Water Sensitive Urban Design Strategy

Book One

January 2004

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1. Introduction

Urban development has associated impacts on the physical environment, including that associated with the water environment. Urban areas import substantial amounts of potable water, sourced from catchments external to the developed areas. A typical household in Sydney uses 300 kL/yr of potable water, and across Sydney, the water used each day can fill approximately 450 Olympic size swimming pools.

Although the current per capita water usage is reducing as a result of Sydney Water's sound demand management initiatives, the continual growth of Sydney's population means that the demand pressure on the region's water resources is increasing.

The majority of potable water imported into an urban area is used to transport waste, through the sewerage system, with less than 10% of its use requiring the water quality standards that it has been treated to. Up to 70% of the imported water is used to transport waste to wastewater treatment plants and subsequently into the aquatic environment.

Urban areas generate more stormwater runoff due to increased catchment imperviousness and efficient stormwater drainage infrastructure. This leads to the continued physical degradation of natural watercourses in urban environments as evident by creek erosion and siltation. Activities in urban areas also cause urban contaminants to be deposited and subsequently conveyed by stormwater to surrounding natural water environments, leading to stormwater pollution in these environments.

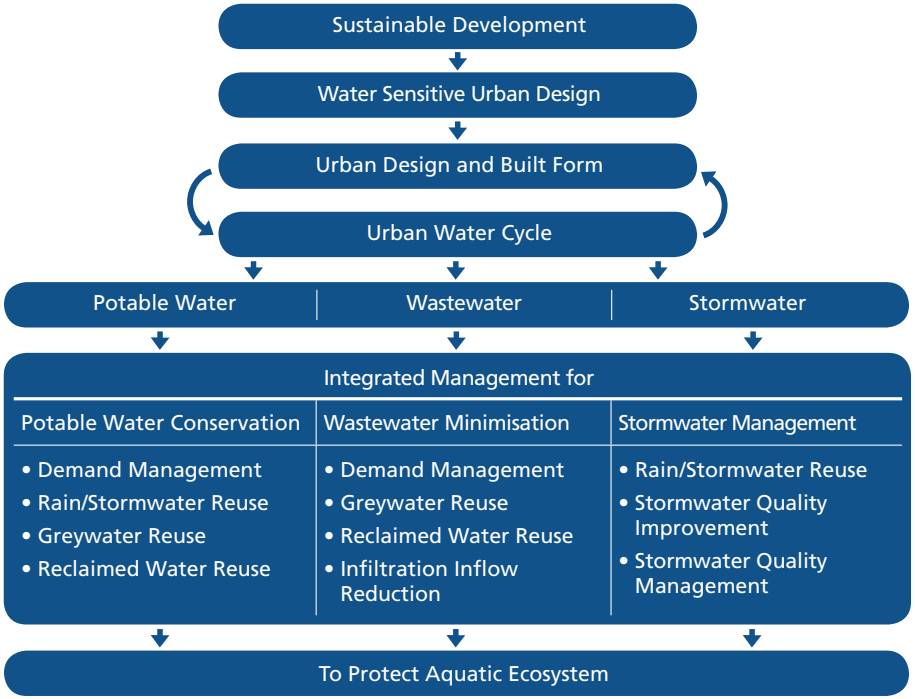
Landcom is committed to ensuring an integrated approach to urban water cycle management, minimising its impact on the urban waterways and setting an example for others.

2. Water Sensitive Urban Design (WSUD) Overview

WSUD can be best explained as the interactions between the urban built form (including urban landscapes) and the urban water cycle as defined by the three urban water streams of potable water, wastewater, and stormwater.

The guiding principles of WSUD are centred on achieving integrated water cycle management solutions for new urban release areas and urban renewal developments aimed at:

- Reducing potable water demand through water efficient appliances, rainwater and greywater reuse.
- Minimising wastewater generation and treatment of wastewater to a standard suitable for effluent reuse opportunities and/or release to receiving waters.
- Treating urban stormwater to meet water quality objectives for reuse and/or discharge to receiving waters.
- Using stormwater in the urban landscape to maximise the visual and recreational amenity of developments.



3. WSUD Strategy Objectives

Landcom has adopted a corporate Sustainability Strategy which is founded on the four key principles of (i) sustainable quality of life; (ii) resource conservation; (iii) pollution minimisation; and (iv) biodiversity conservation. WSUD Strategy has been developed to specifically address Landcom's aim to achieve sustainable and integrated urban water cycle management in all its developments.

Landcom's integrated urban water cycle management includes objectives for water conservation, pollution control and mitigation of the effect of increased flow as a result of catchment urbanisation. The implementation of the stated WSUD objectives will result in the protection of aquatic ecosystems and water resources.

This Strategy has been developed to provide Landcom development staff, its consultants and private sector partners with an overview of WSUD guiding principles and practices together with selection guidelines of suitable and appropriate WSUD practices.

The following information books are included:

Book One – Water Sensitive Urban Design Strategy

Includes an overview of Landcom's WSUD Strategy, the objectives and the targets.

Book Two – Best Planning and Management Practices

Includes both technical and non-technical issues associated with the successful implementation of WSUD principles and practices.

Book Three – Case Studies

The four case studies draw on the characteristics of current Landcom project sites and demonstrate the potential application of WSUD to both greenfield and urban renewal developments with different physical site characteristics and development densities. The case studies represent preliminary designs based on Best Planning and Management Practices in WSUD.

The CD-Rom

The CD-Rom includes all information provided in the three booklets for easy reference; Fact Sheets for elements of WSUD outlining their functionality and design considerations; and the Rainwater Tank Discussion Paper.

4. WSUD Targets

4.1 Water Conservation

This objective refers to conservation of potable water and encompasses water efficiency measures as well as alternative supply sources such as rainwater and treated greywater. Greywater includes shower, bathroom and laundry sinks and washing machine water. Reduction in potable water consumption is measured by the proportion of potable water demand that is met by non-potable (alternative) water sources and the reduction in water consumption through demand management (through water efficient household appliances and landscape design).

Landcom's target for potable water conservation is 40% reduction in comparison to base case. Base case water consumptions are the average potable water consumptions (indoor and outdoor) for typical household types derived from Sydney Water data[1].

4.2 Pollution Control

This objective relates to the reduction in wastewater generation and the reduction in urban stormwater pollutants discharged from an area following development. Wastewater minimisation is linked to demand management and reuse of treated wastewater and is closely associated with the objectives of water conservation.

1 www.landcom.nsw.gov.au/landcom/nsw/resources/images/wateruse.pdf

Landcom's key sustainability indicators and targets for this objective are based on the percentage reduction in urban stormwater pollutants typically generated from the development projects (in the absence of any stormwater treatment):

Pollutant	Goal/Vision	Treatment Target
Suspended Solids (SS)	SS loads from the catchment that results in the attainment of the ambient water quality concentration objective.	80% retention of the average annual load.*
Total Phosphorus (TP)	TP loads from the catchment that results in the attainment of the ambient water quality concentration objective.	45% retention of the average annual load.*
Total Nitrogen (TN)	TN loads from the catchment that results in the attainment of the ambient water quality concentration objective.	45% retention of the average annual load.*
Litter	No anthropogenic litter in waterbodies. Input of organic litter equal to those which would have been exported for the equivalent forested catchment.	Retention of litter greater than 50 mm for flows up to 50% of the **One-year ARI peak flow.
Coarse Sediment	Coarse sediment loads equal to those that would have been exported from the equivalent forested catchment.	Retention of sediment coarser than 0.125 mm for flows up to 50% of the **One-year ARI peak flow.
Oil and Grease	No visible oil and grease (anthropogenic hydrocarbons in waterbodies.	In areas with concentrated hydrocarbon deposition, no visible oils for flows up to 50% of the **One-year ARI peak flow.

*Performance assessment based on a well-established computer model for performance assessment of urban stormwater management systems

Table 4.1

**ARI – Average Recurrence Interval. An indication of how frequently a flood of a particular size is likely to occur on average. For example a 100 year ARI flood is likely to occur once in 100 years.

4.3 Flow Management

This objective relates to the management of the hydrologic impact of catchment urbanisation on the ecosystem health of urban waterways. Research has now directly linked the increased in the magnitude of frequent storm flows to degradation of habitat values in urban waterways.

The target for this objective is to maintain the post-development storm discharges to the natural catchment storm discharge levels for one and a half years ARI event.

4.4 Summary of WSUD Targets

Objective	Performance Measure and Target
WSUD Strategy	(a) 100% of projects to have project-specific WSUD strategies. (The strategy is appropriate to the size of the project).
Water Conservation	(a) Combination of water efficiency and reuse options–40% reduction on base case*.
Pollution Control**	(a) 45% reduction in the mean annual load of Total Nitrogen (TN). (b) 45% reduction in the mean annual load of Total Phosphorus (TP). (c) 80% reduction in the mean annual load of Total Suspended Solids (TSS). (d) Retention of litter greater than 50 mm for flows up to 50% of the one-year ARI peak flow. (e) Retention of sediment coarser than 0.125 mm for flows up to 50% of the one-year ARI peak flow. (f) In areas with concentrated hydrocarbon deposition, no visible oils for flows up to 50% of the one-year ARI peak flow.
Flow Management	(a) Post-development storm discharges = pre-development storm discharges for one and a half years ARI event. The purpose of this is to minimise the impact of frequent events on the natural waterways and to minimise bed and bank erosion.

Table 4.2

*Base case water consumption is the average typical household potable water consumption (indoor and outdoor) of 300 kL/yr derived from Sydney Water data. www.landcom.nsw.gov.au/landcom/nsw/resources/images/wateruse.pdf

**Pollution control targets are based on EPA best practice guidelines: "Managing Urban Stormwater–Council Handbook". http://www.epa.nsw.gov.au/stormwater/usp/docs.htm

5. Mandatory WSUD Requirements

Landcom's mandatory WSUD requirements are:

- All Landcom projects must have a project specific WSUD strategy developed appropriate to the size, scale and complexity of the project. The WSUD strategies must meet Landcom WSUD targets.
- Priority must be given to the use of non-potable water sources for public domain irrigation within all Landcom projects.
- Where reticulated recycled water is available from the local water utility, it must be used for appropriately matched uses such as toilet flushing, garden watering etc.

6. Exemptions

Exemptions to the mandatory requirements apply where there are:

- Genuine implementation constraints; and/or
- Alternative solutions with demonstrated better social, environmental and economic outcomes.

7. Landcom's Position on Mandatory Rainwater Tanks

Landcom does not regard mandatory rainwater tanks to be the appropriate solution for every project. Landcom's water conservation target is performance based, non-prescriptive and in line with the fundamentals of BASIX (Building Sustainability Index) model.

The use of rainwater tanks within an overall potable water conservation strategy will be dependant on a range of regional and site specific factors. It is important to be cognisant of the many factors that would influence the appropriateness, practicality and cost-effectiveness of using rainwater tanks to achieve water conservation targets. Supply and demand considerations include such factors as roof area to occupancy ratio, climatic region, size of allotment and competing uses of rainwater and stormwater.

Landcom's project scales, development types, and geographical settings require a flexible approach to achieving its water conservation objectives which should not be confined to the use of rainwater tanks. To this end, the position taken by Landcom in response to those councils who are encouraging or mandating the implementation of rainwater tanks will be informed by an understanding of the relative suitability, cost and effectiveness of rainwater tanks compared with the other available measures to achieve its water conservation target.

The availability of an alternative supply source such as reclaimed water or competing uses of harvested rainwater/stormwater are two possible scenarios where the use of rainwater tanks at individual households may not deliver a holistically sustainable outcome for achieving the adopted potable water conservation target.

Rainwater tanks can potentially play an important role in achieving Landcom's water conservation target on each of its projects. However, their use should be considered within a broader consideration of water conservation measures, involving demand management and alternative water supplies. Achieving reduced potable water usage in, and wastewater discharge from Landcom projects will ultimately be the key driver for any water conservation initiatives adopted by Landcom.

For a copy of Landcom's Rainwater Tank Discussion Paper prepared by Ecological Engineering Pty Ltd, see the CD-Rom accompanying this pack.

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Riverbank Corporate Centre
Level 2, 330 Church Street
Parramatta NSW 2150
PO Box 237, Parramatta NSW 2124
P: (02) 9841 8600 F: (02) 9841 8666
E: environment@landcom.nsw.gov.au
W: www.landcom.nsw.gov.au

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