ESD Analysis

Prepared For: KX Architecture Pty Ltd

Project: Development of 4 residential dwellings

Address: 8 Carpenter Street, Noble Park

Reference Number: 202405

Date: 23rd January 2024

Prepared by: Geokal Services Pty Ltd

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PREPARED BY: Geokal Services Pty Ltd

PROJECT: Development of 4 residential dwellings

AUTHOR: George Kalajdzic (DMN/11/2035) **SIGNED:**.....

Revision	Issue	Date
-	First issue	23rd January 2024

1. SCOPE

1.1. This report has been prepared for KX Architecture Pty Ltd. The scope of this report is to assess the proposed works at 8 Carpenter Street, Noble Park. This report will address the requirements and compliances to the National Construction Code (NCC) Part 3.12 using the alternative solution method of calculating the proposed building heating and cooling loads via House Energy Rating Software as per NCC 2019.

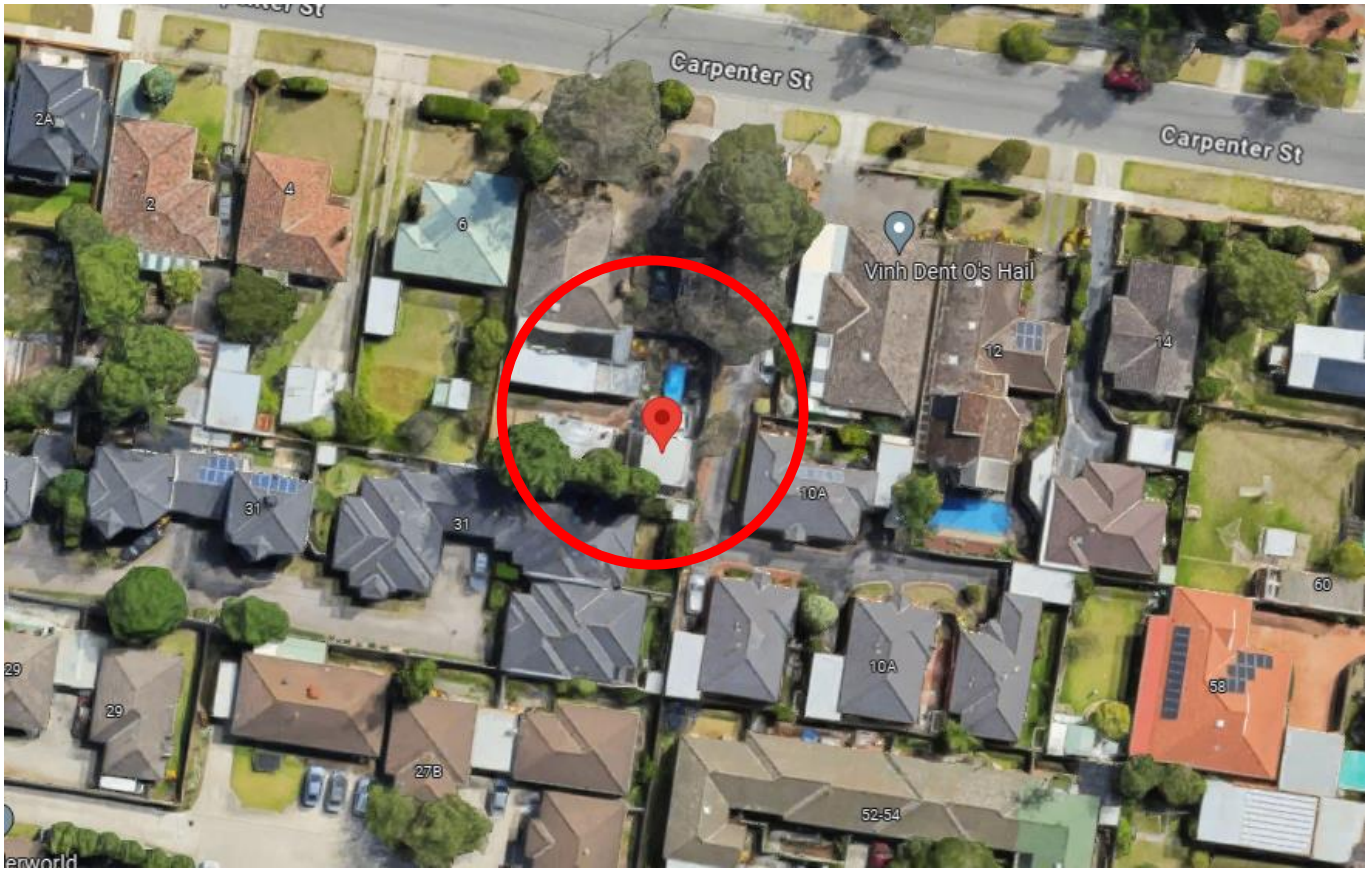
The BESS assessment has also been included as part of this report.

2. BUILDING DESCRIPTION

2.1. The proposed building consists of construction of 4 residential dwellings. Some building characteristics which are to be noted are as follows:

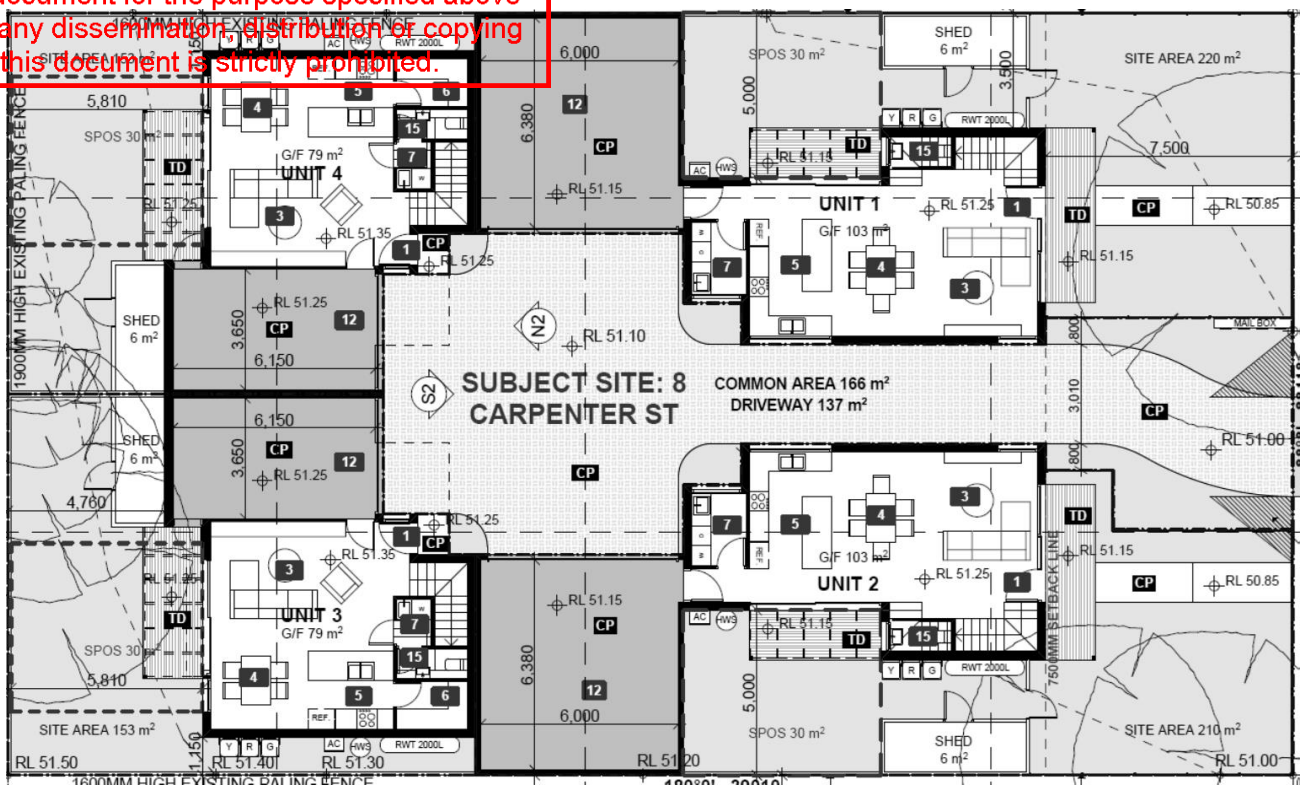
Climate Zone:	Melbourne (Zone 6)
Direction of Heat Flow:	Upwards
Roof Lights:	Non-Applicable
Class of Building:	1a (Dwelling)

Proposed development is located at 8 Carpenter Street, Noble Park. The proposed building site location is suburban and is surrounded by existing residential buildings and landscaping which provide some protection from the elements. The image along with the architectural drawings gives a clear indication of the above.



The following plans were used during this assessment:

GROUND FLOORPLAN



FIRST FLOORPLAN

3. DOCUMENTATION REVIEWED

3.1. Working Drawings TP1-22

4. ASSESSMENT METHOD

4.1. This project has been assessed using FirstRate5 version 5.2.3 and The BESS program has been used in addressing council objectives. No additional software has been used during this assessment.

5. LIMITATIONS

5.1. This report is to be strictly used as a verification method of the proposed building and is not to be used for any of the following;

- Used in validation or reference to any other building which are not nominated in this report,
- Used in validation of any heating or cooling services and systems.

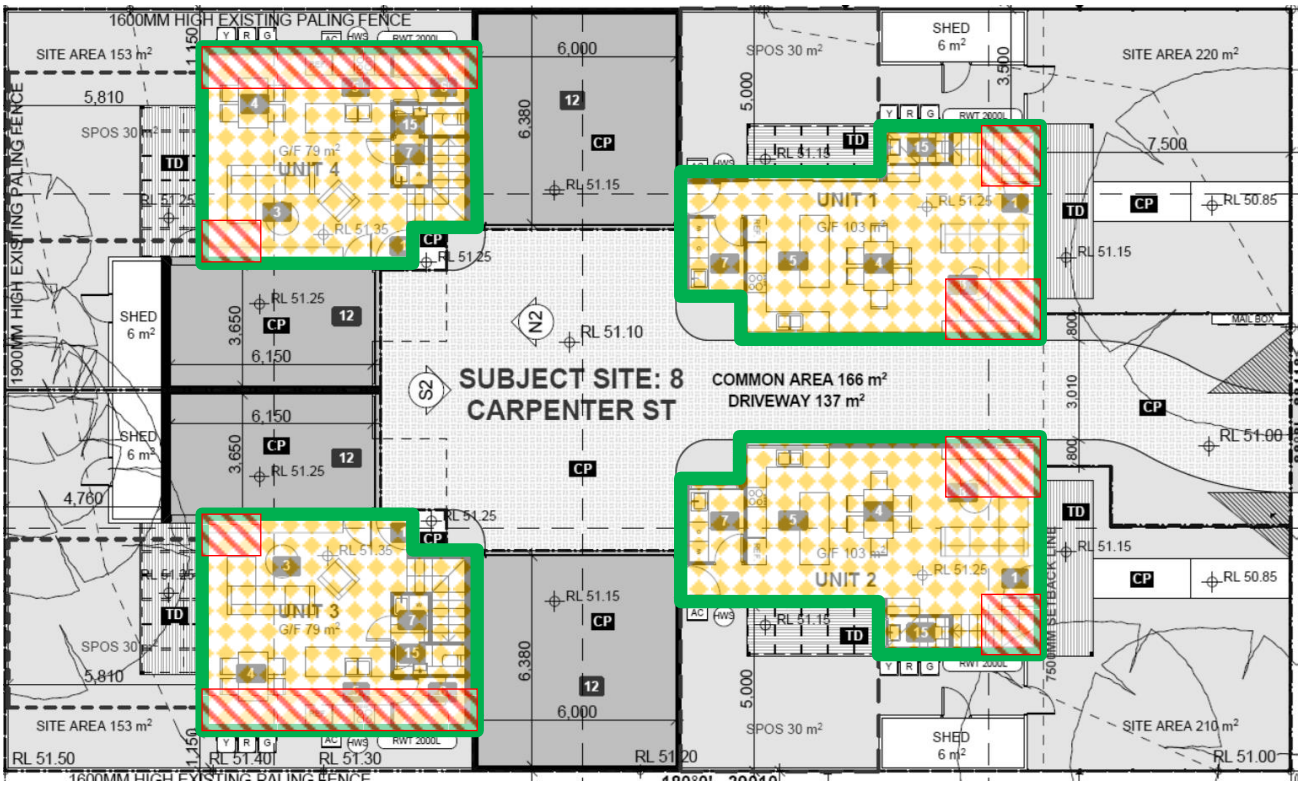
6. FINDINGS AND RESULTS

6.1. **Section 3.12.1 - Building Fabric**:

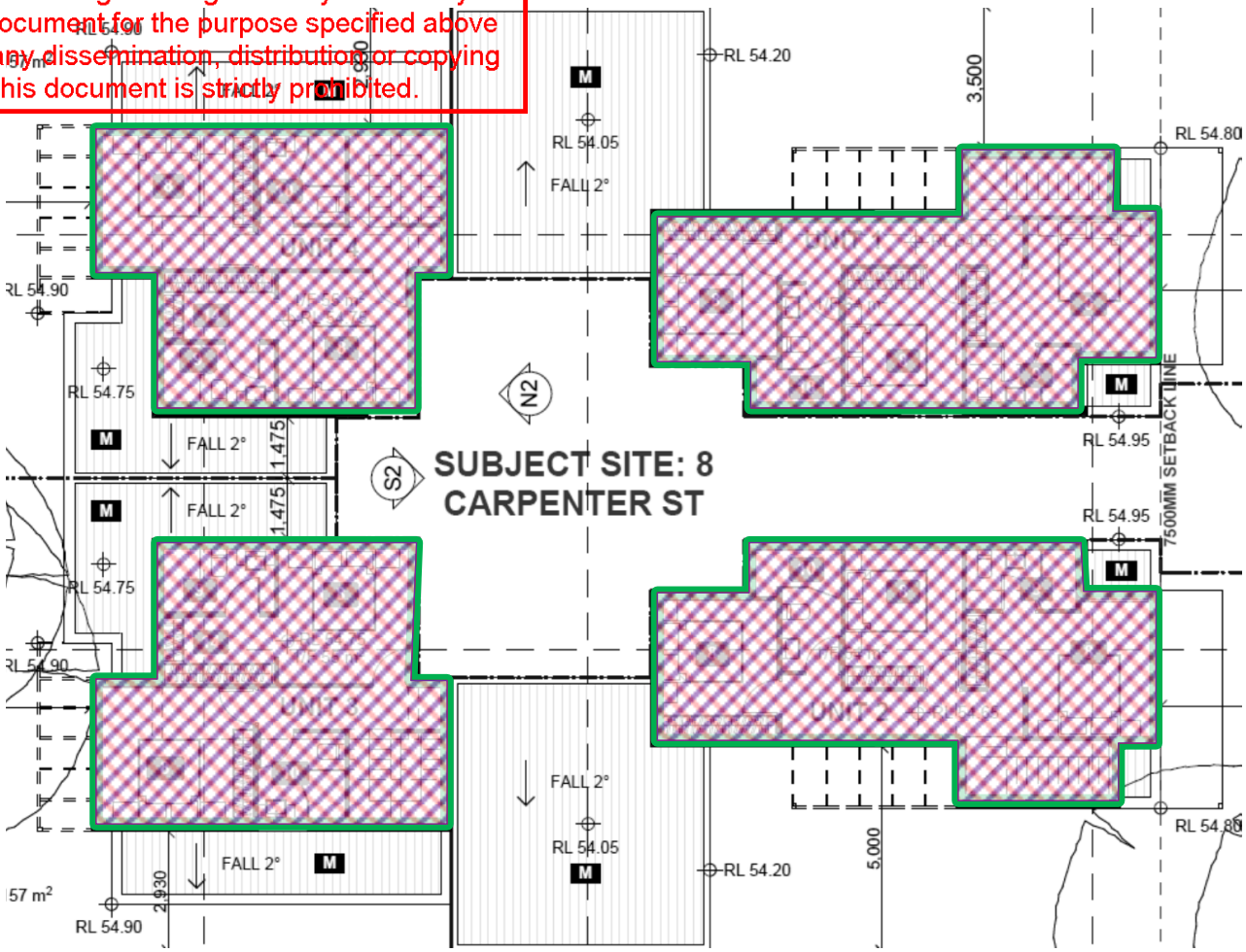
6.1..1. Building insulation requirements are as follows below;

ASSEMBLY	#MINIMUM INSULATION	LOCATION
*CEILING	R6.0	
WALLS	R2.5	
WALLS (Double for part walls)	R2.5	
FLOOR	R2.5	
UNDERSLAB INSULATION	R1.5	

GROUND FLOORPLAN



FIRST FLOORPLAN



Section 3.12.2 – External Glazing:

6.1..1.1. An assessment of the proposed glazing as nominated on the drawings has been taken into consideration as part of this energy rating assessment.;

WINDOW TYPE	*Window Type*	*MINIMUM U-Value*	*MINIMUM SOLAR HEAT GAIN COEFFICIENT (SHGC)*	*LOCATION*
Aluminium double glazed	Sliding Doors, fixed windows	U Value = 3.6	SHGC = 0.54	**Townhouse 1, 2 & 3**
	Awning Windows	U Value =3.6	SHGC = 0.47	

6.2. Section 3.12.3 – Building Sealing:

6.2..1.1. Building sealing procedures are to be as following:

- All roofs, walls, floors etc are to be constructed in a manner that will minimise airleakage and all doors and windows are to be adequately sealed by foam or rubber materials to prevent any air infiltration, and
- All exhaust fans, flues, evaporative coolers, or any other mechanical ventilation/temperature control systems are to be provided with self closing dampers or flaps that will seal and prevent any air infiltration.

6.3. Section 3.12.4 – Air Movement:

6.3..1.1. Air movement has been assessed as part of FirstRate assessment and has been taken into consideration as part of this star rating. Air movement is to comply with the requirements of BCA part F4, the relevant building surveyor is to assess and approve the proposed building to BCA Part F4. Compliance to BCA part F4 will ensure compliance with BCA part 3.12.4

6.4. Section 3.12.5 – Service:

6.4..1.1. No heating or cooling services have been considered as part of this FirstRate/Part 3.12 assessment. Plans/specifications are to make reference to the following service insulation procedures for any new ducted heating:

Service Unit	Insulation Location	Minimum R-Value of Insulation to be installed	Insulation Type
Central Heating (water pipes only)	Internal piping	0.2	9mm of closed cell polymer – or similar
	Piping located in ventilated wall space, enclosed sub-floor or roof space	0.45	19mm of closed cell polymer – or similar
	Piping located external to the building or unenclosed subfloor or roof space	0.6	25mm of closed cell polymer – or similar
Evaporative cooling systems	Ductwork	0.6	40mm polyester fibre insulation (250g/m²) – or similar
	Fittings	0.4	40mm polyester fibre insulation (250g/m²) – or similar
Heating only or refrigerated cooling only systems *See Note	Ductwork	1	70mm polyester fibre insulation (450g/m²) – or similar
	Fittings	0.4	40mm polyester fibre insulation (250g/m²) – or similar
Combined heating and refrigeration cooling systems	Ductwork	1.5	90mm polyester fibre insulation (800g/m²) – or similar
	Fittings	0.4	40mm polyester fibre insulation (250g/m²) – or similar

*Note: Total minimum R-Value for ductworks can be reduced by 0.5 if the ducts are located under a suspended floor with enclosed perimeter or in a roof space that has insulation of not less than R0.5 directly located beneath the roofing

6.5. Artificial Lighting and Power:

6.5..1.1. As no electrical design showing the relevant lighting wattage has been provided part 3.12.5. An alternative assessment has been undertaken and indicates that the development must be restricted to the below nominated watts per meter for each area.

All external perimeter lighting must be installed as per the following specifications;

(i) be controlled by—

(A) a daylight sensor; or

(B) 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

(C) have an average light source efficacy of not less than 60 Lumens/W; or

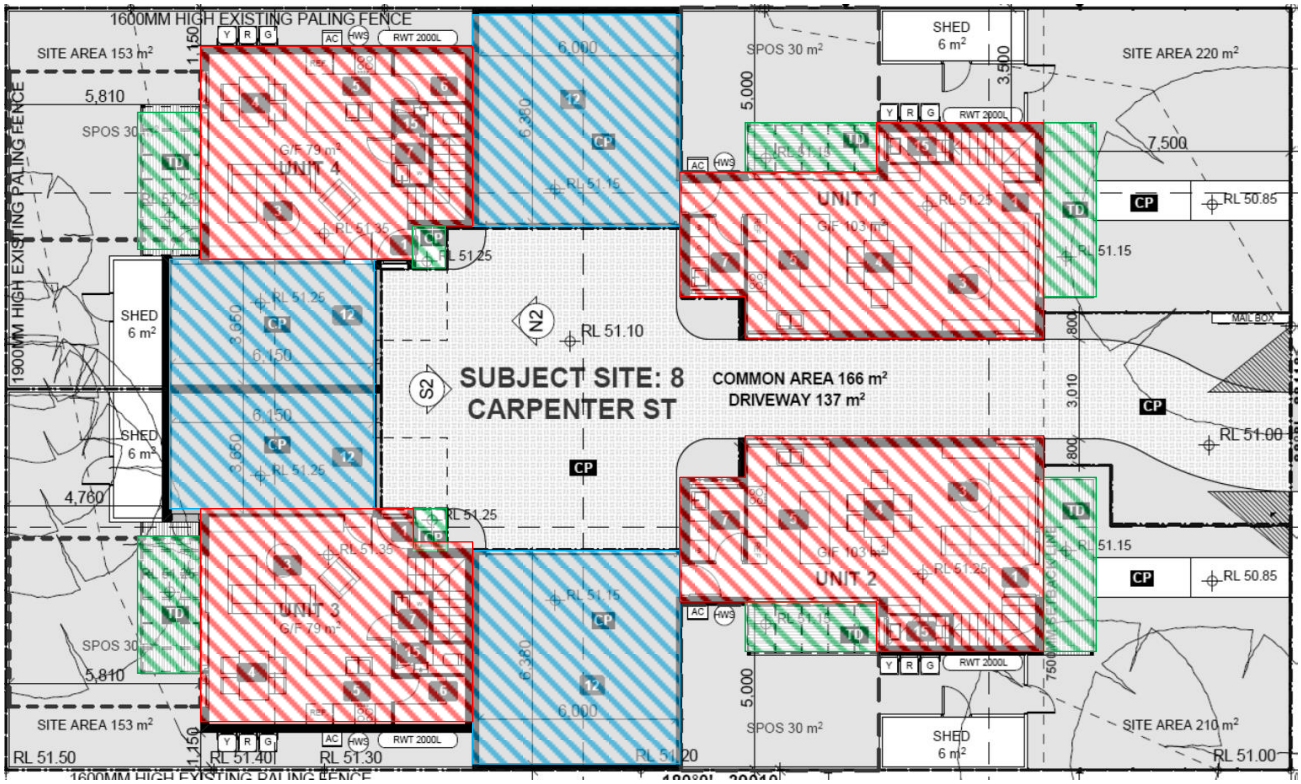
(D) be controlled by a motion detector; and

(ii) when used for decorative purposes, such as facade lighting or signage lighting, have a separate time switch.

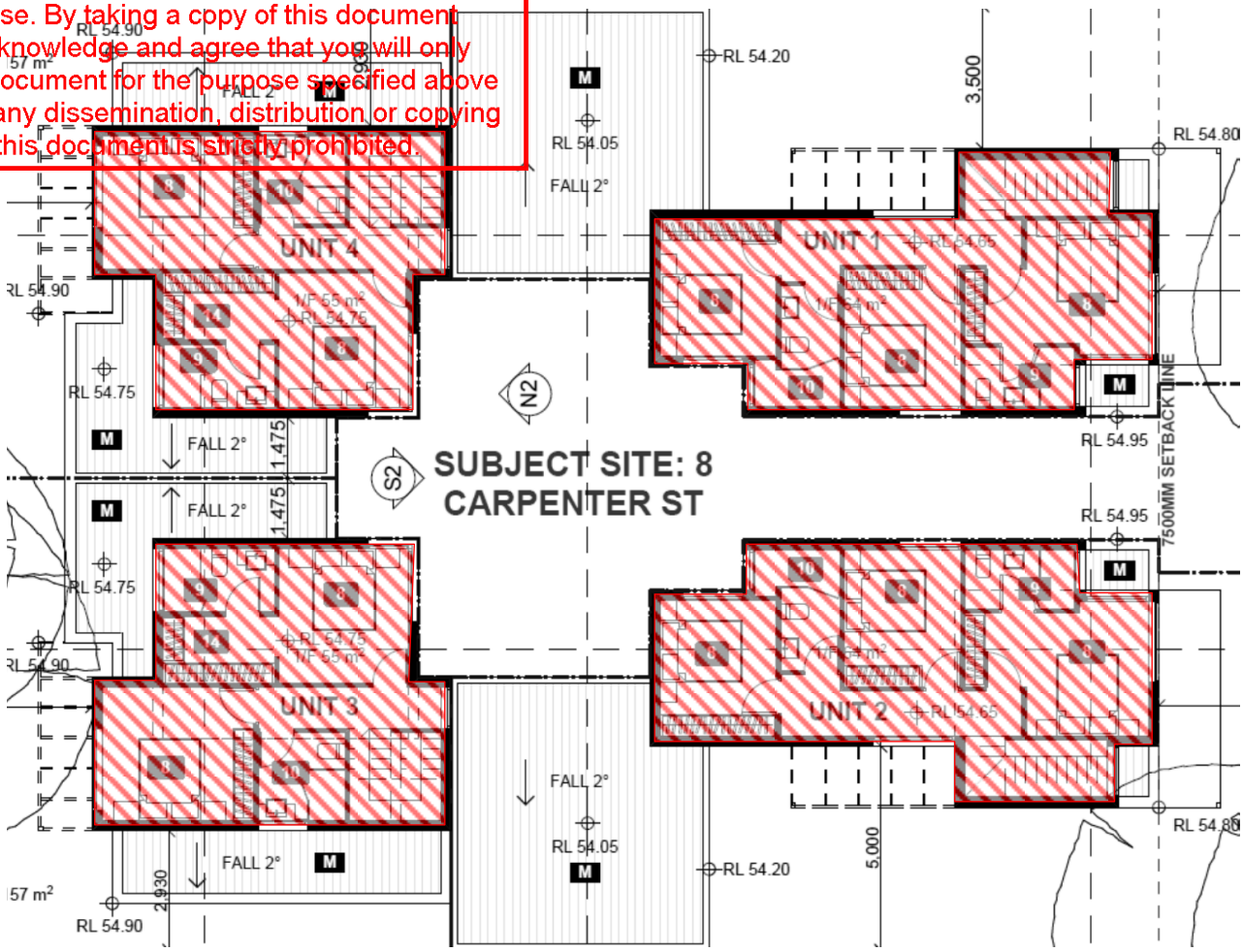
Artificial lighting and power is to be limited throughout the residential apartments, as a sufficient electrical design has not been provided, table and diagram below indicating the required maximum wattages to be adhered to.

SPACES	MAXIMUM WATTS PER METER	AREA
Residential Areas	4 W/m² (Reduced 20% from BCA allowance)	
Garage	2.4 W/m² (Reduced 20% from BCA allowance)	
Balcony/ Veranda	3.2 W/m² (Reduced 20% from BCA allowance)	

GROUND FLOORPLAN



FIRST FLOORPLAN



NatHERS Assessment

6.5..1.2. The following table is an overview to the NatHERS energy rating assessment undertaken using FirstRate assessment software for whole buildings.

Building	Star Rating	Heating Loads (MJ/m2)	Cooling Loads (MJ/m2)	Energy Consumption (MJ/m2)
Dwelling 1	6.1	100	21.2	121.2
Dwelling 2	6.3	91.9	21.3	113.2
Dwelling 3	6.3	99.2	16.1	115.3
Dwelling 4	6.2	101.1	15.4	116.5
Average	**6.2**	**98.05**	**18.5**	**116.5**

BESS Assessment

6.6..1.1. BESS assessment has been undertaken and prior to compliance of these requirements the following items must be actioned or shown on drawings

Items	Statue	Who to Action	Remark
External lighting sensors annotated	Incomplete	Architect Electrical Engineer	Make a note / Show external lighting sensors
Location of any stormwater management systems used in STORM and rainwater tanks	Incomplete	Architect Civil Engineer	Show permeable concrete required as part of STORM rating, must be engineered by civil engineer A minimum 2500L water tank installed to each

			house (100% of roof to discharge into tanks), toilets and laundries to be connected to the tanks.
Water efficient garden annoted	Incomplete	Architect	Drawings to be amended to nominate usage of only low water use plant selection and specify water efficient irrigation (i.e. drip irrigation with timers and rain sensors)
Glazing specification to be annotated	Incomplete	Architect	Show window and glazing specification as per this report

6.6..1.2. The following table is an overview to the BESS assessment which gave this project a score of 57% out of 100%:

	Management (33% Score)
2.2	**Thermal Performance Modelling (Multi-Dwelling Residential) –** Preliminary NatHERS ratings have been undertaken, it has demonstrated that townhouses will be achieving a minimum star rating of 6.0 stars.

	Water (66% Score)
	Water Approach – Water approach has been assessed using the BESS built in calculation tools.
	Water Profile Questions – As part of this project a 2,500litre rainwater tank will be installed to each townhouse. A total of approximate 364square meters of roof area will be connected to the rainwater tanks.
	Water fixtures, fittings and connections – The following fixtures and fittings are to be installed; - *Showerheads* = 4 Star WELS (>6.0 but <=7.5) - *Kitchen Taps* = 5 Star WELS - *Bathroom Taps* = 5 Star WELS - *WC* = 3 Star WELS - *Rainwater Tank* = All toilets and laundries are to be connected to the rainwater tank
1.1	**Potable Water Use Reduction (Interior Uses) –** BESS assessment tool has calculated a credit of 40% for this section.
2.1	**Rainwater Collection & Reuse –** BESS assessment tool has calculated a credit of 100% for this section.
3.1	**Water Efficient Landscaping –** BESS assessment tool has calculated a credit of 100% for this section. Plants to be installed that use low water use plant selection, water efficient irrigation such as drip irrigation with timers and rain sensors.

	Energy (50% Score)
	Energy Approach – The BESS build in calculation tools have been used to approach the energy section.
	Energy Profile Questions – No gas supply will be installed, development will be wholly all-electric.

	Dwelling Energy – The following is an overview of energy efficiency for townhouses and the required appliance efficiencies to be installed: - *NatHERS ratings* = All Townhouses will achieve an average of 6.0 stars - *Type of Heating* = Reverse cycled central heating, achieving efficiency of 4 stars - *Type of Cooling* = Refrigerate central, achieving efficiency of 4 stars - *Type of Hot Water System* = Electric Heat Pump Band 2 - *Clothes Line* = Private outdoor clotheslines
2.1	**Greenhouse Gas Emissions –** BESS assessment tool has calculated a credit of 100% for this section.
2.3	**Electricity Consumption –** BESS assessment tool has calculated a credit of 100% for this section.
2.4	**Gas Consumption –** BESS assessment tool has calculated a credit of 100% for this section.
2.6	**Electrification –** BESS assessment tool has calculated a credit of 100% for this section.
3.2	**Hot Water –** BESS assessment tool has calculated a credit of 100% for this section.
3.3	**External Lighting –** BESS assessment tool has calculated a credit of 100% for this section, external lighting will be controlled by a motion detector.
3.4	**Clothes Drying –** BESS assessment tool has calculated a credit of 100% for this section. Each building will be provided with Private Outdoor clothes line approximately 700mm x 1200mm in area.
3.6	**Internal Lighting (Residential Multiple Dwelling) –** The W/m² of illumination power density will be limited to be 20% lower than as that required under NCC/BCA. Development will achieve a maximum illumination power density of 4W/sqm or less will be achieved. BESS assessment tool has calculated a credit of 100% for this section.
3.7	**Internal Lighting (Non-Residential) –** The W/m² of illumination power density will be limited to be 20% lower than as that required under NCC/BCA. BESS assessment tool has calculated a credit of 100% for this section.

Stormwater (100% Score)

1.1 **Stormwater Treatment –**

Melbourne Water STORM rating has been undertaken achieving a score rating of 101%.

A minimum combined roof area of 364m² (100% of roof area) must be connected to a 2500litre water tanks to each dwelling. All toilets and laundries are to be connected to the water tanks. For STORM rating please see appendix 4.

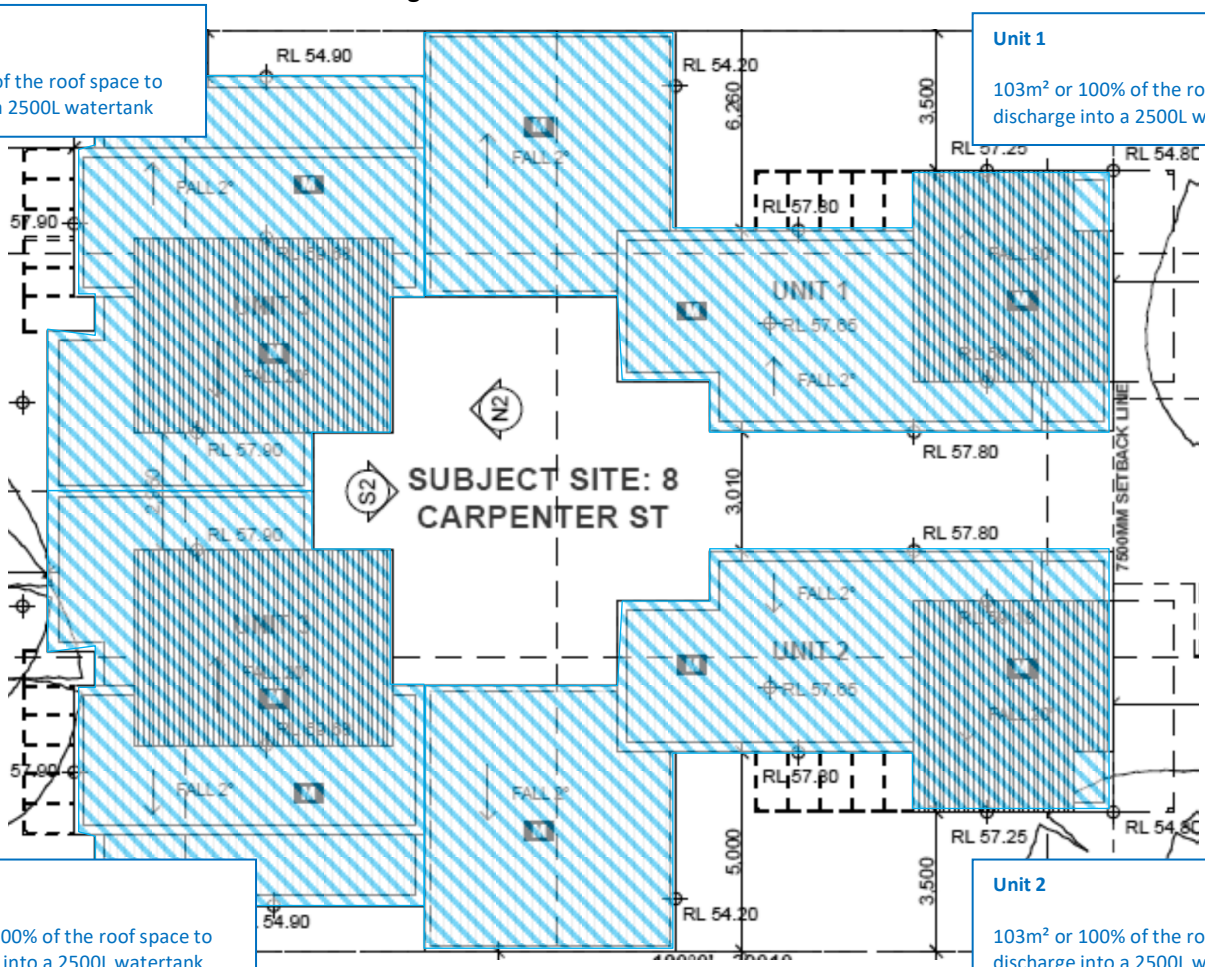
Water tank Design

Unit 3

79m² or 100% of the roof space to discharge into a 2500L watertank

Unit 1

103m² or 100% of the roof space to discharge into a 2500L watertank



Unit 3

79m² or 100% of the roof space to discharge into a 2500L watertank

Unit 2

103m² or 100% of the roof space to discharge into a 2500L watertank

Indoor Environment Quality (60% Score)

3.1 **Thermal Comfort- Double Glazing –**

BESS assessment tool has calculated a credit of 100% for this section.

All townhouses will be installed with double glazing to all bedrooms and living areas.

Paints

Proposed design principals must ensure that adequate natural lighting and ventilation will be provided to all habitable rooms in accordance with the requirements of the BCA. Development commits that all paints and internal finishes are selected based on low Volatile Organic Compounds (VOCs), this will ensure that building occupants are exposed to low toxicity materials.

Transport (50% Score)	
1.1	**Bicycle Parking (Residential) –** BESS assessment tool has calculated a credit of 100% for this section. Townhouses will be provided 4 bicycle parking spaces as required, 1 per town house.

Waste (50% Score)	
2.1	**Operational Waste (Food & Garden Waste) –** BESS assessment tool has calculated a credit of 100% for this section as facilities will be provided for onsite management of food and garden waste, such as composting bins.

Urban Ecology (62% Score)	
2.1	**Vegetation –** BESS assessment tool has calculated a credit of 100% for this section as the site is covered with 33% vegetation.
3.1	**Food Production (Residential)–** BESS assessment tool has calculated a credit of 0% for this section.

Innovation	
1.1	**Innovation –** BESS assessment tool has calculated a credit of 0% as we are not seeking any innovation credits.

6.6..1.3. **Urban Ecology**

As part of proposed construction works, only indigenous vegetation will be planted to buildings gardens and surrounding lands. During time of construction, special care will be taken by building contractors to ensure that contamination from products such as concrete, paint, adhesives etc to land is minimised by placing special bins and wash-up areas.

6.6..1.4. **Sustainable Materials**

Development will be committed to using either of the following sustainable materials;

- Supplementary Cementing Material (SCMs) with all Portland cement are to be used for building footing and driveway construction, or
- All timber used in construction must be either PEFC or FSC sustainable certified timers.

Drawings are to be amended to note the above commitment and it will be the builders responsibility to ensure the commitments are met.

7. CONCLUSION

7.1. An assessment of the proposed works has shown that the works will achieve an overall rating of 6.0 stars. All insulation requirements are to be as nominated in the FirstRate report with additional insulation and as per clause 6.1 of this report.

The BESS assessment concludes that the proposed new development will achieve a score of 54% out of 100%.

Any alteration or variations to the proposed building fabric, window schedules and building form could detriment the star rating and BESS outcomes, and further reassessment may need to be conducted.

Appendix 1 – Sustainable Management Plan

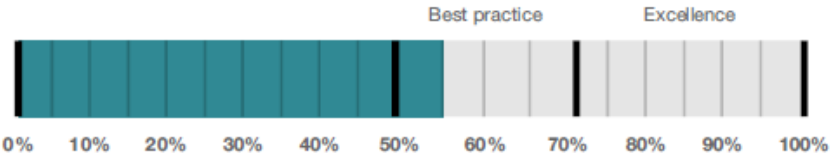
BESS Report

Built Environment Sustainability Scorecard

This BESS report outlines the sustainable design commitments of the proposed development at 8 Carpenter St Noble Park Victoria 3174. The BESS report and accompanying documents and evidence are submitted in response to the requirement for a Sustainable Design Assessment or Sustainability Management Plan at Greater Dandenong City Council.

Note that where a Sustainability Management Plan is required, the BESS report must be accompanied by a report that further demonstrates the development's potential to achieve the relevant environmental performance outcomes and documents the means by which the performance outcomes can be achieved.

Your BESS Score

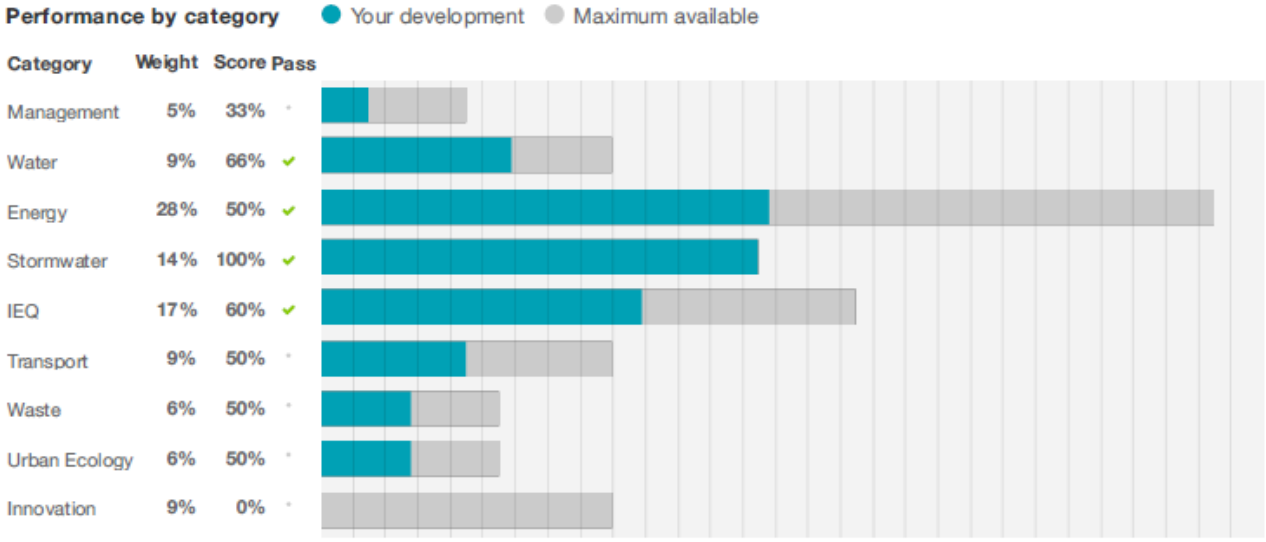


54%

Project details

Address	8 Carpenter St Noble Park Victoria 3174
Project no	BA9F5D93-R1
BESS Version	BESS-7
Site type	Multi dwelling (dual occupancy, townhouse, villa unit etc)
Account	geokalconsult@gmail.com
Application no.	
Site area	902.00 m²
Building floor area	602.00 m²
Date	22 January 2024
Software version	1.8.1-B.407

Performance by category



Dwellings & Non-Res Spaces

Dwellings

Name	Quantity	Area	% of total area
Townhouse			
Townhouse 1 & 2	2	167 m²	55%
Townhouse 3 & 4	2	134 m²	44%
Total	**4**	**602 m²**	**100%**

Supporting information

Floorplans & elevation notes

Credit	Requirement	Response	Status
Water 3.1	Annotation: Water efficient garden details		-
Energy 3.3	Annotation: External lighting controlled by motion sensors		-
Energy 3.4	Location of clothes line (if proposed)		-
Stormwater 1.1	Location of any stormwater management systems (rainwater tanks, raingardens, buffer strips)		-
IEQ 3.1	Annotation: Glazing specification (U-value, SHGC)		-
IEQ 3.3	North-facing living areas		-
Transport 1.1	Location of residential bicycle parking spaces		-
Waste 2.1	Location of food and garden waste facilities		-
Urban Ecology 2.1	Location and size of vegetated areas		-

Supporting evidence

Credit	Requirement	Response	Status
Management 2.2	Preliminary NatHERS assessments		-
Energy 3.5	Average lighting power density and lighting type(s) to be used		-
Stormwater 1.1	STORM report or MUSIC model		-
IEQ 3.1	Reference to floor plans or energy modelling showing the glazing specification (U-value and Solar Heat Gain Coefficient, SHGC)		-
IEQ 3.3	Reference to the floor plans showing living areas orientated to the north		-

Credit summary

Management Overall contribution 4.5%

1.1 Pre-Application Meeting	0%
2.2 Thermal Performance Modelling - Multi-Dwelling Residential	100%
4.1 Building Users Guide	0%

Water Overall contribution 9.0%

	Minimum required 50%	66%	✔ Pass
1.1 Potable Water Use Reduction		60%	
3.1 Water Efficient Landscaping		100%	

Energy Overall contribution 27.5%

	Minimum required 50%	50%	✔ Pass
1.2 Thermal Performance Rating - Residential		0%	
2.1 Greenhouse Gas Emissions		100%	
2.2 Peak Demand		0%	
2.3 Electricity Consumption		100%	
2.4 Gas Consumption		N/A	◈ Scoped Out
		No gas connection in use	
2.5 Wood Consumption		N/A	◈ Scoped Out
		No wood heating system present	
2.6 Electrification		100%	
3.2 Hot Water		100%	
3.3 External Lighting		100%	
3.4 Clothes Drying		100%	
3.5 Internal Lighting - Houses and Townhouses		100%	
4.4 Renewable Energy Systems - Other		0%	⊘ Disabled
		No other (non-solar PV) renewable energy is in use.	
4.5 Solar PV - Houses and Townhouses		0%	⊘ Disabled
		No solar PV renewable energy is in use.	

Stormwater Overall contribution 13.5%

	Minimum required 100%	100%	✔ Pass
1.1 Stormwater Treatment		100%	

IEQ Overall contribution 16.5%

	Minimum required 50%	60%	✔ Pass
2.2 Cross Flow Ventilation		0%	
3.1 Thermal comfort - Double Glazing		100%	
3.2 Thermal Comfort - External Shading		0%	
3.3 Thermal Comfort - Orientation		100%	

Transport Overall contribution 9.0%

	50%	
1.1 Bicycle Parking - Residential	100%	
1.2 Bicycle Parking - Residential Visitor	N/A	Scoped Out
		Not enough dwellings.
2.1 Electric Vehicle Infrastructure	0%	

Waste Overall contribution 5.5%

	50%	
1.1 - Construction Waste - Building Re-Use	0%	
2.1 - Operational Waste - Food & Garden Waste	100%	

Urban Ecology Overall contribution 5.5%

	50%	
2.1 Vegetation	100%	
2.2 Green Roofs	0%	
2.3 Green Walls and Facades	0%	
2.4 Private Open Space - Balcony / Courtyard Ecology	0%	
3.1 Food Production - Residential	0%	

Innovation Overall contribution 9.0%

	0%	
1.1 Innovation	0%	

Credit breakdown

Management Overall contribution 1%

1.1 Pre-Application Meeting		0%
Score Contribution	This credit contributes 50.0% towards the category score.	
Criteria	Has an ESD professional been engaged to provide sustainability advice from schematic design to construction? AND Has the ESD professional been involved in a pre-application meeting with Council?	
Question	Criteria Achieved ?	
Project	No	
2.2 Thermal Performance Modelling - Multi-Dwelling Residential		100%
Score Contribution	This credit contributes 33.3% towards the category score.	
Criteria	Have preliminary NatHERS ratings been undertaken for all thermally unique dwellings?	
Question	Criteria Achieved ?	
Townhouse	Yes	
4.1 Building Users Guide		0%
Score Contribution	This credit contributes 16.7% towards the category score.	
Criteria	Will a building users guide be produced and issued to occupants?	
Question	Criteria Achieved ?	
Project	No	

Water Overall contribution 9% Minimum required 50%

Water Approach	
What approach do you want to use for Water?:	Use the built in calculation tools
Project Water Profile Question	
Do you have a reticulated third pipe or an on-site water recycling system?:	No
Are you installing a swimming pool?:	No
Are you installing a rainwater tank?:	Yes
Water fixtures, fittings and connections	
Showerhead: All	4 Star WELS (>= 6.0 but <= 7.5)
Bath: All	Scope out
Kitchen Taps: All	>= 5 Star WELS rating
Bathroom Taps: All	>= 5 Star WELS rating
Dishwashers: All	Default or unrated
WC: All	>= 3 Star WELS rating
Urinals: All	Scope out
Washing Machine Water Efficiency: All	Occupant to Install
Which non-potable water source is the dwelling/space connected to?:	
Townhouse 1 & 2	Tanks 1-2
Townhouse 3 & 4	Tanks 3-4
Non-potable water source connected to Toilets: All	Yes
Non-potable water source connected to Laundry (washing machine): All	Yes
Non-potable water source connected to Hot Water System: All No	
Rainwater Tanks	
What is the total roof area connected to the rainwater tank?:	
Tanks 1-2	206 m^2
Tanks 3-4	158 m^2
Tank Size:	
Tanks 1-2	5,000 Litres
Tanks 3-4	5,000 Litres
Irrigation area connected to tank:	
Tanks 1-2	-
Tanks 3-4	-
Is connected irrigation area a water efficient garden?:	
Tanks 1-2	Yes
Tanks 3-4	Yes
Other external water demand connected to tank?:	
Tanks 1-2	-
Tanks 3-4	-

1.1 Potable Water Use Reduction		60%
Score Contribution	This credit contributes 83.3% towards the category score.	
Criteria	What is the reduction in total potable water use due to efficient fixtures, appliances, rainwater use and recycled water use? To achieve points in this credit there must be >25% potable water reduction.	
Output	Reference	
Project	719 kL	
Output	Proposed (excluding rainwater and recycled water use)	
Project	602 kL	
Output	Proposed (including rainwater and recycled water use)	
Project	387 kL	
Output	% Reduction in Potable Water Consumption	
Project	46 %	
Output	% of connected demand met by rainwater	
Project	99 %	
Output	How often does the tank overflow?	
Project	Often	
Output	Opportunity for additional rainwater connection	
Project	144 kL	
3.1 Water Efficient Landscaping		100%
Score Contribution	This credit contributes 16.7% towards the category score.	
Criteria	Will water efficient landscaping be installed?	
Question	Criteria Achieved ?	
Project	Yes	

Energy

Minimum required 50%

Dwellings Energy Approach	
What approach do you want to use for Energy?:	Use the built in calculation tools

Project Energy Profile Question	
Are you installing any solar photovoltaic (PV) system(s)?:	-
Are you installing any other renewable energy system(s)?:	No
Energy Supply:	All-electric

Dwelling Energy Profiles	
Below the floor is: All	Ground or Carpark
Above the ceiling is: All	Outside
Exposed sides: All	3
NatHERS Annual Energy Loads - Heat:	
Townhouse 1 & 2	95.9 MJ/sqm
Townhouse 3 & 4	100 MJ/sqm
NatHERS Annual Energy Loads - Cool:	
Townhouse 1 & 2	21.2 MJ/sqm
Townhouse 3 & 4	15.7 MJ/sqm
NatHERS star rating: All	6.2
Type of Heating System: All	Reverse cycle space
Heating System Efficiency: All	4 Star
Type of Cooling System: All	Refrigerative space
Cooling System Efficiency: All	4 Stars
Type of Hot Water System: All	Electric Heat Pump Band 2
Clothes Line: All	Private outdoor clothesline
Clothes Dryer: All	Occupant to Install

1.2 Thermal Performance Rating - Residential	0%
Score Contribution	This credit contributes 30.0% towards the category score.
Criteria	What is the average NatHERS rating?
Output	Average NATHERS Rating (Weighted)
Townhouse	6.2 Stars

2.1 Greenhouse Gas Emissions	100%
Score Contribution	This credit contributes 10.0% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?
Output	Reference Building with Reference Services (BCA only)
Townhouse	41,588 kg CO_2
Output	Proposed Building with Proposed Services (Actual Building)
Townhouse	11,113 kg CO_2
Output	% Reduction in GHG Emissions
Townhouse	73 %

2.2 Peak Demand		0%	
Score Contribution	This credit contributes 5.0% towards the category score.		
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?		
Output	Peak Thermal Cooling Load - Baseline		
Townhouse	51.4 kW		
Output	Peak Thermal Cooling Load - Proposed		
Townhouse	51.5 kW		
Output	Peak Thermal Cooling Load - % Reduction		
Townhouse	-1 %		
2.3 Electricity Consumption		100%	
Score Contribution	This credit contributes 10.0% towards the category score.		
Criteria	What is the % reduction in annual electricity consumption against the benchmark?		
Output	Reference		
Townhouse	40,772 kWh		
Output	Proposed		
Townhouse	10,895 kWh		
Output	Improvement		
Townhouse	73 %		
2.4 Gas Consumption		N/A	Scoped Out
This credit was scoped out	No gas connection in use		
2.5 Wood Consumption		N/A	Scoped Out
This credit was scoped out	No wood heating system present		
2.6 Electrification		100%	
Score Contribution	This credit contributes 10.0% towards the category score.		
Criteria	Is the development all-electric?		
Question	Criteria Achieved?		
Project	Yes		
3.2 Hot Water		100%	
Score Contribution	This credit contributes 5.0% towards the category score.		
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?		
Output	Reference		
Townhouse	53,434 MJ		
Output	Proposed		
Townhouse	12,783 MJ		
Output	Improvement		
Townhouse	76 %		

3.3 External Lighting		100%	
Score Contribution	This credit contributes 5.0% towards the category score.		
Criteria	Is the external lighting controlled by a motion detector?		
Question	Criteria Achieved ?		
Townhouse	Yes		
3.4 Clothes Drying		100%	
Score Contribution	This credit contributes 5.0% towards the category score.		
Criteria	What is the % reduction in annual energy consumption (gas and electricity) from a combination of clothes lines and efficient driers against the benchmark?		
Output	Reference		
Townhouse	2,690 kWh		
Output	Proposed		
Townhouse	538 kWh		
Output	Improvement		
Townhouse	80 %		
3.5 Internal Lighting - Houses and Townhouses		100%	
Score Contribution	This credit contributes 5.0% towards the category score.		
Criteria	Does the development achieve a maximum illumination power density of 4W/sqm or less?		
Question	Criteria Achieved?		
Townhouse	Yes		
4.4 Renewable Energy Systems - Other		0%	⊘ Disabled
This credit is disabled	No other (non-solar PV) renewable energy is in use.		
4.5 Solar PV - Houses and Townhouses		0%	⊘ Disabled
This credit is disabled	No solar PV renewable energy is in use.		

Stormwater

Overall contribution 14% Minimum required 100%

Which stormwater modelling are you using?:	Melbourne Water STORM tool	
1.1 Stormwater Treatment	100%	
Score Contribution	This credit contributes 100.0% towards the category score.	
Criteria	Has best practice stormwater management been demonstrated?	
Question	STORM score achieved	
Project	101	
Output	Min STORM Score	
Project	100	

2.2 Cross Flow Ventilation		0%
Score Contribution	This credit contributes 20.0% towards the category score.	
Criteria	Are all habitable rooms designed to achieve natural cross flow ventilation?	
Question	Criteria Achieved ?	
Townhouse	No	
3.1 Thermal comfort - Double Glazing		100%
Score Contribution	This credit contributes 40.0% towards the category score.	
Criteria	Is double glazing (or better) used to all habitable areas?	
Question	Criteria Achieved ?	
Townhouse	Yes	
3.2 Thermal Comfort - External Shading		0%
Score Contribution	This credit contributes 20.0% towards the category score.	
Criteria	Is appropriate external shading provided to east, west and north facing glazing?	
Question	Criteria Achieved ?	
Townhouse	No	
3.3 Thermal Comfort - Orientation		100%
Score Contribution	This credit contributes 20.0% towards the category score.	
Criteria	Are at least 50% of living areas orientated to the north?	
Question	Criteria Achieved ?	
Townhouse	Yes	

Transport Overall contribution 4%

1.1 Bicycle Parking - Residential		100%	
Score Contribution	This credit contributes 50.0% towards the category score.		
Criteria	How many secure and undercover bicycle spaces are there per dwelling for residents?		
Question	Bicycle Spaces Provided ?		
Townhouse	4		
Output	Min Bicycle Spaces Required		
Townhouse	4		
1.2 Bicycle Parking - Residential Visitor		N/A	Scoped Out
This credit was scoped out	Not enough dwellings.		
2.1 Electric Vehicle Infrastructure		0%	
Score Contribution	This credit contributes 50.0% towards the category score.		
Criteria	Are facilities provided for the charging of electric vehicles?		
Question	Criteria Achieved ?		
Project	No		

Waste

1.1 - Construction Waste - Building Re-Use		0%
Score Contribution	This credit contributes 50.0% towards the category score.	
Criteria	If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used?	
Question	Criteria Achieved ?	
Project	No	
2.1 - Operational Waste - Food & Garden Waste		100%
Score Contribution	This credit contributes 50.0% towards the category score.	
Criteria	Are facilities provided for on-site management of food and garden waste?	
Question	Criteria Achieved ?	
Project	Yes	

Urban Ecology Overall contribution 50%

2.1 Vegetation		100%
Score Contribution	This credit contributes 50.0% towards the category score.	
Criteria	How much of the site is covered with vegetation, expressed as a percentage of the total site area?	
Question	Percentage Achieved ?	
Project	41 %	
2.2 Green Roofs		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Does the development incorporate a green roof?	
Question	Criteria Achieved ?	
Project	No	
2.3 Green Walls and Facades		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Does the development incorporate a green wall or green façade?	
Question	Criteria Achieved ?	
Project	No	
2.4 Private Open Space - Balcony / Courtyard Ecology		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	Is there a tap and floor waste on every balcony / in every courtyard?	
Question	Criteria Achieved ?	
Townhouse	No	
3.1 Food Production - Residential		0%
Score Contribution	This credit contributes 12.5% towards the category score.	
Criteria	What area of space per resident is dedicated to food production?	
Question	Food Production Area	
Townhouse	-	
Output	Min Food Production Area	
Townhouse	3 m^2	

Innovation Overall contribution 0%

1.1 Innovation		0%
Score Contribution	This credit contributes 100.0% towards the category score.	
Criteria	What percentage of the Innovation points have been claimed (10 points maximum)?	

Disclaimer

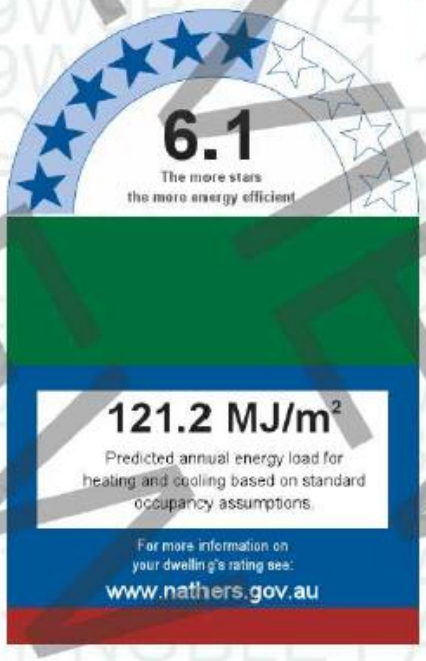
The Built Environment Sustainability Scorecard (BESS) has been provided for the purpose of information and communication. While we make every effort to ensure that material is accurate and up to date (except where denoted as 'archival'), this material does in no way constitute the provision of professional or specific advice. You should seek appropriate, independent, professional advice before acting on any of the areas covered by BESS.

Appendix 2 – FirstRate Ratings

Nationwide House Energy Rating Scheme

NatHERS Certificate

Generated on 23 Jan 2024 using FirstRate5: 5.3.2b (3.21)



Property

Address	1, 8 Carpenter Street, Noble Park, VIC, 3174
Lot/DP	-
NCC Class*	Class 1a
Type	New Home

Plans

Main plan	9/01/2024
Prepared by	KX Architecture Pty Ltd

Construction and environment

Assessed floor area (m²)*		**Exposure type**
Conditioned*	90.3	suburban
Unconditioned*	49.6	**NatHERS climate zone**
Total	139.9	62 Moorabbin Airport
Garage	39.1	

Thermal performance

Heating	Cooling
100 MJ/m²	21.2 MJ/m²

About the rating

NatHERS software models the expected thermal energy loads using information about the design and construction, climate and common patterns of household use. The software does not take into account appliances, apart from the airflow impacts from ceiling fans.

Accredited assessor

Name	George Kalajdzic
Business name	Geokal Services Pty Ltd
Email	geokalconsult@gmail.com
Phone	0431631535
Accreditation No.	DMN/11/2035
Assessor Accrediting Organisation	Design Matters National
Declaration of interest	Declaration completed: no conflicts

Verification

To verify this certificate, scan the QR code or visit When using either link, ensure you are visiting www.FR5.com.au.

National Construction Code (NCC) requirements

The NCC's requirements for NatHERS-rated houses are detailed in 3.12.0(a)(i) and 3.12.5 of the NCC Volume Two. For apartments the requirements are detailed in J0.2 and J5 to J8 of the NCC Volume One.

In NCC 2019, these requirements include minimum star ratings and separate heating and cooling load limits that need to be met by buildings and apartments through the NatHERS assessment. Requirements additional to the NatHERS assessment that must also be satisfied include, but are not limited to, insulation installation methods, thermal breaks, building sealing, water heating and pumping, and artificial lighting requirements. The NCC and NatHERS Heating and Cooling Load Limits (Australian Building Codes Board Standard) are available at www.abcb.gov.au.

State and territory variations and additions to the NCC may also apply.

Nationwide House Energy Rating Scheme

NatHERS Certificate

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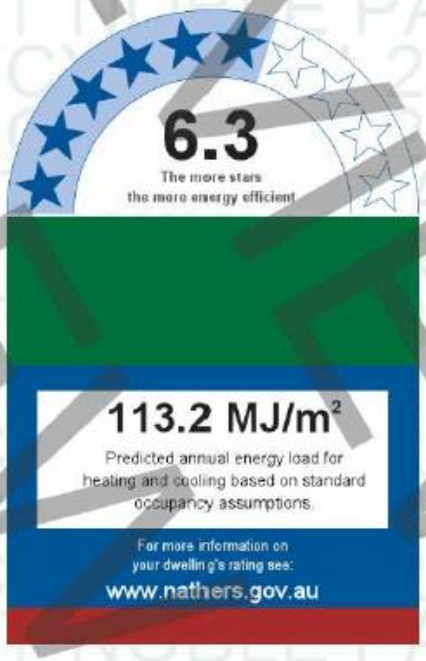

Property

Address	2, 8 Carpenter Street, Noble Park, VIC, 3174
Lot/DP	-
NCC Class*	Class 1a
Type	New Home

Plans

Main plan	9/01/2024
Prepared by	KX Architecture Pty Ltd

Construction and environment

Assessed floor area (m²)*	
Conditioned*	90.3
Unconditioned*	49.6
Total	139.9
Garage	39.1

Exposure type
suburban

NatHERS climate zone
62 Moorabbin Airport

Thermal performance

Heating	Cooling
91.9 MJ/m²	21.3 MJ/m²

About the rating

NatHERS software models the expected thermal energy loads using information about the design and construction, climate and common patterns of household use. The software does not take into account appliances, apart from the airflow impacts from ceiling fans.

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Nationwide House Energy Rating Scheme

NatHERS Certificate

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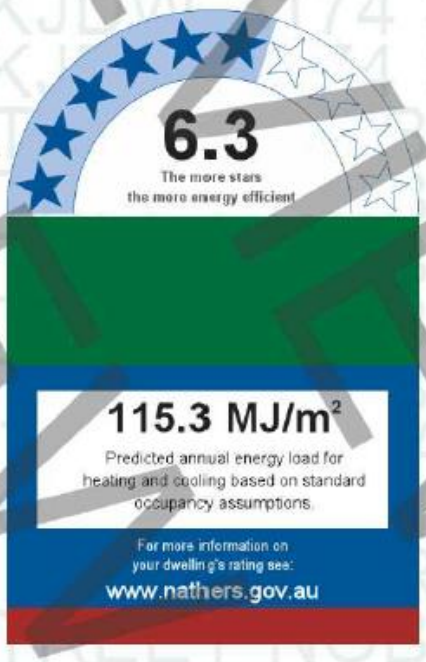

Property

Address	3, 8 Carpenter Street, Noble Park, VIC, 3174
Lot/DP	-
NCC Class*	Class 1a
Type	New Home

Plans

Main plan	9/01/2024
Prepared by	KX Architecture Pty Ltd

Construction and environment

Assessed floor area (m²)*	
Conditioned*	83.1
Unconditioned*	27.4
Total	110.5
Garage	22.7

Exposure type
suburban

NatHERS climate zone
62 Moorabbin Airport

Thermal performance

Heating	Cooling
99.2 MJ/m²	16.1 MJ/m²

About the rating

NatHERS software models the expected thermal energy loads using information about the design and construction, climate and common patterns of household use. The software does not take into account appliances, apart from the airflow impacts from ceiling fans.

Accredited assessor

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Nationwide House Energy Rating Scheme

NatHERS Certificate

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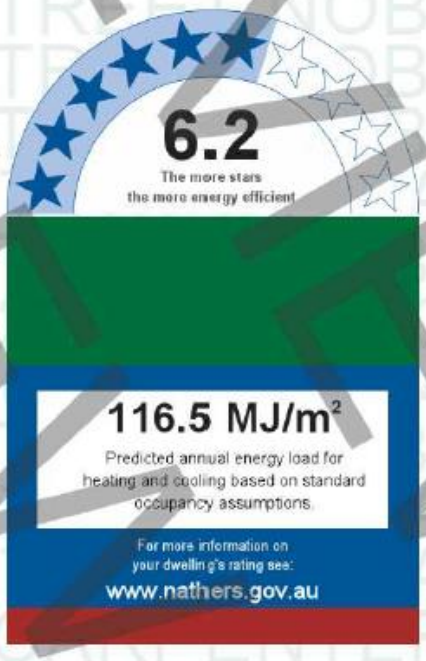

Property

Address	4, 8 Carpenter Street, Noble Park, VIC, 3174
Lot/DP	-
NCC Class*	Class 1a
Type	New Home

Plans

Main plan	9/01/2024
Prepared by	KX Architecture Pty Ltd

Construction and environment

Assessed floor area (m²)*		**Exposure type**
Conditioned*	83.1	suburban
Unconditioned*	27.4	**NatHERS climate zone**
Total	110.5	62 Moorabbin Airport
Garage	22.7	

Thermal performance

Heating	Cooling
101.1 MJ/m²	15.4 MJ/m²

About the rating

NatHERS software models the expected thermal energy loads using information about the design and construction, climate and common patterns of household use. The software does not take into account appliances, apart from the airflow impacts from ceiling fans.

Accredited assessor

Name	George Kalajdzic
Business name	Geokal Services Pty Ltd
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State and territory variations and additions to the NCC may also apply.

* Refer to glossary.

Appendix 3 – STORM Rating & Selection of Plants

STORM Rating Report

TransactionID:	0
Municipality:	GREATER DANDENONG
Rainfall Station:	GREATER DANDENONG
Address:	8 Carpenter Street
	Noble Park
	VIC 3174
Assessor:	George Kalajdzic
Development Type:	Residential - Multiunit
Allotment Site (m2):	902.00
STORM Rating %:	101

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Unit 1 - Treated	103.00	Rainwater Tank	2,500.00	4	140.40	84.00
Unit 2 - Treated	103.00	Rainwater Tank	2,500.00	4	140.40	84.00
Unit 3 - Treated	79.00	Rainwater Tank	2,500.00	3	151.30	87.60
Unit 4 - Treated	79.00	Rainwater Tank	2,500.00	3	151.30	87.60
Driveway	137.00	None	0.00	0	0.00	0.00
Shed	24.00	None	0.00	0	0.00	0.00

Selection of Plants

The following selection of plants can be planted in the raingarden, builder/client can decide on plant selection during construction of rain garden.

Botanical name	Common name	Conditions	SIZE (H x W) (cm)	Picture
***Anigozanthos* species**	Kangaroo Paw	Full sun	30-90 x 100-120	
Blechnum nudum	Fishbone Water-fern	Full sun to partial shade	50-100 x 40-80	
Calocephalus lacteus	Milky Beauty-Heads	Full sun to partial shade	15-30 x 10-30	
Carex appressa	Tall Sedge	Full sun to partial shade	80-100 x 120	
Carpobrotus modestus	Pigface	Full sun	20cm high and spreading	

Chrysocephalum apiculatum	Common Everlasting	Full sun	30-90 x 10-30	
Derwentia perfoliata	Digger's Speedwell	Full sun to partial shade	20-40 x 30-60	
Dianella species	–	Full sun to partial shade	60-120 x 40-150	
Ficinia nodosa	Knobby Club-Rush	Full sun	50-150 x 60-200	
Juncas amabilis	Hollow Rush	Full sun to partial shade	20-120 x 20-50	
Juncas flavidus	Yellow Rush	Full sun to partial shade	40-120 x 20-100	

Leucaphyta brownii	Cushion Bush	Full sun, salt tolerant	100 x 200	
Lomandra species	–	Full sun to partial shade	60-120 x 50-100	
Melaleuca ericifolia	Swamp Paperback	Full sun to partial shade	4m high x 3m wide	
Myoporum parvifolium	Creeping Boobialla	Full sun	20-30 x 300	
Patersonia occidentalis	Native Iris	Sun to partial shade	20-40 x 30-60	

Pratia peraduncuiata	Matter Pratia	Partial shade	50-150 x 1.8-5	
Wahlenbergia communis	Tufted Bluebell	Full sun	15-50 x 15	

Appendix 4 – Additional Construction Consideration

Additional Construction Considerations

Insulation

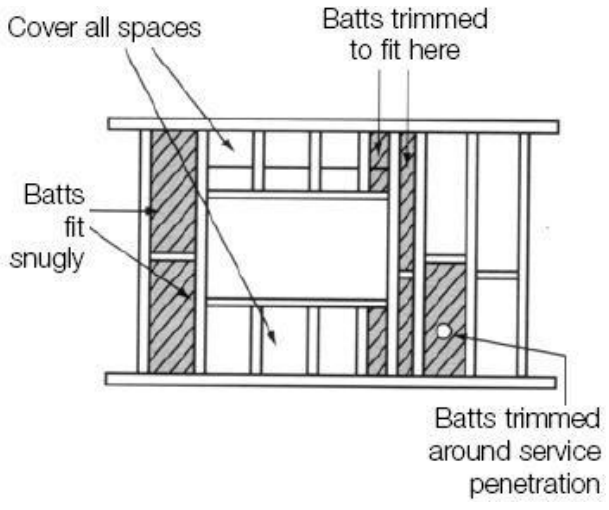
A building cannot achieve energy efficiency if insulation is not adequately installed during the construction stages of the building; insulation in the ceiling can save up to 45% on heating and cooling energy costs, while insulating walls will save up to 20% on heating and cooling. The following are some installation tips that are to be adhered to when installing insulation.

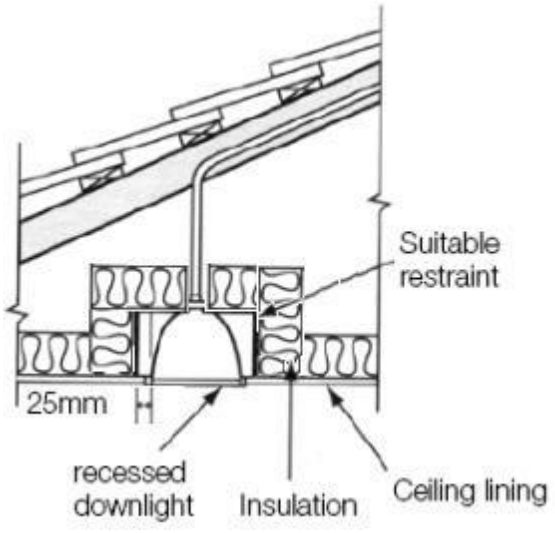
Bulk Insulation

There are many different bulk insulation products circulating on today's markets, the most common of these are Glasswool (fibreglass) batts, Polyester Batts, Cellulose Fibre, Polystyrene foam Boards, Wool, Rockwool etc.

As bulk insulation functions by trapping air pockets, it is very important that insulation installers fit bulk insulation by;

- Covering all Roof and Wall spaces, and
- Trimming batts to fit tight areas around doors and windows (i.e. between Jack and Jamb studs work, between lintels and plasterboard etc), and
- Tight fitting trimming around service penetrations, and
- Adequate fittings around the suitable restraints used on recessed downlight – where possible it is recommended that Surface Mounted downlights are used as they will minimise the amount of penetrations through ceiling insulation, thus increase insulation performance, and
- Adequately providing insulation with suitable a vapour barrier. Moisture will not only reduce insulation performance, but it will also present a health problem over time, and
- Ensuring that insulation is NOT COMPRESSED as it will reduce the overall R-Value, etc.





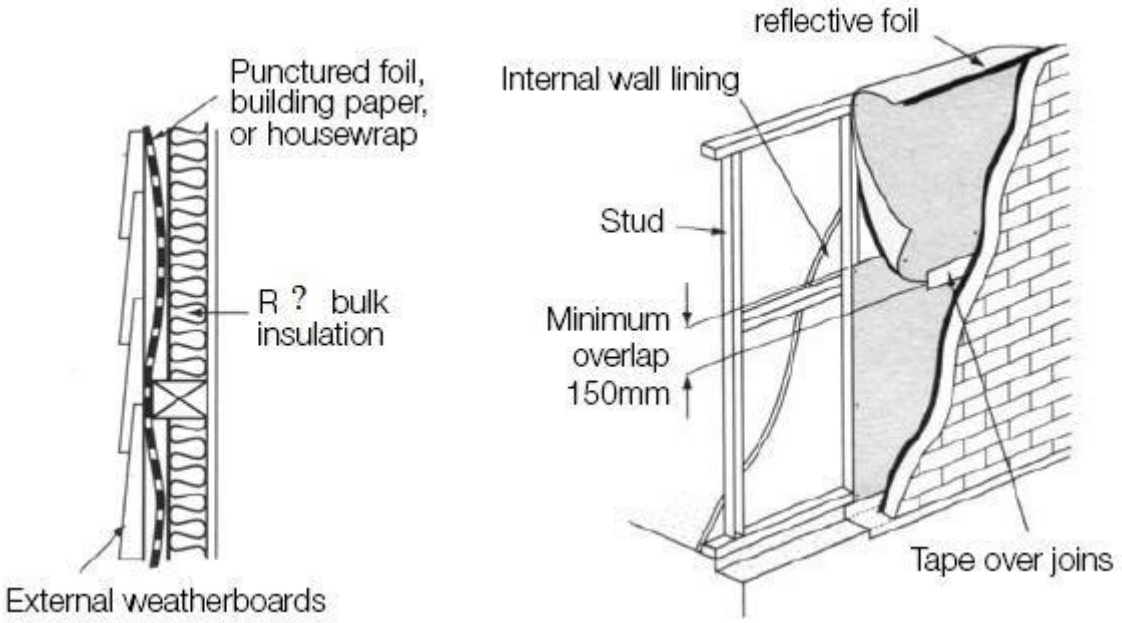
Reflective Foils

Reflective foil insulation (also known as sisilation) is most commonly used in construction as a vapour barrier. Installers of reflective foils (usually builders or bricklayers) must be aware that reflective foils play an important role in thermal performance of a building.

The reflective 'shiny' side of a foil blocks out radiant heat from coming in or escaping out of a building depending on how it is installed. In a cold Melbourne climate, a building should always be constructed to try and keep heat in, thus the

reflective shiny side should always face into the building. The following are some important facts that are to be remembered when installing reflective foils;

- Foils are to overlap at least 150mm over each other and adequately taped using heavy duty tape, and
- All holes and gaps are to be patched and taped over, and
- The 'shiny' side of foil is to be clean and bright, dirty foils will lose the value of their thermal performance properties, and
- Ensure that there is at least 25mm of clear airspace between any building element and the 'shiny' side of reflective insulation to achieve optimum thermal performance, and
- The entire house is to be sealed with reflective foils – NOTE: Plywood bracing is not the same as reflective foil and should not to be considered as an adequate insulation or as a moisture barrier, foils are to overlap all plywood bracing, etc.



Sealing

Gaps in building are mostly responsible for the majority of air infiltration. Gaps between floor joist, windows and doors, roof tiles, bearers and joist account for the most air infiltration into a building. The following are places that are to be sealed either with self expanding foam or similar during the construction stages to stop air infiltration;

- Between external door frames and enclosing timber framing, and
- Between external window frames and enclosing timber framing, etc.

To addition of the above mentioned sealing the following must be implemented;

- All external exhaust fans such as bathrooms, laundries and toilets are to be provided with self-closing dampers, and
- All mechanical air-conditioning and heating vents are to be provided with self-closing dampers, and
- Doors are to be provided with seals that will stop air-leaking from beneath and around the doors, and
- Windows are to be provided with seals that will stop air-leaking from beneath and around the windows, etc.
-