

# Sustainable Design Assessment…

## 168-170 Fyans Street, South Geelong VIC 3220

passivenergy
Sustainable Building Consultants

# Job Details…

| | |
|---|---|
| **Job Number:** | 260770 |
| **Date:** | 19th October 2026 |
| **Address:** | 168-170 Fyans Street, South Geelong VIC 3220 |
| **Project:** | Proposed office, restricted retail and warehouse |
| **Client:** | |
| **Plan Reference:** | Prepared by Projekt Evolve |
| **Assessor:** | Proud Kraturerk |
| **Council:** | Greater Geelong City Council |
| **Panning Scheme:** | Clause 15.01-2L |
| **BESS Project Number** | A0451DED |

# Revision Details…

| Rev. | Revision Details | Date |
|---|---|---|
| **A.** | Preliminary report for review | 12th August 2026 |
| **B.** | SDA Report | 28th August 2026 |
| **C.** | Amendment per updated plan | 3rd September 2026 |
| **D.** | Warehouse/retail store daylight access removed | 7th September 2026 |
| **E.** | Amendment per RFI | 19th October 2026 |

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# Executive Summary…

This Sustainable Design Assessment has been prepared to assess the proposed development from an environmentally sustainable design perspective and to document the key sustainability initiatives incorporated into the project for the purposes of the planning permit process.

In Victoria, Sustainable Design Assessments are commonly requested by councils for smaller developments as part of the planning application process, while larger developments may instead require a Sustainability Management Plan. The BESS framework states that a BESS report can be used to support these submissions and that the applicable trigger thresholds are set by individual councils according to local development context.

This report has been prepared having regard to the relevant planning and sustainability framework applicable to the site, including the local planning context, the use of recognised assessment tools such as BESS, and the design response proposed for the development. BESS describes itself as a planning-stage sustainability assessment tool created by Victorian local governments to assist builders and developers in demonstrating sustainable design outcomes.

Based on the information made available at the time of assessment, the proposed development is assessed as Capable of Supporting the Proposed Sustainable Design Response in accordance with the sustainability principles and project-specific recommendations identified in this report.

# Scope of Assessment…

This report applies to the proposed development at 168-170 Fyans Street, South Geelong and has been prepared for the purpose of documenting the sustainable design response for the site in support of a planning permit application and associated design review process.

The scope of this report generally includes:

- review of the proposed development type and scale
- review of the project's sustainability objectives
- assessment of key environmental design measures
- review of energy efficiency, water efficiency, stormwater management, indoor environment quality, transport, waste and urban ecology initiatives, where relevant
- review of the project using the applicable planning-stage sustainability assessment framework
- identification of design issues affecting sustainability performance
- provision of recommendations intended to support best-practice or improved sustainable design outcomes

This report is based on the plans, drawings, schedules and supporting information made available at the time of assessment and should be read in conjunction with those documents.

Where the site layout, dwelling mix, material selections, façade design, building services, landscape strategy, water strategy or other sustainability-related project parameters are amended after the date of this report, reassessment may be required.

# Compliance Framework…

This report has been prepared with reference to the following planning and guidance framework.

**Victorian planning policy relating to environmentally sustainable development**

Planning Victoria states that the planning system has been updated to better support environmentally sustainable development and climate change responses, and that new policies and standards are being developed to improve the sustainability of buildings and subdivisions across Victoria.

**Local planning policy and council ESD frameworks**

Many Victorian councils have adopted ESD planning policy frameworks and application requirements that require either a Sustainable Design Assessment or Sustainability Management Plan, depending on project scale. Recent planning scheme material for multiple Victorian municipalities shows explicit SDA requirements and confirms that councils often require supporting assessments prepared using BESS, STORM, MUSIC or other methods.

**BESS – Built Environment Sustainability Scorecard**

BESS states that it is a planning-stage sustainability assessment tool created by local governments in Victoria. BESS also states that it assesses projects across nine environmental categories and supports the Sustainable Design Assessment in the Planning Process framework.

**Sustainable Design in Planning framework**

The BESS Sustainable Design in Planning fact sheet states that BESS can be used to undertake a Sustainable Design Assessment and that the BESS report can be submitted with a planning permit application.

This report has been prepared having regard to the relevant Victorian planning policy direction for environmentally sustainable development, the local council sustainable design framework, and the recognised planning-stage assessment tools commonly used for SDA submissions.

# Purpose of a WSUD Assessment…

The purpose of a Sustainable Design Assessment is to demonstrate that sustainability has been meaningfully considered in the design of the proposed development at the planning stage. An SDA should show how the design responds to the applicable environmental objectives and how the development seeks to reduce resource consumption, improve occupant amenity, support resilience, and reduce environmental impact over the life of the building.

BESS states that it assesses projects across nine categories: Management, Water, Energy, Stormwater, Indoor Environment Quality, Transport, Waste, Urban Ecology, and Innovation. It also explains that BESS uses an overall scoring system and mandatory pass categories for Indoor Environment Quality, Energy, Water and Stormwater.

A strong SDA should therefore do more than merely attach a scorecard. It should explain the sustainability intent of the design, summarise the relevant initiatives being adopted, identify where the project performs strongly, and note any recommendations or conditions required to improve the sustainability outcome.

# Assessment Methodology…

This assessment has been prepared using a structured sustainable design review methodology appropriate to the scale and nature of the proposed development.

Depending on project type, the methodology may include:

- review of the site and development layout
- review of passive design opportunities and constraints
- review of building fabric and glazing strategy
- review of energy and water efficiency measures
- review of stormwater management initiatives
- review of indoor environment quality considerations
- review of bicycle parking, transport and travel initiatives
- review of waste and recycling arrangements
- review of landscape and urban ecology measures
- completion of a BESS assessment, where applicable
- review of supporting tools such as STORM, BlueFactor or MUSIC where relevant to specific categories

The assessment has been prepared as a planning-focused sustainability review intended to demonstrate how the proposed development responds to applicable sustainable design objectives, rather than as a construction-stage certification report or post-occupancy operational audit.

BESS states that the questions and information required by the tool are tailored to the size and type of development being assessed, and that the tool is intended to support planning-stage sustainable design submissions.

# Online Assessment Tools and Scorecards Used

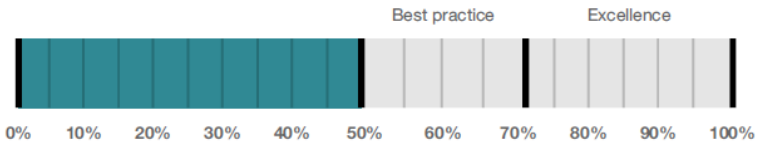
To support the preparation of this assessment, a number of recognised online tools, scorecards and calculator-based methods may be used, depending on the nature, scale and location of the project. These tools assist in structuring the assessment, improving consistency, and providing a transparent basis for documenting sustainability outcomes at planning stage. Unless expressly stated otherwise, these tools are used as **assessment aids** only and should be read together with the broader design review, consultant judgement, and the project documentation relied upon for this report.

| Tool/ Scorecard | Purpose | Application to This Report |
|---|---|---|
| BESS | The Built Environment Sustainability Scorecard (BESS) is a planning-stage sustainability assessment tool developed by local governments in Victoria. It assesses projects across categories including management, water, energy, stormwater, indoor environment quality, transport, waste, urban ecology and innovation, and produces an overall score against a benchmark project. | In this report, the BESS scorecard is used to provide a structured and transparent summary of the project's sustainability initiatives and to support council review of the proposed environmentally sustainable design response. |
| Bluefactor | BlueFactor is an online stormwater assessment tool used in Victoria to assess stormwater runoff and pollutant loads generated by a development and to identify suitable treatment responses. Melbourne Water states that BlueFactor has replaced the STORM Calculator for small developments in Victoria and can be used for planning applications. | In this report, the BlueFactor scorecard is used to assist in demonstrating the development's stormwater quality response and to document how proposed treatment measures contribute toward achieving the relevant planning and stormwater management objectives. |
| WalkScore | Walk Score is a location-based walkability indicator that assigns a score out of 100 based on the walking distance to nearby amenities. Its published methodology explains that points are awarded according to the distance to destinations, with closer amenities receiving higher weighting. | In this report, the Walk Score scorecard may be used as a general indicator of neighbourhood walkability and local accessibility, assisting in the discussion of sustainable transport, liveability and reduced car dependence outcomes associated with the site. It is used as a contextual metric rather than a statutory compliance tool. |
| Daylight Modelling | Daylight modelling has been undertaken using the Better Building app to assess daylight access within the building. The modelling provides a quantitative assessment of daylight performance across the nominated occupied areas and assists in identifying areas that achieve the relevant daylight requirements.<br>The Better Building app uses building geometry, glazing properties, orientation, and other relevant design inputs to simulate daylight conditions within the | The daylight modelling results have been used as a supporting design review tool to demonstrate and document daylight performance within the assessed areas. |

| | | |
|---|---|---|
| | assessed spaces. The results provide a clear and consistent basis for reviewing daylight access and supporting the project's Indoor Environment Quality assessment. | |
| NCC 2022 Volume One Façade Calculator | The NCC 2022 Volume One Façade Calculator is an ABCB calculator resource intended to help users understand and apply the façade-related Deemed-to-Satisfy provisions of NCC Volume One Part J4D6 Building fabric. | In this report, the façade calculator may be used as a supporting assessment aid to review façade performance inputs and document the basis of the Section J or broader building fabric analysis undertaken for the project. It is used to support the assessment process, not as a substitute for professional review or compliance judgement. |

# BESS Assessment…

**Your BESS Score**



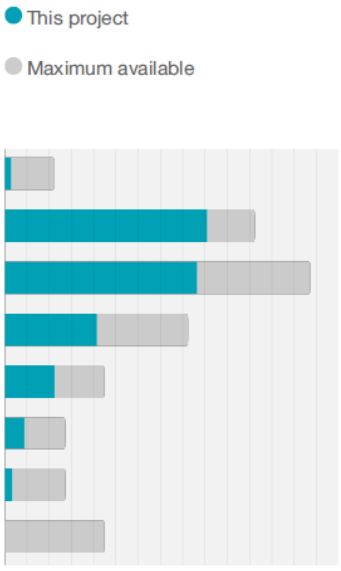

**51%**

**Project details**

| | |
|---|---|
| Name | 168-170 Fyans Street, South Geelong |
| Address | 168-170 Fyans St South Geelong Victoria 3220 |
| Project ID | A0451DED-R4 |
| BESS Version | BESS-10 |
| Date | 19 October 2026 |
| Software version | 2.3.0-B.657 |
| Site type | Non-residential development |
| Account | rob@passivenergy.com.au |
| Application no. | |
| Site area | 1,011 m² |
| Building floor area | 1,100 m² |

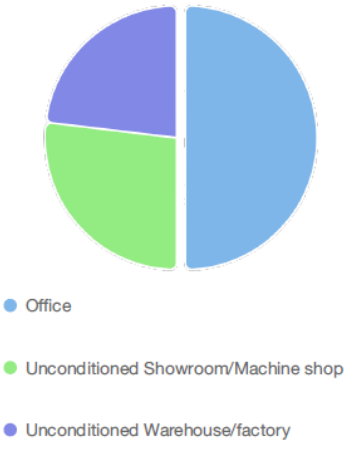
# Performance By Category…

**Performance by category**




| Category | Weight | Score | Pass |
|---|---|---|---|
| Management | 5% | 14% | |
| Integrated Water Management | 23% | 81% | ✓ |
| Operational Energy | 28% | 63% | ✓ |
| Indoor Environment Quality | 17% | 50% | ✓ |
| Transport | 9% | 50% | |
| Waste & Resource Recovery | 6% | 33% | |
| Urban Ecology | 6% | 12% | |
| Innovation | 9% | 0% | |

**Project composition**



# Water requirements…

**Objectives**

- To improve water efficiency.
- To reduce total operating potable water use.
- To encourage the collection and reuse of stormwater.
- To encourage the appropriate use of alternative water sources (eg. Grey water)

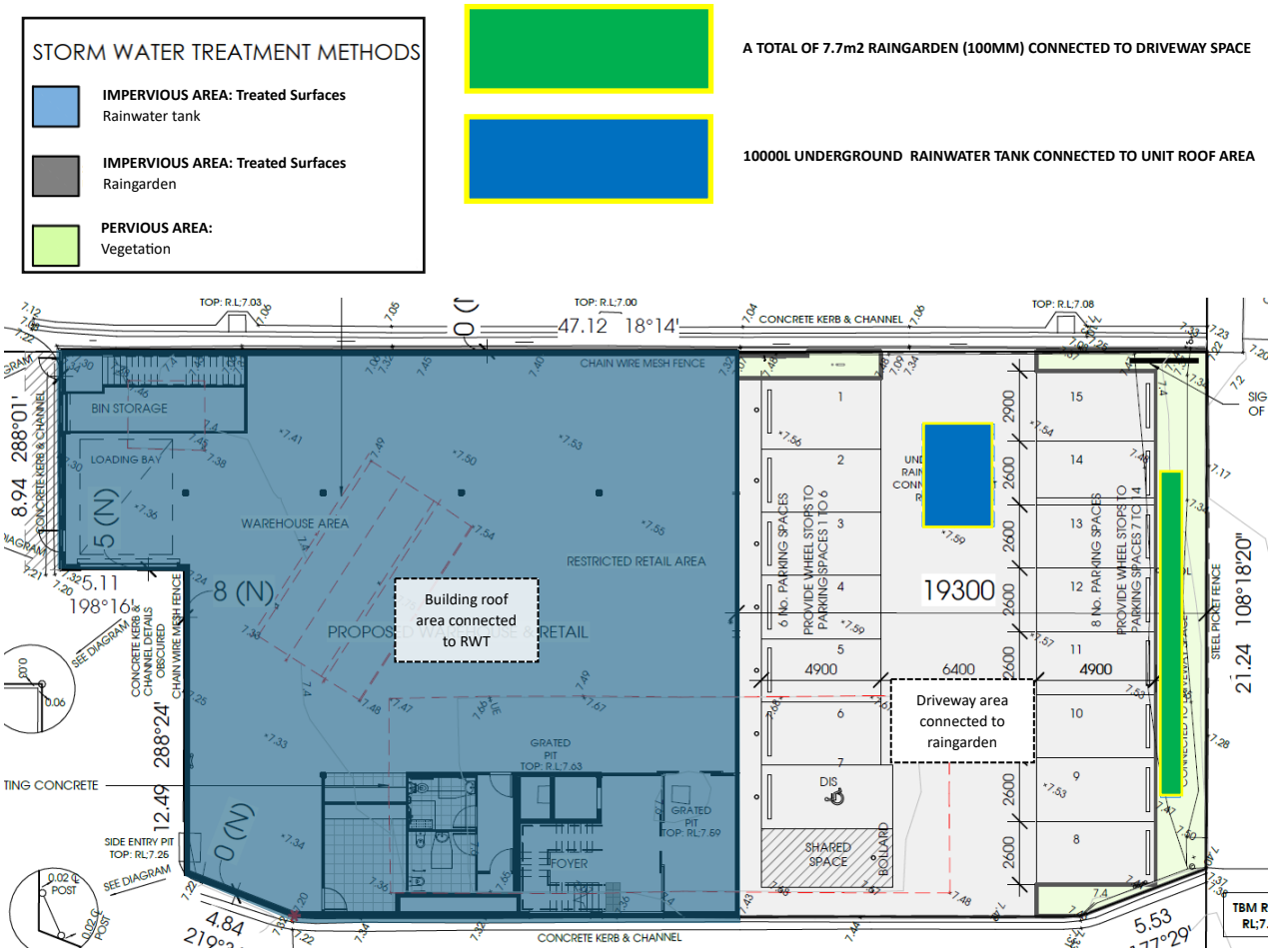
**Initiatives**

- Rainwater tank details
  - 10,000L water tank connect to 570m2 of roof area.
  - Rainwater tanks connected to all toilet flushing and irrigation area.
- Water efficient landscaping.
  - A landscape plan prepared by a suitable landscape architect to nominate water efficient vegetation throughout the development.
  - For outdoor water reductions, plants, shrubs and lawn which require low amounts of water (drought-resistance) should be chosen. Native plants will be selected as they use less water and are more resistant to local plant diseases. Plant slopes with plants that will retain water and help reduce runoff.
  - Group plants according to their watering needs.
  - Mulch will slow evaporation of moisture while discouraging weed growth. Adding 2 - 4 inches of organic material such as compost or bark mulch will increase the ability of the soil to retain moisture.
- Fixtures, fittings & connections
  - Shower heads to be 4 Star WELS rating(>=6.0 but <= 7.5).
  - Kitchen taps to be 5 Star WELS rating.
  - Bathroom taps to be 5 Star WELS rating.
  - Toilets to be 4 Star WELS rating.

**Stormwater Treatment Stratagy**

| Hard Surface | Area | Nominated treatment type |
|---|---|---|
| Driveway and carpark | 382.55m2 | 7.7m2 Raingarden (100mm) |
| Building roof area | 572m2 | 10,000L Rainwater tank |
| Rainwater tank note: | Water tanks to be connected to toilet flushing<br>Irrigation garden area will be supplied by rainwater tank | |

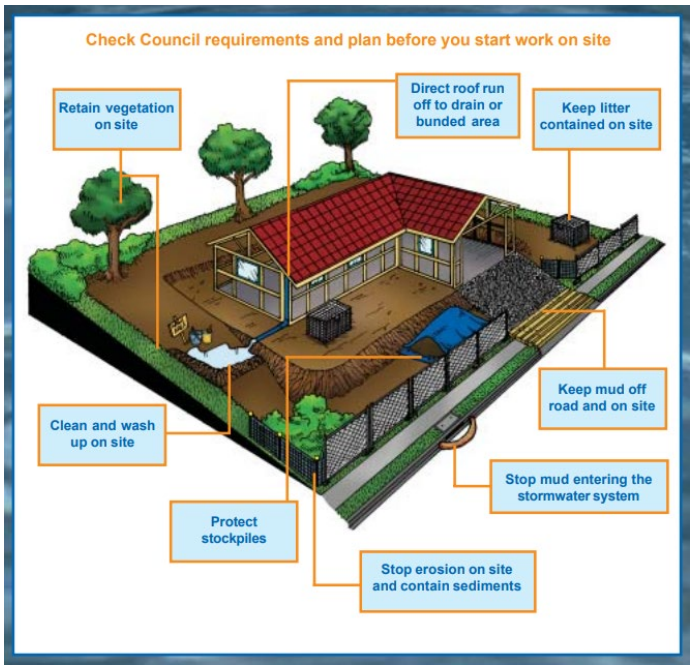
## Indicative Stormwater Treatment Plan




***Note:***

- *Plan is indicative only and final locations of treatment systems and roof catchment area is subject to civil engineering.*
- *Residual stormwater flows not connected to a treatment type will be direct to LPOD.*
- *Please refer to civil engineering plans (once prepared) for detailed drainage designs.*

**Stormwater Site Management Initiatives**




*Sourced from: Keeping our Stormwater Clean – A Builder's Guide, Melbourne Water.*

**6 Site Rules to Keep The Stormwater Clean:**

1. Check council requirements and plan before you start work on site.
2. Stop erosion onsite and contain sediments.
3. Protect stockpiles.
4. Keep mud off road and on site.
5. Keep litter contained on site.
6. Clean and wash up on site.

The methods and processes specified in "Keeping our Stormwater Clean – A Builder's Guide, developed by Melbourne Water will be adhered to by the builder/developer for managing the construction site.

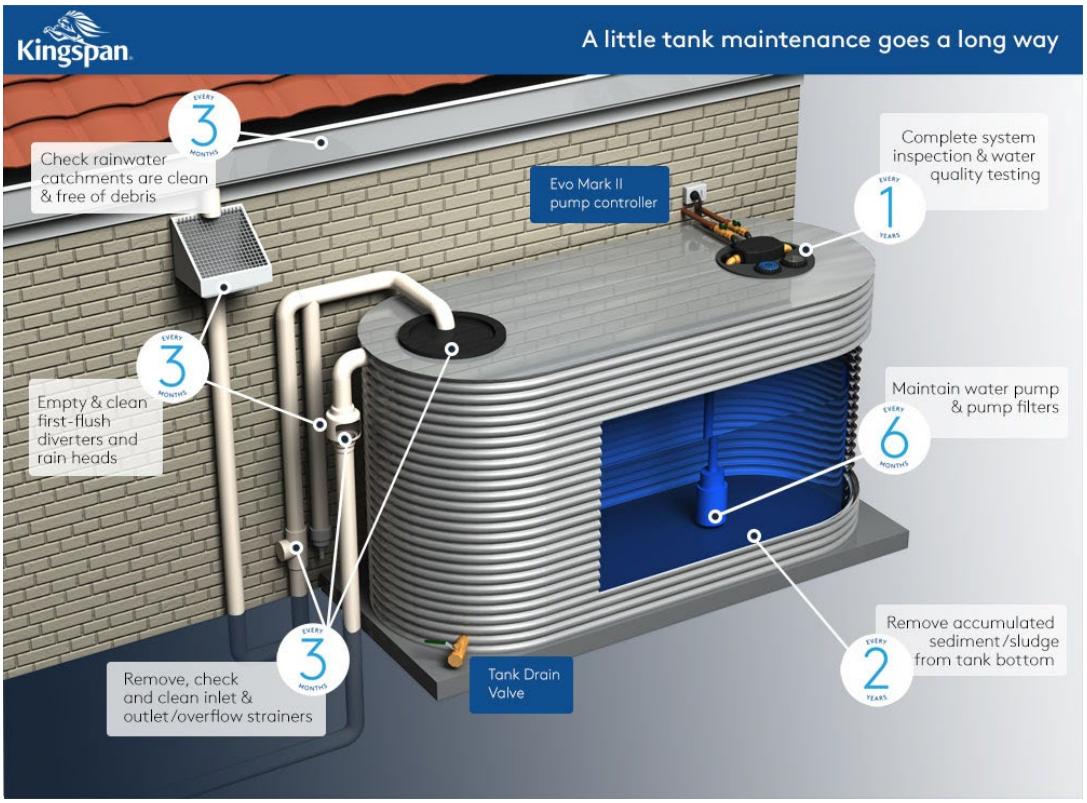
https://www.clearwatervic.com.au/resource-library/guidelines-and-strategy/keeping-our-stormwater-clean-a-builders-guide.php

# Rainwater Tank Maintenance Schedule…

Regular inspections and maintenance of the proposed stormwater treatment systems are essential to ensure their continued effectiveness. It is the responsibility of the building owner(s) to implement the necessary maintenance measures for the rainwater tank(s). While general maintenance guidelines are outlined in the tables below, any specific instructions provided by the product manufacturer must also be followed and will take precedence over the general requirements.

The following need to take place onsite to ensure compliance with WSUD requirements and maintain operation of rainwater tank(s) and connections onsite.

| Task | When? | Requirement |
|---|---|---|
| Inspect rainwater tanks | Every 6 months | • Check for any damage/compression<br>• Check any blockage of first flush diverter<br>• Correct operation of potable mains back up switch<br>• Check that mesh covers have not deteriorated and intact.<br>• Check that supporting base is free of cracks and movement.<br>• Mosquito infestation |
| | Every 3-5 years | Sludge Build up – if sludge build up occurs a vacuum tank<br>needs to be called out to site |
| Inspect pumps | Every 2 years | Serviced to prolong the pump life |
| Inspect roofs & gutters | Every 6 months | • Clean out of leaves / debris<br>• Remove any overhanging branches onsite |



# Rain Garden Maintenance Schedule…

- To operate successfully, the plants in a rain garden system need to be well-established and dense.
- The plants need to be grouped close together so any runoff water will flood or seep through, rather than establishing little flow channels (known as rills) which may erode the surface. Mulch should prevent erosion.
- Maintaining the health and density of vegetation is vital, particularly in the early stages. High density planting will also ensure a uniform root zone in rain garden systems.
- New planting will need to be maintained for at least 6 months. Tasks include regular watering, weeding, replacing dead plants, monitoring and controlling pests, and removing rubbish.
- Any scour at inlets needs to be monitored closely. Litter, debris and sediment can build up at inlet points. Litter and debris also need to be removed from surcharge pits.
- Check overflow pits for structural faults. Check the pits are functioning properly.
- If the filtration capacity is reduced significantly, the filter material should be replaced, along with new plans and mulch.

Source: EPA Victoria: Maintaining water sensitive urban design elements

| Component | Key Activities | Typical Frequency |
|---|---|---|
| **Filter Media** | • Remove leaf litter and gross pollutants<br>• Check for biofilms (algal biofilms may develop on the surface of the filter media leading to clogging issues)<br>• Monitor ponding of water following rainfall events<br>• Check for permanently boggy/pooled areas | 3 months & following storm events |
| | • Remove sediment (or scarify filter media surface if required) | Annually |
| **Erosion** | • Check for erosion/scouring<br>• Check for evidence of preferential flow paths<br>• Replace filter media in eroded areas<br>• Add rock protection around inlets (if required) | 3 Months |
| **Mulch** | • Check depth and even distribution of mulch<br>• Check mulch is not touching plant stems<br>• Check for sediment/silt accumulation in mulch layer<br>• Replace mulch (if required<br>• Retain mulch using jute mats or net (if required) | 3 Months |
| **Vegetation** | • Inspect plant health and cover<br>• Replace dead plants (maintain a consistent vegetation density of 6-10 plants per square meter across the raingarden filter media).<br>• Prune plants (where applicable)<br>• Water plans (if required during establishment phase) | 3 months & following storm events |
| **Civil Components** | • Check infrastructure for damage and repair as required<br>• Ensure inlet and outlet points are clear of sediment, litter and debris | 3 months & following storm events |
| | • Inspection opening for underdrain (slotted drainage pipe):<br>• Check water level<br>• Check for sediment accumulation<br>• Flush the underground system (if required) | Annually |

For additional inspection and maintenance scheduled for building managers: **Refer to Appendix A**

# Energy…

**Objectives**

- To improve the efficient use of energy, by ensuring development demonstrates design potential for ESD initiatives.

**Office (Conditioned Space) Initiatives**

- The proposed development, as currently designed, is capable of meeting the building fabric requirements of the NCC 2022 BCA Volume One, Section J, using the Deemed-to-Satisfy provisions. The building elements will comply with the insulation and thermal performance requirements as outlined below:
    - Roof
        - The roof is required to achieve a minimum of R3.2
        - For a 10% improvement the required roof insulation must be R3.52.
        - The proposed metal roof has a total system R-Value of 0.48.
        - **The minimum total added roof insulation must be R3.04.**
    - Floor
        - The roof is required to achieve a minimum of R2.0.
        - For a 10% improvement the required floor insulation must be R2.2.
        - The proposed concrete slab floor has a total system R-Value of 2.0.
        - **The minimum total added floor insulation must be R0.20.**
        - The proposed first floor joist has a total system R-Value of 0.27.
        - **The minimum total added floor insulation must be R1.73.**

    - Wall and Glazing
        - The wall component of a wall-glazing construction must achieve a minimum Total R-Value of R1.0.
        - As per the NCC 2022 Volume 1 Façade Calculator :
            - Office space: Concrete wall panel **+ R1.5 insulation.**
            - Glazing: Average window performance
                - Ground Floor – **U-Value 3.74, SHGC 0.66**.
                - First Floor – **U-Value 5.80, SHGC 0.38**.

    *Note: This assessment is provided for information purposes to support the town planning application. It is not intended to demonstrate full compliance with Section J for building approval and a formal Section J/J1V3 report will be required at the building permit stage.*

- Heating and cooling systems will be within one Star, or Coefficient of Performance(COP) & Energy Efficiency Ratios(EER) will be 85% or better than the most efficient equivalent capacity unit available.
- Water heating systems will be within one Star, or 85% or better than the most efficient equivalent capacity unit available.
- A minimum **2kW PV system** will be installed and connected to the office space.
- A minimum 90% of the floor area will achieve a maximum illumination power density will be at least 10% lower than required in accordance with the NCC 2022 BCA Volume 1, as calculated below:

| Space | Maximum illumination power density (W/m2) |
|---|---|
| Office | 4.5 |
| Foyer/Boardroom/Corridor | 5 |
| Lunchroom | 4 |
| Toilet | 3 |

| | |
|---|---|
| Service | 1.5 |

- For a 10% improvement the maximum illumination power density must not exceed:
  - Office space: **4.05W/m2**
  - Lobby/Boardroom/Corridor space: **4.5W/m2**
  - Lunchroom space: **3.6W/m2**
  - Toilet space: **2.70W/m2**
  - Service space: **1.35W/m2**
- LED luminaires will be specified with best practice efficiency.
- External and communal area lighting will be fitted with energy-efficient LED fixtures and equipped with control systems such as motion sensors and timers to reduce energy consumption during off-peak hours (e.g., between 11:00 pm and 5:00 am).

**Warehouse and Retail (Unconditioned Space) Initiatives**

- A minimum 90% of the floor area will achieve a maximum illumination power density will be at least 10% lower than required in accordance with the NCC 2022 BCA Volume 1, as calculated below:

| Space | Maximum illumination power density (W/m2) |
|---|---|
| Warehouse | 4.5 |
| Retail (unconditioned showroom) | 14 |

- For a 10% improvement the maximum illumination power density must not exceed:
  - Warehouse space: **4.05W/m2**.
  - Retail (unconditioned showroom) space: **12.6W/m2**.

# Indoor Environment Quality (IEQ)…

**Objectives**

- To achieve a healthy indoor environment quality for the wellbeing of building occupants, including the provision of fresh air intake, cross ventilation, and natural daylight.
- To achieve thermal comfort levels with minimised need for mechanical heating, ventilation and cooling.
- To reduce indoor air pollutants by encouraging use of materials with low toxic chemicals.
- To reduce reliance on mechanical heating, ventilation, cooling and lighting systems.
- To minimise noise levels and noise transfer within and between buildings and associated external areas.

**Initiatives**

**Daylight Access:**

- 43.5% of the office areas have a daylight factor of 2% or higher.
    - Refer to Appendix A, Daylight Modelling Assessment for further details.
- Daylight penetration through windows/openings will be enhanced with the use of clear glazing and light internal colours, allowing for a better internal reflection of daylight.

**Ventilation**

- 100% of outdoor air is available to regular use spaces compared to the minimum required by AS 1668:2012.
- The ventilation system for the office spaces is designed to achieve and monitor a C02 concentration level of 700 ppm.
- All bathrooms and kitchens will have their own exhaust fans or range hoods. These will be vented directly outside and will not recycle air back into the building.
- 50% of regularly used areas are effectively shaded by substantial eaves on the north elevation. Shading devices for windows on the other elevations are not applicable, as the required shading structures or awnings would extend beyond the title boundary.

**Indoor Air Quality & Ventilation Strategy**

To support the claimed BESS credits for Outdoor Air Supply and $CO_2$ Concentration Management, the following preliminary ventilation and monitoring strategies are proposed:

- Outdoor Air Supply: The mechanical ventilation system serving warehouse, retail and office spaces will be designed to provide 100% additional outdoor air above the minimum ventilation rates specified in AS 1668.2:2012. This may be achieved through dedicated Outdoor Air Systems (DOAS), Heat Recovery Ventilation (HRV) units, or appropriately sized supply fans, subject to detailed mechanical design. The system will be designed to accommodate the increased outdoor air supply while maintaining occupant thermal comfort.
- $CO_2$ Concentration Management & Monitoring: The mechanical ventilation system serving office spaces will be designed to maintain and monitor indoor $CO_2$ concentrations at a target level of 700 ppm during normal occupancy hours. $CO_2$ sensors will be installed in representative occupied spaces or suitable return-air ducts and connected to the mechanical control system to monitor indoor $CO_2$ levels and adjust ventilation rates as required.
- Detailed Design: The mechanical ventilation rates, equipment selection, sensor locations and control strategies will be confirmed by the mechanical engineer during detailed design to demonstrate consistency with the claimed BESS credits.

**Air Quality**

- All carpets, internal paints and all finishes and flooring will be selected for their low VOC properties.
- E1-E0 grade timber products will be specified.

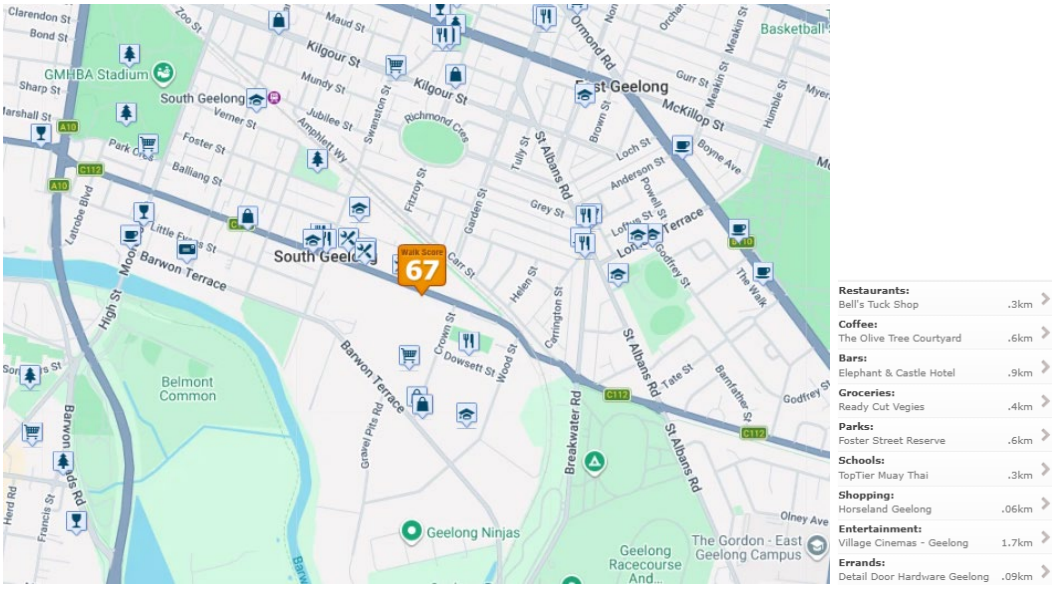
# Transport…

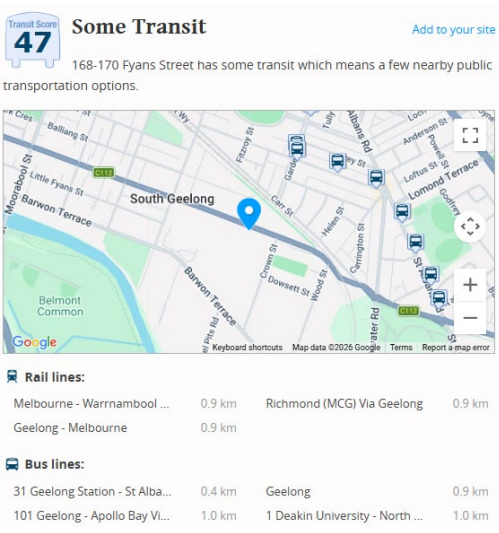
**Objectives**

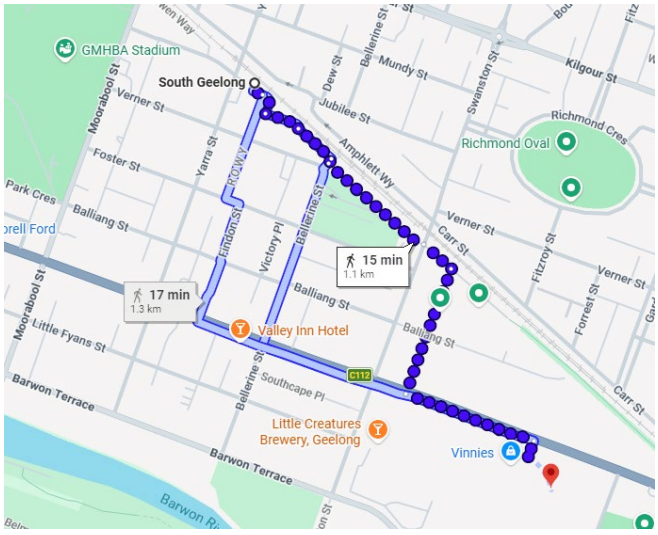
- To ensure that the built environment is designed to promote the use of walking, cycling and public transport, in that order and to minimise car dependency.
- To promote the use of low emissions vehicle technologies and supporting infrastructure.

**Initiatives**

- There are 4 bicycle spaces within the development.
- 168-170 Fyans Street has a Walk Score of 67 out of 100. This location is Somewhat Walkable so some errands can be accomplished on foot.
- This location is in the Breakwater neighborhood in Geelong. Nearby parks include Foster Street Reserve, Hopeton Park and Geelong Amateur Radio Club.
- The site is situated 1.1km to South Geelong train station.
- Provision of conduit and cabling for future installation of EV charging infrastructure.



# Waste management…

**Objectives**

- To promote waste avoidance, reuse and recycling during the design construction and operation stages of the development.
- To ensure durability and long term reusability of building materials.
- To ensure sufficient space is allocated for future change in waste management needs, including (where possible) composting and green waste facilities.

**Initiatives**

- The development is to recycle or reuse a minimum of 80% of construction demolition waste.
- Re-use of excavated material on-site and disposal of any excess to an approved site;
- Green waste mulched and re-used in landscaping either on-site or off-site;
- Bricks, tiles, concrete recycled off-site and plasterboard returned to supplier for recycling;
- Framing timber to be recycled elsewhere;
- Windows, doors, joinery, plumbing, fittings and metal elements recycled off-site;
- All asbestos, hazardous and/or intractable wastes are to be disposed of in accordance with Workcover Authority and EPA requirements;
- Locations of on-site storage facilities for material to be reused on-site, or separated for recycling off-site

# Materials…

**Objectives**

- To reduce the environmental impact of materials by recycling of existing material or use of environmentally friendly materials and materials with low embodied energy.

**Initiatives**

- The development will use sustainable timber, where it meets the Australian Forestry Standard(AFS) or Forest Stewardship Council(FSC) standard and will use E1 or E0-grade engineered wood products.
- The development will use 20-35% supplementary cementitious materials(SCM) as a partial cement alternative, subject to the structural engineer's approval.
- Consider materials that included recycled content such as polyester insulation, recycled paving or timber landscape elements.
- Using recyclable and long lifecycle materials, such as steel, concrete and bricks.
- Materials proposed are local and readily available reducing embodied energy from transportation.
- Industry accepted benchmarks and/or third party certified low VOC and non-toxic products will be used for the development.
- All steel to be sourced from a Responsible Steel Maker i.e. 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)
- All concrete to use recycled aggregate where appropriate and recycled water in its manufacture.

# Urban ecology…

**Objectives**

- To protect and enhance biodiversity with the municipality
- To provide environmentally sustainable landscapes and natural habitats, and minimise the urban heat island effect.
- To encourage the retention of significant trees and the planting of indigenous vegetation,
- To encourage the provision of space for productive gardens, particularly in larger residential developments.

**Initiatives**

- The development will include native/indigenous plants.
- Landscape architect to prepare water efficient landscape design.
- Light/medium coloured roofing and/or paving will be used to minimise UHI effect. The roof colour is to be light to medium in colour with a solar absorptance equal to or less than 0.60 to reduce the urban heat island effect. Driveways and paved areas should have a Solar Reflective Index (SRI) higher than 0.40, light coloured concrete or similar.
- The vegetation percentage area to be at least 5%. (Vegetation area per the BESS calculations include plant and turf areas which may differ from the garden area calculated for town planning purposes.)

# Conclusion…

This Sustainable Design Assessment has assessed the proposed development having regard to the relevant Victorian planning policy direction for environmentally sustainable development, the local council sustainable design framework, and the sustainability measures proposed for the site. Planning Victoria confirms that the planning system is being strengthened to improve the sustainability of buildings and subdivisions across Victoria, and BESS provides one of the principal frameworks used by councils and applicants at the planning permit stage.

Based on the information available at the time of assessment, the development is assessed as suitable from a sustainable design planning perspective, subject to the assumptions and recommendations identified in this report.

Where unresolved matters or design shortcomings have been identified, the recommended amendments outlined in this report should be incorporated into the project documentation and confirmed as part of the detailed design and permit process.

# Limitations…

This report has been prepared using the plans, specifications, schedules and supporting information made available to PassivEnergy as at the date of issue. It is limited strictly to the purpose of assessing the project from a sustainable design and planning support perspective.

This report does not constitute a construction-stage certification report, a NatHERS certificate, a Section J report, a detailed hydraulic design, a detailed traffic engineering assessment, a structural design certification, or a post-occupancy performance audit unless expressly stated otherwise.

- Without limitation, this report does not assess or certify matters relating to:
- detailed structural adequacy
- detailed fire engineering
- detailed acoustic design
- detailed condensation risk analysis unless expressly included
- detailed traffic engineering or swept path analysis
- authority approvals outside the stated planning scope
- final contractor methodology or construction quality

Where such matters arise, they should be referred to the appropriately qualified consultant, engineer, building surveyor, specialist assessor, authority or other relevant expert engaged for that purpose.

This report is to be read as a whole and must not be relied upon in part only.

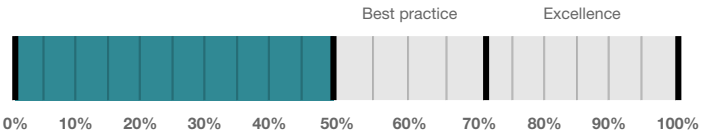
# BESS Buildings Report

Built Environment Sustainability Scorecard

This BESS report outlines the sustainable design commitments of the proposed development at 168-170 Fyans St South Geelong Victoria 3220. 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**

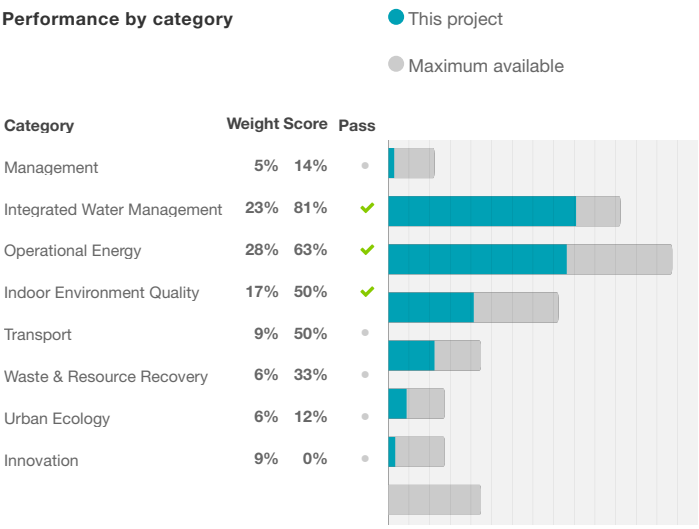



**51%**

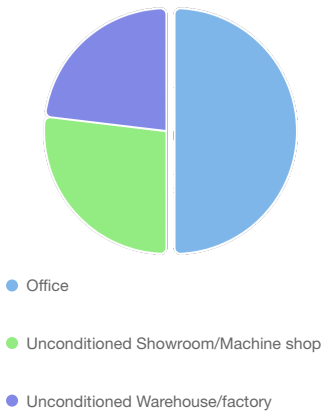
**Project details**

| | |
|---|---|
| **Name** | 168-170 Fyans Street, South Geelong |
| **Address** | 168-170 Fyans St South Geelong Victoria 3220 |
| **Project ID** | A0451DED-R4 |
| **BESS Version** | BESS-10 |
| **Date** | 19 October 2026 |
| **Software version** | 2.3.0-B.657 |
| **Site type** | Non-residential development |
| **Account** | rob@passivenergy.com.au |
| **Application no.** | |
| **Site area** | 1,011 m² |
| **Building floor area** | 1,100 m² |

**Performance by category**




**Project composition**




## Buildings

| Name | Height | Footprint | % of total footprint |
|---|---|---|---|
| Building 1 | 2 | 550 m² | 100% |

## Dwellings & Non Res Spaces

### Non-Res Spaces

| Name | Quantity | Area | Building | % of total area |
|---|---|---|---|---|
| **Office** | | | | |
| Office | 1 | 550 m² | Building 1 | 50% |
| **Total** | **1** | **550 m²** | **50%** | |
| **Unconditioned Warehouse/factory** | | | | |
| Warehouse | 1 | 254 m² | Building 1 | 23% |
| **Total** | **1** | **254 m²** | **23%** | |
| **Unconditioned Showroom/Machine shop** | | | | |
| Retail | 1 | 296 m² | Building 1 | 26% |
| **Total** | **1** | **296 m²** | **26%** | |

## Supporting Evidence

### Shown on Floor Plans

| Credit | Requirement | Response | Status |
|---|---|---|---|
| Integrated Water Management 2.1 | Location of any stormwater management systems (rainwater tanks, raingardens, buffer strips) | | - |
| Integrated Water Management 3.1 | Annotation: Water efficient garden details | | - |
| Operational Energy 4.2 | Location and size of solar photovoltaic system | | - |
| Transport 1.4 | Location of non-residential bicycle parking spaces | | - |
| Transport 2.1 | Location of electric vehicle charging infrastructure | | - |
| Waste & Resource Recovery 2.2 | Location of recycling facilities | | - |
| Urban Ecology 2.1 | Location and size of vegetated areas | | - |

### Supporting Documentation

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

**14%**

| | | |
|---|---|---|
| 1.1 Pre-Application Meeting | 0% | |
| 2.3 Thermal Performance Modelling - Non-Residential | 50% | |
| 3.2 Metering - Non-Residential | N/A | Scoped Out |
| | The development will have only one tenancy. | |
| 3.3 Metering - Common Areas | N/A | Scoped Out |
| | The development does not have common areas. | |
| 4.1 Building Users Guide | 0% | |

## IWM Overall contribution 22.5%

| | | |
|---|---|---|
| | 81% | ✔ Pass |
| 1.1 Potable Water Use | 44% | ✔ Achieved |
| 2.1 Stormwater Treatment | 100% | ✔ Achieved |
| 3.1 Water Efficient Landscaping | 100% | |
| 4.1 Building Systems Water Use | N/A | ✥ Scoped Out |
| | No chiller system proposed. | |

## Operational Energy Overall contribution 27.5%

| | | | |
|---|---|---|---|
| | Minimum required 50% | 63% | ✔ Pass |
| 1.1 Thermal Performance Rating - Non-Residential | | 37% | |
| 2.1 Greenhouse Gas Emissions | | 100% | |
| 2.2 Peak Demand | | 100% | |
| 2.6 Electrification | | 0% | ⊘ Disabled |
| | Credit is available when the energy supply is set to all-electric (no gas or wood). | | |
| 2.7 Energy consumption | | 100% | |
| 3.1 Carpark Ventilation | | N/A | ✥ Scoped Out |
| | No basement carpark proposed. | | |
| 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 | | 97% | |
| 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% | 50% | ✔ Pass |
| 1.4 Daylight Access - Non-Residential | | 43% | ✔ Achieved |
| 2.3 Ventilation - Non-Residential | | 50% | ✔ Achieved |
| 3.4 Thermal comfort - Shading - Non-Residential | | 66% | |
| 3.5 Thermal Comfort - Ceiling Fans - Non-Residential | | 0% | |
| 4.1 Air Quality - Non-Residential | | 100% | |

## Transport Overall contribution 9.0%

**50%**

| | |
|---|---|
| 1.4 Bicycle Parking - Non-Residential | 100% |
| 1.5 Bicycle Parking - Non-Residential Visitor | 0% |
| 1.6 End of Trip Facilities - Non-Residential | 0% |
| 2.1 Electric Vehicle Infrastructure | 100% |
| 2.2 Car Share Scheme | 0% |
| 2.3 Motorbikes / Mopeds | 0% |

## Waste & Resource Recovery Overall contribution 5.5%

**33%**

| | |
|---|---|
| 1.1 Construction Waste - Building Re-Use | 0% |
| 2.1 Operational Waste - Food & Garden Waste | 0% |
| 2.2 Operational Waste - Convenience of Recycling | 100% |

## Urban Ecology Overall contribution 5.5%

**12%**

| | |
|---|---|
| 1.1 Communal Spaces | 0% |
| 2.1 Vegetation | 25% |
| 2.2 Green Roofs | 0% |
| 2.3 Green Walls and Facades | 0% |
| 3.2 Food Production - Non-Residential | 0% |

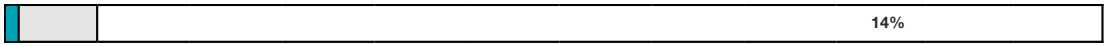
## Innovation Overall contribution 9.0%

**0%**

| | |
|---|---|
| 1.1 Innovation | 0% |

## Credit breakdown

**Management** Overall contribution 4.5%




| | |
|---|---|
| **1.1 Pre-Application Meeting** | 0% |
| Score Contribution | This credit contributes 52.9% 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 29.4% towards the category score. |
| | |
| Criteria | Has a preliminary facade assessment been undertaken in accordance with NCC2022 Section J4D6? |
| Question | Criteria Achieved ? |
| Office | Yes |
| | |
| Criteria | Has preliminary modelling been undertaken in accordance with either NCC2022 Section J (Energy Efficiency), NABERS or Green Star? |
| Question | Criteria Achieved ? |
| Office | No |
| **3.2 Metering - Non-Residential** | N/A Scoped Out |
| | The development will have only one tenancy. |
| This credit was scoped out | The development will have only one tenancy. |
| **3.3 Metering - Common Areas** | N/A Scoped Out |
| | The development does not have common areas. |
| This credit was scoped out | The development does not have common areas. |
| **4.1 Building Users Guide** | 0% |
| Score Contribution | This credit contributes 17.6% 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%**

| | | | |
|---|---|---|---|
| | | 81% | ✔ 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?: | 138 |
| 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 | 572 m² |
| | - |
| Tank Size: | |
| Rainwater Tank 1 | 10,000 Litres |
| | - |
| Irrigation area connected to tank: | |
| Rainwater Tank 1 | 56.0 m² |
| | - |
| Is connected irrigation area a water efficient garden?: | |
| Rainwater Tank 1 | Yes |
| | - |
| Other external water demand connected to tank?: | |
| Rainwater Tank 1 | - |
| | - |

| **Fixtures, fittings & connections profile** | |
|---|---|
| Building: All | Building 1 |
| Showerhead: All | 4 Star WELS (>= 6.0 but <= 7.5) |
| Bath: All | Scope out |
| Kitchen Taps: All | >= 5 Star WELS rating |
| Bathroom Taps: All | >= 5 Star WELS rating |
| Dishwashers: All | Default or unrated |
| WC: All | >= 4 Star WELS rating |
| Urinals: All | Scope out |
| Washing Machine Water Efficiency: All | Occupant to Install |
| Which non-potable water source is the dwelling/space connected to?: All | Rainwater Tank 1 |
| Non-potable water source connected to Toilets: All | Yes |

| | |
|---|---|
| **Non-potable water source connected to Laundry (washing machine):** All | No |
| **Non-potable water source connected to Hot Water System:** All | No |

**1.1 Potable Water Use** — 44% ✔ 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 | 2206 kL |
| Output | Proposed (excluding rainwater and recycled water use) |
| Project | 1859 kL |
| Output | Proposed (including rainwater and recycled water use) |
| Project | 1587 kL |
| Output | % Reduction in Potable Water Consumption |
| Project | 28 % |
| Output | % of connected demand met by rainwater |
| Project | 66 % |
| Output | How often does the tank overflow? |
| Project | Never / Rarely |
| Output | Opportunity for additional rainwater connection |
| Project | 1100 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 | 138 |

**3.1 Water Efficient Landscaping** — 100%

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

**4.1 Building Systems Water Use** — N/A ✣ Scoped Out

No chiller system proposed.

| | |
|---|---|
| This credit was scoped out | No chiller system proposed. |

**Operational Energy** Overall contribution 27.5%

| | | | | |
|---|---|---|---|---|
| | | Minimum required 50% | 63% | ✔ Pass |

| | |
|---|---|
| **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: | Electricity & Natural Gas |
| Are you installing a cogeneration or trigeneration system?: | - |
| **Solar Photovoltaic system profile** | |
| System Size (lesser of inverter and panel capacity): Solar Photovoltaic system 1 | 2.0 kW peak |
| Orientation (which way is the system facing)?: Solar Photovoltaic system 1 | North |
| Inclination (angle from horizontal): Solar Photovoltaic system 1 | 5.0 Angle (degrees) |
| Which Building Class does this apply to?: Solar Photovoltaic system 1 | Office |
| **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** — 0% — Disabled

Credit is available when the energy supply is set to all-electric (no gas or wood).

| | |
|---|---|
| This credit is disabled | Credit is available when the energy supply is set to all-electric (no gas or wood). |

**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

No basement carpark proposed.

| | |
|---|---|
| This credit was scoped out | No basement carpark proposed. |

**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 ? |
| Office | Yes |
| Unconditioned Warehouse/factory | Yes |
| Unconditioned Showroom/Machine 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** — 97%

| | |
|---|---|
| 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 |
| Office | 2,332 kWh |
| Output | % of Building's Energy |
| Office | 13 % |

**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% | 50% | ✔ Pass |

| 1.4 Daylight Access - Non-Residential | | 43% ✔ 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? | |
| Office | 43 % | |
| Unconditioned Warehouse/factory | 43 % | |
| Unconditioned Showroom/Machine shop | 43 % | |

| 2.3 Ventilation - Non-Residential | | 50% ✔ 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? | |
| Office | 0 % | |
| Unconditioned Warehouse/factory | 0 % | |
| Unconditioned Showroom/Machine shop | 0 % | |
| | | |
| Criteria | What increase in outdoor air is available to regular use areas compared to the minimum required by AS 1668.2:2012? | |
| Question | Percentage Achieved? | |
| Office | 100 % | |
| Unconditioned Warehouse/factory | 100 % | |
| Unconditioned Showroom/Machine shop | 100 % | |
| | | |
| Criteria | What CO2 concentrations are the ventilation systems designed to achieve, to monitor and to maintain? | |
| Question | Value | |
| Office | 700 ppm | |
| Unconditioned Warehouse/factory | 0 ppm | |
| Unconditioned Showroom/Machine shop | 0 ppm | |

| 3.4 Thermal comfort - Shading - Non-Residential | | 66% |
|---|---|---|
| Score Contribution | This credit contributes 17.6% towards the category score. | |
| | | |
| Criteria | What percentage of east, north and west glazing to regular use areas is effectively shaded? | |
| Question | Percentage Achieved? | |
| Office | 50 % | |
| Unconditioned Warehouse/factory | 50 % | |
| Unconditioned Showroom/Machine shop | 50 % | |

| 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? |
| Office | 0 % |
| Unconditioned Warehouse/factory | 0 % |
| Unconditioned Showroom/Machine shop | 0 % |

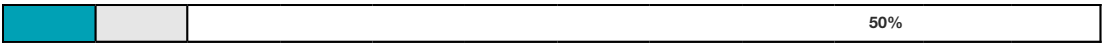
| 4.1 Air Quality - Non-Residential | 100% |
|---|---|
| Score Contribution | This credit contributes 5.9% towards the category score. |

| Criteria | Do all paints, sealants and adhesives meet the maximum total indoor pollutant emission limits? |
|---|---|
| Question | Criteria Achieved ? |
| Office | Yes |
| Unconditioned Warehouse/factory | Yes |
| Unconditioned Showroom/Machine shop | Yes |

| Criteria | Does all carpet meet the maximum total indoor pollutant emission limits? |
|---|---|
| Question | Criteria Achieved ? |
| Office | Yes |
| Unconditioned Warehouse/factory | Yes |
| Unconditioned Showroom/Machine shop | Yes |

| Criteria | Does all engineered wood meet the maximum total indoor pollutant emission limits? |
|---|---|
| Question | Criteria Achieved ? |
| Office | Yes |
| Unconditioned Warehouse/factory | Yes |
| Unconditioned Showroom/Machine shop | Yes |

**Transport Overall contribution 9.0%**




| 1.4 Bicycle Parking - Non-Residential | | 100% |
|---|---|---|
| Score Contribution | This credit contributes 25% towards the category score. | |
| Criteria | Have the planning scheme requirements for employee bicycle parking been exceeded by at least 50% (or a minimum of 2 where there is no planning scheme requirement)? | |
| Question | Criteria Achieved ? | |
| Office | Yes | |
| Unconditioned Warehouse/factory | Yes | |
| Unconditioned Showroom/Machine shop | Yes | |
| Question | Bicycle Spaces Provided ? | |
| Office | 2 | |
| Unconditioned Warehouse/factory | 1 | |
| Unconditioned Showroom/Machine shop | 1 | |

| 1.5 Bicycle Parking - Non-Residential Visitor | | 0% |
|---|---|---|
| Score Contribution | This credit contributes 12.5% towards the category score. | |
| Criteria | Have the planning scheme requirements for visitor bicycle parking been exceeded by at least 50% (or a minimum of 1 where there is no planning scheme requirement)? | |
| Question | Criteria Achieved ? | |
| Office | No | |
| Unconditioned Warehouse/factory | No | |
| Unconditioned Showroom/Machine shop | No | |
| Question | Bicycle Spaces Provided ? | |
| Office | - | |
| Unconditioned Warehouse/factory | - | |
| Unconditioned Showroom/Machine shop | - | |

| 1.6 End of Trip Facilities - Non-Residential | 0% |
|---|---|

| | |
|---|---|
| Score Contribution | This credit contributes 12.5% towards the category score. |
| Criteria | Where adequate bicycle parking has been provided. Is there also: * 1 shower for the first 5 employee bicycle spaces plus 1 to each 10 employee bicycles spaces thereafter, * changing facilities adjacent to showers, and * one secure locker per employee bicycle space in the vicinity of the changing / shower facilities? |
| Question | Number of showers provided ? |
| Office | 1 |
| Unconditioned Warehouse/factory | 1 |
| Unconditioned Showroom/Machine shop | - |
| Question | Number of lockers provided ? |
| Office | - |
| Unconditioned Warehouse/factory | - |
| Unconditioned Showroom/Machine shop | - |
| Output | Min Showers Required |
| Office | 1 |
| Unconditioned Warehouse/factory | 1 |
| Unconditioned Showroom/Machine shop | 1 |
| Output | Min Lockers Required |
| Office | 2 |
| Unconditioned Warehouse/factory | 1 |
| Unconditioned Showroom/Machine shop | 1 |

**2.1 Electric Vehicle Infrastructure** 100%

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

**2.2 Car Share Scheme** 0%

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

**2.3 Motorbikes / Mopeds** 0%

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

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

| | | |
|---|---|---|
| | | **33%** |

| | | |
|---|---|---|
| **1.1 Construction Waste - Building Re-Use** | | 0% |
| Score Contribution | This credit contributes 33.3% towards the category score. | |
| Criteria | If the development is on a site that has been previously developed, has at least 30% of the existing building been re-used? | |
| Question | Criteria Achieved ? | |
| Project | No | |
| **2.1 Operational Waste - Food & Garden Waste** | | 0% |
| Score Contribution | This credit contributes 33.3% towards the category score. | |
| Criteria | Are facilities provided for on-site management of food and garden waste? | |
| Question | Criteria Achieved ? | |
| Project | No | |
| **2.2 Operational Waste - Convenience of Recycling** | | 100% |
| Score Contribution | This credit contributes 33.3% towards the category score. | |
| Criteria | Are the recycling facilities at least as convenient for occupants as facilities for general waste? | |
| Question | Criteria Achieved ? | |
| Project | Yes | |

**Urban Ecology Overall contribution 5.5%**

| | |
|---|---|
| | 12% |

| 1.1 Communal Spaces | | 0% |
|---|---|---|
| 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? | |
| Question | Common space provided | |
| Office | - | |
| Unconditioned Warehouse/factory | - | |
| Unconditioned Showroom/Machine shop | - | |
| Output | Minimum Common Space Required | |
| Office | 44 m² | |
| Unconditioned Warehouse/factory | 5 m² | |
| Unconditioned Showroom/Machine shop | 14 m² | |

| 2.1 Vegetation | | 25% |
|---|---|---|
| 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 | 5 % | |

| 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 | | 0% |
|---|---|---|

| | |
|---|---|
| Score Contribution | This credit contributes 12.5% towards the category score. |
| Criteria | What area of space per occupant is dedicated to food production? |
| Question | Food Production Area |
| Office | - |
| Unconditioned Warehouse/factory | - |
| Unconditioned Showroom/Machine shop | - |
| Output | Min Food Production Area |
| Office | 12 $m^2$ |
| Unconditioned Warehouse/factory | 2 $m^2$ |
| Unconditioned Showroom/Machine shop | 4 $m^2$ |

**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)? | |

**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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Project # 65393886
V2: 168-170 Fyans Street, South Geelong
Rob Iacono - rob@passivenergy.com.au
168-170 Fyans St, South Geelong VIC 3220, Australia
02 September 2026 8:19 p.m.

BLUE FACTOR®

## 168-170 Fyans Street, South Geelong

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

138%
SCORE

## Project details

| | |
|---|---|
| Name | V2: 168-170 Fyans Street, South Geelong |
| Project ID | 65393886 |
| Street address | 168-170 Fyans St, South Geelong VIC 3220, Australia |
| Municipality | Greater Geelong |
| Site area | 1011 $m^2$ |
| Planning Number | |

## Results

| Item | Result | Target |
|---|---|---|
| **Total suspended solids (%)** | 80% | >80% |
| **Total phosphorus (%)** | 63% | >45% |
| **Total nitrogen (%)** | 62% | >45% |
| **Total gross pollutants (%)** | 95% | >70% |
| **Mean annual runoff volume harvested or evapotranspired (%)** | 31% | >32% |
| **Mean annual runoff volume infiltrated or filtered (%)** | 64% | >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.

## Water treatment

### Configuration 1



**Building roof catchment area** Roof, 572m2



**Rainwater Tank 1**
Rainwater tank retention volume in kilolitres: 10



**Building 1** Non-Residential Mixed Use, 15 employee(s)

### Configuration 2



**Driveway and carpark** Paved, 382.55m2



**Raingarden 1** Area: 7.7 $m^2$,
Extended detention depth: 0.1 m,
Submerged zone depth: 0.3 m, Site soil type: Clay

## Catchments



**Building roof catchment area** Roof, 572m2



**Driveway and carpark** Paved, 382.55m2



**Garden and lawn** Pervious (garden and lawn), 56.4m2

## Treatments



**Rainwater Tank 1**
Rainwater tank retention volume in kilolitres: 10

**118%**



**Raingarden 1** Area: 7.7 $m^2$,
Extended detention depth: 0.1 m,
Submerged zone depth: 0.3 m, Site soil type: Clay

**167%**

## Buildings & dwellings



**Building 1** Non-Residential Mixed Use, 15 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 (> 6 but < 7.5 litres per minute) |
| **Clothes Washer - Primary water source** | |
| **Clothes Washer - Efficiency** | Scope out |
| **Urinal - Primary water source** | Mains water |
| **Urinal - Efficiency** | No urinals |
| **Toilets connected to mains water** | 0 |
| **Toilets connected to rainwater** | 6 |
| **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** | 56 $m^2$ |
| • **Recycled Water** | 0 $m^2$ |
| **Garden water use efficiency** | Medium |

# Façade

Report

**Calculator**

## Project Summary

**Date**
10-08-26

**Name**
Proud Kraturerk

**Company**
PassivEnergy Pty Ltd

**Position**
ESD Consultant

**Building Name / Address**
Proposed Warehouse with Office - GF
168-170 Fyans Street, South Geelong

**Building State**
VIC

**Climate Zone**
Climate Zone 6 - Mild temperate

**Building Classification**
Class 5 - office building

**Storeys Above Ground**
1

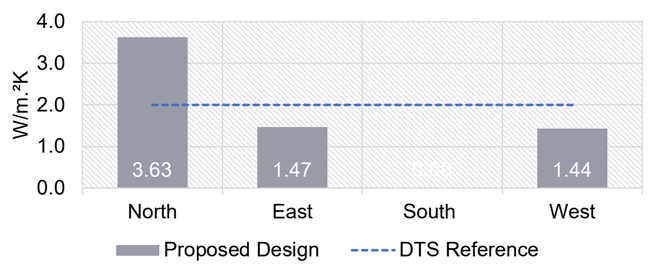
**Tool Version**
1.5 (May 2024)

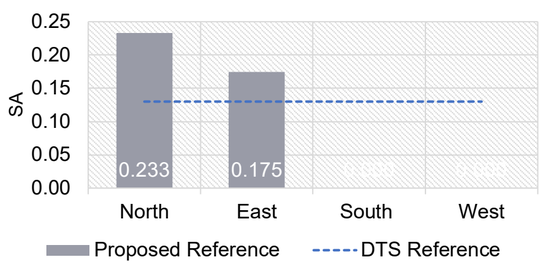
The summary below provides an overview of where compliance has been achieved for Specification S37 - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Apects).

Compliant Solution =
Non-Compliant Solution =

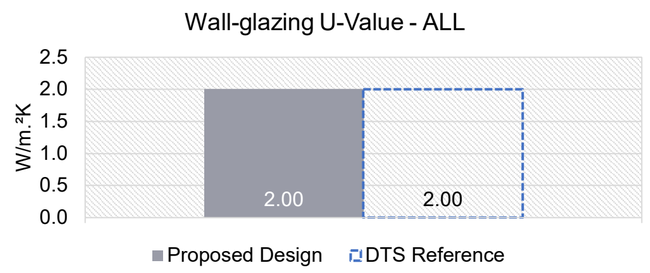
| | Method 1 North | Method 1 East | Method 1 South | Method 1 West | Method 2 All |
|---|---|---|---|---|---|
| **Wall-glazing U-Value (W/m².K)** | 3.63 | 1.47 | | 1.44 | 2.00 |
| **Solar Admittance** | 0.23 | 0.17 | | | |
| **AC Energy Value** | | | | | 17 |

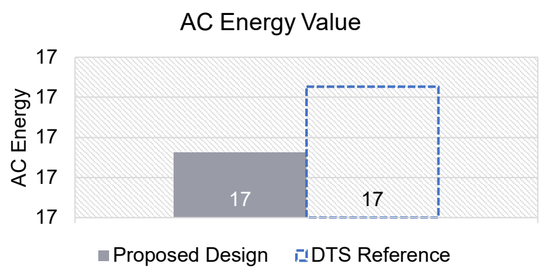
**Method 1**




**Method 2**




## Project Details

| | North | East | South | West |
|---|---|---|---|---|
| **Glazing Area (m²)** | 17.92 | 7.2 | | 7.2 |
| **Glazing to Façade Ratio** | 97% | 26% | | 25% |
| **Glazing References** | North | East | | West |
| **Glazing System Types** | Casement | Fixed | | Fixed |
| **Glass Types** | Double Glazed Unit - no low-E coating | Double Glazed Unit - no low-E coating | | Double Glazed Unit - no low-E coating |
| **Frame Types** | Aluminium | Aluminium | | |
| **Average Glazing U-Value (W/m².K)** | 3.74 | 3.74 | | 3.74 |
| **Average Glazing SHGC** | 0.66 | 0.66 | 0.00 | 0.00 |
| **Shading Systems** | Horizontal | Horizontal | Horizontal | Horizontal |
| **Wall Area (m²)** | 0.64 | 20 | | 21.28 |
| **Wall Types** | Wall | Wall | | Wall |
| **Methodology** | Wall | | | |
| **Wall Construction** | Concrete wall panel + R1.5 | Concrete wall panel + R1.5 | | |
| **Wall Thickness** | 150 | 150 | | 150 |
| **Average Wall R-value (m².K/W)** | 1.53 | 1.53 | | 1.53 |
| **Solar Absorptance** | 0.6 | 0.6 | 0.6 | 0.6 |

OFFICIAL

# Façade

Report

Calculator

## Project Summary

**Date**
03-09-26

**Name**
Proud Kraturerk

**Company**
PassivEnergy Pty Ltd

**Position**
ESD Consultant

**Building Name / Address**
Proposed Warehouse with Office - 1F
168-170 Fyans Street, South Geelong

**Building State**
VIC

**Climate Zone**
Climate Zone 6 - Mild temperate

**Building Classification**
Class 5 - office building

**Storeys Above Ground**
2

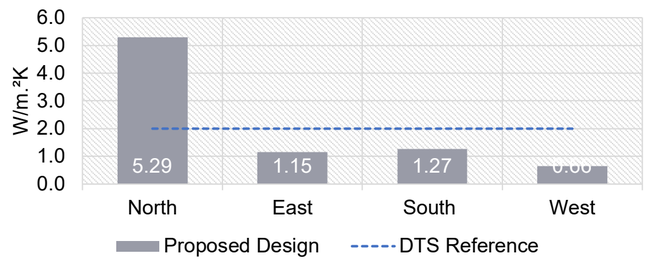
**Tool Version**
1.5 (May 2024)

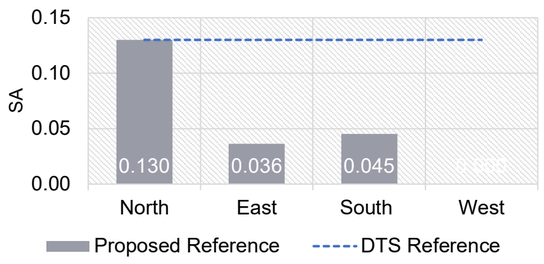
The summary below provides an overview of where compliance has been achieved for Specification S37 - Calculation of U-Value and solar admittance - Method 1 (Single Aspect) and Method 2 (Multiple Apects).

Compliant Solution =
Non-Compliant Solution =

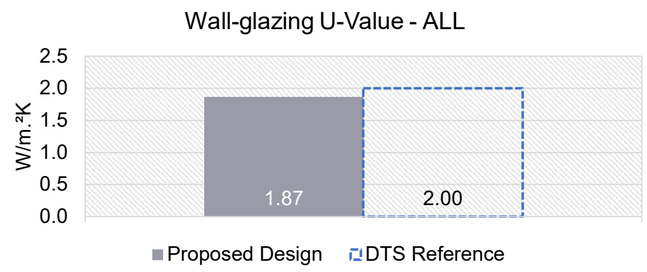
| | Method 1 North | Method 1 East | Method 1 South | Method 1 West | Method 2 All |
|---|---|---|---|---|---|
| **Wall-glazing U-Value (W/m².K)** | 5.29 | 1.15 | 1.27 | 0.66 | 1.87 |
| **Solar Admittance** | 0.13 | 0.04 | 0.05 | | |
| **AC Energy Value** | | | | | 21 |

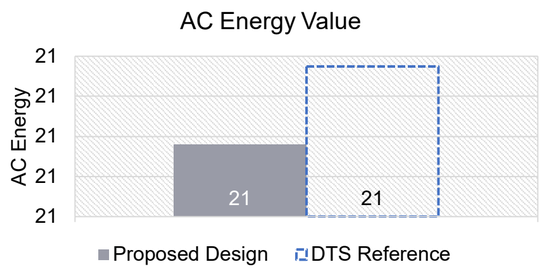
**Method 1**




**Method 2**




## Project Details

| | North | East | South | West |
|---|---|---|---|---|
| **Glazing Area (m²)** | 67.2 | 15.54 | 6.72 | 0 |
| **Glazing to Façade Ratio** | 90% | 10% | 12% | 0% |
| **Glazing References** | Balcony - N North | East Full East | South | |
| **Glazing System Types** | Sliding Door Fixed | Fixed | Fixed | |
| **Glass Types** | Single Glazing - low-E coating | Single Glazing - low-E coating | Single Glazing - low-E coating | |
| **Frame Types** | Aluminium | Aluminium | Aluminium | Aluminium |
| **Average Glazing U-Value (W/m².K)** | 5.80 | 5.80 | 5.80 | |
| **Average Glazing SHGC** | 0.38 | 0.38 | 0.38 | 0.00 |
| **Shading Systems** | Horizontal | Horizontal | Horizontal | Horizontal |
| **Wall Area (m²)** | 7.36 | 146.84 | 49.98 | 86.4 |
| **Wall Types** | Wall | Wall | Wall | Wall |
| **Methodology** | Wall | | | |
| **Wall Construction** | Concrete wall panel + R1.5 | Concrete wall panel + R1.5 | Concrete wall panel + R1.5 | Concrete wall panel + R1.5 |
| **Wall Thickness** | 150 | 150 | 150 | 150 |
| **Average Wall R-value (m².K/W)** | 1.53 | 1.53 | 1.53 | 1.53 |
| **Solar Absorptance** | 0.6 | 0.6 | 0.6 | 0.6 |

OFFICIAL

INSTRUCTION SHEET

# Building an inground raingarden

healthy waterways
Raingardens

## 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.

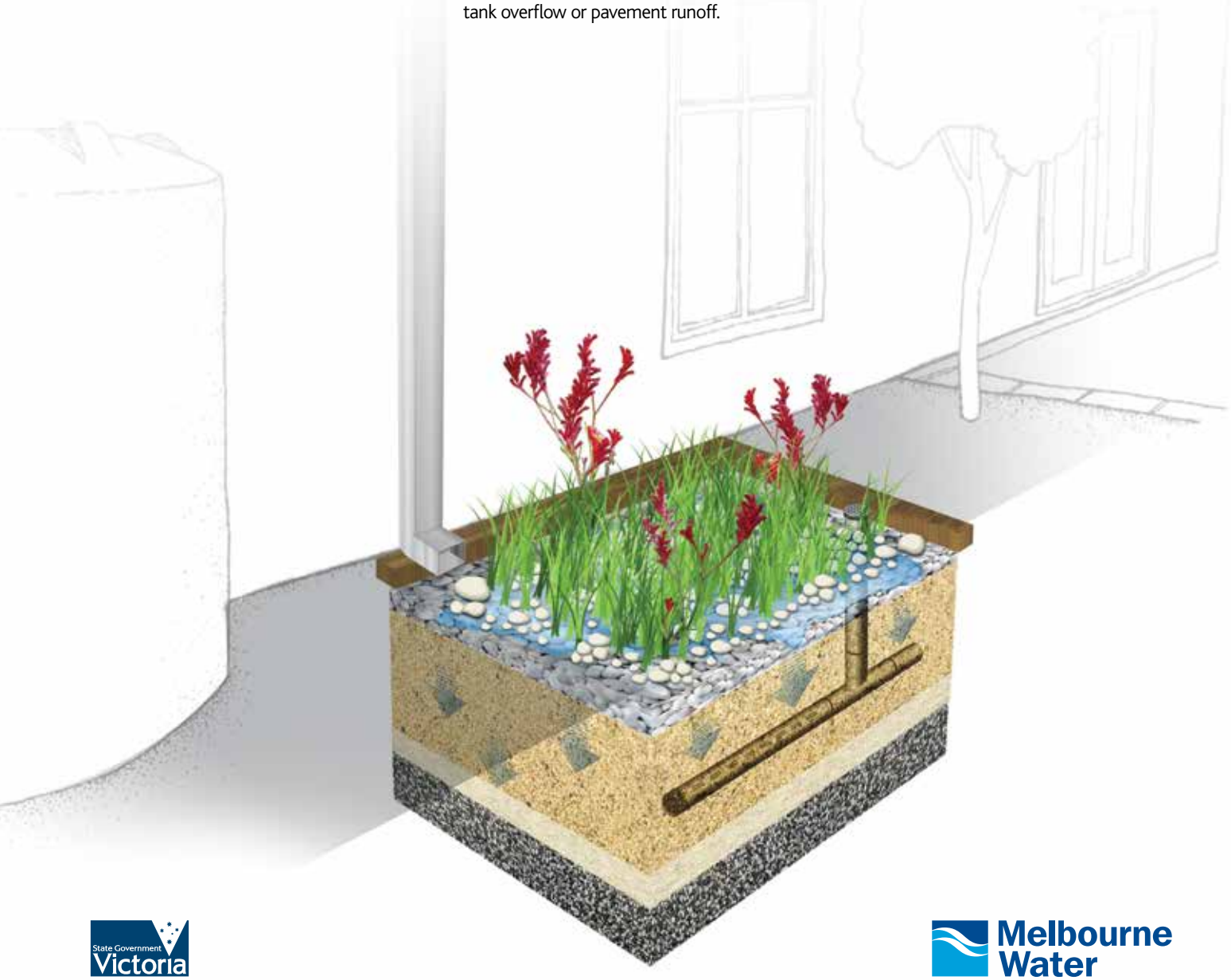
A raingarden is a specially prepared garden designed to receive and filter rain run-off from roofs or hard surfaces such as driveways or paving.

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.*



State Government Victoria

Melbourne Water

# 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

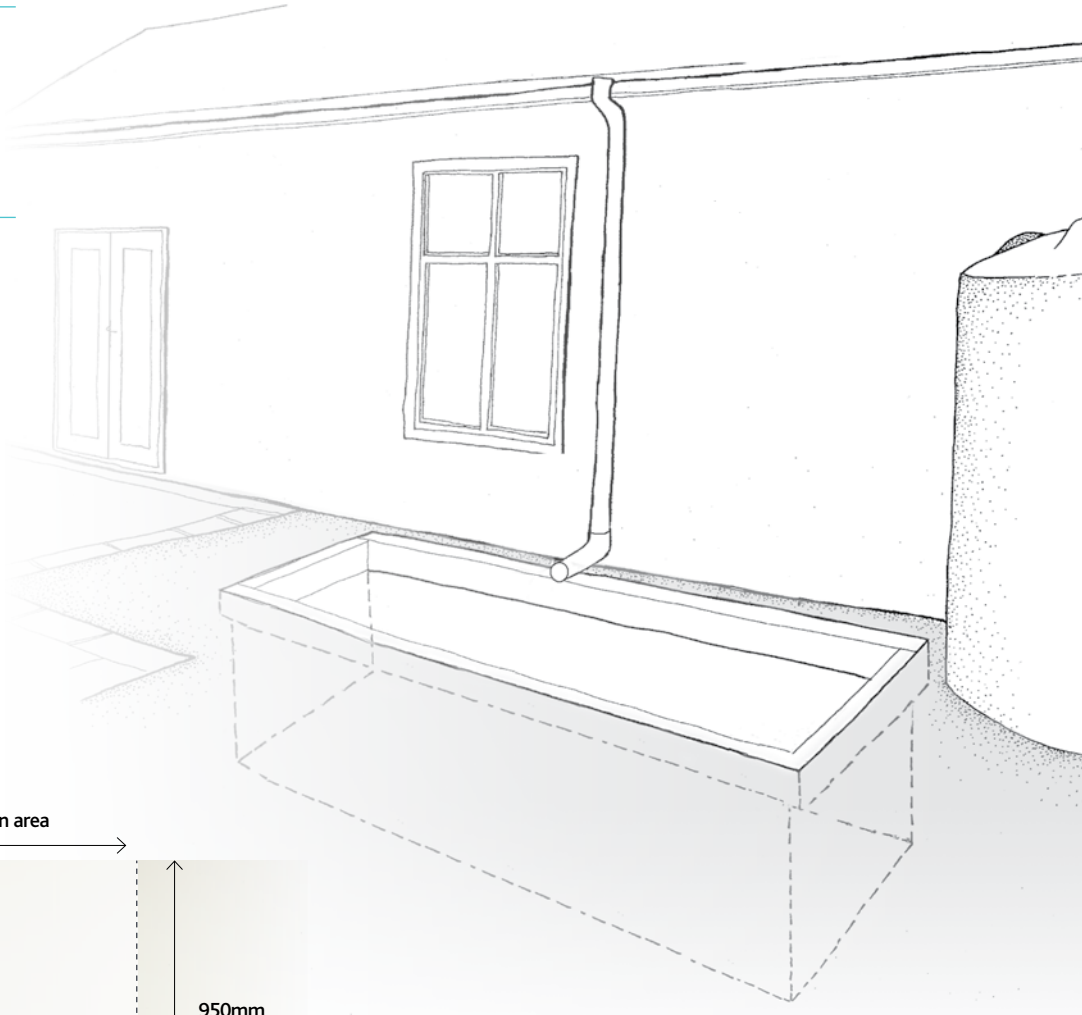
Be aware of any underground services (gas, electricity, water) that run near your house or under your garden as this will influence where you can excavate your raingarden. Raingardens should not be built over or in close proximity to a septic system.

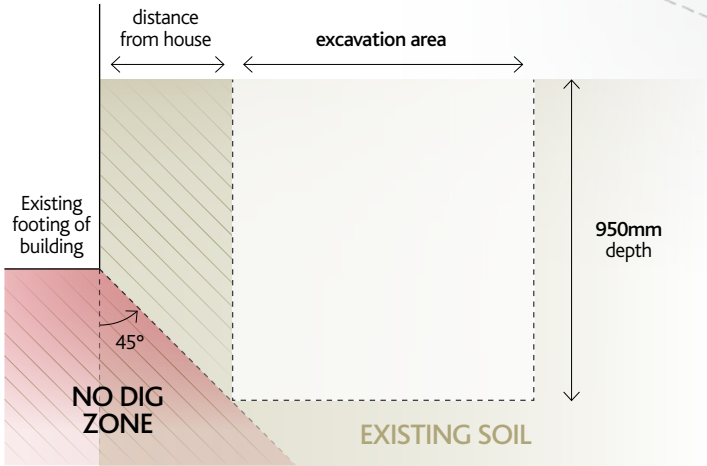
### Materials

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

**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 |





### 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 (m²) | RAINGARDEN SIZE (m²) |
|---|---|
| 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.

*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.*

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.

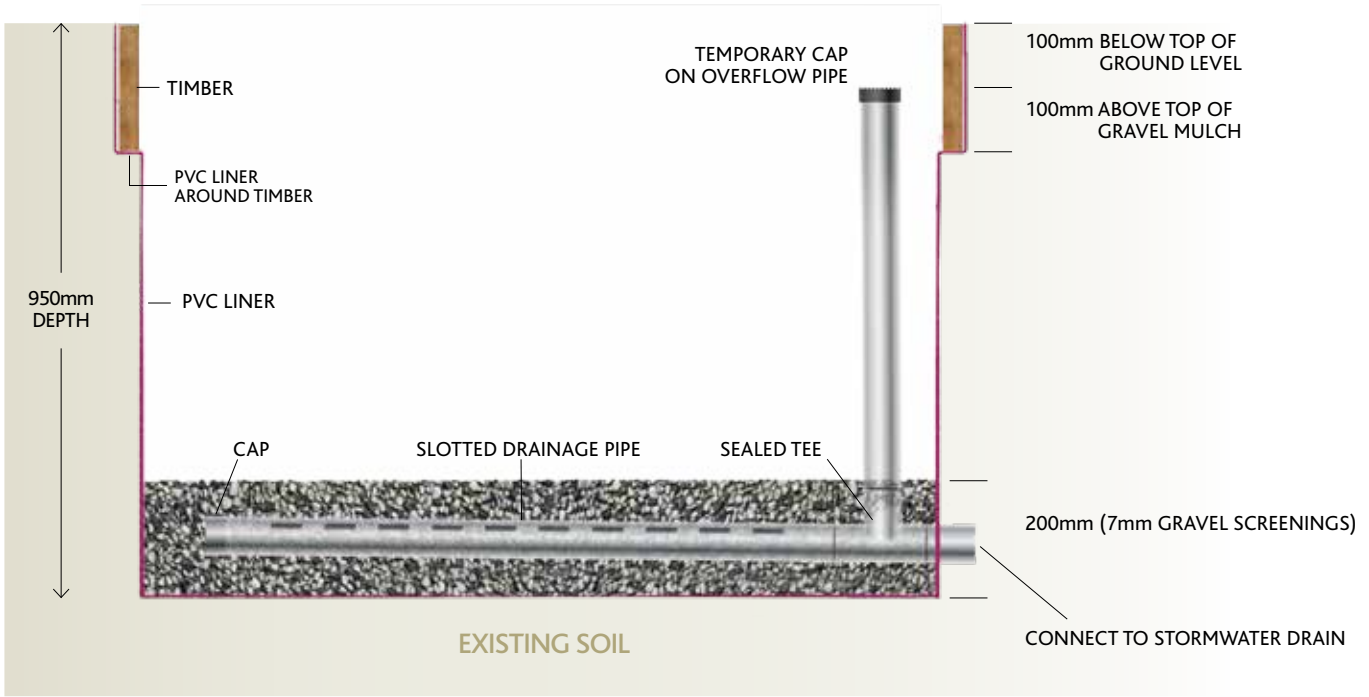
Install a temporary cap on top of the overflow pipe to prevent materials dropping into it during construction. Some plastic taped across the top of the pipe will work fine.

### Frame

Install a frame to separate your raingarden from the surrounding soil. If using timber, ensure that it is no less that 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.



# 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:

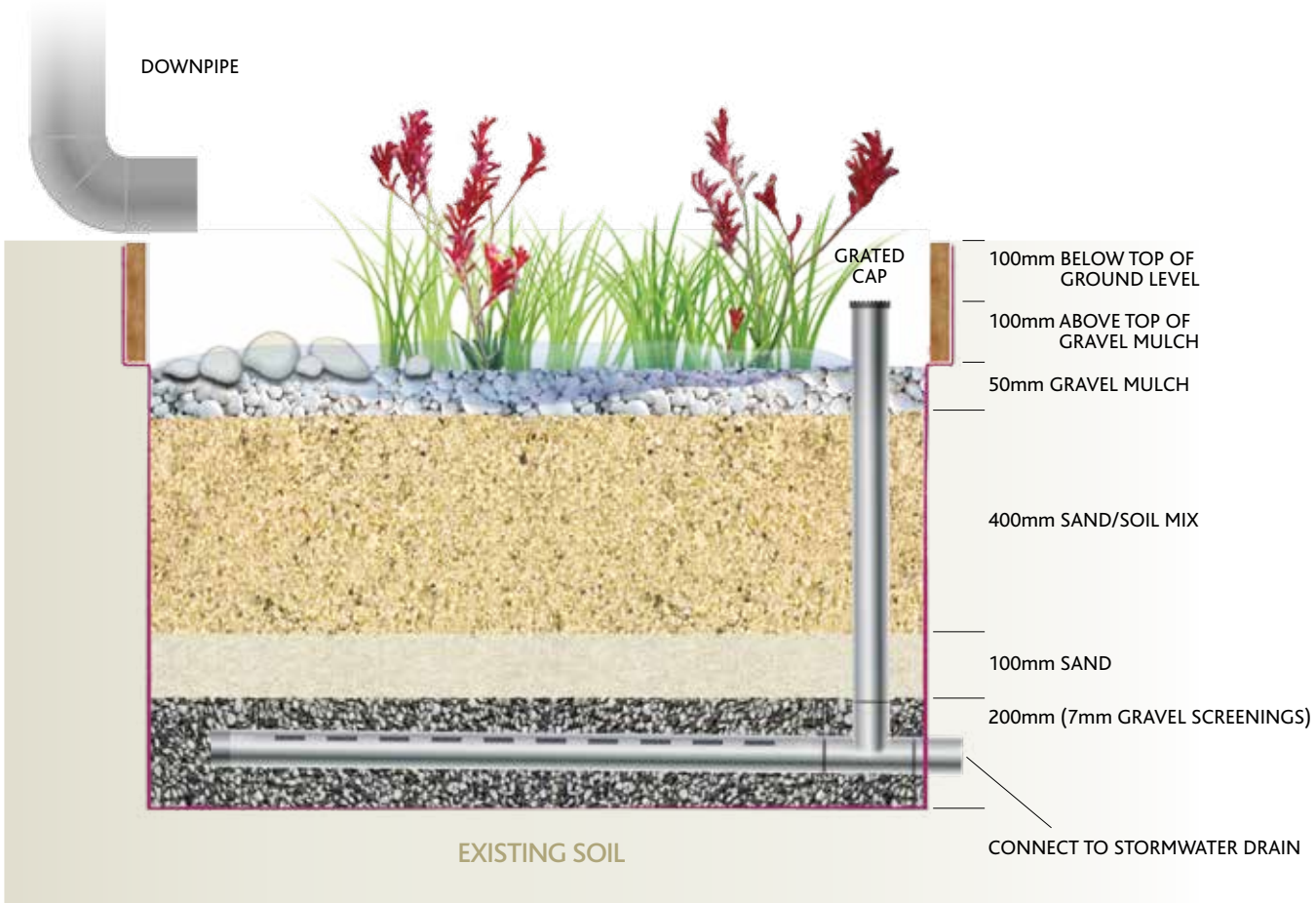
- like dry conditions but can tolerate temporary wet periods
- are perennial rather than annual
- have an extensive fibrous root system.

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.



# 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 casue blockages.

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



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

**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







# Plant List – the best plants for your raingarden

The following plants grow well in raingardens.

**Table 4 – Raingarden plant list**

| BOTANICAL NAME | COMMON NAME | CONDITIONS | SIZE (H x W) (cm) |
|---|---|---|---|
| *Anigozanthos sp.* | Kangaroo paw | Full sun | 30-90 x 100-120 |
| *Blechnum nudum* | Fishbone Water-fern | Full sun to partial shade | 50-100 x 40-80 |
| *Calocephalus lacteus* | Milky Beauty-heads | Full sun to partial shade | 15-30 x 10-30 |
| *Carex Appressa* | Tall Sedge | Full sun to partial shade | 80-100 x 120 |
| *Carpobrotus modestus* | Pigface | Full sun | 20cm high and spreading |
| *Chrysocephalum apiculatum* | Common Everlasting | Full sun | 30-90 x 10-30 |
| *Derwentia perfoliata* | Digger's Speedwell | Full sun to partial shade | 20-40 x 30-60 |
| *Dianella species* | | Full sun to partial shade | 60-120 x 40-150 |
| *Ficinia nodosa* | Knobby Club-rush | Full sun | 50-150 x 60-200 |
| *Juncas amabilis* | Hollow Rush | Full sun to partial shade | 20-120 x 20-50 |
| *Juncas flavidus* | Yellow Rush | Full sun to partial shade | 40-120 x 20-100 |
| *Leucaphyta brownii* | Cushion Bush | Full sun, salt tolerant | 100 x 200 |
| *Lomandra species* | | Full sun to partial shade | 60-120 x 50-100 |
| *Melaleuca ericifolia* | Swamp paperback | Full sun to partial shade | 4m high x 3m wide |
| *Myoporum parvifolium* | Creeping Boobialla | Full sun | 20-30 x 300 |
| *Patersonia occidentalis* | Native iris | Sun to partial shade | 20-40 x 30-60 |
| *Pratia perdunculata* | Matter Pratia | Partial shade | 50-150 x 1.8-5 |
| *Wahlenbergia communis* | Tufted Bluebell | Full sun | 15-50 x 15 |





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## 2.4 INSPECTION AND MAINTENANCE SCHEDULE

This is an example schedule to guide the timing of your inspection and maintenance activities. This schedule outlines the average service the assets require, but you can adjust these timings to suit your assets. This schedule and the "Inspection and Maintenance form" (see over page) have been designed to be copied and used on site.

**Responsibility of assets**

**Example:**
Regular inspections should be carried out every 3 months. The inspection and maintenance of the raingarden including all civil and landscape components is the responsibility of Council/contractor.

The operation and maintenance of adjacent stormwater infrastructure, parklands, garden beds, recreational assets, pathways and road surfaces is the responsibility of Council.

| Item | What to check for | Action | Frequency |
|---|---|---|---|
| **Civil components – Raingarden** | | | |
| **Inlet** | No evidence of erosion, blockage, damage or standing water. | Clear inlet of accumulated sediment or debris.<br>Eroded areas should be locally re-profiled or reinforced, and re-planted if necessary.<br>Refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets* if the erosion is either recurring or severe. | Storm events<br>3 months |
| **Outlet** | No evidence of erosion, blockage, damage or standing water<br>Outlet freely draining. | Clear outlet of accumulated sediment or debris.<br>Refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets* if standing (backwatering into the raingarden) is present. | Storm events<br>3 months |
| **Other structures** | No evidence of erosion and damage to other structures, e.g. pits, pipes, access ramps, walls and rock protection. | Repair minor damage to structures.<br>Eroded areas should be repaired (reinforced). This may involve minor re-profiling or re-planting works.<br>For severe damage, i.e. where flows have scoured down the side of a structure refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets*. | 3 months |
| **Batters and bunds** | No evidence of erosion. | Eroded areas should be locally re-profiled or reinforced, and re-planted if necessary. | Annually |
| **Hydraulic conductivity** | Filter media is draining freely. No water ponded on the surface of the raingarden for more than 12 hours after rainfall. | If water is ponded on the surface of the raingarden for more than 12 hours after rainfall, refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets*.<br>Note: the disposal of raingarden filter material must comply with EPA Victoria guidelines for the disposal of contaminated soil (Appendix C). | Storm events |
| **Sediment accumulation** | Sediment forebay less than 75% full.<br>No major sediment accumulation on surface of the raingarden. | Clean out accumulated sediment from the sediment forebay.<br>Accumulated sediment to be removed from the surface of the raingarden and the system replanted as required. | Annually |
| **Filter media surface** | No surface scour, depressions. | Filter surface to be repaired. This may involve evening out the surface, importing additional filter media and replanting. | 3 months |
| **Fine sediment surface crust** | No impermeable or clayey surface on the filter media.<br>No major surface crusting (<3mm depth across less than 10% of the filter area is permissible). | Repair surface layer by scarify filter media surface, re-profiling and re-establishing vegetation, if required.<br>If the problem persists refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets*. | 3 months |
| **Mulch layer** | Even depth and distribution of the mulch layer.<br>Surface of the mulch layer is at least 100 mm below the top of the outflow pit.<br>Mulch is not touching the plant stems | Re-distribute or replace mulch that has been washed out or displaced. This may involve retaining mulch using jute mats or nets.<br>Remove mulch that is touching plant stems. | 3 months |
| **Algal or moss growth** | No major algal growth (less than 10% of raingarden area is permissible).<br>No moss growth. | If significant patches of algal growth or moss persist across the surface of the raingarden (i.e. greater than 10% of the surface) then refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets*. | 3 months |
| **Inspection opening** | Water level is below filter media layer.<br>No sediment accumulation in underdrain system. | Refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets* if standing water is present in the filter media layer.<br>Flush the underdrain system using low pressure water jet to remove accumulated sediment. | Annually |

# Appendix C

| Item | What to check for | Action | Frequency |
|---|---|---|---|
| **Landscape components – Raingarden** | | | |
| **Vegetation cover – filter media** | Greater than 90% vegetation cover.<br>Plants healthy, free from disease and vigorously growing. | Remove any dead or diseased vegetation.<br>Replant individual bare patches (greater than 5% of the area) using either new plants or by dividing and translocating existing plants.<br>If bare areas represent greater than 30% of the raingarden area, refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets*. | 3 months |
| **Vegetation cover – batters** | Continuous vegetation cover along the lower batter.<br>Greater than 90% vegetation cover.<br>Plants healthy, free from disease and vigorously growing. | | Annually |
| **Weeds – filter media – batters** | Less than 10% of the filter media surface area and batters covered in weeds. | Physically remove weeds from filter media surface and batters.<br>Do not use herbicides as these may harm the desirable raingarden vegetation and contaminate the filter media.<br>Refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets* if weed ingress is a persistent problem (i.e. weed coverage is persistently greater than 30%). | 3 months |
| **Litter** | Filter media surface and batters free of litter (i.e. less than 1 piece litter per 4m$^2$). | Remove all litter and excessive debris | 3 months |
| **Pests** | No damage by pest animals and insects. | Seek specialist advice if persistent insect damage is observed.<br>Refer to Water by Design (2012) *Rectifying Vegetated Stormwater Treatment Assets* if there is evidence of pest animal damage. | 3 months |

# 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.

## 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.




A typical home uses approximately 250,000 litres of water each year.

MelbourneWater

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# Rainwater Tanks

Stormwater Sensitive Homes




## 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.

## 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:

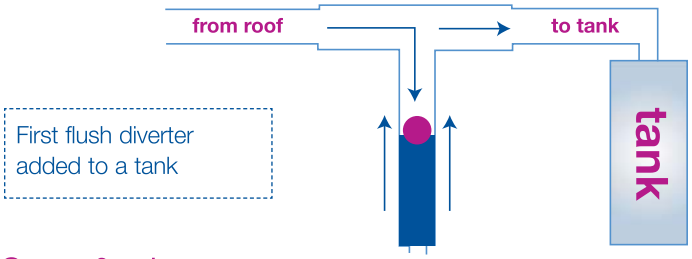
**Tank systems:**

*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).




## 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.

**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


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, ABM, 2004.