

ERIKSSON ENGINEERING SOLUTIONS

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Byron Community Hub

NCC 2019

SECTION J

Deemed to Satisfy (DTS)

Report

Eriksson Engineering Solutions (EES)

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1 EXECUTIVE SUMMARY

This report undertakes a Section J Deemed to Satisfy (DTS) thermal performance assessment as per the National Construction Code (NCC) 2019 Amendment 1 for the Old Byron Hospital conversion to the proposed Byron Community Hub. The proposed community hub is consisting with class 9b & class 5 spaces, and located at 10- 12 Shirley Street, Byron Bay 2481.

A summary of Section J key findings:

Element	Description	Requirement
Roof system	All new metal clad roof over the thermal envelope	Minimum R3.15 insulation.
External Walls	All new light-weight walls that form part of the thermal envelope	Minimum R2.5 insulation.
	All new metal clad walls that form part of the thermal envelope	Minimum R2.5 insulation.
	All new brick veneer walls that form part of the thermal envelope	Minimum R2.5 insulation.
Internal Walls	All new plasterboard walls that form part of the thermal envelope	Minimum R2.5 insulation.
Glazing	All new external fixed windows that forms the thermal envelope	U-value – 4.7 & SHGC - 0.59
	All new external sliding windows that forms the thermal envelope	U-value – 5.44 & SHGC - 0.53
	All new external hinged doors that forms the thermal envelope	U-value – 4.82 & SHGC - 0.47
	All new external sliding doors that forms the thermal envelope	U-value – 4.62 & SHGC - 0.50
Floor system	Concrete slab on grade under the thermal envelope	No insulation required.

Detailed calculations and certificates are provided in the relevant sections and Appendices.

2 INTRODUCTION

This report provides an assessment of the design plans and documentation for the Old Byron Hospital conversion to the proposed Byron Community Hub and to satisfy the requirements of Local Government Area of the development for issuance of Construction Certificate for construction operations in the development site.



The scope of this report is limited to the design documentation referenced in Section 3 - Assessment of this report and only covers the Deemed-to-Satisfy (DTS) provisions of Section J - Energy Efficiency, Part J1 Building fabric, Part J3 Building sealing, Part J6 Artificial lighting and Part J8 Facilities for energy monitoring of the Building Code of Australia (BCA) 2019, Amendment 1.

This Section J report has been undertaken as per architectural documentation provided by BKA Architecture.

3 ASSESSMENT

The Deemed to Satisfy thermal performance assessment as per the National Construction Code (NCC) 2019 Amendment 1 provided in this report are based on provided architectural documents listed in the section below. Any changes to documentation may require a reassessment of the thermal performance of the building.

Architectural Documentation			
Sheet No.	Revision	Date	Description
000	B	01.06.2021	Cover Page
001	B	01.06.2021	Site Analysis
002	B	01.06.2021	Demolition Plan
100	B	01.06.2021	Proposed DA
101	B	01.06.2021	Proposed Roof Plan
200	B	01.06.2021	Elevations
201	B	01.06.2021	Elevations
202	B	01.06.2021	Elevations
300	B	01.06.2021	Section
500	B	01.06.2021	Site Management Plan
510	B	01.06.2021	Waste Management Plan
510	B	01.06.2021	Finishes Schedule

The results provided in this report are based on minimum insulation values as required to meet the DTS provisions of NCC and are provided as a guide to be used in the selection of products or materials. Alternative products or materials may be proposed by the installer, provided that the R values are complied with as stated in this report.

Further, this section J report shall be read in conjunction with the following Australian Standards and guidelines.

Australian Standard	Description
AS/NZS 3000	Australian and New Zealand Wiring Rules
AS 3999	Thermal insulation of buildings -Bulk insulation - Installation requirements
AS/NZS 4200.2	Pliable building membranes and underlays - Installation requirements
AS/NZS 4389	Safety mesh
AS/NZS 4859.1	Materials for the thermal insulation of buildings - General criteria and technical provisions
AS 4773	Masonry in small buildings
ASTM E408	Standard Test Methods for Total Normal Emittance of Surfaces Using Inspection-Meter Techniques

4 PROPOSED DEVELOPMENT

The subject property is identified as Byron Community Hub which is previously known as Byron District Hospital, at 10- 12 Shirley Street, Byron Bay 2481.

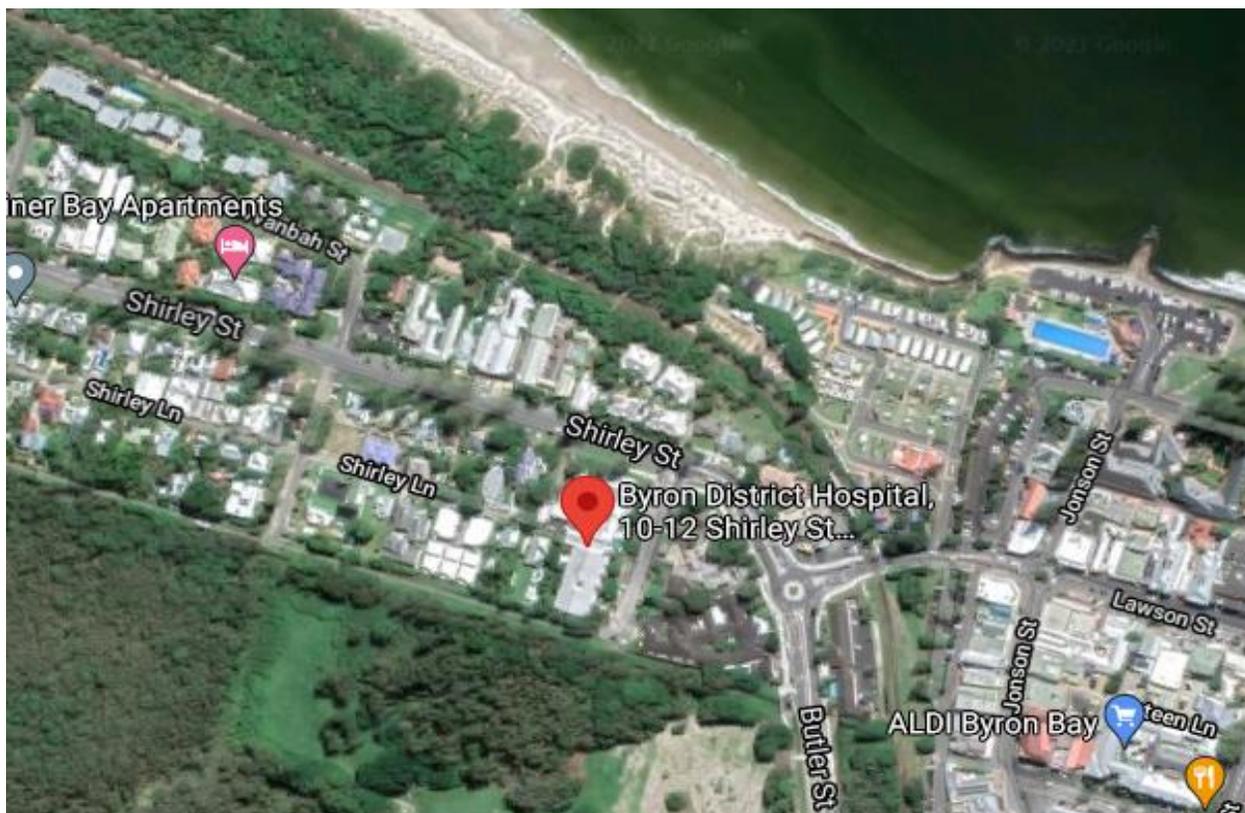


Figure 1 – Development Location

Project Details

Climate Zone: Climate zone 2
High humidity summer, mild winter.

Council: Byron Shire Council

NCC Classification: Class 9b & Class 5
Collage/study & Offices

5 SCOPE (BUILDING ENVELOPE)

“Envelope”, for Section J, define as the parts of the building fabric that separate a conditioned space or habitable room from-

- d) the exterior of the building; or
- e) 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.

Legend:

Building Envelope and scope of this report

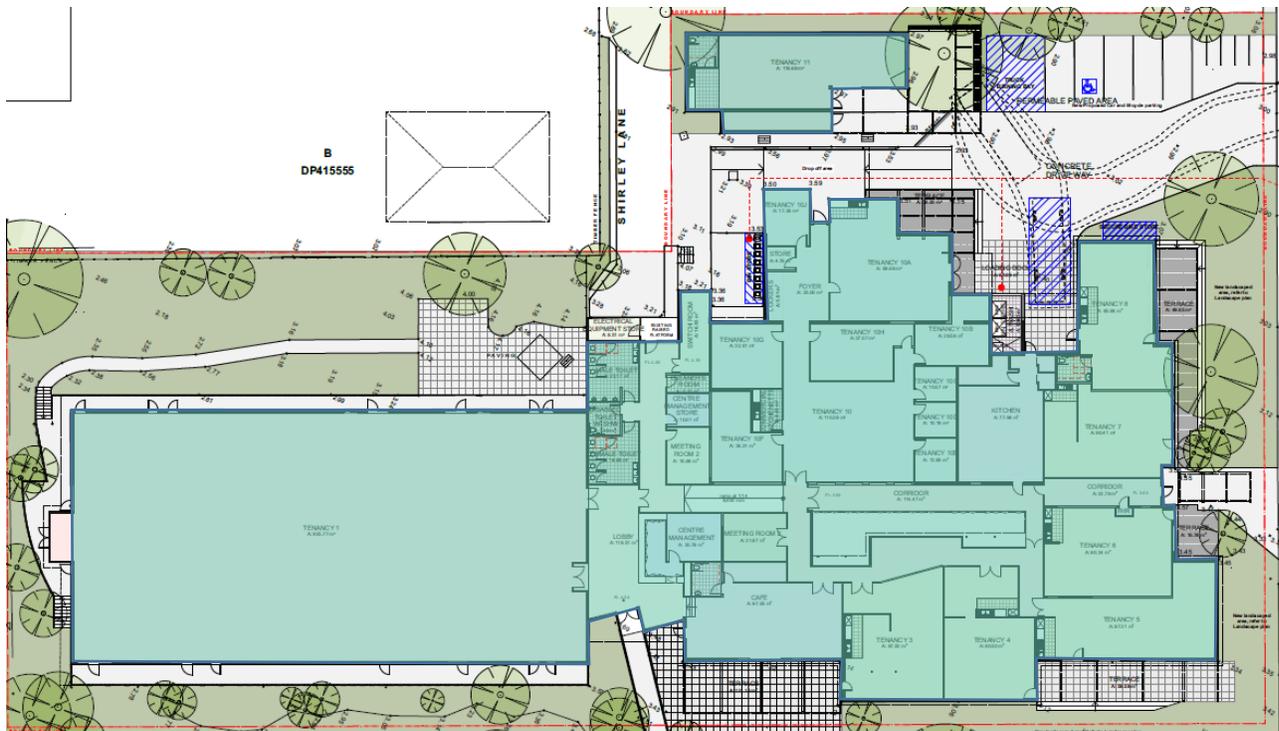


Figure 2 – Building Envelope - Ground Floor



6 NCC SECTION J – PART 1

6.1 J1 Building Fabric

Building elements that are part of the envelope, other than of a sole-occupancy unit of a Class 2 building or a Class 4 part of a building, must achieve the Deemed-to-Satisfy provisions specified in NCC Section J.

6.1.1 J1.3 Roof and Ceiling Construction

As per the National Construction Code (NCC) 2019, all new roof and ceiling construction that form the part of thermal envelope must comply with total R values (total thermal resistance) for the direction of heat flow & solar absorptance stipulated in Section J1.3.

Refer roof details below:

Roof Characteristics	
Type:	Metal Roof Sheeting with + 13mm Plasterboard ceiling, horizontal
Default R-value of the system:	R 0.55

Project Summary Compliance Assessment		
Minimum R-Value as per NCC Section J1.3	Additional insulation requirement	Compliance as per NCC Section J1.3
R 3.7	R 3.15	PENDING
Comments:	The solar absorptance value of the roofing sheets to be 0.45 or less. Refer appendix for detailed calculations.	

6.1.2 J1.4 Roof Lights

As per the National Construction Code (NCC) 2019, roof lights must comply with total roof light area, SHGC & U-value stipulated in Section J1.4.

Refer roof light details below:

Roof lights Characteristics	
Roof lights:	Translucent roof sheets



Project Summary Compliance Assessment		
Percentage of roof lights servicing the space (m2)	Range %	Compliance as per NCC Section J1.4
41.4%	>5%	Pending
Comments:	Total roof light area should not be more than 5% of the floor area of the room or space served. Total system SHGC: TBC. Total system U-value: TBC.	

6.1.3 J1.5 Walls and glazing

As per the National Construction Code (NCC) 2019, all new wall-glazing constructions that form parts of the thermal envelope must comply with SHGC & U-value stipulated in Section J1.5.

Refer wall-glazing construction details below:

6.1.3.1 External Walls

External Wall Characteristics	
External wall:	Metal clad wall - with timber stud + 13mm plasterboard lining Lightweight wall - with timber stud + 13mm plasterboard lining Brick veneer wall - with timber stud + 13mm plasterboard lining
Default R-value of the system:	Metal clad wall – R 0.40 Lightweight wall – R 0.43 Brick veneer wall – R 0.57

Project Summary Compliance Assessment		
Minimum R-Value required as per NCC Section J1.5 (Façade calculator – Method 2)	Additional insulation requirement	Compliance as per NCC Section J1.5
Metal clad wall – R 2.20 Lightweight wall – R 2.25 Brick veneer wall – R 2.58	R 2.5	PENDING
Comments:	The solar absorptance value of the exterior wall to be 0.60 or less. Refer appendix for detailed calculations.	



6.1.3.2 Glazing

Project Summary Compliance Assessment			
Glazing Orientation	Total System U-Value (AFRC)e	Total System SHGC (AFRC)	Compliance as per NCC Section J1.5
Fixed windows	4.7	0.59	Pending
Sliding windows	5.44	0.53	Pending
Hinged doors	4.82	0.47	Pending
Sliding doors	4.62	0.50	Pending
Comments:	These glazing system values are based on Evantage Clear glazing on general alluminium frames. However, alternative glazing systems with better total system thermal performances may provide. Refer appendix for detailed calculations.		

6.1.3.3 Internal Walls

Internal Wall Characteristics	
Internal wall:	Plasterboards with timber studs
Default R value of the system:	R 0.58

Project Summary Compliance Assessment		
Minimum R-Value as per NCC Section J1.5 (Façade calculator – Method 2)	Additional insulation requirement	Compliance as per NCC Section J1.5
R 2.39	R2.5	Pending
Comments:	Refer appendix for detailed calculations.	



6.1.4 J1.6 Floors

As per the National Construction Code (NCC) 2019, new floor constructions that form the parts of thermal envelope must comply with total R values (total thermal resistance) for the direction of heat flow stipulated in Section J1.6.

Refer to floor construction details below:

Floor Characteristics	
Floor:	Concrete slab on ground, 150 mm
Default R-value of the system:	R 3.46

Project Summary Compliance Assessment		
Minimum R-Value as per NCC Section J1.6	Additional insulation requirement	Compliance as per NCC Section J1.6
R 2.0	Not required.	Yes
Comments:	Refer appendix for detailed calculations. A floor without an in-slab heating or cooling system considered.	

7 NCC SECTION J – PART 2

7.1 J2 Glazing

This section has been included in above Part J1.

8 NCC SECTION J – PART 3

8.1 J3 Building Sealing

Building elements that are part of the envelope, must achieve the Deemed-to-Satisfy provisions specified in this part of NCC Section J, other than –

- A building in climate zone 1, 2, 3 and 5 where the only means of air-conditioning is by using an evaporative cooler; or
- A permanent building opening, in a space where a gas appliance is located, that is necessary for the safe operation of a gas appliance; or
- A building or space where the mechanical ventilation required by NCC Part F4 provides sufficient pressurization to prevent infiltration.



8.1.1 J3.2 Chimneys and flues

Not Available.

8.1.2 J3.3 Roof lights

- a) A roof light but be sealed or capable of being sealed when serving -
 - (i) a conditioned space; or
 - (ii) a habitable room in climate zones 4, 5, 6, 7 or 8.
- b) A roof light required by (a) to be sealed or capable of being sealed, must be constructed with –
 - (i) An imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or
 - (ii) A weatherproof seal; or
 - (iii) A shutter system readily operated either manually, mechanically or electronically by the occupant.

8.1.3 J3.4 Windows and doors

- d) A seal to restrict air infiltration must be fitted to each edge of a door, openable window or the like when forming part of —
 - (i) the thermal envelope; or
 - (ii) the fabric of a habitable room in climate zones 4, 5, 6, 7 or 8.
- e) The requirements of (a) do not apply to —
 - (iii) a window complying with AS 2047; or
 - (iv) a fire door or smoke door; or
 - (v) a roller shutter door, roller shutter grille or other security door or device installed only for out-of-hours security.
- f) A seal to restrict air infiltration —
 - (i) for the bottom edge of an external swing door, must be a draft protection device; and
 - (ii) 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.
- g) An entrance to a building, leading to a conditioned space with over 50 m² must have an airlock, self-closing door, revolving door or the like.

8.2 J3.5 Exhaust fans

An exhaust fan, must be fitted with a sealing device such as a self-closing damper or the like when serving —

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

8.2.1 J3.6 Construction of roofs, walls and floors

- 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) when forming part of —
 - (i) 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.

8.2.2 J3.7 Evaporative coolers

Not Available.

9 NCC SECTION J – PART 4

9.1 J4 Not in Use

Not used.

10 NCC SECTION J – PART 5

10.1 J5 Air-conditioning and Ventilation Systems

10.1.1 J5.2 Air-conditioning systems

Not a part of this scope of works.

10.1.2 J5.3 Mechanical ventilation systems

Not a part of this scope of works.

10.1.3 J5.4 Fan systems

Not a part of this scope of works.



11 NCC SECTION J – PART 6

11.1 J6 Artificial Lighting and Power

11.1.1 J6.2 Artificial lighting

- b) In a building other than a sole occupancy unit of a Class 2 building or a Class 4 part of a building:
 - (i) For artificial lighting, the aggregate design illumination power load must not exceed the sum of the allowances obtained by multiplying the area of each space by the maximum illumination power density in NCC 2019 Table J6.2a; and
 - (ii) The aggregated design illumination power density load in (i) is the sum of the design illumination power loads in each of the space served; and
 - (iii) Where there are multiple lighting systems serving the same space, the design illumination power load to be determined as per the NCC 2019 J6.2 (b)(iii).
- c) The above requirements do not apply to the followings:
 - (iv) Emergency lighting provided in accordance with NCC part E4.
 - (v) Signage, display lighting with cabinet and display cases that are fixed in place.
 - (iv) A heater where the heater also emits light, such as in bathroom.
 - (v) Lighting of a specialist process nature such as in a surgical operating theater, fume cupboard or clean workstation.
 - (viii) Lighting installed solely to provide photosynthetically active radiation for indoor plant growth on green walls and the like.
- d) Following control devices must comply with NCC Specification J6:
 - (i) Lighting timers.
 - (ii) Motion detectors.
 - (iii) Daylight sensors and dynamic lighting control devices.

11.1.2 J6.3 Interior artificial lighting and power control

- a) All artificial lighting of a room or space must be controlled individually operated by –
 - (i) A switch; or
 - (ii) Other control device; or
 - (iii) A combination of above (i) and (ii)
- c) An artificial lighting switch or other control device in above (a) must –
 - (i) If an artificial lighting switch, be located in a visible and easily accessed position –
 - (A) In the room or space being switched; or
 - (B) In an adjacent room or space from where 90% of the lighting being switched is visible; and
- d) 95% of the light fittings in a building or storey of a building of more than 250 m² must be controlled by –
 - (ii) A time switch in accordance with NCC Specification J6; or
 - (iii) An occupant sensing device such as –
 - (A) A security key card reader that registers a person entering and leaving the building; or
 - (B) A motion detector in accordance with NCC Specification J6.
- f) Artificial lighting in a fire-isolated stairway, fire-isolated pathway or fire-isolated ramp, must be controlled by a motion detector in accordance with NCC Specification J6.



- g) Artificial lighting in a foyer, corridor and other circulation spaces –
 - (i) Of more than 250 W within a single zone; and
 - (ii) Adjacent to windows,

Must be controlled by a daylight sensor and dynamic control device in accordance with NCC Specification J6.

- i) The requirements of above a), c), d), f) and g) do not apply to the following:
 - (i) Emergency lighting in accordance with NCC part E4.
- j) The requirements of above d) do not apply to the following:
 - (ii) A heater where the heater also emits light, such as in bathrooms.

11.1.3 J6.4 Interior decorative and display lighting

- a) 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 area 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 NCC Specification J6 where the display lighting exceeds 1 kW.
- b) Window display lighting must be controlled separately from other display lighting.

11.1.4 J6.5 Exterior artificial lighting

- a) Exterior artificial lighting attached to or directed at the façade of a building, must -
 - (i) Be controlled by –
 - (C) a daylight sensor; or
 - (D) 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 lighting load exceeds 100 W –
 - (A) Use LED luminaires for 90% of the total lighting load; or
 - (B) Be controlled by a motion detector in accordance with NCC Specification J6; or
 - (C) When used for decorative purposes, such as façade lighting or signage lighting, have a separate time switch in accordance with NCC Specification J6.
- b) The requirements of above a)(ii) do not apply to the followings:
 - (iii) Emergency lighting in accordance with NCC Part E4.
 - (iv) Lighting around a detention center.

11.1.5 J6.6 Boiling water and chilled water storage units

Not available.

11.1.6 J6.7 Lifts

Not available.

11.1.7 J6.8 Escalators and moving walkways

Not available.



12 NCC SECTION J – PART 7

12.1 J7 Heating Water Supply and Swimming Pool and Spa Pool Plant

12.1.1 J7.2 Heater water supply

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

12.1.2 J7.3 Swimming pool heating and pumping

Not available.

12.1.3 J7.4 Spa pool heating and pumping

Not available.

13 NCC SECTION J – PART 8

13.1 J8 Facilities for Energy Monitoring

13.1.1 J8.3 Facilities for energy monitoring

- 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 consumption data recording, in accordance with (c), of their energy consumption of -
- (i) Air conditioning system;
 - (ii) Artificial lighting system;
 - (iii) Appliance power;
 - (iv) Central hot water supply;
 - (v) Internal transport devices; and
 - (vi) Other ancillary plant.
- c) 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 review.

APPENDIX J1.3 ROOF & CEILING CALCULATIONS

Roofing System - Metal Clad Roof

Layer	Roof & Ceiling system – Metal roof	R value [m ² K/W]
1	Outdoor air film (> 3 m/s)	0.03
2	Colorbond Metal Roof Sheeting	0.00
3	Roof airspace - horizontal	0.28
4	-	-
5	Plasterboard ceiling 13 mm	0.08
6	Indoor still air film - horizontal	0.16
	Default R value of the system:	R 0.55
	Required Total NCC R value:	R 3.7 Downward heat flow
	Additional insulation requirement:	R 3.15



APPENDIX J1.5 WALL & GLAZING CALCULATIONS

External Wall System – Light-weight Walls

Wall Systems							
	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation	Unventilated						
Material	Fibre-cement	Insulation 90mm R2.5	Gypsum plasterboard				
Thickness (mm)	9	90	13				
Conductivity (W/mK)	0.250	0.036	0.170				
Framing Material		Timber					
Metal Frame, Web Thickness (mm)							
Metal Frame, Flange Width (mm)							
Framing Area %		15.0%					
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m².K/W)	0.04	1.97	0.08	0	0	0	0
Wall Construction	FC 9mm		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)				0.03
			Internal Surface Resistance (still air, on a wall)				0.12
			System R-Value (m².K/W)				2.24
			System U-Value (W/m².K)				0.45

Figure 4 – R-value Calculation of light-weight walls



External Wall System – Metal Clad Walls

Wall Systems								
	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7	
Ventilation	Unventilated							
Material	Steel	Insulation 90mm R2.5	Gypsum plasterboard					
Thickness (mm)	1	90	13					
Conductivity (W/mK)	47.500	0.036	0.170					
Framing Material	Timber							
Metal Frame, Web Thickness (mm)								
Metal Frame, Flange Width (mm)								
Framing Area %	15.0%							
Thermal Break Material								
Thermal Break Thickness (mm)								
Thermal Break Overlap Area %								
Resistance (m ² .K/W)	0.00	1.97	0.08	0	0	0	0	
Wall Construction	Metal Sheet Cladding		External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)				0.03	
	Internal Surface Resistance (still air, on a wall)						0.12	
	System R-Value (m ² .K/W)						2.20	
	System U-Value (W/m ² .K)						0.45	

Figure 5 – R-value Calculation of metal clad walls



External Wall System – Brick Veneer Walls

Wall Systems						
Ventilation	Unventilated					
Material	Clay brick - 3.25kg	Airspace - non-reflective unventilated	Insulation 90mm R2.5	Gypsum plasterboard		
Thickness (mm)	110	30	90	13		
Conductivity (W/mK)	0.650		0.036	0.170		
Framing Material			Timber			
Metal Frame, Web Thickness (mm)						
Metal Frame, Flange Width (mm)						
Framing Area %			15.0%			
Thermal Break Material						
Thermal Break Thickness (mm)						
Thermal Break Overlap Area %						
Resistance (m ² .K/W)	0.17	0.00	2.18	0.08	0	0
Wall Construction	Brick Veneer 3.25kg	External Surface Resistance (moving air, more than 3m/s and not more than 7/ms wind speed)				0.03
		Internal Surface Resistance (still air, on a wall)				0.12
		System R-Value (m ² .K/W)				2.58
		System U-Value (W/m ² .K)				0.39

Figure 6 – R-value Calculation of brick veneer walls



Internal Wall System – Plasterboard Stud Walls

Wall Systems							
	Layer 1	Layer 2 (Air space)	Layer 3	Layer 4	Layer 5	Layer 6	Layer 7
Ventilation	Unventilated						
Material	Gypsum plasterboard	Insulation 90mm R2.5	Gypsum plasterboard				
Thickness (mm)	13	90	13				
Conductivity (W/mK)	0.170	0.036	0.170				
Framing Material	Timber						
Metal Frame, Web Thickness (mm)							
Metal Frame, Flange Width (mm)							
Framing Area %	15.0%						
Thermal Break Material							
Thermal Break Thickness (mm)							
Thermal Break Overlap Area %							
Resistance (m ² .K/W)	0.08	1.97	0.08	0	0	0	0
Wall Construction	Plasterboard Internal Wall		Internal Surface Resistance (Still air)				0.14
	Internal Surface Resistance (still air, on a wall)						0.12
	System R-Value (m ² .K/W)						2.39
	System U-Value (W/m ² .K)						0.42

Figure 7 – R-value Calculation of plasterboard stud walls

APPENDIX WALL INSULATION MARKUP

- R2.5 Exterior wall Insulation
 -
 R2.5 Interior Wall Insulation
- (only required for new wall areas)

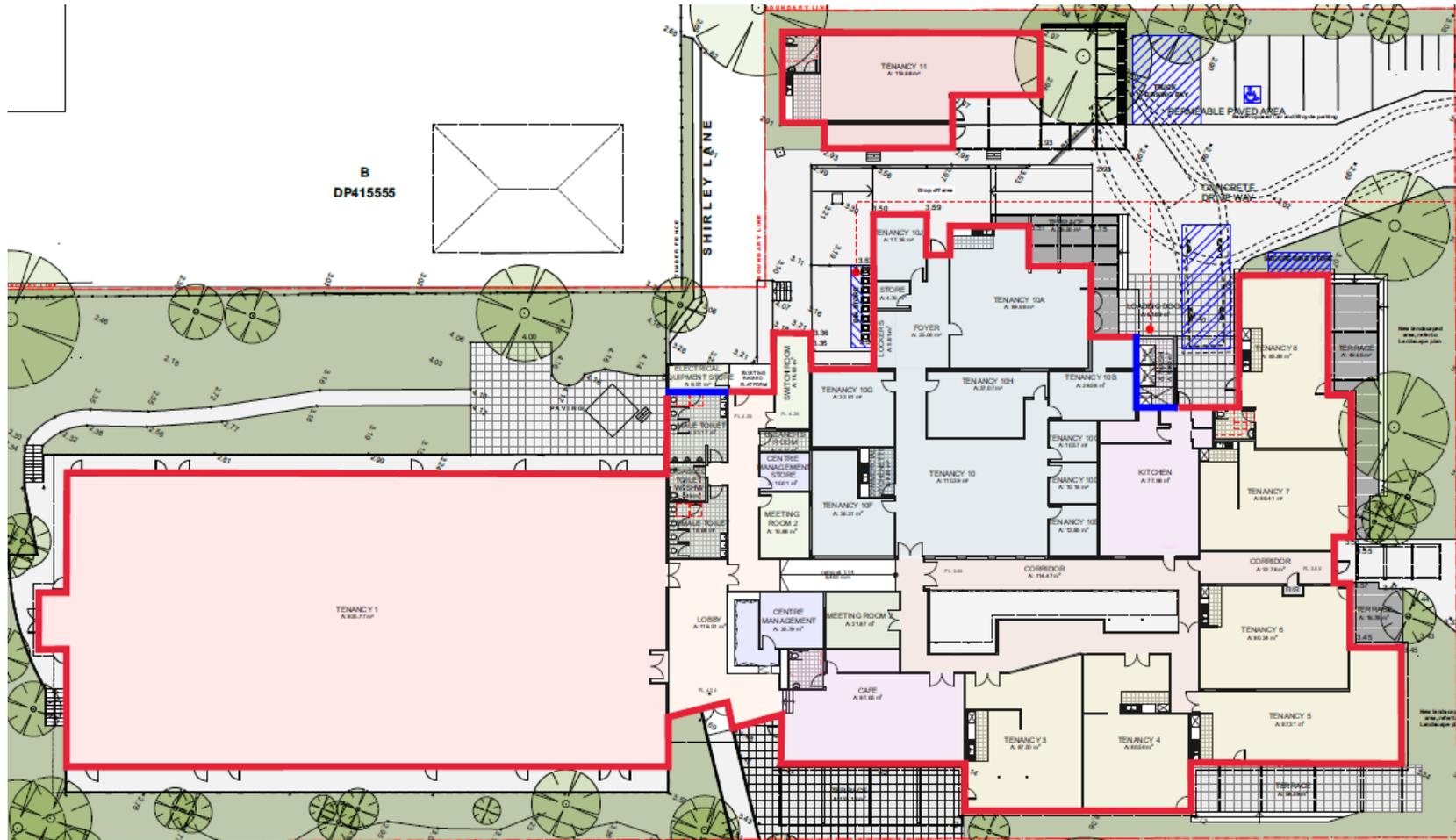


Figure 8 – Wall insulation mark-up



APPENDIX J1.6 FLOOR CALCULATIONS

Flooring System – Concrete Slab on Grade

Layer	Flooring system – Concrete slab on grade	R value [m ² K/W]
1	Indoor still air film (upward)	0.11
2	Solid concrete (150 mm)	0.10
3	-	-
4	Ground thermal resistance (as per Section 3.5 of CIBSE Guide A)	3.25
	Default R value of the system:	R 3.46
	Required Total NCC R value:	R 2.0
	Additional insulation requirement:	Not required.



APPENDIX FACADE CALCULATOR



Façade

Report



Calculator

Project Summary

Date
22/06/2021

Name
0

Company
Eriksson Engineering Solutions (EES)

Position
ESD Consultant

Building Name / Address
Byron Community Hub
10- 12 Shirley Street, Byron Bay 2481

Building State
NSW

Climate Zone
Climate Zone 2 - Warm humid
summer, mild winter

Building Classification
Mixed 2 - 2 common, 5, 6, 7, 8,
9b, 9a non-ward

Stores Above Ground
1

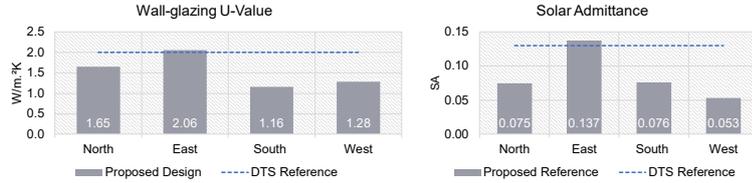
Tool Version
1.2 (June 2020)

The summary below provides an overview of where compliance has been achieved for Specification J1.5a - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Aspects).

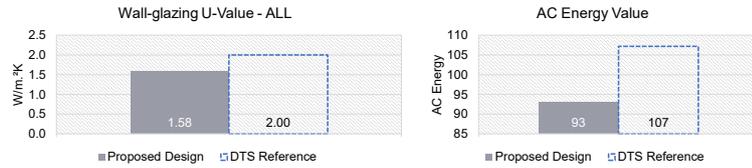
Compliant Solution =
Non-Compliant Solution =

	Method 1				Method 2 All
	North	East	South	West	
Wall-glazing U-Value (W/m ² .K)	1.65	2.06	1.16	1.28	1.58
Solar Admittance	0.07	0.14	0.08	0.05	
AC Energy Value					93

Method 1



Method 2



Project Details

	North	East	South	West
Glazing Area (m ²)	46	120.75	31.65	56.27
Glazing to Façade Ratio	28%	38%	17%	20%
Glazing References	Fixed W/S3 Hinged D/S3 Fixed W/S1 Hinged D/S2 Sliding W/S1 Sliding W/S4 Hinged D/S5 Fixed W/S5 Fixed W MC/S5 Hinged D/S7 Hinged D/S8	Fixed W/S1 Fixed W/S6 Hinged D/S3 Fixed W/S3 Sliding D/S3 Hinged D/S5 Fixed W/S5 Hinged D/S7 Fixed W/S7	Hinged D/S3 Fixed W/S1 Hinged D/S5 Fixed W/S5 Fixed W/S8 Hinged D/S8 Fixed W MC	Hinged D/S5 Fixed W/S5 Fixed W MC/S5 Hinged D/S3 Fixed W/S1 Hinged D/S2 Fixed W/S3
Glazing System Types	0	0	0	0
Glass Types	0	0	0	0
Frame Types	0	0	0	0
Average Glazing U-Value (W/m ² .K)	4.83	4.71	4.75	4.74
Average Glazing SHGC	0.35	0.56	0.54	0.46
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal
Wall Area (m ²)	119.753	196.5	157.89	228.013
Wall Types	Wall	Wall	Wall	Wall
Methodology	Wall			
Wall Construction	Fiber-cement+Timber Stud+R2.5 Metal Clad+Timber Stud+R2.5 Plaster B+Timber Stud+R2.5 Brickwork+Timber Stud+R2.5	Fiber-cement+Timber Stud+R2.5 Brickwork+Timber Stud+R2.5	Fiber-cement+Timber Stud+R2.5 Metal Clad+Timber Stud+R2.5 Brickwork+Timber Stud+R2.5	Fiber-cement+Timber Stud+R2.5 Metal Clad+Timber Stud+R2.5 Brickwork+Timber Stud+R2.5
Wall Thickness	0	0	0	0
Average Wall R-value (m ² .K/W)	2.30	2.31	2.29	2.32
Solar Absorptance	0.6	0.6	0.6	0.6