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Water Sensitive Urban Design Response
45-49 Portman Street, Oakleigh, Vic

SUSTAINABLE DEVELOPMENT _CONSULTANTS

Proposed Mixed Use Development
45-49 Portman Street, Oakleigh, Vic

Water Sensitive Urban Design Response

September 2019

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PREPARED BY:

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V1	26-09-2019	For review and submission	ML	LR

Preamble

Sustainable Development Consultants have been engaged to undertake a Water Sensitive Urban Design Response for the proposed mixed-use development located at 45-49 Portman Street, Oakleigh. This has been prepared to address the Clause 53.18 *Stormwater Management in Urban Development* of the Monash Planning Scheme.

1. Introduction

Stormwater runoff from developed areas has the potential to cause a wide range of impacts on downstream waterways. If managed incorrectly, it increases the likelihood of flooding, and also has the potential to transport high pollutant loads directly to rivers, streams and wetlands. This can have a variety of negative effects on public health and safety, local and regional infrastructure, and the ecological health and recreational amenity of waterways.

The purpose of this Water Sensitive Urban Design (WSUD) Response is to provide an understanding of the issues of urban stormwater and waterway management, and to provide Council with a comprehensive list of actions that will be implemented to achieve appropriate stormwater management throughout the development.

This report includes an assessment of the proposed development, to determine the potential impacts as a result of stormwater runoff from the site during rainfall events. The report identifies a number of initiatives that will be incorporated into the development as a means of mitigating these stormwater impacts. These initiatives are considered the most appropriate and practical for the site to ensure the proposed development meets the target water quality objectives required by City of Monash. However, alternative measures can also be recommended if sought by the client.

Melbourne Water has developed the STORM (Stormwater Treatment Objective – Relative Measure) Calculator to analyse the impacts of stormwater quality based on various treatment methods applied to a property. The STORM Calculator is able to display the amount of effective treatment that typical WSUD measures will provide in relation to best practice targets. However, it does not include all of the types of treatment measures available. It has instead been restricted to include rainwater tanks, ponds, wetlands, rain gardens, infiltration systems, buffers and swales[1].

[1] The STORM tool provides only the most basic of options for a typical detached urban development. For more information visit http://library.melbournewater.com.au/content/wsud/using_STORM.pdf

1.1 Site Description

The site of 45-49 Portman Street, Oakleigh is located approximately 18km southeast of the Melbourne CBD. The site is located in a residential area in close proximity to the train station, shops and other facilities. The 988m² is currently occupied by a double storey development and a single storey building. The double storey building will be demolished prior to the construction of the new development and the single storey will remain as part of the new development.

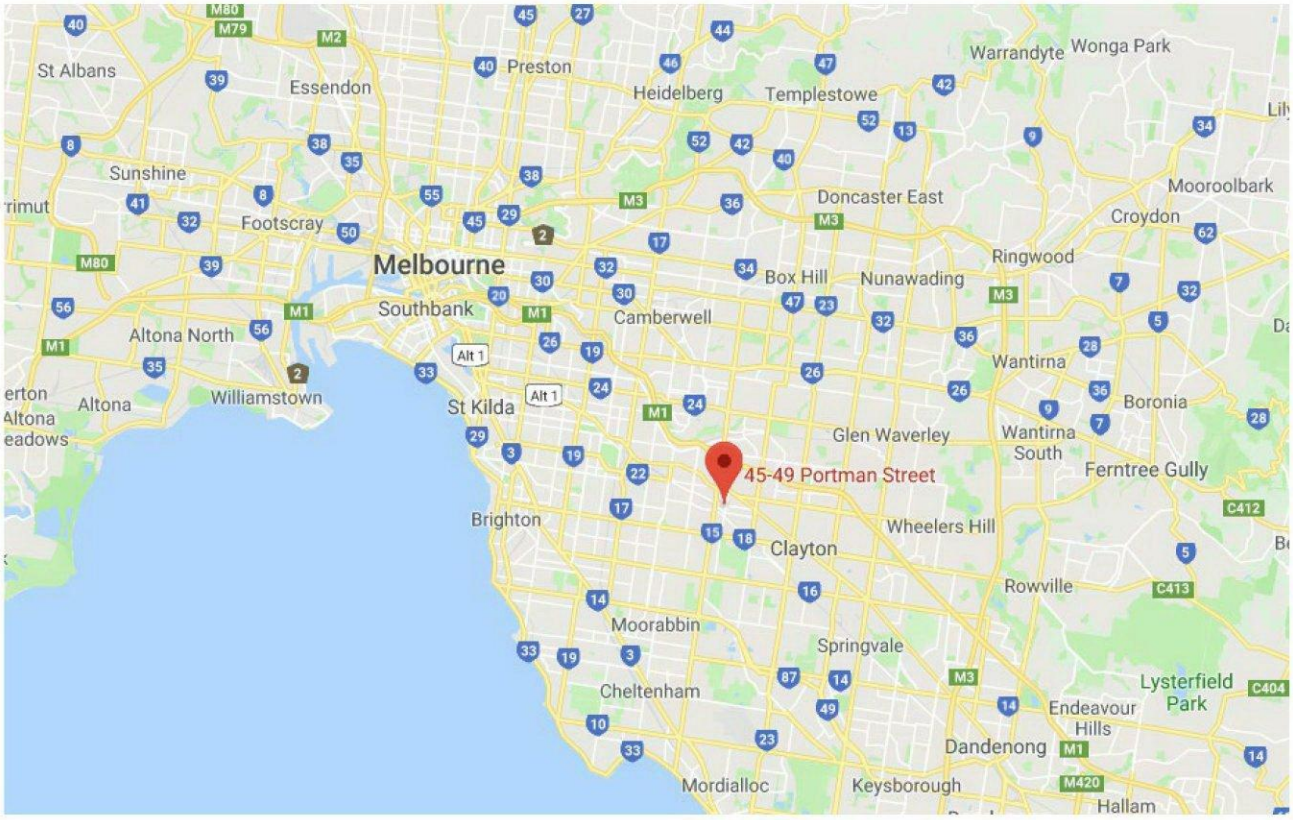


Figure 1: The red balloon shows the location of the proposed development relative to the Melbourne CBD (source: Google Maps)

The development summary is as follows:

Development Information	
Total site area	988m²
Ground Floor	**Common Car Park (18 Car Spaces)** 5 x Standard Car Parks 13 x Semi Automated Car Parks 58m² Conference Room 10m² Managers Office 54m² Lobby 114m² Retail 27m² Gym
Level 1 – Level 4	Level 1 x 14 Apartments Level 2 & Level 3 x 15 Apartments Level 4 x 11 Apartments

Figure 2: 45-49 Portman Street, Oakleigh site location (source: Nearmap, mark up by SDC)

2. Stormwater Management Objectives

The quality and quantity of stormwater leaving a site can have a significant impact on the surrounding infrastructure and waterways. Impervious surfaces move water quickly and efficiently out of built up areas straight into stormwater infrastructure, which in turn rapidly moves the untreated water into natural watercourses. This process does not treat the stormwater effectively. As the water flows into natural water courses, it causes erosion and pollution of those waterways with the rubbish, sediments, pathogens, and other pollutants dispelled off the impervious surfaces into the stormwater drains.

The City of Monash has recognised the importance of stormwater management and the effects on the surrounding environment. As a result, Clause 53.18 "*Stormwater Management in Urban Development*", has been introduced into the City of Monash Planning Scheme. New developments, or extensions to existing buildings must adhere to the local policy.

The proposed development will comply with the objectives outlined in the EPA Best Practice Guidelines for Stormwater management to address water management considerations raised in Clause 53.18

The objectives are:

- To achieve the best practice water quality performance objectives as set out in the Urban Stormwater Best Practice Environmental Management Guidelines, Victoria Stormwater Committee 1999 (as amended). Currently, these water quality performance objectives are:
    - Suspended Solids - 80% retention of typical urban annual load
    - Total Nitrogen - 45% retention of typical urban annual load
    - Total Phosphorus - 45% retention of typical urban annual load
    - Litter - 70% reduction of typical urban annual load
- To promote the use of water sensitive urban design, including stormwater re-use.
- To mitigate the detrimental effect of development on downstream waterways, by the application of best practice stormwater management through water sensitive urban design for new development.
- To minimise peak stormwater flows and stormwater pollutants to improve the health of water bodies, including creeks, rivers and bays.
- To reintegrate urban water into the landscape to facilitate a range of benefits including microclimate cooling, local habitat and provision of attractive spaces for community use and well-being.

New developments must also incorporate treatment measures that improve the quality of water and reduce flow of water discharged into waterways (such as collection and reuse of rainwater/stormwater on site), and encourage the use of measures to prevent litter being carried off-site in stormwater flows. The proposed development has addressed these requirements by identifying the impervious surfaces within the site and implementing treatments to mitigate the impacts of stormwater leaving the site. To assess these initiatives, the STORM tool – which is an industry accepted tool – was used to determine the treatment effectiveness of these initiatives.

3. Development Characteristics

For the purposes of the stormwater assessment, the site has been delineated into basic surface types listed in the table below:

Table 1: Delineation of the Portman Street site areas used in the stormwater assessment

Surface type	Area
Total site	988m^2
Roof Area New Building to drain to rainwater tank (blue)	474m^2
Roof Area Existing Building to drain to rainwater tank (blue)	217m^2
Remaining Impervious Area (Yellow)	297m^2

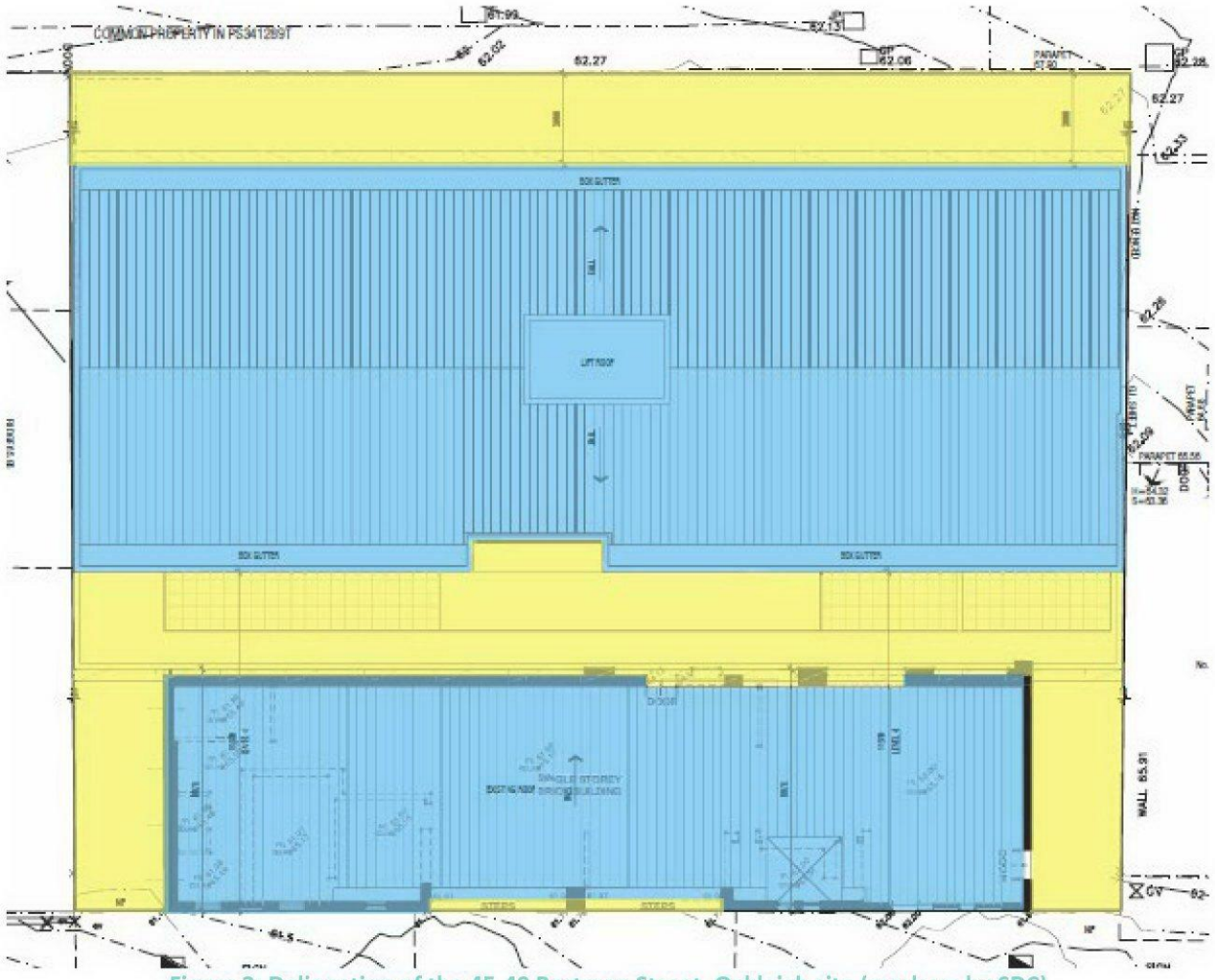


Figure 3: Delineation of the 45-49 Portman Street, Oakleigh site (mark-up by SDC)

4. Stormwater Management Initiatives

Stormwater treatment initiatives will need to be implemented. The following section presents the different surfaces that have been identified for treatment, and the required treatment. The initiatives to manage stormwater flows for the building area will underpin the overall performance of the building and its ability to meet stormwater management objectives.

Table 2: List of areas and their stormwater treatment measures

Surfaces	Topographic Area (m^2)	Required Treatment
Roof catchment area (blue)	691m^2	Runoff will be directed to a rainwater tank (min 18,000L) which will be connected to all toilets within the developments. Any overflow from the tank will be discharged to the legal point of discharge (LPD) onsite.
Remaining impervious area (Yellow)	297m^2	No treatment proposed. Excess overflow will be discharged into the LPD.

5. STORM Assessment Results

The impervious surfaces and recommended treatments have been applied to the STORM tool and as a result, the proposed development has achieved 103%. With the proposed stormwater treatment measures incorporated into the development at 45-49 Portman Street, Oakleigh, Victoria. The design will meet the minimum performance standards required by the City of Monash.

Melbourne Water **STORM Rating Report**

TransactionID:	840895
Municipality:	MONASH
Rainfall Station:	MONASH
Address:	45-49 Portman Street
	Oakleigh
	VIC 3166
Assessor:	SDC
Development Type:	Residential - Mixed Use
Allotment Site (m2):	988.00
STORM Rating %:	103

Description	Impervious Area (m2)	Treatment Type	Treatment Area/Volume (m2 or L)	Occupants / Number Of Bedrooms	Treatment %	Tank Water Supply Reliability (%)
Roof Catchment Area	691.00	Rainwater Tank	18,000.00	50	146.90	78.00
Remaining Impervious	297.00	None	0.00	0	0.00	0.00

Figure 4: Results of the STORM assessment for the 45-49 Portman Street development

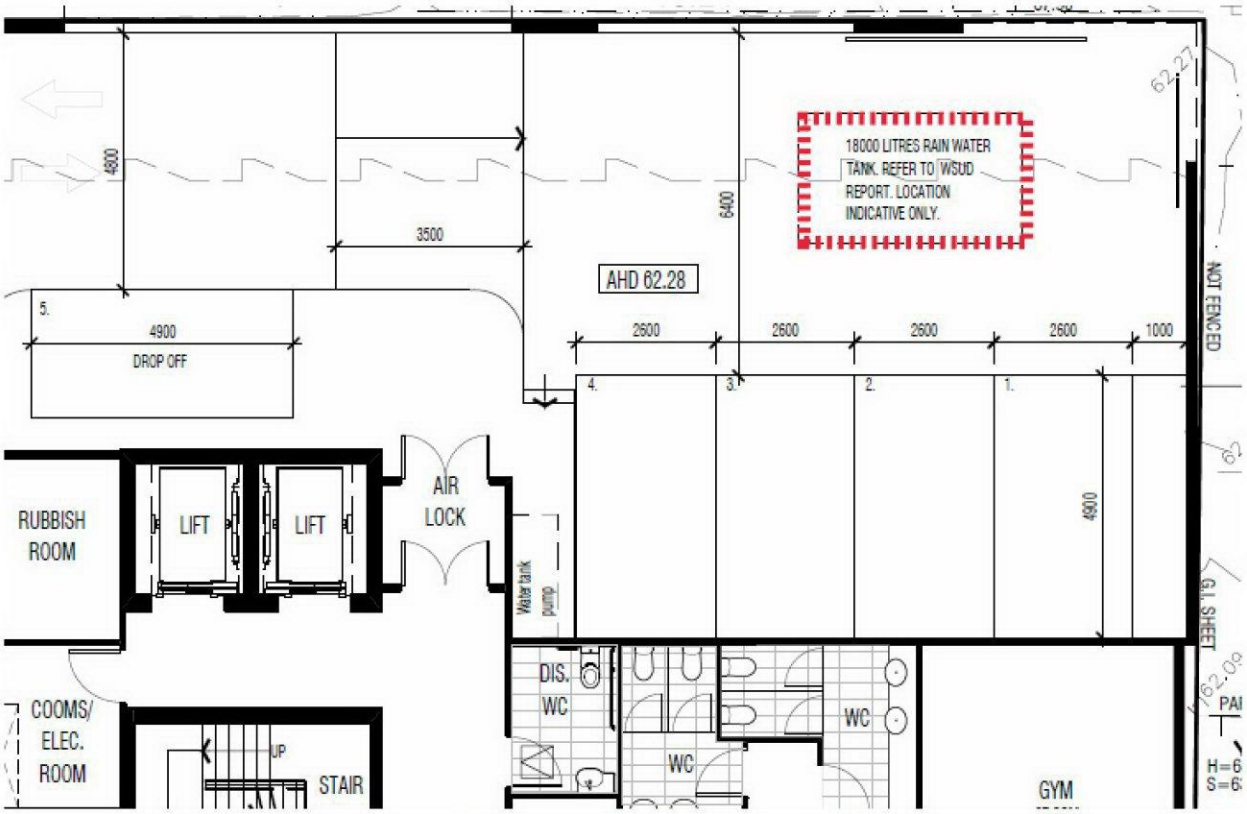


Figure 5: Location of the 18,000L Rainwater Tank

6. Stormwater Runoff Treatment during the Construction Stage

Treatment – Various

Stormwater management in the construction stage will include measures which will be put in place to minimise the likelihood of contaminating stormwater discharge from the site as well as reduce the velocity of the flows generated from the building as it is being constructed. This will mean ensuring buffer strips are in place, and the site will be kept clean from any loose rubbish. More information is available from "*Keeping Our Stormwater Clean – A Builder's Guide*" by Melbourne Water[2]. The diagram below is an illustration of the various objectives which assist in minimising the impacts of stormwater runoff typical during the construction phase. Typical pollutants that are generated from a construction site during a rainfall event include:

- Dust
- Silt
- Mud
- Gravel
- Stockpiled materials
- Spills/oils
- Debris/litter

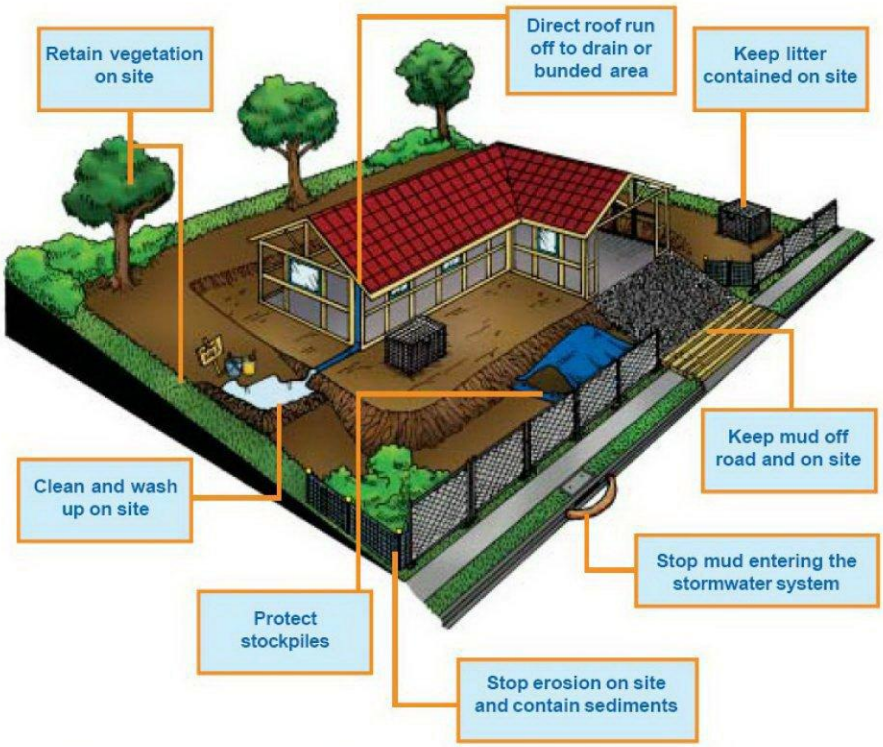
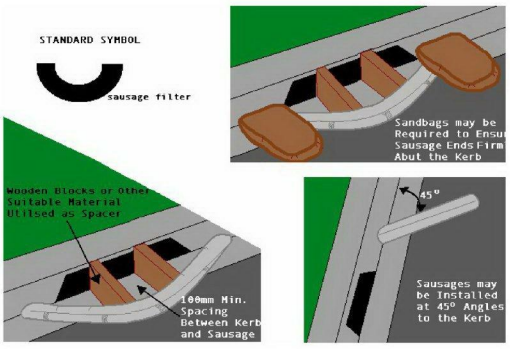


Figure 6: Stormwater will be effectively managed during construction phase according to the requirements listed in "Keeping Our Stormwater Clean – A Builder's Guide"

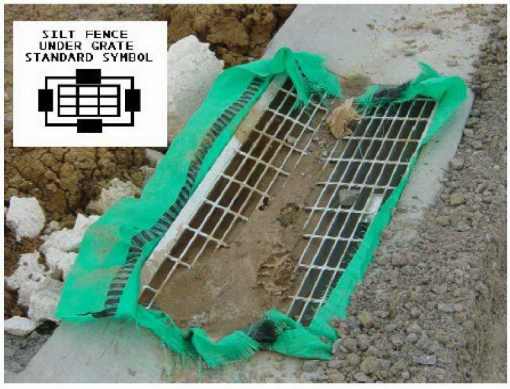
To reduce the impacts and minimise the generation of these pollutants the following measures are proposed. The symbols embedded within each image are typically used for Construction Environmental Management Plans.

[2] For copies please contact Melbourne Water on 131 722.

Gravel Sausage filters – to be placed at the entrance of pits/side stormwater inlets. These permeable sacks will filter the suspended soils and sediments and any other litter carried by the stormwater to prevent the pollutants entering the system.



Silt Fences Under Grates - Silt fence material may be placed under the grate of surface-entry inlets to prevent sediment from entering the stormwater system.



Temporary Rumble Grids – these are designed to open the tread on tires and vibrate mud and dirt off the vehicle (in particular the chassis). This will heavily minimise the amount of soil/dirt deposited on local roads where it can be washed (by rainfall or other means) into the stormwater drains.

7. Maintenance Program

Stormwater management measures or WSUD assets require undertaking regular scheduled maintenance to ensure that they perform to their optimal level and meet their intended objectives. This section provides guidance on how to effectively maintain the WSUD assets proposed for the 45-49 Portman Street development. The following management framework covers all the stages of a maintenance program for a WSUD asset, from its installation to its commissioning.

7.1 Inspection Requirements

The section below lists the inspection requirements for each stormwater treatment measure used in the project. These include rainwater tanks, raingardens and permeable pavement.

7.1.1 RAINWATER TANK

Inspections of roof areas and gutters leading to the proposed rainwater tanks should take place every 6 months. Rainwater in the tanks should be checked every 6 months for mosquito infestation. The rainwater tanks should be examined every 2 years for sludge build up.

The following tips for inspection have been sourced from City of Port Phillip's "Maintenance Manual - Rainwater Tanks".[3]

Leaf litter/debris in gutters
Inspect the gutters for presence of litter/debris.

Blocked downpipe
Check if water is spilling from the edge of the gutters and ensure that the downpipes are not blocked.

First flush diverter clogging
To ensure the diverters function properly, clean out by unscrewing the cap at the base of the diverters and remove the filter. Wash the filter with clean water as well as the flow restrictor inside the cap.

Debris on the mesh cover over inlets/outlets
Ensure that the mesh cover over inlets and outlets are clean of leaves and debris.

Dirt and debris around the tank base or side
Keep leaf build-up, sticks, and other items off the lid of the rainwater tanks and ensure there is no debris on the base, bottom lip and walls of the tanks.

Smelly water or mosquitos
Ensure that the harvested rainwater does not smell. If there are signs of mosquito infestation, refer to Section 7.2 of this report.

Pump
Ensure the pumps are operating regularly by monitoring the sound. Check that pumps are kept clear of surface water (flooding), vegetation, and have adequate ventilation.

Mains backup or pump operation
If the mains backup switching device fails, it may not be noticed for a long time. Consider a manual operating system to ensure continuous operation.

Overflow
Check that the overflow is not blocked and that there is a clear path for water to safely spill from the tank through the overflow pipe when full. Check that a clean mesh screen is safely in place to prevent mosquitoes entering the tank.

[3] From the City of Port Phillip website: https://www.mvcc.vic.gov.au/planning-and-building/building/making-your-home-sustainable/rainwater-tanks.aspx

Sediment/debris build-up in tank (more than 20mm)

Inspect the sludge build-up in the bottom of the tank, and ensure that it is no more than 20mm thick. When the sludge builds up to be more than 20mm, the rainwater tank can be emptied and washed with a high-pressure washer or hose.

Base area

Tanks must be fully supported by a flat and level base. Check for any movement, cracks or damage to the slab or pavers. If damage is observed, empty the tank and have the fault corrected to prevent further damage.

Monitoring the water level

Ensure the monitoring system (be it digital or a simple float system) is functioning properly by checking the water level in the rainwater tanks.

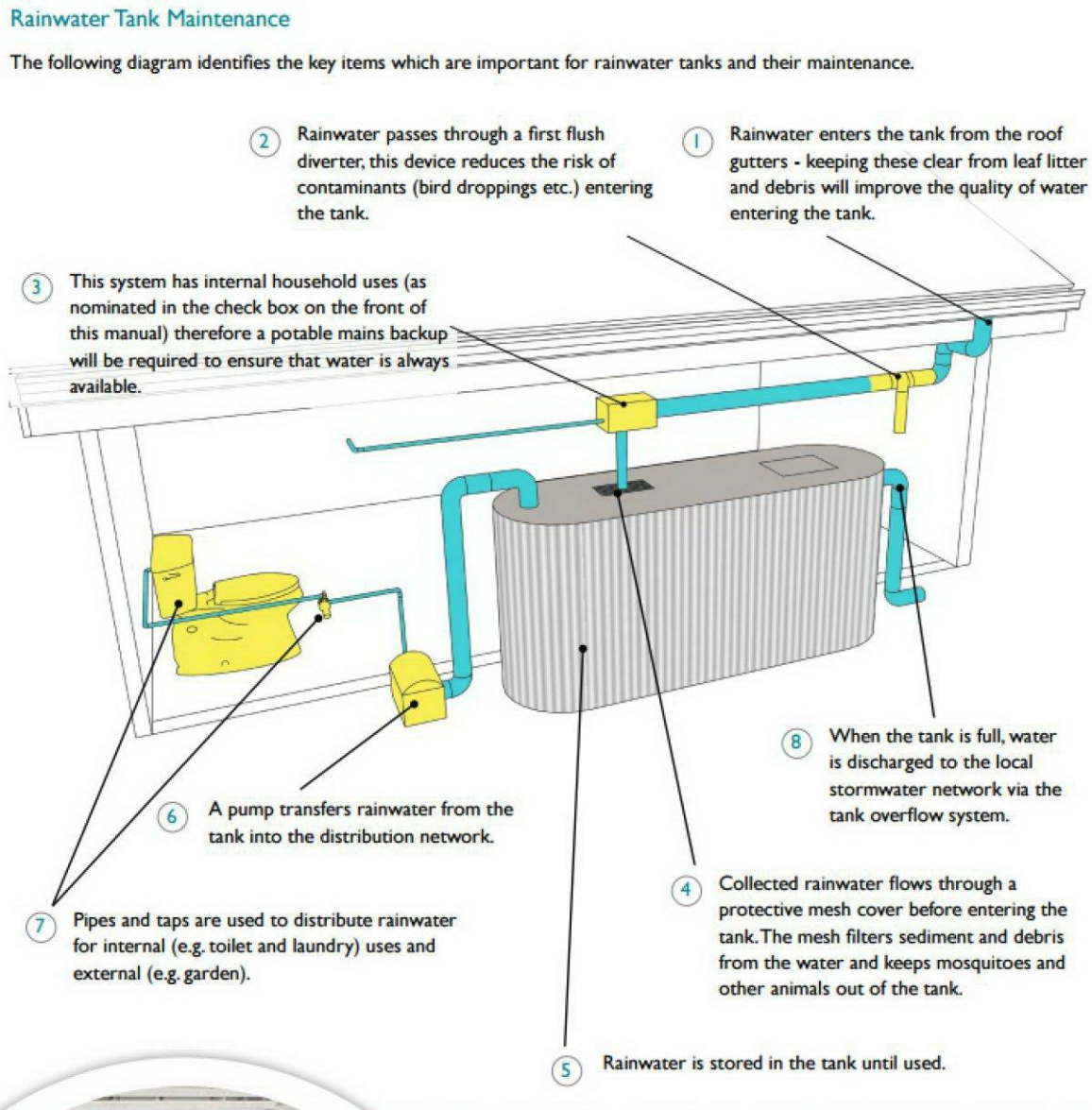


Figure 7: Diagram identifying the key items for rainwater tanks and their operation and maintenance (Source: Port Phillip Maintenance Manual- Rainwater Tanks)

Please note that the above image is not representative of the type of rainwater tanks for this project, however the maintenance aspects are to be very similar. This should be used as a guide along with the As Built drawings for the site which will be provided in the development's Operations and Maintenance manual.

7.2 Clean out Procedures

7.2.1 ROOF, GUTTERS AND RAINWATER TANK

Water ponding in gutters should be avoided as this provides a breeding ground for mosquitos; tanks should also not become breeding grounds for mosquitoes. If mosquitoes are detected in the tanks, remedial steps need to occur to prevent breeding.

If mosquitoes or other insects are found in rainwater tanks, the point of entry should be located and repaired. As well as preventing further access, this will prevent the escape of emerging adults. Gutters should be inspected to ensure they do not contain ponded water, and be cleaned if necessary.

There is no ideal treatment to kill mosquito larvae present in rainwater. The two commonly recognized treatments involve adding chemicals (medicinal or liquid paraffin, or kerosene) to tanks, which defeats one of the advantages of collecting rainwater. In addition, problems have been reported with both types of treatment.

As a last resort, tanks can be treated by adding a small quantity of medicinal or liquid paraffin or kerosene. The recommended dose of kerosene is 3.5mL or one and a half teaspoon for a 1,500L tank. When using paraffin, the dose is double that used for kerosene.

Note: Commercial or industrial kerosene, for example power kerosene for tractors etc., **should not** be used in rainwater tanks.

Paraffin can be used in all types of tanks, but there have been reports of coagulation after a time and of deposits forming on the sides of tanks. Kerosene is not suitable for use in tanks coated with Aguaplate® and may not be suitable for use in tanks constructed of, or lined with, plastic. If in doubt, consult the manufacturer of the tank. Used carefully, kerosene will not result in risks to human health, but excess quantities can taint the water and very high doses can be poisonous to humans. Kerosene added to the surface will not mix through the body of rainwater in the tank and it will either evaporate or be washed out of the tank by overflow. Kerosene should not be added to tanks when water levels are low.

Internationally, it has been suggested that larvicides, such as temephos, s-methoprene and Bti (Bacillus thuringiensis), could be used in rainwater tanks (WHO 1997). However, only larvacide s-methoprene is registered for use in rainwater tanks by the Australian Pesticides and Veterinary Medicines Authority.

Note: Vegetable oils **should not** be used as they can become rancid after a while". [4]

Figure 8: Gutters need to be cleaned out regularly; installation of gutter guards will reduce maintenance requirements

[4] From the Australian Department of Health: http://www.health.gov.au/internet/publications/publishing.nsf/Content/ohp-enhealth-raintank-cnt-l~ohp-enhealth-raintank-cnt-l-5~ohp-enhealth-raintank-cnt-l-5.5

7.3 Installation

7.3.1 RAINWATER TANK

An 18,000L rainwater tank is proposed to be installed in the development. The tanks' manufacture or material has not been nominated. However, the rainwater harvesting system will be installed with a mesh insect cover over the inlet pipe to ensure the tank does not become a breeding ground for pests. Mesh needs to be installed over overflow pipes. A first-flush diverter will also be installed to prevent sediment from piping affecting the rainwater supply.

8. Conclusion

With the proposed stormwater treatment measures incorporated into the development, the design will achieve a score of 103%, which meets the minimum performance standards of the City of Monash.

The development has managed the outflows and quality of stormwater runoff from the site by reducing the volume and intensity of stormwater runoff, thus achieving best practice objectives required.

The builder will also be required to adhere to Melbourne Water's stormwater management guidelines during the construction stage.