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Part 2.6 – Energy Efficiency

NCC 2016 Building Code of Australia, Volume Two

Compliance assessment of:
Residential building - BCA Class 1a

Date:

26 October 2017

Site:

Dwelling 2
4 Redwood Street
ROSTREVOR
SA 5073
BCA Climate Zone 5

Client:

Mr Coscia

Reference no:

170248-2

Assessor:

Nathan Prince

1. Objective

O2.6

The objective of this section of the building code is to reduce greenhouse gas emissions

2. Functional Statement

F2.6

To reduce greenhouse gas emissions, to the degree necessary—

- (a) a building, including its domestic services, is to be capable of efficiently using energy; and
- (b) a building's domestic services for heating are to obtain their energy from—
 - (i) a low greenhouse gas intensity source; or
 - (ii) an on-site renewable energy source; or
 - (iii) another process as reclaimed energy.

3. Performance Requirements

P2.6.1 Building

A building must have, to the degree necessary, a level of thermal performance to facilitate the efficient use of energy for artificial heating and cooling appropriate to—

- (a) the function and use of the building; 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 cooling.

P2.6.2 Services

Domestic services, including any associated distribution system and components must, to the degree necessary—

- (a) have features that facilitate the efficient use of energy appropriate to—
 - (i) the domestic service and its usage; and
 - (ii) the geographic location of the building; and
 - (iii) the location of the domestic service; and
 - (iv) the energy source; and
- (b) obtain heating energy from—
 - (i) a source that has a greenhouse gas intensity that does not exceed 100 g CO₂-e/MJ of thermal energy load; or
 - (ii) an on-site renewable energy source; or
 - (iii) another process as reclaimed energy.

4. Summary

Actions required to comply with Part 2.6

P2.6.1 – Building

Additional requirements

Note: All the information required to verify that the thermal performance of the building is satisfied has not been fully provided in the documentation provided, the following acceptable construction practices must be undertaken in order to achieve compliance with the NCC2016:

1. 3.12.1.1 Building fabric thermal insulation must comply with AS/NZS 4859.1 and installation is to comply with this section.
2. 3.12.3.3 External windows and doors must be sealed to comply with this section.
3. 3.12.3.4 Exhaust fans must be fitted with a sealing device such as a self-closing damper, filter or the like when serving a conditioned space; or a habitable room.
4. 3.12.3.5 Building sealing for the construction of roofs, walls and floors must comply with this section.

P2.6.2 – Services

Additional requirements

Note: All the information to verify that the domestic services requirements are satisfied have not been fully provided, the following acceptable construction manuals or practices must be undertaken in order to achieve compliance with the NCC2016:

5. 3.12.5.0 A heated water supply system must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia.
6. 3.12.5.3 Installation of heating and cooling ductwork must comply with this section.
7. 3.12.5.4 Electric resistance space heating must comply with this section.
8. 3.12.5.5 Artificial lighting lamp power density or illumination power density must comply with this section. Halogen lamps must be separately switched from fluorescent lamps and artificial lighting around the perimeter of the building must be controlled by a daylight sensor; or have an average light source efficacy of not less than 40 Lumens/W.

5. Compliance

To comply with Part 2.6 Energy Efficiency a building must meet the Performance Requirements P2.6.1 Building.

3.12.0 (a)(ii)

This assessment has been undertaken using Elemental Provisions – 3.1.0(a)(ii) to satisfy all the detailed provisions as required under this section of the code

Building Fabric

Component	Material	Insulation R-Value	System R-Value
Roof	Pitched roof with flat ceiling – Metal cladding	5.0	6.39 (Up)
	Unventilated	(0.39)	✓
	Reflective foil blanket at roof	(1.0)	
	Solar absorption of more than 0.6 100% of added insulation load on ceiling Loss of ceiling insulation: 0.0% to less than 0.5%		
External	Clay masonry veneer (0.56)	2.5	3.06 ✓
	Fibre-cement sheet (0.42)	2.5	2.92 ✓
	75mm Expanded Polystyrene Clad (1.98)	2.0	3.98 ✓
Floors	Concrete Slab on ground		✓

External Glazing

Type	U-Value	SHGC
Aluminium –Single Glazed Clear	6.70	0.70
Aluminium –Single Glazed Low-e Low Solar Gain	5.60	0.36
Aluminium –Single Glazed Low-e High Solar Gain	5.40	0.58
Aluminium –Double Glazed Low-e High Solar Gain	4.30	0.53

Refer attached NCC Glazing Calculator – Volume Two 2014

Building Sealing

There are no chimneys or flues for an open solid-fuel burning appliance.

There are no roof lights.

Refer to summary section additional requirements – points 2, 3 & 4

- | | |
|----------|--|
| 3.12.3.3 | External windows and doors must be sealed to comply with this section |
| 3.12.3.4 | Exhaust fans must be fitted with a sealing device such as a self-closing damper, filter or the like when serving a conditioned space; or a habitable room. |
| 3.12.3.5 | Building sealing for the construction of roofs, walls and floors must comply with this section. |
| 3.12.3.6 | Any evaporative cooler must comply with this section. |

Air Movement

Applies to a *habitable room* in Class 1 building

Room ventilation	Floor Area (m ²)	Area of Ventilation Opening (m ²)	Percentage of Floor Area	Minimum required opening (without ceiling fan)	
Kitchen/Dine	35	4.4	12.5%	7.5%	✓
Bed 1	14.2	4.8	34%	7.5%	✓
Bed 2	10.5	0.80	7.6%	7.5%	✓
Bed 3	12.2	1.4	11.5%	7.5%	✓
Passage/Study Area	17	Complies with 3.12.4.1 (b)	✓		

Services

Class 1 regions

The total area of internal rooms is 113m², a maximum total of 565 watts for all new lighting is allowed.

Verandah, balcony or the like regions

The total area of balcony & P.O.S is 27m², a maximum total of 108 watts for all lighting is allowed.

Class 10a region

The total area of new garage is 37m², a maximum total of 111 watts for all new lighting is allowed.

To comply with Part 2.6 Energy Efficiency a building must meet the Performance Requirements P2.6.2 Services.

Insufficient information has been provided by the client relating to the building's domestic services in order to fully verify compliance. The relevant 'Deemed-to-Satisfy' requirements under Part 3.12.5 of NCC2016 – Volume Two have been stipulated in full in the appendix.

Appendix A – P2.6.1 Building

Section 3.12.1 - Building Fabric

3.12.1.1 Building fabric thermal insulation

- (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 columns, studs, noggings, joists, furring channels and the like where the insulation must butt 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 domestic service or fitting.
- (b) Where required, reflective insulation must be installed with—
- (i) the necessary airspace, to achieve the required R-Value between a reflective side of the reflective insulation and a building lining or cladding; and
 - (ii) the reflective insulation closely fitted against any penetration, door or window opening; and
 - (iii) the reflective insulation adequately supported by framing members; and
 - (iv) each adjoining sheet of roll membrane being—
 - (A) overlapped not less than 150 mm; or
 - (B) taped together
- (c) Where required, bulk insulation must be installed so that—
- (i) it maintains its position and thickness, other than where it crosses roof battens, water pipes, electrical cabling or the like; and
 - (ii) in a ceiling, where there is no bulk insulation or reflective insulation in the external wall beneath, it overlaps the external wall by not less than 50 mm.

Section 3.12.3 Building Sealing

3.12.3.1 Chimneys and flues

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

3.12.3.2 Roof lights

- (a) A roof light must 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 and 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.

3.12.3.3 External windows and doors

- (a) A seal to restrict air infiltration must be fitted to each edge of an external door, openable window and other such opening—
 - (i) when serving a conditioned space; or
 - (ii) in climate zones 4, 5, 6, 7 and 8, when serving a habitable room.
- (b) A window complying with the maximum air infiltration rates specified in AS 2047 need not comply with (a).
- (c) A seal required by (a)—
 - (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 swing door or the edges of an openable window or other such opening, may be a foam or rubber compressible strip, fibrous seal or the like.

3.12.3.4 Exhaust fans

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

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

3.12.3.5 Construction of roof and walls

- (a) Roofs, external walls, external 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 the external fabric of—
 - (i) a conditioned space; or
 - (ii) a habitable room in climate zones 4, 5, 6, 7 and 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 by caulking, skirting, architraves, cornices or the like.

3.12.3.6 Evaporative coolers

An evaporative cooler must be fitted with a self-closing damper or the like when serving—

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

Appendix B – P2.6.2 Services

Section 3.12.5 - Services

3.12.5.0

A heated water supply system must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia

3.12.5.3 Heating and cooling ductwork

- (a) Heating and cooling ductwork and fittings must—
 - (i) achieve the material R-Value in Table 3.12.5.2; and
 - (ii) be sealed against air loss—
 - (A) by closing all openings in the surface, joints and seams of ductwork with adhesives, mastics, sealants or gaskets in accordance with AS 4254 Parts 1 and 2 for a Class C seal; or
 - (B) for flexible ductwork, with a draw band in conjunction with a sealant or adhesive tape.
- (b) Duct insulation must—
 - (i) abut adjoining duct insulation to form a continuous barrier; and
 - (ii) be installed so that it maintains its position and thickness, other than at flanges and supports; and
 - (iii) where located outside the building, under a suspended floor, in an attached Class 10a building or in a roof space—
 - (A) be protected by an outer sleeve of protective sheeting to prevent the insulation becoming damp; and
 - (B) have the outer protective sleeve sealed with adhesive tape not less than 48 mm wide creating an airtight and waterproof seal.
- (c) The requirements of (a) do not apply to heating and cooling ductwork and fittings located within the insulated building envelope including a service riser within the conditioned space, internal floors between storeys and the like.

3.12.5.4 Electric resistance space heating

An electric resistance space heating system that serves more than one room must have—

- (a) separate isolating switches for each room; and
- (b) a separate temperature controller and time switch for each group of rooms with common heating needs; and
- (c) power loads of not more than 110 W/m² for living areas, and 150 W/m² for bathrooms.

3.12.5.5 Artificial Lighting

- (a) The lamp power density or illumination power density of artificial lighting, excluding heaters that emit light, must not exceed the allowance of—
 - (i) 5 W/m² in a Class 1 building; and
 - (ii) 4 W/m² on a verandah, balcony or the like attached to a Class 1 building; and
 - (iii) 3 W/m² in a Class 10a building associated with a Class 1 building.
- (b) The illumination power density allowance in (a) may be increased by dividing it by the illumination power density adjustment factor for a control device in Table 3.12.5.3 as applicable.
- (c) When designing the lamp power density or illumination power density, the power of the proposed installation must be used rather than nominal allowances for exposed batten holders or luminaires.
- (d) Halogen lamps must be separately switched from fluorescent lamps.
- (e) Artificial lighting around the perimeter of a building must—
 - (i) be controlled by a daylight sensor; or
 - (ii) have an average light source efficacy of not less than 40 Lumens/W.

3.12.5.6 Water heater in a hot water supply system

A water heater in a heated water supply system must be designed and installed in accordance with Part B2 of NCC Volume Three – Plumbing Code of Australia

Disclaimer

This report has been prepared by Lelio Bibbo Pty. Ltd. based on information and architectural plans supplied by the D'Andrea & Associates 26.10.17

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

Building name/description

Dwelling 2, 4 Redwood Street, Rostrevor

Climate zone

5C_U

CONSTANTS 13.464

C_{SHGC}

0.122

Storey Floor Construction Area

Ground

Direct contact

50m²

Air Movement

Suspended

Wall insulation option chosen for 3.12.1.4

No wall insulation concession used**Standard****50m²**

Area of storey

Area of glazing 15.7m² (31% of area of storey)C_U (only) C_{SHGC} x Area

ALLOWANCES 13.5

6.1

Number of rows for table below

10 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS										CALCULATED OUTCOMES - OK (if inputs are valid)			
Glazing element		Orientation		Size		Performance		SHADING		CALCULATION DATA		Conductance - PASSED	
ID	Description (optional)	Facing sector	Height (m)	Width (m)	Area (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P (m)	H (m)	P/H	Es	U x area / winter access	Element share of % of allowance used
1	Living	N	0.60	1.10		6.70	0.70	0.60	0.80	0.75	0.31	0.51	5% of 81%
2	Living	N	2.40	2.29		6.70	0.70	0.60	2.70	0.22	0.50	4.24	39% of 81%
3	Dine	E	2.40	0.71		5.60	0.36				1.19	1.10	10% of 81%
4	Dine	S	2.40	1.83		5.60	0.36				0.68	2.83	26% of 81%
5	Laundry	E	2.40	0.71		5.60	0.36				1.19	1.10	10% of 81%
6	WC	E	2.40	0.71		5.60	0.36				1.19	1.10	10% of 81%
7													
8													
9													
10													

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 (including air movement levels) are valid



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

Building name/description

Dwelling 2, 4 Redwood Street, Rostrevor

Climate zone

5

C_U

CONSTANTS 12.118

C_{SHGC}

0.110

Storey

Floor Construction

Area

First

Air Movement

Direct contact

Suspended

66m²

Wall insulation option chosen for 3.12.1.4

No wall insulation concession used

66m²

Area of storey

Area of glazing 15.4m² (23% of area of storey)

ALLOWANCES 12.1

C_{SHGC} x Area

7.3

Number of rows for table below

10 (as currently displayed)

GLAZING ELEMENTS, ORIENTATION SECTOR, SIZE and PERFORMANCE CHARACTERISTICS										SHADING		CALCULATION DATA		CALCULATED OUTCOMES - OK (If inputs are valid)						
Glazing element			Orientation		Size			Performance			P&H or device		Exposure		Size		Conductance - PASSED		Solar heat gain - PASSED	
ID	Description (optional)	Facing sector	Height (m)	Width (m)	Area (m ²)	Total System U-Value (AFRC)	Total System SHGC (AFRC)	P	H	Es	Area used (m ²)	U x area / winter access	Element share of % of allowance used	SHGC x Es x area	Element share of % of allowance used					
1	Bed 1	N	2.40	2.70		4.30	0.53	1.80	2.70	0.67	0.33	6.48	4.42	37% of 100%	1.1	24% of 67%				
2	Bed 1	E	2.40	0.71		5.40	0.58	0.40	2.70	0.15	0.95	1.70	1.46	12% of 100%	0.9	19% of 67%				
3	Bath	E	0.73	0.61		5.40	0.58	0.40	1.00	0.40	0.71	0.44	0.38	3% of 100%	0.2	4% of 67%				
4	Bed 2	E	1.60	1.51		5.40	0.58	0.40	1.00	0.40	0.71	2.42	2.07	17% of 100%	1.0	20% of 67%				
5	Bed 3	E	2.40	0.61		5.40	0.58	0.40	2.70	0.15	0.95	1.46	1.25	10% of 100%	0.8	17% of 67%				
6	Bed 3	S	1.60	1.81		5.40	0.58	0.40	1.80	0.22	0.47	2.90	2.48	21% of 100%	0.8	16% of 67%				
7																				
8																				
9																				
10																				

IMPORTANT NOTICE AND DISCLAIMER IN RESPECT OF THE GLAZING CALCULATOR

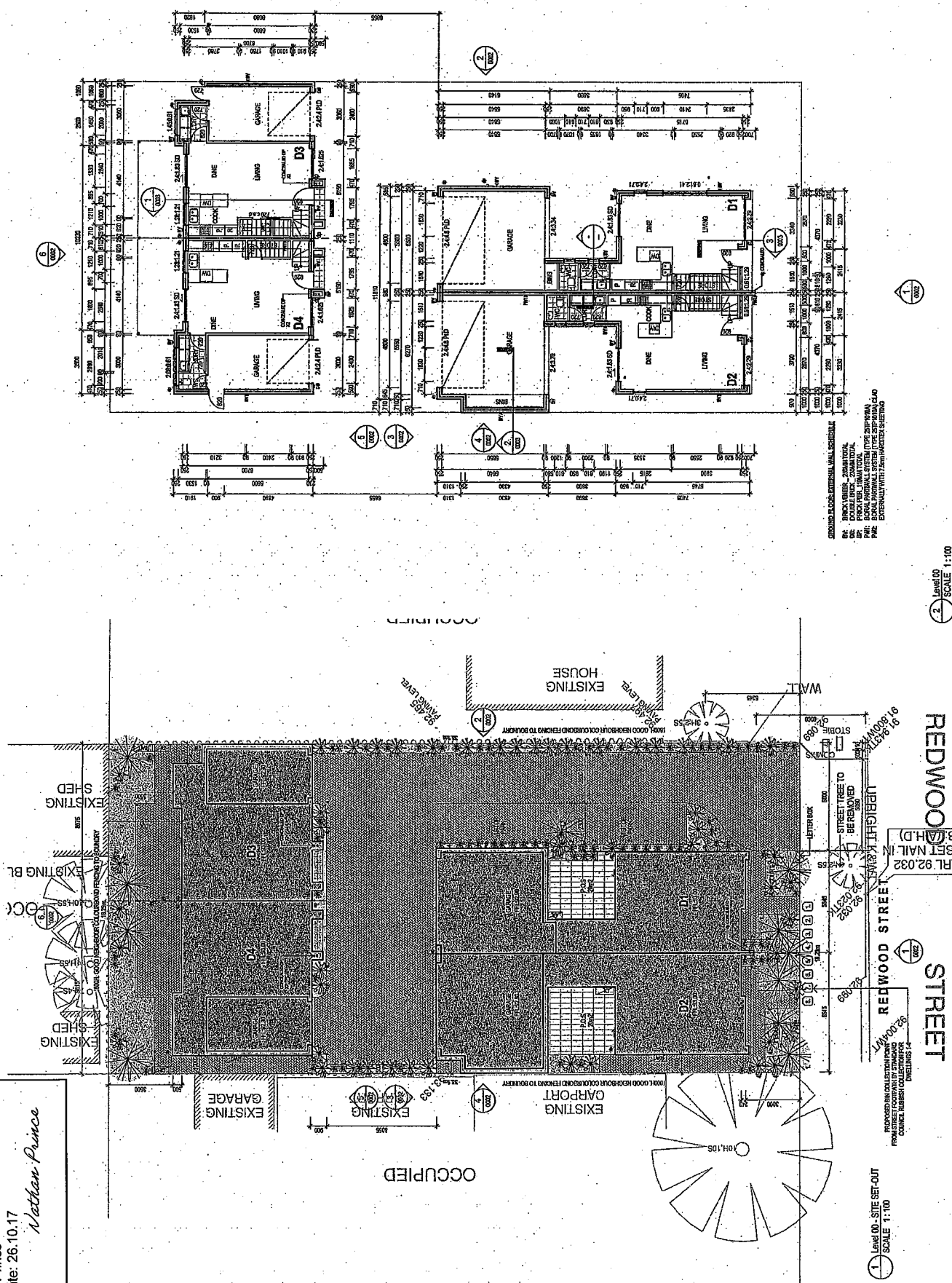
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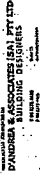
If inputs (including air movement levels) are valid



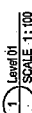


Notes & Layout
 Circulate and verify all dimensions on site before commencing work or preparing shop drawings. Do not make changes.

MR COSCIA



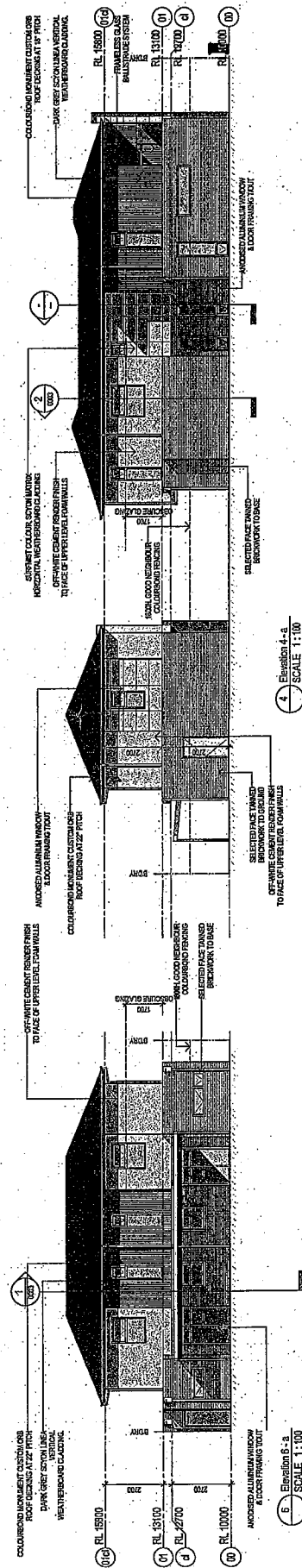
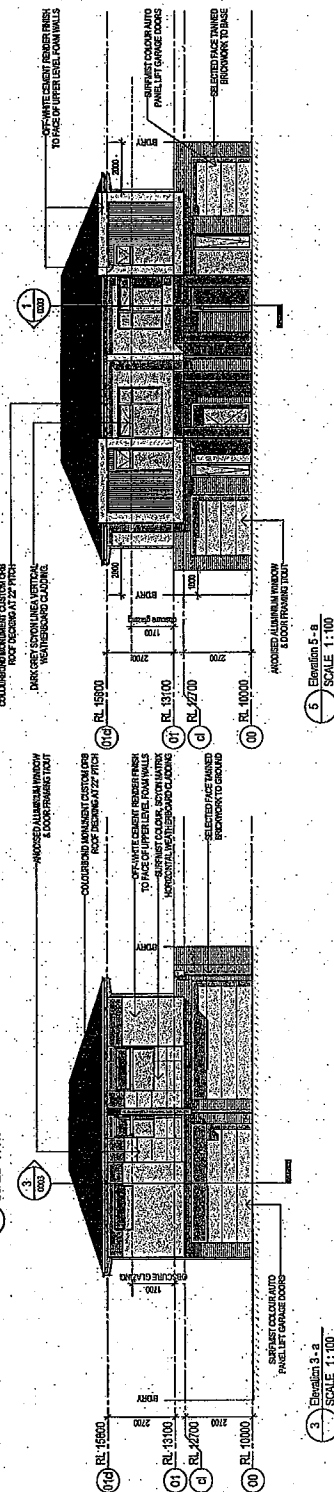
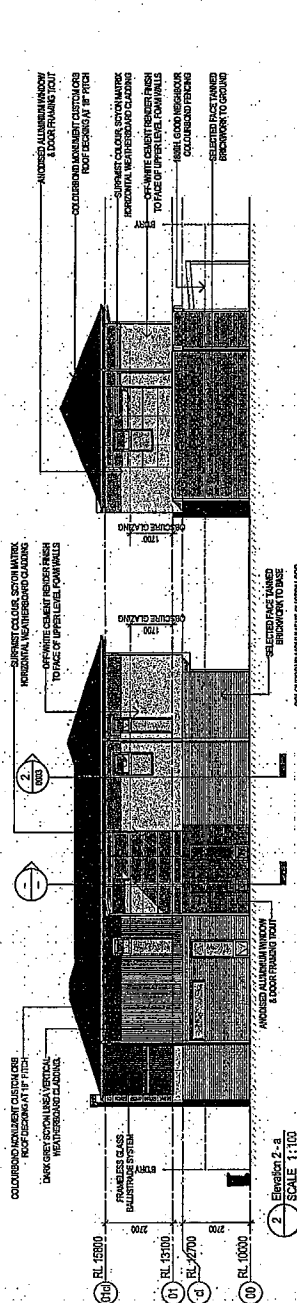
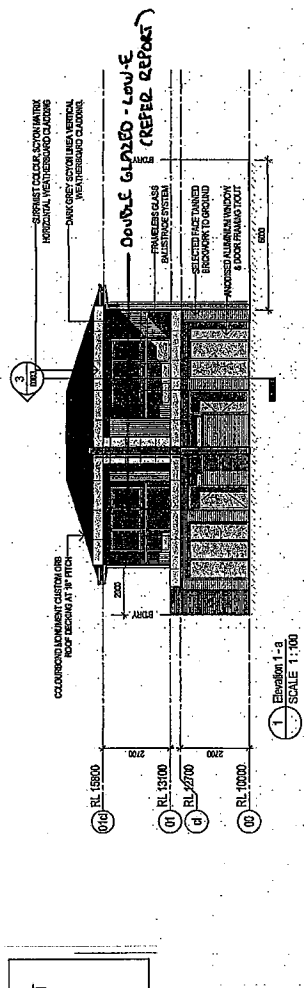
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Studies : : :

75MM REND EX POLYSTYRENE FOAM PANEL ON 25MM TOP HATS.
FIXED TO 60MM PACKING, 90MM TIMBER STUD FRAMING. M GRADE FOAM

170246 BEIR
ENERGY EFFICIENCY REPORT
N. Prince
Date: 26.10.17
Nathan Prince

NOTE:
ALL WINDOWS - ALUMINUM
SG HIGH SOLAR GAIN LOW-E
U.N.O
REFER REPORT FOR DETAILS



170246 BER
ENERGY EFFICIENCY REPORT
N. Prince
Date: 28.10.17
Nathan Prince

