Kings Square raingardens

Land use / development type	Scale
Commercial	Street/lot
Public realm	Precinct

Stormwater controls	Scale
Raingardens	Street
Gross pollutant traps	Street
Biofilters	Street

Efficient use of water	Scale
Waterwise planting	Street/lot
Passive irrigation	Street/lot

Water reuse	Scale
Delivery of treated stormwater to local aquifer	Precinct

Site conditions	
Soils	Silt/Clay + ASS
Groundwater	High
Slope	1:20 max

Local government	Location
City of Perth	Perth and Northbridge

Context

The Perth City Link (PCL) project's core vision is to reconnect Perth's city centre with Northbridge. It will become the new commercial core to the city with water sensitive stormwater management solutions integrated into the streets and open spaces. The site straddles the recently sunk railway line into Perth Central Train Station between Wellington Street and Roe Street with the Perth Arena at the western end and William Street Overpass at the eastern end.

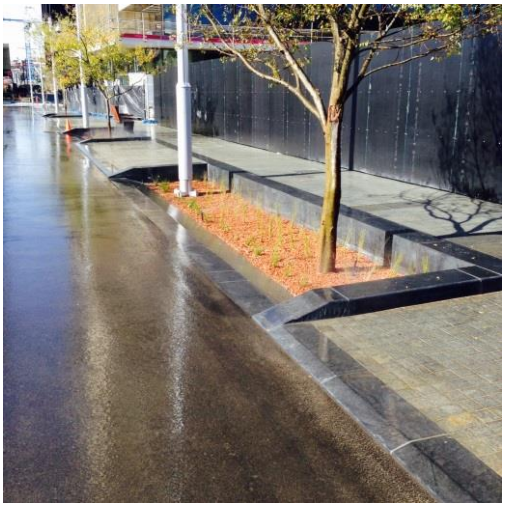
As part of the design of the streetscape, a water sensitive urban design strategy was developed that includes a network of raingardens integrated with street parking. These raingardens provide retention, filtration, litter management and bio-remediation outcomes and integration with street furniture and lighting.

The raingardens are designed to fit into the cross sectional parking dimension between road crossing points. They are located to accommodate alfresco dining and retail opportunities at certain locations with shade, rest points and amenity provided by the vegetation and trees.

There are 10 raingardens ranging in length from 4m to 9m and a width of 2.5m. This equates to approximately 1:2 ratio of infiltration area to parking area not seen in the City's hard urban landscape to date.

The materials carried by the first flush are the most damaging to the environment and are the target of this strategy. First flush pollutants include hydrocarbons, heavy metals, litter, nutrients, dust and leaf litter. The dense understory plantings (8 plants/m^2) assist in increasing biodiversity, removing nutrients and binding pollutants into the soil.

Street and pedestrian pavements were designed to sheet stormwater into raingardens around trees and planting beds to promote passive irrigation.



Wetland sedge plantings such as *Meeboldina scariosa* and *Lepidosperma calcicola* (both locally native) will treat stormwater as close to runoff source as possible.

The pre-development site was originally wetland where both species were common.

Key Project Features

- The raingardens designed appropriate to local streetscape context and dimensions. This helps to maximise footpath widths to facilitate movement of large crowds and provide quiet, safe and shady places to pause.
- Raingardens are integrated upstream of a traditional pit and pipe system to catch the first flush events which account for approximately 95% of rainfall.
- The equal raingarden spacing across the site facilitates an even coverage of at-source capture. This helps minimise sheet flow velocity throughout the site by intercepting runoff from all small rainfall events. The pit and pipe drainage network provides for serviceability and management of minor and major events.
- Two deciduous trees (*Ulmus parvifolia* and *Jacaranda mimosifolia*) were selected. *Ulmus parvifolia* provides summer shade and winter solar access. The trees were also selected for their relatively small leaf size to reduce the likelihood of drainage system blockages.

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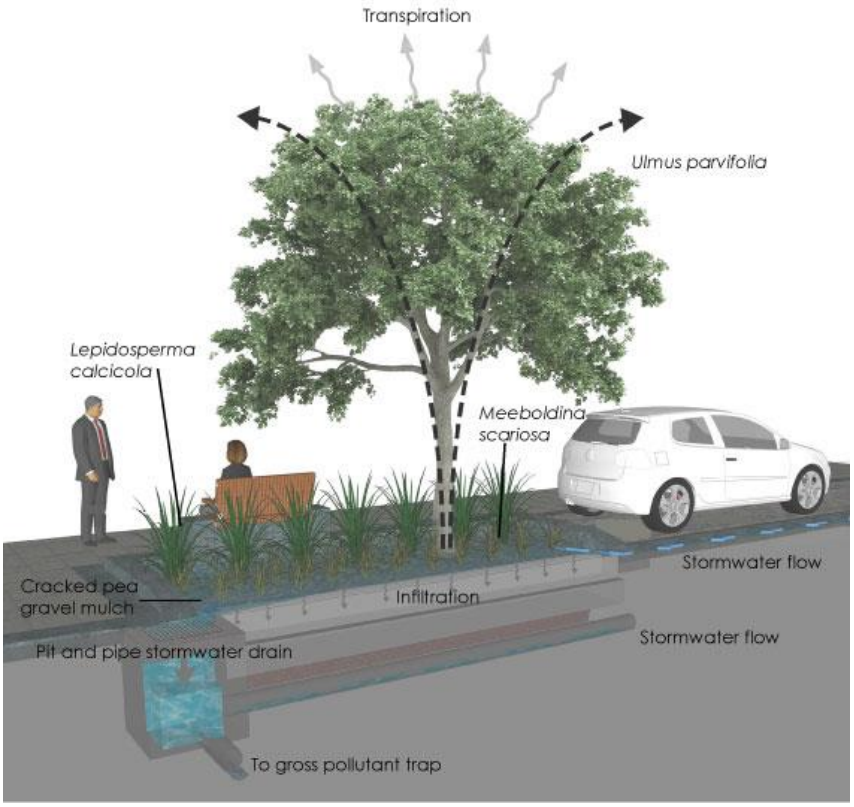
Issues

Well-designed public areas can contribute significantly to the quality of the built environment and play a key role in the delivery of sustainable stormwater management. A number of drainage principles must integrate to produce an attractive, distinctive and inclusive place that celebrates the City's character and identity.

Public safety is paramount in urban streetscapes, especially around level changes adjacent to paths of travel. Integrated trafficable ramps along the road edge allow for stormwater ingress and vehicle egress (if needed). The ramps have been constructed from a high contrast stone to visually deter cars from entering the raingarden. An integrated stone kerb to the back and sides act as wheel stops to parking bays and prevents pedestrians and the vision-impaired from falling into the raingardens. Depths were also designed to minimise injury if a car or pedestrian accidentally fell in.



Outcomes

The Kings Square streetscape aims to link the 'destinations' within Perth City Link precinct to the broader context of the CBD and Northbridge and as an extension of the 'City Walk' to Perth Arena. It is an uncluttered streetscape that has been designed in accordance with the City of Perth material standards and guidelines. Consideration has been given to practical servicing and maintenance requirements as part of the addition of custom granite clad and timber bench seating which is integrated with the raingarden.

The raingardens exhibit urban design innovations *which* capitalise on local ecology, lighting, plants and place-making *for a functional and high amenity outcome*.

Kerbs are reduced to 80mm high with car parking bays raised via mountable kerbs to be flush with the footpath. This gives a sense of spatial generosity and a 'shared' feel to the space. When car bays are vacant, the area between the raingardens function as a pedestrian environment.

Plant procurement specifications required certified Phytophthora-free (dieback) plant stock using local wetland sedge species. Species were selected specifically to strip nutrients from stormwater whilst maintaining a local genetic provenance profile and a contemporary aesthetic.

Development Costs[1]

Overall Project Cost	$1.2 Million
Typical Raingarden Cost	$15,000 each

[1]All Costs are site specific and are an approximation given for guidance purposes only

Maintenance Costs[1]

Reduction to street sweeping	-$1200 /annum
Raingarden maintenance	$750 / annum

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Contact details for further information

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August 2017

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