



# Urban intensification and green infrastructure: towards a water sensitive city

## Overview

Water sensitive urban design (WSUD) is commonly best implemented at a precinct-scale. This enables an integrated approach and the employment of an appropriate mix of design and technologies for a spatially considered, climate resilient and resource sensitive outcome where local water capture, storage, treatment, use and reuse can be introduced as a contributor to the urban environment.

This project examines the issues and processes involved in delivering best practice WSUD through demonstration precinct development and redevelopment projects in Victoria, Western Australia, South East Queensland and in international cities. The scale, design and delivery of each project will be determined by the particular constraints and contexts of each location. Design projects will seek to integrate both the physical and environmental characteristics of the location, such as climate, building density, availability of open space and local catchment issues as well as the social, cultural and legislative aspects, such as development regulations, community needs and qualities of place. The precincts, which include greenfield, greyfield and activity centres, will incorporate an integrated and holistic approach to water systems and activities.

## Key outcomes

This project will develop plans, visualisations, design guidelines and demonstration outputs that support government agencies, policy-makers, developers and consultants in facilitating the adoption of WSUD principles at precinct-scale.

A key outcome will be the demonstration of how the various social, science and economic outputs of the CRC for Water Sensitive Cities (CRCWSC) can influence design and the visualisation of what these sites, precincts and cities of the future might look like.



Visualisation of Tonsley's master plan (© CRCWSC)

## Early insights into master planning water sensitive urban design

The closure of the Mitsubishi car manufacturing plant in Adelaide's Tonsley Park in 2008 created a unique opportunity to redevelop a 61 hectare inner-city urban renewal site in a sustainable context. Renewal SA, the government body responsible for delivering Tonsley's new master plan, teamed up with the CRCWSC to explore a range of "what-if" scenarios, with a view to incorporating best practice WSUD principles into Tonsley's master plan. This project provided an excellent opportunity for the CRCWSC to demonstrate its technical capability to provide input into a large-scale, mixed-use redevelopment. A CRCWSC Industry Partners' Workshop held in October 2013 culminated in Ideas for Tonsley — a report capturing important design principles and suggestions for the implementation stage. These include:

- diverting and distributing stormwater to irrigate shade trees which form part of an urban forest along pedestrian and cycle routes
- (partially) "daylighting" drains and creeks that are currently piped which slows the flow of water and helps sustain a range of vegetation; reduces downstream flooding; captures, cleans and reuses otherwise wasted water; increases moisture content in the soils; and improves groundwater to support an urban forest and biodiversity. An open creek would also greatly improve public amenity for residents of Tonsley and neighbouring suburbs, which keeps with the intention to integrate this redevelopment into the broader landscape and maintain certain cultural linkages
- storing excess winter rain harvested from roofs and stormwater in large tanks to use for evaporative cooling and spray misting in summer. Using this water to irrigate shade trees during summer, for example, could cool the shaded areas by 2–3°C during the day and 4–5°C at night
- collecting runoff from the 8 hectare large shed roof in steel storage tanks providing cooling during summer and heat repositories (enhanced by solar panels) during winter.



## Project design

The project will undertake a number of interrelated research sub-projects for the incorporation of WSUD in a range of precincts in Australian and international cities and towns. Each sub-project will facilitate an exchange of expertise, information, skills and knowledge across the project-leading universities and cities. In particular, these sub-projects involve:

- designing strategies for precinct-scale development and redevelopment that achieve high-quality and higher density dwellings that respond to a changing demographic; as well as interconnected open space for social, recreational and ecological purposes
- developing a design and performance toolkit and assessment framework consisting of mechanisms, tools and processes for identifying suitable land for precinct development and redevelopment; innovative financing models; and the assessment of a range of environmental, economic and social benefits of proposed precincts
- identifying best practice principles for precincts resilient to events such as flooding, storm surges, droughts and temperature extremes
- developing best practice principles for incorporating renewable energy and resource recovery solutions.

## Outlook

The next steps will continue to identify, scope and design various demonstration projects in Australia and internationally at a range of scales. A research repository will be developed in order to document and integrate the research findings and learnings from other CRCWSC programs into the development of design projects.

Final outputs of the project will include:

- a repository of CRCWSC's research relevant to built environment outcomes
- design project case studies and appropriate visual representations of a mix of precinct types and scales in Australia and internationally
- a toolkit demonstrating key design principles that best support the integration of resilient water sensitive precinct design. This will include a process for testing these principles for their suitability to be built into regulations and to challenge existing regulations that inhibit best outcomes.



## About the Cooperative Research Centre for Water Sensitive Cities

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) brings together interdisciplinary research expertise and thought-leadership from Australia and the world to address current urban water management challenges facing our cities and regions. In collaboration with over 80 research, government and industry partners, it develops and synthesises knowledge into powerful tools and influences key players aiming to achieve sustainable, resilient and liveable water sensitive cities.

### Further information

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