Bio-rentention Systems (Rain-gardens, Bio-filtration Systems) and on Site Stormwater Detention

AIM

The aim of this technical solution is to inform plumbing practitioners about bio-retention and detention systems, which are becoming an increasingly popular method of holding and treating stormwater.

PLUMBING REGULATIONS 2008

The *Plumbing Code of Australia* (PCA) is generally adopted by and forms part of the *Plumbing Regulations 2008*. However, the following parts of the PCA are not adopted by, and do not form part of the *Plumbing Regulations 2008*: Part D2, to the extent that it relates to the construction of subsoil drains, and the construction of stormwater pits, below-ground storage or retention tanks.

BACKGROUND

Polluted stormwater run-off is a growing problem in urban areas, where hard surfaces such as roads, carparks and footpaths cover much of the ground.

In the past, when gardens covered a greater area, rain seeped slowly into the earth. Now, water run-off from hard surfaces flows quickly to stormwater drains, picking up pollutants such as oil, petrol, fertilisers, and other residues. In towns and cities, almost all stormwater eventually ends up in our rivers and bays.

Pollution from heavy metals, nitrogen and phosphorous impact greatly on the environment and overall cost of stormwater management.

DESCRIPTION - BIORETENTION SYSTEMS

Bio-retention systems are landscaping features created to treat stormwater runoff. They are commonly located in carpark islands or within small pockets in residential / commercial land development, both within the property, and as part of the streetscape. Bio-retention systems can be used in new or existing developments.

Surface runoff is directed into shallow, landscaped depressions that are designed to remove pollutants in a similar way to naturally occurring ecosystems. Bio-retention systems use vegetation, such as trees, shrubs, and grasses, to remove these pollutants. Stormwater runoff and light rain then filters through the vegetation and soil within the bio-retention area.

During heavier storms, ponding may occur above the surface mulch and soil in the system. This run-off is diverted past the apparatus directly to the stormwater drain. The system has three layers of media:

- the filter media (such as sandy loam), which is approximately 400mm to 700mm deep or as specified in the engineering design, and

- a transition layer (such as river sand), which is approximately 150mm deep, and
- a drainage layer, which is approximately 150mm min. deep, surrounding a perforated pipe.

The bio-retention filtration system operates so that stormwater passes through the filter media moving via gravity through the profile to the perforated pipe and stormwater system (see Figure 1).

DESIGN CONSIDERATIONS OF BIORETENTION SYSTEMS

The design of systems will vary, depending on the type of system and local government requirements. Bio-retention systems may be designed by a landscape architect and should feature minimal future maintenance requirements.

Bio-retention systems are best applied to shallow slopes (not exceeding 5%). Sufficient slope is needed to ensure that the stormwater runoff that enters a bio-retention area can be connected to the stormwater drainage system. Stormwater should be conveyed to the system in a manner which minimises erosion potential.

DETENTION

"Detention" is the holding of stormwater run-off on site for short periods during peak flows. By restricting the rate at which stormwater leaves a site, the risk of overloading both the infrastructure drainage system and downstream creeks and rivers is minimised.

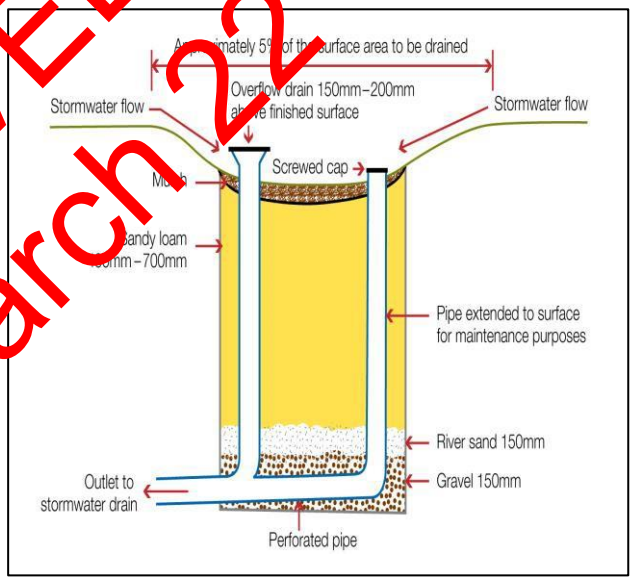
With increased development in existing urban areas, many municipal authorities require an on-site detention system to be included as part of the overall building plan.

The benefits to this type of system are that excessive run-off problems are addressed at the source of the development, and the effectiveness of existing infrastructure drains is not compromised (see Figure 2).

PLUMBER'S ROLE

- Practitioners should be prepared to work closely with builders and designers to ensure that correct levels, gradient and depth of cover can be achieved for stormwater drains.
- Bio-retention systems must be appropriately designed and sized to avoid excess stormwater ingress into any part of the below ground sanitary drainage system.
- Be aware of local government requirements on both new and redevelopment projects.
- For other information visit www.melbournewater.com.au

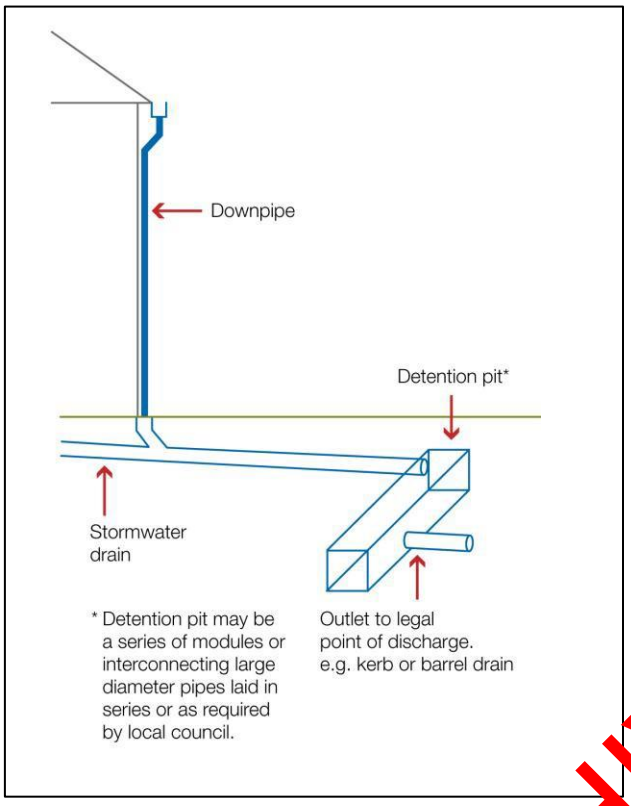
FIGURE 1 - BIORETENTION SYSTEM (RAINGARDEN)



Notes:

- This diagram is dealing with surface water run off only. Roof water is run separately to the legal point of connection / discharge.
- Landscaping and filtration media are critical to the function and appearance of bio-retention systems. Plants should be selected that can withstand the conditions created in this type of environment.

FIGURE 2 - DETENTION PIT



Note:
The sketch is not to scale or intended to be an exact guide.