Case Study 2

Bioretention Sump at Parafield Station

WATER SENSITIVE URBAN DESIGN SYSTEM
- Bioretention sump

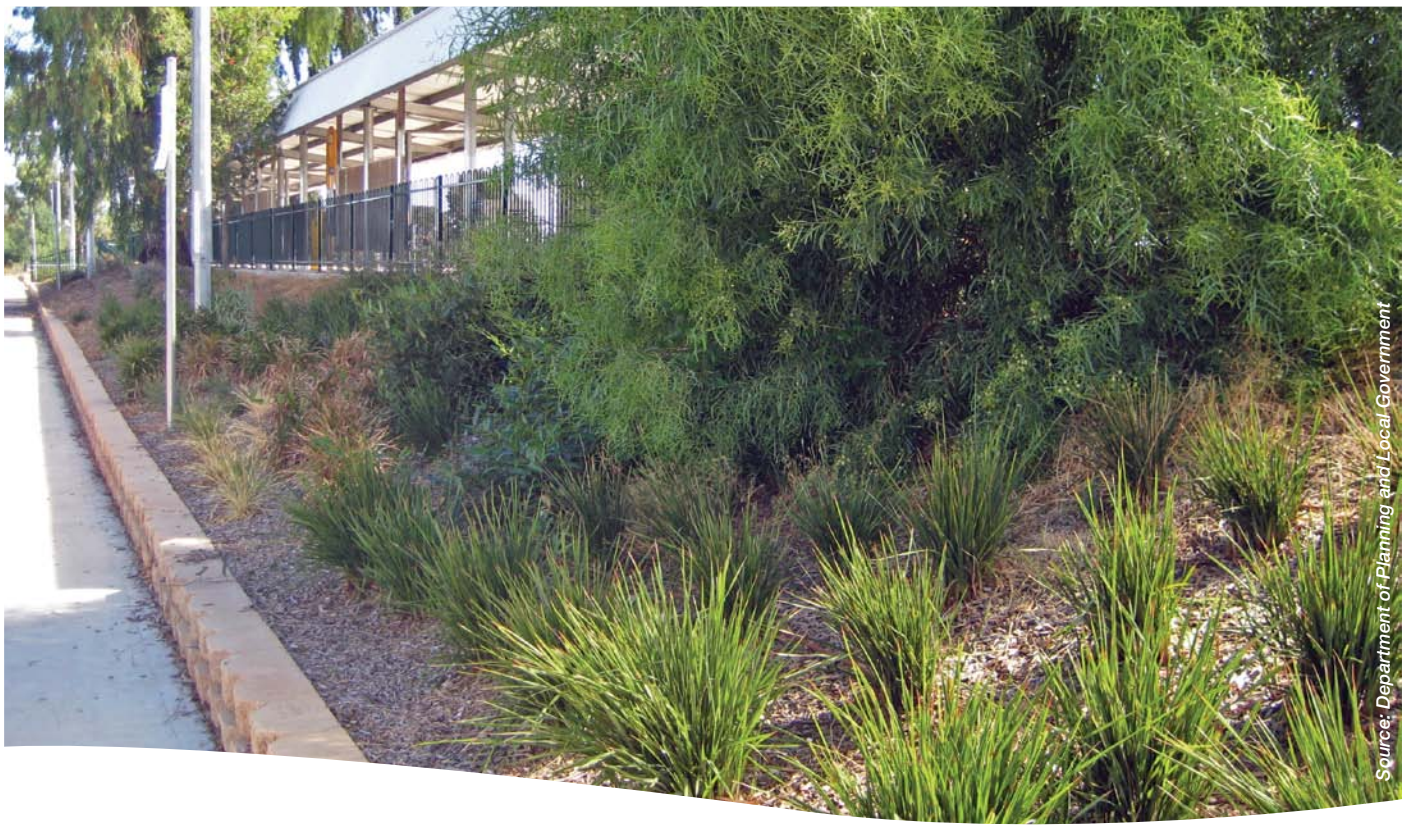
LOCATION
- Kings Road, Parafield Gardens

AVERAGE ANNUAL RAINFALL
- 438 mm (Parafield Airport)

YEAR ESTABLISHED
- Spring 2008

RESPONSIBLE AUTHORITY
- Department of Transport, Energy and Infrastructure

Case study prepared by Rural Solutions SA, Environmental Design and Management Team, November 2009



Source: Department of Planning and Local Government

Background

This is one of several case studies providing examples of bioretention and swale systems that have been incorporated into landscaping in public spaces.

Project objectives

The project aims to:

- capture stormwater run-off on site to irrigate local native species landscaping and reduce pollution entering waterways
- maintain a healthy, flourishing garden with native plants
- encourage local wildlife to visit Parafield Station site
- implement crime prevention principles
- create a green space for the enjoyment of local residents and train commuters
- demonstrate urban biodiversity concepts to the wider community.

Project description

Stormwater from the passenger shelters and platform is directed into a lined sump, which is used to irrigate the garden beds. The water capture system comprises several plastic modular crates (formed from plastic panels that click together), which were combined to form a larger structure (see photo). The crates were wrapped in a geotextile felt-like fabric and then a polypropylene liner. The geotextile acts as a cushion to protect the liner and as a filter to prevent soil from entering the crates, while the liner makes the system waterproof.

The garden beds were planted with native species that require little additional water or maintenance; however, a small pump was installed to irrigate the beds as required during extended dry periods to ensure the garden flourishes all year round. The introduction of native plants improves the biodiversity of the site while also providing an example of a native garden for commuters. Biodiversity was further enhanced by removing weed species (primarily *Acacia saligna*). The safety of commuters was improved by pruning and replacing medium-sized shrubby species with small shrubs and groundcovers to increase visibility around the site.

The site has received a low level of maintenance since establishment, which is evident from the current site conditions. This demonstrates that regular upkeep is needed to maintain the site's aesthetic appeal and ensure proper functioning of these systems.

Construction phase: assembling crates for the sump

Lessons learned

The plastic modular crates were found to be lightweight, strong and easy to install and assemble on-site without the need for specialised tools. This style of system also was well suited to the site, as it proved flexible enough to

Exposed irrigation lines should be covered and weeds need to be managed

form a linear section of the garden bed. It was noted that budgeting for similar projects should allow for accredited plumbing services to oversee installation and connection of the system.

In addition to the obvious environmental benefits, the sub-surface water storage (tank) system provided more useable space on the site and an enhanced aesthetic setting compared to an above-ground tank. The design of the system adds to the quality of the landscape features by providing an enduring moisture supply.

Isolepis nodosa is well established in some areas but struggling in others

The capture of rainwater and stormwater for re-use on the garden bed was a key objective of the project, intended to meet both the client's and communities needs though innovative environmental design.

It has been observed, however, that these systems require a long-term maintenance commitment to ensure pumps, irrigation and weed-control continues to function as planned. In addition, the garden beds in public areas should be covered with adequate mulch to conceal irrigation lines and so minimise the likelihood of damage by vandals.

Specifications

The water storage system includes:

- Australian-made product (from recycled milk containers)
- compact components
- high crush strength
- approximately 10,000-litre capacity
- lined with geotextile fabric and polypropylene membrane
- low-pressure electric pump
- minimum 300 mm soil cover on the garden bed
- native grass / lily species (it is important to plant only these plant species on the sump to avoid roots damaging the system).

Maintenance suggestions

Sump and irrigation:

- Check pumping operation prior to and during summer application on a regular basis.
- Inspect irrigation system and maintain and repair lines as required each month.
- Check solenoids.

Landscaping:

- Regularly sweep or blow excess plant debris in gutters back onto larger garden areas. Sweep gravel back into beds.
- Apply slow-release fertiliser (suitable for natives) in spring every third year to help keep plants looking fresh and green.
- Control weeds as a priority to preserve the aesthetic value of the site and promote strong, healthy native plant establishment. Numerous non-local native weeds (*Acacia saligna*) and other broad leaf and grassy weeds require immediate control on this site.
- Remove River Red Gum (*Eucalyptus camaldulensis*) seedlings from the garden beds, particularly above the sump, before they develop into trees. (Significant regeneration of this species on the site is probably due to the irrigation.)
- Mulch the site to minimise evaporation, suppress weed growth and cover irrigation lines.

Species used in irrigated landscaping

Scientific name	Common name	Observations in November 2009
Dianella caerulea	Little Jess	• This was the dominant species used on the station embankment, grouped for landscape appeal. Plants establishing well.
Dianella revoluta	Little Rev Flax Lily	• Adaptable cultivar. Plants establishing well.
Dianella revoluta var revoluta	Flax Lily	• Adaptable local plant to the area. Plants establishing well.
Lomandra multiflora ssp. dura	Hard Mat-rush	• Adaptable local plant to the area. Plants establishing well.
Ficinia nodosa Syn. *Isolepis nodosa*	Knobby Club-rush	• Benefiting from direct surface run-off. Plants establishing well where extra soil moisture is available.
Hardenbergia violacea	Native Lilac	• Adaptable to dappled shade area. Benefits from additional summer watering under large trees.
Correa alba	White Correa	• Benefits from additional summer watering. • Plants establishing well.
Olearia ramulosa "grey"	Twiggy Daisy-bush (compact form)	• Attractive contrasting foliage and form to sedges and lilies. Generally planted in non-irrigated areas of entrance area.
Allocasuarina verticillata	Drooping Sheoak	• Used in landscaping on non-irrigated median strip. • Adaptable local plant to the area. Plants establishing well.
Enchylaena tomentosa	Ruby Saltbush	• Used in landscaping on non-irrigated median strip. • Adaptable local plant to the area. Plants establishing well.

Plant species that are well established on the site include the Lomandra and Dianella species

Vegetation required weed control and mulching as a priority in November 2009

New shoots of Dianella caerulea 'Little Jess'

Before: old garden beds requiring topsoil and mulch improvement

Before: good shade trees but no other lower vegetation

After: improved garden beds and visual appeal

After: improved garden beds and visual appeal; the site, however, is in need of some maintenance in order to ensure the proper functioning of the system and its aesthetic appeal

After: improved garden beds and visual appeal, although the site does require some maintenance

The project described in this case study was undertaken with the support of Government of South Australia

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