Summary Sheet

Urban Water Harvesting and Reuse

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Sustainable water management involves the use of locally generated rainwater, stormwater and wastewater to supplement traditional water sources.

Urban water harvesting and reuse can be applied at a range of scales as there are numerous methods to utilise rainwater, stormwater and wastewater as a resource.

The capture and use of water on site is environmentally preferable as it reduces the need for piping or pumping. Fewer resources are needed and greenhouse gas emissions are reduced.

This summary sheet does not address reuse of stormwater or wastewater for drinking water purposes. The use of rainwater for drinking water supply is covered in Summary Sheet No. 5 on rainwater tanks.

What is Water Sensitive Urban Design?

Water Sensitive Urban Design (WSUD) is an approach to urban planning and design that integrates the management of the total water cycle into the urban development process. It includes:

- Integrated management of groundwater, surface runoff (including stormwater), drinking water and wastewater to protect water related environmental, recreational and cultural values;
- Storage, treatment and beneficial use of runoff;
- Treatment and reuse of wastewater;
- Using vegetation for treatment purposes, water efficient landscaping and enhancing biodiversity; and
- Utilising water saving measures within and outside domestic, commercial, industrial and institutional premises to minimise requirements for drinking and non-drinking water supplies.

There are many different WSUD measures which together form a 'tool kit' from which individual measures can be selected to form a specific response suiting the characteristics of each development (or redevelopment).

Those measures are described in detail in the WSUD Technical Manual, which can be found online at www.planning.sa.gov.au/go/wsud

Urban water harvesting and reuse is one such measure.

Applications

The type and scale of water harvesting possible is dependent on:

- The proposed water source and quality (i.e. rainwater, treated wastewater etc);
- The proposed water use (i.e. irrigation);
- The demand pattern and volume (i.e. summer for irrigation);
- The seasonality and volume of water available for harvest (depends on type and source of water);
- The storage options and site constraints;
- Treatment options (if required);
- Objectives for the harvesting system (i.e. reduced mains water supply or reduced runoff from site); and
- Capital and operational costs including monitoring and maintenance costs.

Water Sources

Treated wastewater reuse can provide a relatively constant supply. The primary technical disadvantage of wastewater reuse is the level of treatment, and thus cost, required to achieve the level of water quality necessary for reuse. In addition, the public perception of wastewater reuse and possible health risks needs to be considered using a risk assessment approach.

Stormwater can require a similar level of treatment to wastewater. Supply is dependent on rainfall patterns, thus back up supply from another water source may be needed to maintain continuity of supply. Studies have shown public perceptions of stormwater reuse are more positive than wastewater reuse.

Rainwater captured in rainwater tanks or underground tanks often requires little or no treatment and can be more easily used for a variety of purposes than stormwater and wastewater because of its higher raw water quality. Rainwater supply may not be available during long dry periods and so may require a back up system to ensure continuity of supply.

Water Storage Options

The capacity of any harvesting and reuse scheme is significantly influenced by the size and type of the storage system used. Storage systems used can provide a varying level of treatment in addition to other processes in the treatment train e.g. reduction in suspended solids through settling.

There are various types of storage systems including:

- Rainwater tanks (or above ground storage tanks);
- Underground storage tanks;
- Surface storages (e.g. dams or wetlands); and
- Groundwater (e.g. aquifer).

Public Perception

Public perception is a key issue in the implementation of water harvesting and reuse projects. Investigations have shown that there is a correlation between the scale of a water harvesting and reuse project and its degree of public acceptance. Water from a person's own home is generally more acceptable than a communal or neighbourhood scale water harvesting system, however acceptance is high again with respect to a large scale system such as that serving a city.

Regulatory Requirements

A thorough investigation of required approvals and permits should be undertaken as part of the conceptual design of an urban water harvesting and reuse scheme. This should include consultation with local government, SA Water, health and environment agencies.

A proposed urban water harvesting and reuse scheme needs to meet the requirements of a range of legislation and guidelines including:

- The *Development Act 1993* under which development approval may be required;
- The *Environment Protection Act 1993* under which any development, including the construction of an urban water harvesting and reuse scheme, has a general environmental duty to not cause environmental harm. Aspects of the Act which should be considered include the Environment Protection (Water Quality) Policy 2003, the Environment Protection (Industrial Noise) Policy 1994, the potential effects on air quality, the disposal of waste from the site, the need for a licence for certain activities, the *South Australian Reclaimed Water Guidelines* and the EPA *Code of Practice for Managed Aquifer Recharge*;
- The *Natural Resources Management Act 2004* which provides the statutory framework for water extraction from rivers, lakes and groundwater;
- The *Public and Environmental Health Act 1987* which is implemented by the Department of Health (Environmental Health Branch); and
- The *Australian Guidelines for Water Recycling* include a risk management framework and specific guidance on managing the health and environmental risks.

Maintenance and Monitoring Requirements

Appropriate maintenance is important to ensure that the scheme continues to meet its design objectives in the long term and does not present public health or environmental risks.

Protection of treatment and retention systems from contamination is necessary and contingency plans should be developed to cater for the possibility of contaminated water being inadvertently utilised.

Regular inspections of a scheme will be needed to identify any defects or required additional maintenance.

Design Process

The degree of complexity of a water reuse scheme is dependent on the number of users, the quality of water to be recycled and the end use. The key steps in the design process are:

- Assess site, catchment and appropriate regulatory requirements. Careful assessment and interpretation of the site conditions is fundamental to effectively incorporate WSUD. The detail of the site and catchment investigation required should match the size and scale of the development and its potential impacts;
- Identify objectives and targets. The design objectives and targets will vary from one location to another and will depend on site characteristics, development form and the requirements of the receiving ecosystems. Specifying the objectives for an urban water harvesting and reuse scheme is an important step for ensuring that it operates as intended;
- Identify potential options. This step identifies various possible layouts for a scheme to meet the project's objectives and is likely to involve modelling of outcomes. The process needs to consider collection (i.e. swales), storage (i.e. retention basin), treatment (i.e. wetland) and distribution;.
- Identify and consult with key stakeholders. This will assist with gaining support for the scheme and ensuring that appropriate approvals are obtained and required information provided;
- Understand and comply with the relevant legislative requirements;
- Identify land and asset ownership to ensure that maintenance and management responsibilities are clearly understood;
- Evaluate options. The various options identified should be evaluated, taking into account social, economic and environmental considerations. Possible analysis techniques include cost benefit, triple bottom-line and multi-criteria decision analysis;
- Detailed design of selected option. During the detailed design of the selected scheme, a risk management strategy should be developed to identify public health and environmental hazards and the controls to be implemented during the design and operational phases; and.
- Obtain approvals.

Further Information

While there is a large range of useful resources and further information available on pervious pavements, in the first instance it is suggested that people read Chapter 7 of the *Water Sensitive Urban Design in Greater Adelaide Technical Manual*. Further information is available at www.planning.sa.gov.au/go/wsud.

Other Summary Sheets

Other Water Sensitive Urban Design Summary Sheets for the Greater Adelaide Region are available in this series. To download the summary sheets, visit www.planning.sa.gov.au/go/wsud.

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