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Sustainability Management Plan

**75-81 Murradoc Road,
Drysdale**

28th July 2026

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**Melbourne
Sustainability
Consultants.**

Table of Contents

Introduction & Council's Requirements	3
Site & Proposed Development Description.....	3
ESD Assessment Tools	4
Summary of Initiatives.....	5
1. Construction and Building Management.....	6
2. Water Resources	7
3. Energy Efficiency.....	8
4. Stormwater Quality Management.....	10
5. Indoor Environment Quality	11
6. Sustainable Transport	12
7. Operational Waste Management.....	13
8. Urban Ecology.....	13
9. Materials.....	14
10. Result in Summary & Implementation	15
Appendix 1 – WSUD Report.....	17
Appendix 2 – WSUD Maintenance Manual.....	33
Appendix 3 – Green Star VOC Limits.....	39
Appendix 4 – Daylight Hand Calculation	35
Appendix 5 – BESS Report.....	34

Document History

Version	Date	Status	Author	Approved
0	11/03/2025	First Issue	DM	JO
1	22/06/2025	Updated as per latest WSUD solution and RFI comments	DM	JO
2	29/06/2025	Updated as per client's comments	DM	JO
3	28/07/2025	Updated as per latest drawings and WSUD solution	DM	JO

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Melbourne Sustainability Consultants has been commissioned to provide guidance on achieving environmentally Sustainable Development outcomes for the proposed retail development located at 75-81 Murradoc Road, Drysdale.

Clause 15.01-2L of the policy outlines the key categories that the City of Greater Geelong has identified as crucial to be addressed in the assessment. These categories include Energy Performance, Water Resources, Stormwater Management, Indoor Environment Quality, Construction, Building & Waste Management, Building Materials, Transport, and Urban Ecology.

Site & Proposed Development Description

The site is located at 75-81 Murradoc Road, Drysdale within Greater Geelong local authority. The site is currently as shown in the image below:



Figure 1: Site location and surroundings sourced from Google Maps.

The proposal consists of development of the site into a petrol station with associated convenience store and convenience restaurant as well as an automated car wash.

ESD Assessment Tools

BESS

BESS has been built and is maintained by local governments and is the only dedicated tool in Victoria for assessing sustainable design at the planning permit stage.

BESS evaluates the energy and water efficiency, thermal comfort, and overall environmental sustainability performance of new buildings or modifications. It was created to ensure that new development adheres to sustainability requirements as part of a planning permit application.

A BESS assessment has been conducted for the proposed development, providing a benchmark for the level of sustainability achieved by the project in line with the SDAPP 10 Key Sustainable Building Categories.

Each target area within the BESS tool typically receives a score ranging from 1% to 100%. To meet the energy, water, stormwater, and IEQ requirements, a minimum score of 50% is necessary. An overall project score of 50% represents 'Best Practice,' while a score above 70% represents 'Excellence.'

The car wash will be fully automatic without any office associated with it. There will be no building with proposed occupancy, only the automated bays therefore only the store and restaurant have been included in BESS.

BLUE FACTOR

The BLUE FACTOR calculator is a tool developed by The Department of Energy, Environment and Climate Action (DEECA) and Microburst Software to assist with the design and assessment of stormwater management systems. The calculator enables users to determine the effectiveness of stormwater treatment measures in removing pollutants from stormwater runoff, thereby protecting waterways and aquatic ecosystems. Blue Factor is the successor to STORM and can already be used to replace it as an accepted tool.

BlueFactor assessment can be found in Appendix 1.

The WSUD assessment results is provided by the civil engineer.

Summary of Initiatives

Initiatives listed below should be reflected on TP drawings either graphically on the plan (e.g. bike spaces, RWT etc.) or with a clear note. All WSUD initiatives listed in Appendix 1 should be clearly noted on drawings including all areas diverting to the proposed treatment (e.g. RWT, raingarden etc.) – Refer to Appendix 1.

Category	Requirement
Management	80% of all construction and demolition waste to be diverted from landfill
	Separate utility meter for each tenancy
Water Efficiency	Minimum WELS rating of fittings and fixtures: 4 Star Toilets / 5 Star Taps / 4 Star (6.0-7.5 L/min) Showerhead
	Recycling Water System in place for car wash – Up to 80% recycling
	42,000L tank collecting water from the roof from service station and car wash – Water to be used for toilet flushing, irrigation and car wash.
Energy Efficiency	NCC 2022 section J commitment to meet requirement with 10% increase on minimum floor and ceiling insulation
	Illumination power densities to meet NCC 2022 section J7D3 requirements
	Sensors (motion, daylight, timers) for external and common area lighting
	Electric System chosen within one star of the best available product in the range at the time of purchase or 15% most efficient available products if no star rating is available
	HVAC system chosen within one star of the best available product in the range at the time of purchase or 15% most efficient available products if no star rating is available
	3kW Solar PV on each tenancy
Stormwater	160m ² of Raingarden to treat 3,067m ² of the site
	400m ² of permeable paving
IEQ	Mechanical ventilation to provide fresh air rates 50% higher than minimum from AS1668 or to maintain CO2 level below 800ppm
	1.5m horizontal projection above west glazing
	All paint, adhesives, sealants and flooring to be low VOC – refer to Appendix 2 for limits
	All engineered wood will be low formaldehyde with E0 or better certification
	Glazing with VLT targeting 40% VLT or more
Transport	Bike spaces for staff and visitors with 50% increase on min. statutory requirements or minimum 2 spaces for staff and 1 for visitors if there is no min. requirement.
	Minimum one EV charger provided (minimum Level 2 – 32A 7Kw)
Waste	3-bin system (Rubbish, Recycling, FOGO)
Urban Ecology	Light to medium-coloured roof
Materials	Timber framing if used to be certified PEFC, AFS or FSC – No rainforest timber to be used
	Steel to be sourced from steel maker with ISO 14001 facility a member of the World Steel Association's (WSA) Climate Action Program (CAP).
	Carpet and underlay with third-party sustainable certification (GECA, Carpet institute ECS etc.)

1. Construction and Building Management

Effective construction and building management practices are crucial for sustainable development. By minimizing construction waste and effectively monitoring building performance, these practices can significantly reduce the environmental impact of the development and enhance its long-term sustainability.

Initiative	Description	Reference
Metering and Monitoring	Separate utility meters (water and electricity) will be provided for each tenancy.	BESS Man 3.2
Construction Waste Management	On-site staff will receive a construction waste management plan during a site orientation session to minimise on-site waste generation and ensure proper disposal. A minimum of 80% of all construction and demolition waste created on-site will be reused or recycled.	N/A
Construction Environmental Management	The builder will identify environmental risks associated with construction and implement management strategies such as effective erosion and sediment control measures throughout construction and operation. They will also ensure that earthworks are staged appropriately to avoid bare earthworks in high-risk areas of the site during periods of dominant rainfall.	Clause 53.18

2. Water Resources

Maximising water efficiency in developments helps conserve water resources, reduces the strain on local water systems, and lower water bills for homeowners, making it an environmentally responsible and economically beneficial choice for developers. Additionally, implementing water-efficient practices and technologies can also contribute to a more sustainable and resilient community.

Initiative	Description	Reference
Fixtures and Fittings	The development will be provided with efficient fittings and fixtures. This will all be for a reduction of potable water use onsite. The following minimum Water Efficiency Labelling Scheme (WELS) star rating will be specified: • 4-Star Toilets • 5-Star Taps (Kitchen and bathrooms) • 4-Star (6.0-7.5 L/min) Showerheads	BESS Wat 1.1
Rainwater Collection and use	The roof of the car wash and store combined will have rainwater runoff collected and stored in a 42,000L tank. Additional charged pipe systems or multiple tanks may be installed to collect water if necessary. If a charged pipe system is used, it will not be placed underneath the building's slab. Rainwater collected will be utilised for toilet flushing and car wash significantly reducing the development's stormwater impact and aiding in compliance with the BlueFactor calculator (refer to Appendix 1).	BESS Wat 1.1 BESS Storm 1.1
Car Wash Water Recycling	A water recycling system will be installed for the car wash to reduce water consumption and costs associated with the car wash. Up to 80% of the water used could be recycled with a recycling system. The recycling system will use different filtration process to reducing pollution level in the water (oil, grease, suspended solid) to an acceptable level for reuse. There are several providers of recycling system in Australia including Cleanawater® or Washtec®.	Car Wash Specific initiative

3. Energy Efficiency

Maximizing energy efficiency in developments reduces greenhouse gas emissions and lowers utility costs for homeowners, making it an environmentally responsible and economically beneficial choice for developers. In addition, energy-efficient buildings are often more comfortable and healthier to live in, improving the quality of life for occupants.

Initiative	Description	Reference
NCC Section J Commitment	A section J (NCC 2022) DTS assessment will occur for the development (prior to construction) with the following commitments: • 10% improvement on NCC 2022 floor and ceiling insulation levels (Total R-Value); • Wall insulation and glazing system within NCC 2022 DTS requirements; • Heating/cooling system to be chosen within one star of the best available product in the range at the time of purchase or COP/EER chosen within the best 15% of available products if no star rating is available; and • Water heating system to be chosen within one star of the best available product in the range at the time of purchase or the 15% most efficient available products if no star rating is available. Alternatively, an NCC J1V3 modelling will be undertaken prior to construction. The J1V3 modelling will demonstrate compliance with building fabric requirement when compared to an 'improved reference building' that will include the 10% improvement on NCC 2022 DTS floor and ceiling insulation levels. The J1V3 approach described above would produce a lower score under BESS Energy 1.1 than the DTS approach however the BESS assessment submitted would maintain BESS compliance with the slightly decreased score.	BESS Ene 1.2 BESS Ene 2.1 BESS Ene 2.3
Hot water System	An electric instantaneous or storage system will be installed for the each tenancy. The system will be chosen within one star of the best available whichever is greater. System efficiency should be chosen within the 15% most efficient available products if no star rating is available.	BESS Ene 3.2

Initiative	Description	Reference
HVAC System	Heating and cooling will be provided with, split systems, VRF or packaged unit. HVAC unit will be chosen within one star of the best available in a similar range at the time of purchase or will be chosen with COP/EER within 15% of the best available product if no star rating is available.	BESS Ene 2.3
All Electric Development	The development will be all-electric and will not have a gas connection. This will align the development with Councils and state targets for net zero and reduction of fossil fuel usage.	BESS Ene 2.6
Internal Lighting	LED lighting will be implemented throughout each tenancy resulting in lower energy consumption for artificial lighting. The development will commit to meet the maximum illumination power densities from NCC 2022 part J7D3. Additionally, the utilisation of light internal colours will enhance daylight penetration, leading to a decreased reliance on artificial lighting.	BESS Ene 3.7
Lighting Controls and External Lighting	LED lighting will be implemented for all external lighting. External lighting, common areas and spaces used intermittently will be controlled with motion sensors and/or daylight sensors reducing overall use and energy consumption. Ventilation in these areas will also be controlled with these sensors.	BESS Ene 3.7
Solar PV System	Each tenancy will have a 3kW solar photovoltaic system installed on its roof to generate renewable energy. This measure will reduce energy consumption for the development.	BESS Ene 4.5

4. Stormwater Quality Management

WSUD (Water Sensitive Urban Design) is crucial for developments because it helps manage stormwater runoff, reduces flooding risks, and improves water quality by using natural systems to filter and treat water. Additionally, WSUD can enhance the aesthetic value of a development by incorporating green infrastructure and providing green spaces for occupants to enjoy.

Initiative	Description	Reference
Rainwater Collection and use	The roof of the car wash and store combined will have rainwater runoff collected and stored in a 42,000L tank. Additional charged pipe systems or multiple tanks may be installed to collect water if necessary. If a charged pipe system is used, it will not be placed underneath the building's slab. Rainwater collected will be utilised for toilet flushing and car wash significantly reducing the development's stormwater impact and aiding in compliance with the BlueFactor calculator (refer to Appendix 1).	BESS Wat 1.1 BESS Storm 1.1
Raingarden	Part of the driveway will have rainwater runoff channelled towards 160m² of raingarden. The raingarden location will be confirmed by the civil engineer once engaged however it should be away from footings or boundary to avoid flooding issues (minimum 300mm). Implementation of raingarden will actively treat stormwater pollution and help towards achieving compliance with WSUD requirements as described in Appendix 1.	BESS Storm 1.1
Permeable Paving	Permeable paving will be installed for a minimum of 400m² of the exposed driveway. Permeable paving will be installed with an impervious liner and agricultural drain if there is clay soil.	BESS Storm 1.1

5. Indoor Environment Quality

IEQ (Indoor Environmental Quality) is essential for development because it affects the health, comfort, and well-being of occupants by addressing factors such as air quality, temperature, lighting, and noise levels. Providing a high-quality indoor environment can also increase the value and desirability of a development, leading to higher occupancy rates and property values.

Initiative	Description	Reference
Daylight Access	Light internal colours will be used for the development which will result in better internal reflection of natural light, enhancing the penetration of daylight through windows or other openings. Large windows will be installed in the store and restaurant which will increase natural light access. Windows will be provided on multiple façades wherever possible and room depth will be limited to improve daylight access even further. The development has achieved best practice requirement as demonstrated in the daylight hand calculation prepared in Appendix 4.	BESS IEQ 1.4
Thermal Comfort – Shading	All west glazing in store and restaurant is provided with horizontal projection (1.5m projection). Horizontal projection is not typically the most appropriate type of shading for west façade however it is not possible install external adjustable shading or vertical shading for retail and entrance of restaurant as this would be a hazard for customer moving in and out of the room as well as reduce visibility for displaying good. Council has confirmed that 1.5m projection would be deemed appropriate, therefore, based on all shading types proposed on each façade in the development, we have input 100% under IEQ 3.4 in BESS.	BESS IEQ 3.4
Ventilation (Mechanical)	Mechanical ventilation will be provided to store and restaurant to provide fresh air with a minimum 50% improvement of minimum rates from AS1668. Alternatively, mechanical ventilation will be provided to maintain CO2 levels below 800ppm.	BESS IEQ 2.3
Low VOC and Low Formaldehyde	All paints, adhesives and sealants and flooring should not exceed the limits outlined in Appendix 3. Alternatively, products will be selected with no VOCs. All engineered wood products will have 'low'	BESS IEQ 4.1

Initiative	Description	Reference
	formaldehyde emissions, certified as E0 or better or with no formaldehyde. Providers such as Polytec and Laminex Australia offer E0 or better products in their range.	

6. Sustainable Transport

Sustainable transport such as cycling and public transport is essential for residential developments as it reduces the environmental impact of commuting while improving air quality and decreasing traffic congestion. Additionally, it promotes healthy lifestyles by encouraging physical activity and reducing sedentary behaviours associated with car dependence.

Initiative	Description	Reference
Staff and Visitor Bike Parking	The development will be provided with bicycle park for staff and visitors. A minimum 50% increase on minimum statutory requirement will be provided. Two spaces for staff and 1 for visitor will be provided if there is not minimum requirement.	BESS Tran 1.4
EV Charging Infrastructure	At least one EV charger will be provided for the site. The charger should be a Level 2, 32amp, 7kW charger as a minimum.	BESS Tran 2.1

7. Operational Waste Management

Effective operational waste management is vital for developments to minimise the amount of waste generated, reduce environmental impacts, and improve sustainability by promoting recycling and composting. Implementing efficient waste management practices can also lower operating costs, increase efficiency, and enhance the overall liveability of the development.

Initiative	Description	Reference
Operational Waste	Each tenancy will be provided with a three-bin system including general, recycling and food & organic (FOGO) waste. Collection will be provided by a private contractor. Private contractor will need to have capacity to treat FOGO separately. 	BESS Waste 2.1

8. Urban Ecology

Incorporating urban ecology principles into development promotes biodiversity, provides ecological services such as air and water purification, and enhances the overall health and well-being of residents by connecting them with nature. Additionally, creating sustainable and resilient urban ecosystems can also help mitigate the impacts of climate change and support the long-term viability of the development.

Initiative	Description	Reference
Vegetated Area	The proposed development will be proposed with landscaped areas. This will provide an enjoyable working environment.	BESS Eco 2.1

9. Materials

Choosing the right materials for a development is crucial as it impacts the durability, energy efficiency, and overall sustainability of the buildings. Thoughtful material selection can minimize environmental impacts, improve indoor air quality, and contribute to the long-term value and desirability of the development.

Initiative	Description	Reference
Sustainable Timber	No rainforest timber will be used on site. Timber framing (if used on site) will be procured from accredited sources such as Forest Stewardship Council (FSC), Program for the Endorsement of Forest Certification (PEFC) or Australian Forestry Scheme (AFS).	Clause 15.01-2L
Carpet	Wherever used, carpet and carpet underlay will be chosen with as third party certification such as Global GreenTag, GECA or Carpet Institute of Australia Limited, Environmental Certification Scheme (ECS).	Clause 15.01-2L
Steel	Steel for the development (structural and reinforcing) will be procured from a responsible steel maker. A responsible steel maker must have facilities with a currently valid and certified ISO 14001 Environmental Management System (EMS) in place, and be a member of the World Steel Association's (WSA) Climate Action Program (CAP).	Clause 15.01-2L

10. Result in Summary & Implementation

The development will comply with the BESS and WSUD requirements by implementing all measures, as stated in this report. All the measures included in this report have demonstrated their efficiency and are easy to upkeep, with any faults promptly noticeable to the development's occupants. This approach ensures the development's sustainability in the long run, as the installed systems will be maintained and functional throughout the building's life cycle.

All initiatives listed in the report will be implemented by the relevant design team member at the relevant stage of the development. An implementation schedule has been prepared as follows – Full detail for each initiative is available in the body of the report (hyperlink):

ESD Implementation Table

Initiative	Responsibility	Stage
Metering and Monitoring	Services Engineer Architect	Design Development
Construction Waste Management Plan – 80% of waste diverted from landfill	Head Contractor	Construction
Construction Environmental Management Plan	Head Contractor	Construction
Water Fixtures and Fitting – Minimum WELS rating	Architect Head Contractor	Design Development
Rainwater Collection and Reuse	Architect Civil Engineer	Design Development
NCC Section J commitment	Section J Consultant	Design Development
Hot Water System chosen within one star or 15% most efficient	Services Engineer Architect	Design Development
HVAC System chosen within one star or 15% most efficient	Services Engineer Architect	Design Development
Internal Lighting Power in line with NCC 2022 section J7D3	Services Engineer Architect	Design Development
External and common area Lighting – LED with sensors	Services Engineer Architect	Design Development
Solar PV System – Minimum 3kW per tenancy	Solar Contractor Architect	Design Development
Permeable paving for part of driveway	Architect Civil Engineer	Design Development

Initiative	Responsibility	Stage
Raingarden treating the driveway	Architect Civil Engineer	Design Development
Mechanical Ventilation – 50% Improvement on AS1668 or CO2 level maintained at 800ppm	Service Engineer	Design Development
Low VOC and Low Formaldehyde Products	Architect Head Contractor	Design Development Construction
Bike parking for staff and visitor – 50% increase on min. statutory requirement or 2 spaces for staff and 1 for visitor if no min. requirements	Architect	Design Development
At least one EV charger – Level 2 provision	Architect Service Engineer	Design Development
Three-bin system	Architect Waste Consultant	Design Development
Carpet commitment to sustainable certification	Architect Head Contractor	Design Development
Steel commitment to responsible steel maker	Architect Head Contractor	Design Development
Timber commitment to certified plantations	Architect Head Contractor	Design Development



Appendix 1 – WSUD Report

To address Clause 15.01-2L and 53.18, a Water Sensitive Urban Design (WSUD) assessment of the proposed development must occur.

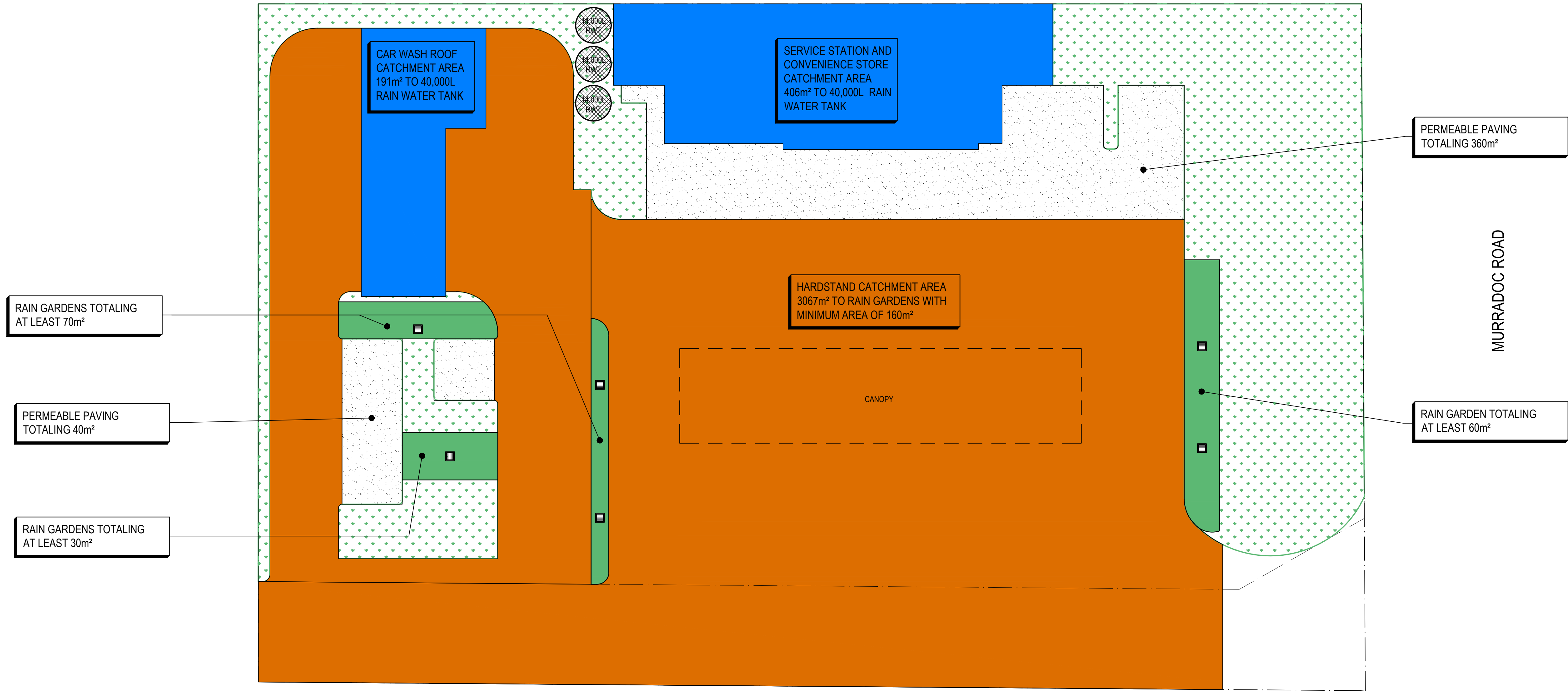
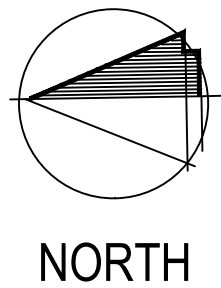
Under Clause 53.18, WSUD assessment and associated proposed stormwater management system should be designed to:

- Meet the current best practice performance objectives for stormwater quality as contained in the Urban Stormwater - Best Practice Environmental Management Guidelines (Victorian Stormwater Committee, 1999). Currently, these water quality performance targets are:
 - Suspended Solids - 80% retention of typical urban annual load.
 - Total Nitrogen - 45% retention of typical urban annual load.
 - Total Phosphorus - 45% retention of typical urban annual load.
 - Litter - 70% reduction of typical urban annual load.
- Minimise the impact of chemical pollutants and other toxicants including by, but not limited to, bunding and covering or roofing of storage, loading and work areas.
- Contribute to cooling, improving local habitat and providing attractive and enjoyable spaces.

By identifying the impervious surfaces within the site and implementing treatments to mitigate the impacts of stormwater leaving the site, the proposed development has successfully fulfilled the objectives listed above.

The development was evaluated using the STORM tool, a widely accepted tool in the industry, to verify compliance with the aforementioned best practice targets. To meet the required standards, the development must attain a minimum compliance score of 100%.

The WSUD assessment results is provided by civil engineers.



STORMWATER MANAGEMENT SITE PLAN

SCALE 1: 200

AREA SCHEDULE:

SITE ANALYSIS

SITE AREA:	5,455 m ²
PAVING AREAS: OPEN TO SKY	3,665 m ²
ROOF AREAS:	597 m ²
LANDSCAPE AREAS:	1,193 m ²
SITE COVERAGE	78.13% 4,262 m ²
SITE PERMEABILITY:	21.87% 1,193 m ²

LEGEND:

	DENOTES ROOF CATCHMENT AREAS CONTRIBUTING TO RAINWATER TANKS (AS SCHEDULED AND NOTED)
	DENOTES PROPOSED CONCRETE DRIVEWAY (OPEN TO SKY) - TREATED AREA BY STORM WATER PITS DRAINED TO MIN. 160 m2 RAIN GARDEN. REFER DETAIL.
	DENOTES PROPOSED PERMEABLE CONCRETE PAVEMENT (OPEN TO SKY) - TO DRAIN DIRECTLY TO SUB-GRADE.
	DENOTES LANDSCAPING AREAS
	DENOTES RAIN GARDEN
	DENOTES RAIN WATER TANKS (RWT) WITH TOTAL VOLUME OF 42,000 LITRES CONNECTED TO TOILETS FOR FLUSHING & LANDSCAPE AREAS FOR IRRIGATION & TO CAR WASH - TREATED AREA

STORM WATER / BLUE FACTOR ASSESSMENT:

ROOF CATCHMENT
DRAIN / RETICULATE 597m² OF ROOF AREA DIRECTLY TO 1 x 42,000 LITRES RAIN WATER TANK (VIA FULLY-CHARGED GRAVITY FED SYSTEM).

DRIVEWAY / PARKING
DRAIN / RETICULATE 3,067m² (CLEAR TO SKY) OF MAIN DRIVEWAY AND PARKING INTO MINIMUM 160m² RAIN GARDENS.
REFER TO BLUE FACTOR RATING REPORT FOR DETAIL.

No.	REVISION DESCRIPTION	DRAWN	CHECKED	APPROVED	DATE
D	PRELIMINARY ISSUE	G.P.	A.M.S.	A.M.S.	27.07.2026
C	PRELIMINARY ISSUE	G.P.	A.M.S.	A.M.S.	18.06.2026
B	PRELIMINARY ISSUE	G.P.	A.M.S.	A.M.S.	10.03.2026
A	PRELIMINARY ISSUE	G.P.	A.M.S.	A.M.S.	26.02.2026

PRELIMINARY



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SCALE	AS NOTED	ORIGINAL SIZE	A1	CLIENT:	BELLARINE COMMERCIAL DEVELOPMENTS PTY LTD			
DRAWN	G.P.	DESIGNED	A.M.S.	PROJECT:	75-81 MURRADOC ROAD, DRYSDALE			
APPROVED	A.M.S.	DATE	MARCH 2026	TITLE:	STORM WATER MANAGEMENT PLAN			
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Project # 50DE2CCF
V3: 75-81 Murradoc Road, Drysdale, VIC
Andrew Slade - andrew@structplan.com.au
75-81 Murradoc Rd, Drysdale VIC 3222, Australia
27 July 2026 6:18 p.m.



75-81 Murradoc Road, Drysdale, VIC

Nitrogen reduction target has been met, and a small low-risk project is deemed to comply. Higher risk projects need to meet all targets.



Project details

Name	V3: 75-81 Murradoc Road, Drysdale, VIC
Project ID	50DE2CCF
Street address	75-81 Murradoc Rd, Drysdale VIC 3222, Australia
Municipality	Greater Geelong
Site area	5455 m ²
Planning Number	PP 282 2026

Results

Item	Result	Target
Total suspended solids (%)	93%	>80%
Total phosphorus (%)	90%	>45%
Total nitrogen (%)	91%	>45%
Total gross pollutants (%)	93%	>70%
Mean annual runoff volume harvested or evapotranspired (%)	32%	>32%
Mean annual runoff volume infiltrated or filtered (%)	55%	>3%

For small low-risk sites, Total Nitrogen has been used as a proxy for other pollutants indicating compliance has been adequately met for many years. This has meant that if the Blue Factor score meets 100% based on Nitrogen, the Responsible Authority has the discretion to accept stormwater management design responses that do not meet all the individual pollutant load reduction targets on small low-risk sites.

Larger, high-risk projects, with roads, car parks or activities that may yield higher than typical pollutant loads, must meet all water quality targets fully. All projects should manage flow volume reductions through harvesting and evapotranspiration as well as infiltration to a level that is reasonably practicable.

Additional considerations

Flow and other pollutant load reductions should also be considered. The EPA Urban stormwater management guidelines (EPA - Publication [1739.1](#)) are referenced in the VPPs as a policy document and support compliance with the General Environmental Duty.

You can use the guidelines to help minimise risks from urban stormwater so far as reasonably practicable ([epa.vic.gov.au/about-epa/laws-ew-laws/what-is-reasonablypracticable](#)). Doing what is reasonably practicable means putting in proportionate controls to minimise the risk of harm to human health and the environment relative to the values being protected and risks presented by the site.

A completed small-scale low risk site with no public roads or external user parking areas will usually generate very little sediment, referred to as total suspended solids (TSS). It is common that the 80% TSS target will not easily be achieved for this type of site.

Other sites may generate significant total suspended solids (TSS) as well as litter, referred to as gross pollutants and should meet all targets.

The generation of sediment and litter during the construction phase is a significant problem and must be addressed effectively for all developments.

You should demonstrate what appropriate controls will be used to ensure the generation of litter and sediment is prevented and controlled during construction to minimise risk of harm.

Blue Factor is designed to support a range of developments of less than 10,000 square metres including small scale residential, apartment developments, small scale commercial and small public use developments which must meet planning requirements including stormwater management quality objectives in the EPA Urban stormwater management guidelines (EPA - Publication 1739.1) It is recommended that MUSIC is used for larger and more complex projects to demonstrate compliance.

Configuration 1



Roof Catchment 1 597m2



Rainwater Tank 1
Rainwater tank retention volume in kilolitres: 42



Building 1 Non-Residential BCA Class 6 - Retail/Food,
50 employee(s)

Configuration 2



Treated Pavement Paved, 3067m2



Raingarden 1 Area: 160 m², Extended detention depth: 0.1 m,
Submerged zone depth: 0.3 m, Site soil type: Sandy loam

Catchments



Roof Catchment 1 597m2



Treated Pavement Paved, 3067m2



Landscape Pervious (garden and lawn), 1193m2



Untreated Pavement Paved, 198m2



Permeable Paving Pervious (garden and lawn), 400m²

Treatments



Rainwater Tank 1

Rainwater tank retention volume in kilolitres: 42

215%



Raingarden 1 Area: 160 m²,

Extended detention depth: 0.1 m,

Submerged zone depth: 0.3 m, Site soil type: Sandy loam

213%



Building 1 Non-Residential BCA Class 6 - Retail/Food,
50 employee(s)

Water sources	I want to calculate my water use based on fixtures and fittings
Basin taps - Primary water source	Mains water
Basin taps - Efficiency	5 star WELS rating
Showers - Primary water source	Mains water
Showers - Efficiency	3 star WELS rating (> 4.5 but < 6 litres per min plus water saving feature)
Clothes Washer - Primary water source	
Clothes Washer - Efficiency	Scope out
Urinal - Primary water source	
Urinal - Efficiency	No urinals
Toilets connected to mains water	0
Toilets connected to rainwater	3
Toilets connected to recycled water	0
Toilets efficiency	4 star WELS rating
Garden water use	Garden water demands are in use
Garden primary water source	Rainwater
Irrigated garden area supplied by:	
• Mains	0 m ²
• Rainwater Tank	160 m ²
• Recycled Water	0 m ²
Garden water use efficiency	Low

1. Proposed Treatment Typical Cross-Section

This section will include a typical cross-section of all WSUD treatments proposed in the development.

a. Rainwater Tanks

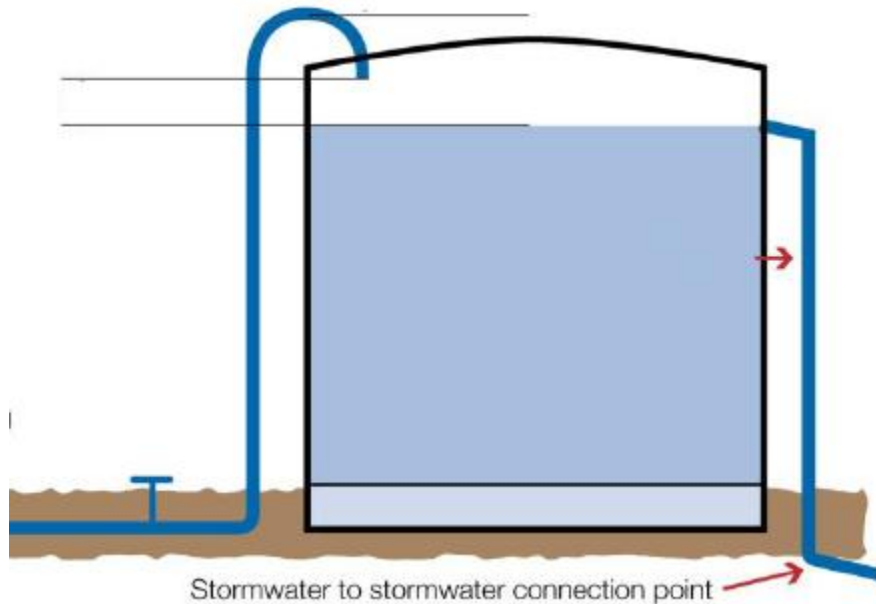


Figure 2: Typical Rainwater tank Cross-Section

b. Raingarden

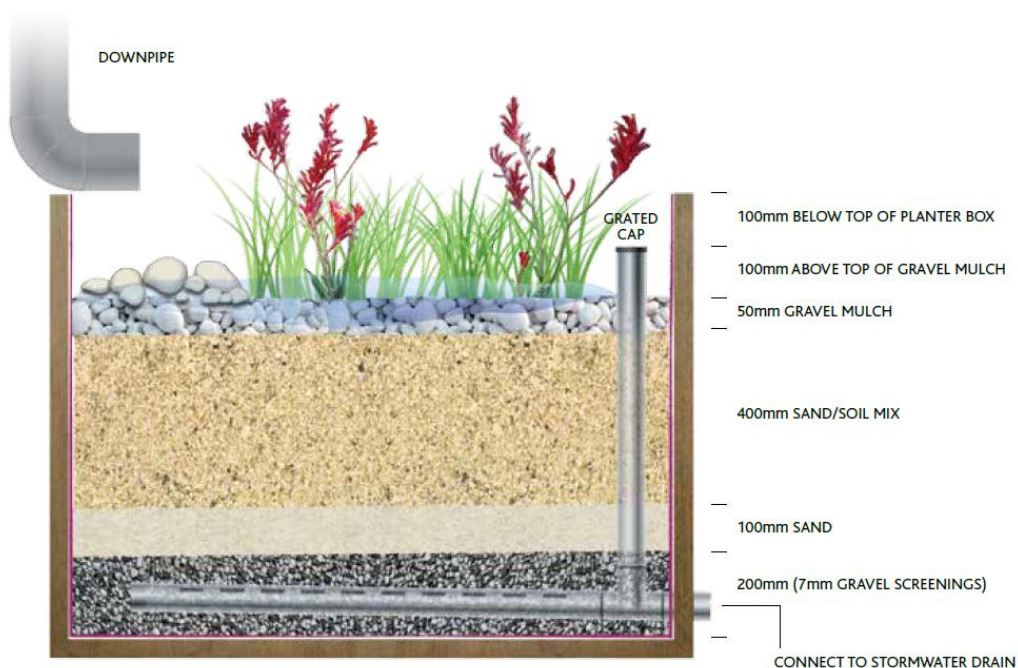


Figure 3: Raingarden Typical Cross-Section.

Acceptable raingarden design

- standard system with 300-500mm filter media depth
- including a submerged zone system and 300mm filter depth
- standard system with filter media depth of 500mm where surrounding soil has a high infiltration rate

Avoid

- standard raingardens with filter media depth less than 300mm
- raingardens downstream of a wetland or an oversized sedimentation basin

Note: All systems should be designed as per Adoption Guidelines for Stormwater Biofiltration Systems (FAWB, 2009).

Plant selection

This should be guided by expert opinion, based on the particular project conditions. The plant species that are commonly used in raingardens can be grouped into three general categories:

Category	Example plant species
Tolerant of both wet and dry conditions once established	<i>Carex appressa</i> (tall sedge)
Tolerant of dry conditions once established	<i>Ficinia nodosa</i> <i>Lomandra longifolia</i> <i>Juncus amabilis</i>
Prefer more constant conditions without wet/dry extremes	<i>Goodenia ovate</i> <i>Juncus flavidis</i>

Note: Other plant species may be appropriate for a particular system and these should be guided by expert opinion.

Scientific Name	Common name	Height (m)	Width (m)	Density (m ²)
<i>Acacia implexa</i> *	Lightwood	8	5	1
<i>Acacia melanoxylon</i> *	Blackwood	12	8	1
<i>Allocasuarina cunninghamiana</i> *	River Sheoak	15	8	1
<i>Carex appressa</i>	Tall Sedge	0.5-1.2	.05-1	4
<i>Callistemon sieberi</i>	River Bottlebrush	4	2	1
<i>Dianella admixta</i>	Black-anther Flax-lily	0.3-0.8	0.5-1.5	6
<i>Dianella longifolia</i>	Smooth Flax-lily	0.5	0.5	6
<i>Dianella tasmanica</i>	Tasman Flax-lily	0.75	1	4
<i>Ficinia nodosa</i>	Nobby Club-rush	0.5-1.5	0.6-2.0	5
<i>Gahnia radula</i>	Thatch Saw-sedge	1.5	1	4
<i>Juncus amabilis</i>	Hollow rush	0.2-1.2	0.2-0.5	6
<i>Juncus flavidus</i>	Yellow Rush	0.4-1.2	0.2-1	4
<i>Lepidosperma laterale</i> var. <i>laterale</i>	Variable Sword-sedge	1	0.4-1	4
<i>Lomandra filiformis</i> ssp. <i>Filiformis</i>	Wattle Mat-rush	0.3	0.3	6
<i>Lomandra longifolia</i>	Spiny-headed Mat-rush	1	1	4
<i>Lomandra nana</i>	Dwarf Mat-rush	1.5	10-20	5
<i>Myoporum parvifolium</i>	Creeping Boobialla	20-30	300	4
<i>Poa labillardieri</i>	Common Tussock-grass	0.3-0.8	1.3	4

*Canopy trees are only suitable in vegetation over 6m² with a minimum width of 2m.

At least 50% of the plants chosen for a bioretention system should have the following characteristics for effective nutrient removal (FAWB, 2009):

- high root density
- extensive fibrous root systems (no bulbs)
- vigorous growth
- tolerant of freely draining soils
- drought and inundation tolerant

c. Permeable Paving

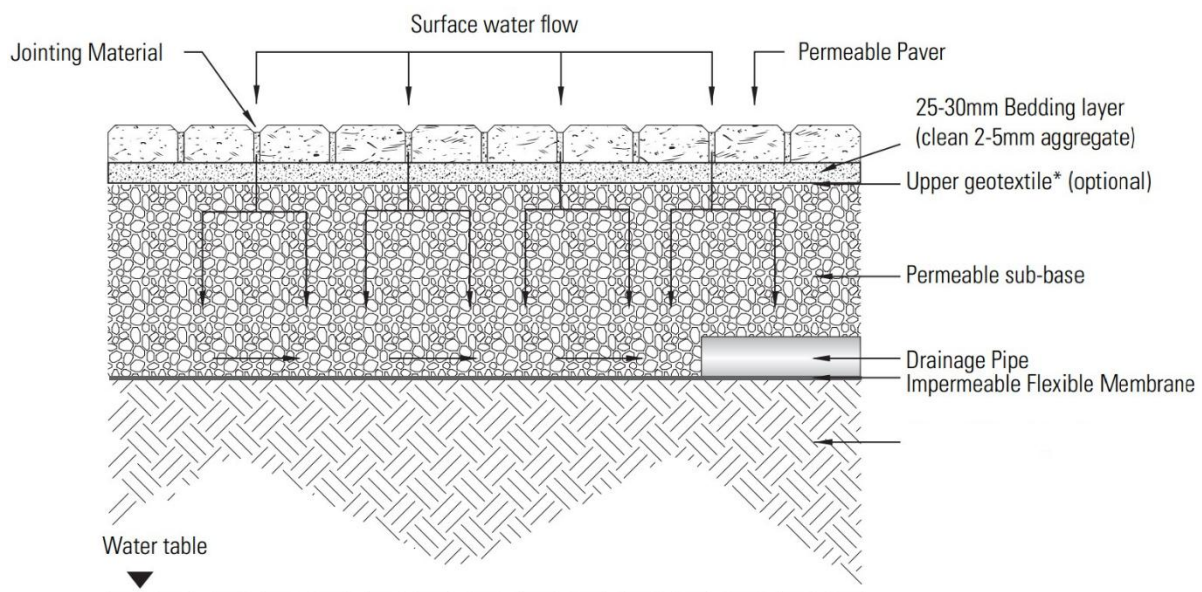
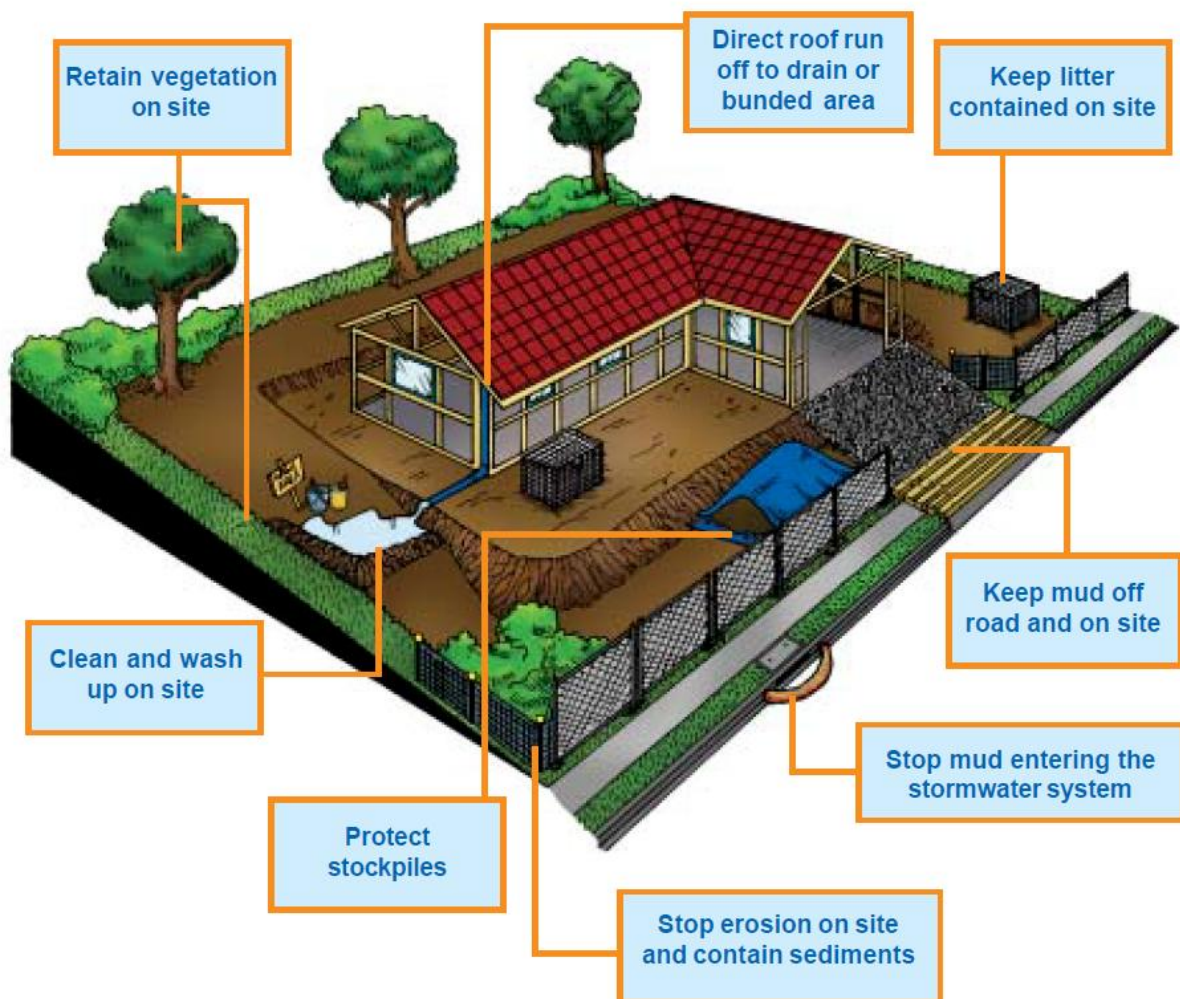


Figure 2: Typical Permeable Paving Cross-Section.

2. Stormwater Management During Construction

To prevent contamination of stormwater discharge and to decrease the speed of flows produced during construction, steps will be taken to manage stormwater. These measures will involve establishing buffer strips and maintaining a clean site by removing loose rubbish. "[Keeping Our Stormwater Clean - A Builder's Guide](#)" by Melbourne Water provides additional information. The objectives depicted in the diagram below illustrate ways to minimise the effects of stormwater runoff during the construction phase.

Check Council requirements and plan before you start work on site





Appendix 2 – WSUD Maintenance Manual

WSUD manuals are sourced from the City of Port Philip which has developed a detailed manual for the majority of treatment systems.



Maintenance manual

Rainwater tanks

Site address: _____

Planning permit number: _____



Rainwater tank maintenance

This manual lists the key tasks required to maintain a domestic rainwater tank and the recommended frequency of each task. This manual can be submitted with planning permit applications for developments that include the installation of a domestic rainwater tank. Once endorsed, the property owner is responsible for continuous implementation of rainwater tank maintenance, in accordance with the guidance in this manual.

Rainwater tanks are an exceptional tool for environmental protection.They collect and store roofwater for use inside and outside the home.This simultaneously reduces the demand on our precious potable mains water and limits the amount of stormwater pollutants that enter our sensitive Bay.

Maintenance of rainwater tanks is relatively easy however it is important to do the following key tasks to ensure the quality of water is high:

- stop leaf litter and debris entering the tank.
- prevent bird droppings and dust building up in the gutters.
- prevent mosquitos and other animals entering the tank.

Tank connected to	toilet only ☐ toilet & irrigation ☐ toilet & laundry & irrigation ☐ toilet & laundry & hot water & irrigation ☐
Rainwater tank location	
Planning drawing number showing rainwater tank location	
Rainwater tank construction date	
Date of final building inspection	
Tank volume (litres)	
Area or percentage of the roof that is connected to the tank via gutters and downpipes	

Tips for undertaking maintenance

Things to look for and how to fix them.

Leaf litter / debris in gutters	Pump not working
Regularly clear your gutters. Make sure you cover the tank inlet if you're rinsing down the gutters to avoid debris entering the tank.	Check operating instructions for your pump. Check that pumps are kept clear of surface water (flooding), vegetation, and have adequate ventilation. Pumps should be serviced every few years to prolong the pump life.
Blocked downpipe	Mains backup or pump not working
If you see water spilling from the edge of the gutters check that the downpipe is not blocked, removing any debris.	Have you heard the pump operating? If the mains backup switching device fails many people do not notice for a long time. Consider a manual system if the switching device is problematic and you don't mind operating it manually.
First flush diverter clogging	Overflow
To clean out, unscrew the cap at the base of the diverter and remove the filter. Wash the filter with clean water and the flow restrictor inside the cap.	Check that the overflow is not blocked and that there is a clear path for water to safely spill from the tank through the overflow pipe when full. Check that a clean mesh screen is safely in place to prevent mosquitoes entering the tank.
Debris on the mesh cover over inlets / outlets	Sediment / debris build-up in tank (more than 20mm thick)
The fine stainless steel mesh is similar to fly screen mesh. It should be cleaned regularly to ensure it does not become blocked with leaves and other material.	Over time a small amount of fine sediment will collect in the bottom of your tank and this is harmless and natural. It should not be disturbed until it is approx 20 mm thick which may take many years.To clean your tank out simply empty your tank and wash out with a high-pressure washer or hose.
Dirt and debris around the tank base or side.	Base area
Keep leaf build-up, sticks, pot plants and other items off the lid of your tank. Use a hose to remove dust and dirt from the outside of the rainwater tank and ensure there is no debris on the base, bottom lip and walls of your tank.	Tanks must be fully supported by a flat and level base. Check for any movement, cracks or damage to the slab or pavers. If damage is observed, empty the tank to remove the weight and have the fault corrected to prevent damage to the tank. There is no warranty from suppliers for damage to a rainwater tank if the base has failed.
Smelly water or mosquitos	Monitoring the water level
Rainwater tanks can smell if there is debris in the gutters. Check the gutters and leaf strainers are clean. Mosquitos or wrigglers can make their way into your tank if they are small enough to pass through the inlet strainer. A very small amount of chlorine (approx 4 parts per million) can be put in the tank to kill off mosquitos or the bacteria causing odours. The chlorine will disinfect the water and then evaporate. Chlorine tablets from a pool supplier can be used (but check the recommended dose based on your tank capacity).	A range of devices are available to monitor water level. Some simple float systems can be used effectively.

Acknowledgement: Information from PJT Green Plumbing's 'Maintenance Guide for Your Rainwater Tank' was used to develop this fact sheet.

For more information please visit www.portphillip.vic.gov.au or contact the Sustainability team via:

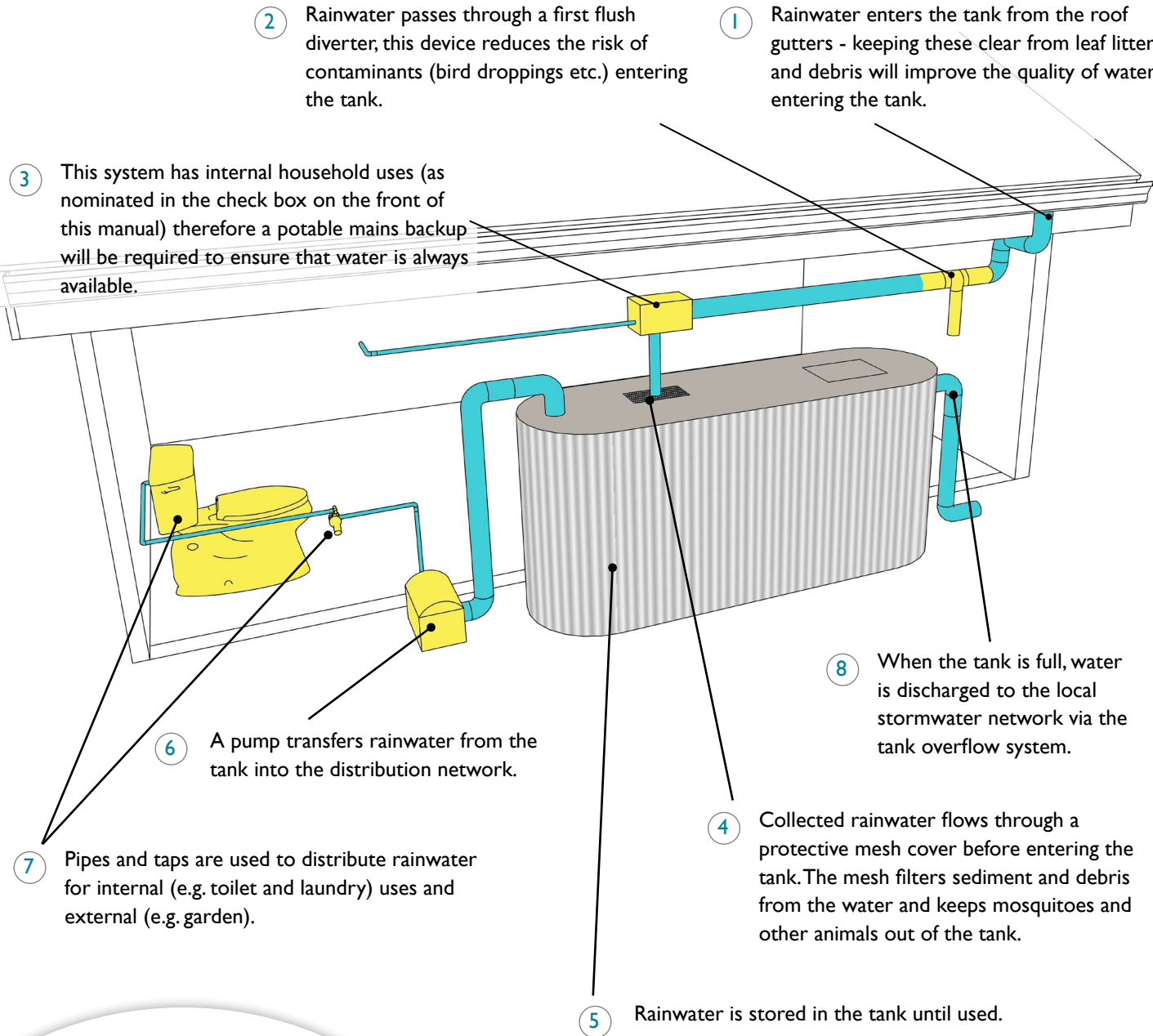
Phone: 03 9209 6777
email: sustainabledesign@portphillip.vic.gov.au



Maintenance Overview

Rainwater Tank Maintenance

The following diagram identifies the key items which are important for rainwater tanks and their maintenance.



Maintenance Checklist

The property owner is responsible for checking the maintenance items in this checklist at the recommended frequency at the bottom of the table. The maintenance log at the bottom of the page should be filled in once each maintenance check is complete. Upkeep of this maintenance log should continue throughout the life of the rainwater tank.

Item	Rainwater tank element	Inspection item	Y/N	Likely maintenance task
1	Roof gutters and downpipes	Is there leaf litter or debris in the gutters?		Remove by hand and dispose responsibly.
2	First flush diverter	Is there anything blocking the first flush diverter (leaves etc)?		Remove by hand and dispose responsibly.
3	Potable mains back up device	Is the potable mains back up switch operating correctly?		Repair or replace device. Consider a manual switching device.
4	Mesh cover	Has the mesh cover deteriorated or have any holes in it?		Replace mesh cover.
5	Tank volume	Is there large amounts of sediment or debris sitting in the bottom of the tank, reducing the volume available in the tank to store water?		Remove sediment and dispose responsibly.
6	Pump	Is the pump working effectively? Have you heard it on a regular basis?		Check the potable mains back up is not permanently on. Repair or replace pump.
7	Pipes and taps	Are pipes and taps leaking?		Repair as needed.
8	Overflow	Is the overflow clear and connected to the stormwater network?		Remove blockages and/or restore connections to stormwater network.
9	Supporting base	Are there any cracks or movement of pavers?		Empty the tank to reduce weight then repair any damage to the base.

Maintenance frequency

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
All tasks	x			x			x			x		

Regular maintenance will improve the water quality and extend the life of your system. A well maintained tank isn't likely to need to be cleaned out for up to ten years (when there is more than 20mm of accumulated sediment).

Maintenance Log

Maintenance date	Maintenance undertaken





Maintenance manual

Porous pavements

Site address: _____

Planning permit number: _____

Porous pavement maintenance

This manual lists the key tasks required to maintain porous pavement and the recommended frequency of each task. This manual can be submitted with planning permit applications for developments that include the installation of a domestic porous pavement. Once endorsed, the property owner is responsible for continuous implementation of porous pavement maintenance, in accordance with the guidance in this manual.

Porous pavements allow water to drain through the pavement surface and seep into the ground below. This benefits vegetation by improving access to air and water. It also helps the environment by reducing the amount of stormwater runoff and pollutants that enter the Bay.

Porous pavements can be constructed with loose gravel, structural gravel, structural grass, masonry pavers or engineered pavers. It is important to include a layer of sand or gravel under the porous pavers to improve drainage. In areas where soils have poor drainage (e.g. heavy clays) an underdrain may be needed under the drainage layer. In the City of Port Phillip soils are typically sandy and well drained so underdrains are often not required. However, this must be confirmed on a site by site basis.

Maintenance should focus on keeping the pavement porous so that water can continue to soak through it.

Porous pavement location	
Planning drawing number showing porous pavement location	
Porous pavement construction date	
Date of final building inspection	
Area of porous pavement (m ²)	
Area of catchment (m ²) (e.g. paving and/or roof) directed to the porous pavement (this will include the area of the pavement itself)	

Tips for undertaking maintenance

Things to look for and how to fix them.

Uneven surface /damaged sub-grade material	Water ponding on the pavement /blocked pavements
An uneven paving surface can result from the sub-grade material failing to provide an even base (from frequent wetting and drying). The paving and sub-grade material may need to be reset. Consider installing an impermeable liner (e.g. geotextile) below the drainage layer to prevent wetting and drying of the sub-grade. Issues for normal paving (like tree roots) may also be relevant.	Water ponding on porous pavements may be a result of sediment blocking the pavers. Remove any visible sediment build up by vacuum sweeping or using a broom. Dispose of sediment in nearby grassed areas or garden beds. Refill joint between pavers if required. Care needs to be taken with high pressure hoses as they can cause damage to loose material in the joints and sub-grade. In some cases resetting the pavers with thorough cleaning of accumulated sediment may be necessary.
Rubbish, leaf litter or sediment	Scour or erosion of joint material
It is important not to let sediment accumulate as it will block pavers or sub-grade material. Use a broom or high pressure hose as appropriate to remove and dispose responsibly. Care needs to be taken with high pressure hoses as they can cause damage to loose material in the joints and subgrade.	Erosion (particularly between the pavers) may result if water is concentrated in one spot (e.g. near a down pipe or point where water flows onto the porous paving or is concentrated by uneven surfaces). It may be necessary to re-profile the surface, resetting the gravel or material around pavers, adding more joint and drainage layer material.
Boggy soils caused by water not being able to drain from the site	Blocked underdrainage
Water should be moving through the pavers/joints to the sand/gravel drainage layer and into the subgrade material. Boggy soils may occur if an underdrain is blocked or is needed (if not initially installed). If an underdrain has been installed, lift the pavers to check for blockages. If an underdrain isn't present check for clogging of pavement and consider installing an underdrain if the problem persists.	Underdrainage is provided to collect the water moving through the pavers and direct it to the stormwater network. Often an inspection pit is provided so you can check that water is flowing in the underdrain following rainfall. If there is no water flowing, lift the pavers to check for blockages.

Porous pavement

Porous pavement can be created with traditional masonry tiles that have a porous jointing material between the tiles. The jointing material is often loose and not robust like typical grouting material – but it plays an important role in allowing the water to move through to the ground below. Care needs to be taken to not cause damage with high pressure hoses. It is important to sweep, top up joint material and occasionally reset the pavers to maintain an even surface.



Permeable pavement

Permeable pavement describes tiles that have been designed to allow water through (i.e. the tiles are porous). The permeable pavement can be laid with more robust grouting material. This means that a high pressure hose can be used to clean the pavers (although in some cases this may drive dirt further into the pores of the paver). Cleaning dust and dirt from the tile surfaces with a broom or vacuum sweeper will reduce clogging of open pores in the tiles, extending the functional life of the pavement.



For more information please visit www.portphillip.vic.gov.au or contact the Sustainability team via:

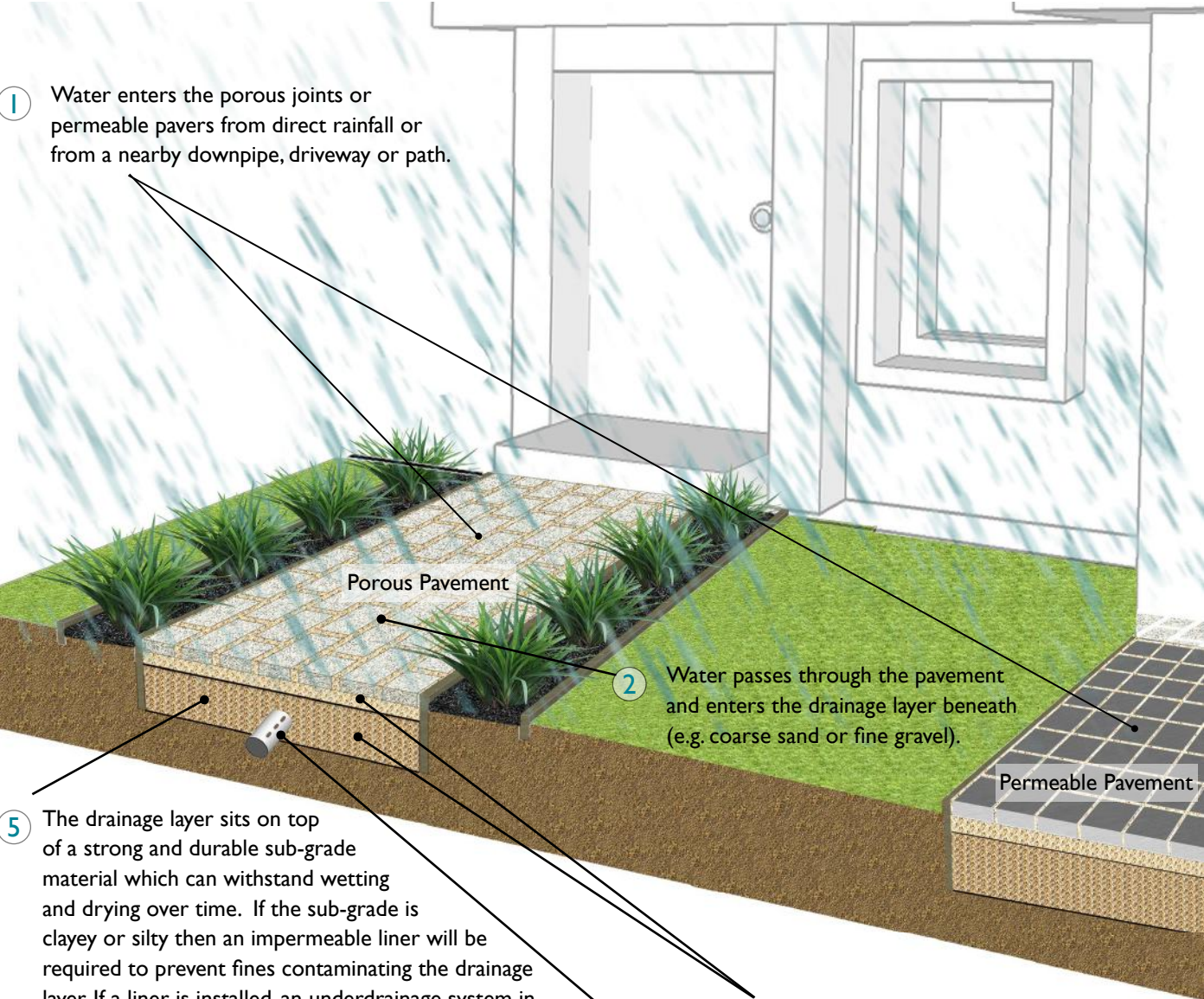
Phone: 03 9209 6777
email: sustainabledesign@portphillip.vic.gov.au



Maintenance Overview

Porous Pavement Maintenance

The following diagram identifies the key items which are important for permeable pavements and their maintenance.



1 Water enters the porous joints or permeable pavers from direct rainfall or from a nearby downpipe, driveway or path.

2 Water passes through the pavement and enters the drainage layer beneath (e.g. coarse sand or fine gravel).

5 The drainage layer sits on top of a strong and durable sub-grade material which can withstand wetting and drying over time. If the sub-grade is clayey or silty then an impermeable liner will be required to prevent fines contaminating the drainage layer. If a liner is installed, an underdrainage system in the drainage layer will also be required.

4 An underdrainage system may be included in the drainage layer to collect water and transfer it into the local stormwater network.

3 The permeable pavers sit on a 50mm deep bedding layer, below the bedding layer is a 200mm deep drainage layer. Typically coarse sand or fine gravel (2 – 5 mm) is suitable for both layers as it provides acceptable drainage and strength. If finer material is used for the bedding layer (or in the joints) a layer of filter material will be required to prevent fines from the bedding layer contaminating the drainage layer below.

Maintenance Checklist

The property owner is responsible for checking the maintenance items in this checklist at the recommended frequency at the bottom of the table. The maintenance log at the bottom of the page should be filled in once each maintenance check is complete. Upkeep of this maintenance log should continue throughout the life of the porous paving.

Item	Porous pavement element	Inspection item	Y/N	Likely maintenance task
1	Inflow to porous joints and/or permeable pavers	Has the material in the joints or drianage layer been eroded away or displaced by concentrated water flow?		Re-profile the surface with hand tools and top up joint and drainage layer material.
		Is there rubbish, leaf litter or sediment blocking the inflows?		Remove by hand and dispose responsibly.
2	Blocked pavement	Is water ponding and not draining through the pavement?		Remove sediment build up by vacuum sweeping or manually sweeping. Once removed, dispose of sediment in nearby grassed areas or garden beds.
		Is there unwanted vegetation in the pavement?		
3	Soggy and boggy soils	Is water not draining away from the area creating boggy and wet areas?		Ensure that the bedding and drainage layers contain appropriate material and haven't become blocked by fines/sediment. Replace this material as needed. If the problem persists consider installing an underdrain to enhance drainage. If an underdrain has been installed lift the pavers to check for blockages.
4	Underdrainage (if required)	Does water in the underdrain enter the local stormwater network after a storm?		Use an inspection pit (if available) to ensure that water is flowing in the underdrain following rainfall. If there is no water flowing lift the pavers and check for blockages.
5	Uneven pavements	Is the sub-grade material failing causing pavement to move and become uneven?		Consider installing an impermeable liner (e.g. geotextile) below the drainage layer to prevent wetting and drying of the sub-grade.

Maintenance frequency

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
x			x			x			x		

+ after heavy rainfall

Maintenance Log

Maintenance date	Maintenance undertaken





Maintenance manual

Raingardens



Site address: _____

Planning permit number: _____

Raingarden maintenance

This manual lists the key tasks required to maintain a domestic raingarden and the recommended frequency of each task. This manual can be submitted with planning permit applications for developments that include the installation of a domestic raingarden. Once endorsed, the property owner is responsible for continuous implementation of raingarden maintenance, in accordance with the guidance in this manual.

A raingarden is a specially designed garden that uses plants and soil to remove the pollutants from stormwater runoff that is generated from roofs, driveways and paths following rainfall events. These natural treatment systems help protect the environment by reducing the amount of stormwater runoff and pollutants that enter the Bay.

Maintenance of raingardens is essential in order to ensure that they:

- effectively treat stormwater,
- continue to look good, and
- don't cause local flooding.

Raingarden location	
Planning drawing number showing raingarden location	
Raingarden construction date	
Date of final building inspection	
Area of raingarden (m ²)	
Area of catchment (m ²) (e.g. roof and/ or paving) directed to the raingarden	

Tips for undertaking maintenance

Things to look for and how to fix them.

Scour or erosion	Weeds
Erosion and scour reduce the overall area of treatment by directing flows to certain areas only. Erosion or scour can be re-profiled with hand tools, limiting the damage to adjacent vegetation. If fill material is required to create a flat surface, use an appropriate raingarden planting media mix. If erosion / scour keeps happening at the inlet, place some small rocks where erosion occurs.	Weeds can take over the plants which are needed in the raingarden for treatment. Hand pull weeds and dispose of appropriately. Plant bare patches if needed. Weeding should take place before the plants flower to reduce the likelihood of seed dispersal and further regeneration.
Rubbish, leaf litter or sediment	Moss or clay on surface
A lot of rubbish or leaf litter at the inlet or on the surface of the raingarden can affect how well water can enter and filter through the raingarden. This material can be removed easily by hand or with tongs / rakes. Collected litter should be placed into bags or similar for disposal.	Moss or clay on the surface of the raingarden can result in a crust forming which prevents water from filtering and being treated. Use hand tools to scrape off the clay or moss and dispose of appropriately. Check raingarden drains.
Uneven surface	Raingarden outlets not draining
An uneven surface may result in some areas not getting wet during rain events, reducing the area of treatment. Depressions or mounds can be flattened with hand tools, limiting the damage to vegetation.	Blockages of outlet pits and pipes can cause a flooding risk for the property as water is unable to leave the raingarden. Blockages are typically caused by sediment, leaf litter and rubbish. Blockages should be removed manually, by hand or with hand tools such as tongs and shovels. Large blockages in pits may require vacuuming or other appropriate machinery.
Elevated surface level / lots of excess sediment on surface	Impermeable liner
If sediment has entered the system and has raised the level of the surface, this reduces the amount of water which can be filtered. Use hand tools to remove/scrape sediment from around the plants. Remove sediment from the raingarden and dispose of appropriately.	An impermeable liner (e.g. geotextile or flexible membrane) is sometimes used to ensure water does not move into the surrounding soils. This may be required if the surrounding soils are very sensitive to any added moisture (e.g. sodic soils, shallow groundwater or close proximity to significant structures such as building foundations).
Unhealthy or dying plants / bare patches	Raingarden holding water on the surface because of blocked planting media
Good plant cover is critical for raingardens so if plants are looking stressed in dry periods, irrigation may be required. Remove (prune) any areas affected by disease or pests. If the plants are dying and have created bare patches, the plants need to be replaced. If the plants keep struggling, replace with a plant type which is growing well in the raingarden.	Generally raingardens should be able to filter water at a rate of ~100mm per hour. If the surface of the raingarden is clogged (by clay or moss etc.) or the underlying filter media is not appropriate then water will not be able to drain through the system to be treated. If the surface is clogged use hand tools to scrape off the clay or moss. If this doesn't fix the drainage issue remove an area of planting media to expose the filter media. Check that water can pass through the filter media by pouring water on its exposed surface. If the water can drain then replace the top planting media and check for blockages elsewhere. If the water does not drain the filter media will need to be replaced.

For more information please visit www.portphillip.vic.gov.au or contact the Sustainability team via:

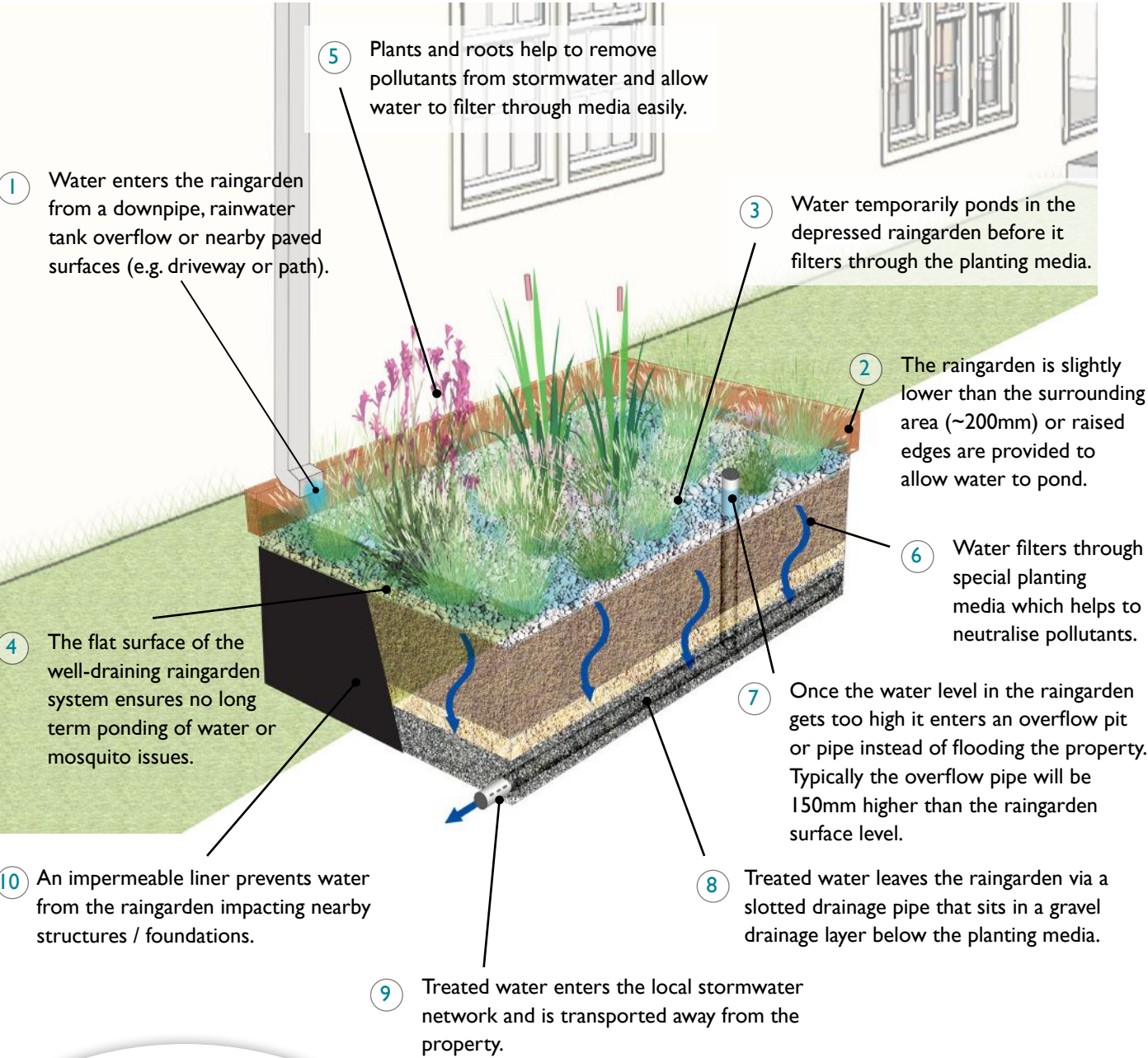
Phone: 03 9209 6777
email: sustainabledesign@portphillip.vic.gov.au



Maintenance Overview

Raingarden Maintenance

This diagram depicts an in-ground raingarden. Raised bed raingardens are also common (refer to photograph).



Note: It is important not to add fertiliser, compost or floatable mulch to a raingarden as the nutrients will pass through the raingarden and pollute the Bay. The plants best suited to raingardens will grow well in the planting media and take nutrients for their growth from the water entering the raingarden.

Maintenance Checklist

The property owner is responsible for checking the maintenance items in this checklist at the recommended frequency at the bottom of the table. The maintenance log at the bottom of the page should be filled in once each maintenance check is complete. Upkeep of this maintenance log should continue throughout the life of the raingarden.

Item	Raingarden element	Inspection item	Y/N	Likely maintenance task							
1	Raingarden inlet	Is there scour or erosion where water enters the raingarden?		Re-profile with hand tools, place gravel or stones at the inlet.							
		Is there rubbish, leaf litter or sediment blocking the inlet?		Remove by hand and dispose responsibly.							
2	Raingarden surface level	Is the level of the raingarden surface sitting less than 5 cm below the raingarden edges/borders?		Remove sediment from the surface so it is sitting about 10-20 cm below surrounding areas.							
3	Raingarden temporary detention	Is there moss or clay on the surface of the raingarden which seem to be slowing the filtration of flows?		Remove the crust from the top of the raingarden and check water will filter through exposed media.							
4	Raingarden surface	Are there areas which appear to be higher and are not getting wet during rain events?		Smooth out surface so it is flat with hand tools.							
		Are there areas which have been eroded away or scoured?									
5	Plants	Are the plants looking unhealthy or dying?		Prune diseased sections, irrigate and/ or replace dead plants. If plants keep dying, replace with a different type which is doing well. Do not use fertilizer to improve plant health as this will pollute the raingarden.							
		Are there bare patches forming between plants?									
		Are there weeds present?		Remove weeds by hand and dispose responsibly.							
6	Planting media	Is the raingarden holding water for more than a couple of hours after the rain has stopped?		Remove and replace the top 100 mm of planting material (loamy sand).							
7	Overflow pit / pipe	Is there anything blocking the top of the overflow pit / pipe preventing water from entering?		Remove blockages and dispose responsibly.							
8	Underdrainage	Is there rain draining to the bottom of the raingarden following heavy rain?		Flush the underdrain or uncover it to check for blockages.							
9	Stormwater network connection	Is there water ponding in the overflow pit or pipe and not entering the stormwater network?		Remove blockages and dispose responsibly.							
Maintenance frequency											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
			x						x		
+ after heavy rainfall											

Maintenance Log

Maintenance date	Maintenance undertaken





Appendix 3 – Green Star VOC Limits

VOC Limits for Paints, Adhesives and Sealants

Product Category	Maximum VOC content (g/L)
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 sealants, waterproofing membranes and sealants, fire retardant sealants and adhesives	250
Structural glazing adhesive, wood flooring and laminate adhesives and sealants	100

VOC Limit for Carpets

Test Protocol	Limit (mg/m ² per hour)
ASTM D5116 – Total VOC Limit	0.5
ASTM D5116 – 4 -PC (4-Phenylcyclohexene)	0.05
ISO 16000 / EN 13419 – TVOC at three days	0.5
ISO 10580 / ISO/TC 219 (Document N238) – TVOC at 24 hours	0.5

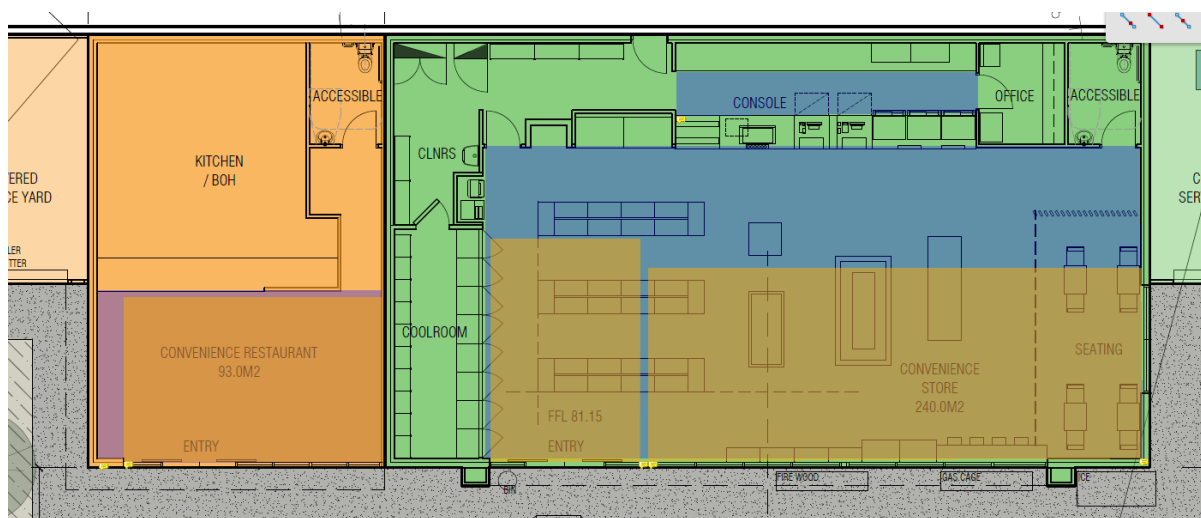


Appendix 4 – Daylight Hand Calculation

Daylight access in the café was assessed using the Green Star Daylight Hand Calculation.

The Green Star Daylight Hand Calculation is a simple method to assess how much of a space has achieved the minimum BESS best practice requirement (2% Daylight Factor (DF)). The calculation is based on one simple formula as follows: Zone of compliance = 2 x Height of window above working plane x Width of the window. Windows must have a minimum of 40% VLT to use this hand calculation method.

Working plane is 700mm for the store and restaurant. See below for a mark-up of nominated areas (blue) and compliant areas (orange):



Note the below table represents daylight performance outcomes for office spaces:

Space Type	Nominated Area (m ²)	Floor Area Compliant (m ²)	Compliant Areas (%)
Convenience Store	157.1	92.5	59%
Convenience Restaurant	35	30.4	87%
TOTAL	192.1	122.9	64%



Appendix 5 – BESS Report

BESS Buildings Report

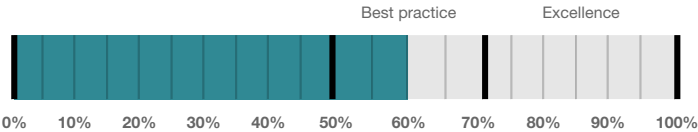
Built Environment Sustainability Scorecard



This BESS report outlines the sustainable design commitments of the proposed development at 75-81 Murradoc Rd, Drysdale VIC 3222, Australia Drysdale Victoria 3222. 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

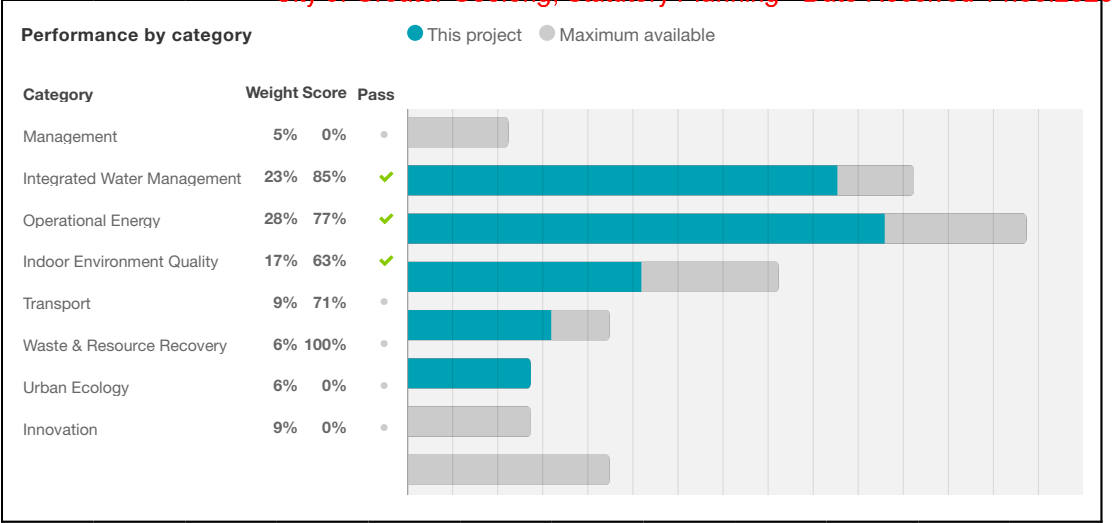


62%

Project details

Name	75-81 Murradoc Road, Drysdale
Address	75-81 Murradoc Rd, Drysdale VIC 3222, Australia Drysdale Victoria 3222
Project ID	FBD48C29-R3
BESS Version	BESS-10
Date	28 July 2026
Software version	2.3.0-B.655
Site type	Non-residential development
Account	admin@msconsultants.com.au
Application no.	
Site area	5,455 m²
Building floor area	333 m²





Buildings

Name	Height	Footprint	% of total footprint
Convenience Store + restaurant	1	333 m²	100%

Dwellings & Non Res Spaces

Non-Res Spaces

Name	Quantity	Area	Building	% of total area
Shop				
Retail + Restaurant	1	333 m²	Convenience Store + restaurant	100%
Total	1	333 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)		-
Operational Energy 4.2	Location and size of solar photovoltaic system		-
Transport 1.4	Location of non-residential bicycle parking spaces		-
Transport 1.5	Location of non-residential visitor bicycle parking spaces		-
Transport 2.1	Location of electric vehicle charging infrastructure		-

Credit	Requirement	Response	Status
Waste & Resource Recovery 2.1	Location of food and garden waste facilities		-
Waste & Resource Recovery 2.2	Location of recycling facilities		-

Supporting Documentation

Credit	Requirement	Response	Status
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%

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

IWM Overall contribution 22.5%

		85%	✓ Pass
1.1 Potable Water Use		75%	✓ Achieved
2.1 Stormwater Treatment		100%	✓ Achieved
3.1 Water Efficient Landscaping		N/A	✦ Scoped Out
			N/A
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.	

IEQ Overall contribution 16.5%

		Minimum required 50%	63%	✓ Pass
1.4 Daylight Access - Non-Residential			64%	✓ Achieved
2.3 Ventilation - Non-Residential			33%	✓ Achieved
3.4 Thermal comfort - Shading - Non-Residential			100%	
3.5 Thermal Comfort - Ceiling Fans - Non-Residential			100%	
4.1 Air Quality - Non-Residential			100%	

Transport Overall contribution 9.0%

		71%
1.4 Bicycle Parking - Non-Residential		100%
1.5 Bicycle Parking - Non-Residential Visitor		100%
1.6 End of Trip Facilities - Non-Residential		0% ⚡ Disabled
		Credit 1.4 must be complete first.
2.1 Electric Vehicle Infrastructure		100%
2.3 Motorbikes / Mopeds		0%

Waste & Resource Recovery Overall contribution 5.5%

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

Urban Ecology Overall contribution 5.5%

		0%
1.1 Communal Spaces		N/A  Scoped Out
		N/A
2.1 Vegetation		0%
2.2 Green Roofs		0%
2.3 Green Walls and Facades		0%
3.2 Food Production - Non-Residential		0%

Innovation Overall contribution 9.0%

		0%
1.1 Innovation		0%

Credit breakdown

Management Overall contribution 4.5%

	0%
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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		0%
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 ?	
Shop	No	
Criteria	Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star?	
Question	Criteria Achieved ?	
Shop	No	
3.2 Metering - Non-Residential		N/A  Scoped Out
		N/A
This credit was scoped out	N/A	
3.3 Metering - Common Areas		N/A  Scoped Out
		N/A
This credit was scoped out	N/A	
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	

IWM Overall contribution 22.5%

85% ✔ Pass

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?: Blue Factor

Blue Factor score achieved?: 203

Flow: 1 %

Total Suspended Solids: 83 %

Total Phosphorus: 74 %

Total Nitrogen: 53 %

Rainwater tank profile

What is the total roof area connected to the rainwater tank?:

Tank 597 m²

-

Tank Size:

Tank 42,000 Litres

-

Irrigation area connected to tank:

Tank 0.0 m²

-

Is connected irrigation area a water efficient garden?:

Tank No

-

Other external water demand connected to tank?:

Tank 0.0 Litres/Day

-

Fixtures, fittings & connections profile

Building: Convenience Store + restaurant

Showerhead: Scope out

Bath: Scope out

Kitchen Taps: >= 5 Star WELS rating

Bathroom Taps: >= 5 Star WELS rating

Dishwashers: Scope out

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?: Tank

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			75%	✓ 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	449 kL			
Output	Proposed (excluding rainwater and recycled water use)			
Project	319 kL			
Output	Proposed (including rainwater and recycled water use)			
Project	218 kL			
Output	% Reduction in Potable Water Consumption			
Project	51 %			
Output	% of connected demand met by rainwater			
Project	100 %			
Output	How often does the tank overflow?			
Project	Very Often			
Output	Opportunity for additional rainwater connection			
Project	65 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	Min Blue Factor Score			
Project	100			
Output	Blue Factor Score			
Project	203			
3.1 Water Efficient Landscaping			N/A	✖ Scoped Out
				N/A
This credit was scoped out	N/A			
4.1 Building Systems Water Use			0%	
Score Contribution	This credit contributes 6.7% 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			

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?:	Yes
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): 3kW per tenancy	6.0 kW peak
Orientation (which way is the system facing)?: 3kW per tenancy	North
Inclination (angle from horizontal): 3kW per tenancy	10.0 Angle (degrees)
Non-residential Deemed-to-Satisfy profile	
Do all exposed floors and ceilings (forming part of the envelope) demonstrate a minimum 10% improvement in 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	37%
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	100%
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	100%
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	100%

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 ?	
Shop	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	
Shop	7,271 kWh	
Output	% of Building's Energy	
Shop	19 %	
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.	

IEQ Overall contribution 16.5%

		Minimum required 50%	63%	✓ Pass
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1.4 Daylight Access - Non-Residential			64%	✓ 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?			
Shop	64 %			
2.3 Ventilation - Non-Residential			33%	✓ 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?			
Shop	-			
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?			
Shop	50 %			
Criteria	What CO2 concentrations are the ventilation systems designed to achieve, to monitor and to maintain?			
Question	Value			
Shop	-			
3.4 Thermal comfort - Shading - Non-Residential			100%	
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?			
Shop	100 %			
3.5 Thermal Comfort - Ceiling Fans - Non-Residential			100%	
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?			
Shop	100 %			
4.1 Air Quality - Non-Residential			100%	
Score Contribution	This credit contributes 5.9% towards the category score.			

Criteria	Do all paints, sealants and adhesives meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Shop	Yes
Criteria	Does all carpet meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Shop	Yes
Criteria	Does all engineered wood meet the maximum total indoor pollutant emission limits?
Question	Criteria Achieved ?
Shop	Yes

Transport Overall contribution 9.0%

		71%
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1.4 Bicycle Parking - Non-Residential		100%
Score Contribution	This credit contributes 28.6% 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 ?	
Shop	Yes	
Question	Bicycle Spaces Provided ?	
Shop	-	
1.5 Bicycle Parking - Non-Residential Visitor		100%
Score Contribution	This credit contributes 14.3% 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 ?	
Shop	Yes	
Question	Bicycle Spaces Provided ?	
Shop	-	
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 28.6% towards the category score.	
Criteria	Are facilities provided for the charging of electric vehicles?	
Question	Criteria Achieved ?	
Project	Yes	
2.3 Motorbikes / Mopeds		0%
Score Contribution	This credit contributes 14.3% 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%

		100%
1.1 Construction Waste - Building Re-Use		N/A ✦ Scoped Out
		Undeveloped site
This credit was scoped out		Undeveloped site
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	

Urban Ecology Overall contribution 5.5%

	0%
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1.1 Communal Spaces	N/A	Scoped Out
N/A		
This credit was scoped out	N/A	
2.1 Vegetation		0%
Score Contribution	This credit contributes 57.1% 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	0 %	
2.2 Green Roofs		0%
Score Contribution	This credit contributes 14.3% 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 14.3% 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		0%
Score Contribution	This credit contributes 14.3% towards the category score.	
Criteria	What area of space per occupant is dedicated to food production?	
Question	Food Production Area	
Shop	-	
Output	Min Food Production Area	
Shop	9 m²	

Innovation Overall contribution 9.0%

	0%
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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)?	

Disclaimer

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

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