lid Low Impact Development Consulting

Stormwater Management

Water Sensitive Urban Design assessment for:

156 Autumn St, Geelong West

Prepared for: Matt Gillett
Prepared by: AV – Low Impact Development Consulting

19/01/2026

e: info@lidconsulting.com.au
p: 03 9016 9486
a: Level 6, 114 Flinders St, Melbourne 3000
w: www.lidconsulting.com.au

Version	Date	Description	Drawings	Prepared	Checked
1.0	19/01/2026	TP Issue	Dated 28/08/25	AV	PM

Disclaimer

The content of this document represents the entirety of work output or recommendations offered by LID Consulting for this particular project. This content supersedes all other verbal discussions undertaken by LID Consulting representatives in relation to this project.

Contents

LID acknowledges and pays respect to the Australian Aboriginal and Torres Strait Islander people, to their ancestors and elders, past, present and emerging, as the traditional custodians of the lands upon which we work and live. We recognise Aboriginal and Torres Strait Islander people's deep cultural and spiritual relationships to the water, land and sea, and their rich contribution to society.

1 Introduction

Low Impact Development (LID) Consulting was engaged to assess the proposed development at 156 Autumn St, Geelong West and prepare a Stormwater Management (Water Sensitive Urban Design) response addressing the requirements of planning scheme clauses:

- VPP 19.03-3S Integrated water management
- VPP 53.18 Stormwater management in urban development
- VPP 55.05-1 Permeability and stormwater management objective (Standard B5-1)

This report is based on the drawing set prepared by Miles Douglas Architects dated 28.08.25

The site area can be seen below in Figure 1, showing the catchment boundary considered.

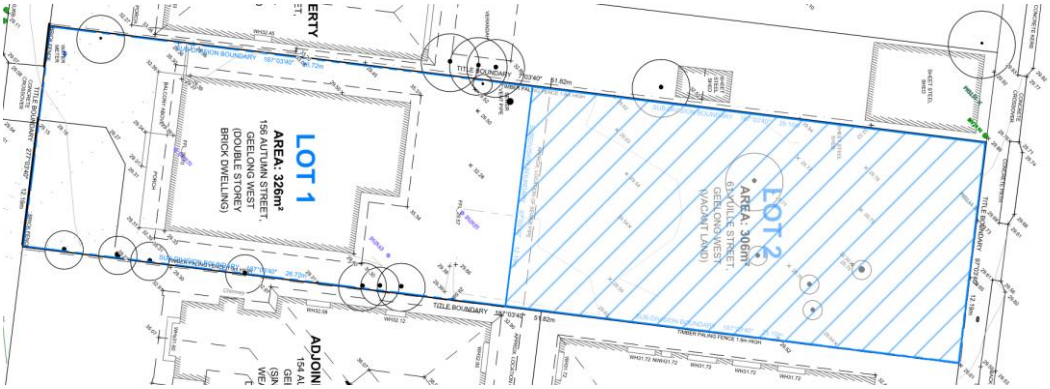


Figure 1 - Site Area

Note in accordance with clause 53.18-7 Decision guidelines, this assessment is limited to new works areas only, where there is reasonable opportunity to incorporate new WSUD features. Areas not subject to new works are excluded on the basis they will not generate additional stormwater discharge or adversely affect water quality entering the drainage system, and the inclusion of stormwater treatment systems for these areas would necessitate further drainage infrastructure works on-site.

The following documents informed the WSUD recommendations of this report:

1. Best Practice Environmental Management Guidelines for Urban Stormwater (CSIRO 1999) (BPEMG)
2. WSUD Engineering Procedures: Stormwater (CSIRO 2005 EPS)
3. WSUD Maintenance Guidelines – A guide for asset managers (Melbourne Water)

1.1 Development Summary

Address:	**156 Autumn St, Geelong West**
Type:	**Multi dwelling**
Site area:	**632 m²**
Assessment area:	**306 m²**
Dwellings:	**1**
Bedrooms:	**3**

1.2 Response Summary

The chosen response is to direct all new roof rainfall runoff to a retention tank serving all toilets within the proposed development. These responses should be co-ordinated with architect and civil design to ensure feasibility.

Catchment areas are summarised as follows:

Table 1 - Catchment Summary

Catchment	Area (m²)	Treatment Type	Treatment Size (L)
Roof	154.5	Rainwater tank	4,500
Other Impervious	27.9	-	-
Impervious to landscape	29.3	-	-
Pervious	94.3	-	-

2 Site Layout

Refer to Appendix 2 for site layout plan.

3 Proposed Response

3.1 Response

The proposed development achieves the Water-Sensitive Urban Design (WSUD) objectives of the City of Greater Geelong by water harvesting and re-use. A Blue Factor assessment on the above property has been undertaken in order to demonstrate in-operation compliance with Best Practice stormwater treatment objectives as set out in the Urban Stormwater Best Practice Environmental Management Guidelines[1]. The proposed plans achieved a stormwater treatment score of 101% (100% or greater shows compliance with Best Practice Nitrogen removal targets) with the following parameters:

- Rainwater shed from new roof areas (minimum 154m²) will be collected in rainwater tank(s) of minimum 4,500L retention capacity.
- Rainwater tanks will be connected to all toilets in the development serving all toilets for flushing purposes. In addition to stormwater benefits, this capture and re-use of rainwater provides mains water saving benefits.
- Leaf diverting rain heads and first flush diverters should be included upstream of the tank to divert the initial sediment flow when rain events occur from flowing into the tank.
- The rear and front soft landscaping areas will be permeable, allowing direct ground infiltration. As such, these have been excluded from effective impervious areas.

[1] *Urban Stormwater: Best Practice Environmental Management Guidelines*, CSIRO, 1999, http://www.publish.csiro.au/pid/2190.htm

- In accordance with the Australian Rainfall and Runoff (ARR2019) guidelines, impervious areas are those which have an immediate rainfall runoff response (i.e. dedicated drainage from a surface or concentrated flows). Paved paths and ground level terraces have been considered effectively pervious as runoff from these surfaces will drain directly into adjacent pervious landscaping.

- The development is not expected to have any chemical pollutants or toxicants where stormwater runoff would impact the local environment.

- The design includes vegetated landscaping to all private open spaces (POS), and trees. The lawn area will assist with retaining moisture and promote evapotranspiration in the immediate environment. This will contribute towards cooling and improving the local habitat, and providing an attractive and enjoyable space.

3.2 Items to be included on plans

Where not already shown the following should be included on plans for town planning submission:

1. All treatment means need to be shown.
    a. The rain water tank location and minimum retention volume (size) of 4,500L needs to be shown, also indicating whether the tank is above ground or below ground. Indicate the tank is connected to all toilets for flushing.
2. The permeability status of surface finishes if unclear.
3. Any location where retaining walls or garden bed edging would prevent water run-off from paths entering landscaped permeable areas (this scenario can make WSUD assessments more challenging to comply ie water infiltration on site is beneficial). From the plans we have not assumed any of these scenarios on site.

4 Site Management

The following is intended to inform the site management plan in matters relating to stormwater management during construction. Relevant principles per the EPA Civil Construction, Building and Demolition Guide[2], and measures as per Urban Stormwater Best Practice Environmental Management Guidelines Section 6.3 are shown below.

The site management plan should restrict runoff to adjoining properties and ensure minimal earth disturbance occurs during construction. Additionally, building waste, dangerous chemicals and food waste must be managed to prevent damage to flora and fauna, or build up or blockage in drains and nearby creeks.

Item	Potential issues	Control Measure
Fences	Porous fences allow stormwater runoff to carry sediment across the site and discharge into the stormwater network.	Mesh fabric and silt fences to be installed on fences where site includes slopes greater than 1:20. Hay bales may also be suitable for larger sites.
Pit inlets	Without sediment filters, pit inlets allow sediment to enter the stormwater network causing sediment build-up downstream.	Sediment traps or drain filters should be installed on all pit inlets, particularly those in the street that are the first to receive water from the site.
Downpipes	Localised flooding due to lack of site drainage.	Temporary downpipes to be installed as soon as roofing is installed to minimise overland flow across the site (see plastic tube roll image below). These should be connected to the rainwater tank where possible, or alternatively the stormwater pipes.
Vehicle traffic on site	Areas of vehicle traffic are subject to disturbance of soil.	Use stabilised vehicle entrances and paths, with crushed rock or other suitable material. Include rumble grates, track mats (where access is over sand), and physically remove mud from tyres of vehicles prior to leaving the site.
Mounded earth	Unsecured mounds create significant issues with sedimentation after rainfall.	Use erosion control blankets for mounded earth. Ensure correct installation, and incorporate secondary measures such as silt fences on steep sites.

[2] *EPA Civil Construction, Building and Demolition Guide, Publication 1834 (2020)* https://www.epa.vic.gov.au/about-epa/publications/1834

Item	Potential issues	Control Measure
Bins	Where suitable bins are not provided, litter can be washed from the site.	Ensure appropriate bins are provided for construction workers and staff. Ensure bins for lightweight food packaging and construction waste have lids to stop waste blowing away.
Waste material	Pollution of stormwater can occur where appropriate disposal methods for waste materials are not established on site.	Provide separate bins for paints and solvents to allow safe removal and disposal at accredited locations. Ensure all staff are aware of correct disposal methods.
Stockpiles	Incorrect stockpiling can lead to stormwater contamination, and site pollution.	Locate stockpiles away from drainage paths, and construct stockpiles with gentle slopes (max 1:2).

In addition, the contractor will be required to:

- **Identify and document,** prior to construction commencing, where these measures will be installed, and how erosion and loose waste will be managed.
- **Install tarps on site waste bins** every night.
- **Avoid overfilling vehicles** or cover all soil loads being taken offsite.
- **Sweep up the site** every day when works occur on site to ensure loose waste does not blow around the site and into the surrounding streets.
- **Ensure erosion and sediment control measures are maintained** through daily checks – maintenance measures may include removing sediment trapped in filters and topping up gravel on the vehicle entry path.

Figure 2 - Temporary Downpipes

Figure 3 - Sediment Trap

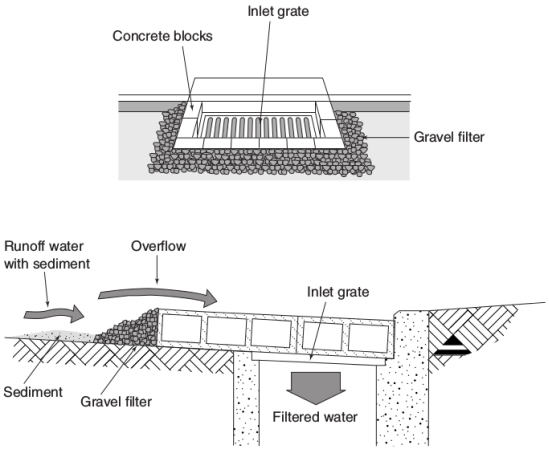


Figure 4 - Block and Gravel Filter (CSIRO)

Figure 5 - Sediment Trap

5 Maintenance Plan

5.1 Rainwater Tanks

The following maintenance schedule is to be used as a guide for rainwater tank maintenance. It is based on average maintenance requirements for rainwater tanks in Victoria, and timings may need to be adjusted to suit specific site assets. Regular inspections should be undertaken every three months. Inspection and maintenance of all rainwater tanks will be the responsibility of the dwelling owner.

Refer to the Melbourne Water WSUD Maintenance Guidelines for further details.

Item	What to check for	Action	Frequency
Tank inlet	Tank inlet is not blocked by accumulated debris	Physically remove debris build up	1-3 months
First flush device and filters	First flush device and filters are not blocked and flow is not limited by litter or sediment accumulation	Physically remove litter and sediment from first flush device, or if it contains a flush-out valve, use water to remove sediment.	1-3 months
Tank outlet	Tank outlet is not restricted by sediment.	Flush tank as required.	1-3 months
Mosquito screens	Mosquito screens are not torn or loose	Replace mosquito screens if necessary. Put screens back carefully, ensuring they are tightly refitted.	1-3 months
Pumps	Water around pump equipment. Water pressure.	Replace seals where leaks are noted. Clean pumps as required to maintain pump pressure. Refer to pump manufacturer's maintenance requirements.	1-3 months
Roof and gutters	Accumulated debris in gutters. Discolouration of tank water, or notable odours.	Physically remove accumulated debris, including leaf and other plant material. More regular maintenance may be required where there are overhanging trees.	3-6 months
Overhanging trees	Vegetation overhanging roof and gutters	Prune overhanging trees where possible to reduce vegetation build up and chance of blockages in tank network.	3-6 months
Tank	Tank defects or damage. Sediment and sludge build up in tank, or sulphide/rotten egg odours.	Replace defect or damaged tank as necessary. Remove accumulated sediment and sludge from tank. Clean tank if required.	2-3 years

Appendix 1 - Policy Objectives

For information only, the objectives of relevant stormwater management policies are shown here:

19.03-3S
22/11/2024
VC263

Integrated water management

Objective

To sustainably manage water supply and demand, water resources, wastewater, drainage and stormwater through an integrated water management approach.

53.18
26/10/2018
VC154

STORMWATER MANAGEMENT IN URBAN DEVELOPMENT

Purpose

To ensure that stormwater in urban development, including retention and reuse, is managed to mitigate the impacts of stormwater on the environment, property and public safety, and to provide cooling, local habitat and amenity benefits.

55.05-1
31/03/2025
VC267

Permeability and stormwater management objective

To reduce the impact of increased stormwater run-off on the drainage system and downstream waterways.

To facilitate on-site stormwater infiltration.

To encourage stormwater management that maximises the retention and reuse of stormwater.

To contribute to urban cooling.

Standard B5-1

The site area covered by the pervious surfaces is at least 20 percent of the site.

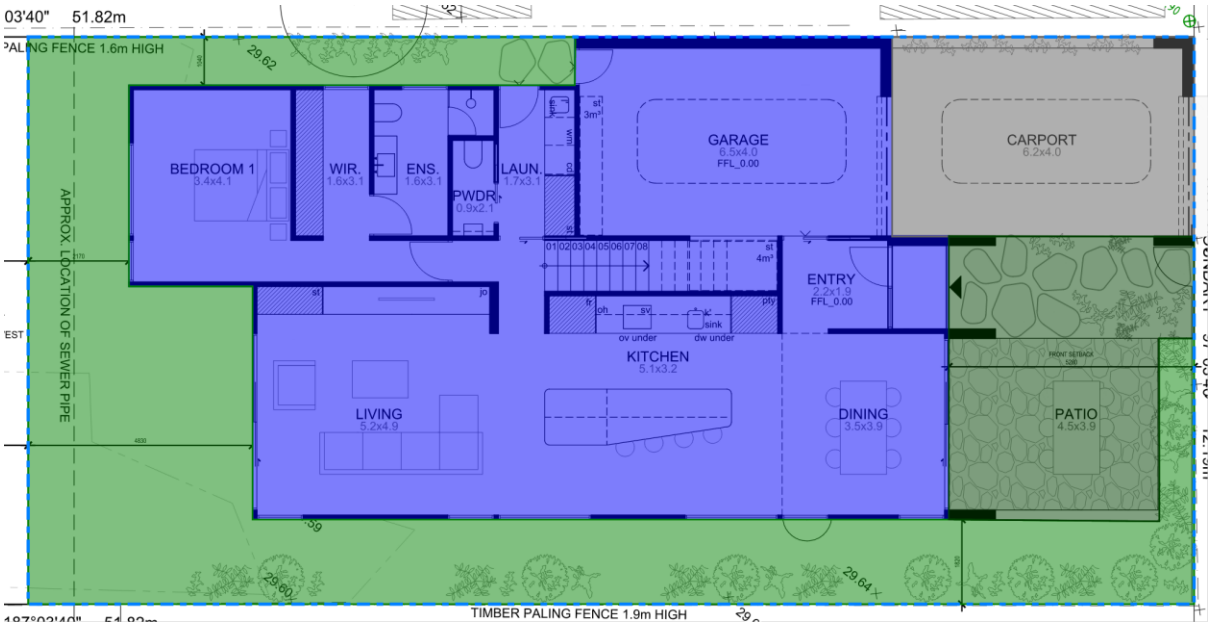
The development includes a stormwater management system designed to:

- Meet the best practice quantitative performance objectives for stormwater quality specified in the Urban stormwater management guidance (EPA Publication 1739.1, 2021) of:
  - Suspended solids 80% reduction in mean annual load.
  - Total phosphorus and Total Nitrogen 45% reduction in mean annual load.
  - Litter 70% reduction of mean annual load.

  Note:

  A certificate generated from a stormwater assessment tool including Stormwater Treatment Objective - Relative Measurement (STORM), Model for Urban Stormwater Improvement Conceptualisation (MUSIC) or an equivalent product accepted by the responsible authority may be used to demonstrate the performance objectives for stormwater quality are met.
- Direct flows of stormwater into treatment areas, garden areas, tree pits and permeable surfaces, with drainage of residual flows to the legal point of discharge.

Appendix 2 - Site Layout Plan



Legend

Description	Quantity	Unit
Assessed area	306.0	sq m
Impervious Other	27.9	sq m
Impervious to Landscape	29.3	sq m
Pervious	94.3	sq m
Roof to RWT	154.5	sq m

Appendix 3 - Blue Factor Report

Project # FA6D16D9 - 156 Autumn St, Geelong West
156 Autumn St, Geelong West VIC 3218, Australia
15 December 2025 2:29 p.m.

BLUE FACTOR®

156 Autumn St, Geelong West

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

101%
SCORE

Project details

Name	156 Autumn St, Geelong West
Street address	156 Autumn St, Geelong West VIC 3218, Australia
Municipality	Greater Geelong
Site area	306 m^2
Planning Number	

Flow and pollutant load reductions

Item	Result	Target
Mean annual runoff volume harvested or evapotranspired (%)	34%	>28%
Mean annual runoff volume infiltrated or filtered (%)	0%	>9%
Total suspended solids (%)	69%	>80%
Total phosphorus (%)	59%	>45%
Total nitrogen (%)	45%	>45%
Total gross pollutants (%)	83%	>70%

Water treatment

Catchments

Roof to RWT 154.5m2

Impervious other Paved, 27.9m2

Impervious to landscape Pervious (garden and lawn), 29.3m2

Pervious Pervious (garden and lawn), 94.3m2

Treatments

Rainwater Tank 1
Rainwater tank retention volume in kilolitres: 4.5

Buildings & dwellings

Building 1 Residential Townhouse, 3 bedroom(s)

Configuration 1

Roof to RWT 154.5m2

Rainwater Tank 1
Rainwater tank retention volume in kilolitres: 4.5,

Building 1 Residential Townhouse, 3 bedroom(s)

Appendix 4 - Technical Measures Explained

Rainwater Harvesting

Rain water tanks collect water from the roof via downpipes, providing flow detention capacity and storage for reuse. Rainwater tanks reduce stormwater run-off but also treat water by allowing particle settlement within the tank. Water can be generally used for irrigation, toilet flushing, laundry services and showers.

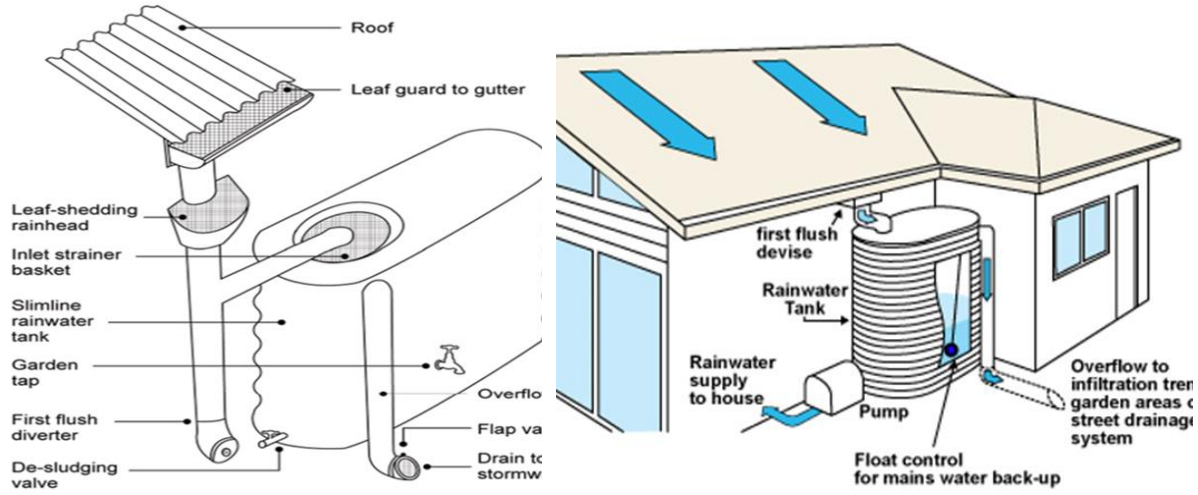


Figure 6 - Components of a Rainwater Harvesting System (Bluescope Steel)

Rainwater Filtration

Rainwater Filtration requirements depend upon intended end-use. See the following table for required quality levels across typical end-uses:

Table 2 - Required Rainwater Quality for Different End Uses [3]

	Required Quality			
End Use	**Clear**	**Odourless**	**Low in dissolved solids**	**No human pathogens, toxins or heavy metals**
Garden/lawn irrigation				
Toilet flushing	✓	✓		
Clothes washing	✓	✓		
Showering/bathing	✓	✓	✓	
Drinking	✓	✓	✓	✓

See the following table for appropriate treatment measures to meet the specified quality above:

[3] https://www.yourhome.gov.au/water/rainwater

Table 3 - Required Rainwater Filtration for Different End Uses [4]

	Filter		
Fixture/use	**Tannin filter (if tannins from overhanging trees expected)**	**Sediment filter (eg. 20 micron)**	**Sub 1 micron absolute filter**
Irrigation and outdoor			
Hot water system	✓		
Toilet cistern/washing machine	✓		
Drinking water outlets (cold)	✓	✓	✓

Further considerations:

- The simplest tank system is where downpipes can flow directly into the top of a water tank as shown above. Where a number of downpipes from around the building are collecting water for the same tank that is not underground, a charged pipe system might be required, where by water sits in the downpipes to the level of the top of the tank. When more water enters the downpipes, the existing water in the pipes will enter the tank as the water level stays balanced.
- Rainwater tank systems may either be wet (charged) or dry. Charged systems are systems where the pipes from the gutter go down the wall and underground, then up into the tank. They are 'wet' because the size of buildings and/or the placement of tanks away from buildings mean that there are long runs of pipe underground which remain full of water. Dry systems are systems where the pipe network is designed to run direct from the gutter into the tank. The pipes drain out after rain and do not hold water when rainfall stops.
- Charged tank systems (where water tanks are above ground) should incorporate 1mm aperture screens on all openings to ensure pipes do not become breeding grounds for mosquitoes. **No charged pipes are to be located beneath ground slabs.**
- A **first flush device** that diverts the initial most polluted 1-2 minutes of runoff from the roof into the garden should be incorporated in the system prior to the tank.
- **Connection to toilets** or other regularly used end-uses should ensure that tanks are run down regularly. This leaves spare capacity to collect new rainfall water and hence reduces the level of rain from the roofs going down the drains.
- **Tank to mains switches** which can divert water supply from tanks to mains need to be incorporated in any design, in the event that tanks empty or become near empty. Automated switch-over is ideal, but having good access to switches in the event of failure of the automated switches is also a good design consideration.

[4] https://www.yourhome.gov.au/water/rainwater

a) 

b) 

c) 

d) 

Figure 7 - Types of Rainwater Tanks a) Slimline; b) Storage walls; c) Underground; d) Modular (www.yourhome.gov.au/water/rainwater & www.freshwater.com.au)