

Case study – Randolph Avenue streetscape upgrade (Fullarton)

This is one of a series of case studies aimed at demonstrating the range of WSUD solutions being applied by practitioners in SA



Project planning & design

The Randolph Avenue landscape design incorporates a pathway along the southern side of the street, landscaped garden beds, the replacement of existing trees, additional green space for residents, biofiltration raingardens and stormwater infiltration wells.

The site was chosen by the City of Unley for multiple reasons:

- The mature elm trees lining the southern side of the street were identified as being in poor condition with a life expectancy of less than 10 years.
- The flexibility associated with an unusually wide 20m road reserve and the removal of the elm trees.
- Significant surface flows generated in the roadway due to runoff generated from adjoining residential properties, and a number of large townhouse and aged care complexes.
- The northern footpath was identified as needing replacement and the project provided an opportunity to provide a footpath on the southern side of the road.

An underutilised space was converted into a softer, environmentally friendly area and the whole area now has potential to capture, treat and re-use stormwater within the linear open space.

Financial partners

This project is a pilot with part funding from the Catchment to Coast project being led by the EPA with funding from the National Landcare Programme (\$250,000), to demonstrate action that can be taken at a street level to improve urban water quality and the quality of Adelaide's coastal waters

About the site

Organisation

City of Unley

Development type

Public streetscape

WSUD feature type

Bioretention – raingardens & stormwater infiltration wells

Cost

\$500,000

Date completed

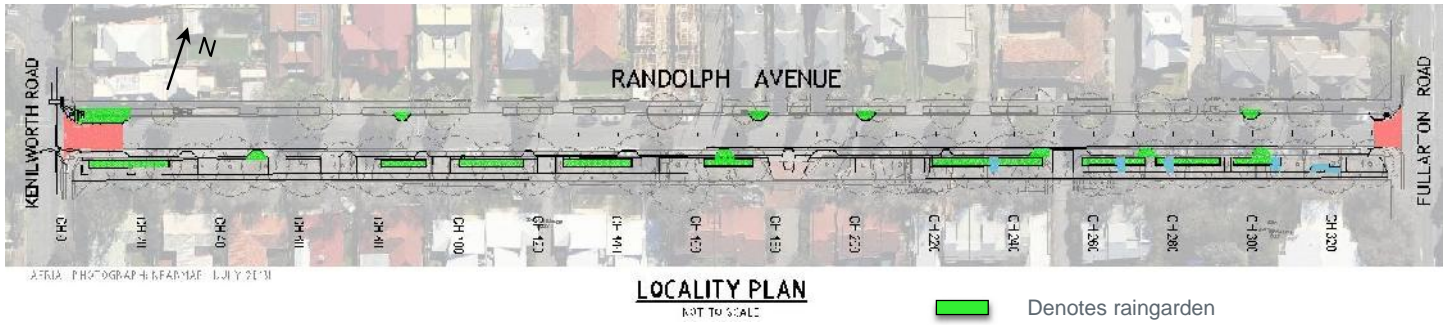
July 2015



A. Streetscape upgrade and raingardens, January 2016

B. Prior to construction. Source: City of Unley

C. During construction, April 2015



Plan view of Randolph Avenue raingarden locations

WSUD features and design criteria

Previously, stormwater in the street was managed via the kerb and gutter system draining to a conventional underground stormwater pipe system and associated side entry pits (SEPs) at the end of the street. In the new design, all road runoff and stormwater systems from adjoining multi-dwelling complexes are directed to a series of raingardens that are located and sized to cater to the contributing sub-catchment. The raingardens contain sedges and rushes that are effective at removing pollutants, in particular nitrogen, from the stormwater.

Outlets have been designed to provide between 100mm and 200mm extended detention. The raingardens typically include three inspection and flushing pipes. Treated stormwater collected by the raingarden underdrains (100mm slotted PVC pipe), overflows to a new dedicated 'collector' drain that distributes this filtered water to a number of soak wells located adjacent to the new street trees. Any subsequent overflow discharges to the existing downstream drainage system and ultimately to Glen Osmond Creek.

Total impervious area of contributing catchment
5.25 hectares

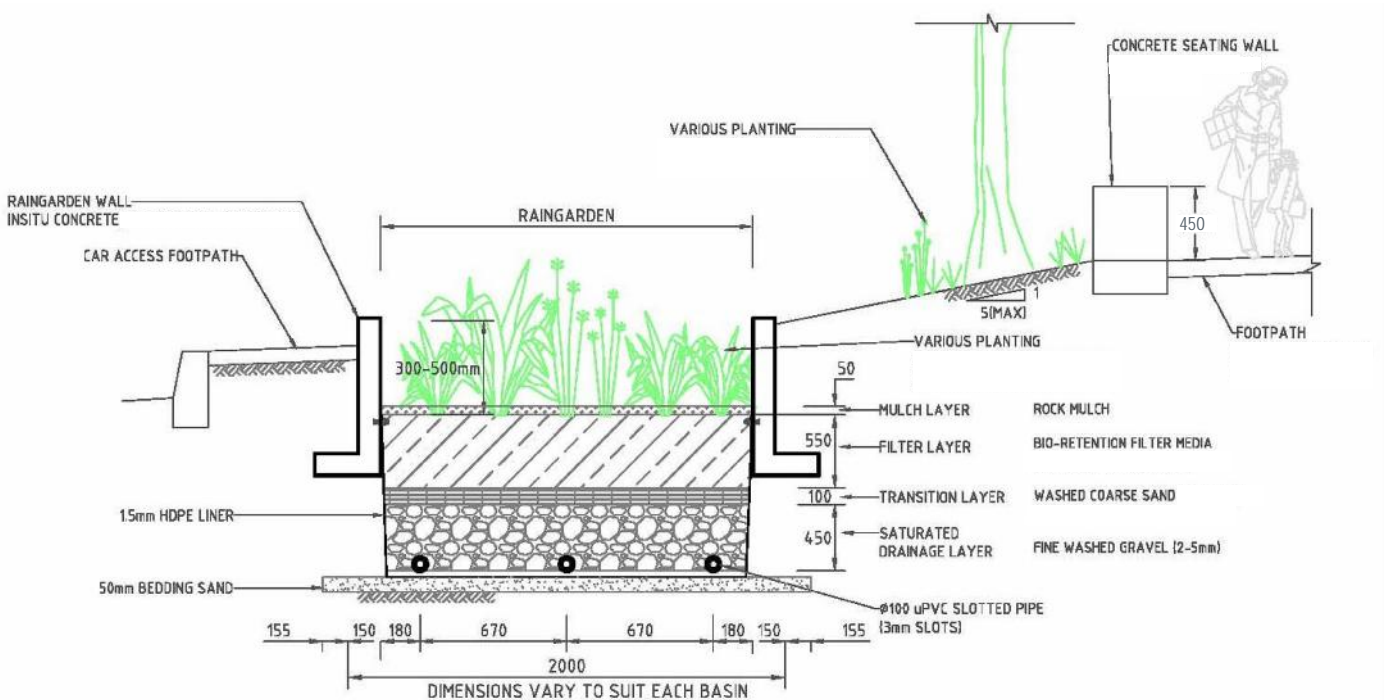
WSUD features

Bioretention – raingardens

- 10 raingardens of dimensions 1.70-2.10m wide with a variety of lengths ranging from 6.75-25.5m)
- Total length of raingarden is 146m giving a total treatment area of 245m² (0.5% of impervious contributing catchment)
- A saturated zone of 450mm depth to assist plant viability and storage capacity
- A design infiltration rate of 160mm/hr through filter media
- HDPE lined system with no exfiltration

Stormwater infiltration wells

- 31 infiltration wells of dimensions 600x400x450 mm deep
- Waterproof membrane top and bottom with geofabric and 20mm screenings around the perimeter, providing lateral infiltration to adjacent trees and garden beds.

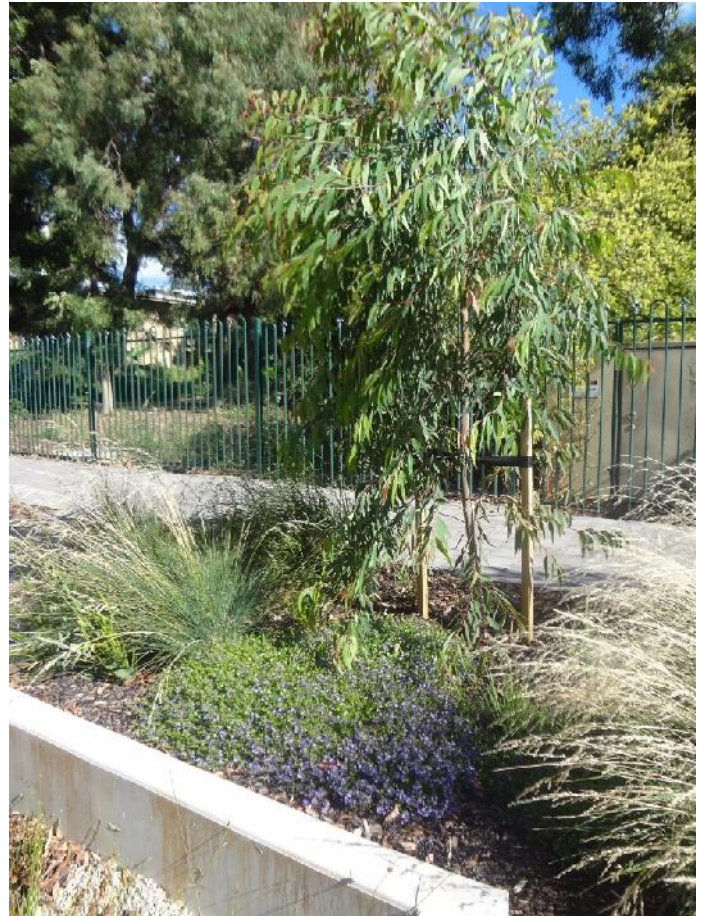


Raingarden typical section

Dimensions in mm



Streetscape trees and understorey supported by stormwater runoff via infiltration wells and shade of existing tree, January 2016



Street trees and understorey supported by stormwater runoff via infiltration wells, January 2016

Challenges & learnings

- Competing demands for space (parking, parking lane paths, footpaths and spots for wheelie bins) left surprisingly limited space for raingardens.
- The original landscape design proposed the inclusion of 70 trees, however to maintain minimum distances from sewer connections this figure was reduced to 50 at the time of planting.
- The tight site made stockpiles difficult to store on site.
- Relocating services for the raingardens.
- Working with community expectations that were more extensive than anticipated.
- A large rain event in December 2014 scoured the open excavations requiring rectification works.
- Four water mains burst not related to the project and resulted in heavy siltation of the basin on the northern side of Randolph Avenue.
- The project required greater than usual site supervision as the contractor had not built similar features before.
- The first filter media presented to site had a filtration rate of 11mm/hr which was rejected given it is well below specifications.

In hindsight, the project would consider

- minimising hard forms (e.g. concrete structural components), potentially considering a design with battered sides instead; this could prospectively also reduce costs
- undertaking more comprehensive community engagement and communication.

Future opportunities

A key innovative feature of this project is the integration of a collector drain that collects treated stormwater from each of the raingardens and distributes this water to a number of soakage devices to facilitate passive irrigation for new street trees. The success of this approach will be monitored.

The system is estimated to convey approximately 10ML of treated flow and there is potential opportunity to harvest and reuse this flow in additional areas should suitable sites be identified.

Education program & community

The streetscape renewal project included extensive community engagement in early 2013. Findings from the engagement process directly informed an early concept design that was subsequently discarded when the opportunity to achieve an innovative WSUD outcome with a broader streetscape appeal was identified. A further round of community consultation did not occur, which on reflection would have benefited the project in terms of influencing community expectations with respect to the revised project objectives and in addressing areas of concern.

The design provides opportunities for monitoring and evaluation of various aspects, including:

- the performance of one raingarden in receiving arterial road runoff, against raingardens receiving solely local road runoff and solely unit complex runoff
- location of underdrain junction boxes in suitable locations for future monitoring activity
- interpretive signage along the new path.

Maintenance

Maintenance is currently being undertaken by the contractor as a part of the contract for the capital works and includes fortnightly visits to the site to inspect and undertake the following works:

- General inspection of raingarden: rock mulch, liner, walls etc
- Ensure irrigation system is working correctly
- Removal of rubbish
- Removal of organic material from inlets
- Weeding as required
- Replacement of failed plants. These works will occur in autumn when conditions are more suitable for plant survival.

Project delivery

Civil Design
Southfront

Landscape design
ASPECT Studios

Constructed by
Digit Landscapes

Case study contributors

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For further information

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Disclaimer:

While every effort has been made to verify the accuracy of items in the Water Sensitive SA case study fact sheets, independent advice should be sought on matters of specific interest.

Raingarden vegetation species

Group A – Effective at nitrogen removal



Cyperus gymnocaulos (Spiny Sedge)



Ficinia nodosa (Knobby Club Rush)

Group B – Companion planting



Gahnia filium (Chaffy Saw-Sedge)



Eocharis acuta (Common Spike Rush)

Plant images sourced from *The Atlas of Living Australia*
<http://bie.ala.org.au/>