

Practice Notes



Bioretention basin
[source: Melbourne Water]

This Water Sensitive Practice Note provides guidance on rain gardens and bioretention systems.

1.1 Introduction

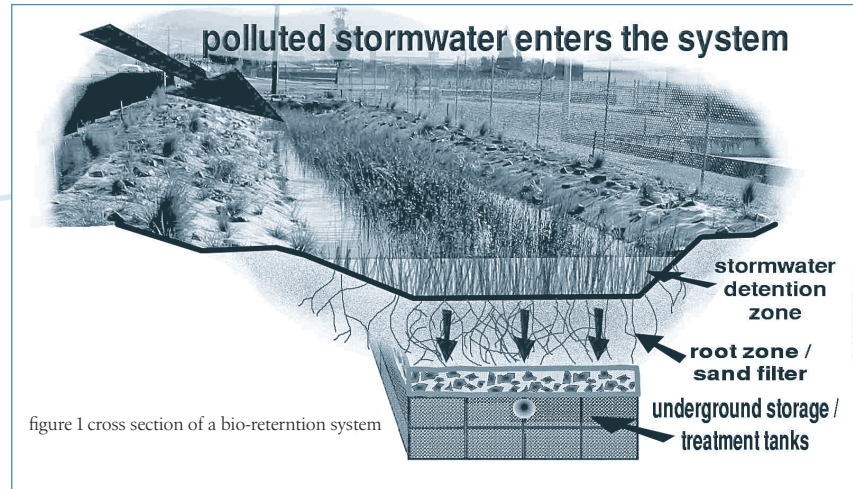
A bioretention system is a filtration device used to filter stormwater through vegetation and a filter media prior to disposal or collection for reuse. A rain garden is a bioretention system, usually designed as a landscape feature.

Water enters a bioretention system as piped inflow, direct overland flow or is conveyed by another WSUD feature such as a vegetated swale. Water then passes through the filter/planting soil profile and is collected underneath using perforated pipes, see Figure 1.

Bioretention systems as WSUD features have many advantages such as adaptability for aesthetic appeal as well as excellent pollutant removal mechanisms.

Bioretention systems may also be designed as bioretention swales so that they incorporate a stormwater conveyance function at the surface during storms.

7 Rain gardens and bioretention systems



1.2 Treatment processes

Water passing through a bioretention system is cleaned in a number of ways. Firstly, water running into the system is screened as it flows through the surface vegetation. Some detention is also provided in systems designed to allow water to pool at the surface, this allows coarse sediments to fall out of suspension. Water then infiltrates through the soil medium and is screened of finer suspended solids. Microbial action also aids pollutant removal around the root zone of the vegetation.

Bioretention systems have been found to effectively remove nutrients, sediment and heavy metals from stormwater.

1.3 Site considerations

Bioretention systems are extremely versatile in their design and configuration allowing them to be adapted so that they may be used under almost

any site conditions. The following points provide some advice on site constraints/characteristics and relevant design adjustments.

Steep slopes – Bioretention systems can be built on steep slopes. Individual cells may be terraced on very steep slopes, systems can be lined to prevent exfiltration (water infiltrating to the soil profile below the perforated collection pipe) if throughflow is a problem.

Problematic soils – Bioretention systems require a filter/planting media with a moderately high hydraulic conductivity (approximately 36-180mm/hr), usually a sandy loam. If local soils are inappropriate, external soils should be imported to either replace or blend with the local soil.

Size constraints – One of the great advantages of bioretention systems is the adaptability of design. A bioretention system can be built in any size or shape, allowing them to often be built in otherwise unused spaces. The

Practice Notes



Bioretention swale
[source: Melbourne Water]

primary variable in designing a bioretention system is the total surface area required. This surface area can be any shape or form, however where inflows to a system are delivered to a single point, care must be taken to avoid scour or damage to vegetation caused by high velocity flow.

Vegetation requirements – Whilst native vegetation is preferable in bioretention systems (and there are many suitable species endemic to Hobart) exotic species may be used to fit with existing landscaping.

7 Rain gardens and bioretention systems

References

Deeks, B. & Milne, T., 2005, 'WSUD Engineering Procedures for Stormwater Management in Southern Tasmania 2005', Derwent Estuary Program, Department of Primary Industries Water and Environment, Hobart.

Melbourne Water, 'Water Sensitive Urban Design Engineering Procedures: Stormwater. Draft. Report' , prepared by Ecological Engineering, WBM and Parsons Brinkerhoff, Melbourne, June, 2004

© Hobart City Council, 2006

No part of this document is to be copied, published or stored in any retrieval means (electronic or otherwise) for financial gain.

However, you are welcome to reproduce material contained in this publication for non-commercial use without formal permission or charge, provided that you give acknowledgment to the document and the Hobart City Council as author and publisher.