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Sustainability Management Plan

+ Green Travel Plan

Report No: 2025-4165-SMP

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Date: 5 May 2026

Address: 155 Staughton Vale Rd, Staughton Vale VIC 3340

SMP

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Tracking	Date	Issue	Description	Consultant
	25 November 2025	1	Original report issue	MS
	5 May 2026	2	Update to lighting commitment	MS

Project details

Project details	Property address	155 Staughton Vale Rd, Staughton Vale VIC 3340
	Project description	Bacchus Marsh Grammar, Staughton Vale Campus
	Council	Greater Geelong City Council
	Proposed Site area	21,110 m ²
	Plans assessed	Plans prepared by GO Design Drafting, dated 20/10/2025

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Purpose and scope of report

EcoResults has been engaged as ESD consultants to prepare a Sustainability Management Plan (SMP) incorporating a Green Travel Plan (GTP) for the proposed development to ensure that the development adequately responds to the Greater Geelong City Council Planning Scheme Clause 15.01-2L (ESD) and Clause 53.18 (WSUD).

- The purpose of this report is to detail how the proposed design and operation of the building, as detailed in the planning drawings and our comments and recommendations listed in this herein, satisfies both clauses.
- EcoResults has consulted extensively with the designer, planning consultant and other relevant sub-consultants on how best to incorporate sustainability principles in the proposed design, and to comply with the current benchmarks required.
- Sustainability outcomes have been assessed using the following benchmarking tools:
 - **ESD:** BESS
 - **WSUD:** Blue Factor
 - **Energy Efficiency:** NCC Section J Deemed to Satisfy Provisions
 - **Daylight:** Green Star Hand Calculations
- Our assessment shows that the proposed development meets current best practice for ESD.
- This report should be attached to and read in conjunction with the town planning drawings as well as the BESS printouts within the Appendix of this report.
- An in-depth list of all ESD commitments for this project is located on page(s) 5-7 of this report.

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ESD schedule of commitments

All ESD measures listed below are commitments and should be shown/noted on plans

Energy	- A preliminary DTS assessment of the commercial and common areas within the building envelope has been undertaken in accordance with NCC 2022 Section J to show compliance with Energy Deemed-to-Satisfy requirements - All exposed floors and ceilings meet the minimum NCC 2022 requirements for insulation levels for floors and ceilings (total R-value upwards and downwards) - Wall and glazing will meet the requirements of NCC 2022 Clause J4D6 - Refer to pages 17 & 18 for details of preliminary assessment - The above represents our assessments of the DTS pathway. Compliance with the NCC at Building Approval stage will be via the DTS or J1V3 pathway subject to a compliant BESS and mandatory BESS energy score being achieved
Solar PV	A 10.0kW (lesser of inverter and panels) solar photovoltaic system will be provided
Lighting	The maximum illumination power density (W/m2) in at 90% of the area of the relevant building will be at least 20% lower than required by Table J7D3a of the NCC 2022 Volume 1 for commercial development
Appliances	- The development will be all electric - Heating and cooling systems will 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 equivalent capacity unit available - Water heating systems will be within one star of the best available, or at least 85% better than the most efficient equivalent capacity unit
Water & WSUD	BESS has calculated a 32% reduction in Potable Water Consumption due to efficient fixtures, appliances, rainwater and recycled water use - Rainwater tank(s) with a minimum capacity of 15,000L dedicated reuse to be plumbed/connected to: 4 star WELS rated toilets for flushing 4 star WELS rated urinals for flushing 6 star WELS rated basin taps in kitchens and bathrooms 4 star WELS rated shower heads (flow between 6.0 and 7.5L/min) - Water efficient landscaping will be provided - Water efficient landscapes do not require supplementary watering with potable water to survive 16m² Raingarden

- Blue Factor achieves 103%
 - Refer to pages 12-14 for a detailed WSUD response
-
- A daylight assessment of all commercial conditioned, regular use areas has been undertaken in accordance with BESS IEQ requirements
 - 31.8% of the nominated floor area has at least 2% daylight factor
 - Glazing is assumed to have a visible light transmittance greater than 40%
 - Refer to pages 19 & 20 for a detailed daylight response
 - Openable windows will be provided throughout the development to aid in natural ventilation
 - Ventilation systems to be designed to achieve, monitor, and maintain a 70% increase in outdoor air (L/s) available to regular use areas compared to the minimum requirement by AS 1668.2:2012.
 - All carpet, engineered wood, paints, sealants and adhesives to meet the maximum total indoor pollutant emission limits, as set by one of the following current standards: GECA, Global GreenTag GreenRate, Green Star or WELL standards for TVOC in paints, adhesives and sealants (by volume) and carpets (by area) as well as for Formaldehyde in engineered wood (by area)
 - For example, Green Star limits as shown

Paints, Adhesives, Sealants, and Carpets

At least 95% of internally applied paints, adhesives, sealants (by volume) and carpets (by area) must meet stipulated 'Total Volatile Organic Compounds (TVOC) Limits' below.

Compliance can be demonstrated in the following ways:

- The product(s) are certified under a Recognised Product Certification Scheme listed in the 'Exposure to Toxins Product Certifications Schemes Index'. The certificate must be current at the time of purchase
- The product(s) are tested in a laboratory
- There are no paints, adhesives, sealants, and carpets in the building at practical completion

Total VOC limits

Paints, Adhesives and Sealants

Product category	Max. Total Volatile Organic Compounds (TVOC) content in grams per litre (g/L) of ready to use product
General purpose adhesives and sealants	50
Interior wall and ceiling paint, all sheen levels	16
Trim, varnishes, and wood stains	75
Primers, sealers, and prep coats	65
One and two pack performance coatings for floors	140
Acoustic sealants, architectural sealant, waterproofing membranes and sealant, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

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Source: Green Star Buildings Submission Guidelines v1: Revision B

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Shading	▪ A wrap around verandah will provide the development with ample shading
Transport & GTP	▪ The surrounding road network does not provide safe or direct connections for cyclists, and as such, bicycle use is not considered a viable transport mode for staff or students at this stage. Accordingly, no bicycle parking spaces are proposed as part of this development ▪ Public transport access is also unavailable, with the precinct serviced by private vehicle. School buses will be provided to transport the students to and from the site
Urban ecology	▪ 70% of the site is covered in vegetation ▪ A minimum 135m² of indoor and outdoor common spaces will be available to facilitate interaction and socialising between students ▪ The school has an existing 1 acre of Market Garden along with another ¼ acre kitchen Garden on site which students will have access to
Waste	▪ Recycling facilities must be at least as convenient for occupants as facilities for general waste ○ To maximise recycling rates, recycling bins must always be provided wherever general waste is disposed ○ Onsite composting will be available to manage both food and garden waste ▪ At least 70% of construction waste will be reused or recycled. For example: ○ Steel and metal items including roof sheet, window frames and other steel framing materials can be melted and reused within new steel products ○ Aluminium ○ Glass ○ Gypsum plasterboard ○ Timber can either be directly reused or turned into horticultural mulch ○ Brickwork, concrete slabs and asphalt can be crushed and used as aggregate for new concrete or road base and fill ○ Any bricks in good enough condition to be reused may be cleaned and re-sold as garden/paving supplies or crushed for backfill, aggregate and gravel

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Implementation schedule

The ESD initiatives set out in this report will be coordinated by the Development Manager in conjunction with the listed project design team members

#	Requirement (Refer to ESD Schedule of Commitments above)	Responsibility	Stage
Coordination	Full Implementation of all ESD Commitments as per this SMP	Development Manager	All Stages
Building Fabric	NCC Reports for Building Approval	ESD Consultant (EcoResults)	Construction Documentation
	Drawings and specifications to reflect requirements of NCC Reports when completed	Architect Services Engineer	Construction Documentation
Materials	Specify materials in accordance with nominated schedule. Refer also to Building Materials section within this SMP for additional specific commitments	Architect Builder	Construction Documentation
Appliances	All appliances must be specified in line with SMP	Services Engineer Builder	Construction Documentation
Lighting	Specification of nominated energy efficiency lighting types to the relevant commitment (noting there may be a commitment over NCC requirements in the SMP). Refer to ESD Schedule of Commitments above for details	Building Services Engineer	Construction Documentation

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Stormwater	Specify all WSUD treatment measures required by this SMP	Services Engineer	Construction Documentation
Waste	Specify bin and associated waste management equipment in line with Waste Management Section within this SMP and Waste Management Plan (if available)	Architect Waste Management consultant	Construction Documentation Occupation
Water	Specify water fixtures and fittings in line with SMP. Refer to ESD Schedule of Commitments within this SMP for details	Architect Services Engineer	Construction Documentation
Transport	All Transport commitments must be specified in line with SMP	Architect Builder	Construction Documentation Occupation
Construction	All endorsed ESD Commitments to be implemented including any commitment to recycle demolition/construction waste	Builder	Construction
Commissioning	Specification to include performance standards for commissioning	Services Engineer	Construction Documentation
	Commission and tune all equipment in accordance with performance standards and targets	Services Contractor Independent Commissioning Agent (if applicable)	Pre-Occupancy Post-Occupancy

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Confirmation	ESD Implementation Report confirming all ESD commitments are included as built. Please contact EcoResults prior to construction to confirm process	ESD Consultant (EcoResults)	Post-Construction Pre-Occupancy
Maintenance	Maintain all ESD measures in accordance with ESD commitments	Owners Corporation Building Manager	Occupancy

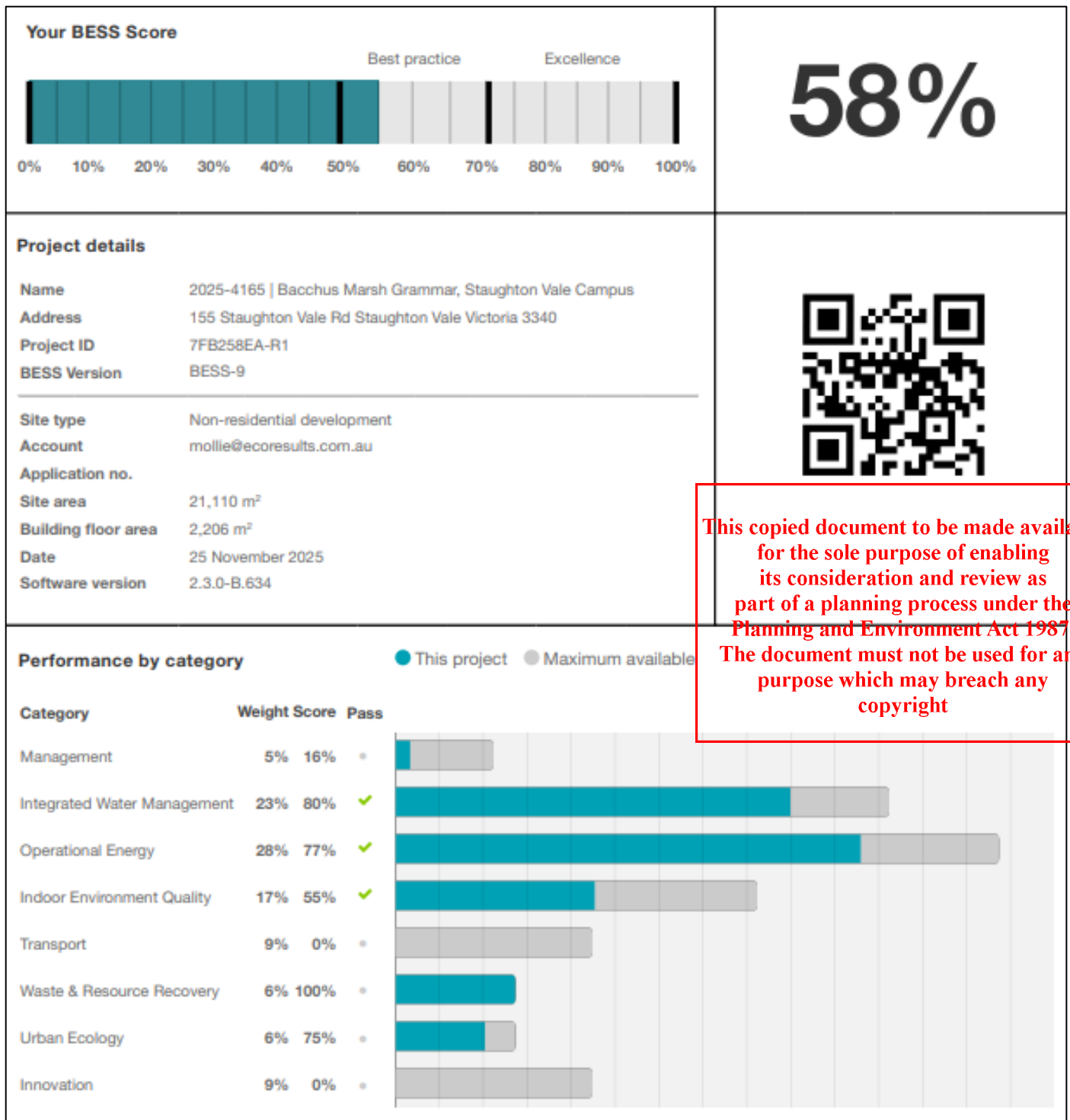
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BESS scores for this project

BESS assessment scores are percentages. Best practice in ESD is defined as an overall 50% score, and WSUD 100%. The scores achieved for each category on this project are shown as a percentage, with Energy, Water and IEQ each requiring a score of 50% to pass and Stormwater requiring a score of 100%.

For the building to achieve the BESS and Blue Factor scores listed, it must be constructed according to the planning drawings, as well as the specifications listed in the notes and BESS printouts within the Appendix of this report.



Stormwater quality | Blue Factor rating

To comply with the permeability and stormwater management objectives outlined in Clause 53.18 a Blue Factor assessment has been conducted. This includes proposed stormwater quality/treatment measures in order to achieve a compliant score.

A compliant Blue Factor assessment meets the current best practice performance objectives for stormwater quality as contained in the Urban Management Guidance. See below for the results and required treatment measures.

Bacchus Marsh Grammar, Staughton Vale Campus

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	Bacchus Marsh Grammar, Staughton Vale Campus
Street address	155 Staughton Vale Rd, Staughton Vale VIC 3340, Australia
Municipality	Greater Geelong
Site area	21110 m ²
Planning Number	

Flow and pollutant load reductions

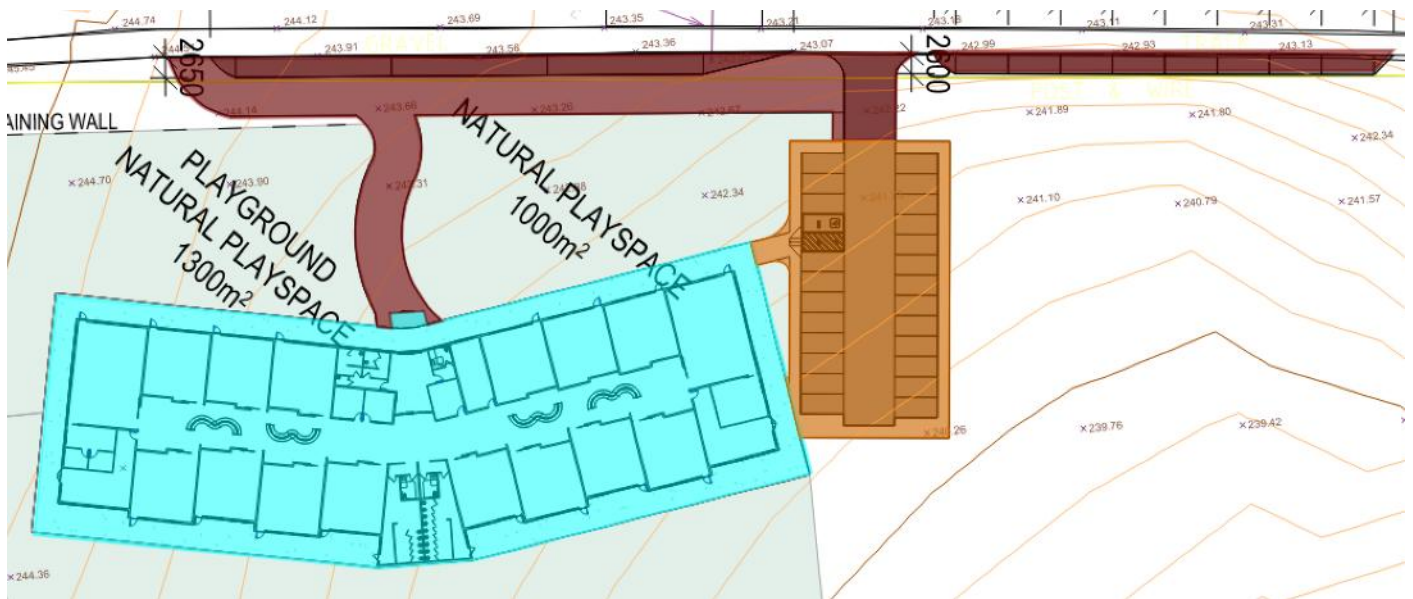
Item	Result	Target
Mean annual runoff volume harvested or evapotranspired (%)	36%	>28%
Mean annual runoff volume infiltrated or filtered (%)	0%	>9%
Total suspended solids (%)	51%	>80%
Total phosphorus (%)	47%	>45%
Total nitrogen (%)	46%	>45%
Total gross pollutants (%)	74%	>70%

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Compliance statement

- The project score of 103% means that the proposed development meets the BPEM Guidelines for urban pollutant loads for WSUD. See schedule below for WSUD Measures required to achieve this score.
- Plans and design details to be shown on plans by designer.
- For the development to achieve the Blue Factor score listed, it must be constructed according to the town planning drawings as well as the specifications outlined in the WSUD measures below. Please contact EcoResults with any questions relating to the WSUD measures in this report.

Markup of impermeable surface areas



Impermeable Surface Areas			
	Description	Quantity	Unit
	Proposed Hardstand to RG	792	sq m
	Proposed Hardstand Untreated	1,024	sq m
	Roof	2,956	sq m

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WSUD measures

WSUD measures to achieve the Blue Factor score

To achieve the above Blue Factor score the following measures will be required:

- Runoff from the school roofs (2,956m²) to be diverted to a 15,000L rainwater tank dedicated to reuse
 - The tank is to be connected to the toilet flushing of all toilets and urinals in the building
 - Tank(s) and any associated filtration to be specified by civil/services engineer so as to be appropriate for the intended usage of harvested water
 - Ensure that selected fittings and appliances are suitable for the Rainwater/filtration system specified
 - The tank may be connected to other uses, e.g. outdoor taps, laundry etc, but this is not required to achieve the Blue Factor score
 - The tank capacity may be achieved by installing several independent tanks as long as they are connected to operate in series as if they were one tank
- Hardstand runoff (792m²) to be diverted to a 100mm freeboard raingarden with a minimum plan area of 16.0m²
 - This runoff area may be directed into more than one raingarden, as long as the runoff area to the raingarden area ratio remains consistent with that in the Blue Factor report. For any adjustments outside of this requirement please contact EcoResults for reassessment
- The detailed, site-specific design of WSUD measures should be undertaken by a suitably qualified person

Notes:

- All areas measured in Blue Factor are in a horizontal plan and open to sky
- Refer to maintenance program for WSUD measures in the following section and within the Appendix of this report
- This WSUD measures outlined in this report are based on the current proposed design. These may be adjusted as the design develops; however, the development commits to achieving best practice using Blue Factor or MUSIC modelling

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WSUD maintenance program

Maintenance program for WSUD measures

Rainwater tanks

- The project's hydraulic/services engineers will be responsible for the design of the tanks and rainwater reticulation, shall inform the building facility manager and/or owners corporation in writing, of the required maintenance tasks to keep the system operational including:
 - Regular inspections of the tank(s), pump(s), reticulation system and toilets to ensure that the system is operating for toilet flushing as designed
 - Periodic cleaning and major maintenance of the tank(s), pump(s) and reticulation system to ensure the long-term viability of the system
- The building facility manager and/or owners corporation shall include on their building maintenance schedule the required maintenance tasks specified by the hydraulic/services engineers at the required intervals
- For further information on maintenance of rainwater tanks refer to the fact sheets within the Appendix of this report

Raingardens

- The project's hydraulic/civil engineers will be responsible for the design of the raingardens and the connection inlets and outlets to and from the raingarden, and shall inform the building facility manager and/or owners corporation in writing, of the required maintenance tasks to keep the system operational including:
 - Watering the raingarden if it does not rain for a long period of time until plants have established compliance with local water restrictions
 - Regular inspections of the raingarden, level of gravel mulch covering the raingarden, blockages in the overflow pipe, sediments in the downpipes, weeds and plant erosion in the raingarden itself
 - Other required activities as specified by the suitably qualified designer of the raingarden – refer to pages 2 and 3 of the attached Melbourne Water WSUD Maintenance Guidelines
 - Distribution of the water flow into the raingarden to limit erosion from heavy rainfall
 - Ongoing protection from pedestrian and vehicular access
 - Owner's Corporation (OC) bylaws to prohibit removal of all soil and plants within raingarden, and an obligation on residents to report any maintenance concerns to the OC
- The building facility manager and/or owners corporation shall include on their building maintenance schedule the required maintenance tasks specified by the hydraulic/services engineers at the required intervals
- For further information on maintenance of raingardens refer to the fact sheets within the Appendix of this report

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Construction site management plan for stormwater

During the construction phase, the key pollutants at risk of entering the stormwater system include:

- Sediments (soil, sand, gravel and concrete washings); and
- Litter, debris etc

These pollutants arise from factors such as dirt from construction vehicles, stockpiles located close to surface runoff flow paths, and surface runoff from disturbed areas during earthmoving and construction works. It is therefore important to have measures in place that either prevent or minimise the pollutant loads entering the stormwater system during construction.

To mitigate the impacts of the above pollutants on the stormwater system, the following stormwater management strategies will be implemented during the construction phase, as appropriate:

- A focus on erosion management and reduction, through measures such as minimising the amount of earth destabilised at one time, retaining existing vegetation and utilising stabilisation matting etc.
- Uncontaminated stormwater will be directed away from the site using flow diversion devices to reduce the volume of stormwater that reaches the destabilised areas of the site.
- Installation of on-site sediment control measures. All installed control measures shall be regularly inspected & maintained to ensure their effectiveness.
- Litter bins with a lid will be used to prevent litter from getting blown away and entering stormwater drains

Additionally, the following work practices shall be adopted to reduce stormwater pollution:

- Site induction by the head contractor/builder to make personnel aware of stormwater management measures in place.
- Employ suitable measures to reduce mud being carried off-site into the roadways such as limiting site access to vehicles, installing a rumble grid/gravel/crushed-rock driveway (or equivalent measure) to provide clean access for delivery vehicles, manual wheel and tyre washing etc.
- Safe handling and storage of chemicals, paints, oils and other elements that could wash off-site to prevent them from entering stormwater drains.
- Where practicable, stockpiles will be covered, located within the site's fence, away from any drainage paths and up-slope of any sediment barriers.

Refer to <https://www.melbournewater.com.au/building-and-works/stormwater-management/options-treating-stormwater/stormwater-quality-objectives> for details of the minimum design requirements which are binding on all developments during the construction phase.

The measures presented above will reduce the pollutants entering the stormwater system from the site during construction works. The information above may be included in any broader Construction Management Plan (CMP) which is prepared for this project and can be updated to account for additional site-specific WSUD management requirements as needed. Furthermore, the initiatives are consistent with Standard W3 within Clause 53.18-6 of the City of Greater Geelong Planning Scheme.

Preliminary NCC Section J Deemed to Satisfy (DTS) assessment

This section is limited to an assessment of the building envelope, comprised by all conditioned and habitable spaces.

A printout of NCC 2022 Façade Calculator results is attached within the Appendix of this report.

Preliminary energy efficiency specifications

Roofs	Lightweight Roofs	1 layer of reflective foil insulation – 0.2 outer/0.05 inner - laid directly under the roof - Minimum R2.0 - Total R-value required by NCC 2022: R3.2 - Total provided: R3.2 - Roof colour (solar absorptance) max 0.45
	Glazing	- Glazing system values required (frame and glass): - U = 5.3 or lower - SHGC = 0.60 or lower
Walls and glazing	External Walls	R2.5 added insulation
	Internal Walls Adjoining Roofscape	R2.0 added insulation
	Glazing to Wall Ratio	- Compliance using the above values have been shown with Method 2 of the NCC 2022 façade calculator - Maximum wall-glazing value: U = 2.00 - Provided wall-glazing value: U = 1.89 - Maximum AC energy value: 218 - Provided AC energy value: 181 Specifications will be finalised prior to Building Approval but compliance using either the façade calculator or J1V3 verification method is committed to

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Floors	Concrete Slab on Ground ▪ Total R-value required by NCC 2022: R2.0 ○ For the purposes of NCC 2022 compliance, a slab on ground that does not have an in-slab heating or cooling system is considered to achieve a Total R-Value of R2.0 ▪ Total provided: R2.0
On-site Energy	Electric Vehicle Charging ▪ N/A ▪
	Solar Photovoltaic and Battery Systems ▪ At least 20% of the roof area of a building must be left clear for the installation of solar photovoltaic panels ▪ The main electrical switchboard of the building must contain at least two empty three-phase circuit breaker slots and four DIN rail spaces labelled to indicate the use of each space for— ○ a solar photovoltaic system; and ○ a battery system; and ▪ The main electrical switchboard of the building must be sized to accommodate the installation of solar photovoltaic panels producing their maximum electrical output on at least 20% of the building roof area

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Daylight assessment

- The objective of the Daylight Assessment is to achieve Council's SDAPP (Sustainable Design Assessment in the Planning Process) Best Practice Standard for daylight access to the development.
- Best Practice for commercial daylight is defined as achieving a daylight factor of at least 2.0% for at least 33% of the floor area in regularly occupied primary spaces where occupants are expected to remain for more than two hours.
- The Green Star hand calculation method was used to assess daylight levels for the development
- The results summary below indicates the internal daylight levels achieved for a representative sample of nominated primary spaces within the development.
- The project complies with the Green Star guidelines for overshadowing.
- The assessed glazing must have a visual light transmittance (VLT) of 40% or greater, as specified by the Green Star guidelines.

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Daylight results

Daylight results	Type	Rated floor area (m ²)	Area >2% DF (m ²)	Percentage of area >2% DF
	Home ECO	116.5	48.4	41.6
	Science	116.4	48.4	41.6
	GPC	963.5	293.1	20.5
	Office	30.0	0.0	0.0
	Commercial Areas Total	1226.4	389.9	31.8

Compliance statement

Green Star hand calculations indicate 31.8% of the rated floor area meets daylight compliance. The calculation method does not consider daylight received through borrowed light highlight windows in the hallway. Offices have been entered with a 0% compliance percentage, despite the likelihood that some borrowed daylight will still be received. Taking these factors into account, a BESS daylight compliance score of 33% has been applied.

Detailed results

The following formulas have been used to perform the Green Star hand daylight calculations:

Depth of the zone of compliance = $h \times 2$

Width (w) of the zone of compliance = width of the glazing

Zone of compliance = $h \times 2 \times w$

Area based credits:

Zone of compliance = $h \times 2 \times w$ (m^2)

Nominated areas = $A^{\text{nominated}}$ (m^2)

Percentage of compliant area = $(\text{zone of compliance}) / (A^{\text{nominated}}) \times 100$ (%)

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Nominated areas (light green) and zones of compliance (dark green)



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Conclusion

Our sustainable building consultants have found that:

- The proposal has met the benchmarks set out by the NCC Section J Deemed to Satisfy, BESS and Blue Factor assessment tools.
- The project has included a range of other ESD features over and above those measured by the NCC Section J Deemed to Satisfy, BESS and Blue Factor benchmarks.
 - These features combine significantly to further enhance the energy efficiency of the development,
 - Lessen its environmental impact, and
 - Encourage sustainable lifestyle choices by the occupants of the building during its life-cycle.
- The development will meet the objectives and application requirements of the City of Greater Geelong Clause 15.01-2L and 53.18 if it is constructed in accordance with the application drawings and the measures detailed in this SDA.

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Appendix

- BESS Assessment Printout (17 pages)
- Greater Geelong Planning Scheme Clause 15.02-2L (4 pages)
- Façade Calculator (1 pages)
- Melbourne Water Rainwater Tank Fact Sheet (2 pages)
- Raingarden Fact Sheet(s) (8-16 pages)
- Blue Factor Report (5 pages)

BESS Report

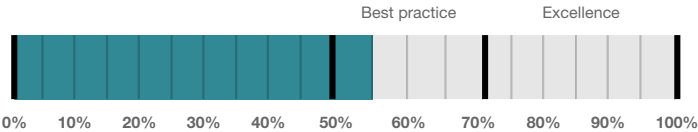
Built Environment Sustainability Scorecard



This BESS report outlines the sustainable design commitments of the proposed development at 155 Staughton Vale Rd Staughton Vale Victoria 3340. 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

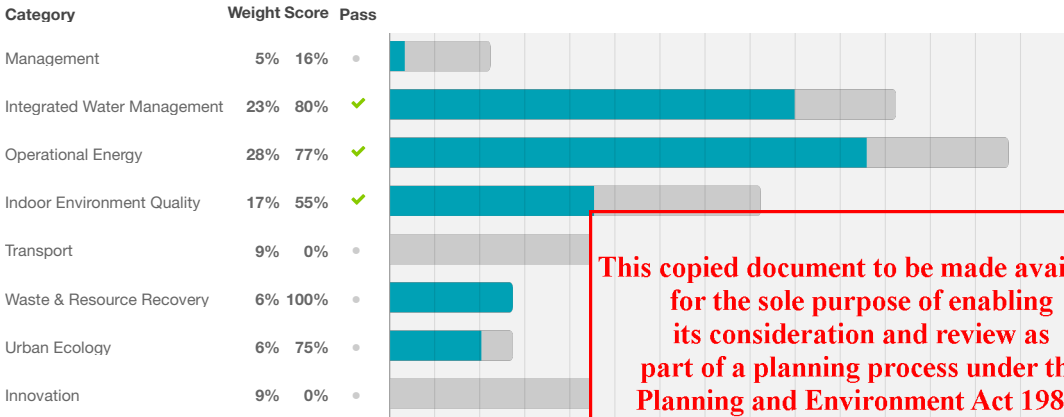
Name	2025-4165 Bacchus Marsh Grammar, Staughton Vale Campus
Address	155 Staughton Vale Rd Staughton Vale Victoria 3340
Project ID	7FB258EA-R1
BESS Version	BESS-9
Site type	Non-residential development
Account	mollie@ecoreresults.com.au
Application no.	
Site area	21,110 m ²
Building floor area	2,206 m ²
Date	25 November 2025
Software version	2.3.0-B.634



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Performance by category

● This project ● Maximum available



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Buildings

Name	Height	Footprint	% of total footprint
Primary School	1	2,956 m²	100%

Dwellings & Non Res Spaces

Non-Res Spaces

Name	Quantity	Area	Building	% of total area
Public building				
School	1	2,206 m²	Primary School	100%
Total	1	2,206 m²	100%	

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)	This copied document to be made available for the sole purpose of enabling its consideration and review as part of a planning process under the Planning and Environment Act 1987. The document must not be used for any purpose which may breach any copyright	-
Integrated Water Management 3.1	Annotation: Water efficient garden details		-
Operational Energy 4.2	Location and size of solar photovoltaic system		-
Waste & Resource Recovery 2.1	Location of food and garden waste facilities		-
Waste & Resource Recovery 2.2	Location of recycling facilities		-
Urban Ecology 1.1	Location and size of communal spaces		-
Urban Ecology 2.1	Location and size of vegetated areas		-
Urban Ecology 3.2	Location of food production areas		-

Supporting Documentation

Credit	Requirement	Response	Status
Management 2.3a	Section J glazing assessment		-
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.		-

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Credit summary

Management Overall contribution 4.5%

		16%
1.1 Pre-Application Meeting		0%
2.3 Thermal Performance Modelling - Non-Residential		50%
3.2 Metering - Non-Residential		N/A ✦ Scoped Out
		Single tenancy
3.3 Metering - Common Areas		N/A ✦ Scoped Out
		Single tenancy
4.1 Building Users Guide		0%

IWM Overall contribution 22.5%

		80%	✓ Pass
1.1 Potable Water Use		56%	✓ Achieved
2.1 Stormwater Treatment		100%	✓ Achieved
3.1 Water Efficient Landscaping		100%	
4.1 Building Systems Water Use		0%	

Operational Energy Overall contribution 27.5%

		Minimum required 50%	77%	✓ Pass
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		
		N/A		
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		N/A ✦ Scoped Out		
		No other (non-solar PV) renewable energy is in use.		

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IEQ Overall contribution 16.5%

		Minimum required 50%		55%	✔ Pass
	1.4 Daylight Access - Non-Residential			33%	✔ Achieved
	2.3 Ventilation - Non-Residential			66%	✔ Achieved
	3.4 Thermal comfort - Shading - Non-Residential			80%	
	3.5 Thermal Comfort - Ceiling Fans - Non-Residential			0%	
	4.1 Air Quality - Non-Residential			100%	

Transport Overall contribution 9.0%

		0%
1.4 Bicycle Parking - Non-Residential		0%
1.5 Bicycle Parking - Non-Residential Visitor		0%
1.6 End of Trip Facilities - Non-Residential		0% ⛔ Disabled
Credit 1.4 must be complete first.		
2.1 Electric Vehicle Infrastructure		0%
2.2 Car Share Scheme		N/A ⚡ Scoped Out
Rural location - not applicable		
2.3 Motorbikes / Mopeds		0%

Waste & Resource Recovery Overall contribution 5.5%

		100%
1.1 Construction Waste - Building Re-Use		N/A ⚡ Scoped Out
N/A		
2.1 Operational Waste - Food & Garden Waste		100%
2.2 Operational Waste - Convenience of Recycling		100%

Urban Ecology Overall contribution 5.5%

		75%
1.1 Communal Spaces		100%
2.1 Vegetation		100%
2.2 Green Roofs		0%
2.3 Green Walls and Facades		0%
3.2 Food Production - Non-Residential		100%

Innovation Overall contribution 9.0%

		0%
1.1 Innovation		0%

Credit breakdown

Management Overall contribution 4.5%

	16%
--	-----

1.1 Pre-Application Meeting	0%
-----------------------------	----

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

2.3 Thermal Performance Modelling - Non-Residential	50%
---	-----

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 ?
Public building	Yes

Criteria	Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star?
Question	Criteria Achieved ?
Public building	No

3.2 Metering - Non-Residential	N/A	Scoped Out
Single tenancy		

This credit was scoped out	Single tenancy
----------------------------	----------------

3.3 Metering - Common Areas	N/A	Scoped Out
Single tenancy		

This credit was scoped out	Single tenancy
----------------------------	----------------

4.1 Building Users Guide	0%
--------------------------	----

Score Contribution	This credit contributes 16.7% towards the category score.
Criteria	Will a building users guide be produced and issued to occupants?
Question	Criteria Achieved ?
Project	No

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IWM Overall contribution 22.5%

		80% ✔ Pass
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Do you have a reticulated third pipe or an on-site water recycling system?:	No
Are you installing a swimming pool?:	No

Stormwater profile	
Which stormwater modelling software are you using?:	Melbourne Water STORM tool
STORM score achieved:	100
Flow:	-
Total Suspended Solids:	-
Total Phosphorus:	-
Total Nitrogen:	-

Rainwater tank profile	
What is the total roof area connected to the rainwater tank?: Rainwater Tank 1	2,956 m²
Tank Size: Rainwater Tank 1	15,000 Litres
Irrigation area connected to tank: Rainwater Tank 1	200 m²
Is connected irrigation area a water efficient garden?: Rainwater Tank 1	Yes
Other external water demand connected to tank?: Rainwater Tank 1	0.0 Litres/Day

Fixtures, fittings & connections profile	
Building:	Primary School
Showerhead:	4 Star WELS (>= 6.0 but <= 7.5)
Bath:	Scope out
Kitchen Taps:	>= 6 Star WELS rating
Bathroom Taps:	>= 6 Star WELS rating
Dishwashers:	Default or unrated
WC:	>= 4 Star WELS rating
Urinals:	>= 4 Star WELS rating
Washing Machine Water Efficiency:	Scope out
Which non-potable water source is the dwelling/space connected to?:	235950
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

1.1 Potable Water Use		56% ✔ Achieved
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Score Contribution	This credit contributes 31.2% 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	7307 kL
Output	Proposed (excluding rainwater and recycled water use)
Project	5358 kL
Output	Proposed (including rainwater and recycled water use)
Project	4574 kL
Output	% Reduction in Potable Water Consumption
Project	37 %
Output	% of connected demand met by rainwater
Project	69 %
Output	How often does the tank overflow?
Project	Very Often
Output	Opportunity for additional rainwater connection
Project	1195 kL
2.1 Stormwater Treatment	100% ✓ Achieved
Score Contribution	This credit contributes 56.2% towards the category score.
Criteria	Has best practice stormwater management been demonstrated?
Output	Min STORM Score
Project	100
Output	STORM Score
Project	100
3.1 Water Efficient Landscaping	100%
Score Contribution	This credit contributes 6.2% towards the category score.
Criteria	Will water efficient landscaping be installed?
Question	Criteria Achieved ?
Project	Yes
4.1 Building Systems Water Use	0%
Score Contribution	This credit contributes 6.2% towards the category score.
Criteria	Where applicable, have measures been taken to reduce potable water consumption by >80% in the buildings air-conditioning chillers and when testing fire safety systems?
Question	Criteria Achieved ?
Project	No

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Operational Energy Overall contribution 27.5%

		Minimum required 50%	77%	✔ Pass
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Project profile	
Use the BESS Deem to Satisfy (DtS) method for Non-residential spaces?:	
Are you installing any renewable energy system(s) (other than solar photovoltaic)?:	No
Energy Supply:	All-electric
Solar Photovoltaic system profile	
System Size (lesser of inverter and panel capacity): Solar Photovoltaic system 1	10.0 kW peak
Orientation (which way is the system facing)?: Solar Photovoltaic system 1	North
Inclination (angle from horizontal): Solar Photovoltaic system 1	15.0 Angle (degrees)
Non-residential Deemed-to-Satisfy profile	
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
1.1 Thermal Performance Rating - Non-Residential	
Score Contribution	This credit contributes 36.4% towards the category score.
Criteria	What is the % reduction in heating and cooling energy consumption against the reference case (NCC2022 Section J)?
2.1 Greenhouse Gas Emissions	
Score Contribution	This credit contributes 9.1% towards the category score.
Criteria	What is the % reduction in annual greenhouse gas emissions against the benchmark?
2.2 Peak Demand	
Score Contribution	This credit contributes 4.5% towards the category score.
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?
2.6 Electrification	
Score Contribution	This credit contributes 100% towards the category score.
Criteria	What is the % reduction in the instantaneous (peak-hour) demand against the benchmark?

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Score Contribution	This credit contributes 13.6% towards the category score.	
Criteria	Is the development all-electric?	
Question	Criteria Achieved?	
Project	Yes	
2.7 Energy consumption		100%
Score Contribution	This credit contributes 18.2% towards the category score.	
Criteria	What is the % reduction in annual energy consumption against the benchmark?	
3.1 Carpark Ventilation		N/A  Scoped Out
		N/A
This credit was scoped out	N/A	
3.2 Hot Water - Non-Residential		100%
Score Contribution	This credit contributes 4.5% towards the category score.	
Criteria	What is the % reduction in annual energy consumption (gas and electricity) of the hot water system against the benchmark?	
3.7 Internal Lighting - Non-Residential		100%
Score Contribution	This credit contributes 9.1% 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 ?	
Public building	Yes	
4.1 Combined Heat and Power (cogeneration / trigeneration)		N/A  Scoped Out
		No cogeneration or trigeneration system in use.
This credit was scoped out	No cogeneration or trigeneration system in use.	
4.2 Renewable Energy Systems - Solar		100%
Score Contribution	This credit contributes 4.5% 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	
Public building	12,444 kWh	
Output	% of Building's Energy	
Public building	15 %	
4.4 Renewable Energy Systems - Other		N/A  Scoped Out
		No other (non-solar PV) renewable energy is in use.
This credit was scoped out	No other (non-solar PV) renewable energy is in use.	

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IEQ Overall contribution 16.5%

		Minimum required 50%	55%	✓ Pass
1.4 Daylight Access - Non-Residential			33%	✓ Achieved
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?			
Public building	33 %			
2.3 Ventilation - Non-Residential			66%	✓ Achieved
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?			
Public building	60 %			
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?			
Public building	50 %			
Criteria	What CO2 concentrations are the ventilation systems to achieve, to monitor and to maintain?			
Question	Value			
Public building	-			
3.4 Thermal comfort - Shading - Non-Residential			80%	
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?			
Public building	70 %			
3.5 Thermal Comfort - Ceiling Fans - Non-Residential			0%	
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?			
Public building	0 %			
4.1 Air Quality - Non-Residential			100%	
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 ?
Public building	Yes
Criteria	Does all carpet meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Public building	Yes
Criteria	Does all engineered wood meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Public building	Yes

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Transport Overall contribution 9.0%

		0%
1.4 Bicycle Parking - Non-Residential		
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 ?	
Public building	No	
Question	Bicycle Spaces Provided ?	
Public building	-	
1.5 Bicycle Parking - Non-Residential Visitor		
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 ?	
Public building	No	
Question	Bicycle Spaces Provided ?	
Public building	-	
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		
Score Contribution	This credit contributes 25% towards the category score.	
Criteria	Are facilities provided for the charging of electric vehicles?	
Question	Criteria Achieved ?	
Project	No	
2.2 Car Share Scheme		
		N/A  Scoped Out
Rural location - not applicable		
This credit was scoped out	Rural location - not applicable	
2.3 Motorbikes / Mopeds		
Score Contribution	This credit contributes 25% 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	

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Waste & Resource Recovery Overall contribution 5.5%

		100%
1.1 Construction Waste - Building Re-Use		N/A ✦ Scoped Out
		N/A
This credit was scoped out	N/A	
2.1 Operational Waste - Food & Garden Waste		100%
Score Contribution	This credit contributes 50% towards the category score.	
Criteria	Are facilities provided for on-site management of food and garden waste?	
Question	Criteria Achieved ?	
Project	Yes	
2.2 Operational Waste - Convenience of Recycling		100%
Score Contribution	This credit contributes 50% 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	

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Urban Ecology Overall contribution 5.5%

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	75%
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1.1 Communal Spaces		100%
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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 : * 1m² for each of the first 50 occupants * Additional 0.5m² for each occupant between 51 and 250 * Additional 0.25m² for each occupant above 251?
Annotation	The design of a school yard and lunch room is to facilitate communication and socialising between students. Therefore this credit has been claimed.
Question	Common space provided
Public building	135 m²
Output	Minimum Common Space Required
Public building	135 m²

2.1 Vegetation		100%
----------------	-----------------------------------	------

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	70 %

2.2 Green Roofs		0%
-----------------	-----------------------------------	----

Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Does the development incorporate a green roof?
Question	Criteria Achieved ?
Project	No

2.3 Green Walls and Facades		0%
-----------------------------	-----------------------------------	----

Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	Does the development incorporate a green wall or green façade?
Question	Criteria Achieved ?
Project	No

3.2 Food Production - Non-Residential		100%
---------------------------------------	-----------------------------------	------

Score Contribution	This credit contributes 12.5% towards the category score.
Criteria	What area of space per occupant is dedicated to food production?
Annotation	School has 1 acre of Market Garden along with another 1/4 acre kitchen Garden on site which students will have access to
Question	Food Production Area
Public building	56.0 m²
Output	Min Food Production Area
Public building	56 m²

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Innovation Overall contribution 9.0%

		0%
1.1 Innovation		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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15.01-2L Environmentally sustainable development

07/07/2022
C417ggee

Policy application

This policy applies to residential and non-residential development, excluding subdivision, in accordance with the thresholds detailed in this policy other than where an ESD plan or framework has been previously approved.

Objective

To achieve best practice in environmentally sustainable development from the design stage through to construction and operation.

General strategies

Facilitate development that minimises environmental impacts.

Encourage environmentally sustainable development that:

- Is consistent with the type and scale of the development.
- Responds to site opportunities and constraints.
- Adopts best practice through a combination of methods, processes and locally available technology that demonstrably minimise environmental impacts.

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Energy performance strategies

Reduce both energy use and energy peak demand through design measures such as:

- Building orientation.
- Shading to glazed surfaces.
- Optimising glazing to exposed surfaces.
- Inclusion of or space allocation for renewable technologies.

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Integrated water management strategies

Reduce total operating potable water use through appropriate design measures such as water efficient fixtures, appliances, equipment, irrigation and landscaping.

Encourage the use of alternative water sources, including greywater, rainwater and stormwater.

Incorporate water sensitive urban design to improve the quality of stormwater runoff and reduce impacts on water systems and water bodies.

Indoor environment quality

Achieve a healthy indoor environment quality, including thermal comfort and access to fresh air and daylight, prioritising passive design over mechanical heating, ventilation, cooling and lighting.

Reduce indoor air pollutants by encouraging use of materials containing chemicals that have low levels of toxicity.

Minimise noise levels and noise transfer within and between buildings and associated external areas.

Transport strategies

Design development to promote the use of walking, cycling and public transport, in that order; and to minimise car dependency.

Promote the use of low emissions vehicle technologies and supporting infrastructure.

Waste management strategies

Promote waste avoidance, reuse and recycling during the design, construction and operation stages of development.

Encourage use of durable and reuseable building materials.

Ensure sufficient space is allocated for future change in waste management needs, including (where possible)

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composting and green waste facilities.

Urban ecology strategies

Protect and enhance biodiversity by incorporating natural habitats and planting indigenous vegetation.

Reduce urban heat island effects through building design, landscape design, water sensitive urban design and the retention and provision of canopy trees.

Encourage the provision of space for productive gardens, particularly in larger residential developments.

Policy guidelines

Residential

Consider as relevant:

A Sustainable Design Assessment (including an assessment using BESS, STORM or other methods) for:

- 3 - 9 dwellings.
- A building for accommodation other than dwellings with a gross floor area between 100 square metres and 1500 square metres.

A Sustainability Management Plan (including an assessment using BESS, STORM, Green star, MUSIC or other methods) and a Green Travel Plan for:

- 10 or more dwellings.
- A building for accommodation other than dwellings with a gross floor area of 1500 square metres or more.

Non-residential

Consider as relevant:

A Sustainable Design Assessment (including an assessment using BESS, STORM, MUSIC or other methods) for:

- A non-residential building with a gross floor area between 300 square metres and 1500 square metres.
- An extension to an existing non-residential building creating between 300 square metres and 1500 square metres of additional gross floor area.

A Sustainability Management Plan (including an assessment using BESS, STORM, Green star, MUSIC or other methods) and a Green Travel Plan for:

- A non-residential building with a gross floor area of 1500 square metres or more.
- An extension to an existing non-residential building creating 1500 square metres or more of additional gross floor area.

Mixed use

Consider as relevant:

Applicable assessments or plans for the residential and non-residential components of the development.

Policy documents

Consider as relevant the following tools to support a Sustainable Design Assessment or Sustainability Management Plan:

- *Sustainable Design Assessment in the Planning Process* (IMAP, 2015)

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- *Built Environment Sustainability Scorecard 'BESS'* (Council Alliance for a Sustainable Built Environment 'CASBE')
- *Green Star* (Green Building Council of Australia)
- *Model for Urban Stormwater Improvement Conceptualisation 'MUSIC'* (Melbourne Water)
- *Nationwide House Energy Rating Scheme 'NatHERS'* (Department of Climate Change and Energy Efficiency)
- *Stormwater Treatment Objective - Relative Measure 'STORM'* (Melbourne Water)
- *Urban Stormwater Best Practice Environmental Management Guidelines* (Victorian Stormwater Committee, 1999)
- *Waste Management and Recycling in Multi-Unit Developments - Better Practice Guide* (Sustainability Victoria, 2018)

Commencement

This policy does not apply to applications received by the responsible authority before 17 October 2019.

Expiry

This policy will expire if it is superseded by a comparable provision in the Victoria Planning Provisions.

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Façade

Report



Calculator

Project Summary

Date
3/11/2025

Name
Vu Nguyen

Company
EcoResults

Position
ESD Consultant

Building Name / Address
Bacchus Marsh Grammar
0

Building State
VIC

Climate Zone
Climate Zone 6 - Mild
temperate

Building Classification
Class 9b - schools

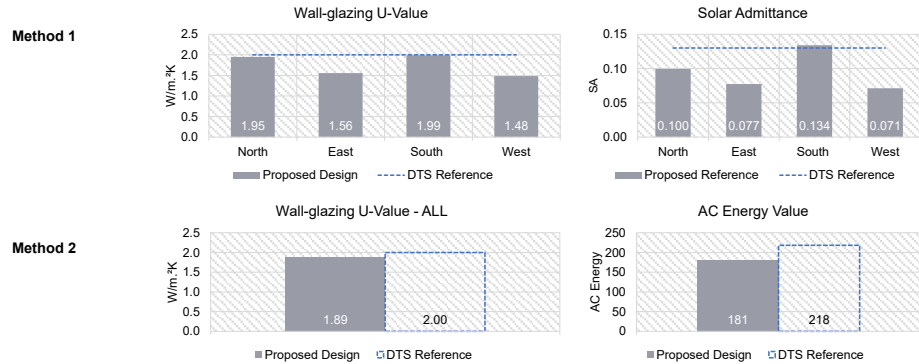
Stores Above Ground
1

Tool Version
1.5 (May 2024)

The summary below provides an overview of where compliance has been achieved for Specification S37 - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Aspects).

Compliant Solution =
Non-Compliant Solution =

	North	East	Method 1 South	West	Method 2 All
Wall-glazing U-Value (W/m².K)	1.95	1.56	1.99	1.48	1.89
Solar Admittance	0.10	0.08	0.13	0.07	
AC Energy Value					181



Project Details

	North	East	South	West
Glazing Area (m²)	139.71	20.79	147.36	20.52
Glazing to Façade Ratio	29%	21%	30%	19%
Glazing References	N 2.4 N 1.8 N .45 N Foyer N High	E 1.8 E .45 E WC	S 2.4 S 1.8 S .45 S High S	W 1.8 W .45 W WC
Glazing System Types	Mixed	Mixed	Mixed	Mixed
Glass Types	Double Glazed Unit - single low-E coating	Double Glazed Unit - single low-E coating	Double Glazed Unit - single low-E coating	Double Glazed Unit - single low-E coating
Frame Types	Aluminium	Aluminium	Aluminium	Aluminium
Average Glazing U-Value (W/m².K)	5.30	5.30	5.30	5.30
Average Glazing SHGC	0.60	0.60	0.60	0.60
Shading Systems	Horizontal	Horizontal	Horizontal	Horizontal
Wall Area (m²)	341.5	80.3	346.8	87.5
Wall Types	Wall	Wall	Wall	Wall
Methodology	Wall			
Wall Construction	BV Wall with Metal Frame (No Thermal Break; + R2.5) Metal R2.5 FC R2.5 Plaster R2.0	BV Wall with Metal Frame (No Thermal Break; + R2.5) Metal R2.5 Plaster R2.0	BV Wall with Metal Frame (No Thermal Break; + R2.5) Metal R2.5 Plaster R2.0 FC R2.5	BV Wall with Metal Frame (No Thermal Break; + R2.5) Metal R2.5 Plaster R2.0 FC R2.5
Wall Thickness	250 200	250 200	250 200	250
Average Wall R-value (m².K/W)	1.72	1.70	1.72	1.70

Building an inground raingarden

What is an inground raingarden?

Building a raingarden is a simple way to help the environment and the health of our local waterways while providing a self-watering garden for your backyard.

A raingarden is a specially prepared garden designed to receive and filter rain run-off from roofs or hard surfaces such as driveways or paving.

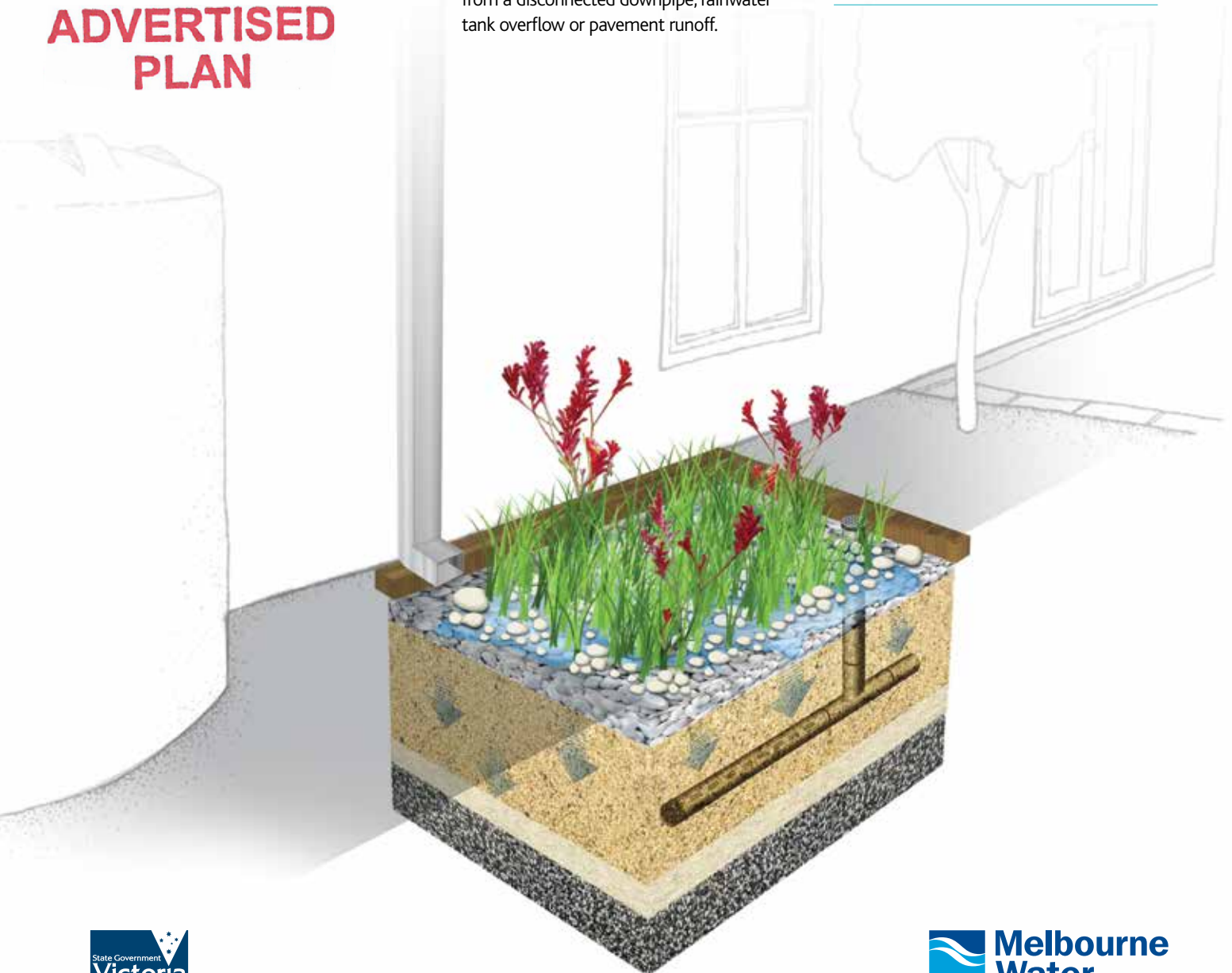
Featuring layers of soil for filtration, gravel for drainage, and plants that can tolerate periods without rain, a raingarden helps to protect our streams and rivers from stormwater pollutants.

With a slotted pipe beneath the soil to take away the filtered rainwater and an overflow pipe on the surface to prevent flooding, raingardens are designed to collect water from a disconnected downpipe, rainwater tank overflow or pavement runoff.

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

Did you know that a raingarden is only wet during and immediately after rain, leaving it dry most of the time? This is due to the drainage and filtration properties of the soil combination used in the raingarden.

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Building your raingarden

Step 1 – getting started

Location

Build your raingarden as close as possible to the water source – whether it is a downpipe, rainwater tank overflow, paved area or driveway. This will help minimise the additional plumbing needed to bring water to the raingarden.

Table 1 sets out how far away your raingarden needs to be from your house depending on how deep your existing foundations are. A minimum distance of 300mm from your house is recommended.

Ensure when digging near your foundations not to disturb areas directly underneath the foundations and area as shown below – ‘no dig zone’.

Handy Hint - Avoid building your raingarden underneath large trees as the root system will interfere with your excavations. As a general rule, the root zone will extend out to the edge of the tree canopy.

Having decided on a location, it is important to determine the depth of the existing underground stormwater pipe to make sure your raingarden is connected properly. Your local plumber can help with this and also how and when to disconnect your downpipe so that the area doesn't flood during construction.

Stormwater reconnection

All connections or modifications to existing stormwater pipes need to be done by a licensed plumber. The plumber should ensure that pipes are reconnected into the property's stormwater and not another services such as the sewer.

Underground services

Be aware of any underground services (gas, electricity, water) that run near your house or under your garden as this will influence where you can excavate your raingarden. Raingardens should not be built over or in close proximity to a septic system.

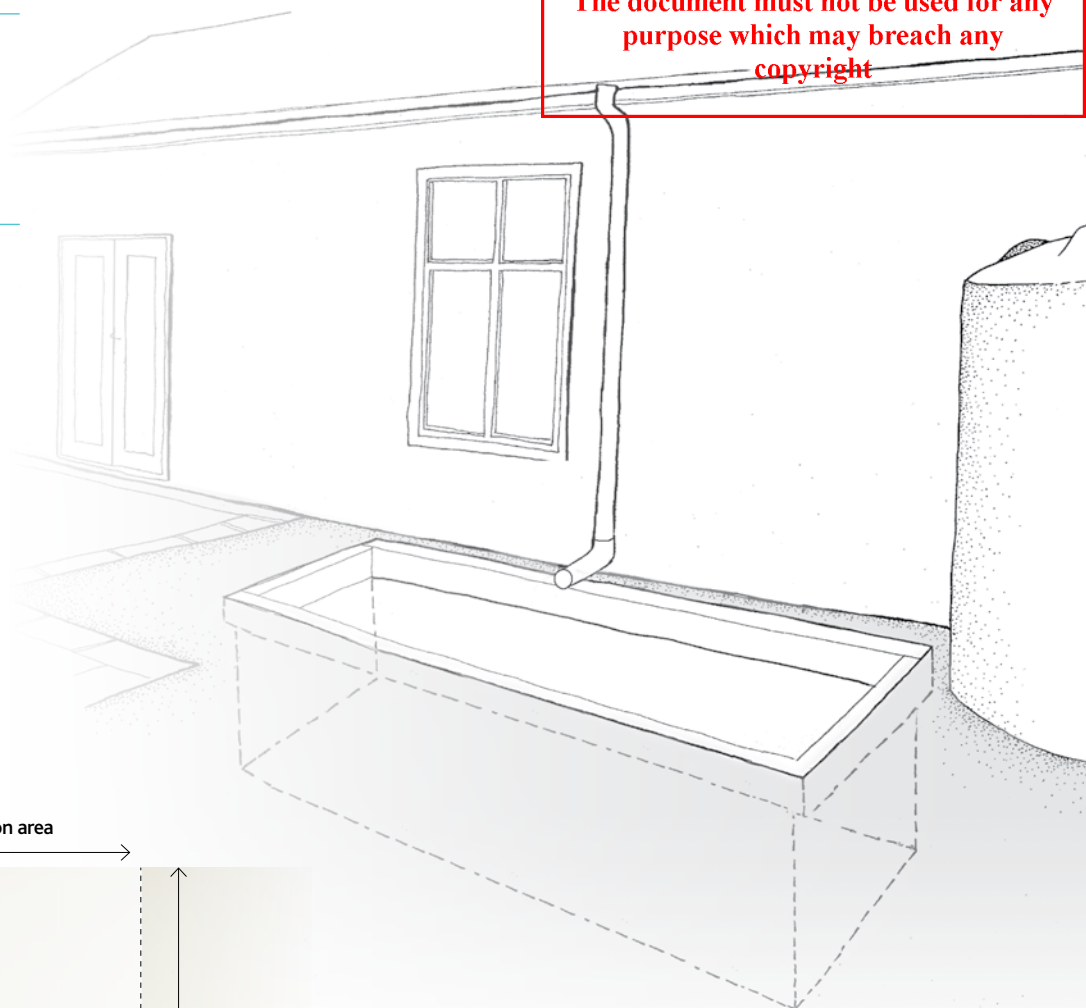
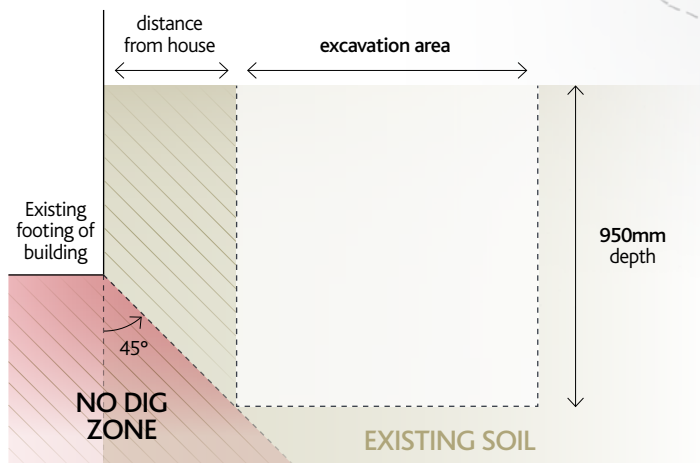
Materials

See *Materials List* for information about what you need to build a raingarden.

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Table 1 – Footing depth chart

EXISTING HOUSE FOUNDATION DEPTH	RAINGARDEN MINIMUM DISTANCE FROM FOOTING
150 mm	800 mm
250 mm	700 mm
350 mm	600 mm
450 mm	500 mm
550 mm	400 mm
650 mm	300 mm



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Size

You need to make sure that your raingarden is large enough to manage the amount of stormwater it will receive. If your raingarden is going to capture run-off from the roof via a downpipe, measure the area of roof that drains to that downpipe. Generally, the size of the raingarden should be approximately 2% of the run-off area. Table 2 will help you work out the correct size.

Table 2 – Raingarden sizing chart

AREA OF RUN-OFF (m ²)	RAINGARDEN SIZE (m ²)
50	1
100	2
150	3
200	4
250	5
300	6
350	7
400	8
450	9

Step 2 - excavation and pipe infrastructure

Excavation

Excavate your raingarden with a gentle slope towards the stormwater outlet (where the water will exit your raingarden).

Line your raingarden (base and sides) with a PVC liner. Overlap the sheets by 200mm and seal the joins with PVC tape.

Place the 7mm screenings (gravel) to a depth of 50mm. This will form a base for the slotted drainage pipe. Make sure the screenings are washed and clean of excess dirt as this can create blockages in the raingardens drainage.

Pipe Infrastructure

Lay a 90mm diameter slotted drainage pipe horizontally along the centre of the raingarden base and cap one end of the slotted drainage pipe. Call your plumber to connect the drainage pipe back into the property's existing stormwater.

Connect the vertical 90mm diameter overflow pipe into the slotted drainage pipe using a 90 degree elbow pipe and seal. When the raingarden is finished, the top of the overflow pipe should sit 100mm above the gravel mulch and 100mm below the surrounding ground level.

Install a temporary cap on top of the overflow pipe to prevent materials dropping into it during construction. Some plastic taped across the top of the pipe will work fine.

Frame

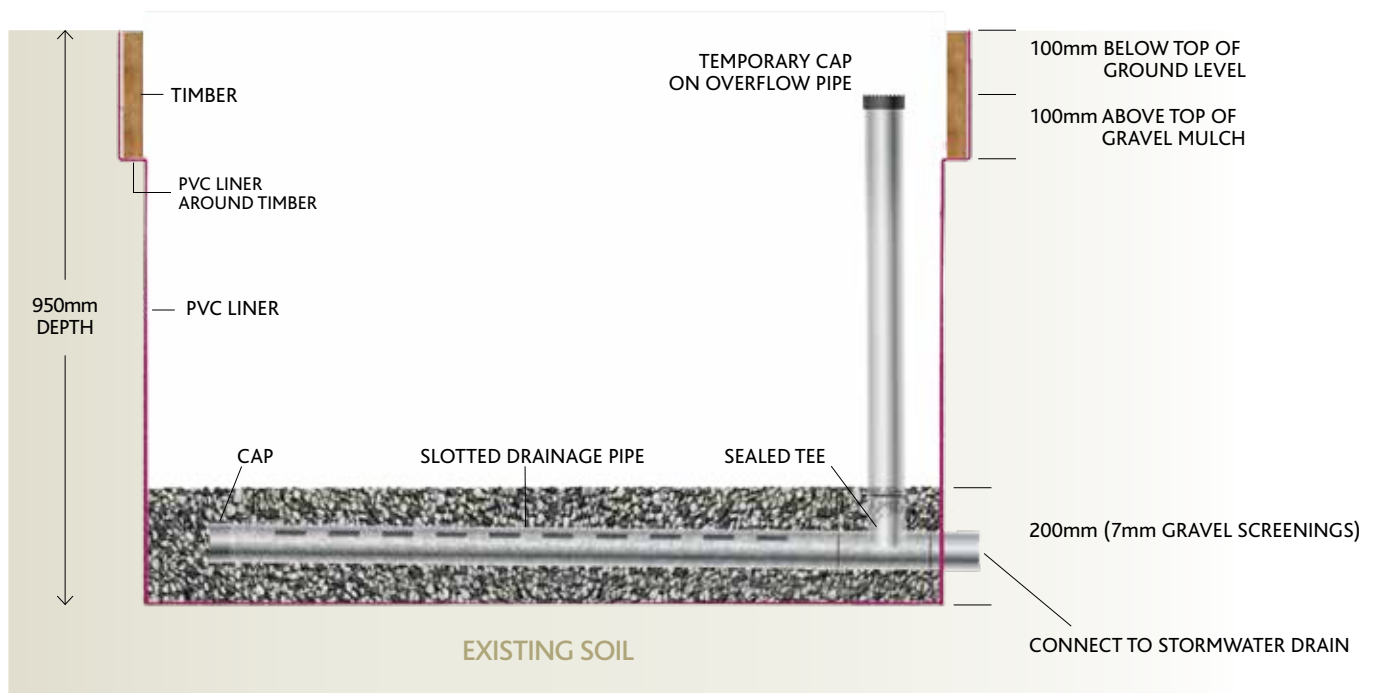
Install a frame to separate your raingarden from the surrounding soil. If using timber, ensure that it is no less than 50mm thick. While Class 1 or similar hardwood (200mm x 50mm) is ideal for this type of frame, you can use any material available that is a similar thickness and won't warp or bend over time.

Excavate a ledge around the top of the raingarden for the frame to rest on. The top edge of the frame needs to sit level with the surrounding ground.

Ensure that the PVC liner sits between the frame and surrounding ground. Secure the PVC liner to the frame to prevent surrounding soil entering the raingarden.

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Handy Hint – If your raingarden is greater than 4m wide, you will need to install two slotted drainage pipes and two overflow pipes. These need to be evenly spaced across the raingarden base to provide adequate drainage.



Building your raingarden

Step 3 – soil layers

Screenings layer

Add 7mm screenings (gravel) to a depth of 150mm over the slotted drainage pipe in the base of your raingarden. This brings to total depth of screenings (gravel) to 200mm. Be careful when not to dislodge or damage the slotted drainage pipe when adding the additional screenings.

Sand layer

Place white washed sand to a depth of 100mm over the screenings (gravel) layer.

Sand/soil mix layer

Mix 4 parts white washed sand with 1 part topsoil. Add this mix to the raingarden to a depth of 400mm.

Handy Hint – Ensure you firmly put down each layer of soil when building your raingarden to help reduce the layers from sinking.

Step 4 – pipe adjustments, plants and mulch

Pipe adjustments

Redirect your downpipe into the raingarden using pipe bends where required. If possible, use two 45 degree bends connected together as this will provide a much gentler and more even flow of water, reducing the risk of erosion and prevent blockages within the downpipe. A 90 degree elbow pipe will do as an alternative.

Handy Hint – To help prevent your raingarden from overflowing, it is important that the raingarden frame sits higher than the top of the overflow pipe.

Plants

In general, plants that grow well in a raingarden:

- › like dry conditions but can tolerate temporary wet periods
- › are perennial rather than annual
- › have an extensive fibrous root system.

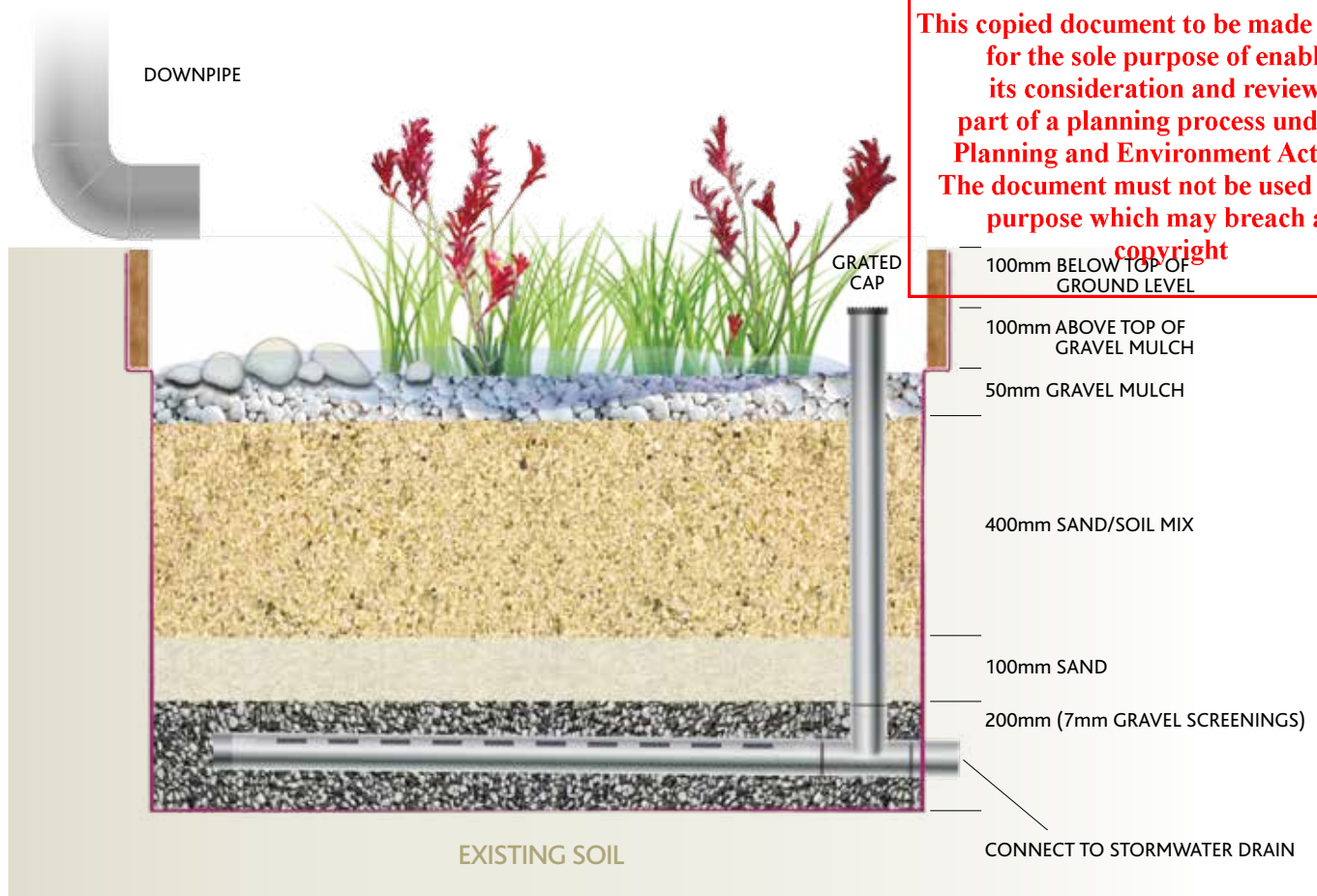
A wide range of plants are suitable for raingardens and your local nursery will be able to guide you on what is right for your area. There are also particular plants that are really good at removing pollutants from stormwater. These include:

- › *Carex appressa*
- › *Lomandra longifolia*
- › *Juncus flavidus*
- › *Melaleuca ericifolia*
- › *Goodenia ovate*.

50% of your raingarden should be planted with these species, the other 50% can be made up of plants that like a dry environment with intermittent wet periods. It is important that the plants you select are suitable for the amount of sun and shade on your raingarden. See the *Plant List* for a suggested list of suitable raingarden plants.

Regardless of the type of plants you select, it is important to plant densely to cover the raingarden, set your plants out at roughly 6 plants per m². So for a 2m² raingarden, you will need to buy 12 plants. Now start planting.

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Looking after your raingarden

Mulch

Spread gravel mulch to a depth of 50mm around the plants.

To allow the spread of water gently over the raingarden, place some large flat rocks where water flows from the downpipe. Place smaller rocks in between the large rocks to fill the gaps and help prevent erosion. Alternatively a flow spreading device can be fitted to the downpipe.

Remove the temporary end cap from overflow pipe and replace with a 90mm PVC finishing collar and domed pipe grate.

Water the plants in – complying with your local water restrictions.

Need help?

If you have questions about building a raingarden, your landscape gardener or local plumber may be able to help.

For more information visit melbournewater.com.au/raingardens

Once established, raingardens are low maintenance especially when planted with native plant species. They don't need to be watered, mowed or fertilised. However, a few simple tips can help your raingarden mature and function well.

- › Gravel mulch will help retain moisture in your raingarden and prevent weeds from growing.
- › Ensure that the overflow is never blocked.
- › Remove any sediment or build up from the downpipe.
- › Some weeding may need to take place until plants have matured.
- › Evenly distribute water flow into your garden to limit erosion from heavy rainfall. Strategically placed rocks may help with this.

- › Inspect your garden regularly – replace plants and repair erosion when necessary.
- › Driving over or squashing your raingarden will affect its ability to work efficiently.
- › Avoid using organic (timber) mulch as this will float in the raingarden and may cause blockages.

Note – If necessary, water your raingarden until your plants have established in compliance with your local water restrictions.



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Materials List – what you need to build your raingarden

Table 3 details the materials required to create a 2m² raingarden. While item prices may vary depending on the materials you select, building a 2m² raingarden is likely to cost between \$400 and \$500 (plus the cost of a plumber).

Table 3 – Raingarden materials list

QUANTITY	MATERIAL
6 l/m	200mmx50mm Class 1 hardwood sleepers
2 l/m	90mm diameter slotted drainage pipe (Ag Pipe)
2 l/m	90mm diameter uPVC pipe*
0.4m³	7mm screenings
0.85m³	Sand (white washed)
0.15m³	Topsoil
12	Plants (150mm pots)
0.1m³	Gravel mulch
1	90mm diameter uPVC 90 degree bend or 2x 45 degree bends
1	PVC grate 90mm finishing collar
1	PVC 90mm diameter domed pipe grate
1	PVC 90mm tee
1	PVC 90mm cap
10m²	PVC liner
	PVC tape

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*Costs per square meter will depend on the length of connections back to the existing stormwater drain.

l/m = lineal metres m² = square metres m³ = cubic metres mm = millimetres

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Plant List – the best plants for your raingarden

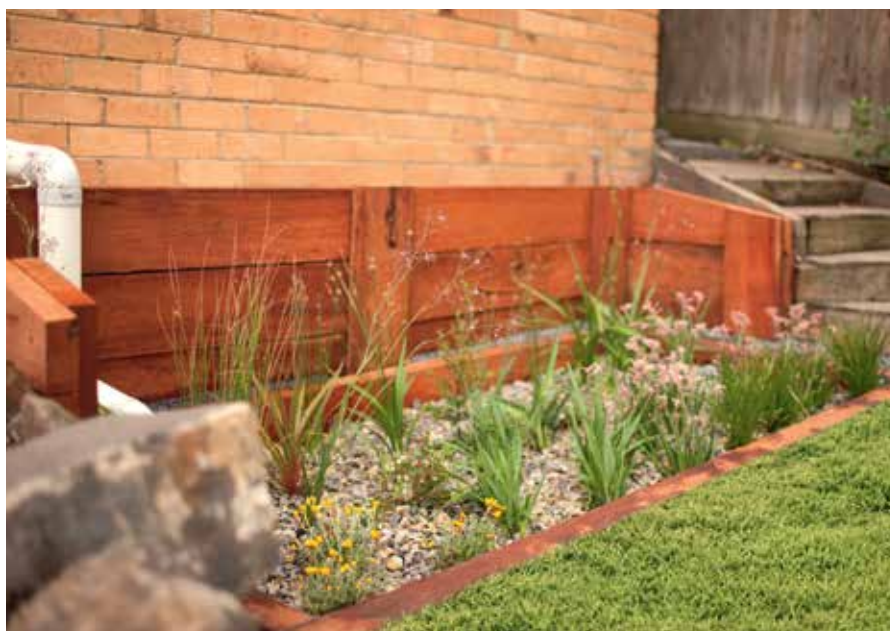
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The following plants grow well in raingardens.

Table 4 – Raingarden plant list

BOTANICAL NAME	COMMON NAME	CONDITIONS	SIZE (H x W) (cm)
<i>Anigozanthos sp.</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
<i>Chrysocephalum apiculatum</i>	Common Everlasting	Full sun	30-90 x 10-30
<i>Derwentia perfoliata</i>	Digger's Speedwell	Full sun to partial shade	20-40 x 30-60
<i>Dianella species</i>		Full sun to partial shade	60-120 x 40-150
<i>Ficinia nodosa</i>	Knobby Club-rush	Full sun	50-150 x 60-200
<i>Juncas amabilis</i>	Hollow Rush	Full sun to partial shade	20-120 x 20-50
<i>Juncas flavidus</i>	Yellow Rush	Full sun to partial shade	40-120 x 20-100
<i>Leucaphyta brownii</i>	Cushion Bush	Full sun, salt tolerant	100 x 200
<i>Lomandra species</i>		Full sun to partial shade	60-120 x 50-100
<i>Melaleuca ericifolia</i>	Swamp paperback	Full sun to partial shade	4m high x 3m wide
<i>Myoporum parvifolium</i>	Creeping Boobialla	Full sun	20-30 x 300
<i>Patersonia occidentalis</i>	Native iris	Sun to partial shade	20-40 x 30-60
<i>Pratia perdunculata</i>	Matter Pratia	Partial shade	50-150 x 1.8-5
<i>Wahlenbergia communis</i>	Tufted Bluebell	Full sun	15-50 x 15

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Certified by the
Carbon Reduction Institute
www.cri.org



Rainwater Tanks



Stormwater Sensitive Homes

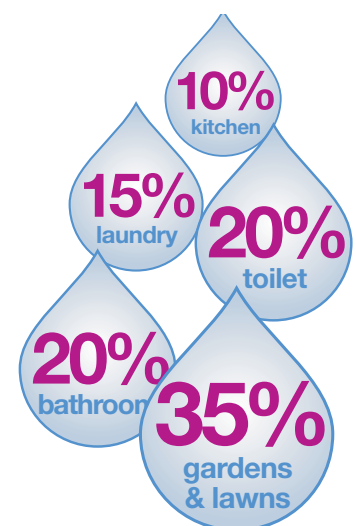
How does a rainwater tank help protect our local streams?

Most people install a rainwater tank primarily to harvest stormwater from their roof and conserve their mains water use. In addition to conserving water, a rainwater tank also helps treat stormwater and protect local streams from high storm flows by reducing the volume of stormwater and quantity of pollutants coming from a house block that would otherwise be delivered to the local stream.

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What do I use my tank water for?

Garden irrigation, laundry and toilet flushing consume much of our home water use. In most cases these uses do not require the water to be of drinking quality standard that is provided by mains water. By plumbing your rainwater tank to your toilet or laundry and substituting these mains water needs with the rainwater harvested from your roof, you can conserve mains water whilst reducing the amount of stormwater that enters our streams.



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Why can't I use my rainwater tank for my garden alone?

So that your tank is not too full to collect rainwater when it rains, you need to be consistently using your tank water all year round.

If tank water is used for your garden alone, your tank will remain full and unused during the winter months when your garden does not require watering. With a full tank, your capacity to capture and store the regular winter rainfall and thus benefit the local waterway is significantly reduced.

By plumbing your rainwater tank to your toilet or laundry, your tank water is used consistently all year round allowing rainfall to refill the tank more often especially in winter. This ultimately reduces the volume of stormwater that is delivered to the stream and the quantity of pollutants that are washed with it.

The Victorian Government has recognised the importance of plumbing your tank to your toilet and offers a cash rebate for the installation of connected rainwater tanks (www.dse.vic.gov.au). In addition, a 5 star energy standard has been introduced that requires a connected 2000Lt rainwater tank or solar hot water service to be installed in all new houses and apartments (class 1 and 2 buildings). (www.buildingcommission.com.au).

How do I choose a rainwater tank?

The most important thing to consider when choosing a rainwater tank is to first identify what you want from your rainwater tank. The size and type of rainwater tank you choose will vary depending on your homes water needs and the reliability you seek from your rainwater tank supply. There are a number of factors that may influence this and the following questions should be considered when planning your tank installation:

- what is the water demand of your home?
- how many people are living in your home?
- what is your intended use of rainwater?
- what reliability do you want from your tank?
- what is the total area of roof draining into your tank?
- what is average rainfall of your area?
- do you need extras like a pressure pump, the ability to top up your tank with drinking water, a backflow prevention device or a first flush device?
- are the materials used on your roof suitable to collect rainwater?
- are there physical constraints of your property that may influence the type of rainwater tank you need?

Once you know how much water you can collect and how much water you are going to use then a tank size can be selected to provide the reliability of water supply that you need.

For more information:

Melbourne Water's Water Sensitive Urban Design Website: www.wsud.melbournewater.com.au

Municipal Association of Victoria Clearwater Program: www.clearwater.asn.au

Water Sensitive Urban Design in the Sydney Region: www.wsud.org

Types of rainwater tanks

Rainwater tanks come in a variety of materials, shapes and sizes and can be incorporated into building design so they don't impact on the aesthetics of the development. They can be located above ground, underground, under the house or can even be incorporated into fences or walls.

There are three main tank systems to consider and a variety of materials to choose from. Features of these are outlined below and in the pictures above:

Tank systems:

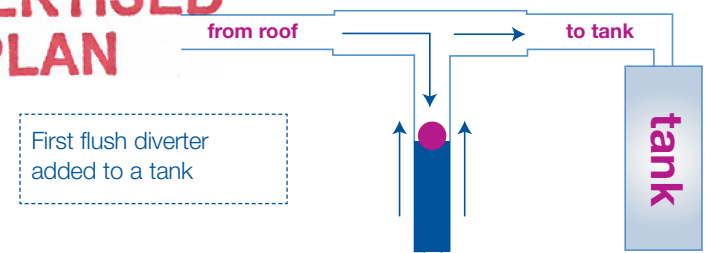
Gravity Systems - rely on gravity to supply rainwater to the household and the garden by placing the tank on a stand at height.

Dual Supply Systems - top your rainwater tank with mains water when tank level is low ensuring reliable water supply.

Pressure Systems - use a pump to deliver rainwater to household and garden fixtures.

To reduce the amount of sediment and debris entering a tank, mesh screens and 'first flush diverters' can be fitted. A screen will filter large debris such as leaves and sticks while 'first flush diverters' store the 'first flush' of the rainfall that carries the sediment and other pollutants initially washed from your roof (see figure below).

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Costs & rebates

Costs of installing a tank vary however a standard 2000Lt tank or bladder will cost around \$1000.

Additional plumbing and/or.....

- Above ground tanks cost approximately \$250 for a 500 litre tank.
- Below ground tanks cost between \$300-\$600 per 1000 litres of storage
- The costs of pumps start from \$200.

Additional plumbing and/or excavation costs vary on intended use, pipe layout, materials and site accessibility.

The Victorian Government offers a total rebate of \$300 for the installation of a rainwater tank that is plumbed to toilet and connected by a licensed plumber. For further details refer to the Department of Sustainability and Environment website www.dse.vic.gov.au.

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Urban Stormwater Best Practice Environmental Management Guidelines, Victorian Stormwater Committee, CSIRO publishing, 1999.

WSUD Engineering Procedures: Stormwater, Melbourne Water, 2005.

Delivering Water Sensitive Urban Design: Final Report of Clean Stormwater a planning framework, ASM, 2004.

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Bacchus Marsh Grammar, Staughton Vale Campus

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.

103%

SCORE

Project details

Name	Bacchus Marsh Grammar, Staughton Vale Campus
Street address	155 Staughton Vale Rd, Staughton Vale VIC 3340, Australia
Municipality	Greater Geelong
Site area	21110 m ²
Planning Number	

Flow and pollutant load reductions

Item	Result	Target
Mean annual runoff volume harvested or evapotranspired (%)	36%	>28%
Mean annual runoff volume infiltrated or filtered (%)	0%	>9%
Total suspended solids (%)	51%	>80%
Total phosphorus (%)	47%	>45%
Total nitrogen (%)	46%	>45%
Total gross pollutants (%)	74%	>70%

Water treatment

Catchments

Proposed Hardstand Untreated Paved, 1024m2

Roof 2956m2

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Permeable Areas Pervious (garden and lawn), 16338m2

Proposed Hardstand Treated Paved, 792m2

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Treatments

Rainwater Tank 1

Rainwater tank retention volume in kilolitres: 15

Raingardens Area: 16 m², Extended detention depth: 0.1 m,
Submerged zone depth: 0 m, Site soil type: Clay

Buildings & dwellings

School Building

Non-Residential BCA Class 5 - Commercial/Office,
320 employee(s)

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Configuration 1

Roof 2956m2

Rainwater Tank 1

Rainwater tank retention volume in kilolitres: 15,

School Building

Non-Residential BCA Class 5 - Commercial/Office,
320 employee(s)

Configuration 2

Proposed Hardstand Treated Paved, 792m²

Raingardens Area: 16 m²,
Extended detention depth: 0.1 m,
Submerged zone depth: 0 m, Site soil type: Clay,

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Legal statement

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This Sustainability Management Plan (SMP) has been prepared in conjunction with Sustainable Design Assessment in the Planning Process (SDAPP) protocols and any required tools including ESD, WSUD, Energy and/or Daylight assessment as required.

The development is assessed to achieve the stated ratings only if it is built in accordance with the specifications listed in the attached assessment tool printouts, and according to the plans provided by the designer to EcoResults. This report must be read in conjunction with all assessment tool printouts. Any variation to the design or construction of the development will deem this SMP void unless the variations are assessed by EcoResults. Please contact EcoResults if there are any questions or variations that are required.

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