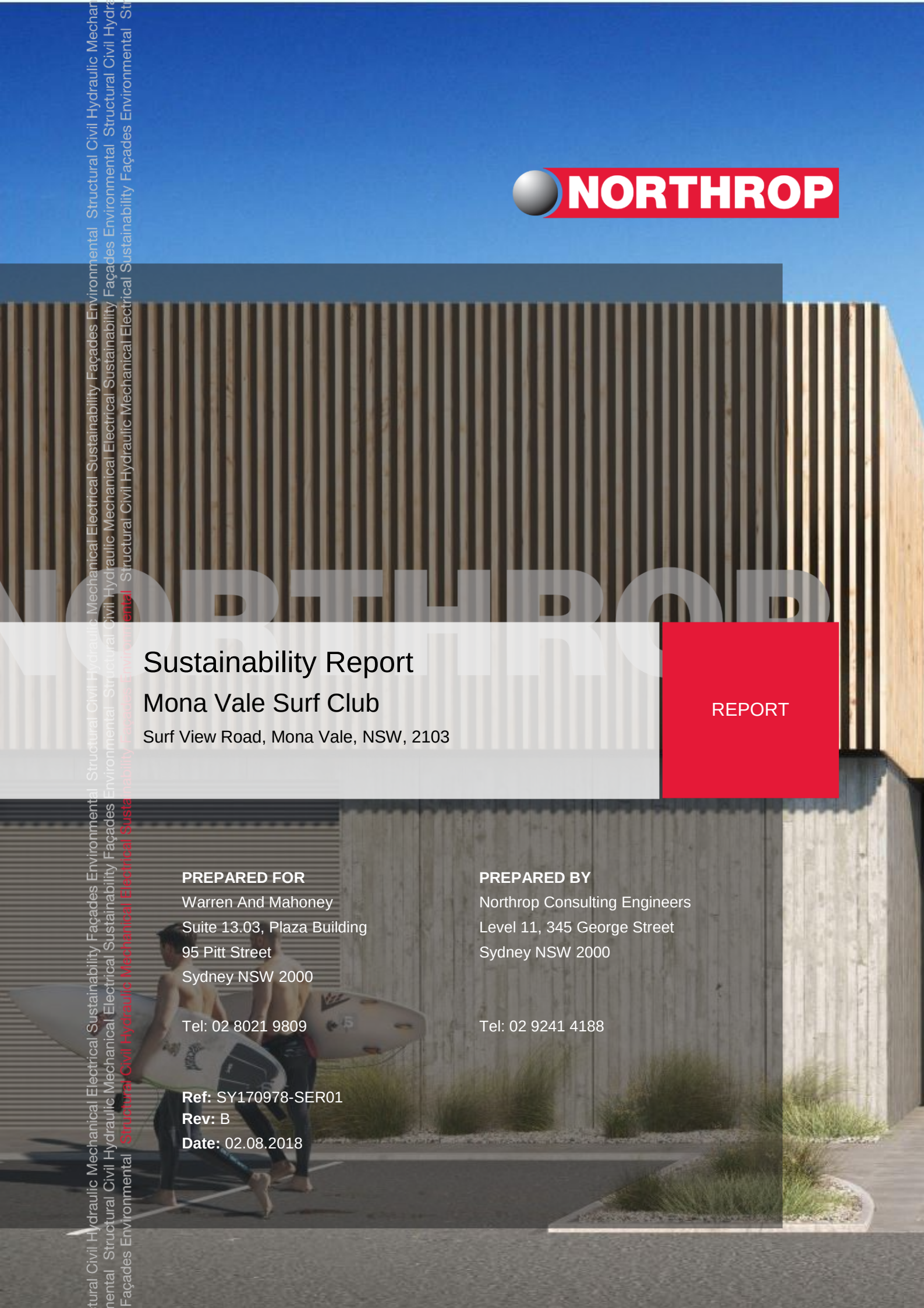

Sustainability Report

Mona Vale Surf Club

Surf View Road, Mona Vale, NSW, 2103

REPORT

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SUSTAINABILITY REPORT

Activity Schedule

Date	Revision	Issue	Prepared By	Approved By
03.08.2018	A	Preliminary Issue	M.Dempsey	A.Girgis
08.10.2018	B	Development Application Issue	M.Dempsey	M.Dempsey

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1. INTRODUCTION

1.1 Scope

Northrop consulting engineers have been engaged by Warren & Mahoney to provide a Sustainability Report to accompany the development application for the new Mona Vale Surf Club.

The new Mona Vale Surf Club development will incorporate a number of key initiatives to reduce the impact on the environment, and enhance the quality of amenities and reduce operational expenditure.

This report focuses on the following key areas to be investigated during future design development stages:

- Energy Efficiency
- Indoor Environment Quality
- Water management
- Waste minimisation
- Materials selection
- Ecology

As well as identifying Sustainability opportunities, this report also includes an NCC Section J Deemed-to-Satisfy (DTS) assessment. The DTS assessment identifies the building fabrics and glazing required for a mandatory level of energy efficiency.

1.2 Limitations

Due care and skill has been exercised in the preparation of this report.

This report is intended as a guide to illustrate the potential BCA section J compliance methods to be considered in the development. It should be read in conjunction with the other design documentation and specific applications may vary during the development of the project. Any products specified or used for the project are to be verified by the contractor as being safe and appropriate for use. Northrop do not take any responsibility for the use of unsafe products.

No responsibility or liability to any third party is accepted for any loss or damage arising out of the use of this report by any third party. Any third party wishing to act upon any material contained in this report should first contact Northrop for detailed advice, which will take into account that party's particular requirements.

2. ENERGY EFFICIENCY

2.1 Passive Design

The site characteristics and orientations can have a large effect on the amount of energy that is required to heat, cool and ventilate a building.

Key considerations will include designing high performance faced including glazing selection and extent, external shading, daylight direction devices, insulation levels, surface properties and possible natural ventilation openings.

Natural ventilation, unlike fan-forced ventilation, uses the natural forces of wind and buoyancy to deliver fresh air into buildings. Ventilating a building naturally can significantly reduce energy consumption of HVAC systems, whilst providing 100% outdoor air into the spaces it serves, creates a very clean environment for occupants.

Figure 1 shown below demonstrates some key consideration that have formed part of the current design.

Figure 1: Prevailing Winds - Mona Vale Beach

2.2 Active Design

2.2.1 HVAC Systems

Various options will be investigated to provide an improved energy efficient outcome system that provides a better level of control. This will include equipment selection, control strategies and zoning.

2.2.2 Energy Efficient Appliances

Minimum Energy Performance Standards (MEPS) specify the minimum level of energy performance that appliances, lighting and electrical equipment must meet or exceed before they can be offered for sale or used for commercial purposes.

High MEPS rated appliances will be considered beyond mandatory product ranges in Australia and New Zealand. These products must be registered through an online database and meet a number of legal requirements before they can be sold in either of these countries.

Figure 2: Typical Energy Rating Labels

2.2.3 Renewable Energy

Solar panels are an effective way of illustrating that a building has renewable energy features, and are often installed to improve the green image of a development. The installation of solar PV on this site will be considered to form an important component in demonstrating leadership and in educating the local community about renewable energy opportunities.

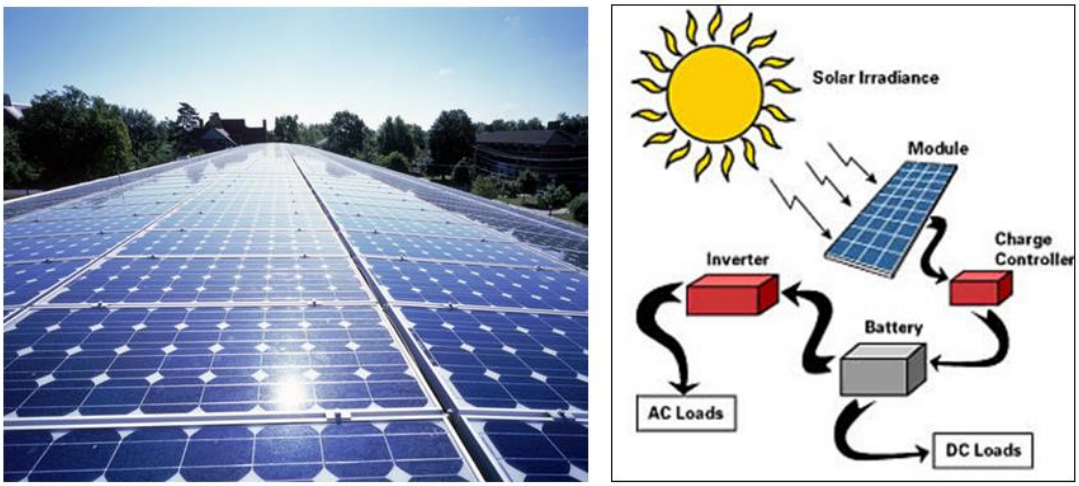

Figure 3: Solar PV System Components

2.2.4 Solar Domestic Hot Water

Solar with natural gas booster hot water heating is one of the most energy efficient ways of heating water for domestic use, which minimise greenhouse gas emissions.

A solar domestic hot water system will be considered comprising:

- Solar panels;
- Solar storage tanks;
- Instantaneous gas fired booster units;
- Flow and return reticulation with Authority read hot water meters for billing purposes for common area amenities toilets.

3. INDOOR ENVIRONMENT QUALITY

The importance of providing spaces that are comfortable and inspiring cannot be over emphasised. A project that prioritises occupants comfort and well-being is likely to be well subscribed to.

3.1 Thermal Comfort

Thermal comfort is typically dictated by the building fabric selections, façade performance, air-conditioning system design & selection and individual controls.

This will also extend to building sealing or enclosed areas, to minimise building air leakage.

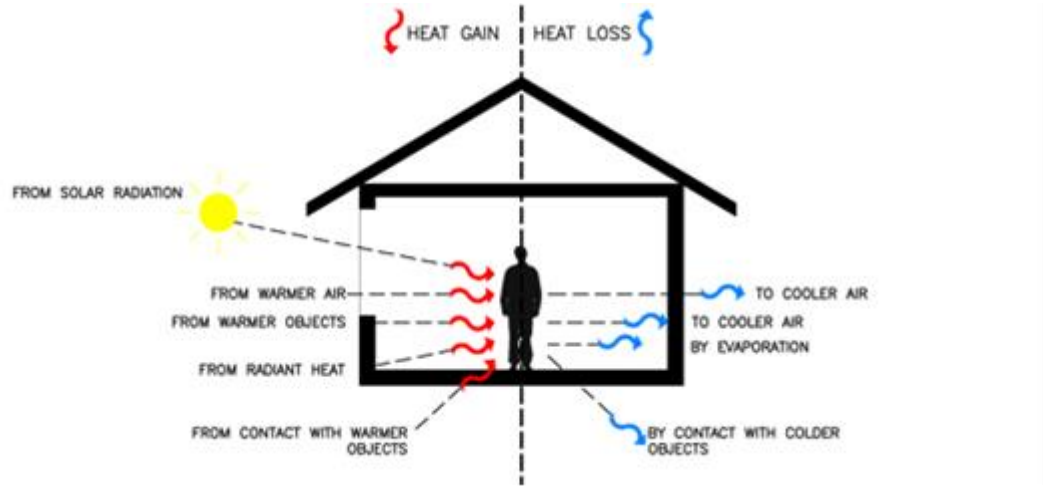

Figure 4: Body heat gains and losses

3.2 Natural Lighting

Lighting is a crucial part of healthy indoor environments. Effective natural lighting improves light quality and lowers energy requirements. Outdoor views help to maintain healthy eyesight and improve morale.

Providing sufficient daylight will be considered to exceed minim planning requirements for all building types.

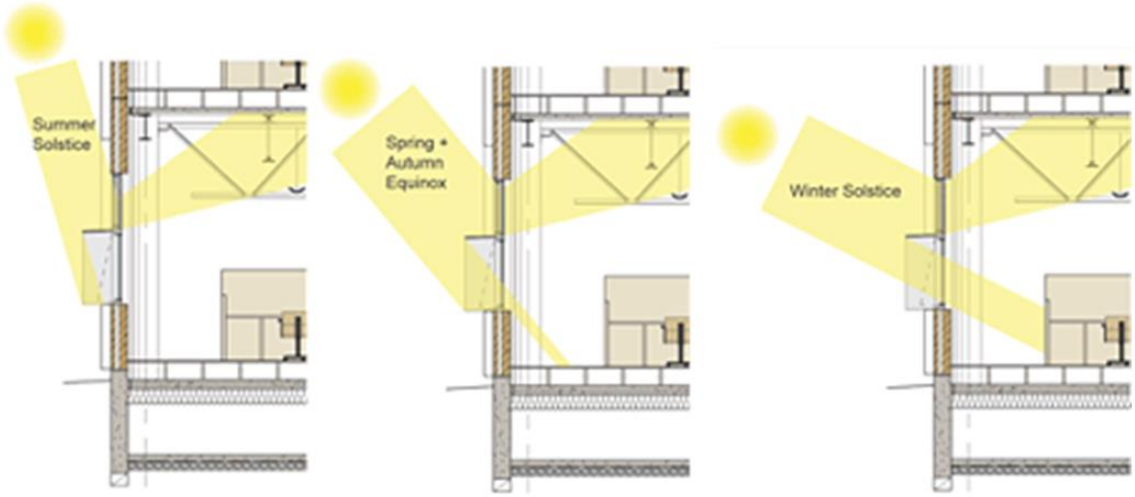

Figure 5: Typical daylight model design assessments

4. WATER MANAGEMENT

4.1 Water Sensitive Urban Design

The site's overall design will incorporate Water Sensitive Urban Design (WSUD) to minimise stormwater pollution impacts to the local ecology and stormwater infrastructure networks. The project team will consider the following biological treatment measures to address stormwater runoff and quality:

- Rain gardens which capture and treat stormwater onsite
- Bioswales to improve the onsite stormwater quality
- Porous pavements to minimise stormwater run-off and reduce impact to the surrounding area

4.2 Fixtures and Fittings

Water Efficient fixtures and fitting will reduce the water consumption of the site. As an indication, the following will be considered:

- Wash hand basin taps 5 star WELS
- General taps 5 Star WELS
- Toilets dual flush 4 Star WELS
- Urinals 0.8 litres per flush 6 Star WELS
- Shower heads 7 litres per minute 3 Star WELS

4.3 Rain Water

Roof collection and tank storage – Water harvesting opportunities will be examined as part of the projects detailed design. Rain water harvesting will be considered to serve land escape irrigation and surf equipment wash downs.

5. TRANSPORT

5.1 Cyclist Facilities

Cyclist facilities will be considered for building's occupants. Bicycle storage and community bikes will be considered for locals to use, and as means of travel to public transport interchanges.

Considerations will also be given to incorporating public art with cyclist facilities.

Figure 6: Alternative Bicycle Parking

6. WASTE MINIMISATION

6.1 Waste Sortation

Waste-sorting bins will be considered for all internal and external spaces to enable users to sort their rubbish and recyclables. Back of house areas will require sufficiently sized and conveniently located waste storage and sorting areas for ease of removal by waste contractors.

7. MATERIAL SELECTION

7.1 Sustainable Construction

Construction works can significantly impact the environment, particularly at a local level. These can arise from site disturbance, pollution, construction waste, water and energy use.

Traditionally, the bulk of construction waste has gone to landfill. Through government programs (such as the Commonwealth Government's WasteWise Construction Program), waste from construction projects is now regularly achieving 70% waste diversion.

A target construction recycling percentage will be considered for this project. Achieving up to 80% recycling is generally achievable without a cost penalty.

7.2 Sustainable Resources

When choosing building materials for this project, the following will be considered:

- **Low Embodied CO_2** – The current concept design incorporates a timber structured building. This will result in significant reductions in the embodied energy associated with the procurement of the building, and consequently contribute substantially to the overall carbon footprint of the building.
- **Sustainability of Resource** – many building materials are derived from finite resources and should be avoided or limited. Major building elements should have recycled content where possible (recycled steel and/or aggregates in concrete, recycled timber, cellulose fibre insulation using recycled paper etc.).
- **Health Impact** – All materials should be considered in regard to their impact on occupants' health. Some types of fibreglass insulations have very fine fibres that, once airborne, can easily enter into the lungs and cause severe irritation. This will include materials with low Volatile Organice Compounds (VOCs), formaldehyde, etc.
- **Environmental Accreditation** – materials which have been certified or approved by independent bodies such as Ecospecifier or Good Environmental Choice Australia should be preferred over non-certified products. These rating systems provide evaluation of various products across a range of environmental performance criteria.

8. LAND USE & ECOLOGY

8.1 Heat Island Effect

Urban heat island effect is defined as hard surfaces within a development heating up due to darker Solar Reflectance Indexes (SRI), compared to a natural area. The results in additional heating generated in the ambient surrounding temperatures as well as allowing more heat to penetrate individual buildings.

The following will be considered in the development to reduce heat island effect;

- Selection of paint finishes with high SRIs
- Increased vegetation areas

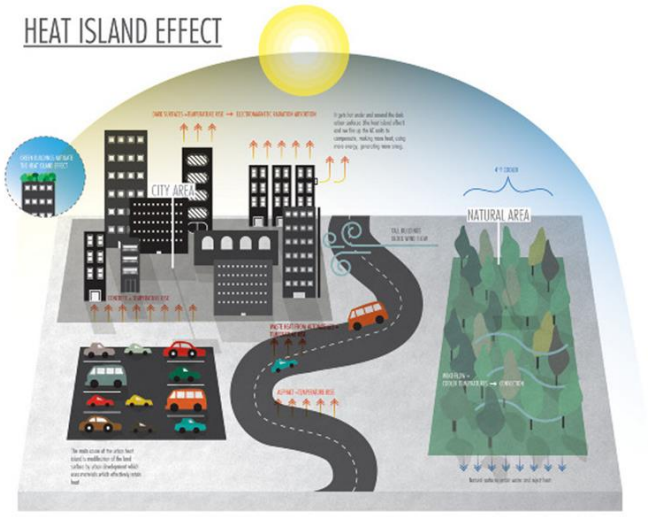

Figure 7: Urban Heat Island Effect

9. NCC SECTION J

9.1 Overview

Northrop Consulting Engineers have conducted a BCA Section J Deemed-to-Satisfy (DTS) assessment according to National Construction Code (NCC) 2016, Sections J1 & J2. This summary report provides minimum compliance requirements for Building Fabric (J1) and Glazing (J2).

The table below outlines compliance requirements for J1 and J2;

Table 1: Insulation Requirements for Main Building Elements

Building Fabrics	Required total R-value	Equivalent insulation
Roof and Ceiling	R3.7	Fletcher PERMASTOP® R3.0 Building Blanket Insulation
External Walls	R2.8	Fletcher PERMASTOP® R3.0 Building Blanket Insulation
South Facing Walls	R2.3	Fletcher PERMASTOP® R2.3 Building Blanket Insulation
Well Shaded Walls >30° Shading Projection	R2.3	Fletcher PERMASTOP® R2.3 Building Blanket Insulation
Insulated Partition Walls	R1.8	Fletcher PERMASTOP® R1.80 Building Blanket Insulation
Suspended Floors	R2.0	Equates to Fletcher PIRFORMATHERM® R2.0 Insulation
Floors and Ceilings to non-conditioned space e.g. Plantrooms	R2.0	Equates to Fletcher PIRFORMATHERM® R2.0 Insulation

Table 2: Uniform Glazing Requirements[1]

Required U-Value	Required SHGC
2.30	0.24

Should the requirements listed above be deemed unfeasible, it is recommend that the project team should proceed with a JV3 performance based solution. This approach is more flexible as it offers a holistic assessment of the building performance, rather than individual components.

[1] Refer to Section 3.4 for individual glazing requirements

9.2 DTS Assessment

9.2.1 Referenced Drawings

Table 3: Referenced Drawings

Drawing No.	Rev	Date	Title
A.DA.10.001	1	02.08.2018	GA PLAN – GROUND LEVEL
A.DA.10.002	1	02.08.2018	GA PLAN – LEVEL 1
A.DA.11.001	1	02.08.2018	ROOF PLAN
A.DA.20.001	1	02.08.2018	NORTH & EAST ELEVATIONS
A.DA.20.002	1	02.08.2018	SOUTH & WEST ELEVATIONS

9.2.2 Building Classification

The Mona Vale Surf Club includes both Class 6 and Class 9b building classifications as defined by the NCC. The development is located in Climate Zone 5 as shown in Figure 1 below.

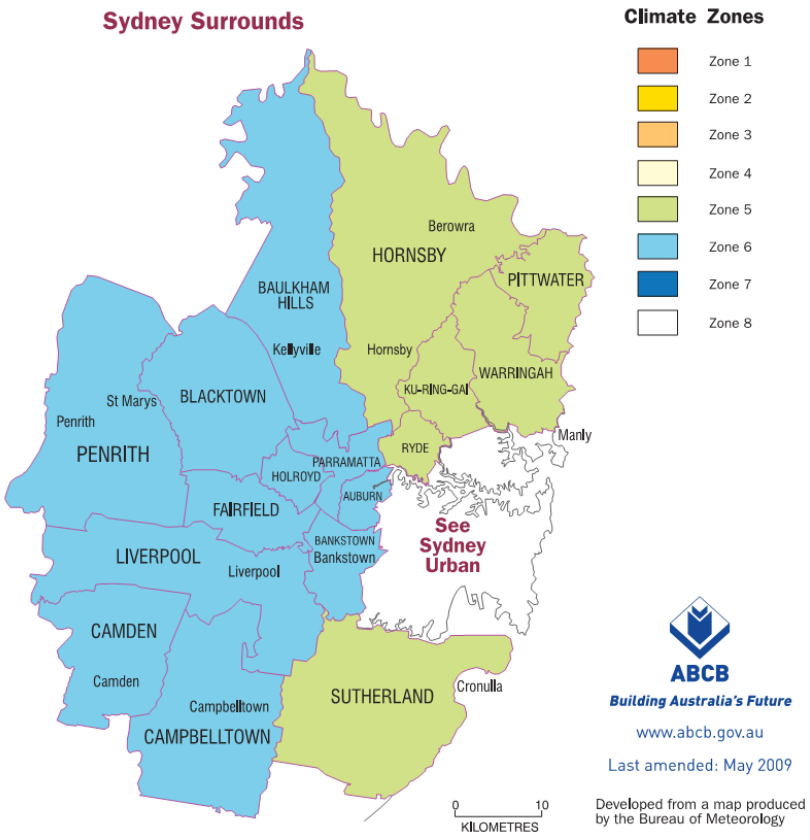

Figure 8: NCC Climate Zones

9.2.3 J1 Building Fabric

Building fabric thermal insulation requirements apply to the building fabric enclosing habitable and conditioned spaces forming part of the thermal boundary of the site (building envelope). The examined thermal envelop is illustrated in mark-up on current drawings in Appendix B.

The tables below outline typical compliance requirements:

Table 4: Roof/Ceiling R3.7 Construction Example

Item Description	R-Value	
Outdoor Air Film (7m/s)	0.04	
Metal Deck Roof	0.00	
R3.00 Insulation (with a layer of foil)[2]	3.00	
Reflective Airspace	0.74	
13mm Plasterboard/Ceiling Tiles	0.08	
Indoor Air Film	0.12	Required
Total R-Value:	3.98	*3.70*

*A roof that has metal sheet roofing fixed to metal purlins, metal rafters or metal battens; and does not have a ceiling lining or has a ceiling lining fixed directly to those metal purlins, metal rafters or metal battens, must have a thermal break, consisting of material with an R-Value of not less than R0.2, installed between the metal sheet roofing and its supporting metal purlins, metal rafters or metal battens.

Table 5: External Wall R2.8 Construction Example

Item Description	R-Value	
Outdoor Air Film	0.04	
4.5mm Fibre Cement Cladding	0.01	
R3.0 Insulation[2]	3.00	
13mm Plasterboard	0.08	
Indoor Air Film	0.12	Required
Total R-Value:	3.25	*2.80*

Table 6: External Wall R2.3 Construction Example

Item Description	R-Value	
Outdoor Air Film	0.04	
4.5mm Cement Fibre Cladding	0.01	
R2.3 Insulation[3]	2.30	
13mm Plasterboard	0.08	
Indoor Air Film	0.12	Required
Total R-Value:	2.55	*2.30*

[2] Equates to Fletcher PERMASTOP® R3.0 Building Blanket Insulation
[3] Equates to Fletcher PERMASTOP® R2.3 Building Blanket Insulation

Table 7: External Wall R1.8 Construction Example

Item Description	R-Value	
Outdoor Air Film	0.04	
4.5mm Cement Fibre Cladding	0.01	
R1.8 Insulation[4]	1.80	
13mm Plasterboard	0.08	
Indoor Air Film	0.12	Required
Total R-Value:	2.05	*1.80*

A wall that has lightweight external cladding such as weatherboards, fibre-cement or metal sheeting fixed to a metal frame; and does not have a wall lining or has a wall lining that is fixed directly to the same metal frame, must have a thermal break, consisting of a material with an R-Value of not less than R0.2, installed between the external cladding and the metal frame.

Table 8: Insulated Partition Construction Example

Item Description	R-Value	
Indoor Air Film	0.11	
13mm Plasterboard	0.08	
R1.8 Insulation[4]	1.80	
13mm Plasterboard	0.08	
Indoor Air Film	0.12	Required
Total R-Value:	2.19	*1.80*

Table 9: Suspended Floor Construction Example

Item Description	R-Value	
Outdoor Air Film	0.04	
Concrete Panel	0.09	
R2.0 Insulation[5]	2.00	
19mm Timber Floor	0.12	
Indoor Air Film	0.12	Required
Total R-Value:	2.37	*2.00*

Table 10: Floor/Ceiling to Non-Conditioned Space Construction Example

Item Description	R-Value	
Indoor Air Film	0.04	
13mm Plasterboard	0.08	
R2.0 Insulation[5]	2.00	
19mm Timber Floor	0.12	
Indoor Air Film	0.12	Required
Total R-Value:	2.36	*2.00*

[4] Equates to Fletcher PERMASTOP® R1.80 Building Blanket Insulation
[5] Equates to Fletcher PIRFORMATHERM® R2.0 Insulation

9.2.4 J2 Glazing

Glazing requirement in terms of U-value and Solar Heat Gain Coefficient (SHGC) as well as indicative glazing type are listed below. The DTS glazing calculator assesses the glazing on different orientations independently, thus the below tables provide different glazing requirements on different orientations;

Table 11: Ground Floor Glazing Requirements

Orientation	U-Value	SHGC	Equivalent Glazing
North East	5.80	0.37	Single Glazing, medium tint
Southeast	3.80	0.44	Double glazing, medium tint
Internal	4.40	0.80	High performance single glazing, clear

Table 12: First Floor Glazing Requirements

Orientation	U-Value	SHGC	Equivalent Glazing
North West	5.80	0.77	Single glazing, clear
South East	2.30	0.24	Double glazing, dark tinted
South West	3.80	0.35	Double glazing, medium tinted

Should one glazing product be sought for the development, the following DTS complaint solution would apply;

Table 13: Uniform Glazing Solution

U-Value	SHGC	Equivalent Glazing
2.30	0.24	Double Glazing, dark tinted

The uniform solution requires the installation of a glazing product equivalent to a Capral 425 Narrowline Double Glazed window frame with the following build up:

- 6mm Grey / 12mm Argon Fill Gap / 6mm Cool-Lite SKN 163 II

It is recommend that the project team consider a JV3 performance based solution which would provide greater flexibility around compliant glazing options and potentially provide cost savings for the project.

10. CONCLUSION

This report has identified opportunities available for Ecologically Sustainable Design initiatives to be incorporated into the development of Mona Vale Surf Club. These opportunities have been presented across six major categories including:

- Energy Efficiency
- Indoor Environment Quality
- Water Management
- Waste Minimisation
- Materials Selection
- Ecology

In addition, an NCC Section J DTS assessment has been conducted based on current drawings. Based on this, compliant building fabrics and glazing have been identified.

11. APPENDIX A GLAZING CALCULATOR(S)

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

HELP

Building name/description: MONA VALE SURF CLUB

Application: other

Climate zone: 5

Storey: GROUND

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A		62.7m²		67m²					16m²
Option B									n/a
Glazing area (A)		*23.1m²*		*34.7m²*					*12m²*

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 (m²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	G (m)	Heating (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	CAFÉ	NE		3.30	7.00	23.10	5.8	0.37				0.00	1.00	1.00	23.10	100% of 100%
2	CAFÉ	SE		3.30	7.40	24.42	3.8	0.44				0.00	1.00	1.00	24.42	70% of 100%
3	PATROL / LIFEGUARD	SE		3.30	3.10	10.23	3.8	0.44				0.00	1.00	1.00	10.23	30% of 100%
4	OFFICE	internal		3.30	3.50	11.55	4.4	0.80			2.00	0.00	0.64	0.54	11.55	100% of 100%

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

The Glazing Calculator has been developed by the ABCB to assist in developing a better understanding of glazing energy efficiency parameters.
While the ABCB believes that the Glazing Calculator, if used correctly, will produce accurate results, it is provided "as is" and without any representation or warranty of any kind, including that it is fit for any purpose or of merchantable quality, or functions as intended or at all.
Your use of the Glazing Calculator is entirely at your own risk and the ABCB accepts no liability of any kind.

if inputs are valid

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

HELP

Building name/description: MONA VALUE SURF CLUB

Application: other

Climate zone: 5

Storey: LEVEL 1

Facade areas

	N	NE	E	SE	S	SW	W	NW	internal
Option A				200m²		72.9m²		112m²	
Option B									n/a
Glazing area (A)				*199m²*		*55.7m²*		*21.8m²*	

Number of rows preferred in table below: 14 *(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 (S_H)	Cooling (S_C)	Area used (m²)	Element share of % of allowance used
1	RESTURANT (UNSHADE	SE		4.00	4.40		2.3	0.24				0.00	1.00	1.00	17.60	10% of 100%
2	RESTURANT (SHADED)	SE		4.00	10.30		2.3	0.24	2.200	4.400	0.50	0.40	0.85	0.80	41.20	21% of 100%
3	CIRCULATION	SE		4.00	5.90		2.3	0.24				0.00	1.00	1.00	23.60	13% of 100%
4	FUNCTION (UNSHADED	SE		4.00	7.90		2.3	0.24				0.00	1.00	1.00	31.60	18% of 100%
5	FUNCTION (SHADED)	SE		4.00	11.80		2.3	0.24	2.800	4.000	0.70	0.00	0.66	0.57	47.20	21% of 100%
6	MEMBERS (UNSHADED	SE		4.00	1.80		2.3	0.24				0.00	1.00	1.00	7.20	4% of 100%
7	MEMBERS (SHADED)	SE		4.00	4.30		2.3	0.24	1.800	4.000	0.45	0.00	0.76	0.69	17.20	8% of 100%
8	MEMBERS / OBSERVAT	SE		4.00	3.40		2.3	0.24	3.900	4.000	0.98	0.00	0.57	0.48	13.60	6% of 100%
9	MEMBERS / OBSERVAT	SW		3.70	2.50		3.8	0.35	8.000	3.700	2.16	0.00	0.39	0.34	9.25	15% of 100%
10	MEMBERS	SW		3.70	10.90		3.8	0.35	3.000	3.700	0.81	0.00	0.66	0.57	40.33	71% of 100%
11	CARETAKER	SW		3.40	1.80		3.8	0.35				0.00	1.00	1.00	6.12	13% of 100%
12	MEETING	NW		3.40	1.80		5.8	0.77				0.00	1.00	1.00	6.12	28% of 100%
13	CARETAKER	NW		3.40	1.10		5.8	0.77				0.00	1.00	1.00	3.74	17% of 100%
14	CIRCULATION	NW		3.40	3.50		5.8	0.77				0.00	1.00	1.00	11.90	55% of 100%

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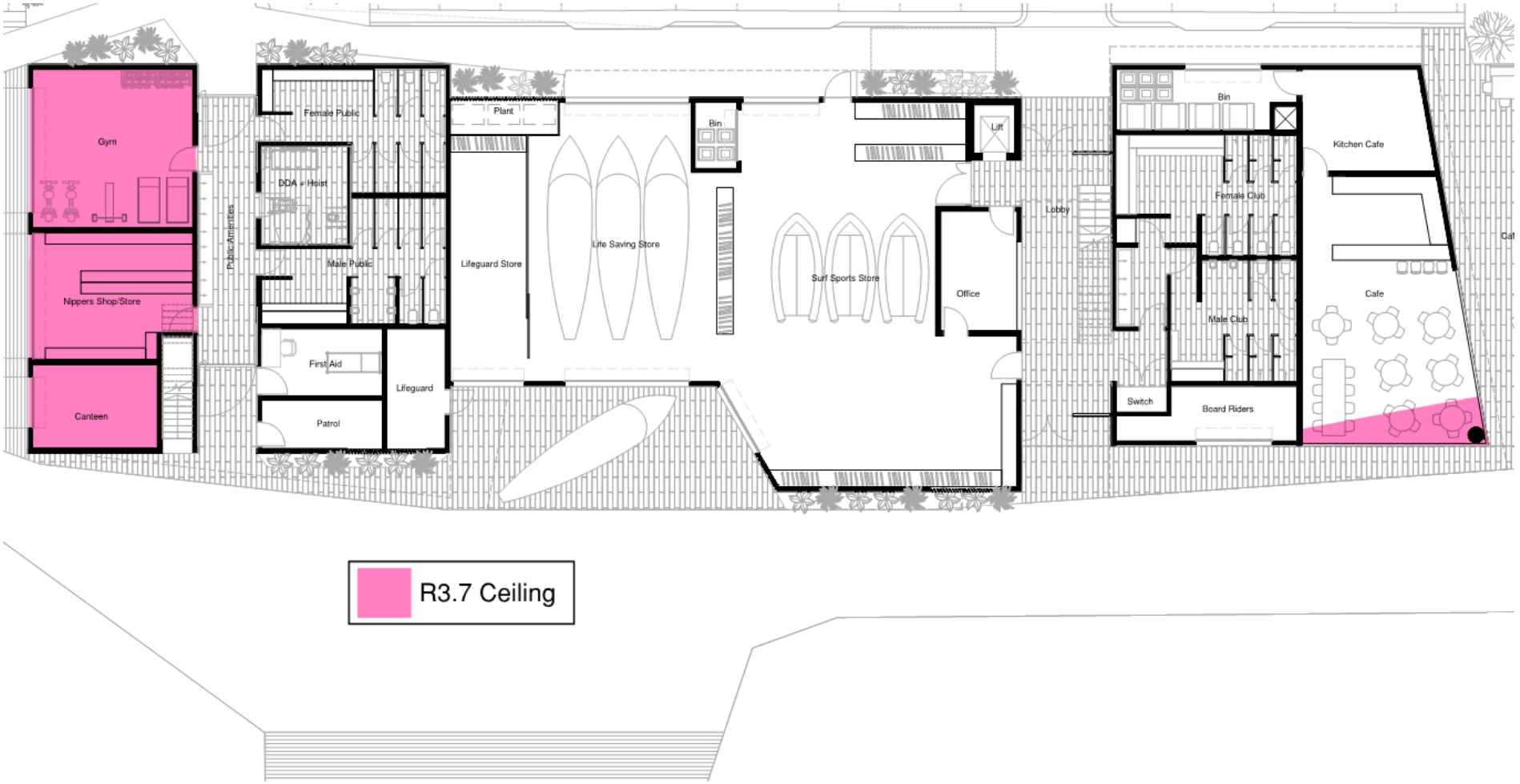
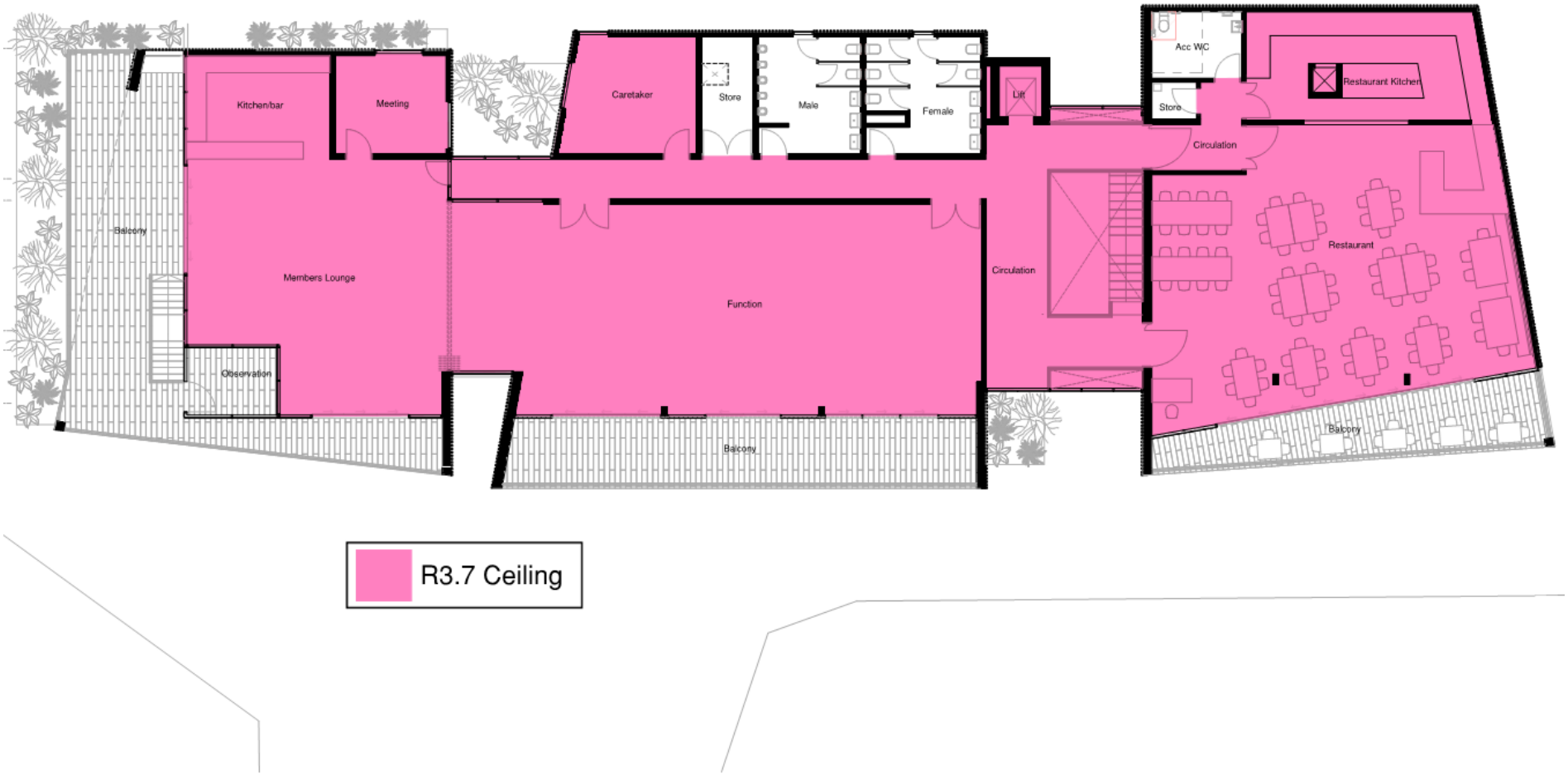
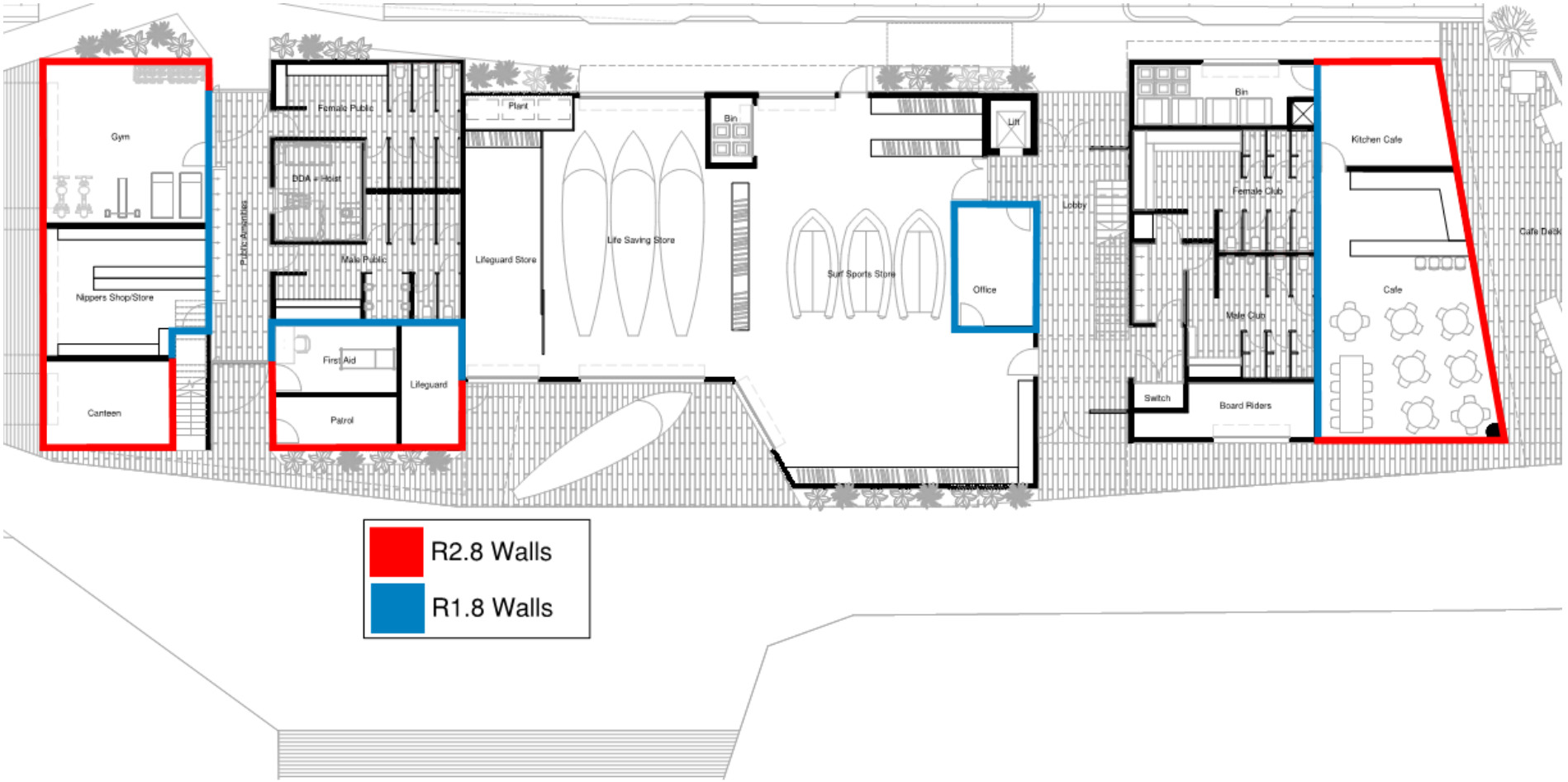
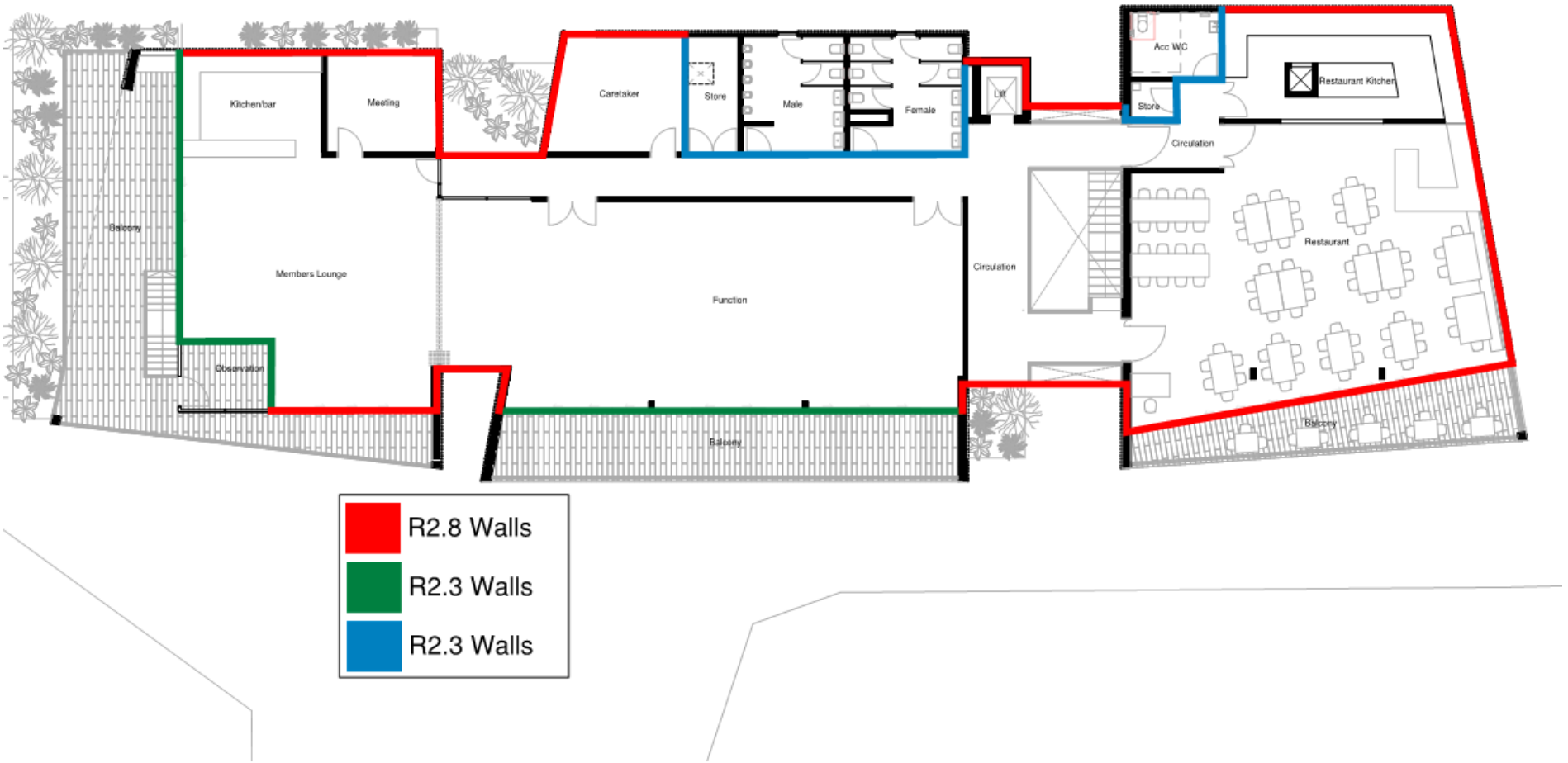
if inputs are valid

12. APPENDIX B BUILDING THERMAL BOUNDARY MARKUP




Kitchen/bar
Meeting
Caretaker
Store
Male
Female
Lift
Acc WC
Store
Restaurant Kitchen
Circulation
Balcony
Members Lounge
Function
Circulation
Restaurant
Observation
Balcony
Balcony
R3.7 Ceiling


Gym
Nippers Shop/Store
Canteen
Public Amenities
Female Public
DDA + Host
Male Public
First Aid
Lifeguard
Patrol
Plant
Lifeguard Store
Life Saving Store
Bin
Surf Sports Store
Lift
Office
Lobby
Bin
Female Club
Male Club
Switch
Board Riders
Kitchen Cafe
Cafe
Cafe Deck
R2.8 Walls
R1.8 Walls


Kitchen/bar
Meeting
Caretaker
Store
Male
Female
Lift
Acc WC
Store
Restaurant Kitchen
Circulation
Balcony
Members Lounge
Function
Circulation
Restaurant
Observation
Balcony
Balcony
R2.8 Walls
R2.3 Walls
R2.3 Walls


Kitchen/bar
Meeting
Caretaker
Store
Male
Female
Lift
Acc WC
Store
Restaurant Kitchen
Circulation
Balcony
Members Lounge
Function
Circulation
Restaurant
Observation
Balcony
Balcony
R2.0 Floor