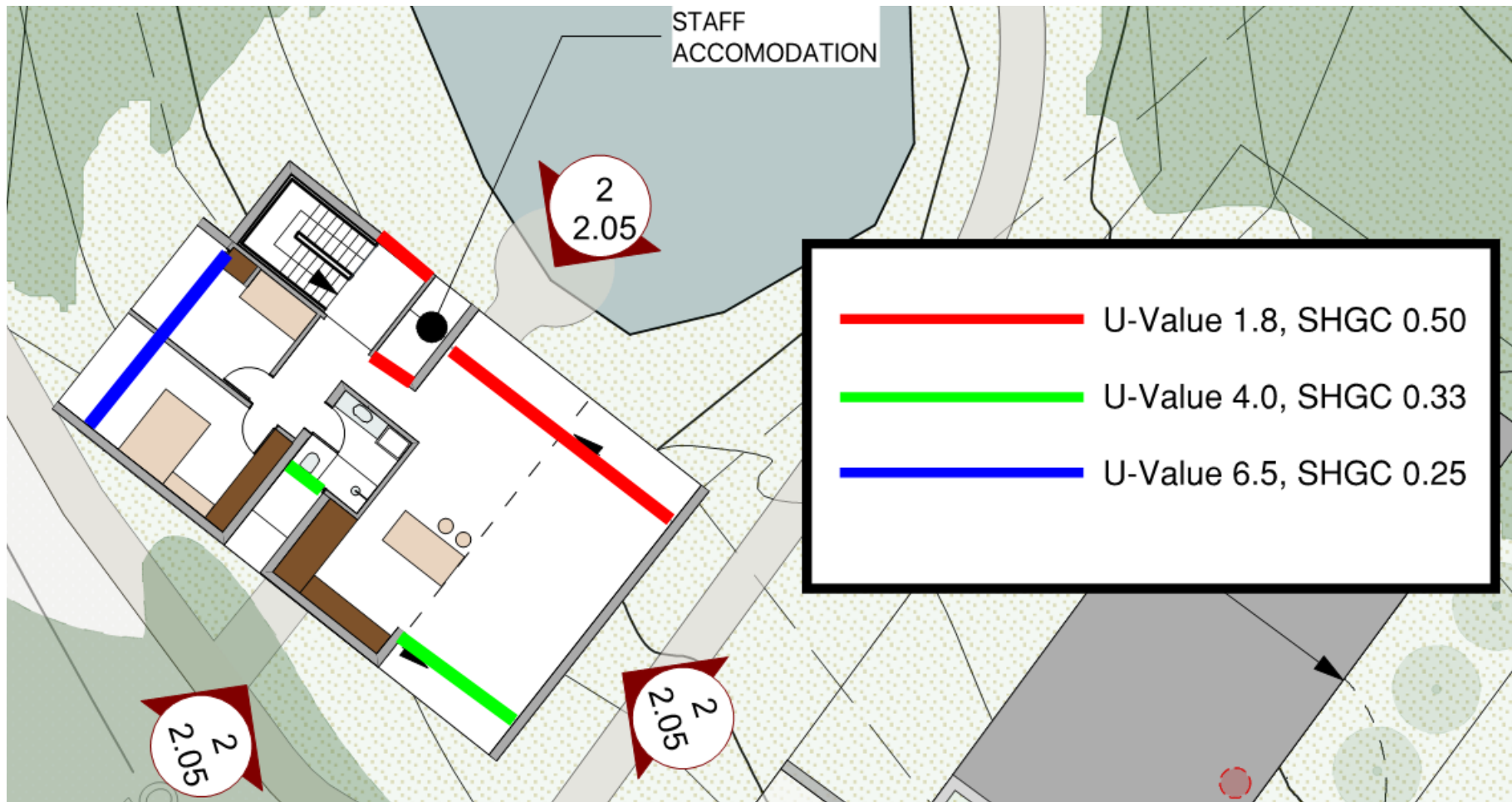


Community Leisure and Wellness Centre Ground Floor





Ecovillas Reception Ground Floor



Ecovillas Reception Level 1