

# Environmentally Sustainable Design (ESD) Analysis

**Prepared For:** SymeTrie Design Group Pty Ltd

**Project:** Construction of a new Dental Clinic

**Address:** 279 Torque Road, Grovedale

**Reference Number:** 2025164

**Date:** 16 December 2025

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**GEOKAL SERVICES PTY LTD**



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**Reference:** 2025164

**Project:** Construction of a new Dental Clinic

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**SIGNED:**



Revision	Issue	Date
-	First Issue	15 October 2025
A	Second Issue	20 October 2025
B	Third Issue	18 November 2025
C	Fourth Issue	16 December 2025



## 1. Scope

This report has been prepared for SymeTrie Design Group Pty Ltd. The scope of this report is to assess the proposed works at 279 Torque Road, Grovedale. This report will address the requirements of the ESD provisions for Whittlesea City Council. This will be achieved using the Built Environment Sustainability Scorecard (BESS) system which rates the project ESD initiatives for design management, water management, energy efficiency, stormwater utilization, indoor environment quality, transportation, waste management and urban ecology. A BESS score of 50% is considered best practice and will be deemed as demonstrating compliance with council ESD provisions.

Further to BESS assessment being undertaken to demonstrate compliance to ESD provisions, compliance to National Construction Code 2022 will be demonstrate using section J assessment. This report will demonstrate how the proposed

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project is suitably buildable post town planning stage.

## 2. Description

Some building characteristics which are to be noted are as follows:

<i>Climate Zone:</i>	Melbourne (Zone 6)
<i>Project:</i>	Construction of a new Dental Clinic
<i>Roof Lights:</i>	N/A
<i>Class of Building:</i>	1a (Residential dwellings)

Proposed development is located at 279 Torque Road, Grovedale. The proposed building will be constructed in an existing estate as shown in the satellite image below.





### 3. Documentation Reviewed

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Architectural Drawings: Sheets 1 to 14

### 4. Assessment Method

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This project has been assessed using the BESS assessment tool as a benchmark to meet council SDA requirements. A minimum 50% BESS score is deemed as complying with SDA best practice. Part B has been assessed to NCC2022 Section J requirements.

### 5. Limitations

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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. Report Structure

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This report has been structured into 2 separate sections that will best demonstrate how this project will comply with town planning ESD requirements and be constructed in a manner that will ensure compliance with the NCC and the energy efficiency requires as committed under BESS best practice energy efficiency requirements. The following is the structure of this report;

**Part A (Page 6 to 18)** - This part of the report will demonstrate which ESD initiatives have been proposed and how they will achieve best practice under the BESS scoring system.

**Part B (Page 20 to 26)** - This part of the report will outline the building fabric construction requirements associated with compliance to NCC2022. This part will provide specific and technical requirements needed for the project to achieve compliance to the NCC. This part will demonstrate that the proposed design (window sizes and wall types) will be buildable and won't need to be revised after the town planning permit is issued, reducing the risk of council approving unbuildable designs.



## Part A – ESD Initiatives

This section includes the follow ESD design commitments under BESS

- Water Efficiency
- Energy Efficiency
- Stormwater Management
- Indoor Environment Quality
- Transport
- Waste
- Urban Ecology
- Innovations



## 7. BESS Overview

The project will meet BESS Best Practice score of 60% by committing to the following initiatives and achieving the following individual scores.

Category	Score	Commitment
<b>Management</b>	50 %	<ul style="list-style-type: none"> <li>- Project has been assessed to preliminary section JV3 requirement of the NCC.</li> <li>- Buildings will be provided with a Building Users Guide, see appendix 1 on page 27</li> </ul>
<b>Water</b>	88 %	<ul style="list-style-type: none"> <li>- Water efficient fixtures and fittings to be installed.</li> <li>- All toilets to be connected to a water tank.</li> <li>- Water efficient landscaping is to be installed throughout.</li> </ul>
<b>Energy</b>	73 %	<ul style="list-style-type: none"> <li>- Photovoltaic solar panels to be installed for electrical production, a total of 6kW for the development.</li> <li>- Project will be all electric, no gas will be connected.</li> <li>- Internal lighting to be limited to 4w/sqm.</li> </ul>
<b>Stormwater</b>	100 %	<ul style="list-style-type: none"> <li>- Project is to be installed with a 3500L water tanks to be installed to services 100% of the proposed roof area.</li> </ul>
<b>IEQ</b>	50 %	<ul style="list-style-type: none"> <li>- Daylight modelling has been undertaken and indicates compliance to BESS requirements.</li> <li>- All finishes to be low Volatile Organic Compounds (VOCs).</li> <li>- Buildings will be provided with good cross ventilation.</li> </ul>
<b>Transport</b>	37 %	<ul style="list-style-type: none"> <li>- Clinic is to be installed with 2 bicycle parking space.</li> <li>- Clinic is to be provided with a 32A-40A Electric Vehicle Charging Infrastructure.</li> </ul>
<b>Waste</b>	33 %	<ul style="list-style-type: none"> <li>- Clinic will be provided for onsite management of food and garden waste, such as composting bins.</li> </ul>
<b>Urban Ecology</b>	37 %	<ul style="list-style-type: none"> <li>- Project site will be covered with 23% vegetation.</li> </ul>
<b>Innovation</b>	0 %	<ul style="list-style-type: none"> <li>- No points are being sought for this category.</li> </ul>

The above commitments will be further explained in following sections.

### Building Occupancy Numbers

Building occupancy numbers have been determined using the NCC2022 D2D18 requirements which are used to determine suitable number of exits during building permit stage. These occupants' numbers will be specified on the occupancy permit and will limit the number of occupants allowed within the building.

Number of Occupants Calculator (to NCC2022 D2D18)			
Floor Area	Use	Area per person (m <sup>2</sup> )	Allowable Occupants
286	Office, including	10	28.6



## 8. Water Efficiency

The project will be installed following fixtures and fittings.

- Kitchen Taps = 5 Star WELS
- Bathroom Taps = 4 Star WELS
- WC = 4 Star WELS
- Rainwater Tank = All toilets are to be connected to the rainwater tank

### Rain Capture System Overview

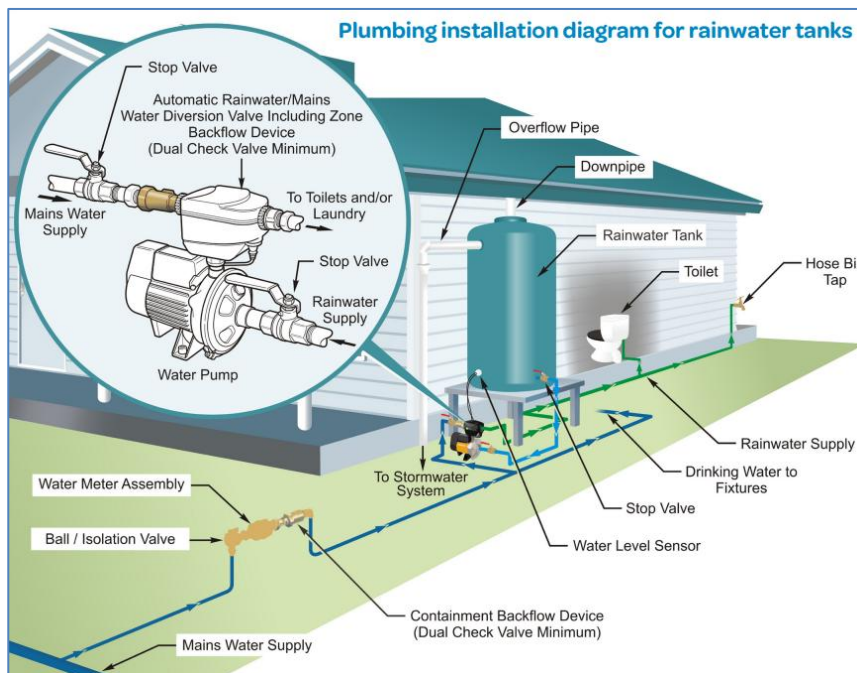
Table below calculates the amount of water saved annually based on the rain captured

Assumed Consumption Calculation					
Uses		Remarks			
Toilets	Number of Toilets	3	As shown on drawings.		
	Flushes per day	5	(35 per week).		
	Number of Occupants	28	As per NCC		
	Litres per flush	5	Based on dual flush toilet.		
Laundry	Daily Consumption L	0	Assume for high-efficiency washing machines.		
	Number	0	Number of Laundries		
	Will washing machines be connected to water tanks?		no		
Total Roof Area		208 m <sup>2</sup>			
Area connected to water tanks?		100 %			
Tank Volume		4000 L			

Month	Rainfall Average (mm)	Rainfall Capture (L)	Estimate demand (L)	Estimate shortfall (L)	Saved Capacity in Tank (L)
Jan	46.8	9,734.40	65,100.00	55,365.60	-1785.99
Feb	48	9,984.00	58,800.00	48,816.00	-1743.43
Mar	50.1	10,420.80	65,100.00	54,679.20	-1763.85
Apr	57.3	11,918.40	63,000.00	51,081.60	-1702.72
May	55.7	11,585.60	65,100.00	53,514.40	-1726.27
Jun	49.5	10,296.00	63,000.00	52,704.00	-1756.80
Jul	47.5	9,880.00	65,100.00	55,220.00	-1781.29
Aug	50	10,400.00	65,100.00	54,700.00	-1764.52
Sep	58	12,064.00	63,000.00	50,936.00	-1697.87
Oct	66	13,728.00	65,100.00	51,372.00	-1657.16
Nov	60.3	12,542.40	63,000.00	50,457.60	-1681.92
Dec	59.1	12,292.80	65,100.00	52,807.20	-1703.46
Annual	648.3	134,846.40	766,500.00	631,653.60	-20765.26
<b>Total Annual Water Savings (L)</b>				<b>134,846.40</b>	<b>Tank size suitable</b>

The following is an overview of the rain capture system required.



\*Diagram source Southeast Water



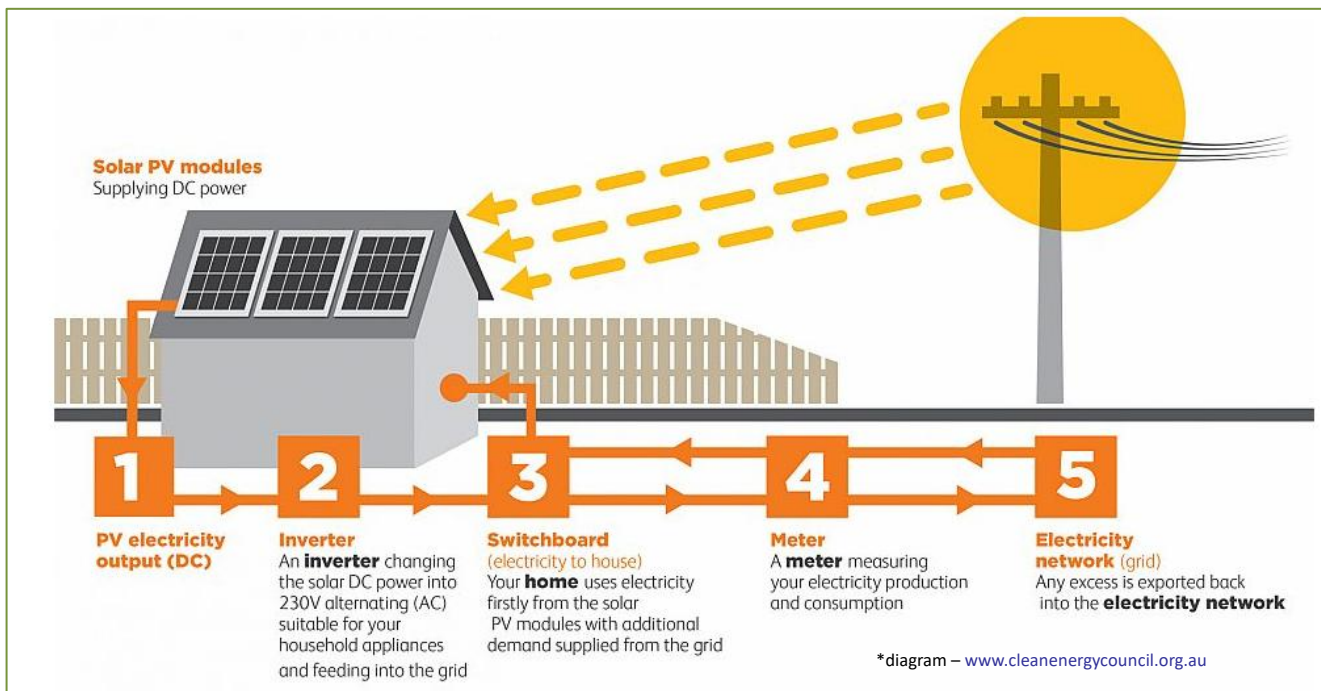
## 9. Energy Efficiency

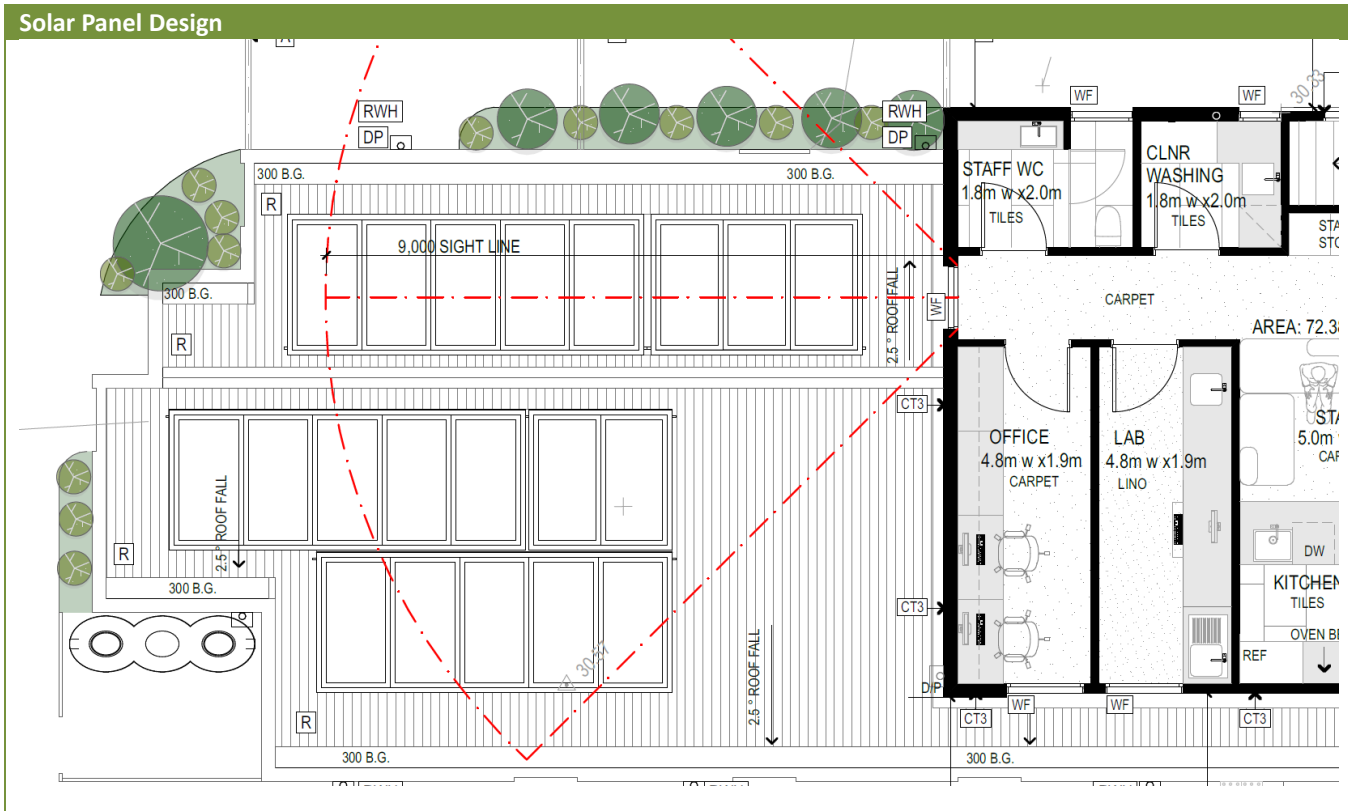
The following is an overview of energy efficiency provision committed to this project and the required appliance efficiencies to be installed as per the following table;

Requirement	Commitment
Heating	If any heating or cooling systems are installed, they must be within one star of the most efficient equivalent capacity unit available, or Coefficient of Performance (CoP) & Energy Efficiency Ratios (EER) not less than 85% of the CoP & EER of the most efficient equipment capacity unit available.
Cooling	
Hot Water System	Water heating system within 1 star or 85% of better efficiency than the most efficient equivalent capacity must be installed.
Energy Efficiency	Project has been modelled and shows compliance under JV3 modelling.
External Lighting	All external lighting will be controlled by a motion detector.
Internal Lighting	The W/m <sup>2</sup> of illumination power density will be limited to be 20% lower than as that required under NCC. Development will achieve a maximum illumination power density of 4W/sqm or less.
Electrification	No gas supply will be installed, development will be wholly all-electric.
Solar Panel System	Project will be installed with a 6kW Photovoltaic Solar Panel system. No onsite battery storage is proposed.
Utility meters	Each commercial tenant must have their own utility meters.

### Solar System Overview

Photovoltaic Solar system to be installed as means of onsite energy production. System will generate energy during daytime for household consumption, excess electricity will be sold to the grid at a fix price as determined by the electricity retailer.

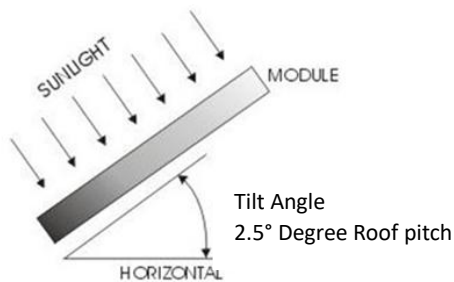




**Solar Panel Specification**

**Solar Panel Tilt:** 2.5° Degree Roof pitch

**Orientation:** North





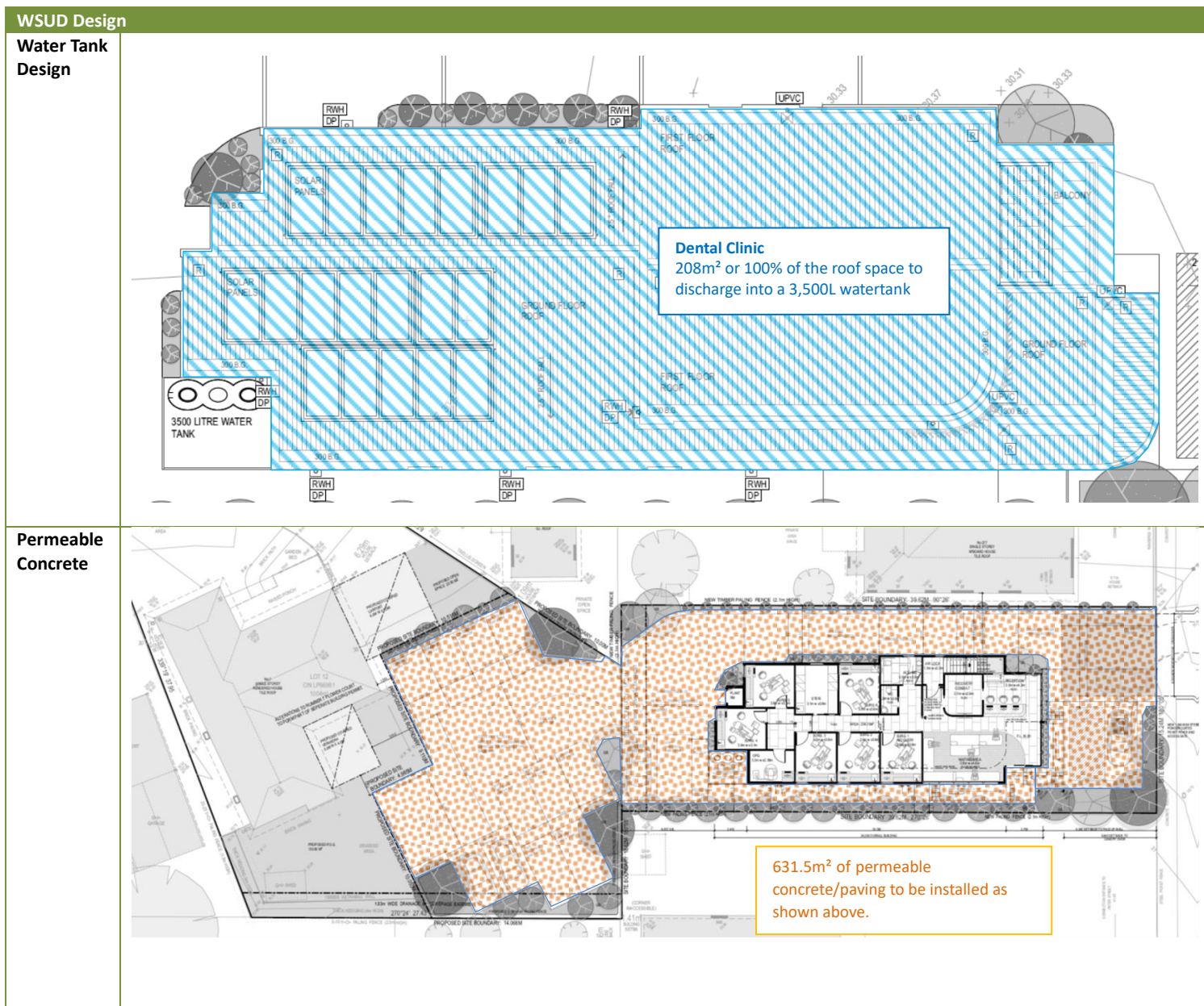
### 10. Stormwater Management

The following is an overview of stormwater management initiative WSUD design proposed for the project which will ensure a STORM score of 100% is achieved. Copy of the STORM report is located in appendix 5 on page 94.

During construction addition measures must be installed by the builder to ensure debris and run off is correctly managed to avoid entrance into the stormwater system. Prior to any works starting a Construction Management Plan (CMP) is to be prepared addressing how construction will be managed. All construction works to be in accordance with the EPAs publication 'A Builders Guide to Keeping Our Stormwater Clean' located in appendix 4 located on page 65. Existing home and the front section not being altered has been excluded from the WSUD assessment.

#### WSUD Design

Legend	Remark
	Roof area to be directed to the water tanks.
	Permeable Concrete



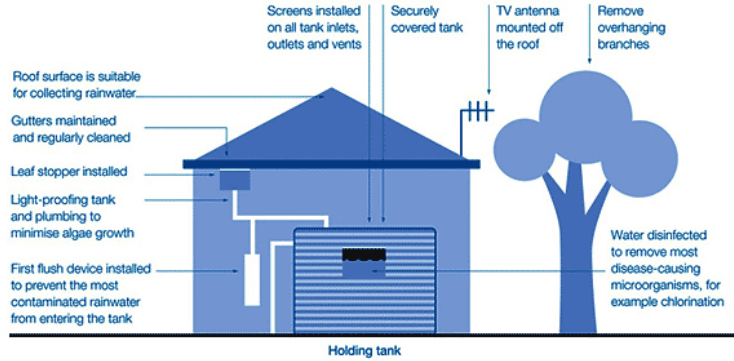


**Design Considerations**

Following are design considerations associated with the WSUD design. Each design must be designed by a registered civil engineer to ensure runoff coefficients are suitable for a 100-year ARI rainfall and that the proposed design will not result in flooding. Civil engineer must ensure concrete falls are correctly designed and all stormwater discharge is connected to a Legal Point of Discharge. All works to be undertaken by a registered plumber. Further information for these and various WSUD systems is found in appendix 3 and selection of drought tolerant plants in appendix 3 located on page 60.

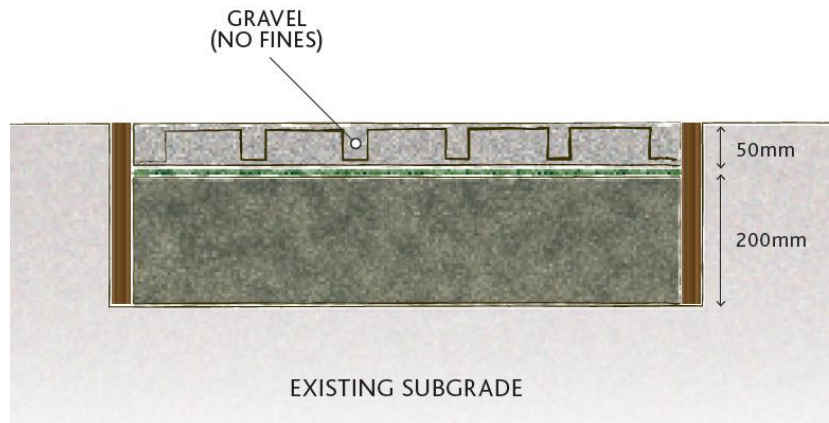
**Rainwater Tanks**

Rainwater tanks collect stormwater run-off from impervious surfaces such as roofs, reducing the amount that enters our waterways. They are fitted with an overflow mechanism, meaning that once a tank is full the excess water is redirected into the stormwater drainage system.



**Permeable Concrete / Pavings**

Permeable concrete/pavings are designed to allow water to soak through the surface and seep back into the ground. This reduces the stormwater run off and pollutants entering rivers and creeks, and also benefits nearby vegetation by allowing water and air to reach the root zone beneath the paved area.



**WSUD Maintenance Requirements**

Proposed rainwater management system will need to be maintained correctly to ensure correct operation. Following is a maintenance plan that the building owner is to adhere through the life of the building by the building owner/body corporate.

System	Element	Maintenance	Intervals	Reference
Water Tank	Water tank	Cleaning out gutters	Annual	Melbourne Water guidelines
		Inspection and general cleaning of Mosquito mesh	3 Months	Manufactures specification
		Check water quality if using for purposes other than toilet flushing and gardening	6 Months	Manufactures specification
	Pumps	Inspect the pump for any damage and ensure they correctly operate.	6 Months	Manufactures specification
	Filter	Inspect and clean out filter, ensure it functions correctly	As per manufacturers recommendations	Manufactures specification



	Other Specialised Equipment	All specialised equipment must be maintained as per the manufacturer's specifications	As per manufacturers recommendations	Manufactures specification
Permeable Concrete/Pavers	Vacuum / Blowing Sweeping	Regularly vacuum / blow or sweep the surface to keep it free of leaves, dirt, and other debris	Monthly	Melbourne Water guidelines
	Prevent Clogging	<ul style="list-style-type: none"> <li>- <b>Monitor for Sediment Buildup:</b> Check the surface for sediment accumulation and remove it as needed to maintain permeability.</li> <li>- <b>Manage Adjacent Areas:</b> Ensure that landscaped areas and soil are well-maintained to prevent soil and debris from being transported onto the driveway.</li> </ul>	Monthly	
	Inspect and Repair	<ul style="list-style-type: none"> <li>- <b>Visual Inspections:</b> Conduct visual inspections to ensure the surface is clean and free of debris. Look for signs of deterioration or spalling annually.</li> <li>- <b>Repair as Needed:</b> If sections of the driveway become damaged, they should be cut out and replaced with new permeable concrete</li> </ul>	Annually	
	Avoid Sealing	<b>No Impervious Sealers:</b> Do not use asphalt or other impervious sealers on permeable concrete, as this will block its permeability	As required	
	Divert Excess Water	<b>Manage Water Flow:</b> Divert excessive water flow that carries debris away from the driveway to prevent clogging	As required	
	Good Housekeeping	<b>Trash and Debris:</b> Prevent the accumulation of trash, sediment, or other debris on the surface by following good housekeeping practices	As required	

## 11. Indoor Environment Quality

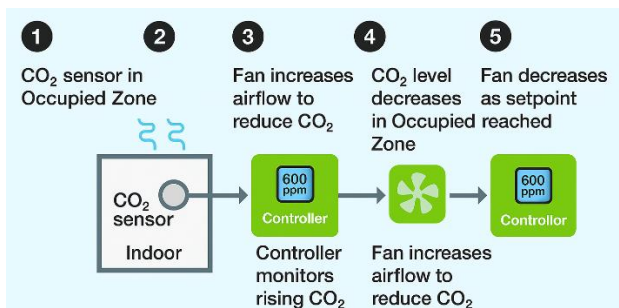
Project will meet the Indoor Environment Quality requirements of BESS via following initiative.

Requirement	Commitment
<b>Paints</b>	<p>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.</p> <p>Paints, sealants and adhesives, carpet and engineered wood products that meet current GECA, Global GreenTag GreenRate, Carpet Institute Australia Environmental Classification Scheme Level 2, Green Star or WELL standards for TVOC in paints, adhesives and sealants (by volume) and carpets (by area) and for Formaldehyde in engineered wood (by area).</p>
<b>Double Glazing</b>	Double glazing will be installed to all windows – See Part B of this report on page 20 which demonstrates double glazing performances required to comply with section J requirements.
<b>Shading</b>	Suitable shading devices will be installed to North, East and West facing windows.
<b>Ventilation</b>	<p>Ventilation must be designed and installed to monitor and maintain a CO2 concentration of 600ppm and must provide 50% increase in outdoor air availability to regular use areas compared to the minimum required by AS1668.2:2012.</p> <p>Proposed windows must be openable to allow for natural ventilation.</p>
<b>Daylighting</b>	<p>Daylight modelling has been undertaken to confirm the working plane area within limit as a %.</p> <p>See figure 2 below which indicates the result of daylight modelling</p>



### CO2 Monitoring System

HVAC system to be design to AS1668.2 and NCC Section F by a qualified mechanical engineer. System to be designed to ensure CO2 levels within the building are monitored and maintain to a concentration of not more than 600ppm. Such system must be capable of maintaining indoor CO2 levels for optimal air quality and cognitive performance while also extracting aerosol and contaminants generated during dental procedures. A generic overview of such a CO2 ventilation system must operate is shown below.



Suggested equipment to be designed by a qualified mechanical engineer, however a possible equipment selection can be as following.

<b>CO2 Sensor</b>	<p>NDIR Sensor with +/-75ppm accuracy.</p> <p>CO2 Sensors to be Installed in each surgery, office, lab, kitchen, staff room, waiting area, recovery, and OPG room. They are to continuously monitor indoor CO2 concentrations and detect rising levels of CO2 due to occupancy or procedures.</p>
<b>Controller</b>	<p>BMS compatible controller with programmable setpoints.</p> <p>Central Controller which can receive sensor data and adjusts airflow dynamically.</p>
<b>Filters</b>	HEPA and Carbon Filters to capture fine particles, pathogens, and odors.
<b>Ventilation Units</b>	<p>Energy/Heat Recovery Ventilation units.</p> <p>ERV/HRV Unit that supplies fresh air and extracts stale air, ducted to each zone as designed by the mechanical engineer.</p>
<b>Ducting</b>	Flexible ductwork with silencers to surgery room and rigid ducting for shared zones
<b>Fans</b>	Electronically Commutated fans with variable speed control and dampers to adjust airflow based on real-time CO2 readings to maintain 600 ppm.



**Shading**

Building is to be installed with appropriate shading in forms of eaves or external shading devices to all habitable room windows to North, East and West facing windows. Suggested shading types are as follows:

Orientation	Shading
<b>North, East &amp; West</b>	Use of adjustable shade screen or deep overhangs. Adjustable shade screen that excludes low-angle sun

Recommended shading designs are as below

Types	Shading	Diagram
<b>Adjustable Shading</b>	<p>Adjustable shading allows the user to control the level of shade into the building. This is useful in spring and autumn when heating and cooling needs are variable. It is important to note that this system is user operated.</p> <p>Adjustable shading can be made up of shade clothes, sliding screens, louvre screen, shutters, retractable awnings and adjustable external blinds.</p> <p>Adjustable shading is recommended for north-east and north-west elevations because they receive a combination of high-and low-angle sun throughout the day. These systems allow the user to exclude all sun in summer, gain full sun in winter, and manipulate sun levels at other times.</p>	<p style="text-align: center;">Awning blind                      Roller shutter</p>
<b>Louvres</b>	<p>For Melbourne Victoria, the mid-winter sun angle at solar noon during the winter solstice (around June 21<sup>st</sup>) is approximately 29° above the horizon.</p> <p>Fixed horizontal (overhead) louvres should be designed and set to the noon mid-winter sun angle and spaced correctly allow winter heating and summer shading. The spacing between fixed horizontal louvres should be 75% of their width. The louvres should be as thin as possible to avoid blocking out the winter sun.</p>	

\*reference [www.yourhome.gov.au](http://www.yourhome.gov.au)



**Figure 2 - Daylight Factor Assessment Outcome**

The following is the outcome of the daylight modelling

**Daylight modelling**

Daylight modelling was undertaken to following assumptions.

**Software:** Better Building)

**Sky Lux level:** 10,000 lux Zenith illuminance

**Window Light Transmission:** 0.6

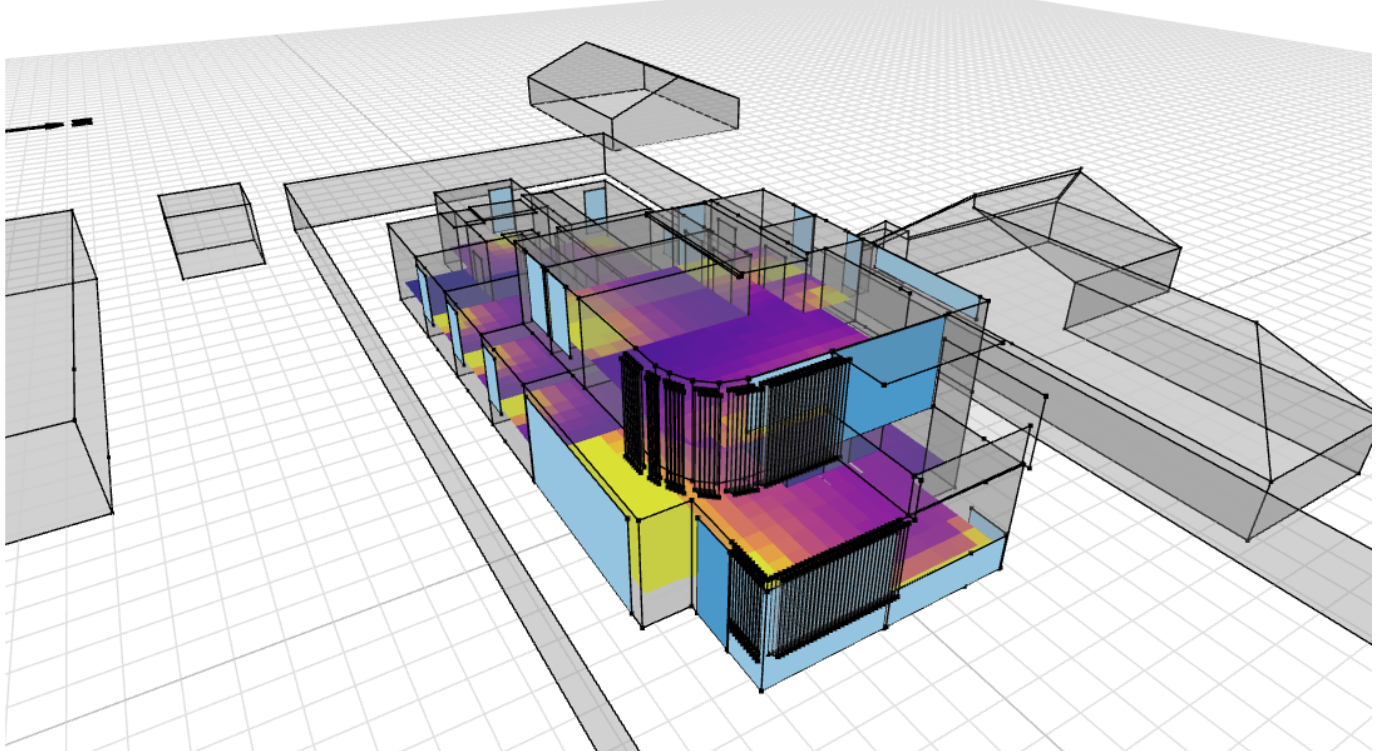
**Modelling outcomes nominated below**

Level	Zone	Area m <sup>2</sup>	Min %	Avg %	Max %	Pass Area m <sup>2</sup>	Contribution %
1	1. Reception	53.76	0.38	4.47	17.06	36.34	14.61
1	10. Air Lock	7.79	0.42	1.29	2.72	1.22	0.49
1	11. Recovery Consult	8.90	0.00	0.00	0.00	0.00	0.00
1	12. OPG	7.25	0.00	0.00	0.00	0.00	0.00
1	13. ACC WC	5.92	0.48	1.90	3.49	2.55	1.02
1	14. WC	2.87	0.00	0.00	0.00	0.00	0.00
1	2. Hall	22.89	0.00	0.02	0.45	0.00	0.00
1	3. Surgery 2	11.36	0.29	1.77	11.27	2.45	0.98
1	4. Sterilisation	11.36	0.32	1.45	3.46	2.50	1.00
1	5. Surgery 5	10.65	0.36	1.89	13.27	2.45	0.98
1	6. Surgery 3	11.13	0.33	1.89	11.78	2.65	1.07
1	7. Surgery 4	10.12	0.40	2.00	13.34	2.36	0.95
1	8. Surgery 1	11.00	0.30	1.81	11.32	2.45	0.98
1	9. Surgery 6	11.00	0.34	2.25	16.17	3.07	1.24
2	1. Staff/Kitchen	32.10	0.47	2.11	8.51	11.27	4.53
2	2. Laboratory	9.63	0.57	2.91	15.96	4.19	1.68
2	3. Office	8.46	0.57	3.06	16.03	3.74	1.50
2	5. Hall	4.93	0.93	4.13	15.53	3.10	1.25
2	6. Staff WC	4.08	0.77	4.17	13.79	2.72	1.09
2	7. Cleaner Washing	3.57	0.71	3.03	11.80	2.12	0.85

Pass Yes

**Daylight Modelling Extracts**

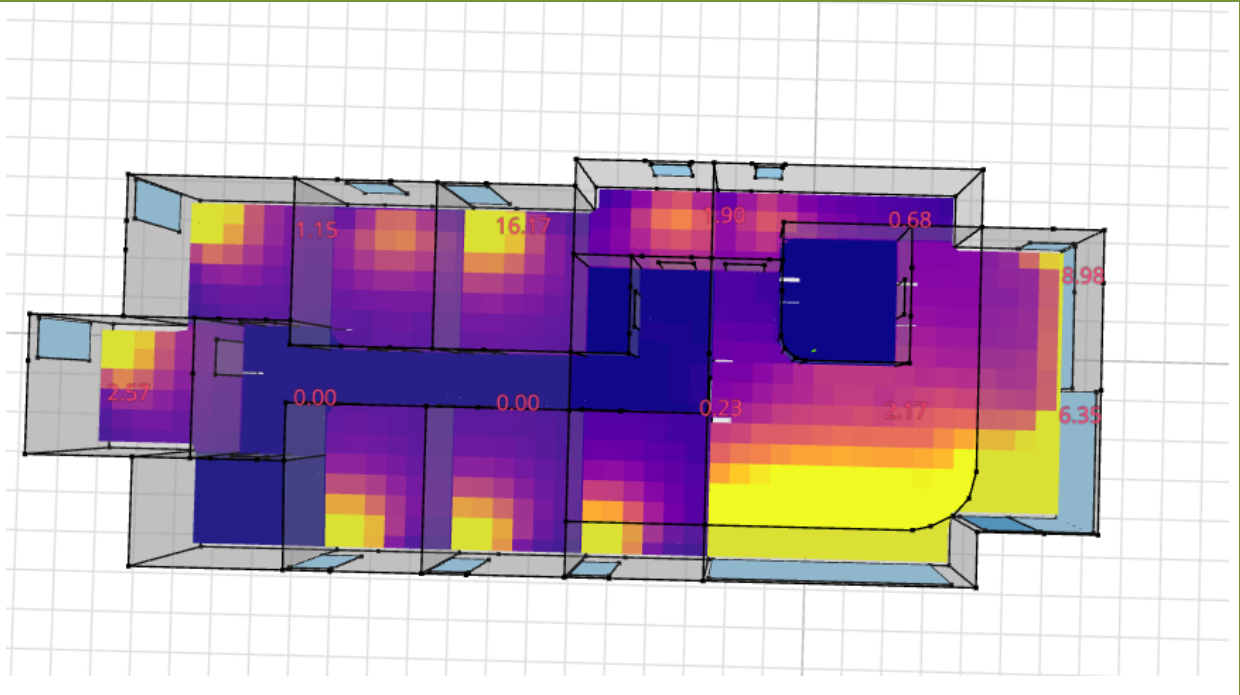
Adjoining properties have been modelled as part of the daylight modelling. See image below.





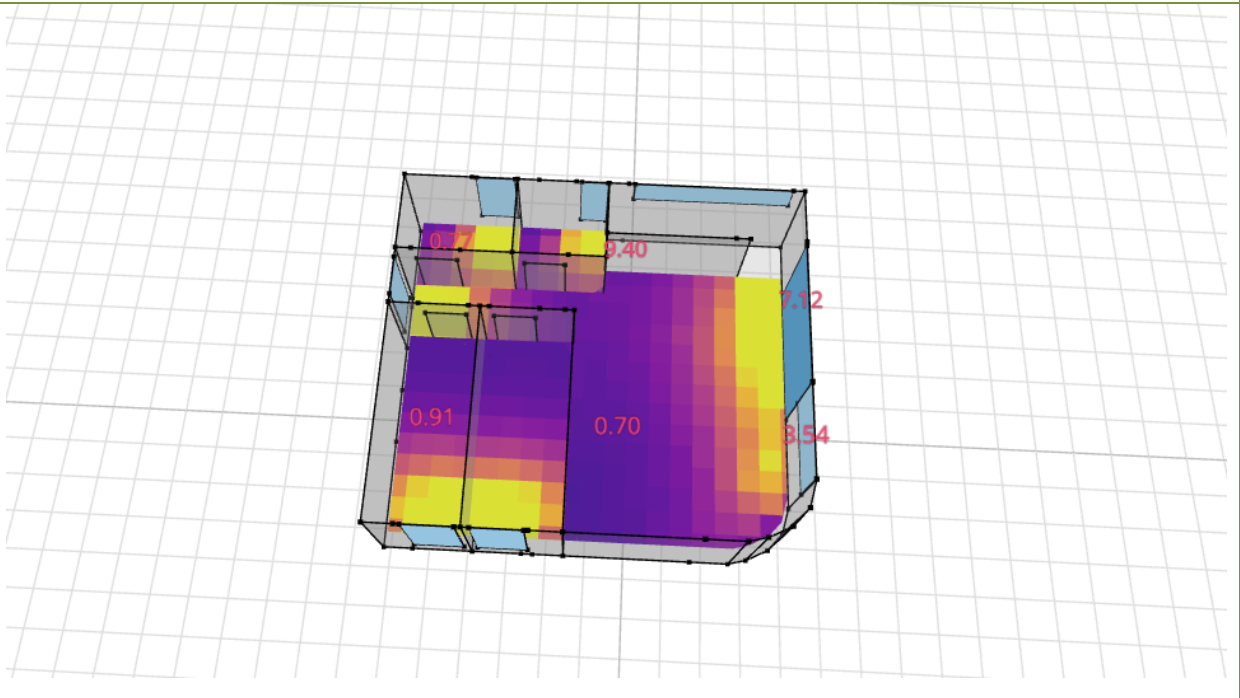
Faylight Factor Diagram per Floor

Ground




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First





## 12. Transport

Project will meet the Transport requirements of BESS by installing the features as shown below. A Walkability assessment has also been undertaken for this project with results shown below.

Requirement	Commitment
<b>Bicycles Parking</b>	Project will include installation of secure bicycle parking spaces. A total of 2 bicycles spaces will be installed, including 1 for visitors and 1 for staff.
<b>Electric Vehicle Infrastructure</b>	Each dwelling is to be provided with a 32A-40A Electric Vehicle Charging Infrastructure in the garage.
<b>Walkability</b>	Project is in a car-dependent locality based on the walkability assessment. See below

### Walkability Assessment

Walkability of the site has been assessed using the walk score website. Outcomes are shown below.

<b>Location Overview</b>	279 Torquay Road has a Walk Score of 64 out of 100. This location is Somewhat Walkable so some errands can be accomplished on foot. This location is in the Grovedale neighborhood in Geelong. Nearby parks include Grovedale Park, Waurn Ponds Parkland and Coolabah Park.
<b>Score</b>	<div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p>Walk Score</p> <p><b>64</b></p> </div> <div> <p><b>Somewhat Walkable</b></p> <p>Some errands can be accomplished on foot.</p> </div> </div> <div style="display: flex; align-items: flex-start;"> <div style="margin-right: 20px;"> <p>Transit Score</p> <p><b>33</b></p> </div> <div> <p><b>Some Transit</b></p> <p>A few nearby public transportation options.</p> </div> </div> <div style="margin-top: 20px;"> </div>



### 13. Waste, Urban Ecology & Innovation

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Project will meet the Waste and Urban Ecology requirements of BESS by following initiatives.

Requirement	Commitment
<b>Waste</b>	<p>Facilities will be provided for onsite management of food and garden waste, such as composting bins.</p> <p>Refer to the project Waste Management Plan for the overview of the buildings Waste Management requirements as detailed by Easy Waste report dated 25 November 2025.</p>
<b>Urban Ecology</b>	Project will be provided with 23% vegetation area.
<b>Innovation</b>	Project is not seeking innovation credits.



## Part B – Section J Energy Rating Requirements

This section includes the overview of following NatHERS Energy Rating Requirements

- Building Insulation
- External Glazing
- Building Sealing
- Air Movement
- Energy Consumption
- Building Services
- Whole of Home Analytics



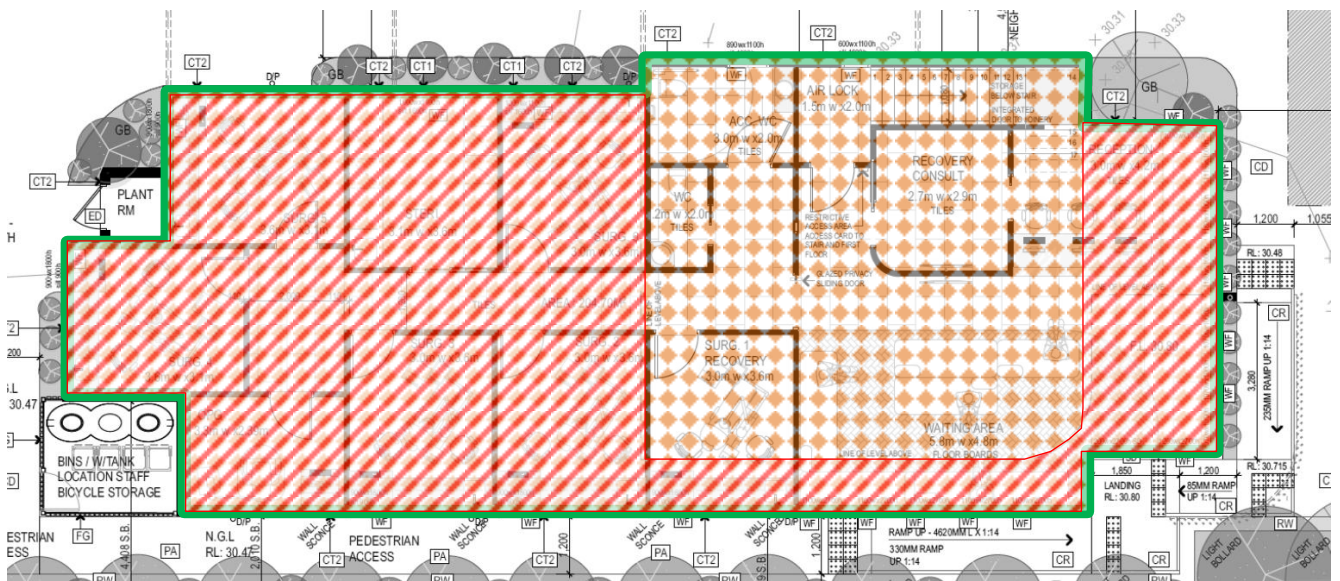
## 14. Findings and Results

### Building Fabric

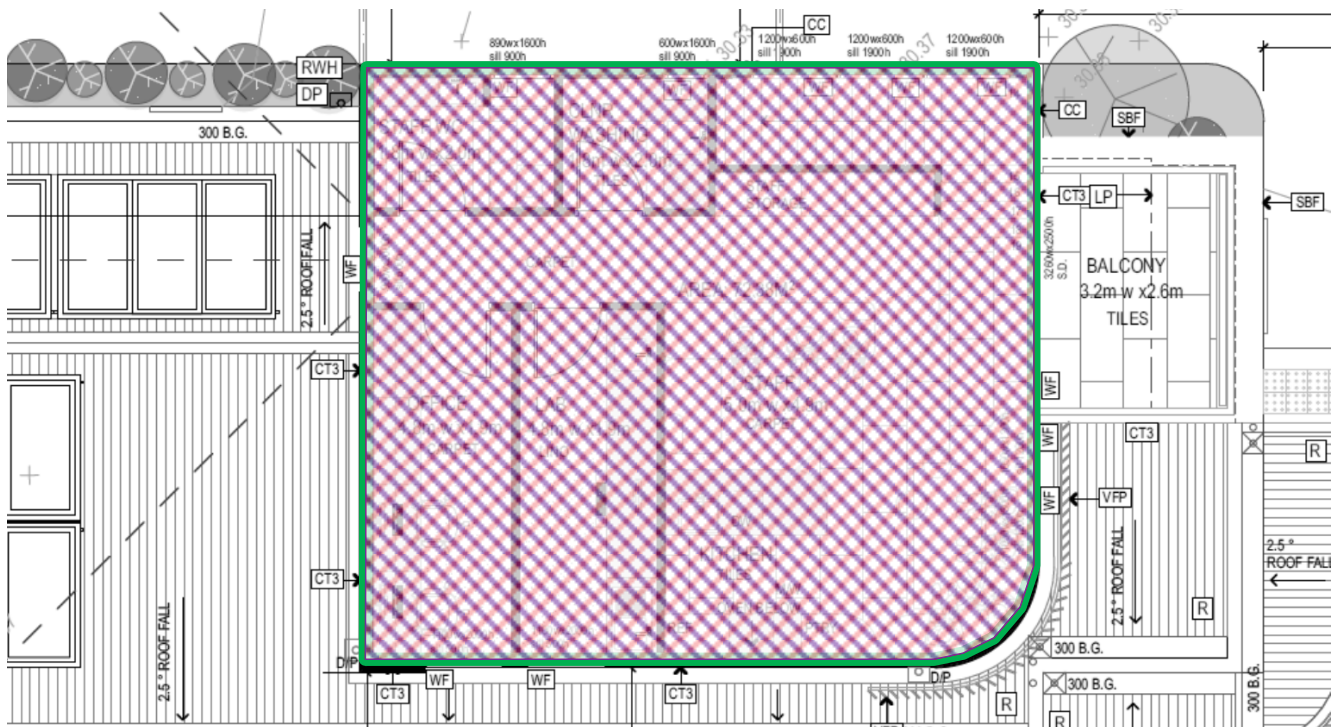
Building elements are to be installed with insulation achieving the minimum performances as following;

Colour	Building Fabric	Frame Material	Minimum Insulation R-Value to be Installed
	Walls	Timber	2.5
	Ceilings	Timber	6.0
	Floor	Timber	3.0
	Under slab Insulation	N/A - Concrete	1.0

Ground



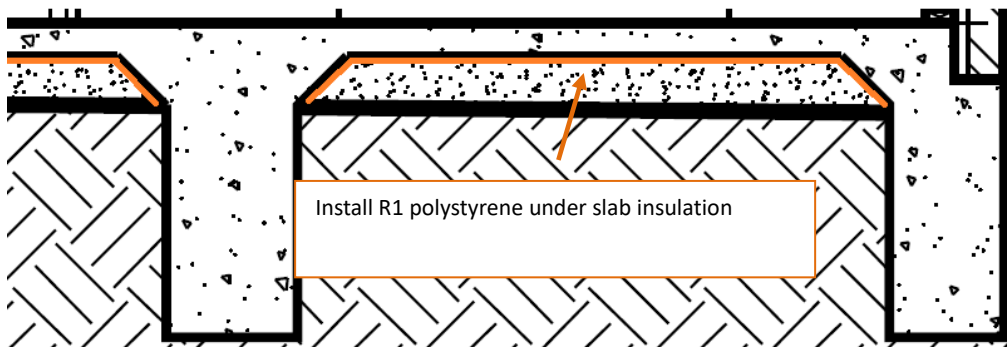
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**Under slab**

Under slab insulation must be designed by the structural engineer and be as per diagram below.

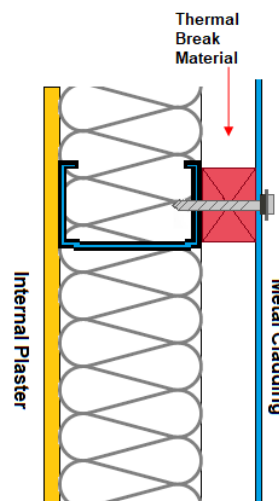


**Thermal Breaks Requirements (Where required)**

Thermal break consisting of a material with an R-Value of not less than R0.2, installed between the metal sheet cladding and supporting metal frames as nominated below;

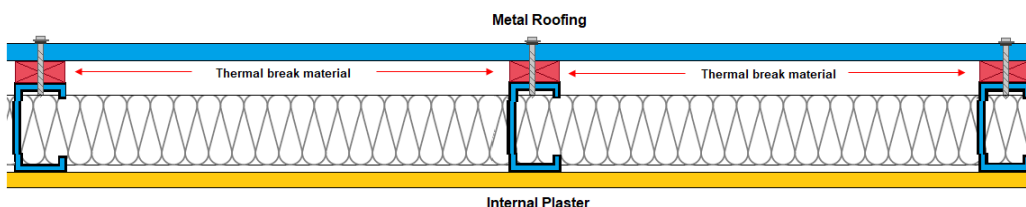
Thermal breaks can be of expanded polystyrene, bulk insulation, rubber or similar, following thicknesses are considered to achieve an R-Value of not less than 0.2.

Material	Thickness
Expanded Polystyrene	12mm
Bulk Insulation	20mm
Timber	20mm



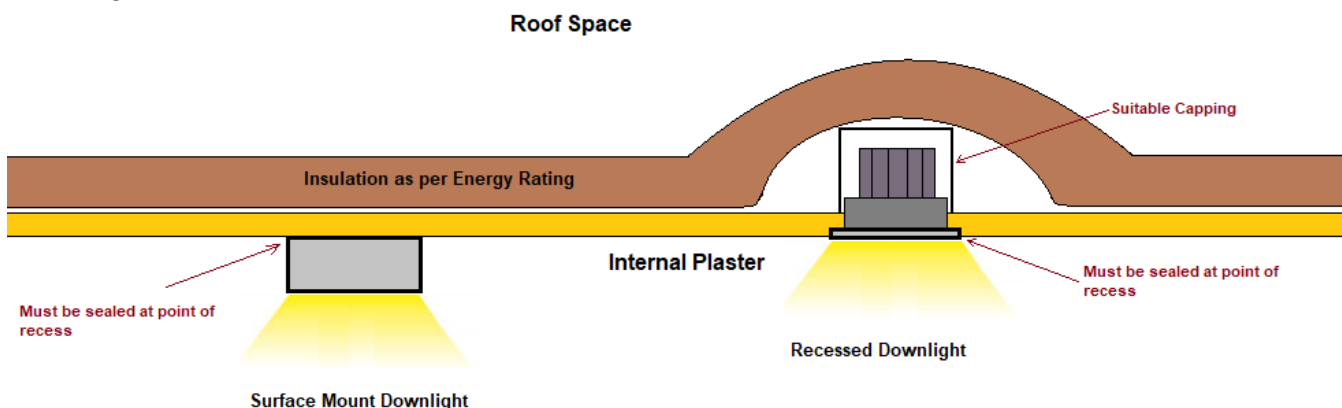
**Walls (See right diagram)** – where a wall has lightweight external cladding such as weatherboards, fibre-cement or metal sheeting fixed to a metal frame, and do not have wall lining or has wall lining that is fixed directly to the same metal frame.

**Roof (See below diagram)** - where roof have metal sheet cladding fixed to metal purlins, metal rafters or metal battens, and do not have ceiling lining or has ceiling lining that is fixed directly to the same metal frame



**Downlights**

Downlights must not penetration the ceiling/roof insulation. Insulation must be placed over the point of recess. Downlights must be either surface mount or if recessed they must IC-4 rated, be suitably sealed and capped with continuous insulation being placed over the downlights.





### Condensation Management Design

Building designers must adequately consider condensation management alongside energy efficiency to ensure the durability of building materials, prevent moisture-related damage, and maintain a healthy indoor environment.

Building designers must ensure that their designs adequately incorporate the insulation and glazing strategies specified within this report with their condensation management strategies. Building designers must ensure adequate air movement is correctly designed and suitable to comply with the NCC requirements. Table below demonstrates various insulation thicknesses that can be used as a guide in determining thickness required for each insulating material to assist building designers with their condensation management designs.

Effective condensation control complements energy-efficient designs by promoting thermal performance and reducing the risk of mould growth, safeguarding both the structure and occupants' well-being

Geokal Services Pty Ltd is not liable for assessing or designing condensation mitigation for this project

### Insulation Thickness

Different types of materials need different thickness to achieve the same R-Value. Table below gives an indication to which materials can be used to design the insulation strategy. Different materials can be used to achieve the required R-Value. Figures below are indicative only and will vary from one manufacturer to another.

Insulation	R-Value	Thickness (mm)
Cellulose Fibre	R2.5	100
Cellulose Fibre	R4.0	160
Cellulose Fibre	R5.0	200
Cellulose Fibre	R6.0	240
Cellulose Fibre	R7.0	280
Glass Fibre	R2.5	90
Glass Fibre	R4.0	176
Glass Fibre	R5.0	220
Glass Fibre	R6.0	264
Glass Fibre	R7.0	308
Polystyrene Extruded	R2.5	70
Polystyrene Extruded	R4.0	112
Polystyrene Extruded	R5.0	140
Polystyrene Extruded	R6.0	168
Polystyrene Extruded	R7.0	196
Rockwool Batt	R2.5	83
Rockwool Batt	R4.0	132
Rockwool Batt	R5.0	165
Rockwool Batt	R6.0	198
Rockwool Batt	R7.0	231

### **External Glazing:**

Assessment of the proposed external glazing assemblies to NCC using the façade calculator – see attached appendix 2.

The external windows achieving the U-Value and SHGC performance values as nominated in table below will comply with BCA section J2:

Window Type	Elevation	Minimum U-Value	Minimum Solar Heat Gain Coefficient (SHGC)
Double Glazed	Internal	4.0	0.54



## Building Sealing:

Building must be suitably sealed against air infiltration, following building sealing requirements must be adhered to and nominated in the building design specifications.

Building Element	NCC Building Sealing Requirement
<b>Chimneys and Flues</b>	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.  <b>Note:</b> A solid-fuel burning appliance is a heater that burns materials such as timber, coal and the like. This clause does not apply to gas and liquid fuel burning appliances.
<b>Roof Lights</b>	<ul style="list-style-type: none"> <li>- A roof light must be sealed, or capable of being sealed, when serving— <ul style="list-style-type: none"> <li>o a conditioned space; or</li> <li>o a habitable room</li> </ul> </li> <li>- A roof light required by (1) to be sealed, or capable of being sealed, must be constructed with— <ul style="list-style-type: none"> <li>o an imperforate ceiling diffuser or the like installed at the ceiling or internal lining level; or</li> <li>o a weatherproof seal; or</li> <li>o a shutter system readily operated either manually, mechanically or electronically by the occupant.</li> </ul> </li> </ul>
<b>External Windows and Doors</b>	<ul style="list-style-type: none"> <li>- A door, openable window or the like must be sealed— <ul style="list-style-type: none"> <li>o when forming part of the envelope; or</li> <li>o in climate zones 4, 5, 6, 7 or 8.</li> </ul> </li> <li>- A seal to restrict air infiltration— <ul style="list-style-type: none"> <li>o for the bottom edge of a door, must be a draft protection device; and</li> <li>o for the other edges of a 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.</li> </ul> </li> </ul>
<b>Building Entrance</b>	An entrance to a building, if leading to a conditioned space must have an airlock, self-closing door, rapid roller door, revolving door or the like, other than— <ul style="list-style-type: none"> <li>- where the conditioned space has a floor area of not more than 50 m<sup>2</sup>; or</li> <li>- where a café, restaurant, open front shop or the like has— <ul style="list-style-type: none"> <li>o a 3 m deep un-conditioned zone between the main entrance, including an open front, and the conditioned space; and</li> <li>o at all other entrances to the café, restaurant, open front shop or the like, self-closing doors.</li> </ul> </li> </ul>
<b>Loading Dock Entrance</b>	A loading dock entrance, if leading to a conditioned space, must be fitted with a rapid roller door or the like.
<b>Exhaust Fans</b>	An exhaust fan must be fitted with a sealing device such as a self-closing damper, filter or the like when serving a conditioned space; or habitable room.
<b>Construction of Ceilings, Walls and Floors</b>	<ul style="list-style-type: none"> <li>- Ceilings, walls, floors and any opening such as a <i>window</i> frame, door frame, <i>roof light</i> frame or the like must be constructed to minimise air leakage in accordance with (2)— <ul style="list-style-type: none"> <li>o when forming part of the <i>envelope</i>; or</li> <li>o in <i>climate zones</i> 4, 5, 6, 7 or 8.</li> </ul> </li> <li>- Construction required by (1) must be— <ul style="list-style-type: none"> <li>o enclosed by internal lining systems that are close fitting at ceiling, wall and floor junctions; or</li> <li>o sealed at junctions and penetrations with— <ul style="list-style-type: none"> <li>▪ close-fitting architrave, skirting or cornice; or</li> <li>▪ expanding foam, rubber compressive strip, caulking or the like.</li> </ul> </li> </ul> </li> <li>- The requirements of above do not apply to openings, grilles or the like required for smoke hazard management.</li> </ul>
<b>Evaporative Coolers</b>	An evaporative cooler must be fitted with a self-closing damper or the like when serving— <ul style="list-style-type: none"> <li>o a heated space; or</li> <li>o a habitable room.</li> </ul>
<b>Mechanical Ventilation Requirement</b>	Where an air permeability of not more than 5 m <sup>3</sup> /hr.m <sup>2</sup> at 50 Pa reference pressure is achieved— <ul style="list-style-type: none"> <li>o a mechanical ventilation system must be provided that— <ul style="list-style-type: none"> <li>- can be manually overridden; and</li> <li>- provides outdoor air, either— <ul style="list-style-type: none"> <li>a. continuously; or</li> <li>b. intermittently, where the system has controls that enable operation for not less than 25 percent of each 4 hour segment; and</li> </ul> </li> </ul> </li> <li>o provides a flow rate not less than that achieved with the following formula: <math>Q=(0.05 \times A+3.5 \times (N+1))/p</math> <math>Q=(0.05 \times A+3.5 \times (N+1))/p</math>, where— <ul style="list-style-type: none"> <li>- <math>Q</math> = the required air flow rate (L/s); and</li> <li>- <math>A</math> = the total floor area of the building (m<sup>2</sup>); and</li> <li>- <math>N</math> = the number of bedrooms in the building; and</li> <li>- <math>p</math> = the fraction of time within each 4 hour segment that the system is operational; and</li> </ul> </li> </ul>



	<ul style="list-style-type: none"> <li>○ any space with a solid-fuel burning combustion appliance must be ventilated with permanent openings directly to outside with a free area of not less than half of the cross-sectional area of the appliance's flue; and</li> <li>○ any space with a gas-fuelled combustion appliance must be ventilated in accordance with— <ul style="list-style-type: none"> <li>- clause 6.4 of AS/NZS 5601.1; and</li> <li>- clause 6.4.5 of AS/NZS 5601.1.</li> </ul> </li> </ul>
<b>Building Sealing Verification (H6V3 requirements)</b>	<p>Compliance to Building Sealing requirements is verified for building envelope sealing when a building envelope is sealed at an air permeability of not more than 10 m<sup>3</sup>/hr.m<sup>2</sup> at 50 Pa reference pressure when tested in accordance with AS/NZS ISO 9972 Method 1.</p> <p><b>Please Note:</b> Geokal Services are a qualified Air Tightness Tester and can undertake testing to confirm compliance to H6V3 requirements as nominated above.</p>

#### **Air Movement:**

Air movement is to comply with the requirements of NCC part F4, the relevant building surveyor is to assess and approve the proposed building to NCC Part F4. Compliance to NCC part F4 will ensure compliance with NCC part J4

#### **Air-Conditioning and Ventilation Systems:**

Proposed air-conditioning and ventilation systems must be suitable designed by a qualified and registered Mechanical Engineer.

Appendix 3 of this report contains NCC requirements that must be adhered to when undertaking the air-conditioning and ventilation systems must be adhered to and nominated in the building design specifications as applicable.

#### **Artificial Lighting and Power:**

Proposed artificial lighting and power design must be suitable designed by a qualified and registered Electrical Engineer.

As part of this report, we have undertaken an assessment of the total allowable consumption for artificial lighting based on the maximum illumination power density (W/m<sup>2</sup>) requirements of NCC Table J7D3a. Assessment indicates that the proposed lighting design will comply if the artificial lighting consumption is limited to **1334 Watts** of power – see attached appendix 2.

Appendix 2 of this report contains NCC requirements that must be adhered to when undertaking the artificial lighting and power must be adhered to and nominated in the building design specifications as applicable.

#### **Hot Water Supply:**

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

#### **Facilities for energy monitoring**

Building is required to be installed with facility to record the consumption of gas and electricity that comply with the following

- A building or sole-occupancy unit with a floor area of more than 500 m<sup>2</sup> must have energy meters configured to record the time-of-use consumption of gas and electricity.
- A building with a floor area of more than 2 500 m<sup>2</sup> must have energy meters configured to enable individual time-of-use energy data recording, in accordance with (3), of—
  - a. air-conditioning plant including, where appropriate, heating plant, cooling plant and air handling fans; and
  - b. artificial lighting; and
  - c. appliance power; and
  - d. central hot water supply; and
  - e. internal transport devices including lifts, escalators and moving walkways where there is more than one serving the building; and



- f. on-site renewable energy equipment; and
  - g. on-site electric vehicle charging equipment; and
  - h. on-site battery systems; and
  - i. other ancillary plant.
- Energy meters required by above must be interlinked by a communication system that collates the time-of-use energy data to a single interface monitoring system where it can be stored, analysed and reviewed.
  - The provisions of above do not apply to energy meters serving—
    - a. a Class 2 building where the total floor area of the common areas is less than 500 m<sup>2</sup>; or
    - b. individual sole-occupancy units with a floor area of less than 2 500 m<sup>2</sup>.

#### Facilities for electric vehicle charging equipment

- Subject to below point, a carpark associated with a Class 2, 3, 5, 6, 7b, 8 or 9 building must be provided with electrical distribution boards dedicated to electric vehicle charging—
  - a. in accordance with table below in each storey of the carpark; and
 

Carpark spaces per storey for electric vehicles	Electrical distribution boards for electric vehicle charging per storey
0 - 9	0
10 - 24	1
25 - 48	2
49 - 72	3
73 - 96	4
97 - 120	5
  - b. labelled to indicate use for electric vehicle charging equipment.
- Electrical distribution boards dedicated to serving electric vehicle charging in a carpark must—
  - a. be fitted with a charging control system with the ability to manage and schedule charging of electric vehicles in response to total building demand; and
  - b. when associated with a Class 2 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 11:00 pm to 7:00 am daily; and
  - c. when associated with a Class 5 to 9 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 12 kWh from 9:00 am to 5:00 pm daily; and
  - d. when associated with a Class 3 building, have capacity for each circuit to support an electric vehicle charger able to deliver a minimum of 48 kWh from 11:00 pm to 7:00 am daily; and
  - e. be sized to support the future installation of a 7 kW (32 A) type 2 electric vehicle charger in—
    - i. 100% of the car parking spaces associated with a Class 2 building; or
    - ii. 10% of car parking spaces associated with a Class 5 or 6 building; or
    - iii. 20% of car parking spaces associated with a Class 3, 7b, 8 or 9 building; and
  - f. contain space of at least 36 mm width of DIN rail per outgoing circuit for individual sub-circuit electricity metering to record electricity use of electric vehicle charging equipment; and
  - g. be labelled to indicate the use of the space required by above point is for the future installation of metering equipment.

#### Facilities for solar photovoltaic and battery systems

- The main electrical switchboard of a building must—
  - a. contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for—
    - i. a solar photovoltaic system; and
    - ii. a battery system; and
  - b. be sized to accommodate the installation of solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area.



- At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels, except for buildings—
  - a. with installed solar photovoltaic panels on—
    - i. at least 20% of the roof area; or
    - ii. an equivalent generation capacity elsewhere on-site; or
  - b. where 100% of the roof area is shaded for more than 70% of daylight hours; or
  - c. with a roof area of not more than 55 m<sup>2</sup>; or
  - d. where more than 50% of the roof area is used as a terrace, carpark, roof garden, roof light or the like.

## 15. Conclusion

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In conclusion, this sustainable design assessment has demonstrated alignment with the requirements set forth by the Whittlesea City Council and the National Construction Code of Australia (NCC). By incorporating principles of energy efficiency, water conservation, and environmentally responsible material selection, the proposed design aims to significantly reduce environmental impact while enhancing liveability and long-term value for the community.

This report highlights the importance of adhering to sustainable development standards, not only to meet regulatory obligations but also to contribute to Australia's broader goals for environmental sustainability and carbon neutrality. With continued commitment to these principles, this project sets a benchmark for responsible and forward-thinking design practices.



## Appendix 1 – Building Users Guide

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# Sustainable Building User's Guide for Occupants



For the property at 279 Torque Road, Grovedale



**GEOKAL SERVICES PTY LTD**

Welcome to your new home—a modern, energy-efficient sanctuary designed to embrace sustainable living in Victoria, Australia. This guide will help you understand and maximize the features of your house, ensuring comfort, efficiency, and environmental responsibility.

Your home is a shining example of sustainable design, incorporating cutting-edge technologies and thoughtful systems to reduce your environmental footprint while enhancing your quality of life. With its 7-star NatHERS energy efficiency rating, this house is built to perform exceptionally well in Victoria's diverse climate, from hot summers to chilly winters.

Here's a quick overview of the key features that make your home a model of sustainability:

**1. Rainwater Harvesting for Toilets:**

- A water tank system collects and stores rainwater from your roof, providing a sustainable water source for toilet flushing. This reduces your reliance on mains water and helps conserve precious resources.

**2. Photovoltaic (PV) Solar Panels:**

- Harness the power of the sun to generate clean, renewable electricity for your home. The solar panels reduce your energy bills and contribute to a greener planet.

**3. Fully Electric Design:**

- Your home is entirely electric, eliminating the need for gas and supporting a transition to renewable energy sources. This includes efficient appliances and systems that align with modern sustainability goals.

**4. Induction Cooktops:**

- Enjoy precise, energy-efficient cooking with induction technology. These cooktops are safer, faster, and more environmentally friendly than traditional gas stoves.

**5. Double-Glazed Windows:**

- Double glazing enhances thermal insulation, keeping your home warm in winter and cool in summer. It also reduces noise pollution, creating a peaceful indoor environment.

**6. Refrigerated Heating and Cooling:**

- A state-of-the-art system provides year-round comfort with energy-efficient heating and cooling tailored to Victoria's climate.

**7. EV Charging Station:**

- Your home is equipped with an electric vehicle charging station, supporting sustainable transportation and making EV ownership convenient.

**Why This Matters**

This home is designed to minimize environmental impact while maximizing comfort and cost savings. By integrating these features, you are contributing to a sustainable future, reducing greenhouse gas emissions, and embracing a lifestyle that aligns with global efforts to combat climate change.

This guide will provide detailed instructions on how to use, maintain, and optimize each feature of your home. By following these recommendations, you can ensure your home operates efficiently and continues to deliver its environmental and financial benefits for years to come.

Let's embark on this journey toward sustainable living together!

Photovoltaic (PV) Solar Panel System	Page 4
Water Harvesting System (Water Tanks)	Page 5
Double-Glazed Windows	Page 7
Heat Pump Hot Water System	Page 9
Induction Cooktop	Page 11
Shading Devices	Page 12
Refrigerated Heating and Cooling System	Page 15
Electric Car Charging	Page 17

PV (Photovoltaic) solar panels capture sunlight and convert it into electricity, powering your home with renewable energy. Solar panels reduce your reliance on fossil fuels and the electricity grid. By generating your own clean energy, you decrease greenhouse gas emissions and lower your energy bills. Australia has an abundance of sunshine, making solar energy a perfect match for sustainable living in Victoria. It helps combat climate change by significantly reducing your home's carbon footprint.

## How to Use PV Solar Panels:

- **Monitor Usage:** Use your energy monitor (if available) to track production. Run high-energy appliances during daylight hours.
- **Maintenance:** Report shading or damage to building management.
- **Winter:** Solar output drops with shorter days—prioritize essential use.
- **Summer:** Take advantage of longer days to maximize solar benefits.

## Tips for Seasonal Use

- **Summer:** Clean panels to maximize sunlight absorption.
- **Winter:** Plan energy use to account for shorter daylight hours.

## Cleaning & Maintenance Procedures

Regular maintenance and cleaning can significantly improve the efficiency and lifespan of your solar panels. Here's a comprehensive guide to cleaning and maintaining solar panels, ensuring they operate efficiently and last longer. This is general advise, always refer to system manufacturer for further details.

1. **Preparation:**
  - Conduct a risk assessment to identify potential hazards (e.g., falls, electrical risks).
  - Turn off the solar panel system and isolate it from the power supply.
  - Use appropriate Personal Protective Equipment (PPE), such as gloves, safety glasses, and non-slip footwear.
  - Ensure the work area is free from trip hazards and secure any loose tools.
2. **Cleaning Steps:**
  - **Access Panels Safely:** Use a stable ladder or scaffolding with fall prevention measures (e.g., harnesses or guardrails) if working at heights.
  - **Remove Loose Debris:** Use a soft brush or broom to gently sweep off debris while maintaining a safe working position.
  - **Rinse Panels:** Use a hose with a gentle spray nozzle to rinse panels. Avoid high-pressure washers to prevent damage.
  - **Scrub Gently:** Use a non-abrasive sponge or cloth with soapy water to clean stubborn grime. Avoid harsh chemicals.
  - **Rinse Again:** Thoroughly rinse off soap residue with water.
  - **Dry Panels:** Allow panels to air dry or use a squeegee while ensuring a secure footing.
3. **Safety Tips:**
  - Never work alone; have a colleague present for assistance in case of emergencies.
  - Avoid working in adverse weather conditions (e.g., rain, strong winds).
  - If panels are hard to reach or located on fragile surfaces, hire a professional cleaner with appropriate training and equipment.

Maintenance Schedule

Monthly	Quarterly	Annually	After Extreme Weather
<ul style="list-style-type: none"> <li>- Inspect panels for visible dirt, debris, or damage.</li> <li>- Monitor energy output for any unusual drops.</li> </ul>	<ul style="list-style-type: none"> <li>- Perform a thorough cleaning if dirt accumulation is significant.</li> <li>- Check for loose wiring or mounting issues.</li> </ul>	<ul style="list-style-type: none"> <li>- Engage a licensed professional to inspect the system, including the inverter, wiring, and overall performance.</li> <li>- Ensure panels are free from cracks, discoloration, or other defects.</li> </ul>	<ul style="list-style-type: none"> <li>- Inspect panels for damage after storms, hail, or heavy winds.</li> <li>- Clear any debris while adhering to safety protocols.</li> </ul>

A roof water harvesting system captures and stores rainwater from a building's roof. The collected water is stored in a tank and used for non-potable purposes such as flushing toilets and doing laundry. The system typically includes:

- **Catchment Area:** Roof surfaces where rainwater is collected.
- **Gutters and Downpipes:** Channels directing water to the tank.
- **First Flush Diverter:** Removes initial runoff containing debris or contaminants.
- **Storage Tank:** Holds the rainwater for later use.
- **Pump and Plumbing:** Distributes water to the toilet cisterns and, optionally, the laundry.

### How to Use the System

1. **Toilet Flushing:**
  - Rainwater is pumped from the tank to the toilet cistern.
  - Ensure a reliable pressure pump is installed to maintain consistent water flow.
2. **Laundry (Optional):**
  - Water is filtered before entering the washing machine.
  - Use a pre-filter on the tank outlet to reduce sediment and maintain appliance efficiency.
3. **Switch Between Rainwater and Mains:**
  - Install a dual plumbing system with automatic mains water backup for times when the tank runs dry.
4. **Overflow Management:**
  - Direct excess water to a garden or stormwater system to prevent wastage and flooding.

### Tips for Seasonal Use

#### Summer:

- Inspect the tank for algae or bacteria growth due to high temperatures. Use a UV filter or appropriate treatment if needed.
- Clean gutters regularly to prevent blockages from dry-season debris.

#### Winter:

- Check for leaks or damage to pipes caused by temperature changes or frost.
- Ensure the first flush diverter is cleaned after heavy rains to maintain water quality.

#### Spring:

- Perform system maintenance to prepare for the rainy season.
- Inspect and repair any storm damage to the roof, gutters, or tank.

#### Autumn:

- Clear gutters and downpipes frequently to remove falling leaves and prevent clogging.
- Test the system for proper functionality before the winter season begins.

By understanding and using this system effectively, you not only conserve water but also actively contribute to sustainable living and a healthier environment

### Cleaning & Maintenance Procedures

Regular maintenance and cleaning your rainwater harvesting system will operate efficiently, providing sustainable water for daily use while benefiting the environment. Here's a cleaning procedure and maintenance schedule tailored to a roof water harvesting system connected to toilets and optionally to a laundry system. This is general advice, always refer to system manufacturer for further details.

Component	Frequency	Steps
Roof and Gutters	Quarterly or after heavy storms	<p><b>Conduct a Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>● Identify potential hazards such as working at heights, slips, or contact with sharp objects.</li> <li>● Ensure the area is free from trip hazards and establish clear access paths.</li> </ul> <p><b>Use Personal Protective Equipment (PPE):</b></p> <ul style="list-style-type: none"> <li>● Wear non-slip footwear, gloves, safety glasses, and a hard hat if working near overhead structures.</li> </ul> <p><b>Access the Roof Safely:</b></p> <ul style="list-style-type: none"> <li>● Use a stable ladder or scaffolding with fall prevention measures (e.g., harness, guardrails).</li> <li>● Ensure the ladder is positioned on a level, stable surface and secured to prevent movement.</li> </ul>

# Water Harvesting System - Continued

		<p><b>Cleaning:</b></p> <ul style="list-style-type: none"> <li>• Clear debris manually or with a soft broom while maintaining a secure working position.</li> <li>• Use tools with extended handles to minimize the need to climb onto the roof.</li> </ul>
<b>First Flush Diverter</b>	Monthly or as needed	<ul style="list-style-type: none"> <li>- Turn off the system temporarily to prevent water flow during maintenance.</li> <li>- Wear gloves when handling the diverter to avoid contact with contaminants.</li> <li>- Open the diverter, remove debris, and wash it with clean water.</li> <li>- Reassemble securely and ensure it resets for the next rainfall.</li> </ul>
<b>Tank Inlet and Screens</b>	Monthly or when buildup is noticeable	<ul style="list-style-type: none"> <li>- Use gloves to remove and rinse the inlet screen with water.</li> <li>- Inspect and replace damaged insect-proof screens to maintain hygiene.</li> <li>- Ensure that overflow screens are clear to avoid tank flooding.</li> </ul>
<b>Tank Interior</b>	Inspect annually; clean every 2–3 years or as needed	<ul style="list-style-type: none"> <li>- Drain the tank following WorkSafe guidelines for handling large volumes of water.</li> <li>- Use proper lighting and PPE when entering or inspecting confined spaces. Engage professionals if confined space entry is required.</li> <li>- Remove sediment with a wet vacuum or through flushing, ensuring environmental compliance for waste disposal.</li> <li>- Scrub the tank interior with a soft brush and rinse thoroughly.</li> </ul>
<b>Pump and Filters</b>	Clean filters quarterly; inspect the pump monthly	<ul style="list-style-type: none"> <li>- Turn off the pump and isolate it from the power source.</li> <li>- Wear insulated gloves when handling electrical components.</li> <li>- Remove filters and wash them under running water to clear sediment.</li> <li>- Inspect the pump for wear, noise, or reduced performance. Engage a licensed technician for repairs.</li> </ul>

Maintenance Schedule			
Monthly	Quarterly	Annually	After Extreme Weather
<ul style="list-style-type: none"> <li>- Inspect the tank, pipes, and fittings for leaks, wear, or damage.</li> <li>- Monitor water output for signs of system inefficiency.</li> <li>- Check that safety measures like overflow management are functioning correctly.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean gutters, downpipes, and filters to maintain water flow and quality.</li> <li>- Test the pump and backflow prevention device for proper operation.</li> <li>- Review the effectiveness of safety controls (e.g., fall protection and PPE).</li> </ul>	<ul style="list-style-type: none"> <li>- Conduct a comprehensive system inspection by licensed professionals.</li> <li>- Service pumps, plumbing connections, and backflow prevention devices as per manufacturer guidelines.</li> <li>- Flush the tank to remove sediment and conduct water quality testing if required.</li> </ul>	<ul style="list-style-type: none"> <li>- Clear debris from the roof, gutters, and tank inlets immediately after storms.</li> <li>- Inspect the system for visible damage and repair any compromised components.</li> <li>- Reassess safety measures and reapply hazard controls as necessary</li> </ul>

**Additional Recommendations**

- Always work in pairs or ensure someone is available to assist during cleaning and maintenance.
- Avoid working in adverse weather conditions (e.g., rain, strong winds, or extreme heat).
- Clearly label rainwater pipes and outlets to prevent accidental use for potable purposes.
- Ensure maintenance waste (e.g., sediment, dirty water) is disposed of according to environmental and local regulations.

# Double Glazed Windows

Double-glazed windows consist of two panes of glass with an insulating gap between them, often filled with air or inert gas. They enhance insulation by reducing heat loss in winter and heat gain in summer. This improves energy efficiency and enhances indoor comfort. Efficient insulation reduces the need for heating and cooling, which in turn lowers energy consumption and greenhouse gas emissions.

## How to Use:

- Adjust windows to optimize airflow depending on the season:
  - **Summer:** Open at night to let cool air in.
  - **Winter:** Keep closed to retain warmth.

## Tips for Seasonal Use

- Combine windows with external shading (e.g., blinds or trees) for added comfort year-round.

## Cleaning & Maintenance Procedures

Regular maintenance can ensure your double-glazed windows in excellent condition, Here's a cleaning procedure and maintenance schedule for double-glazed windows. These steps ensure safety while maintaining the windows' efficiency and longevity. This is general advise, always refer to system manufacturer for further details.

Task	Frequency	Steps
<b>Exterior Cleaning</b>	Clean at least twice a year or as needed	<p><b>Conduct a Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>- Identify hazards such as working at heights or handling cleaning agents.</li> <li>- Ensure the area around the windows is clear of obstacles.</li> </ul> <p><b>Use Personal Protective Equipment (PPE):</b></p> <ul style="list-style-type: none"> <li>- Wear gloves, safety glasses, and non-slip footwear.</li> </ul> <p><b>Access the Windows Safely:</b></p> <ul style="list-style-type: none"> <li>- Use a stable ladder or scaffolding with fall prevention measures (e.g., harness, guardrails) if working at heights.</li> <li>- Ensure the ladder is placed on a stable surface and secured.</li> </ul> <p><b>Cleaning:</b></p> <ul style="list-style-type: none"> <li>- Use a soft cloth or sponge with a mild soap solution to clean the glass.</li> <li>- Avoid abrasive materials or harsh chemicals that can damage the glass or seals.</li> <li>- Rinse with clean water and dry with a lint-free cloth to prevent streaks.</li> </ul>
<b>Interior Cleaning</b>	Clean quarterly or as needed.	<ul style="list-style-type: none"> <li>- Use a vacuum cleaner with a brush attachment to remove dust and debris from window frames and sills.</li> <li>- Spray a mild glass cleaner onto a soft cloth (not directly onto the glass) and wipe the interior surface.</li> <li>- Dry the glass with a microfiber cloth to avoid streaks.</li> </ul>
<b>Seal and Frame Maintenance</b>	Inspect and clean annually.	<ul style="list-style-type: none"> <li>- Check the seals for cracks or wear. Replace damaged seals promptly to maintain insulation.</li> <li>- Clean the frames with a damp cloth and mild detergent. Avoid using sharp tools that could scratch the surface.</li> </ul>

# Double Glazed Windows - Continued

Maintenance Schedule			
Monthly	Quarterly	Annually	After Extreme Weather
<ul style="list-style-type: none"> <li>- Inspect the windows for visible damage, such as cracks or condensation between panes.</li> <li>- Check for drafts or difficulty in opening and closing the windows.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean the interior glass and frames to maintain appearance and functionality.</li> <li>- Test the locking mechanisms and hinges for smooth operation.</li> </ul>	<ul style="list-style-type: none"> <li>- Conduct a comprehensive inspection of the windows, including seals, frames, and glass.</li> <li>- Engage a licensed professional to address issues like broken seals, misaligned frames, or shattered glass.</li> <li>- Lubricate hinges and locks to ensure smooth operation.</li> </ul>	<ul style="list-style-type: none"> <li>- Inspect the windows for damage caused by strong winds or debris.</li> <li>- Clear any dirt or debris from the frames and sills to prevent wear.</li> </ul>

**Additional Recommendations**

- Always work in pairs or ensure someone is available to assist during cleaning and maintenance.
- Avoid working in adverse weather conditions (e.g., rain, strong winds).
- Use appropriate cleaning agents that are safe for both the glass and the environment.
- Clearly label any damaged windows to prevent accidental use until repairs are completed.

A heat pump hot water system uses ambient air to heat water, making it an energy-efficient alternative to traditional systems. It uses up to 70% less energy compared to electric or gas systems, reducing both energy costs and emissions. Efficient water heating is vital for sustainable living, as water heating is a significant contributor to household energy use.

**How to Use:**

- Schedule heating during off-peak times for cost efficiency.
- Set the thermostat to approximately 60°C for safety and efficiency.

**Tip:**

- Regularly clear any debris around the outdoor unit to maintain optimal performance.

**Cleaning & Maintenance Procedures**

Regular maintenance for a heat pump hot water system is important to ensure it operates properly. These steps ensure safety, efficiency, and longevity. This is general advise, always refer to system manufacturer for further details.

Task	Frequency	Steps
<b>Exterior Unit Cleaning</b>	Clean quarterly or as needed	<p><b>Conduct a Risk Assessment:</b></p> <ul style="list-style-type: none"> <li>- Identify hazards such as electrical risks or sharp edges on the unit.</li> <li>- Ensure the area around the unit is clear of obstacles.</li> </ul> <p><b>Use Personal Protective Equipment (PPE):</b></p> <ul style="list-style-type: none"> <li>- Wear gloves, safety glasses, and non-slip footwear.</li> </ul> <p><b>Cleaning:</b></p> <ul style="list-style-type: none"> <li>- Turn off the power supply to the heat pump.</li> <li>- Use a soft brush or vacuum with a brush attachment to remove dust, dirt, and debris from the exterior casing and vents.</li> <li>- Wipe the exterior with a damp cloth and mild detergent. Avoid using abrasive materials.</li> </ul>
<b>Air Filter Cleaning</b>	Clean every 3–6 months or as needed	<ul style="list-style-type: none"> <li>- Turn off the power supply to the heat pump.</li> <li>- Remove the air filter from the unit.</li> <li>- Wash the filter with warm water and mild soap. Allow it to dry completely before reinserting.</li> <li>- Inspect the filter for damage and replace it if necessary.</li> </ul>
<b>Water Tank Cleaning</b>	Inspect annually; clean every 2–3 years or as needed	<ul style="list-style-type: none"> <li>- Turn off the power supply and isolate the water supply.</li> <li>- Drain the tank and flush it to remove sediment buildup.</li> <li>- Use a soft brush to clean the interior walls of the tank. Avoid harsh chemicals.</li> <li>- Rinse thoroughly and refill the tank</li> </ul>
<b>Refrigerant Line Inspection</b>	Inspect annually	<ul style="list-style-type: none"> <li>- Check for signs of refrigerant leaks, such as oil stains or hissing sounds.</li> <li>- If a leak is suspected, contact a licensed technician for repairs.</li> </ul>

# Heat Pump Hot Water System - Continued

Maintenance Schedule			
Monthly	Quarterly	Annually	After Extreme Weather
<ul style="list-style-type: none"> <li>- Inspect the system for visible damage, leaks, or unusual noises.</li> <li>- Check the thermostat for accurate temperature settings.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean the air filters and exterior unit to maintain airflow and efficiency.</li> <li>- Ensure the area around the unit is free from obstructions.</li> </ul>	<ul style="list-style-type: none"> <li>- Conduct a comprehensive inspection of the system, including the water tank, coils, and refrigerant lines.</li> <li>- Engage a licensed professional to service the heat pump and check refrigerant levels.</li> <li>- Flush the water tank to remove sediment buildup.</li> </ul>	<ul style="list-style-type: none"> <li>- Inspect the exterior unit for damage caused by debris or strong winds.</li> <li>- Clear any obstructions around the unit to ensure proper airflow.</li> </ul>

**Additional Recommendations**

- Always work in pairs or ensure someone is available to assist during cleaning and maintenance.
- Avoid working in adverse weather conditions (e.g., rain, strong winds).
- Use appropriate cleaning agents that are safe for the system and the environment.
- Clearly label any damaged components to prevent accidental use until repairs are completed.

An induction cooktop uses electromagnetic energy to heat cookware directly, offering fast, precise, and energy-efficient cooking. It's safer, faster, and more efficient than gas or traditional electric cooktops, reducing household energy use. Induction cooking minimizes energy waste, making it an environmentally friendly choice.

**How to Use:**

- Use cookware compatible with induction technology.
- Take advantage of precise temperature settings to cook efficiently.

**Tip:**

- Clean spills promptly to avoid buildup, as the surface cools quickly after cooking.

**Cleaning & Maintenance Procedures**

Cleaning procedure and maintenance schedule for an induction cooktop. These steps ensure safety, maintain efficiency, and extend the lifespan of your appliance. This is general advise, always refer to system manufacturer for further details.

Task	Frequency	Steps
<b>Daily Cleaning</b>	After every use.	<ul style="list-style-type: none"> <li>- Wipe the surface with a damp, soft cloth to remove spills and food residue.</li> <li>- For stubborn stains, use a non-abrasive cleaner specifically designed for induction cooktops.</li> <li>- Avoid using abrasive sponges, steel wool, or harsh chemicals that can scratch or damage the glass surface.</li> <li>- Dry the surface with a microfiber cloth to prevent streaks</li> </ul>
<b>Weekly Deep Cleaning</b>	Once a week or as needed	<ul style="list-style-type: none"> <li>- Apply a small amount of induction cooktop cleaner to the surface.</li> <li>- Use a soft cloth or sponge to gently scrub the surface in circular motions.</li> <li>- Rinse with a damp cloth to remove any cleaner residue.</li> <li>- Dry thoroughly with a lint-free cloth for a streak-free finish.</li> </ul>
<b>Burnt-On Residue Removal</b>	As needed.	<ul style="list-style-type: none"> <li>- Use a plastic or glass scraper designed for induction cooktops to gently remove burnt-on residue.</li> <li>- Apply a small amount of cooktop cleaner and scrub gently with a soft cloth.</li> <li>- Wipe clean with damp cloth and dry thoroughly.</li> </ul>

Maintenance Schedule			
Monthly	Quarterly	Annually	Post-Spill Maintenance
<ul style="list-style-type: none"> <li>- Inspect the cooktop for visible damage, such as cracks or scratches.</li> <li>- Check the power cord and plug for wear or damage.</li> </ul>	<ul style="list-style-type: none"> <li>- Test the cooktop's functionality by heating a small amount of water in an induction-compatible pot.</li> <li>- Inspect the control panel for responsiveness and cleanliness.</li> </ul>	<ul style="list-style-type: none"> <li>- Engage a licensed technician to inspect the internal components, such as the induction coils and wiring.</li> <li>- Ensure the cooktop complies with electrical safety standards.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean spills immediately to prevent them from hardening or damaging the surface.</li> <li>- For sugary spills, turn off the cooktop and clean once it has cooled to avoid damaging the glass.</li> </ul>

**Additional Recommendations**

- Always work in pairs or ensure someone is available to assist during cleaning and maintenance.
- Avoid using the cooktop if there are visible cracks or damage to the glass surface.
- Clearly label the cooktop as "out of service" if repairs are needed.
- Use only induction-compatible cookware to prevent damage to the appliance.

Shading solutions like blinds, awnings, and trees help regulate indoor temperatures by managing sunlight exposure. Effective shading reduces the need for air conditioning in summer and maximizes natural heating in winter. By reducing energy use for heating and cooling, shading plays a critical role in lowering carbon emissions and improving energy efficiency.

**How to Use:**

- **Summer:**
  - Use external shading to block direct sunlight.
  - Close internal blinds to minimize heat gain.
- **Winter:**
  - Open blinds during the day to let sunlight in.
  - Close them at night to trap heat.

**Tips for Season Use:**

**Summer:**

- Ensure shading systems are fully operational to block high-angle sunlight.
- Use light-colored materials for adjustable shading to reflect heat.

**Winter:**

- Adjust shading systems to allow low-angle sunlight for passive heating.
- Prune deciduous trees to maximize sunlight penetration.

**Spring and Autumn:**

- Perform routine maintenance to prepare for seasonal temperature changes.
- Inspect and clean shading systems to ensure year-round efficiency.

**Cleaning & Maintenance Procedures**

Cleaning procedure and maintenance schedule your shading devices. These steps ensure safety, maintain efficiency, and provide yearlong building comfort.

Task	Frequency	Steps
<b>Fixed Shading Structures (e.g., Eaves, Awnings, Pergolas)</b>	Clean quarterly or as needed.	<b>1. Conduct a Risk Assessment:</b> <ul style="list-style-type: none"> <li>- Identify hazards such as working at heights or handling cleaning agents.</li> <li>- Ensure the area is clear of obstacles.</li> </ul> <b>2. Use Personal Protective Equipment (PPE):</b> <ul style="list-style-type: none"> <li>- Wear gloves, safety glasses, and non-slip footwear.</li> </ul> <b>3. Cleaning:</b> <ul style="list-style-type: none"> <li>- Use a soft brush or broom to remove dirt and debris.</li> <li>- Wash with a mild detergent and water using a sponge or cloth.</li> <li>- Rinse thoroughly and dry with a clean cloth</li> </ul>
<b>Adjustable Shading Elements (e.g., Blinds, Louvres)</b>	Clean monthly or as needed	<ul style="list-style-type: none"> <li>- Turn off any motorized systems to prevent accidental movement.</li> <li>- Wipe down surfaces with a damp cloth and mild detergent.</li> <li>- Inspect for damage or wear, such as frayed cords or bent slats.</li> </ul>
<b>Natural Shading (e.g., Trees, Shrubs)</b>	Prune and maintain annually or as needed.	<ul style="list-style-type: none"> <li>- Use appropriate tools (e.g., pruning shears) and wear PPE.</li> <li>- Remove dead or overgrown branches to maintain optimal shading.</li> <li>- Dispose of green waste according to local regulations.</li> </ul>

# Shading Systems - Continued

Maintenance Schedule			
Monthly	Quarterly	Annually	Post-Storm Maintenance
<ul style="list-style-type: none"> <li>- Inspect adjustable shading systems for smooth operation and signs of wear.</li> <li>- Check for dirt or debris accumulation on fixed shading elements.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean fixed shading structures and inspect for damage, such as rust or cracks.</li> <li>- Test motorized systems for proper functionality.</li> </ul>	<ul style="list-style-type: none"> <li>- Engage a licensed professional to inspect and service motorized shading systems.</li> <li>- Repaint or reseal fixed structures to protect against weathering.</li> <li>- Prune natural shading elements to maintain their effectiveness.</li> </ul>	<ul style="list-style-type: none"> <li>- Inspect all shading systems for damage caused by strong winds or debris.</li> <li>- Clear any obstructions to ensure proper functionality.</li> </ul>

**Additional Recommendations**

- Always work in pairs or ensure someone is available to assist during cleaning and maintenance.
- Avoid working in adverse weather conditions (e.g., rain, strong winds).
- Use appropriate tools and cleaning agents that are safe for the materials and the environment.
- Clearly label damaged shading systems to prevent accidental use until repairs are completed.

# Refrigerated Heating and Cooling

Refrigerative systems use a refrigeration cycle to transfer heat, providing both heating and cooling for indoor spaces. Common types include:

- **Split Systems:** Separate indoor and outdoor units.
- **Ducted Systems:** Centralized systems distributing air through ducts.
- **Reverse Cycle Systems:** Provide both heating and cooling.

## How to Use:

- **Winter:**
  - Set to 18–20°C for comfort; use ceiling fans to circulate warm air.
  - Test the heating function and ensure the system is operating efficiently.
  - Check for drafts or leaks in ducts and seal them to retain heat.
- **Summer:**
  - Set to 24–26°C; close blinds to block heat.
  - Ensure the system is serviced before peak usage to maintain cooling efficiency.
  - Clean the outdoor unit to prevent overheating.
- **Spring and Autumn:**
  - Perform routine maintenance to prepare for seasonal temperature changes.
  - Schedule professional servicing during off-peak times for convenience.

## Tips for Season Use:

Dress for the season (jumpers in winter, light clothes in summer) to reduce reliance.

## Cleaning & Maintenance Procedures

Cleaning procedure and maintenance schedule for heating and cooling systems. These steps ensure safety, maintain efficiency, and extend the lifespan of your system. This is general advise, always refer to system manufacturer for further details.

Task	Frequency	Steps
<b>Air Filters</b>	Clean or replace every 1–3 months.	<ol style="list-style-type: none"> <li><b>1. Conduct a Risk Assessment:</b> <ul style="list-style-type: none"> <li>- Identify hazards such as electrical risks or sharp edges.</li> </ul> </li> <li><b>2. Use Personal Protective Equipment (PPE):</b> <ul style="list-style-type: none"> <li>- Wear gloves and safety glasses.</li> </ul> </li> <li><b>3. Cleaning:</b> <ul style="list-style-type: none"> <li>- Turn off the system and isolate it from the power supply.</li> <li>- Remove the filter and vacuum it to remove dust and debris.</li> <li>- Wash reusable filters with warm water and mild soap. Allow them to dry completely before reinserting.</li> </ul> </li> </ol>
<b>Coils (Evaporator and Condenser)</b>	Clean annually or as needed.	<ul style="list-style-type: none"> <li>- Turn off the system and isolate it from the power supply.</li> <li>- Use a soft brush or vacuum to remove dirt and debris from the coils.</li> <li>- Apply a coil cleaner recommended by the manufacturer. Follow the product instructions carefully.</li> </ul>
<b>Outdoor Unit</b>	Inspect and clean quarterly.	<ul style="list-style-type: none"> <li>- Clear debris, leaves, and dirt from around the unit to maintain airflow.</li> <li>- Use a garden hose to gently rinse the exterior fins. Avoid high-pressure water to prevent damage.</li> <li>- Inspect for visible damage or blockages.</li> </ul>
<b>Ducts (For Ducted Systems)</b>	Inspect annually; clean every 3–5 years.	<ul style="list-style-type: none"> <li>- Engage a licensed professional for duct cleaning to ensure compliance with safety standards.</li> <li>- Inspect ducts for leaks or damage and seal them as needed.</li> </ul>

# Refrigerated Heating and Cooling - Continued

Maintenance Schedule			
Monthly	Quarterly	Annually	Post-Storm Maintenance
<ul style="list-style-type: none"> <li>- Inspect air filters and clean or replace them as needed.</li> <li>- Check for unusual noises or reduced airflow.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean the outdoor unit and ensure the area around it is clear.</li> <li>- Test the thermostat for accurate temperature control.</li> </ul>	<ul style="list-style-type: none"> <li>- Engage a licensed technician to inspect and service the system, including refrigerant levels, coils, and electrical components.</li> <li>- Clean the evaporator and condenser coils.</li> <li>- Inspect and clean ducts (if applicable).</li> </ul>	<ul style="list-style-type: none"> <li>- Inspect the outdoor unit for damage caused by debris or strong winds.</li> <li>- Clear any obstructions to ensure proper airflow.</li> </ul>

#### Additional Recommendations

- Always work in pairs or ensure someone is available to assist during cleaning and maintenance.
- Avoid working in adverse weather conditions (e.g., rain, strong winds).
- Use appropriate tools and cleaning agents that are safe for the system and the environment.
- Clearly label damaged components to prevent accidental use until repairs are completed.

# Electric Car Charging

Electric car charging systems supply power to electric vehicles (EVs) through dedicated charging stations or home chargers. They typically include:

- **Charging Unit:** The device that delivers electricity to the EV.
- **Charging Cable:** Connects the charging unit to the vehicle.
- **Connector:** The plug that interfaces with the EV.

## How to Use:

- **Preparation:**
  - Park your EV close to the charging unit, ensuring the charging cable can reach the port without tension.
  - Check that the charger and vehicle are free from visible damage.
- **Connection:**
  - Plug the charging cable securely into the EV's charging port.
  - If using a smart charger, follow on-screen or app instructions to start the session.
- **During Charging:**
  - Monitor the charging session via the charger display or mobile app.
  - Avoid tugging or moving the cable while charging.
- **Ending the Session:**
  - Stop charging through the app, charger interface, or by unplugging the cable, depending on the model.
  - Disconnect the cable from the vehicle and neatly store it in its holder.
- **Post-Charging:**
  - Inspect the connector and cable for debris or damage before storing.

## Tips:

- **Cable Handling:**
  - Avoid dragging or twisting the cable to prevent internal damage.
  - Store the cable neatly when not in use to prevent tripping hazards.
- **Weather Protection:**
  - Install a weatherproof cover or enclosure for the charger to protect it from rain, sun, and extreme conditions.
  - Avoid using the charger during heavy rain or electrical storms.
- **Charging Strategy:**
  - Charge during off-peak hours (e.g., late at night) to reduce electricity costs and support the grid.
  - Avoid frequently charging the battery to 100%, as this can reduce its lifespan. Instead, aim for 80–90% unless needed for long trips.
- **System Monitoring:**
  - Use a smart charger or app to monitor energy usage and charging efficiency.
  - Set reminders for scheduled maintenance to avoid unexpected issues.
- **Upkeep:**
  - Regularly check for software updates for the charger to ensure optimal performance and compatibility.

## Cleaning & Maintenance Procedures

Cleaning procedure and maintenance schedule for EV charging system. These steps ensure safety, maintain efficiency, and extend the lifespan of your system. This is general advice, always refer to system manufacturer for further details.

Task	Frequency	Steps
Charging Unit	Clean monthly or as needed	<ol style="list-style-type: none"> <li>1. <b>Conduct a Risk Assessment:</b> <ul style="list-style-type: none"> <li>- Identify electrical hazards and ensure safe working conditions.</li> </ul> </li> <li>2. <b>Use Personal Protective Equipment (PPE):</b> <ul style="list-style-type: none"> <li>- Wear gloves and safety glasses to protect against cleaning agents and sharp edges.</li> </ul> </li> <li>3. <b>Cleaning:</b> <ul style="list-style-type: none"> <li>- Turn off the charger and isolate it from the power supply.</li> <li>- Wipe the exterior with a damp cloth and mild detergent. Avoid abrasive materials.</li> <li>- Dry thoroughly to prevent moisture ingress.</li> </ul> </li> </ol>

## Electric Car Charging - Continued

<b>Charging Cable and Connector</b>	Inspect and clean monthly.	<ul style="list-style-type: none"> <li>- Disconnect the cable from both the charger and the vehicle.</li> <li>- Wipe the cable with a damp cloth to remove dirt and debris.</li> <li>- Clean the connector with a dry cloth. Avoid using water or cleaning agents on the connector pins.</li> </ul>
<b>Surrounding Area</b>	Inspect and clean quarterly.	<ul style="list-style-type: none"> <li>- Clear debris, dirt, or leaves from the area around the charging unit.</li> <li>- Ensure adequate lighting and remove any trip hazards.</li> </ul>

Maintenance Schedule			
Monthly	Quarterly	Annually	Post-Storm Maintenance
<ul style="list-style-type: none"> <li>- Inspect the charging unit, cable, and connector for visible wear or damage.</li> <li>- Test functionality by plugging the charger into the vehicle.</li> </ul>	<ul style="list-style-type: none"> <li>- Clean the charging unit and surrounding area to maintain optimal performance.</li> <li>- Check for loose connections or unusual sounds during operation.</li> </ul>	<ul style="list-style-type: none"> <li>- Engage a licensed electrician to inspect internal components, wiring, and safety features like circuit breakers.</li> <li>- Test surge protection and ensure compliance with electrical safety standards.</li> </ul>	<ul style="list-style-type: none"> <li>- Inspect the charger for physical damage or water ingress caused by storms.</li> <li>- Clear debris from the surrounding area to ensure safe use.</li> </ul>

### Additional Recommendations

- Always work in pairs or ensure someone is present to assist during cleaning or maintenance.
- Clearly label the charger as “out of service” if damage is detected.
- Use only manufacturer-recommended cleaning agents and tools to avoid voiding warranties.
- Avoid working in adverse weather conditions (e.g., heavy rain or extreme heat) when maintaining the system.



## Appendix 2 – Melbourne Water WSUD Information

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INSTRUCTION SHEET

# Porous paving

healthy waterways  
Raingardens

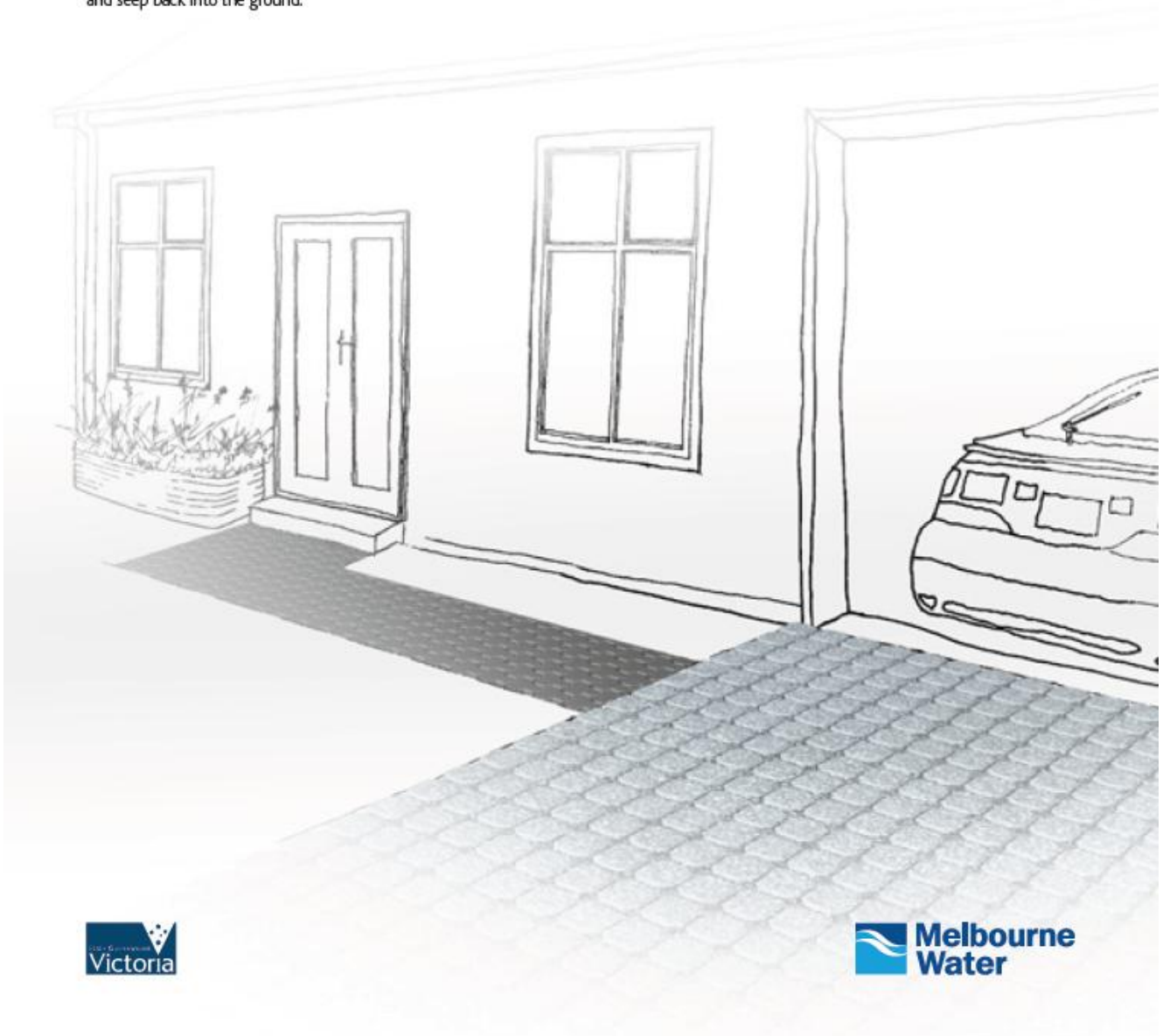
## What is porous paving?

Installing porous paving instead of concrete or standard paving is a simple way to help the environment and the health of our local waterways.

Porous paving is designed to allow water to soak through the paving and seep back into the ground.

This not only reduces the volume of stormwater run off and pollutants entering our rivers and creeks, but also benefits nearby plants and trees by allowing both air and water to reach the root zone underneath the paved area.

*Did you know you can build different types of raingardens? For more information visit [melbournewater.com.au/raingardens](http://melbournewater.com.au/raingardens)*





## Different types of porous paving

Before installing porous paving in a driveway, path or patio area, you need to decide which type to install – **loose gravel, structural gravel or grass, masonry pavers or engineered pavers.**

Things to consider when selecting a paving system include traffic type (vehicle or pedestrian) and frequency, existing soil type, location, aesthetic preference and cost.

*Note: A number of porous paving systems are available from different manufacturers and installation methods will vary. While this instruction sheet provides a general overview of the installation process, it is important to follow the manufacturer's specifications.*

### Location

If the paved area slopes towards the house, a pit or strip drain connected to existing stormwater may be required to remove excess water during heavy rainfall. However, paths and driveways with a gradient greater than 5% (1:20) may not be suitable for porous paving.

### Traffic type

The table below provides an overview of the suitability of the various porous paving options in terms of traffic type and frequency.

### Soil type

Porous paving is most effective when installed in sandy areas where rainwater can easily drain away from the soil. If you are planning to install porous paving in an area with heavy clay soil or poor drainage, additional sub surface drainage may be needed.

### Underground services

Be aware of any underground services (gas, electricity, water) before excavating the pavement area. Porous paving should not be built over or in close proximity to a septic system.

### What's the difference between masonry and engineered pavers?

Masonry pavers allow water to pass through porous sand or gravel filled joints between each paver, while an engineered paver is designed to let water pass through the paver itself.

*Handy hint – Impervious surfaces such as pavements, driveways and footpaths are a major source of stormwater runoff. Replacing these hard surfaces with permeable paving helps the environment by reducing the amount stormwater that flows into our rivers and creeks.*



LOOSE GRAVEL

### \* Note on timber edging

Timber edging is commonly used to contain surfaces that might be subject to movement. When the porous paving surface adjoins an existing hard surface (i.e. concrete or asphalt), no timber edge is required. However, if the porous paving surface is next to an existing lawn or garden, it may be beneficial to install timber edging to keep the material in place.



STRUCTURAL GRAVEL

POROUS PAVING TYPE	VEHICLE		PEDESTRIAN	
	HIGH USE	LOW USE	HIGH USE	LOW USE
GRAVEL PAVING	×	□	□	□□
STRUCTURAL PAVING (GRAVEL)	□	□□	□□	□□
STRUCTURAL PAVING (GRASS)	×	□	□	□□
MASONRY PAVER	×	□	□□	□□
ENGINEERED PAVER	×	□	□□	□□

□□ = most suitable □ = suitable × = not recommended



STRUCTURAL GRASS



MASONRY PAVERS



ENGINEERED PAVERS



## Loose gravel

A pavement or path constructed of loose gravel is the cheapest and easiest way to create porous paving. Traditional gravel paving is designed to drain water away from the surface and direct it to a stormwater pit. However, loose gravel "porous" paving is built to allow rainfall to permeate through the gravel and infiltrate back into the ground.

*Note: Loose gravel paving is not suitable for wheelchair use or high frequency/heavy vehicle traffic. It is also not recommended for steep sites or areas prone to flooding.*

### Constructing porous paving using loose gravel

- › Mark out the area to be paved and determine the quantity of materials required. Refer to Materials List (right).
- › Excavate the area to a depth of 250mm.
- › If any section of the excavated area seems softer than other areas, dig out the "soft" section and fill it with 5-7mm screenings (a type of gravel rock).
- › Where required, use timber edging to stabilise the sides of the excavated area and keep the top gravel layer in place.
- › Place free draining 5-7mm screenings across the base of the excavated area to a minimum depth of 150mm, and lightly compact the screenings to create a stable base.
- › Add your chosen gravel or pebble mix on top of the screenings layer to a depth of 100mm. Ensure that the mix is clean and free of fines. Rake the gravel/pebble mix to ensure an even surface and lightly compact to complete the installation process.

### Materials List – what you need for loose gravel paving

The following table details the materials required per m<sup>2</sup> of paving. While item cost prices will vary depending on the materials selected, loose gravel paving is likely to cost around \$10-15 per m<sup>2</sup>.

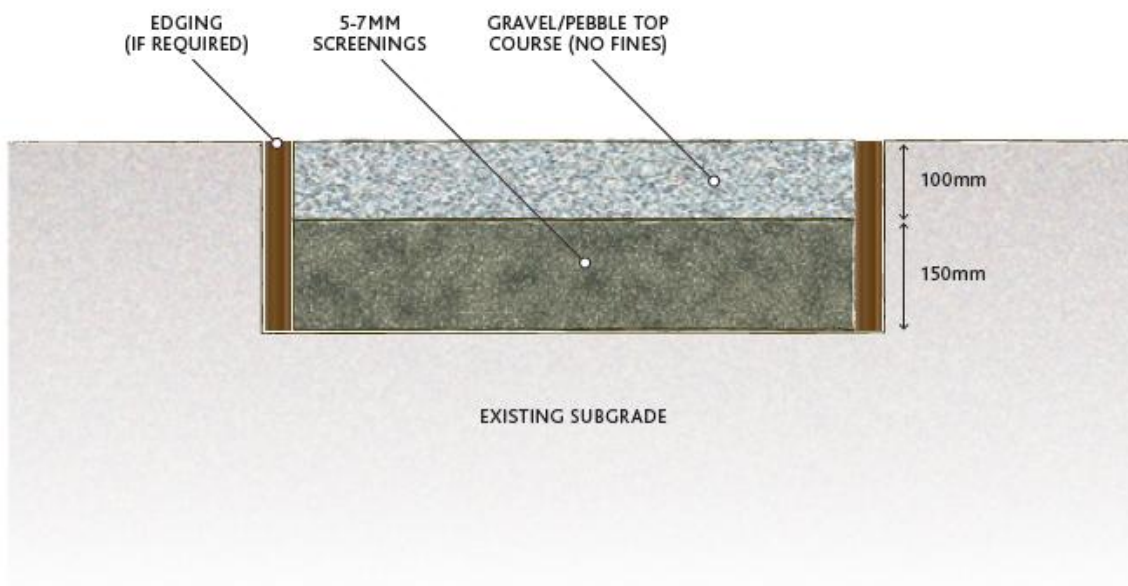
MATERIAL	QUANTITY FOR 1M <sup>2</sup> PAVED AREA
5-7mm SCREENINGS	0.15m <sup>3</sup>
LOOSE GRAVEL OR PEBBLE MIX	0.1m <sup>3</sup>
TIMBER EDGING*	4 X 1m

mm = millimetres  
 m<sup>2</sup> = square metres  
 m<sup>3</sup> = cubic metres

*\*Refer to note on timber edging – page 2*

*Note: Products such as granitic gravel are not suitable in this instance as it has the capacity to compact to a hard surface and is not free draining.*

CROSS SECTION OF LOOSE GRAVEL POROUS PAVING





## Structural gravel or grass

A number of systems can be used to add structural strength to porous gravel or grass surfaces which allow them to take a heavier traffic load, while retaining the ability to soak up rainwater. Some systems are even robust enough to cope with heavy vehicle traffic. When maintained correctly, lawn covered porous surfaces are indistinguishable from a regular lawn. However, because the surface is free draining, it may require some water to maintain the grass quality in drier months.

*Note: If vehicles are left parked on a structural grass surface for an extended period, the grass may die off.*



GRASS PAVING

### Constructing porous paving using structural gravel or grass

#### Step 1

- › Mark out the area to be paved and determine the quantity of materials required. Refer to Materials List (next page).
- › Excavate the area to a depth of 250mm.
- › If any section of the excavated area seems softer than other areas, dig out the "soft" section and fill it with 5-7mm screenings.
- › Where required, use timber edging to stabilise the sides of the excavated area and keep the top gravel layer in place.

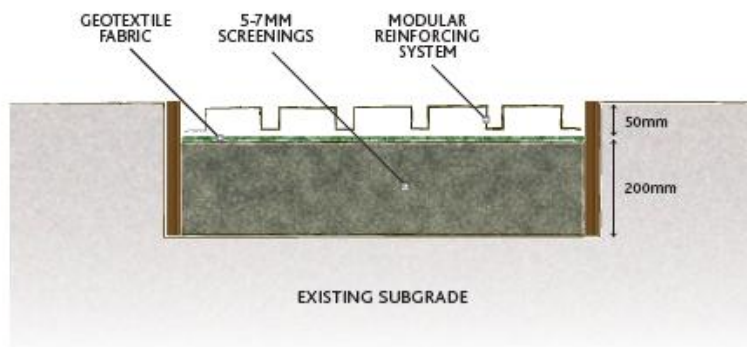
#### Step 2

- › Place free draining 5-7mm screenings across the base of the excavated area to a minimum depth of 200mm, and lightly compact the screenings to create a stable base.
- › Roll out geotextile fabric to cover the base of the excavated area.
- › Install the modular reinforcing system (a type of plastic cell to hold structure) following the manufacturer's instructions.
- › To complete the construction process, follow the instructions on the next page for either gravel or grass paving.

#### STEP 1



#### STEP 2





**For gravel paving**

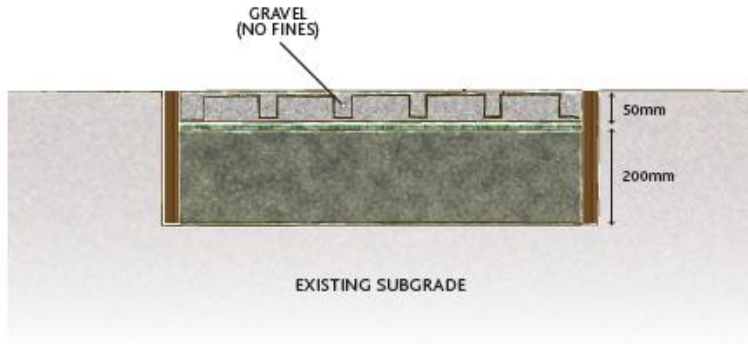
Fill and cover the modular system with 3-5mm gravel. Ensure that the gravel is clean and free of fines. Rake the gravel layer to create an even cover and lightly compact to complete the installation process.

**For grass paving**

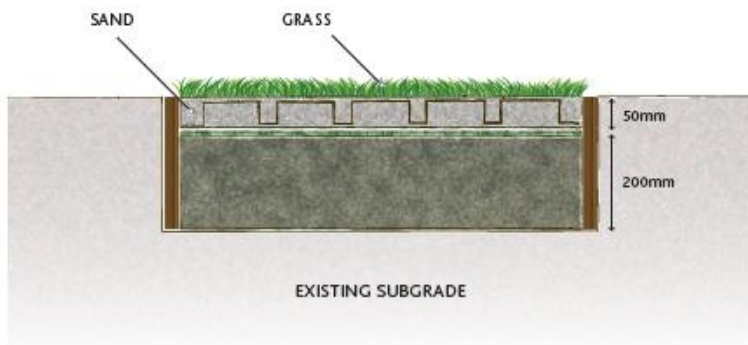
Fill and cover the modular system with course sand and rake to create an even surface. Lay the grass (turf) on top of the sand and flatten it to eliminate air pockets, ensuring good grass root contact with the course sand. Keep the lawn watered and traffic free until established. To avoid any damage to the modular system – never aerate the lawn.

*Note: Hydro-mulching/direct seeding may be suitable for some systems and provide a cheaper alternative to turfing. This process requires a higher level of maintenance during the establishment period and needs to be protected from traffic during this time.*

**GRAVEL PAVING (step 3)**



**GRASS PAVING (step 3)**



**Materials List – what you need for structural gravel & structural grass paving**

The following tables detail the materials required per m<sup>2</sup> of paving. While item cost prices will vary depending on the materials selected, reinforced gravel paving is likely to cost around \$40- 50 per m<sup>2</sup> while reinforced grass may cost around \$50-60 per m<sup>2</sup>.

**GRAVEL**

MATERIAL	QUANTITY FOR 1M <sup>2</sup> PAVED AREA
5-7mm SCREENINGS	0.2m <sup>3</sup>
GEOTEXTILE FABRIC	1m <sup>2</sup>
MODULAR REINFORCING UNIT (PLASTIC CELLS)	1m <sup>2</sup>
3-5MM GRAVEL	0.1m <sup>3</sup>
TIMBER EDGING*	4 x 1m

mm = millimetres  
m<sup>2</sup> = square metres  
m<sup>3</sup> = cubic metres

\*Refer to note on timber edging – page 2

**GRASS**

MATERIAL	QUANTITY FOR 1M <sup>2</sup> PAVED AREA
5-7mm SCREENINGS	0.2m <sup>3</sup>
GEOTEXTILE FABRIC	1m <sup>2</sup>
MODULAR REINFORCING UNIT (PLASTIC CELLS)	1m <sup>2</sup>
COURSE SAND (WHITE WASHED)	0.1m <sup>3</sup>
INSTANT TURF	1m <sup>2</sup>
TIMBER EDGING*	4 x 1m



## Masonry pavers

Special masonry pavers can be used to create porous paving. The pavers allow water to pass through highly pervious gravel or sand filled joints between the pavers and infiltrate back into the ground below the paved area. Several products are available which all vary slightly in design and function. Speak to your local garden specialist for more information.

### Constructing porous paving using masonry pavers

#### Step 1

- › Mark out the area to be paved and determine the quantity of materials required. Refer to Materials List (below).
- › Excavate the area to a depth of 300mm.
- › If any section of the excavated area seems softer than other areas, dig out the "soft" section and fill it with 5-7mm screenings.
- › Where required, use timber edging to stabilise the sides of the excavated area and keep the top gravel layer in place.

- › Place 5-7mm screenings across the base of the excavated area to a minimum depth of 200mm, and compact the screenings to create a stable base.
- › Roll out geotextile fabric to cover the base of the excavated area.

#### Step 2

- › Place a layer of course sand over the geotextile fabric to a depth of 50mm and compact to ensure an even bed for the pavers.
- › Lay the masonry pavers following the manufacturer's instructions.
- › Sweep 3-5mm screenings over the pavers to fill the voids and complete the installation process.

### Materials List – what you need for masonry paving

The following table details the materials required per m<sup>2</sup> of paving. While item cost prices will vary depending on the materials selected, porous masonry paving is likely to cost around \$60-80 per m<sup>2</sup>.

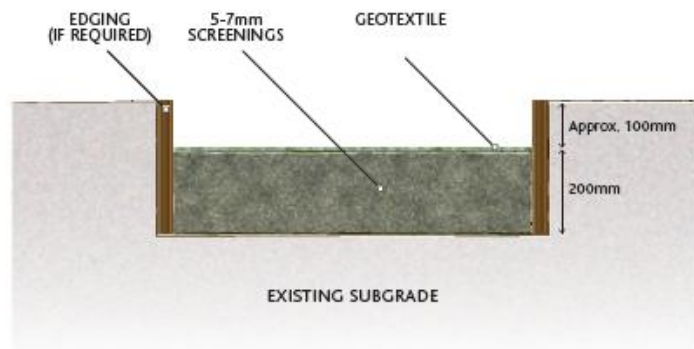
MATERIAL	QUANTITY FOR 1M <sup>2</sup> PAVED AREA
5-7mm SCREENINGS	0.2m <sup>3</sup>
GEOTEXTILE FABRIC	1m <sup>2</sup>
MASONRY PAVERS	1m <sup>2</sup>
COURSE SAND (WHITE WASHED)	0.05m <sup>3</sup>
3-5MM SCREENINGS	0.02m <sup>3</sup>

(NOTE – SCREENINGS TYPE AND SIZE MAY VARY DEPENDING ON THE PAVING SYSTEM SELECTED.)

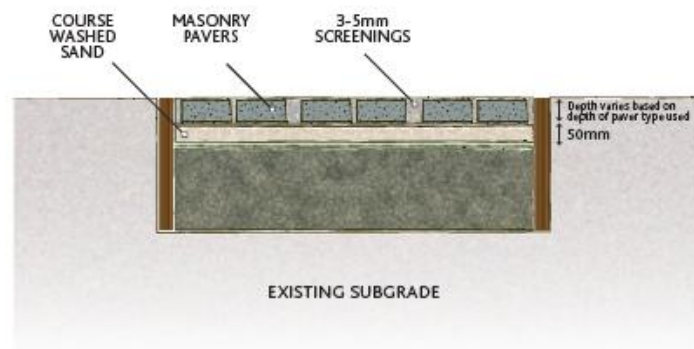


MASONRY PAVERS

#### STEP 1



#### STEP 2





## Engineered pavers

Engineered paving stones are designed to allow water to pass through the paver itself. With a range of products on the market, price, design and how porous the paver is should all be considered when selecting the paver type.

### Constructing porous paving using engineered paver

#### Step 1

- › Mark out the area to be paved and determine the quantity of materials required. Refer to Materials List (below).
- › Excavate the paving area to a depth of 300mm.
- › If any section of the excavated area seems softer than other areas, dig out the "soft" section and fill it with 5-7mm screenings.
- › Where required, use timber edging to stabilise the sides of the excavated area and keep the top gravel layer in place.
- › Place 5-7mm screenings across the base of the excavated area to a minimum depth of 200mm, and compact the screenings to create a stable base.
- › Roll out geotextile fabric to cover the base of the excavated area.

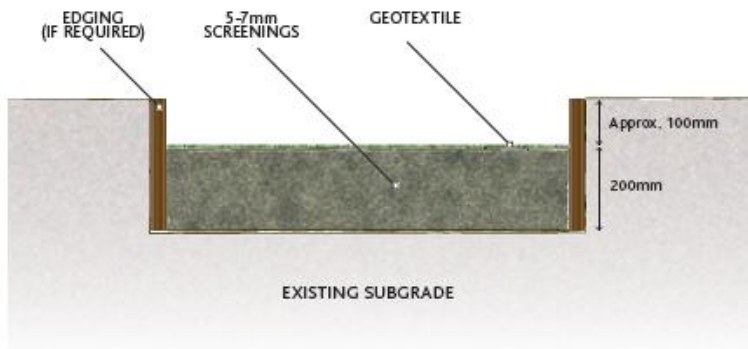


ENGINEERED PAVERS

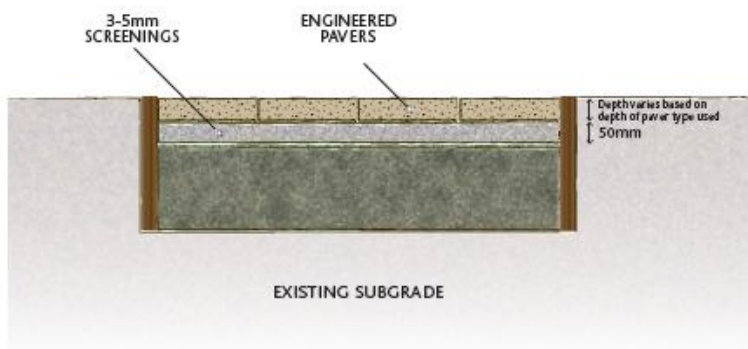
#### Step 2

- › Place a layer of 3-5mm screenings to a depth of 50mm over the geotextile fabric and compact.
- › Lay the engineered pavers following the manufacturer's instructions.

#### STEP 1



#### STEP 2



### Materials List – what you need for engineered pavers

The following table details the materials required per m<sup>2</sup> of paving. While item cost prices will vary depending on the materials selected, porous engineered paving is likely to cost around \$100 -120 per m<sup>2</sup>.

MATERIAL	QUANTITY FOR 1M <sup>2</sup> PAVED AREA
5-7mm SCREENINGS	0.2m <sup>3</sup>
GEOTEXTILE FABRIC	1m <sup>2</sup>
3-5MM SCREENINGS	0.05m <sup>3</sup>
ENGINEERED PAVERS	1m <sup>2</sup>

mm = millimetres  
 m<sup>2</sup> = square metres  
 m<sup>3</sup> = cubic metres



## Looking after your porous paving

Once installed, porous paving needs no more maintenance than traditional paving. However, following a few simple tips will ensure that your paving works as it should.

- › Keep the surface free of leaves, mud and other litter that could limit infiltration.
- › Remove weeds by hand.
- › Avoid mixing concrete, storing soil or any other activities on the pavement surface that may limit its ability to absorb water.
- › Do not allow surrounding surfaces, particularly garden beds, to drain onto the surface of the paving. Porous paving is designed to capture rainfall only, and excess runoff may flood or clog the paving.
- › If the surface of the porous paving becomes blocked, it can be cleaned using a small vacuum, road sweeper or a pressure washer.

### Need help?

If you have any questions about porous paving, your local landscape gardener may be able to help.

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Certified by the Carbon Reduction Institute



## INSTRUCTION SHEET

# Rainwater tank diversion

healthy waterways  
Raingardens

## What is a rainwater tank diversion?

A rainwater tank diversion is a great way to keep your garden green, help the environment and keep our rivers, creeks and bays healthy.

The hard surfaces created by urban development have significantly increased stormwater run-off and reduced the volume of water able to infiltrate back into the ground. These urban flows eventually end up in our waterways causing damage through erosion and pollution.

Heavy storm events often result in rainwater tanks filling to capacity at which point excess water runs through the overflow and

into the stormwater system. By diverting the rainwater tank overflow directly on to your garden you are allowing water to infiltrate naturally back into the ground and create a new water source for your existing garden. You are also helping to reduce the amount of stormwater that flows into our waterways.

Easily fitted to an existing rainwater tank, a rainwater tank diversion is just one of the many things you can do around your home to help better manage stormwater. You may even consider building a raingarden or swale.

*Handy hint – A rainwater tank diversion is most effective when water from the hose flows over a garden or grassed area and is allowed to infiltrate back into the soil. If the area around the house is primarily paved or concrete, then a rainwater tank diversion is not ideal.*

*Please note: A licenced plumber must be used for stormwater connections and modifications.*





## Rainwater tank diversion

### Step 1 – getting started

The first thing to do is determine whether or not a diversion from your tank is appropriate. A diversion is most effective when the water can flow over a garden bed or grassed area and infiltrate back into the soil. If the area around the tank is paved, then a rainwater tank diversion is not ideal.

### Step 2 – identifying the right location

The following points need to be considered before diverting a rainwater tank overflow:

- A) If the rainwater tank is located where the surrounding ground slopes towards the house then it should not be diverted.
- B) A rainwater tank diversion should not discharge water directly over impervious surfaces (surfaces that can't absorb water).

- C) A rainwater tank diversion is most effective when the water can flow over the garden or grass and penetrate into the soil. Soil types also need to be considered before diverting an overflow. See next page *soil types* for more information.

### Step 3 – rainwater tank diversion arrangement

Any modifications to stormwater or a downpipe must be carried out by a licensed plumber.

When full of water, the overflow from your rainwater tank is designed to prevent the tank overflowing in an uncontrolled manner. It is important that the overflow not be entirely disconnected from the stormwater system. Instead, a bypass mechanism should be installed to manage the risk of flooding.

A rainwater tank diversion is fitted into the existing overflow and includes the diverter and hose positioned 1000mm above the surrounding ground level. The hose attached to the diverter should be no more than 13mm in diameter and a length of between 1 metres and 5 metres – depending on the property's soil types. See next page *soil types* for further information.

The 90mm diameter bypass mechanism is connected into the overflow 500mm above and 500mm below the diverter hose, and is positioned to reconnect with the stormwater downpipe. See diagram (next page). A rainwater tank diversion of this type will redirect approximately 90% of all rainfall onto your garden and away from our precious waterways.





### Step 4 – operating the rainwater tank diversion

When the lever on the rainwater tank diverter is pushed closed, water overflowing from the rainwater tank will flow through the hose and onto the garden or grassed area. When opened, overflow water will flow into the stormwater system. To maximise the benefits of the diversion, the lever should remain closed.

### Step 5 – setback requirements

When determining if the diversion is appropriate for your rainwater tank, consider the location of the tank in relation to your house and other buildings on the property, as well as those on neighbouring properties. Check the likely path that the water will travel from the diversion.

For all diversions, a minimum distance from any building to the point of discharge (i.e. end of the hose) is required.

Table 1 provides a guide to these minimum setbacks depending on soil types.

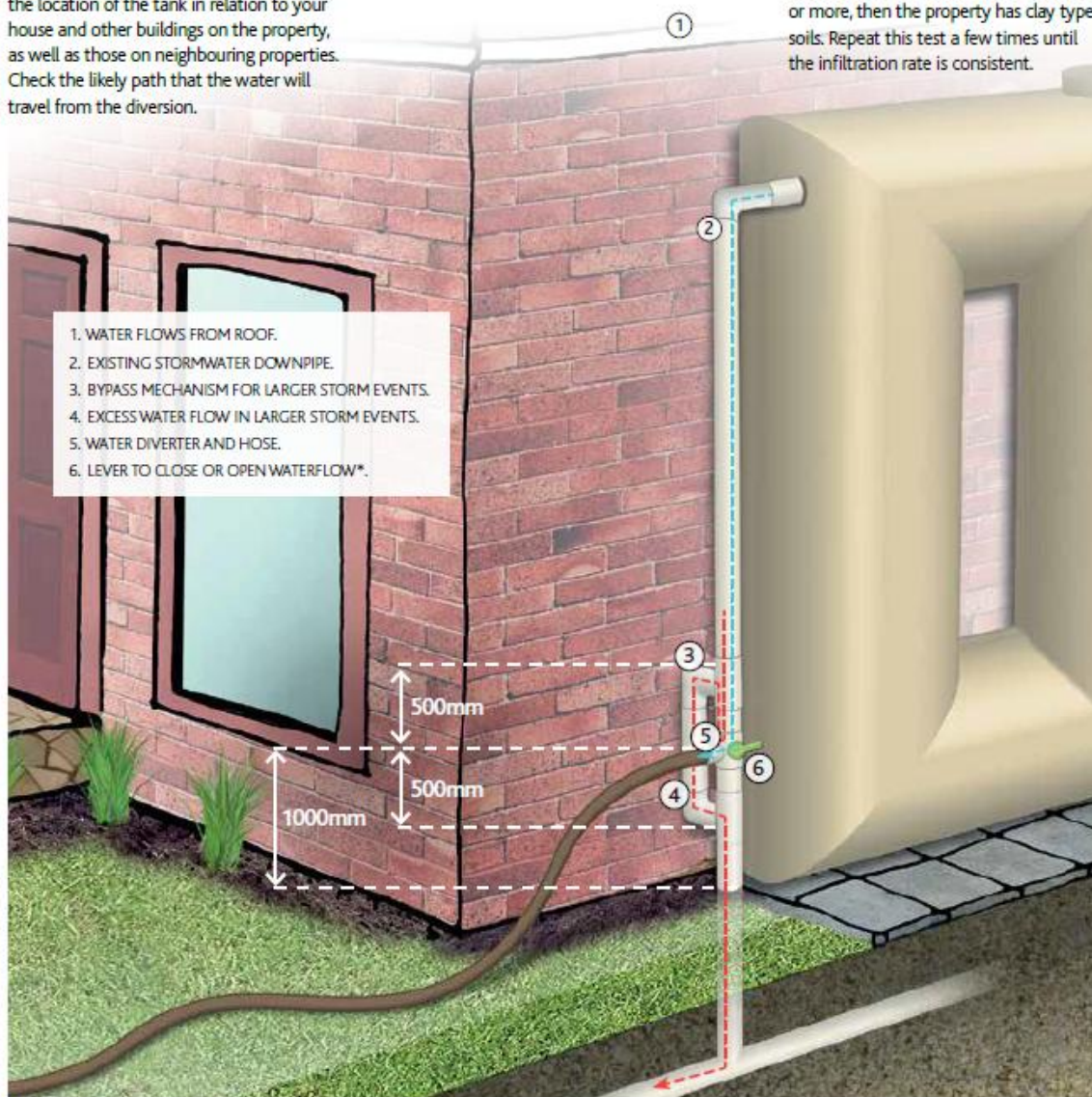
Table 1: Setback requirements – footing distance from hose end.

SOIL TYPE	MINIMUM DISTANCE FROM FOOTINGS (M)
SAND	1
LOAM	2
MEDIUM SAND	4
REACTIVE CLAY	5

### Soil types

If you are unsure of the soil types on the property, your local council may be able to help. Alternatively, you can conduct this following test:

1. Dig a hole – 100mm diameter x 350mm deep.
2. Place 90mm diameter PVC pipe of at least 300mm long into the hole.
3. Pour 1.3 litres of water into the pipe.
4. Observe how quickly the water infiltrates the soil. If the water disappears in less than 1 minute, then the soil type is most likely sandy. If the water takes 3 minutes or more, then the property has clay type soils. Repeat this test a few times until the infiltration rate is consistent.



1. WATER FLOWS FROM ROOF.
2. EXISTING STORMWATER DOWNPIPE.
3. BYPASS MECHANISM FOR LARGER STORM EVENTS.
4. EXCESS WATER FLOW IN LARGER STORM EVENTS.
5. WATER DIVERTER AND HOSE.
6. LEVER TO CLOSE OR OPEN WATERFLOW\*.

\* Diverter most effective when lever pushed closed



## Rainwater tank diversion

### Step 1 – getting started

The first thing to do is determine whether or not a diversion from your tank is appropriate. A diversion is most effective when the water can flow over a garden bed or grassed area and infiltrate back into the soil. If the area around the tank is paved, then a rainwater tank diversion is not ideal.

### Step 2 – identifying the right location

The following points need to be considered before diverting a rainwater tank overflow:

- A) If the rainwater tank is located where the surrounding ground slopes towards the house then it should not be diverted.
- B) A rainwater tank diversion should not discharge water directly over impervious surfaces (surfaces that can't absorb water).

- C) A rainwater tank diversion is most effective when the water can flow over the garden or grass and penetrate into the soil. Soil types also need to be considered before diverting an overflow. See next page *soil types* for more information.

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A rainwater tank diversion is fitted into the existing overflow and includes the diverter and hose positioned 1000mm above the surrounding ground level. The hose attached to the diverter should be no more than 13mm in diameter and a length of between 1 metres and 5 metres – depending on the property's soil types. See next page *soil types* for further information.

The 90mm diameter bypass mechanism is connected into the overflow 500mm above and 500mm below the diverter hose, and is positioned to reconnect with the stormwater downpipe. See diagram (next page). A rainwater tank diversion of this type will redirect approximately 90% of all rainfall onto your garden and away from our precious waterways.





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When determining if the diversion is appropriate for your rainwater tank, consider the location of the tank in relation to your house and other buildings on the property, as well as those on neighbouring properties. Check the likely path that the water will travel from the diversion.

For all diversions, a minimum distance from any building to the point of discharge (i.e. end of the hose) is required.

Table 1 provides a guide to these minimum setbacks depending on soil types.

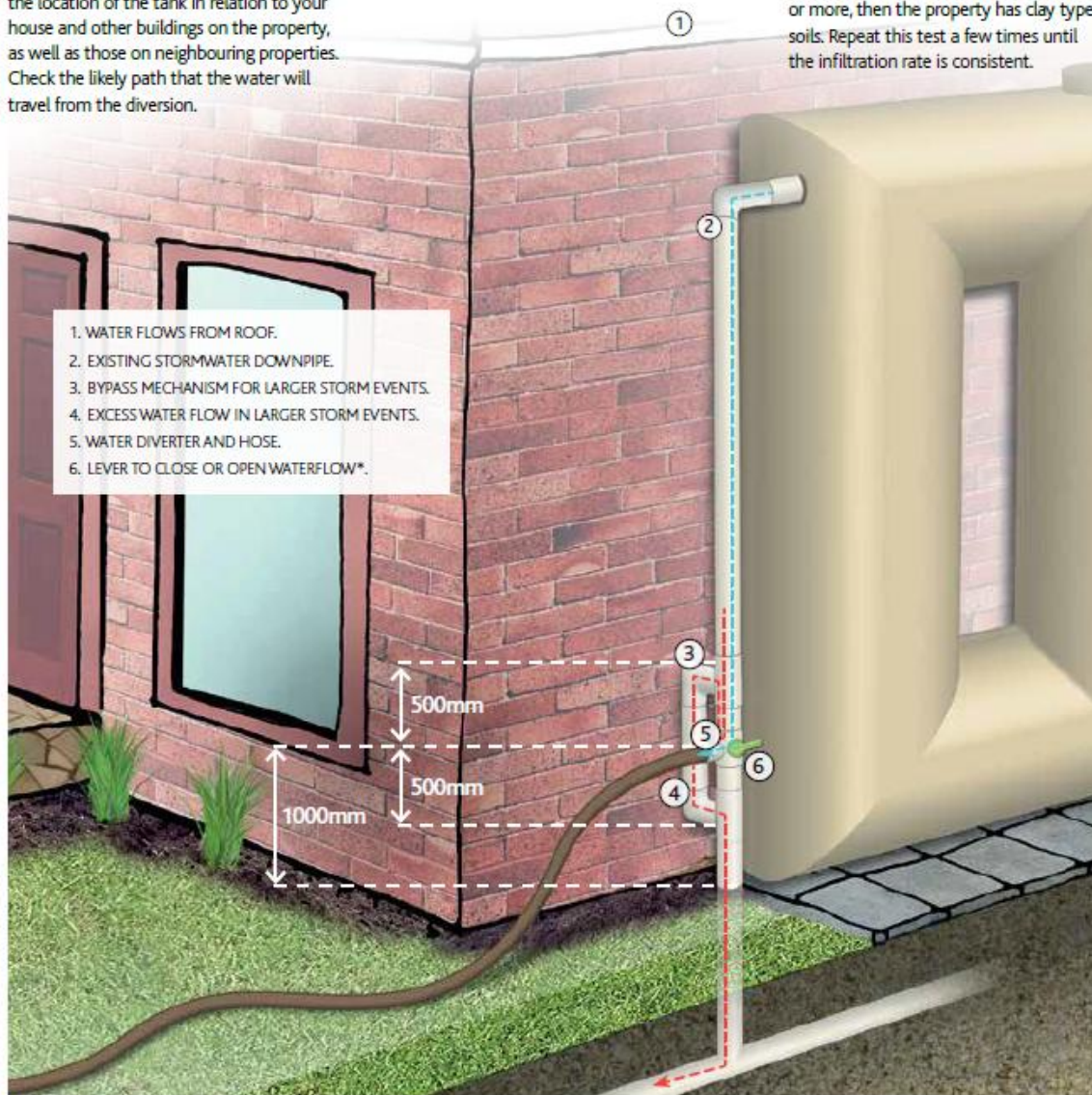
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### Soil types

If you are unsure of the soil types on the property, your local council may be able to help. Alternatively, you can conduct this following test:

1. Dig a hole – 100mm diameter x 350mm deep.
2. Place 90mm diameter PVC pipe of at least 300mm long into the hole.
3. Pour 1.3 litres of water into the pipe.
4. Observe how quickly the water infiltrates the soil. If the water disappears in less than 1 minute, then the soil type is most likely sandy. If the water takes 3 minutes or more, then the property has clay type soils. Repeat this test a few times until the infiltration rate is consistent.



\* Diverter most effective when lever pushed closed



If you are still unsure of the soil types on your property, the diverter hose should be set to discharge water 5 metres away from any building or foundation on the property.

*Handy hint – Water infiltration into the soil near permanent structures can cause the ground to sink or swell which can cause cracking, subsidence or foundation failure. It is important to ensure that the discharge point from the rainwater tank diversion meets the setback requirements outlined in Table 1.*

## Step 6 – monitoring the diversion

Monitoring the rainwater tank diversion will ensure that there is no flooding of the property and neighbouring properties, and that water flow is not causing erosion to surrounding areas.

### Need help?

*If you have any questions about rainwater tank diversions, downpipe diversion or building a raingarden, your landscape gardener or local plumber may be able to help. For more information visit [melbourne.water.com.au/raingardens](http://melbourne.water.com.au/raingardens)*

## Materials List – what you need for a rainwater tank diversion

Table 2: Details the materials required for a rainwater tank diversion.

You can purchase the materials yourself, or a licensed plumber will be able to supply them when fitting the diversion to the rainwater tank. While prices may vary depending on the materials selected, one rainwater tank overflow diversion is likely to cost \$120 (plus the cost of a plumber). A basic diversion is likely to take your plumber 1 hour.

QUANTITY	MATERIAL
1 No.	90mm diameter water diverter with on/off lever and 13mm diameter outlet
2 No.	uPVC 90mm diameter tee
2 No.	uPVC 90mm diameter 90 degree bend (preferably with inspection cap)
2 Vm	90mm diameter pipe
6 Vm	13mm diameter nylon hose

mm= millimetres Vm = lineal metres dia. = diameter

*Note: Lengths are subject to change depending on your downpipe arrangements.*

*The above quantities are based on the downpipes being 90mm diameter.*

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## Appendix 3 – Selection of Drought Tolerant Plants

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**Selection of Plants**


The following selection of plants can be planted in the raingarden, builder/client can decide on plant selection to be planted.

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





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



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



<p><b><i>Pratia perdunculata</i></b></p>	<p>Matter Pratia</p>	<p>Partial shade</p>	<p>50-150 x 1.8-5</p>	
<p><b><i>Wahlenbergia communis</i></b></p>	<p>Tufted Bluebell</p>	<p>Full sun</p>	<p>15-50 x 15</p>	

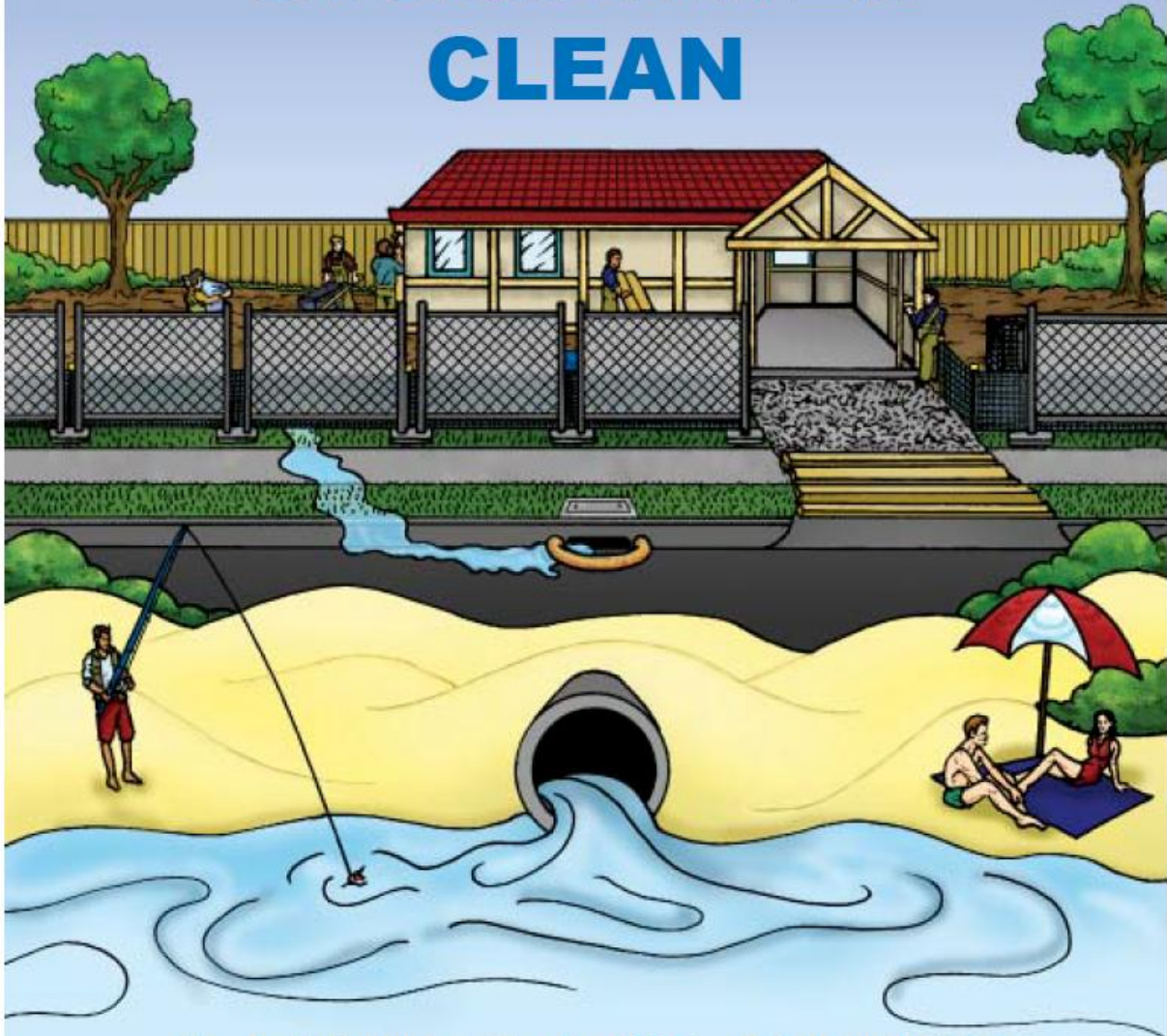


## **Appendix 4 – A Builders Guide to Keeping our Stormwater Clean**

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# KEEPING OUR STORMWATER CLEAN



## A BUILDER'S GUIDE

Information to help you control sediment and litter from your building site and comply with Council and State regulations

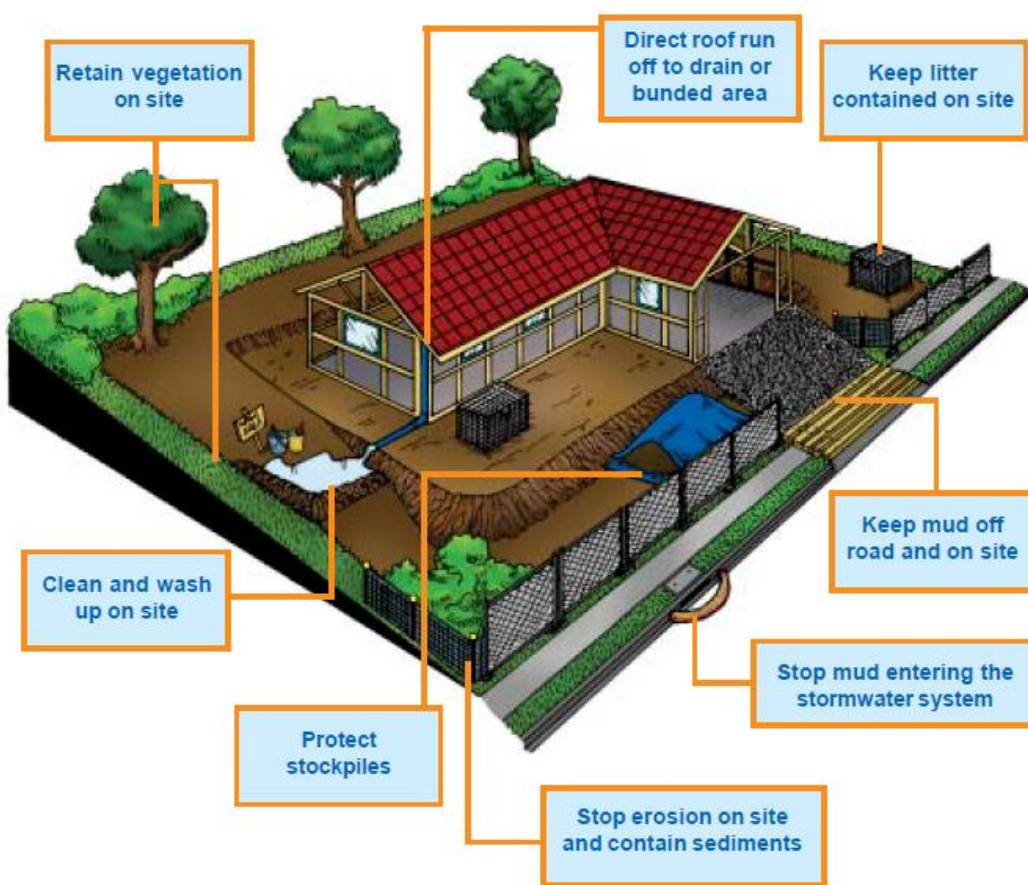




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Check Council requirements and plan before you start work on site



Supplier information for sediment & erosion control on page 3



# CONTENTS

## 6 SITE RULES TO KEEP STORMWATER CLEAN



**SITE RULE 1** Check Council requirements and plan before you start work on site.  
..... Page 4



**SITE RULE 2** Stop erosion onsite and contain sediments.  
..... Page 6



**SITE RULE 3** Protect stockpiles.  
..... Page 12



**SITE RULE 4** Keep mud off road and on site.  
..... Page 16

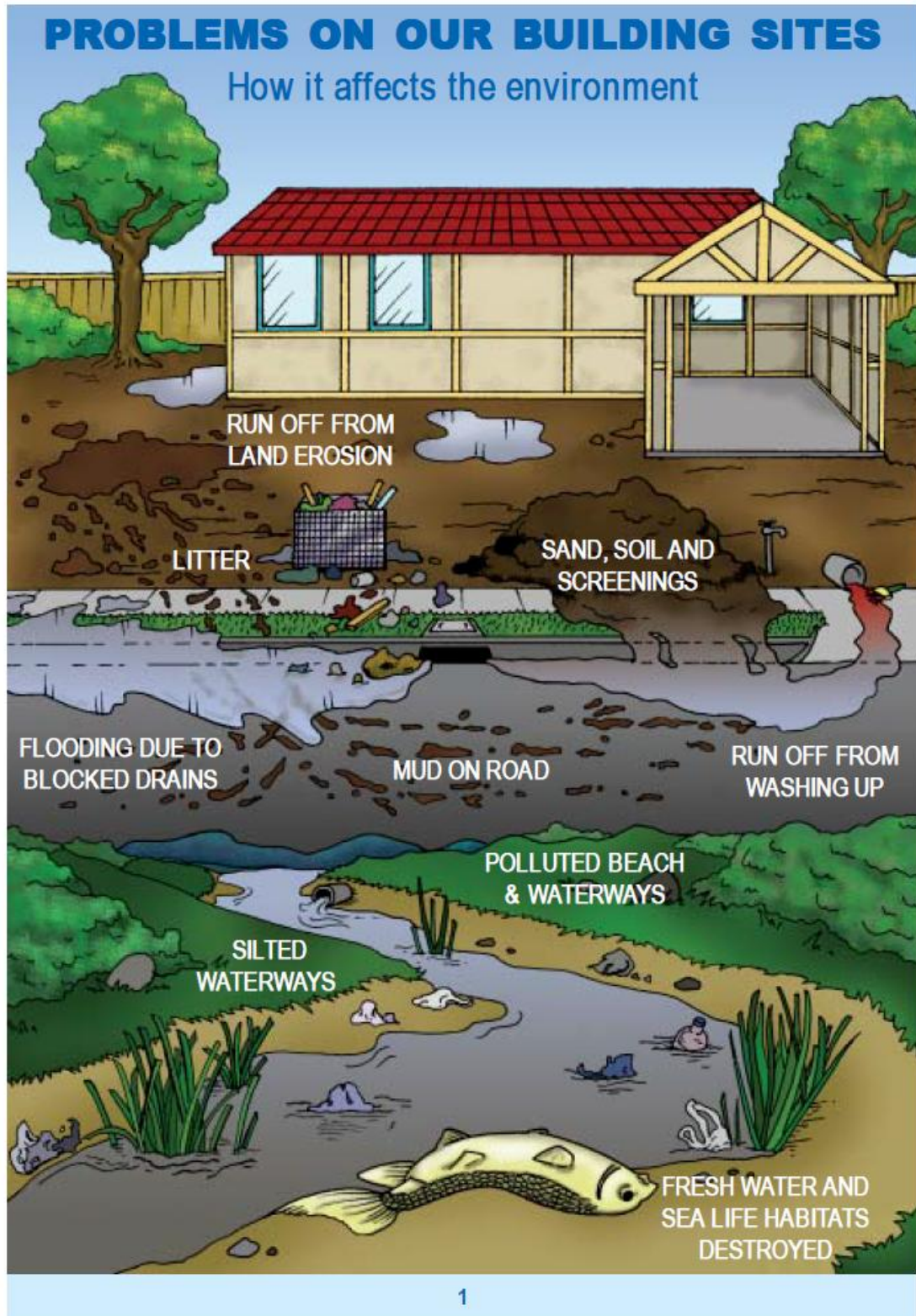


**SITE RULE 5** Keep litter contained on site.  
..... Page 18



**SITE RULE 6** Clean and wash up on site.  
..... Page 21

Use the Site Management Plan..... Page 23





## WHY DO I NEED TO PROTECT OUR ENVIRONMENT?

### It's the law!

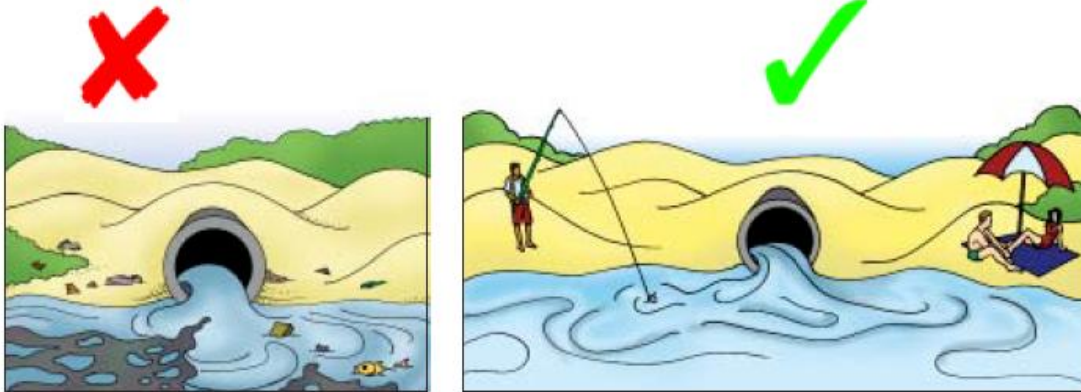
Sediment from building sites can pollute stormwater. There are State and local council laws which make this an offence.

The developer or person managing the building site has the responsibility of making sure that the stormwater is not polluted.

**Penalties apply for polluting stormwater.**



### To enjoy using our environment - now and in the future



**Stormwater is not treated and carries pollution to local waterways and bays. Pollution in our stormwater can lead to short and long term damage to our environment.**

### To benefit builders

**The site looks good** (which is good for attracting new customers) **and you'll be helping to protect our environment.**

**The site has fewer hazards.** A well organised site has less loose material lying around causing a hazard. This reduces health and safety issues on a building site.

**Downtime is reduced.** A well managed and organised site is more efficient. This saves time and money.





## USEFUL SUPPLIER INFORMATION



This information is provided for helpful contact details only. The companies are not listed in any particular order and are not necessarily recommended over others that may provide similar services.

### SEDIMENT CONTROL

Approximate Price:  
Geofabric fencing  
100 m roll from \$55 to \$130  
stakes \$12 for 10  
Filter socks unfilled: 2 m \$4.50 filled \$8 - \$25

**Geofabrics Australasia**  
03 8586 9111 [www.geofabrics.com.au](http://www.geofabrics.com.au)  
Products: silt fencing

**Southern Geosynthetics Supplies**  
0419 478 238 [www.geosynthetics.com.au](http://www.geosynthetics.com.au)  
Products: Silt fences, Silt Sausages

**Statewide River & Stream Management**  
03 9702 9757 [www.stateplanthire.com](http://www.stateplanthire.com)  
Products: silt fence, stakes, silt logs  
Installation service and site kits  
Approx cost: \$220 for 20 m frontage installed, \$88 self installation

**Treemax**  
03 98787 4111 [www.treemax.com.au](http://www.treemax.com.au)  
Products: filter fence, silt worm, silt sock

**Zerosion**  
0408 351 566 [www.zerosion.com.au](http://www.zerosion.com.au)  
Products: silt fence installation  
Approx cost: \$215 for up to 20 m frontage

### STABILISED DRIVEWAYS

For aggregate look under sand, soil and gravel in the Yellow Pages  
Recycled aggregate available from major suppliers.

### TEMPORARY DOWNPIPE

Available from major plumbing suppliers  
**Art Plastic** 25 m rolls of temporary plastic downpipe  
approx: \$25  
**Temporary Flexible Downpipe**  
03 9786 3711 [www.tfd.com.au](http://www.tfd.com.au)  
\$135 per kit - does 2-3 16 sq houses

### OTHER EQUIPMENT

**Coates Shorco Sykes 131994**  
Supply: silt fence \$125 100 m  
Hire: Rumble Grids \$180 p/week for 2 panels  
Hire: Environmental settlement tanks 4 m tank \$542 p/week

### PORTABLE TOILETS

See Toilets – Portable in the Yellow Pages

### TEMPORARY FENCING

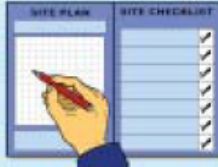
See Fencing Contractors in the Yellow Pages  
**Australian Temporary Fencing 131716**  
**Victorian Temporary Fencing 03 9484 4000**

### BRICK AND TILE CUTTING

**Slop Mop Recycling Products**  
[www.slopmop.com.au](http://www.slopmop.com.au) 0418 825 301 **Brikasaurus:**  
capture and recycle waste water for brick and tile cutting operations.  
**Slopmop:** water delivery & waste clean up system for use behind concrete saws and grinders.

### Useful information is available from:

**Master Builders Green Living Builders**  
[www.mbav.com.au](http://www.mbav.com.au)  
**HIA GreenSmart Program**  
[www.greensmart.com.au](http://www.greensmart.com.au)  
**Keep Australia Beautiful Victoria – CleanSites Program**  
<http://www.kabv.org.au/>  
**Victorian Litter Action Alliance**  
<http://www.litter.vic.gov.au>  
**Environment Protection Agency Victoria**  
[www.epa.vic.gov.au](http://www.epa.vic.gov.au)  
See Publication 981 – Reducing stormwater pollution from construction sites  
**Melbourne Water**  
[www.melbournewater.com.au](http://www.melbournewater.com.au)



## SITE RULE 1

**Check Council requirements and plan before you start work on site.**



**Questions to ask  
BEFORE you start**

Planning, BEFORE you start a job, will make a big difference to how well you manage your site. Check Council requirements for site management. Complete a site management plan (one can be found at the back of this booklet).

### **Where is the lowest point on the site?**

Water always runs to the lowest point. It is important to know where this point is when planning your site. It will affect where you put your crossover, stockpile materials and sediment fence. Leave a buffer of vegetation along the lowest boundary.

### **Where will I put the crossover?**

Try to put the crossover as far away from the lowest point as possible. As water runs to the lowest point it is more likely to be wet and muddy. [See Page 16.]

### **Where will I keep my stockpile?**

Stockpiles are best kept on site, as far away from the lowest point as practical. [See Page 12.]

### **Where will I build my sediment control fence?**

Sediment control fences should be built on the lowest side/s of a site prior to erecting a temporary fence. A flat site may not need sediment control fences. [See Page 9.] These are a primary management measure to keep sediment on site.

### **Which trees and vegetation will be kept on site?**

Rope or fence off the areas you are going to keep. Keeping vegetation such as grassed areas will help to prevent damage to the surface of the site later on and may trap sediment. [See Page 7.]

### **Why fence my site?**

Many councils require sites to be fenced. Site fencing helps to keep building activities to the site, helps stop movement of litter, and helps to keep a site safe by stopping members of the public wandering on site. [See Page 20.]





# SITE RULE 2

## Stop erosion and keep sediment on site



### Why is erosion a problem?

Sediment escaping from building sites can:



**1.** Make roads and footpaths slippery for vehicles and pedestrians, increasing public liability risk.



**2.** Enter the stormwater system and make stream and river water cloudy which can kill plants and animals in creeks and the bay.



**3.** Cause blockages to the stormwater system including the side entry pit and pipes, increasing the chance of flooding and requiring regular cleaning.



**4.** Overload and clog local stormwater filtration systems such as raingardens and swales.

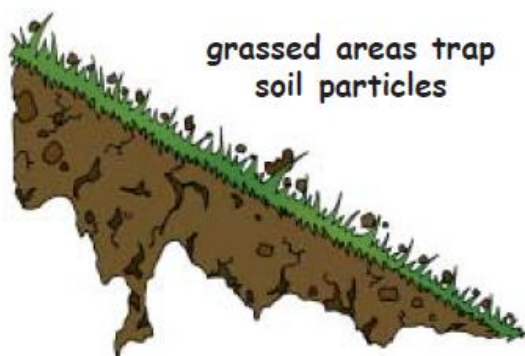
**6** Site Rule 2 - Stop erosion and keep sediment on site.



# METHODS TO CONTROL EROSION

## Control Method 1 - Keep areas of vegetation as a buffer strip at the site boundary.

To prevent sediment leaving site use existing grassed areas and a sediment control fence.



grassed areas trap soil particles

Vegetation helps protect the soil from the effects of rain and surface water by:

- Slowing the flow of water across the ground. Fast water is able to carry more soil particles off site
- Holding the soil together and minimising erosion
- Acting as a filter to trap soil particles.

Decide what areas of vegetation you are going to keep on site. Mark and protect trees, shrubs and grassed areas that you are keeping. Then apply for the relevant permits to remove vegetation.



Protect areas close to the boundary, drains and gutters, and where surface water flows may carry sediment off site.

Site Rule 2 - Stop erosion and keep sediment on site. 7



### Control Method 2 - Early downpipe connection



Connecting downpipes to the stormwater or onsite detention system has a number of benefits:

- Less drainage problems on site
- Less mud on site after rain
- A safer site
- Reduce damage to building foundations
- Less downtime after storms
- Projects get finished sooner.

Aim to have the downpipes connected as soon as the roof is installed (temporary or permanent).

### Control Method 3 - Pipe roof water onto a grassed or banded area.

If you cannot connect to the stormwater system, pipe the water away from the building onto a vegetated area where there is good ground cover or to a banded area.



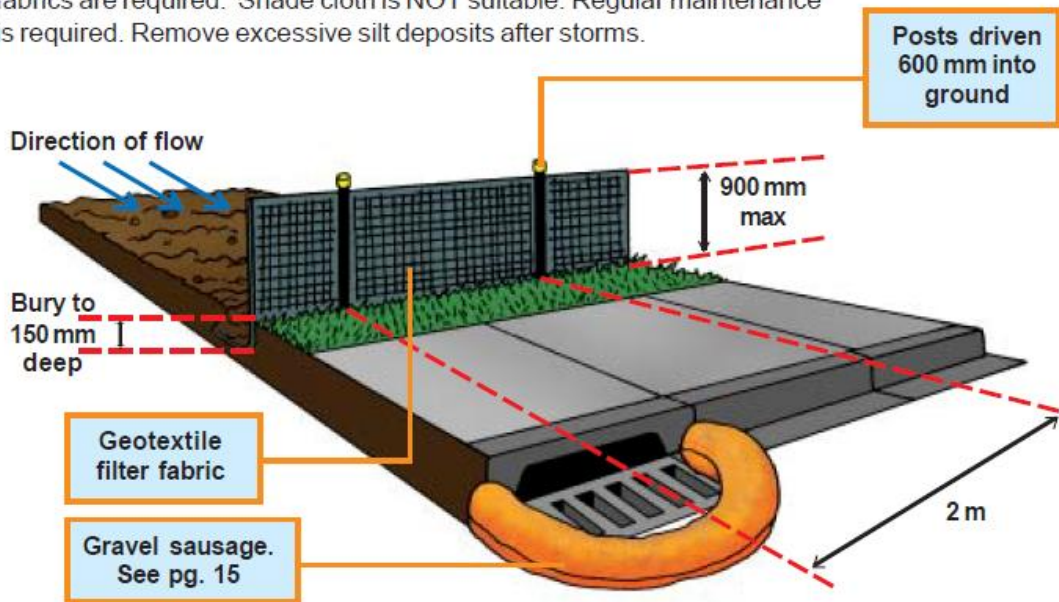
This lets water seep into the ground with less damage to the surface of the soil.



# METHODS TO CONTAIN SEDIMENT ON SITE

## Method 1 - Sediment Control Fences

Sediment control fences stop sediment from being washed off site. The fence allows muddy water to pond behind it and for sediment to settle as the water slowly filters through. Geotextile fabrics are required. Shade cloth is NOT suitable. Regular maintenance is required. Remove excessive silt deposits after storms.



## TO BUILD A SEDIMENT CONTROL FENCE:

### a) Identify the low point of site.

Place sediment control fence along boundaries where the low point is.



This is the point where the land will allow water to carry sediment off the building site.



**b) Dig a trench along the fence line before temporary site fencing is installed.**

The trench will be used to bury the base of the sediment control fabric.

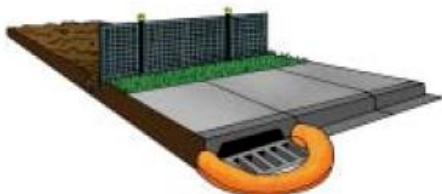
The trench should be 150 mm deep.



**c) Put in 1500 mm wooden posts (38 mm) or star pickets.**

Put 1.5 m star pickets at a maximum of 2 m apart and 600 mm deep.

Put 1.5 m wooden posts (38 mm) at 1.2 m intervals (max 2 m) and 600 mm deep.



**d) Fix geotextile to posts**

Geotextile material allows water to pass through but traps sediments.

Use cable ties or staples to attach the geotextile to the upslope side of the fence posts.

Only join fabric at the pickets with a 150 mm overlap (wrap around post).



**e) Spread volume of water.**

Put a star picket 1.5 m upslope of the others every 20 m (if the fence is longer than 20 m). This spreads the volume of water that flows through each section of fence.

Turn ends up slope to allow for ponding.



## Method 2 - Control dust and slurry from cutting

A large amount of dust can be made from cutting materials such as concrete, bricks and tiles. When mixed with water this material can be turned into slurry and washed into waterways. Cement changes the acidity of water which may then kill water plants and animals. The following methods will help keep this waste on site and out of the waterways:



### a) Cut materials on site

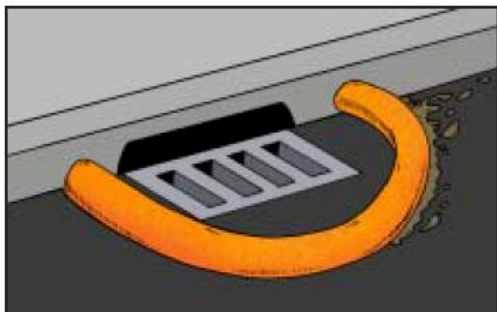
Choose a set area to do all your cutting. This area should be on the building site and away from all stormwater drains.

Equipment is available that captures water used in the cutting process (see page 3).



### b) Put sediment control filters downslope

Sediment logs should be placed downslope to catch cutting slurry. A back-up sediment fence may also be used.



### c) Use a gravel sausage or sediment log

When cutting must take place near stormwater drains, use gravel sausages or sediment logs.

Alternatively, you can buy sleeves from geotextile companies and fill these with sand.

Always clean up and correctly dispose of captured sediment.



### d) Clean up when finished

When you have finished cutting, clean up your equipment in the cutting area.

Use a broom to clean up and get rid of the slurry where it can't get into the stormwater system. Dispose of in waste container

**DO NOT HOSE THE SLURRY AWAY**



## SITE RULE 3

### Contain stockpiles on site

#### Why are sand, soil and screenings a problem?

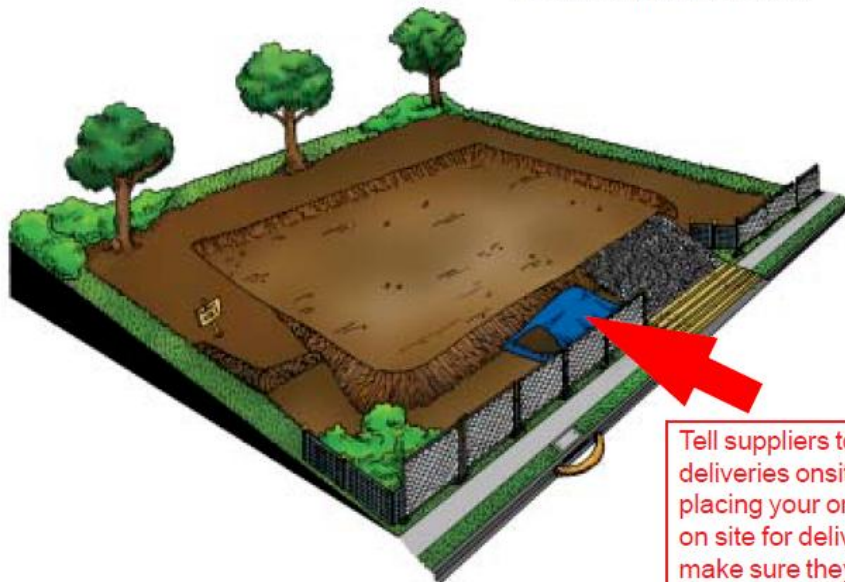


Sand, soil, screenings, dust or sludge from concrete and brick cutting, and other materials escaping from building sites can cause many problems.

Putting stockpiles such as sand, gravel, topsoil and mulch across footpaths and roads will cause a hazard to both vehicles and pedestrians.

Sediment can smother stormwater filtering systems including swales and raingardens.

Stockpiles should be stored on site, not on footpaths or roads.



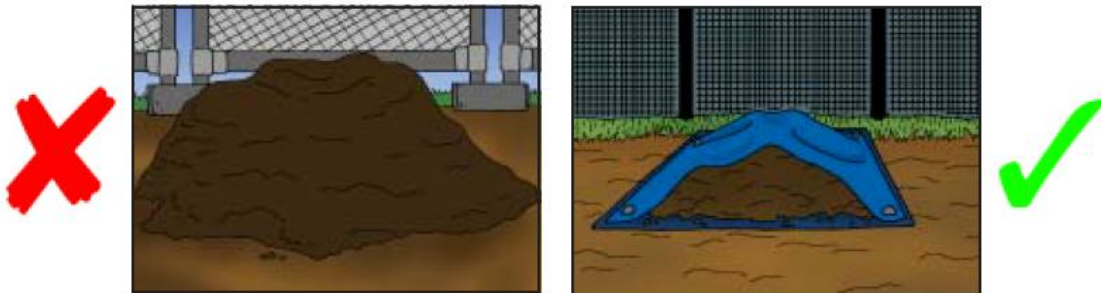
Tell suppliers to place deliveries onsite when placing your order or be on site for deliveries to make sure they are put in the right place.



## Stockpiles not stored properly can get washed or blown away and pollute the stormwater.

This is particularly true of stockpiles that:

- Are high
- Have steep sides
- Are put on hard surfaces where they can be blown or washed away.



## KEEPING STOCKPILES ON SITE

Place the stockpile in a designated area on site, and upslope of the sediment control fence.

If exposed for some time, stockpiles should be covered with a tarp.



In some cases it may be impossible to store stockpiles on site. In this case, a different set of control methods will be used.



## WHEN UNABLE TO STORE STOCKPILES ON SITE

You may have to store a stockpile off site (although never on the footpath, gutter or road). Contact the council to make sure that you have the appropriate council permits.

The council will tell you how stockpiles stored off site are to be managed. Materials may be stored on tarps or on pallets. Containers such as rubbish skips with opening sides that you can get into easily are a good idea.



**Material must not get into drains, gutters or the stormwater system**

The following control methods can be used when storing materials or working off site.

### Method 1 - Cover Stockpile

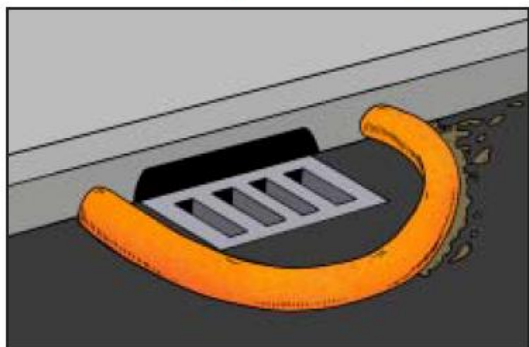
- a) Place a tarp, plastic or banded pallet under the area where the stockpile will be placed.
- b) Place a secured covering over the stockpile.
- c) Then place sediment control logs around the downslope base of the stockpile.





## Method 2 - Protect Downstream Stormwater Pit with a Gravel Sausage or Sediment Log

A gravel sausage or sediment log is a temporary collection device that can be used when stockpiles are stored or cutting is done off site. It is also a useful precautionary measure at all sites.

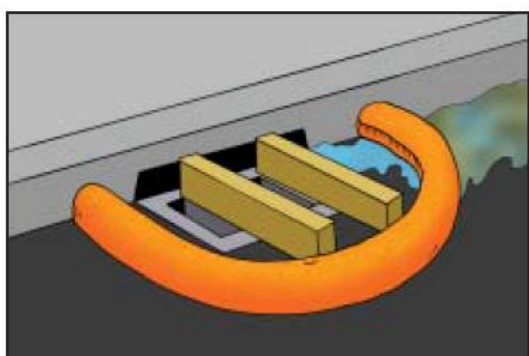


### TO BUILD A GRAVEL SAUSAGE:

#### a) Make the sausage sleeve

A gravel sausage is made from a geotextile sleeve filled with 25 - 50 mm gravel.

The gravel sausage should be 150 mm high.



#### b) Put the gravel sausage across the opening of the inlet pit

Make sure that the sausage is tight with the kerbing on the upslope side of the inlet pit and extends beyond the grate.

There should be a 100 mm gap between the front of the pit and sausage. Use wooden blocks to keep the 100 mm gap.



#### c) Clean out gravel sausage regularly

When soil and sand builds up around the gravel sausage, this should be collected and disposed of on site.

**Regular maintenance is required.**

**DO NOT HOSE SEDIMENT DOWN THE GUTTER**



## SITE RULE 4

### Keep mud off road and on site

#### Why is mud a problem?

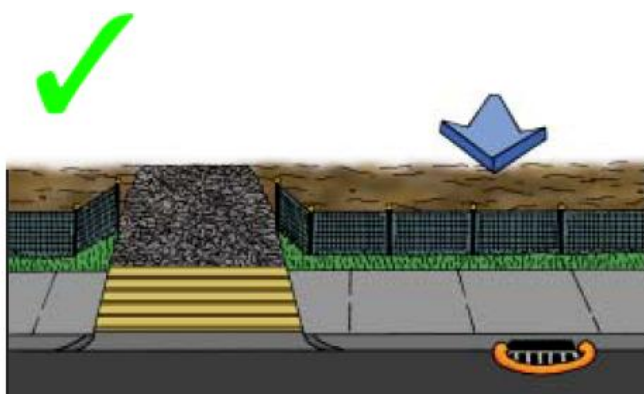
Two things happen when vehicles go on and off the site:

1. The surface area of the site is damaged making it dangerous.
2. Mud is carried back onto the roads and footpaths, and washes into the stormwater system.



## METHODS TO CONTROL MUD

The following simple methods will help you to protect the surface of your site and help stop vehicles from dropping mud on the road from their wheels. The best way to do this is to put crushed rock on the crossover or access point of your building site.



Putting crushed rock on the access point of your site is a good way to prevent damage and provide a dry access point for vehicles. Where possible park vehicles off site.

Make sure gravel does not collect in the gutter or on the footpath.



### Control Method 1: Build a crushed rock crossover



Remove a 3m or greater strip of soil from road (or where concrete crossover ends) to nearest building point or a minimum of 5 m.

Use road base or 40 mm aggregate or crushed rock to a depth of 200 mm.

Restrict vehicle access to this point.

### Control Method 2: Keep to crushed rock path



Only drive where you need to. Keep to a set path (preferably on crushed rock).

### Control Method 3: Remove mud from tyres



Use a shovel to remove mud from truck tyres before leaving site.

### Control Method 4: Clean road



If mud goes on road, remove as much as possible and put it back on site.

Use a broom or a shovel.  
**DO NOT USE A HOSE.**



# SITE RULE 5

## Keep litter contained on site

### Why is litter a problem?



Many building sites have both building rubble and other rubbish spread across them.

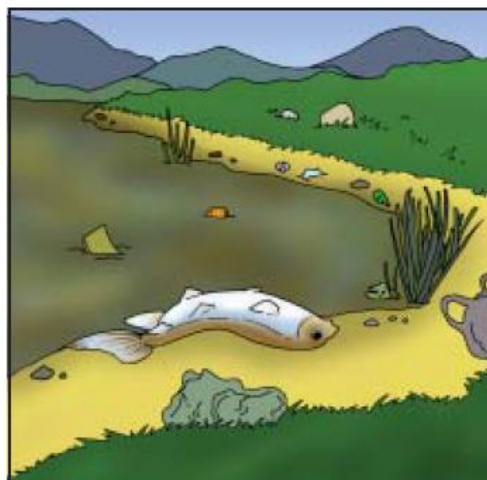


### This causes many problems:

You may now have an **UNSAFE WORK ENVIRONMENT!**  
This could increase the chance of legal and public liability problems



Litter blowing off site can block stormwater drains.



Litter may spoil local creeks and eventually find its way to the coast.



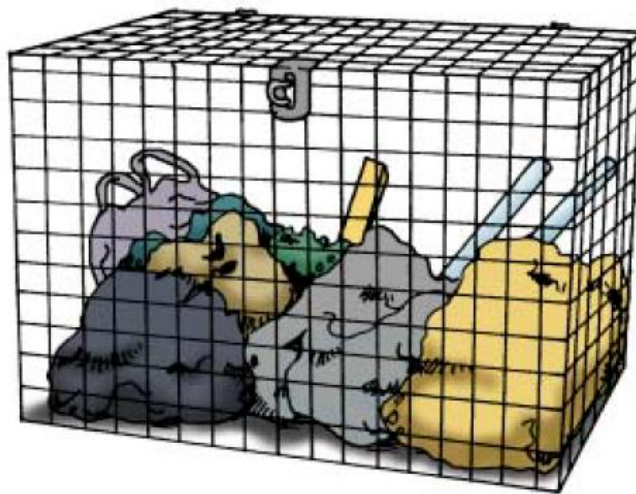
## METHODS TO CONTROL LITTER

The following simple methods will help you to stop litter leaving your site or being a hazard on site.

### Control Method 1: Litter bins or covered skips

A mesh bin with a closeable lid is suitable for larger items like cardboard boxes, plastic wrapping and polystyrene.

Mesh to be 50 mm or smaller



A smaller bin is okay for smaller rubbish like paper, food wrapping and drink containers that may be blown off site. Council bins may be restricted from building sites.



Empty the litter bin regularly. Don't allow overflow. Where possible, collect the materials from the litter bin for recycling and /or keep different materials in separate bins.

**CONSIDER A RECYCLING BIN**

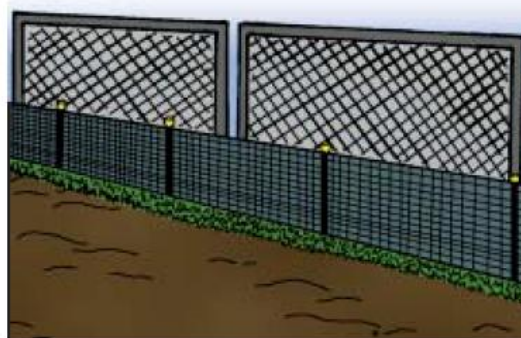
### Control Method 2: Site fencing

Site fencing will help to keep litter from being carried off site by wind or water and provide security.

**A FENCE DOES NOT NEGATE THE NEED FOR A BIN.**



Check council requirements for temporary fencing and avoid trip hazards on footpath.



Remember to install a sediment control fence prior to installation of the temporary fence.



## SITE RULE 6

### Clean and wash up on site

#### Why is washing up a problem?



When cleaning up after painting, plastering or concreting it's most important to keep the wash water out of the stormwater system.

Problems to the environment include:

1. Oil based paints form a thin film over the surface of the water. This starves water plants and animals of oxygen
2. Paints and petrol chemicals can contain toxic compounds
3. Concrete changes the acidity of waterways which can kill water plants and animals. Concrete washings can harden and block drains
4. Roads around a building site can become dirty, slippery and dangerous.





## METHODS TO CONTROL WASHING UP

The following simple methods will help you to stop the contamination of stormwater from paint, plaster or concrete washings.



### Control Method 1: Have a set washing up area

Choose a set area to do all your washing up. This area should be on the building site and away from all stormwater drains. It should be banded and contain wash out barrels.

You could use the same area you have chosen for tile and brick cutting.

Contain chemicals and slurry onsite.

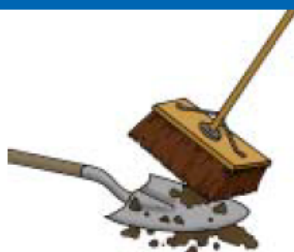
Put sediment control fences downslope.

**NOTE: SEDIMENT CONTROL FENCES WILL NOT STOP CHEMICALS**

### Control Method 2: Get rid of concrete slurry on site

Collect wash water from concrete mixers and pumps in a wheel barrow and get rid of it in your wash area. You can also safely get rid of

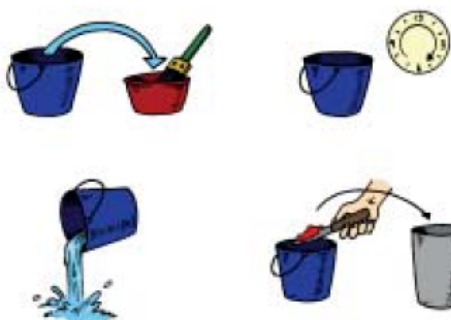
concrete slurry by tipping small amounts in a ditch lined with plastic or geotextile liners. When the water evaporates or soaks into the surface the solids can then be put into a skip bin or recycled in construction or as road base.



### Control Method 3: Clean equipment off before washing

Brush dirt and mud off equipment before you wash it. Spin rollers and brushes to remove paint before you wash them in a wash out bin.

You will then need less water to clean this equipment.



### Control Method 4: Clean painting tools carefully

Use one container to wash the brush and another to rinse it. Let the first container stand overnight to let solids settle. Then pour out the water on to the ground if it is not too dirty and put settled solids in a bin.

Wash oil based paints in solvent baths until clean. **DO NOT PUT THE SOLVENT ON THE GROUND.** Contact a waste disposal company for removal.

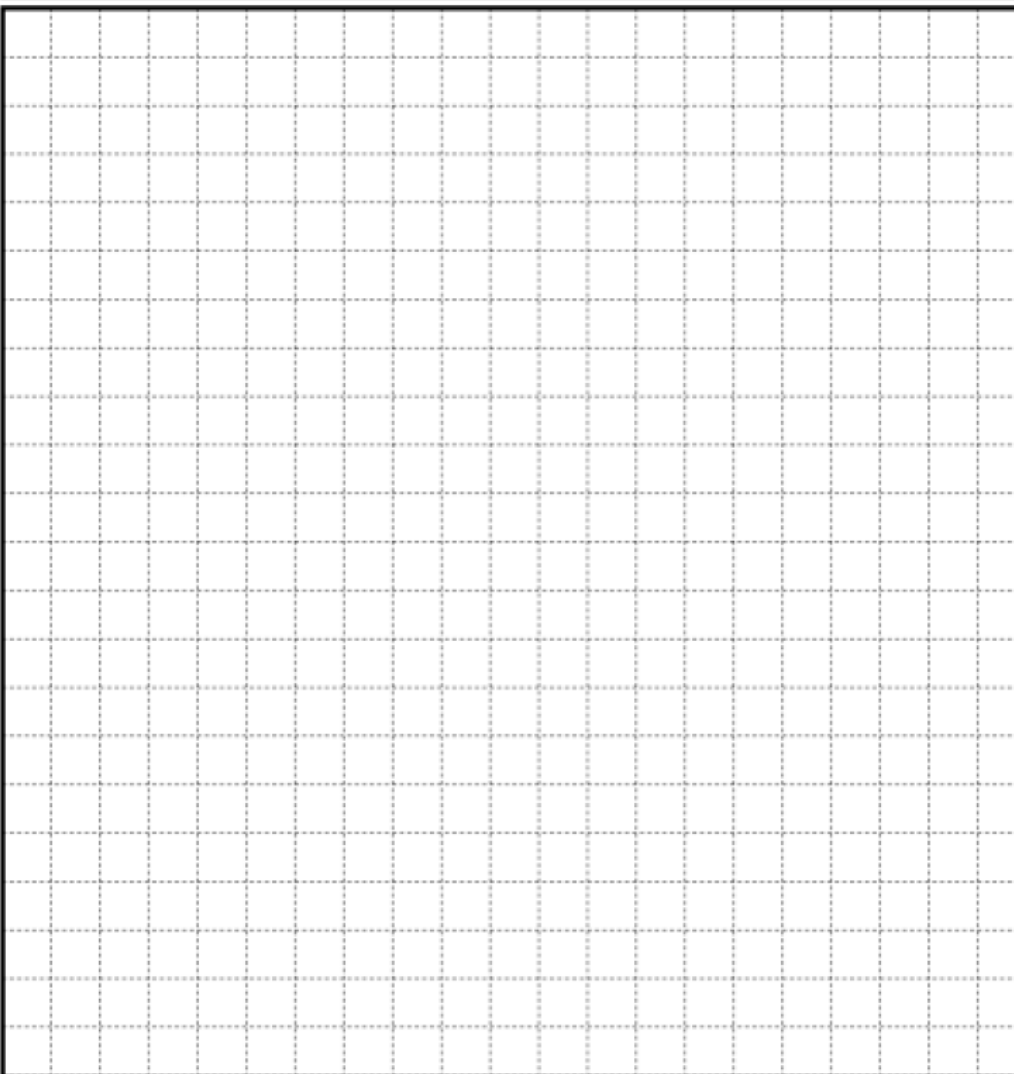


# SITE MANAGEMENT PLAN

Building Company: \_\_\_\_\_ Date: \_\_\_ / \_\_\_ / \_\_\_

Site Address: \_\_\_\_\_

Client Name: \_\_\_\_\_ Contact Number: ( ) \_\_\_\_\_



**LEGEND:**

- Bin	- Rumble grid	- Stabilised access point	- Vegetation to be retained
Scale: _____ = 1 m	- Grass filter strip	- Silt fence	- Stockpile
- Nth	- Gravel sausage	- Skip	- Wash up area
		- Temporary Fencing	



# CLEAN SITE CHECKLIST

Please photocopy to use on site

## SITE DETAILS:

Building Company: \_\_\_\_\_ Date: \_\_\_\_ / \_\_\_\_ / \_\_\_\_  
 Site Supervisor: \_\_\_\_\_  
 Site Address: \_\_\_\_\_  
 Client Name: \_\_\_\_\_ Contact Number: ( ) \_\_\_\_\_

SITE RULE	TASK	CHECK
<b>SITE RULE 1 -</b> Check Council requirements and plan before you start work on site.	Crossover away from lowest point	<input type="checkbox"/>
	Sediment control fence on lowest side	<input type="checkbox"/>
	Stockpiles away from lowest point	<input type="checkbox"/>
	Marked trees and vegetation to keep on site	<input type="checkbox"/>
<b>SITE RULE 2 -</b> Stop erosion on site and contain sediments.	Sediment control fence in place	<input type="checkbox"/>
	Catch drains on high side of site	<input type="checkbox"/>
	Vegetation areas kept at boundary	<input type="checkbox"/>
	Gravel sausage at storm water pit	<input type="checkbox"/>
<b>SITE RULE 3 -</b> Protect stockpiles.	Downpipes set up as early as possible	<input type="checkbox"/>
	Base and cover for stockpiles	<input type="checkbox"/>
<b>SITE RULE 4 -</b> Keep mud off road and on site.	Gravel sausage at stormwater pit	<input type="checkbox"/>
	Crushed rock access point	<input type="checkbox"/>
	Vehicles keep to crushed rock areas	<input type="checkbox"/>
	Mud removed from tyres before leaving site	<input type="checkbox"/>
<b>SITE RULE 5 -</b> Keep litter contained on site.	Clean road if muddy	<input type="checkbox"/>
	Clean stormwater pit and maintain gravel sausage	<input type="checkbox"/>
	Litter bins in place with lid closed	<input type="checkbox"/>
<b>SITE RULE 6 -</b> Clean and wash up on site.	Site fencing in place	<input type="checkbox"/>
	Cutting and clean up area on site	<input type="checkbox"/>
	Clean equipment off before washing	<input type="checkbox"/>
	Sediment filters downslope	<input type="checkbox"/>
	Contain all washings on site	<input type="checkbox"/>



## 6 RULES FOR A CLEAN WORKSITE

SITE RULE 1 -

**Check Council requirements and plan before you start work on site.**

SITE RULE 2 -

**Stop erosion on site and contain sediments.**

SITE RULE 3 -

**Protect stockpiles.**

SITE RULE 4 -

**Keep mud off road and on site.**

SITE RULE 5 -

**Keep litter contained on site.**

SITE RULE 6 -

**Clean and wash up on site.**

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For copies of this guide please contact:  
Melbourne Water on 131 722  
or email [enquiry@melbournewater.com](mailto:enquiry@melbournewater.com)

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Third edition, revised, published September 2003  
Forth edition, revised, published October 2006





## Appendix 5 – ESD Supporting Documents

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Preliminary Section J Assessment

BESS Assessment

WSUD Water Assessment

# New dwelling

New Dentist Clinic

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## Daylight Simulation Report

Project	New Dentist Clinic
Address	279 Torquay Rd, Grovedale VIC 3216, Australia (38.21° S, 144.34° E)
Date	2025-10-14, 11:20 PM
Author	george@geokal.com.au
Scope	National Construction Code 2022

### Using Better Building

Better Building provides various daylight calculations to satisfy the requirements of your local construction code. Radiance 5.3 (Validated against CIE171:2006) has been used to simulate the building with wall, roof, floor, window, and shading surfaces according to user inputs. A grid of sensor points have been generated in the appropriate zones accordance with user inputs. Each metric result includes a summary compared to required outcomes, a level-by-level visualisation of results, and zone-by-zone reporting.

# New dwelling

New Dentist Clinic

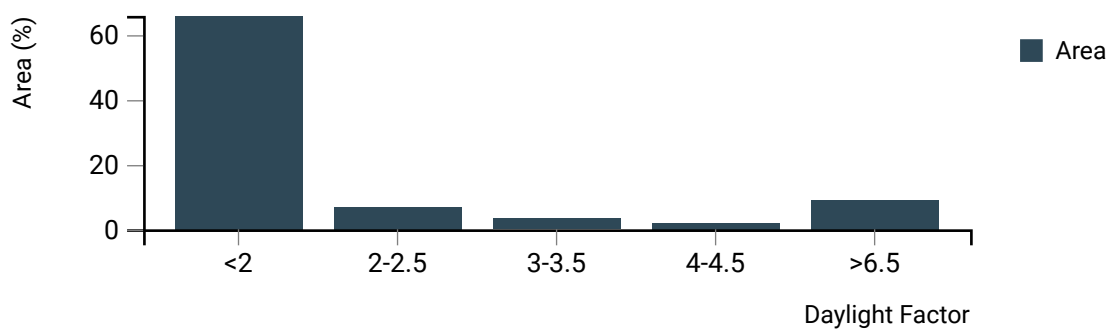
## Results

### Daylight Factor

To meet the acceptance criteria, **33 %** of total area across the assessed zones must meet the conditions:

- daylight factor is greater than 2.00 %

A total of 1229 sensor points representing an area of 248.78 m<sup>2</sup> across 20 zones were assessed, where an area of **34.25 %** achieved the conditions, **meeting** the acceptance criteria.



# New dwelling

New Dentist Clinic

## Inputs

### Levels

Level	Drawing	# Zones	Floor Area (m <sup>2</sup> )	Wall (m <sup>2</sup> )	Window (m <sup>2</sup> )
1	Ground	14	199.2	369.1	44.3
2	First	7	74.1	119.9	13.3

### Zones

Level	Zone	Area (m <sup>2</sup> )	Volume (m <sup>3</sup> )	Treated Area (m <sup>2</sup> )
1	1. Reception	55.18	154.51	55.18
1	2. Hall	21.05	58.93	21.05
1	3. Surgery 2	11.19	31.32	11.19
1	4. Sterilisation	11.19	31.32	11.19
1	5. Surgery 5	11.11	31.12	11.11
1	6. Surgery 3	10.95	30.65	10.95
1	7. Surgery 4	10.77	30.14	10.77
1	8. Surgery 1	10.82	30.31	10.82
1	9. Surgery 6	10.82	30.31	10.82
1	10. Air Lock	8.19	22.94	8.19
1	11. Recovery Consult	8.27	23.14	8.27
1	12. OPG	7.64	21.40	7.64
1	13. ACC WC	6.02	16.87	6.02
1	14. WC	2.49	6.98	2.49
2	1. Staff/Kitchen	32.95	77.44	32.95
2	2. Laboratory	9.25	21.75	9.25
2	3. Office	8.92	20.96	8.92
2	4. Stairway	0.00	12.80	0.00
2	5. Hall	4.68	11.00	4.68
2	6. Staff WC	4.37	10.27	4.37
2	7. Cleaner Washing	3.52	8.28	3.52

# New dwelling

New Dentist Clinic

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Level	Zone	Area (m <sup>2</sup> )	Volume (m <sup>3</sup> )	Treated Area (m <sup>2</sup> )
		249.40		249.40

---

## Grid Parameters

Timestep (mins)	60 minutes
Grid Corners	Mitred
Plane Height (m)	0.75
Boundary Margin (m)	0.2
Internal Boundary Margin (m)	
Internal Shading Margin (m)	
Grid Size (m)	0.5

# New dwelling

New Dentist Clinic

## Materials

Ceiling	Value (%)
Reflectivity	70.0
Specularity	0.0
Roughness	5.0
Floor	Value (%)
Reflectivity	30.0
Specularity	0.0
Roughness	5.0
Wall	Value (%)
Reflectivity	70.0
Specularity	0.0
Roughness	5.0
Shading	Value (%)
Reflectivity	20.0
Ground	Value (%)
Reflectivity	20.0

# New dwelling

New Dentist Clinic

## Glazing

Level	Zone	Title	Heading (°)	VLT	Area (m <sup>2</sup> )
1	1. Reception	Concept	0.0	0.60	1.07
1	1. Reception	Concept	90.0	0.60	12.14
1	1. Reception	Concept	180.0	0.40	3.24
1	1. Reception	Concept	180.0	0.60	18.09
1	10. Air Lock	Concept	0.0	0.60	0.66
1	13. ACC WC	Concept	0.0	0.60	0.98
1	2. Hall	Concept	90.0	0.60	1.67
1	3. Surgery 2	Concept	180.0	0.60	1.62
1	4. Sterilisation	Concept	0.0	0.60	1.10
1	5. Surgery 5	Concept	270.0	0.60	1.62
1	6. Surgery 3	Concept	180.0	0.60	1.71
1	7. Surgery 4	Concept	270.0	0.60	1.62
1	8. Surgery 1	Concept	180.0	0.60	1.62
1	9. Surgery 6	Concept	0.0	0.60	2.10
2	1. Staff/Kitchen	Concept	90.0	0.40	8.07
2	1. Staff/Kitchen	Concept	90.0	0.60	2.70
2	2. Laboratory	Concept	180.0	0.60	2.18
2	3. Office	Concept	180.0	0.60	2.18
2	4. Stairway	Concept	0.0	0.60	2.14
2	5. Hall	Concept	270.0	0.60	1.78
2	6. Staff WC	Concept	0.0	0.60	1.41
2	7. Cleaner Washing	Concept	0.0	0.60	0.95

# New dwelling

New Dentist Clinic

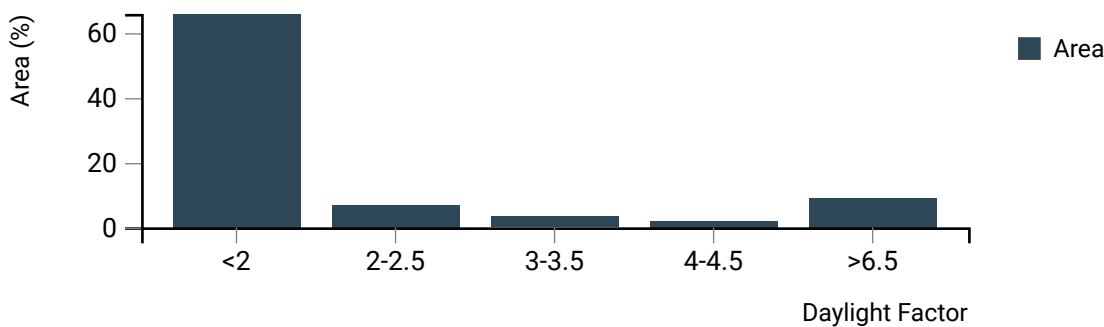
## Detailed Results

### Daylight Factor

To meet the acceptance criteria, **33 %** of total area across the assessed zones must meet the conditions:

- daylight factor is greater than 2.00 %

A total of 1229 sensor points representing an area of 248.78 m<sup>2</sup> across 20 zones were assessed, where an area of **34.25 %** achieved the conditions, **meeting** the acceptance criteria.



Level	Zone	Area (m <sup>2</sup> )	Min (%)	Avg (%)	Max (%)	Pass Area (m <sup>2</sup> )	Contribution (%)
1	1. Reception	53.76	0.38	4.47	17.06	36.34	14.61
1	10. Air Lock	7.79	0.42	1.29	2.72	1.22	0.49
1	11. Recovery Consult	8.90	0.00	0.00	0.00	0.00	0.00
1	12. OPG	7.25	0.00	0.00	0.00	0.00	0.00
1	13. ACC WC	5.92	0.48	1.90	3.49	2.55	1.02
1	14. WC	2.87	0.00	0.00	0.00	0.00	0.00
1	2. Hall	22.89	0.00	0.02	0.45	0.00	0.00
1	3. Surgery 2	11.36	0.29	1.77	11.27	2.45	0.98
1	4. Sterilisation	11.36	0.32	1.45	3.46	2.50	1.00
1	5. Surgery 5	10.65	0.36	1.89	13.27	2.45	0.98
1	6. Surgery 3	11.13	0.33	1.89	11.78	2.65	1.07
1	7. Surgery 4	10.12	0.40	2.00	13.34	2.36	0.95
1	8. Surgery 1	11.00	0.30	1.81	11.32	2.45	0.98
1	9. Surgery 6	11.00	0.34	2.25	16.17	3.07	1.24

# New dwelling

New Dentist Clinic

Level	Zone	Area (m <sup>2</sup> )	Min (%)	Avg (%)	Max (%)	Pass Area (m <sup>2</sup> )	Contribution (%)
2	1. Staff/Kitchen	32.10	0.47	2.11	8.51	11.27	4.53
2	2. Laboratory	9.63	0.57	2.91	15.96	4.19	1.68
2	3. Office	8.46	0.57	3.06	16.03	3.74	1.50
2	5. Hall	4.93	0.93	4.13	15.53	3.10	1.25
2	6. Staff WC	4.08	0.77	4.17	13.79	2.72	1.09
2	7. Cleaner Washing	3.57	0.71	3.03	11.80	2.12	0.85
						Pass	Yes

# New dwelling

New Dentist Clinic

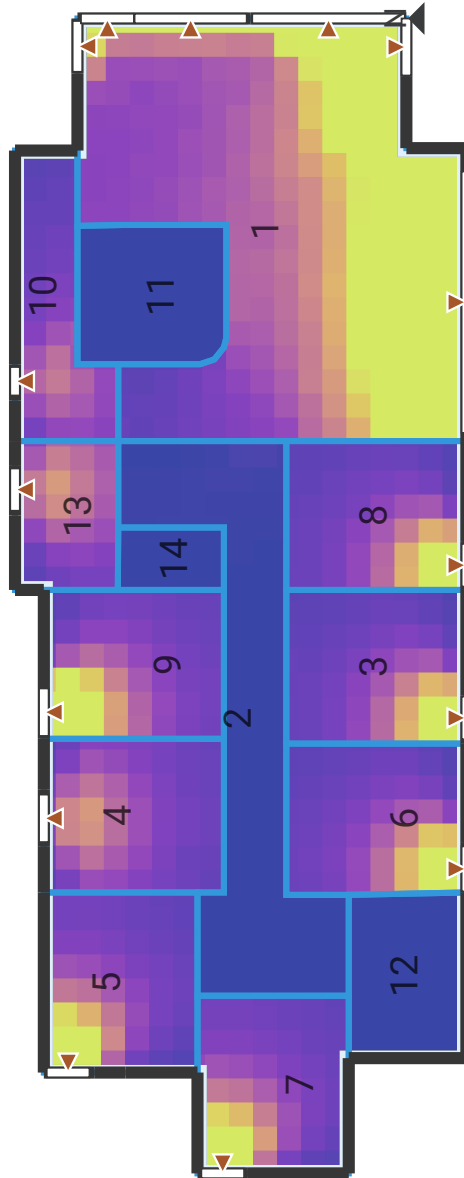
## Radiance Options

Option	Value	Description
Secondary Source Presampling Density (dp)	64	Density of samples taken for secondary light sources.
Direct Sampling Ratio (ds)	0.5	Ratio of samples taken to estimate direct lighting.
Direct Threshold (dt)	0.5	Threshold for considering direct lighting contribution.
Direct Certainty (dc)	0.25	Level of confidence in direct lighting calculations.
Limit Weight (lw)	4.8828125e-05	Maximum influence of specific effects in rendering.
Limit Reflections (lr)	4	Maximum number of reflections considered in rendering.
Specular Sampling Threshold (st)	0.85	Threshold for considering specular reflections.
Ambient Bounces (ab)	3	Number of times light reflects off surfaces.
Ambient Accuracy (aa)	0.1	Degree of precision in simulating indirect light.
Ambient Divisions (ad)	1024	Subdivision of surfaces for ambient lighting calculation.
Ambient Supersamples (as)	512	Additional samples taken to improve accuracy in ambient lighting.
Ambient Resolution (ar)	512	Detail level in ambient lighting computation.
Sky Model		CIE 110 Overcast Sky
Design Sky Illuminance (lux)	10000	

# New dwelling

New Dentist Clinic

## Level 1



■ Min: 0.0%  
▲ VLT 0.5 - 0.6

■ Max: 5.0%

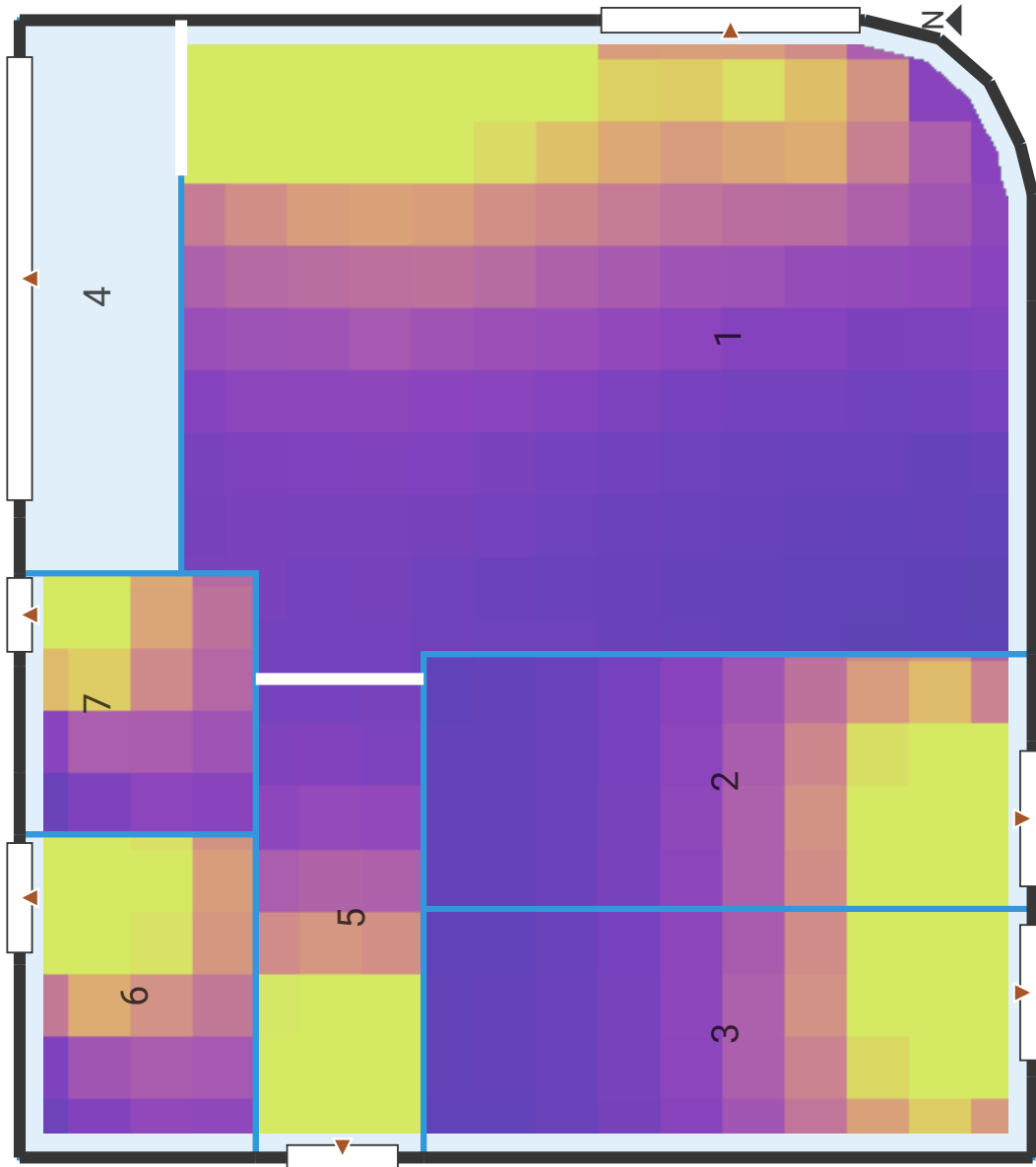
— Thermal Line

□ Windows

# New dwelling

New Dentist Clinic

## Level 2



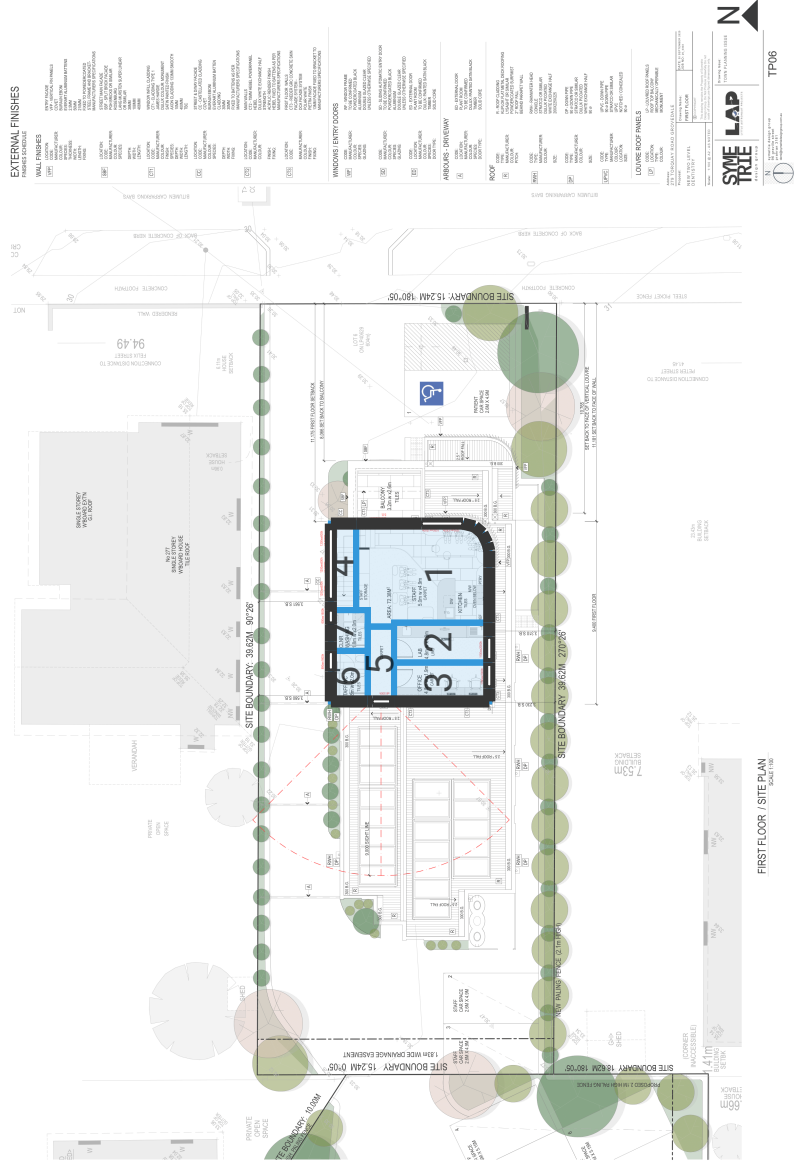
-  Min: 0.0%
-  Max: 5.0%
-  Thermal Line
-  Windows
-  Air Boundary
-  VLT 0.5 - 0.6



# New dwelling

New Dentist Clinic

## Level 2 - First



— Thermal Line

□ Windows

# New dwelling

New Dentist Clinic

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# New dwelling

New Dentist Clinic

## J1V3 Building Assessment

### National Construction Code 2022 - Volume 1

Project	New Dentist Clinic
Address	279 Torquay Rd, Grovedale VIC 3216, Australia (38.21° S, 144.34° E)
Date	2025-10-14, 10:31 PM
Author	george@geokal.com.au
Scope	National Construction Code 2022
Performance Requirements	J1P1 Energy Use
Assessment Process	A2G2 Performance Solution Clause (2)(b)(i)
Building Class	5
Climate Zone	6
Storeys	2
Floor to Floor Height	3000 mm

### Using Better Building

Better Building provides various calculations in line with the National Construction Code 2022 - Volume 1 - Section J Energy Efficiency. These calculations are tested in line with all applicable NCC equations or NCC referenced primary or secondary documents, for them to represent an accurate Performance Solution against the Performance Requirements - J1P1 Energy Use. A Performance Solution must be shown to comply with the relevant Performance Requirements through one or a combination of Assessment Methods. Better Building is a valid Assessment Method by comparison with the Deemed-to-Satisfy Provisions of each relevant area.

# New dwelling

New Dentist Clinic

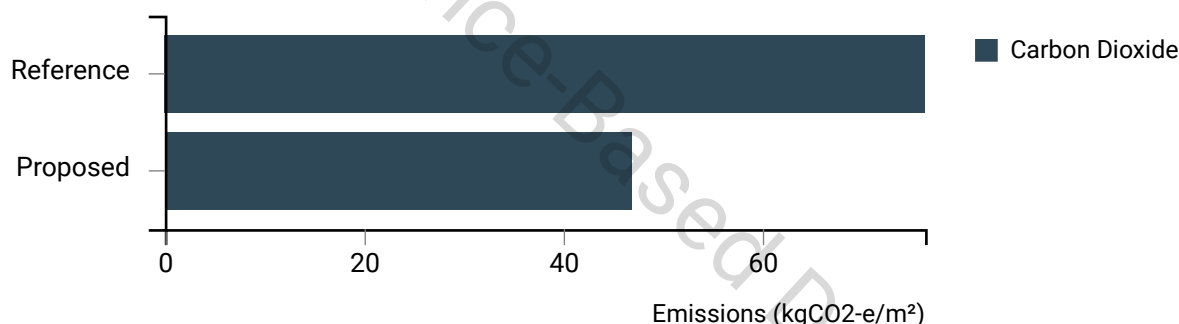
## Results

The National Construction Code (NCC) specifies minimum performance standards for the energy efficiency of buildings through the Building Code of Australia (BCA) Volume 1, Section J. To enable flexibility in the architectural design of the building, a Performance Solution has been used to comply with the Performance Requirement - J1P1.

The Assessment Method, 'J1V3 Verification using a reference building' has been used and is an Alternative Solution for the Building Fabric only. As such, a Proposed Building with the proposed fabric has been modelled as part of this approach, to compare against the Reference Building services.

### Building Emissions

To meet the acceptance criteria, annual Supplied Energy emissions must be less than **76.36** kgCO<sub>2</sub>-e/m<sup>2</sup>. Based on a treated floor area of 249.40 m<sup>2</sup>, the simulated building achieved **46.87** kgCO<sub>2</sub>-e/m<sup>2</sup>, **meeting** the acceptance criteria.



### Thermal Comfort (PMV)

To meet the acceptance criteria, **95** % of total area across the assessed zones must meet the conditions:

- zone thermal comfort (pmv) is between -1.0 and 1.0 PMV
- for at least 98 % of hours
- when above 20 % occupancy

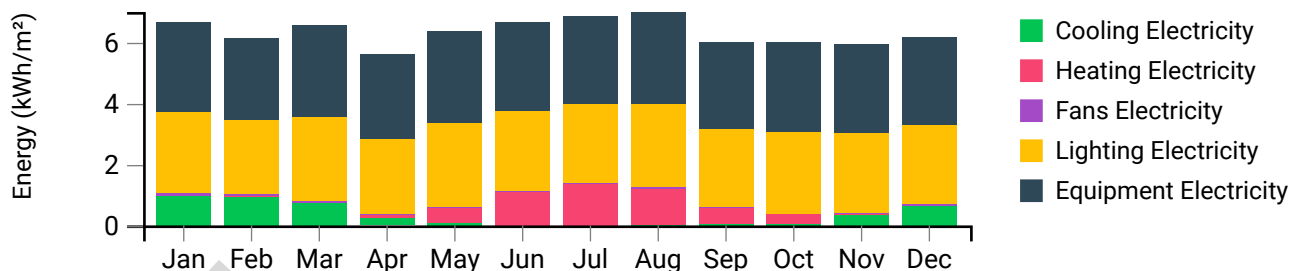
A total area of 249.40 m<sup>2</sup> across 21 zones were assessed, where zones of **95.20** % area achieved the conditions, **meeting** the acceptance criteria.

# New dwelling

New Dentist Clinic

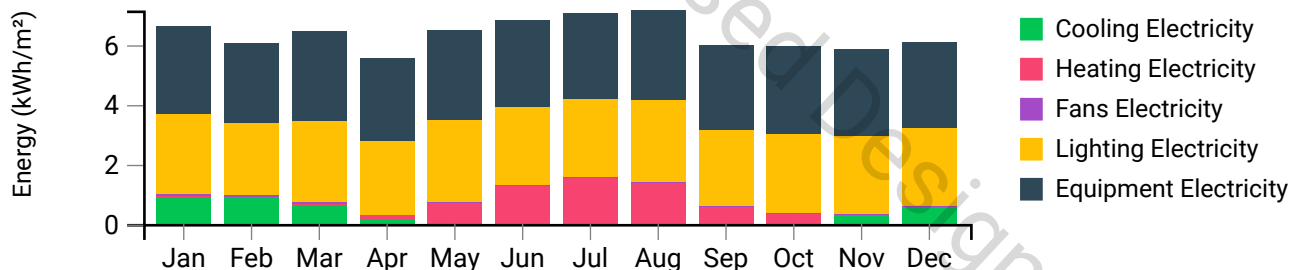
## Building Meters

### Proposed



Meter	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Cooling Electricity	1022.89	4.10	4.37	28 Feb 14:00
Heating Electricity	1283.88	5.15	5.41	24 Jul 07:30
Fans Electricity	142.82	0.57	0.22	24 Jul 07:30
Lighting Electricity	7842.04	31.44	2.00	2 Jan 09:15
Equipment Electricity	8623.15	34.58	2.00	2 Jan 09:15

### Reference



Meter	Energy (kWh)	Energy (kWh/m²)	Peak (kW)	Time
Cooling Electricity	894.13	3.59	4.72	28 Feb 14:00
Heating Electricity	1462.42	5.86	5.63	24 Jul 07:30
Fans Electricity	138.75	0.56	0.23	24 Jul 07:30
Lighting Electricity	7842.04	31.44	2.00	2 Jan 09:15
Equipment Electricity	8623.15	34.58	2.00	2 Jan 09:15

# New dwelling

New Dentist Clinic

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## Method

### Approach

- The National Construction Code (NCC) specifies minimum performance standards for the energy efficiency of buildings through the Building Code of Australia (BCA) Volume 1, Section J.
- To enable flexibility in the architectural design of the building, a Performance Solution has been used to comply with the Performance Requirement - J1P1.
- The Assessment Method, J1V3 verification using a reference building, has been used and is an Alternative Solution for the Building Fabric only. As such, a Proposed Building with the proposed fabric has been modelled as part of this approach to compare against the Reference Building services.
- To meet acceptance criteria, the Proposed Building with the proposed fabric Greenhouse Gas (GHG) emissions must be no greater than the Reference Building services.
- Greenhouse gas emission factors are selected according Vol 1 Specification 34 Modelling Parameters for J1V3 Table S34C3 Greenhouse Gas Emissions Factors (kgCO<sub>2</sub>-e/GJ). In the case of the ACT, an exception is made where a greenhouse gas emission factor of nil is provided, as the national emission factors are not applied as they do not take into account investments in renewable electricity generation in the National Electricity Market.
- When the Simulated Shading Multipliers feature is enabled, each window is simulated in EnergyPlus twice, to compare a completely unshaded window, to a window affected by attached shading, building self-shading, and surrounding structures. The multiplier is based on the ratio of shaded versus unshaded annual average external incident solar radiation, limited between 0.0 and 1.0.

### Assumptions / Limitations

- Parts J3, J5, J6, J7, J8 and J9 are not part of this assessment.
- Specification 33 Additional requirements - General is only met for provisions (a) General Thermal Construction and (b) for Floor Edge Insulation. All other provisions (c - n) are not part of this assessment.
- Specification 34 Modelling parameters for J1V3 S34C1 Scope, S34C2 Reference building and S34C3 Proposed building and reference building have been used to form the basis of the Method of Assessment.
- S34C4 Services Proposed and Reference Building is not part of this assessment as the minimum performance requirements of the services are not included.
- To ensure the reference building can be calculated, windows are limited to a maximum of 99% window-to-wall ratio (WWR).

# New dwelling

New Dentist Clinic

## Inputs

The NCC 2022 - Vol 1 contains technical design and construction requirements for all commercial buildings and their associated structures.

Building Class	5
Wall Area (m <sup>2</sup> )	216.65
Window Area (m <sup>2</sup> )	57.67
Glazed Door (m <sup>2</sup> )	11.31
Roof Area (m <sup>2</sup> )	199.23
Floor Area (m <sup>2</sup> )	199.23
Window-Wall Ratio (%)	21.02

## Levels

Level	Drawing	# Zones	Floor Area (m <sup>2</sup> )	Wall (m <sup>2</sup> )	Window (m <sup>2</sup> )
1	Ground	14	199.2	153.1	44.3
2	First	7	74.1	63.5	13.3

## Zones

Level	Zone	Area (m <sup>2</sup> )	Volume (m <sup>3</sup> )	Treated Area (m <sup>2</sup> )
1	7. Surgery 4	10.77	30.14	10.77
1	5. Surgery 5	11.11	31.12	11.11
1	2. Hall	21.05	58.93	21.05
1	4. Sterilisation	11.19	31.32	11.19
1	9. Surgery 6	10.82	30.31	10.82
1	14. WC	2.49	6.98	2.49
1	12. OPG	7.64	21.40	7.64
1	6. Surgery 3	10.95	30.65	10.95
1	3. Surgery 2	11.19	31.32	11.19
1	8. Surgery 1	10.82	30.31	10.82
1	13. ACC WC	6.02	16.87	6.02
1	10. Air Lock	8.19	22.94	8.19

# New dwelling

New Dentist Clinic

Level	Zone	Area (m <sup>2</sup> )	Volume (m <sup>3</sup> )	Treated Area (m <sup>2</sup> )
1	11. Recovery Consult	8.27	23.14	8.27
1	1. Reception	55.18	154.51	55.18
2	6. Staff WC	4.37	10.27	4.37
2	7. Cleaner Washing	3.52	8.28	3.52
2	4. Stairway	0.00	12.80	0.00
2	5. Hall	4.68	11.00	4.68
2	2. Laboratory	9.25	21.75	9.25
2	3. Office	8.92	20.96	8.92
2	1. Staff/Kitchen	32.95	77.44	32.95
		249.40		249.40

## Walls

Total System R-values of all walls include the effects of thermal bridging, which are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006 (as per J4D3 Thermal Construction – General (5)) or are stated values.

For the purpose of the Reference Building, the wall total system R-value of the wall-glazing construction has been calculated in accordance with J4D6 Walls and Glazing and Specification 37 Calculation of U-Value and solar admittance.

Proposed	Title	Class	R-Value (m <sup>2</sup> K <sup>o</sup> /W)	Solar Abs.	Area (m <sup>2</sup> )
External	Concept	5	2.50	0.2	196.40
External	Monument Wall	5	2.50	0.9	20.25
Reference	Title	Class	R-Value (m <sup>2</sup> K <sup>o</sup> /W)	Solar Abs.	Area (m <sup>2</sup> )
External	Concept	5	2.50	0.6	196.40
External	Monument Wall	5	2.50	0.6	20.25

## Roofs

Total system R-values of all roofs include the effects of thermal bridging are calculated in accordance with AS/NZS 4859.2 and NZ 4214:2006 (as per J4D3 Thermal Construction – General (5)) or are stated values.

For the purpose of the Reference Building, the roof total system R-value has been assumed in accordance with J4D4 Roof and ceiling construction.

# New dwelling

New Dentist Clinic

Proposed	Title	Class	R-Value (m <sup>2</sup> K <sup>o</sup> /W)	Solar Abs.	Area (m <sup>2</sup> )
External	Concept	5	6.01	0.5	125.14
Top	Concept	5	6.00	0.5	74.09
Reference	Title	Class	R-Value (m <sup>2</sup> K <sup>o</sup> /W)	Solar Abs.	Area (m <sup>2</sup> )
External	Concept	5	3.20	0.5	125.14
Top	Concept	5	3.20	0.5	74.09

## Floors

Total system R-values of all floors include the effects of thermal bridging are calculated in accordance with AS/NZS 4859.2, NZ 4214:2006 and Section 3.5 of CIBSE Guide A (as per J4D3 Thermal Construction – General (5)) or are stated values

For the purpose of the Reference Building, the floor total system R-value has been assumed in accordance with J4D7 Floors.

Proposed	Title	Class	R-Value (m <sup>2</sup> K <sup>o</sup> /W)	Solar Abs.	Area (m <sup>2</sup> )
Bottom	Concept	5	1.00	0.5	199.23
Reference	Title	Class	R-Value (m <sup>2</sup> K <sup>o</sup> /W)	Solar Abs.	Area (m <sup>2</sup> )
Bottom	Concept	5	2.00	0.5	199.23

## Windows

Total system U-values of all windows include the effects of thermal bridging at the frame, which are calculated in accordance with ISO 15099, as per J4D3 Thermal Construction – General (5).

For the purpose of the Reference Building, the glazing total system U-value and solar admittance of the wall-glazing construction has been calculated in accordance with J4D6 Walls and Glazing and Specification 37 Calculation of U-Value and solar admittance.

Proposed	Title	Class	U-value	SHGC	Area (m <sup>2</sup> )
External	Concept	5	4.02	0.53	57.67
Reference	Title	Class	U-value	SHGC	Area (m <sup>2</sup> )
External	Concept	5	5.80	0.36	57.67

## Glazed Doors

Proposed	Title	Class	U-value	SHGC	Area (m <sup>2</sup> )
External	Concept	5	3.50	0.35	11.31

# New dwelling

New Dentist Clinic

Reference	Title	Class	U-value	SHGC	Area (m <sup>2</sup> )
External	Concept	5	5.80	0.36	11.31

## Climate

The climate file AUS\_VIC\_Geelong.Racecourse.948570\_TMYx.2007-2021, located at Geelong.Racecourse, VIC AUS, was used for simulations. This file was sourced from Climate.OneBuilding, an online repository collated from public sources. <http://www.climate.onebuilding.org/>.

## Renewables

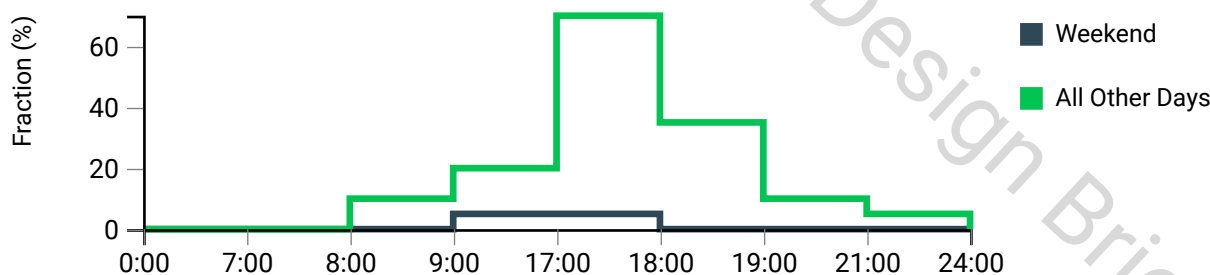
Photovoltaic systems have been nominated for the Proposed Building. They have been placed in the model and are subject to shading from the building, the surrounding site, and from self-shading.

Title	Height (m)	Area (m <sup>2</sup> )	Surf. Fraction	Efficiency	System Size (kW)
PV1	0.0	14.2	0.9	0.2	2.6
PV2	0.0	22.2	0.9	0.2	4.0

## Occupants

### Space Default

	All Year
Design Level (m <sup>2</sup> /Person)	10.00



Option	Value
Activity Level (W)	140.00
Air Velocity (m/s)	0.10
Clothing Level (Clo)	0.70

## Lighting

Lighting power density (W/m<sup>2</sup>) is stipulated in each thermal zone, subject to the function and purpose of the space. Internal heat gains for the Reference and Proposed Reference Building equipment density have been nominated as identical.

# New dwelling

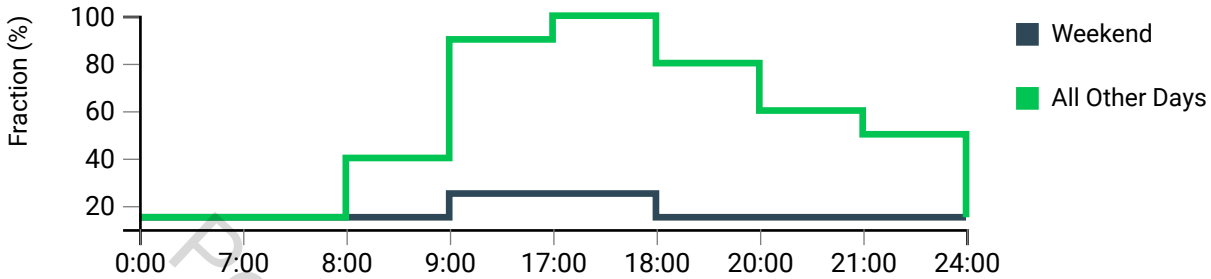
New Dentist Clinic

## Space Default

All Year

Design Level (W/m<sup>2</sup>)

8.00



## Equipment

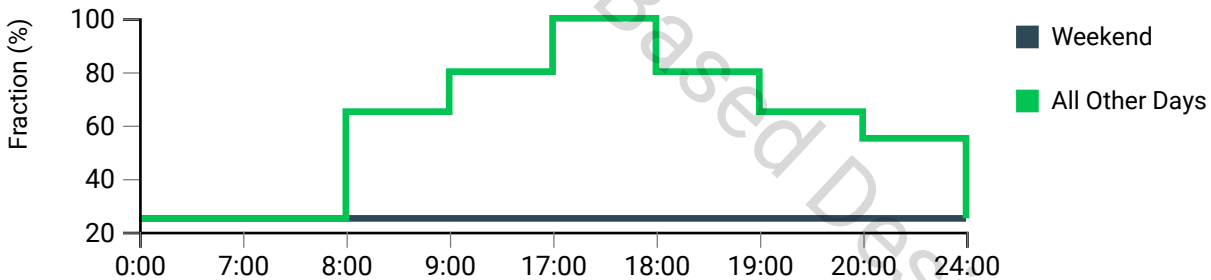
### Space Default

Electric Equipment

All Year

Design Level (W/m<sup>2</sup>)

8.00



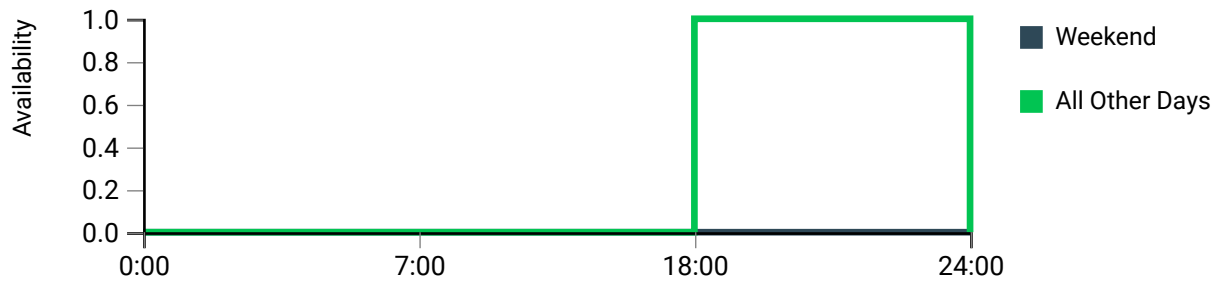
## Air-Conditioning

As a fabric only assessment, air-conditioning equipment and mechanical ventilation rates for the Reference and Proposed Building are identical. Minimum mechanical ventilation is required as per Part F6P3 Outdoor air supply.

### Space Default

# New dwelling

New Dentist Clinic



Performance-Based Design Brief

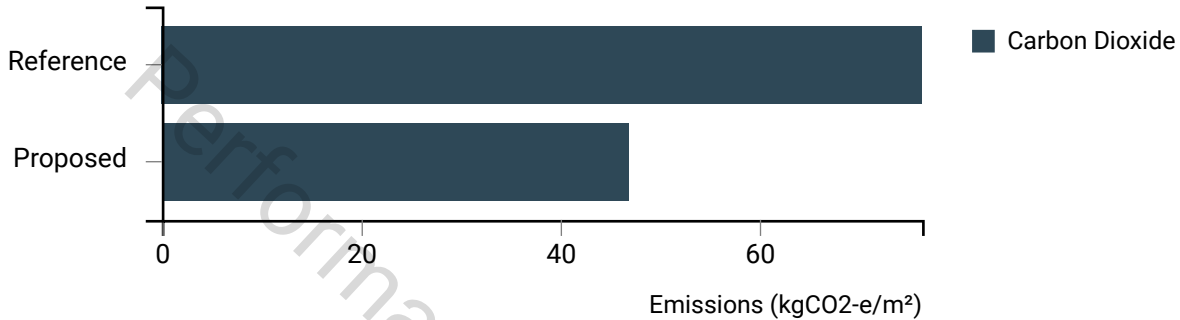
# New dwelling

New Dentist Clinic

## Detailed Results

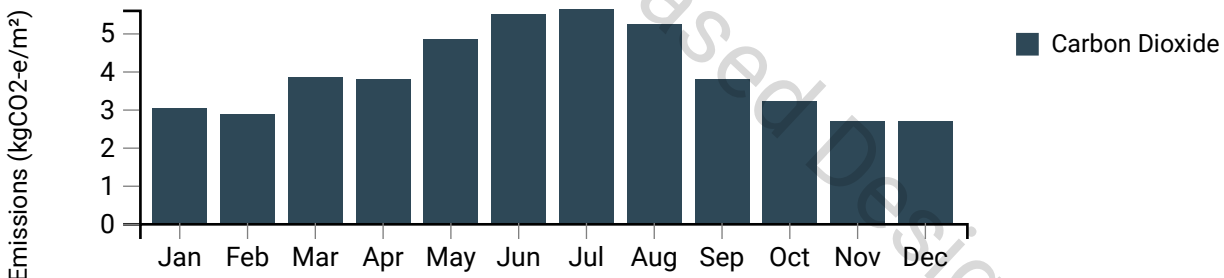
### Building Emissions

To meet the acceptance criteria, annual Supplied Energy emissions must be less than **76.36** kgCO<sub>2</sub>-e/m<sup>2</sup>. Based on a treated floor area of 249.40 m<sup>2</sup>, the simulated building achieved **46.87** kgCO<sub>2</sub>-e/m<sup>2</sup>, **meeting** the acceptance criteria.



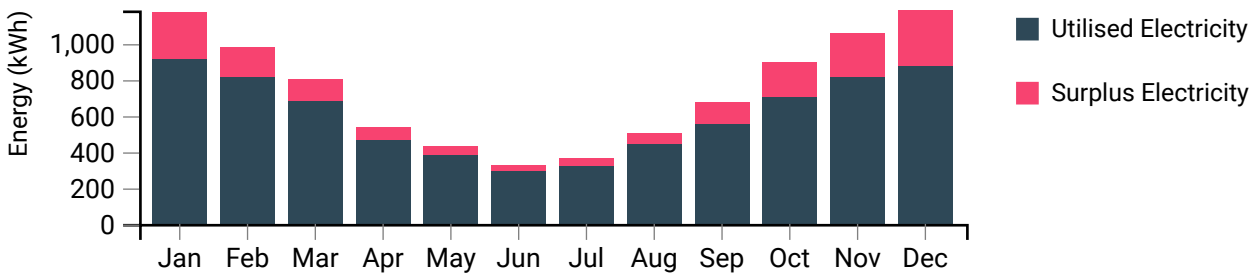
Greenhouse gas emission factors have been nominated as **279.00** kilogram / GJ for electricity, and **51.53** kilogram / GJ for natural gas.

### Proposed



Meter	Emissions (kgCO <sub>2</sub> -e)	Emissions (kgCO <sub>2</sub> -e/m <sup>2</sup> )
Emissions	11689.32	46.87

Sources of renewable energy have been nominated for the building. Only the Utilised Electricity is considered against the Electricity Demand of the Building, while Surplus Electricity is not.



# New dwelling

New Dentist Clinic

Energy	kWh
Produced Electricity	8922.1
Utilised Electricity	7276.7
Purchased Electricity	11638.1
Surplus Electricity	1645.4

## Electricity Purchased

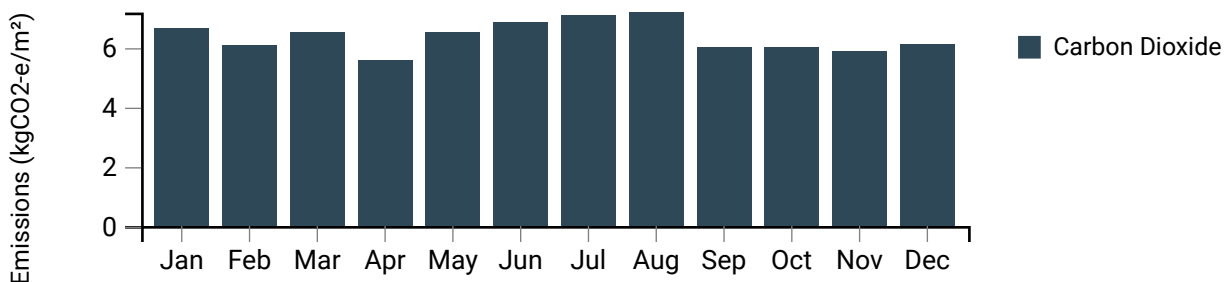
Period	Energy (kWh)	Energy (kWh/m <sup>2</sup> )	Peak (kW)	Time
Jan	747.21	3.00	5.38	17 Jan 14:00
Feb	708.23	2.84	5.56	28 Feb 16:00
Mar	951.90	3.82	4.59	31 Mar 16:00
Apr	933.62	3.74	4.96	17 Apr 07:15
May	1198.73	4.81	7.08	29 May 07:15
Jun	1362.72	5.46	7.14	26 Jun 07:30
Jul	1391.72	5.58	7.73	24 Jul 07:30
Aug	1297.53	5.20	7.57	7 Aug 07:30
Sep	933.58	3.74	6.23	1 Sep 07:15
Oct	791.36	3.17	5.33	12 Oct 07:15
Nov	661.85	2.65	4.39	30 Nov 16:00
Dec	659.65	2.64	4.47	14 Dec 16:00
<b>Total</b>	<b>11638.11</b>	<b>46.66</b>	<b>7.73</b>	<b>24 Jul 07:30</b>

## Gas Demand

The simulated building did not include Gas Demand.

## Reference

The Reference Building simulated results are shown below, which sets the acceptance criteria threshold.



# New dwelling

New Dentist Clinic

Meter	Emissions (kgCO <sub>2</sub> -e)		Emissions (kgCO <sub>2</sub> -e/m <sup>2</sup> )	
Emissions	19043.92		76.36	
<b>Electricity Purchased</b>				
Period	Energy (kWh)	Energy (kWh/m <sup>2</sup> )	Peak (kW)	Time
Jan	1649.21	6.61	7.84	17 Jan 14:00
Feb	1508.87	6.05	8.92	28 Feb 14:00
Mar	1612.41	6.47	6.34	9 Mar 15:00
Apr	1384.65	5.55	5.45	7 Apr 14:00
May	1613.29	6.47	7.43	29 May 07:15
Jun	1701.27	6.82	7.71	26 Jun 07:30
Jul	1758.40	7.05	8.40	24 Jul 08:15
Aug	1781.94	7.14	8.16	7 Aug 08:15
Sep	1488.91	5.97	6.87	1 Sep 08:15
Oct	1486.57	5.96	6.03	12 Oct 07:15
Nov	1457.57	5.84	7.49	30 Nov 14:00
Dec	1517.38	6.08	6.81	14 Dec 11:00
Total	18960.49	76.03	8.92	28 Feb 14:00

## Gas Demand

The simulated building did not include Gas Demand.

# New dwelling

New Dentist Clinic

## Thermal Comfort (PMV)

To meet the acceptance criteria, **95 %** of total area across the assessed zones must meet the conditions:

- zone thermal comfort (pmv) is between -1.0 and 1.0 PMV
- for at least 98 % of hours
- when above 20 % occupancy

A total area of 249.40 m<sup>2</sup> across 21 zones were assessed, where zones of **95.20 %** area achieved the conditions, **meeting** the acceptance criteria.

Level	Zone	Area (m <sup>2</sup> )	Assessed (Hrs)	Pass (Hrs)	Ratio	Pass
1	7. Surgery 4	10.77	2340	2338	99.91	✓
1	1. Reception	55.18	2340	2339	99.96	✓
1	11. Recovery Consult	8.27	2340	2328	99.49	✓
1	10. Air Lock	8.19	2340	2340	100.00	✓
1	8. Surgery 1	10.82	2340	2323	99.27	✓
1	3. Surgery 2	11.19	2340	2315	98.93	✓
1	6. Surgery 3	10.95	2340	2315	98.93	✓
1	13. ACC WC	6.02	2340	2340	100.00	✓
1	14. WC	2.49	2340	2312	98.80	✓
1	9. Surgery 6	10.82	2340	2340	100.00	✓
1	4. Sterilisation	11.19	2340	2340	100.00	✓
1	2. Hall	21.05	2340	2321	99.19	✓
1	5. Surgery 5	11.11	2340	2338	99.91	✓
1	12. OPG	7.64	2340	2183	93.29	✗
2	3. Office	8.92	2340	2340	100.00	✓
2	6. Staff WC	4.37	2340	2255	96.37	✗
2	7. Cleaner Washing	3.52	2340	2317	99.02	✓
2	4. Stairway	0.00	2340	2340	100.00	✓
2	5. Hall	4.68	2340	2340	100.00	✓
2	2. Laboratory	9.25	2340	2340	100.00	✓

# New dwelling

New Dentist Clinic

Level	Zone	Area (m <sup>2</sup> )	Assessed (Hrs)	Pass (Hrs)	Ratio	Pass		
2	1. Staff/Kitchen	32.95	2340	2340	100.00	✓		
						Pass ✓		
Level	Zone	Area (m <sup>2</sup> )	<-1	-1 to -0.5	-0.5 to 0	0 to 0.5	0.5 to 1	>1
1	7. Surgery 4	10.77	2.0	746.0	539.0	604.0	449.0	0.0
1	5. Surgery 5	11.11	2.0	669.0	562.0	632.0	475.0	0.0
1	2. Hall	21.05	19.0	756.0	579.0	889.0	97.0	0.0
1	4. Sterilisation	11.19	0.0	274.0	838.0	948.0	280.0	0.0
1	9. Surgery 6	10.82	0.0	131.0	573.0	1072.0	564.0	0.0
1	14. WC	2.49	28.0	703.0	632.0	847.0	130.0	0.0
1	12. OPG	7.64	157.0	1035.0	454.0	644.0	50.0	0.0
1	6. Surgery 3	10.95	25.0	936.0	464.0	825.0	90.0	0.0
1	3. Surgery 2	11.19	25.0	934.0	458.0	831.0	92.0	0.0
1	8. Surgery 1	10.82	17.0	897.0	459.0	846.0	121.0	0.0
1	13. ACC WC	6.02	0.0	193.0	750.0	942.0	455.0	0.0
1	10. Air Lock	8.19	0.0	206.0	610.0	733.0	791.0	0.0
1	11. Recovery Consult	8.27	12.0	698.0	547.0	914.0	169.0	0.0
1	1. Reception	55.18	1.0	571.0	482.0	606.0	680.0	0.0
2	6. Staff WC	4.37	0.0	26.0	150.0	625.0	1454.0	85.0
2	7. Cleaner Washing	3.52	0.0	31.0	185.0	716.0	1385.0	23.0
2	4. Stairway	0.00	0.0	427.0	629.0	795.0	489.0	0.0
2	5. Hall	4.68	0.0	128.0	471.0	731.0	1010.0	0.0
2	2. Laboratory	9.25	0.0	286.0	657.0	676.0	721.0	0.0
2	3. Office	8.92	0.0	449.0	635.0	679.0	577.0	0.0
2	1. Staff/Kitchen	32.95	0.0	119.0	499.0	851.0	871.0	0.0

## Building Class 5

### Method Two

AC Energy Threshold	22.34
U-Value Threshold (W/m <sup>2</sup> .K)	2.00

# New dwelling

New Dentist Clinic

Reference Window U-Value (W/m <sup>2</sup> .K)	5.80
Reference Window SHGC	0.37
Reference Wall R-Value (m <sup>2</sup> .K/W)	2.50
Total Area (m <sup>2</sup> )	285.63
Window-Wall Ratio	0.24

## Method One - North Aspect

Reference Window U-Value (W/m <sup>2</sup> .K)	5.80
Reference Window SHGC	0.81
Reference Wall R-Value (m <sup>2</sup> .K/W)	2.50
Solar Admittance Threshold	0.13
U-Value Threshold (W/m <sup>2</sup> .K)	2.00
Solar Admittance Weighting	0.00
Aspect Area (m <sup>2</sup> )	95.02
Window-Wall Ratio	0.11

Title	Heading (°)	U-value (W/m <sup>2</sup> K°)	SHGC	Area (m <sup>2</sup> )	P (m)	G (m)	H (m)	SC
Concept	0.0	5.80	0.36	8.77	0.00	0.00	0.00	1.00
Concept	0.0	5.80	0.36	1.64	0.00	0.30	1.40	1.00

## Method One - East Aspect

Reference Window U-Value (W/m <sup>2</sup> .K)	3.76
Reference Window SHGC	0.33
Reference Wall R-Value (m <sup>2</sup> .K/W)	2.50
Solar Admittance Threshold	0.13
U-Value Threshold (W/m <sup>2</sup> .K)	2.00
Solar Admittance Weighting	1.62
Aspect Area (m <sup>2</sup> )	48.07
Window-Wall Ratio	0.48

Title	Heading (°)	U-value (W/m <sup>2</sup> K°)	SHGC	Area (m <sup>2</sup> )	P (m)	G (m)	H (m)	SC
Concept	90.0	5.80	0.36	14.84	0.00	0.00	0.00	1.00
Concept	90.0	5.80	0.36	8.07	1.60	0.03	2.50	0.50

## Method One - South Aspect

# New dwelling

New Dentist Clinic

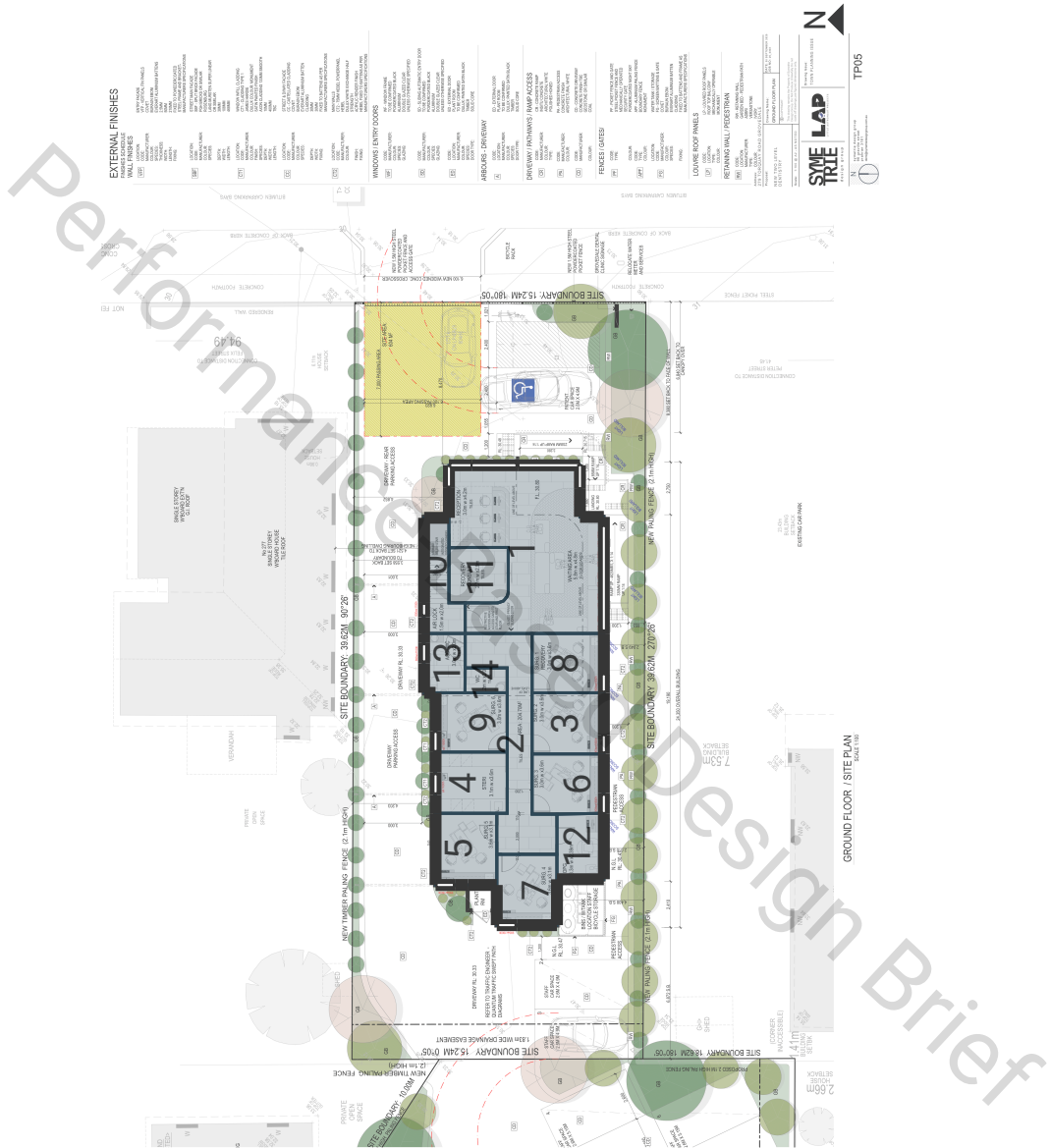
Reference Window U-Value (W/m <sup>2</sup> .K)									5.31
Reference Window SHGC									0.40
Reference Wall R-Value (m <sup>2</sup> .K/W)									2.50
Solar Admittance Threshold									0.13
U-Value Threshold (W/m <sup>2</sup> .K)									2.00
Solar Admittance Weighting									1.00
Aspect Area (m <sup>2</sup> )									93.95
Window-Wall Ratio									0.33
Title	Heading (°)	U-value (W/m <sup>2</sup> K°)	SHGC	Area (m <sup>2</sup> )	P (m)	G (m)	H (m)	SC	
Concept	180.0	5.80	0.36	22.45	0.00	0.00	0.00	1.00	
Concept	180.0	5.80	0.36	1.62	0.00	0.13	1.93	1.00	
Concept	180.0	5.80	0.36	1.71	0.00	0.15	1.95	1.00	
Concept	180.0	5.80	0.36	1.62	0.00	0.30	2.10	1.00	
Concept	180.0	5.80	0.36	3.24	0.00	0.00	0.00	1.00	
<b>Method One - West Aspect</b>									
Reference Window U-Value (W/m <sup>2</sup> .K)									5.80
Reference Window SHGC									0.81
Reference Wall R-Value (m <sup>2</sup> .K/W)									2.50
Solar Admittance Threshold									0.13
U-Value Threshold (W/m <sup>2</sup> .K)									2.00
Solar Admittance Weighting									0.00
Aspect Area (m <sup>2</sup> )									48.58
Window-Wall Ratio									0.10
Title	Heading (°)	U-value (W/m <sup>2</sup> K°)	SHGC	Area (m <sup>2</sup> )	P (m)	G (m)	H (m)	SC	
Concept	270.0	5.80	0.36	1.78	0.00	0.02	2.00	1.00	
Concept	270.0	5.80	0.36	3.24	0.00	0.30	2.10	1.00	

# New dwelling

New Dentist Clinic

## Drawings

### Level 1 - Ground



— Thermal Line

□ Windows

■ Class 5



# New dwelling

New Dentist Clinic

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## Disclaimer

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Performance-Based Design Brief

### NCC Part J6 Assessment Outcome

**Project Address:** 276 Torquay Road, Grovedale

The following outlines the outcome of the projects artificial lighting and power, below table nominates compliance of each individual space and the premises as a whole. Refer to the enclosed pages for the lighting and room specification associated with this project.

	Wattage per m <sup>2</sup>		Total wattage		Compliance with BCA
	BCA	Design	BCA	Design	
<b>Zone 1:</b>	5	N/A	407	0	Zone Complies
<b>Zone 2:</b>	6	N/A	109	0	Zone Complies
<b>Zone 3:</b>	5	N/A	218	0	Zone Complies
<b>Zone 4:</b>	3	N/A	39	0	Zone Complies
<b>Zone 5:</b>	10	N/A	507	0	Zone Complies
<b>Zone 6:</b>	6	N/A	55	0	Zone Complies
<b>Zone 7:</b>	4	N/A	144	0	Zone Complies
<b>Zone 8:</b>	2	N/A	5	0	Zone Complies
<b>Zone 9:</b>	#N/A	N/A	0	0	Not Applicable
<b>Zone 10:</b>	#N/A	N/A	0	0	Not Applicable
<b>Zone 11:</b>	#N/A	N/A	0	0	Not Applicable
<b>Zone 12:</b>	#N/A	N/A	0	0	Not Applicable
<b>Overall project result:</b>			1334	0	Building/Tenancy Complies

Total wattage available to be integrated into current design: -1334 w

NOTE: An artificial lighting switch must not operate lighting within an area than -

- a) 250m<sup>2</sup> for a space of not more than 2000m<sup>2</sup> floor area; or
- b) 1000m<sup>2</sup> for a space of more than 2000m<sup>2</sup> floor area

NOTE: All lighting within close proximity of external windows are to be separately switched from other lighting that is not found within close proximity of external windows.

## Zoning and Space Compartmentation

As part of this assessment the project has been partitioned into multiple spaces. A description of each space is highlighted below with the relevant adjustment factors applicable as per NCC Deemed-To-Satisfy Provisions. Note that the NCC allows for a combination of only two (2) combined adjustment factors. Refer to the enclosed drawing showing the markings of each zone in relation to the project (where applicable).

Zones				Adjustment Factors	
<b>Zone 1</b>					
Type of Use: <i>Health-care - examination room</i>				Room height factor:	0.9
Max illumination power density: 4.5 w (without application of adjustment factors)				Additional factor:	N/A
Width:	9.02 m	Total Area:	81.36 m <sup>2</sup>	Combined Adjustment factor:	N/A
Length:	9.02 m	Height of working space:	2.10 m <small>(Working height space is measured from the working surface to the underside of the ceiling)</small>		
<b>Zone 2</b>					
Type of Use: <i>Office - artificially lit to an ambient level of 200 lx or more</i>				Room height factor:	0.7
Max illumination power density: 4.5 w (without application of adjustment factors)				Additional factor:	N/A
Width:	4.12 m	Total Area:	16.97 m <sup>2</sup>	Combined Adjustment factor:	N/A
Length:	4.12 m	Height of working space:	2.10 m <small>(Working height space is measured from the working surface to the underside of the ceiling)</small>		
<b>Zone 3</b>					
Type of Use: <i>Corridors</i>				Room height factor:	0
Max illumination power density: 5 w (without application of adjustment factors)				Additional factor:	N/A
Width:	6.6 m	Total Area:	43.56 m <sup>2</sup>	Combined Adjustment factor:	N/A
Length:	6.6 m	Height of working space:	0.00 m		

<b>Zone 4</b>				Room height factor:	0
Type of Use:	<i>Toilet, Locker Room, Staff room and the like</i>			Additional factor:	N/A
Max illumination power density:	3 w	(without application of adjustment factors)		Combined Adjustment factor:	N/A
Width:	3.6 m	Total Area:	12.96 m <sup>2</sup>		
Length:	3.6 m	Height of working space:	0.00 m		
				(Working height space is measured from the working surface to the underside of the ceiling)	

<b>Zone 5</b>				Room height factor:	0.9
Type of Use:	<i>Entry lobby from outside of buildings</i>			Additional factor:	N/A
Max illumination power density:	9 w	(without application of adjustment factors)		Combined Adjustment factor:	N/A
Width:	7.12 m	Total Area:	50.69 m <sup>2</sup>		
Length:	7.12 m	Height of working space:	2.10 m		
				(Working height space is measured from the working surface to the underside of the ceiling)	

<b>Space 6</b>				Room height factor:	0
Type of Use:	<i>Laboratory</i>			Additional factor:	N/A
Max illumination power density:	6 w	(without application of adjustment factors)		Combined Adjustment factor:	N/A
Width:	4.8 m	Total Area:	9.12 m <sup>2</sup>		
Length:	1.9 m	Height of working space:	0.00 m		
				(Working height space is measured from the working surface to the underside of the ceiling)	

Zone 7				
<b>Type of Use:</b> <i>Kitchen and food preparation area</i>				<b>Room height factor:</b> 0.9
<b>Max illumination power density:</b> 4 w (without application of adjustment factors)				<b>Additional factor:</b> N/A
<b>Width:</b> 5.7 m	<b>Total Area:</b> 32.49 m <sup>2</sup>			
<b>Length:</b> 5.7 m	<b>Height of working space:</b> 1.60 m			<b>Combined Adjustment factor:</b> N/A
<small>(Working height space is measured from the working surface to the underside of the ceiling)</small>				

Zone 8				
<b>Type of Use:</b> <i>Service area, locker room, staff room, cleaner's room, rest room and the like</i>				<b>Room height factor:</b> 0
<b>Max illumination power density:</b> 1.5 w (without application of adjustment factors)				<b>Additional factor:</b> N/A
<b>Width:</b> 1.8 m	<b>Total Area:</b> 3.60 m <sup>2</sup>			
<b>Length:</b> 2 m	<b>Height of working space:</b> 0.00 m			<b>Combined Adjustment factor:</b> N/A
<small>(Working height space is measured from the working surface to the underside of the ceiling)</small>				

Zone 9				
<b>Type of Use:</b> #N/A				<b>Room height factor:</b> 0
<b>Max illumination power density:</b> #N/A w (without application of adjustment factors)				<b>Additional factor:</b> N/A
<b>Width:</b> 0 m	<b>Total Area:</b> 0.00 m <sup>2</sup>			
<b>Length:</b> 0 m	<b>Height of working space:</b> 0.00 m			<b>Combined Adjustment factor:</b> N/A

<b>Zone 10</b>				<b>Room height factor:</b>	0
<b>Type of Use:</b>	#N/A			<b>Additional factor:</b>	N/A
<b>Max illumination power density:</b>	#N/A	W	(without application of adjustment factors)		
<b>Width:</b>	0 m	<b>Total Area:</b>	0.00 m <sup>2</sup>		
<b>Length:</b>	0 m	<b>Height of working space:</b>	0.00 m	<b>Combined Adjustment factor:</b>	N/A
				(Working height space is measured from the working surface to the underside of the ceiling)	

<b>Zone 11</b>				<b>Room height factor:</b>	0
<b>Type of Use:</b>	#N/A			<b>Additional factor:</b>	N/A
<b>Max illumination power density:</b>	#N/A	W	(without application of adjustment factors)		
<b>Width:</b>	0 m	<b>Total Area:</b>	0.00 m <sup>2</sup>		
<b>Length:</b>	0 m	<b>Height of working space:</b>	0.00 m	<b>Combined Adjustment factor:</b>	N/A
				(Working height space is measured from the working surface to the underside of the ceiling)	

<b>Space 12</b>				<b>Room height factor:</b>	0
<b>Type of Use:</b>	#N/A			<b>Additional factor:</b>	N/A
<b>Max illumination power density:</b>	#N/A	W	(without application of adjustment factors)		
<b>Width:</b>	0 m	<b>Total Area:</b>	0.00 m <sup>2</sup>		
<b>Length:</b>	0 m	<b>Height of working space:</b>	0.00 m	<b>Combined Adjustment factor:</b>	N/A
				(Working height space is measured from the working surface to the underside of the ceiling)	

# BESS Report

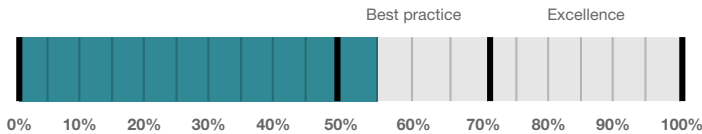
Built Environment Sustainability Scorecard



This BESS report outlines the sustainable design commitments of the proposed development at 279 Torquay Rd Grovedale Victoria 3216. 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 Geelong 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



# 58%

## Project details

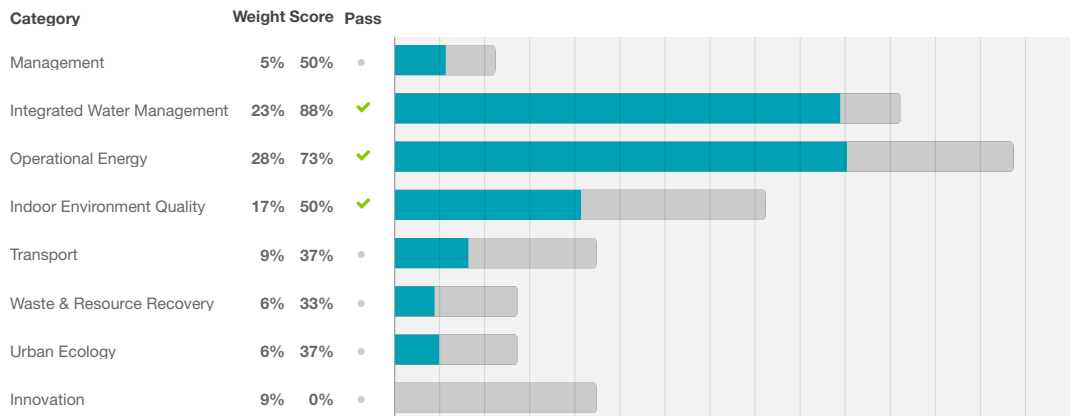
**Name** Construction of a new dental clinic  
**Address** 279 Torquay Rd Grovedale Victoria 3216  
**Project ID** 54D1444B-R3  
**BESS Version** BESS-9

**Site type** Non-residential development  
**Account** geokalconsult@gmail.com  
**Application no.**  
**Site area** 955 m<sup>2</sup>  
**Building floor area** 286 m<sup>2</sup>  
**Date** 19 November 2025  
**Software version** 2.2.0-B.628



## Performance by category

● This project ● Maximum available



## Buildings

Name	Height	Footprint	% of total footprint
Dental Clinic	2	205 m <sup>2</sup>	100%

## Dwellings & Non Res Spaces

### Non-Res Spaces

Name	Quantity	Area	Building	% of total area
<b>Office</b>				
Non-Residential Space 1	1	287 m <sup>2</sup>	Dental Clinic	100%
<b>Total</b>	<b>1</b>	<b>286 m<sup>2</sup></b>	<b>100%</b>	

## Supporting Evidence

### Shown on Floor Plans

Credit	Requirement	Response	Status
Integrated Water Management 2.1	Location of any stormwater management systems (rainwater tanks, raingardens, buffer strips)		-
Integrated Water Management 3.1	Annotation: Water efficient garden details		-
Operational Energy 4.2	Location and size of solar photovoltaic system		-
Transport 1.5	Location of non-residential visitor bicycle parking spaces		-
Transport 2.1	Location of electric vehicle charging infrastructure		-
Waste & Resource Recovery 2.2	Location of recycling facilities		-
Urban Ecology 2.1	Location and size of vegetated areas		-

### Supporting Documentation

Credit	Requirement	Response	Status
Management 2.3a	Section J glazing assessment		-
Management 2.3b	Preliminary modelling report		-
Integrated Water Management 2.1	STORM report or MUSIC model		-
Operational Energy 1.1	Energy Report showing calculations of reference case and proposed buildings		-
Operational Energy 3.7	Average lighting power density and lighting type(s) to be used		-
Operational Energy 4.2	Specifications of the solar photovoltaic system(s)		-
Indoor Environment Quality 1.4	A short report detailing assumptions used and results achieved.		-

## Credit summary

### Management Overall contribution 4.5%

		<b>50%</b>
1.1 Pre-Application Meeting		0%
2.3 Thermal Performance Modelling - Non-Residential		100%
3.2 Metering - Non-Residential		N/A
		✦ Scoped Out
		Single building
3.3 Metering - Common Areas		N/A
		✦ Scoped Out
		Single building
4.1 Building Users Guide		100%

### IWM Overall contribution 22.5%

		<b>88%</b>	✓ Pass
1.1 Potable Water Use		64%	✓ Achieved
2.1 Stormwater Treatment		100%	✓ Achieved
3.1 Water Efficient Landscaping		100%	
4.1 Building Systems Water Use		N/A	✦ Scoped Out
			No chillers or major fire safety system

### Operational Energy Overall contribution 27.5%

		<b>73%</b>	✓ Pass
		<b>Minimum required 50%</b>	
1.1 Thermal Performance Rating - Non-Residential		37%	
2.1 Greenhouse Gas Emissions		100%	
2.2 Peak Demand		100%	
2.6 Electrification		100%	
2.7 Energy consumption		100%	
3.1 Carpark Ventilation		N/A	✦ Scoped Out
			No carpark
3.2 Hot Water - Non-Residential		100%	
3.7 Internal Lighting - Non-Residential		100%	
4.1 Combined Heat and Power (cogeneration / trigeneration)		N/A	✦ Scoped Out
			No cogeneration or trigeneration system in use.
4.2 Renewable Energy Systems - Solar		100%	
4.4 Renewable Energy Systems - Other		0%	

**IEQ Overall contribution 16.5%**

		<b>Minimum required 50%</b>	<b>50%</b>	<b>✓ Pass</b>
1.4 Daylight Access - Non-Residential			34%	✓ Achieved
2.3 Ventilation - Non-Residential			50%	✓ Achieved
3.4 Thermal comfort - Shading - Non-Residential			83%	
3.5 Thermal Comfort - Ceiling Fans - Non-Residential			0%	
4.1 Air Quality - Non-Residential			100%	

**Transport Overall contribution 9.0%**

			<b>37%</b>
1.4 Bicycle Parking - Non-Residential			0%
1.5 Bicycle Parking - Non-Residential Visitor			100%
1.6 End of Trip Facilities - Non-Residential			0% <input type="checkbox"/> Disabled
			Credit 1.4 must be complete first.
2.1 Electric Vehicle Infrastructure			100%
2.2 Car Share Scheme			0%
2.3 Motorbikes / Mopeds			0%

**Waste & Resource Recovery Overall contribution 5.5%**

			<b>33%</b>
1.1 Construction Waste - Building Re-Use			0%
2.1 Operational Waste - Food & Garden Waste			0%
2.2 Operational Waste - Convenience of Recycling			100%

**Urban Ecology Overall contribution 5.5%**

			<b>37%</b>
1.1 Communal Spaces			0%
2.1 Vegetation			75%
2.2 Green Roofs			0%
2.3 Green Walls and Facades			0%
3.2 Food Production - Non-Residential			0%

**Innovation Overall contribution 9.0%**

			<b>0%</b>
1.1 Innovation			0%

## Credit breakdown

### Management Overall contribution 4.5%

			50%
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	<b>1.1 Pre-Application Meeting</b>		0%
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	Score Contribution	This credit contributes 50% 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	

	<b>2.3 Thermal Performance Modelling - Non-Residential</b>		100%
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	Score Contribution	This credit contributes 33.3% towards the category score.	
	Criteria	Has a preliminary facade assessment been undertaken in accordance with NCC2022 Section J4D6?	
	Question	Criteria Achieved ?	
	Office	Yes	

	Criteria	Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star?	
	Question	Criteria Achieved ?	
	Office	Yes	

	<b>3.2 Metering - Non-Residential</b>		N/A <span style="color: orange;">✦</span> Scoped Out
			Single building

	This credit was scoped out	Single building	
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	<b>3.3 Metering - Common Areas</b>		N/A <span style="color: orange;">✦</span> Scoped Out
			Single building

	This credit was scoped out	Single building	
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	<b>4.1 Building Users Guide</b>		100%
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	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	Yes	

IWM Overall contribution 22.5%

88% ✔ Pass

Do you have a reticulated third pipe or an on-site water recycling system?:	No
Are you installing a swimming pool?:	No
<b>Stormwater profile</b>	
Which stormwater modelling software are you using?:	MUSIC or other modelling software
STORM score achieved:	-
Flow:	81 %
Total Suspended Solids:	89 %
Total Phosphorus:	87 %
Total Nitrogen:	75 %
<b>Rainwater tank profile</b>	
What is the total roof area connected to the rainwater tank?: Rainwater Tank 1	208 m <sup>2</sup>
Tank Size: Rainwater Tank 1	4,000 Litres
Irrigation area connected to tank: Rainwater Tank 1	-
Is connected irrigation area a water efficient garden?: Rainwater Tank 1	No
Other external water demand connected to tank?: Rainwater Tank 1	-
<b>Fixtures, fittings &amp; connections profile</b>	
Building:	Dental Clinic
Showerhead:	Scope out
Bath:	Scope out
Kitchen Taps:	>= 5 Star WELS rating
Bathroom Taps:	>= 4 Star WELS rating
Dishwashers:	Default or unrated
WC:	>= 4 Star WELS rating
Urinals:	Scope out
Washing Machine Water Efficiency:	Scope out
Which non-potable water source is the dwelling/space connected to?:	236717
Non-potable water source connected to Toilets:	Yes
Non-potable water source connected to Laundry (washing machine):	No
Non-potable water source connected to Hot Water System:	No
<b>1.1 Potable Water Use</b>	64% <span style="color: green;">✔</span> Achieved

Score Contribution	This credit contributes 33.3% 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	418 kL
Output	Proposed (excluding rainwater and recycled water use)
Project	335 kL
Output	Proposed (including rainwater and recycled water use)
Project	236 kL
Output	% Reduction in Potable Water Consumption
Project	43 %
Output	% of connected demand met by rainwater
Project	71 %
Output	How often does the tank overflow?
Project	Never / Rarely
Output	Opportunity for additional rainwater connection
Project	51 kL

**2.1 Stormwater Treatment**  100% ✔ Achieved

Score Contribution	This credit contributes 60% towards the category score.
Criteria	Has best practice stormwater management been demonstrated?
Output	Flow
Project	81 %
Output	Min Suspended Solids reduction
Project	80 %
Output	Total Suspended Solids reduction
Project	89 %
Output	Min Phosphorus reduction
Project	45 %
Output	Total Phosphorus reduction
Project	87 %
Output	Min Nitrogen reduction
Project	45 %
Output	Total Nitrogen reduction
Project	75 %

**3.1 Water Efficient Landscaping**  100%

Score Contribution	This credit contributes 6.7% towards the category score.
Criteria	Will water efficient landscaping be installed?
Question	Criteria Achieved ?
Project	Yes

**4.1 Building Systems Water Use**  N/A ✘ Scoped Out  
No chillers or major fire safety system










This credit was scoped out

No chillers or major fire safety system

Operational Energy Overall contribution 27.5%

		Minimum required 50%	73%	✔ Pass
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<b>Project profile</b>	
Use the BESS Deem to Satisfy (DtS) method for Non-residential spaces?:	Yes
Are you installing any renewable energy system(s) (other than solar photovoltaic)?:	Yes
Energy Supply:	All-electric
<b>Solar Photovoltaic system profile</b>	
System Size (lesser of inverter and panel capacity): Solar Photovoltaic system 1	6.6 kW peak
Orientation (which way is the system facing)?: Solar Photovoltaic system 1	North
Inclination (angle from horizontal): Solar Photovoltaic system 1	2.5 Angle (degrees)
<b>Non-residential Deemed-to-Satisfy profile</b>	
Do all exposed floors and ceilings (forming part of the envelope) demonstrate meeting the required NCC2022 insulation levels (total R-value upwards and downwards)?:	Yes
Does all wall and glazing demonstrate meeting the required NCC2022 facade calculator (or better than the total allowance)?:	Yes
Are heating and cooling systems within one Star of the most efficient equivalent capacity unit available, or Coefficient of Performance (CoP) & Energy Efficiency Ratios (EER) not less than 85% of the CoP & EER of the most efficient equivalent capacity unit available?:	Yes
Are water heating systems within one star of the best available, or 85% or better than the most efficient equivalent capacity unit?:	Yes
<b>1.1 Thermal Performance Rating - Non-Residential</b>	37%
Score Contribution	This credit contributes 34.8% towards the category score.
Criteria	What is the % reduction in heating and cooling energy consumption against the reference case (NCC2022 Section J)?
<b>2.1 Greenhouse Gas Emissions</b>	100%
Score Contribution	This credit contributes 8.7% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?
<b>2.2 Peak Demand</b>	100%
Score Contribution	This credit contributes 4.3% towards the category score.
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?
<b>2.6 Electrification</b>	100%

Score Contribution	This credit contributes 13% towards the category score.	
Criteria	Is the development all-electric?	
Question	Criteria Achieved?	
Project	Yes	
<b>2.7 Energy consumption</b>		100%
Score Contribution	This credit contributes 17.4% towards the category score.	
Criteria	What is the % reduction in annual energy consumption against the benchmark?	
<b>3.1 Carpark Ventilation</b>		N/A  Scoped Out
	No carpark	
This credit was scoped out	No carpark	
<b>3.2 Hot Water - Non-Residential</b>		100%
Score Contribution	This credit contributes 4.3% towards the category score.	
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?	
<b>3.7 Internal Lighting - Non-Residential</b>		100%
Score Contribution	This credit contributes 8.7% towards the category score.	
Criteria	Does the maximum illumination power density (W/m2) in at least 90% of the area of the relevant building class meet the requirements in Table J7D3a of the NCC 2022 Vol 1?	
Question	Criteria Achieved ?	
Office	Yes	
<b>4.1 Combined Heat and Power (cogeneration / trigeneration)</b>		N/A  Scoped Out
	No cogeneration or trigeneration system in use.	
This credit was scoped out	No cogeneration or trigeneration system in use.	
<b>4.2 Renewable Energy Systems - Solar</b>		100%
Score Contribution	This credit contributes 4.3% towards the category score.	
Criteria	What % of the estimated energy consumption of the building class it supplies does the solar power system provide?	
Output	Solar Power - Energy Generation per year	
Office	7,547 kWh	
Output	% of Building's Energy	
Office	84 %	
<b>4.4 Renewable Energy Systems - Other</b>		0%
Score Contribution	This credit contributes 4.3% towards the category score.	
Criteria	Does another form of renewable energy (not solar) provide 5% of the estimated energy consumption of the building class it supplies?	
Question	Other Renewable Energy - Energy Generation per year	
Office	-	

IEQ Overall contribution 16.5%

		Minimum required 50%	50%	✔ Pass
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<b>1.4 Daylight Access - Non-Residential</b>		34%	✔ Achieved
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Score Contribution	This credit contributes 35.3% towards the category score.
Criteria	What % of the nominated floor area has at least 2% daylight factor?
Question	Percentage Achieved?
Office	34 %

<b>2.3 Ventilation - Non-Residential</b>		50%	✔ Achieved
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Score Contribution	This credit contributes 35.3% towards the category score.
Criteria	What % of the regular use areas are effectively naturally ventilated?
Question	Percentage Achieved?
Office	42 %

Criteria	What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668.2:2012?
Question	Percentage Achieved?
Office	50 %

Criteria	What CO2 concentrations are the ventilation systems designed to achieve, to monitor and to maintain?
Question	Value
Office	600 ppm

<b>3.4 Thermal comfort - Shading - Non-Residential</b>		83%	
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Score Contribution	This credit contributes 17.6% towards the category score.
Criteria	What percentage of east, north and west glazing to regular use areas is effectively shaded?
Question	Percentage Achieved?
Office	75 %

<b>3.5 Thermal Comfort - Ceiling Fans - Non-Residential</b>		0%	
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Score Contribution	This credit contributes 5.9% towards the category score.
Criteria	What percentage of regular use areas in tenancies have ceiling fans?
Question	Percentage Achieved?
Office	0 %

<b>4.1 Air Quality - Non-Residential</b>		100%	
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Score Contribution	This credit contributes 5.9% towards the category score.
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Criteria	Do all paints, sealants and adhesives meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Office	Yes
Criteria	Does all carpet meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Office	Yes
Criteria	Does all engineered wood meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Office	Yes

Transport Overall contribution 9.0%

		37%
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**1.4 Bicycle Parking - Non-Residential** 0%

Score Contribution	This credit contributes 25% towards the category score.
Criteria	Have the planning scheme requirements for employee bicycle parking been exceeded by at least 50% (or a minimum of 2 where there is no planning scheme requirement)?
Question	Criteria Achieved ?
Office	No
Question	Bicycle Spaces Provided ?
Office	1

**1.5 Bicycle Parking - Non-Residential Visitor** 100%

Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Have the planning scheme requirements for visitor bicycle parking been exceeded by at least 50% (or a minimum of 1 where there is no planning scheme requirement)?
Question	Criteria Achieved ?
Office	Yes
Question	Bicycle Spaces Provided ?
Office	1

**1.6 End of Trip Facilities - Non-Residential** 0%  Disabled

Credit 1.4 must be complete first.

This credit is disabled      Credit 1.4 must be complete first.

**2.1 Electric Vehicle Infrastructure** 100%

Score Contribution	This credit contributes 25% towards the category score.
Criteria	Are facilities provided for the charging of electric vehicles?
Question	Criteria Achieved ?
Project	Yes

**2.2 Car Share Scheme** 0%

Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Has a formal car sharing scheme been integrated into the development?
Question	Criteria Achieved ?
Project	No

**2.3 Motorbikes / Mopeds** 0%

Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Are a minimum of 5% of vehicle parking spaces designed and labelled for motorbikes (must be at least 5 motorbike spaces)?
Question	Criteria Achieved ?
Project	No

**Waste & Resource Recovery Overall contribution 5.5%**

		33%
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<b>1.1 Construction Waste - Building Re-Use</b>		0%
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Score Contribution	This credit contributes 33.3% 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	

<b>2.1 Operational Waste - Food &amp; Garden Waste</b>		0%
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Score Contribution	This credit contributes 33.3% towards the category score.	
Criteria	Are facilities provided for on-site management of food and garden waste?	
Question	Criteria Achieved ?	
Project	No	

<b>2.2 Operational Waste - Convenience of Recycling</b>		100%
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Score Contribution	This credit contributes 33.3% towards the category score.	
Criteria	Are the recycling facilities at least as convenient for occupants as facilities for general waste?	
Question	Criteria Achieved ?	
Project	Yes	

Urban Ecology Overall contribution 5.5%

			37%
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	<b>1.1 Communal Spaces</b>		0%
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	Score Contribution	This credit contributes 12.5% towards the category score.	
	Criteria	Is there at least the following amount of common space measured in square meters : * 1m <sup>2</sup> for each of the first 50 occupants * Additional 0.5m <sup>2</sup> for each occupant between 51 and 250 * Additional 0.25m <sup>2</sup> for each occupant above 251?	
	Question	Common space provided	
	Office	-	
	Output	Minimum Common Space Required	
	Office	22 m <sup>2</sup>	

	<b>2.1 Vegetation</b>		75%
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	Score Contribution	This credit contributes 50% 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	23 %	

	<b>2.2 Green Roofs</b>		0%
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	Score Contribution	This credit contributes 12.5% towards the category score.	
	Criteria	Does the development incorporate a green roof?	
	Question	Criteria Achieved ?	
	Project	No	

	<b>2.3 Green Walls and Facades</b>		0%
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	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	

	<b>3.2 Food Production - Non-Residential</b>		0%
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	Score Contribution	This credit contributes 12.5% towards the category score.	
	Criteria	What area of space per occupant is dedicated to food production?	
	Question	Food Production Area	
	Office	-	
	Output	Min Food Production Area	
	Office	6 m <sup>2</sup>	

**Innovation Overall contribution 9.0%**

	0%
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<b>1.1 Innovation</b>	0%
Score Contribution	This credit contributes 100% towards the category score.
Criteria	What percentage of the Innovation points have been claimed (10 points maximum)?

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Project # 365885C6 - Revised New Dental Clinic  
 279 Torquay Rd, Grovedale VIC 3216, Australia  
 20 October 2025 6:22 p.m.



## Revised New Dental Clinic

The proposed stormwater treatments provide 'deemed to comply' compliance with the minimum planning requirement for total nitrogen but does not comply with all the relevant objectives for management of stormwater flows on-site.



### Project details

Name	Revised New Dental Clinic
Street address	279 Torquay Rd, Grovedale VIC 3216, Australia
Municipality	Greater Geelong
Site area	950.7 m <sup>2</sup>
Planning Number	

### Flow and pollutant load reductions

Item	Result	Target
Mean annual runoff volume harvested or evapotranspired (%)	81%	>28%
Mean annual runoff volume infiltrated or filtered (%)	0%	>9%
Total suspended solids (%)	85%	>80%
Total phosphorus (%)	83%	>45%
Total nitrogen (%)	81%	>45%
Total gross pollutants (%)	98%	>70%

### Water treatment

#### Catchments

**Dental Clinic Roof** 208m<sup>2</sup>

**Permeable Driveway** Pervious (garden and lawn), 631.5m<sup>2</sup>

## Treatments

**Dental Clinic Tank** Rainwater Tank,  
Rainwater tank retention volume in kilolitres: 3.5

## Buildings & dwellings

**Dental Clinic** Non-Residential BCA Class 5 - Commercial/Office,  
28 employee(s)

### Configuration 1

**Dental Clinic Roof** 208m2

**Dental Clinic Tank** Rainwater Tank,  
Rainwater tank retention volume in kilolitres: 3.5,

**Dental Clinic**  
Non-Residential BCA Class 5 - Commercial/Office,  
28 employee(s)