

# URBAN WATER

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Raingardens

## Case study

# Howard Street raingardens



## Fast Facts:

### Project title

Howard Street Reserve raingardens

### Project description

Raingardens capture and clean stormwater runoff

### Purpose

Cleaning runoff and improving permeability

### Catchment

Howard Street

### Cost

\$700,000

### Completion date

May 2011

The raingardens on Howard Street intercept stormwater from the road and clean it before it enters our waterways.

Howard Street is a short residential street in North Melbourne. In 2011, the City of Melbourne closed part of the road and turned it into parkland.

The new public open space includes three raingardens that capture and clean stormwater runoff.

We placed two large raingardens at the intersection of Howard and William Streets. They capture water running down the gutters on Howard Street, before it reaches the stormwater drains. The third raingarden captures runoff from William Street.

### What benefits have the raingardens provided?

- Reduced the volume of stormwater entering our waterways.
- Reduced the levels of nitrogen and phosphorus entering the waterways.
- Created a greener streetscape that is better for people and the environment.

Gallery



Project details

How does the system work?

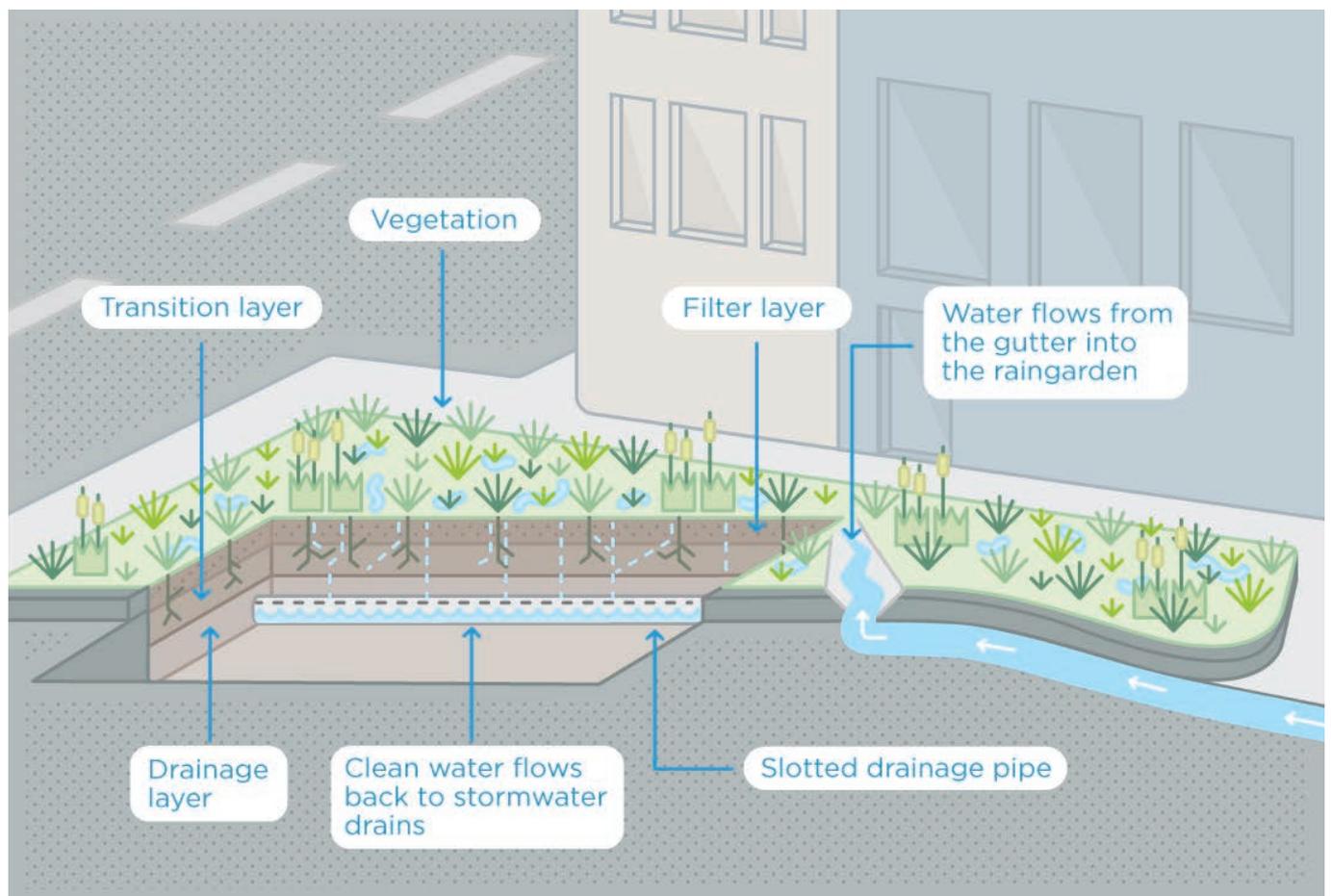
Howard Street slopes down between William Street and Rosslyn Street. We built two new raingardens at the low end of Howard Street. When it rains, the gardens capture water running off the road before it enters the stormwater drains. The water pools in the garden beds and gradually soaks down through the sandy soil.

The raingardens are planted with wetland grasses and look like standard garden beds. Beneath the surface they are made up of several layers of substrate. These are designed to remove litter and pollution from stormwater.

The top layer is called the filter layer. It removes fine particles of pollution from the water and traps litter and debris on

top. The middle layer is called the transition layer. It prevents the finer sands from being washed into the drains.

The bottom layer is called the drainage layer. It allows the clean water to drain from the garden bed and back into the stormwater system, eventually flowing into the Yarra River.



Beneath the surface of a raingarden, special layers of sand work to remove pollution from stormwater.

## Timeline

**Cost estimate**  
October 2007

**Concept design**  
November 2008

**Detailed design**  
November 2008

**Community consultation**  
2007/2008

**Completion**  
May 2011

## Cost

The raingardens in Howard Street were part of broader streetscape redevelopment that cost a total of \$1.5 million.

## Design and planning phase

### Research and planning

The following tasks were completed during the research and planning phase of the project.

#### Traffic study

Because the redevelopment of Howard Street involved turning some of the street into parkland, we did a traffic study to understand the impact of

such change. We also investigated traffic volumes prior to the design process to support the business case for closing part of the road.

#### MUSIC modelling

MUSIC modelling was carried out to help determine the size and location of the raingardens.

#### Concept designs

To aid the community consultation, we developed concept designs. The designs were refined based on community feedback.

### Design challenges and constraints

This was the first time we used the Biofilta planting system, where mature plants are pre grown at the nursery in large format modules. The modules arrive on site with 100 mm of loamy sand thick with plant roots. We placed these close together in the raingardens, on top of 400 mm of filter layer sand.

#### The advantages of this type of installation:

- Plants are established from day one and do not need 6 – 12 months on site to mature.
- The system functions to its ability from day one as the mature plants can absorb the nutrients in the stormwater straight away.
- Establishment and maintenance costs are reduced, especially weeding and plant replacements.

#### TECH TIP

The design of the entry point is critical to the volume and speed of the water entering the raingardens. Initially, the water had too much speed running downhill along Howard Street to the entry of the larger, western raingarden. To counter this we installed a rocky apron to dissipate the water flow. Some of the rocks were installed slightly too high, which stopped some of the water from entering the raingarden.

### Community engagement

We engaged extensively with the community about our plans to turn some of the underused section of Howard Street into parkland. In response to community feedback, we added the raingardens to the original park design.

You can download the concept plan used for consultation at the top of the page.

## System Components

### Substrate

Each raingarden has four layers; the plant modules, a filtration layer, a transition layer and a drainage layer. Each of these are detailed below.

#### Filtration layer

Position: top.

Purpose: this is where all the work happens. This layer filters sediments and larger litter. Phosphorous is absorbed into the filter layer. Nitrogen is removed via the plant roots and soil bacteria that exist in the filter media.

Depth: 450 mm.

Hydraulic conductivity: 180 mm/h (saturated).

Composition: 80% Loamy Sand, 10% vermiculite and 10% perlite, by volume, evenly mixed. A layer of recycled rock aggregate is added to the top to protect the filtration layer.

#### Transition layer

Position: middle.

Purpose: to prevent the fine filter sand entering the drainage layer while facilitating drainage and root growth.

Depth: 100 mm.

Composition: coarse sand.

#### Drainage layer

Position: bottom.

Purpose: drainage layer surrounds the drainage pipe, is free draining and prevents the blocking of the holes in the drainage pipe.

Depth: 100 mm.

Composition: fine, clean washed gravel (2.5 mm particles).

Two 90 mm slotted drainage pipes are set within the drainage layer to allow excess water to flow back into the stormwater network. The pipes have a riser that allows for the flush out of any accumulated sediments. The drainage pipes connect in to the overflow pits. This allows for easy inspection of their function during rain events.

#### TECH TIP

The Howard Street raingardens do not retain moisture during long dry periods. The inclusion of a submerged zone would reduce this impact as the water retained at the bottom of the raingarden keeps the sandy soil moist for longer periods. This is recommended in the Facility for Advancing Water Biofiltration (FAWB) Adoption Guidelines for Stormwater Biofiltration Systems.

We have had to replant the raingardens, as extended dry periods have resulted in some plant losses.

### Plants

The plant modules are 500 mm x 500 mm x 100 mm deep with a well-established root matrix that holds together the sandy soil. These modules are installed like tiles close to one another across the level surface of the filter layer.

Species: *Juncus gregiflorus* and *Juncus procerus*.

Position: planted throughout the raingardens.

Purpose: the biofilm on the plant root system removes nutrients from the water as it soaks through the raingarden.

Density: six plants per square metre.

In addition to the grasses, the banks were planted with *Lomandra longifolia* and a tree was planted in one of the raingardens as a feature to tie it in to the surrounding landscape.

#### TECH TIP

The pre-grown plant modules make the system look well established from day one.

### Overflow

Overflow pits have been installed 100 mm above the surface of the raingarden. In heavy rain, excess water will bypass the raingarden and flow directly to the stormwater system.

## Gallery



## Ongoing Management

## Maintenance

Maintenance tasks include:

- Replacing the top layer of substrate annually using a suction hose.
- Removing weeds from the biofiltration bed and replacing plants as required.
- Monitoring detention time for filter media.

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