Government of Western Australia
Department of Water

Looking after all our water needs

Water sensitive urban design

Stormwater design considerations

Introduction

This brochure provides an overview of the factors that need to be taken into account when designing stormwater management systems for new urban developments, or when modifying existing systems.

This brochure is part of a series that explain various aspects of water sensitive urban design. Please see *Water sensitive urban design in Western Australia* for background information on water sensitive urban design.

Design considerations

Effective stormwater systems must be able to adequately manage small, minor and major storm events. They can be designed to do this by considering the management objectives of each design event and the scale at which the solution (usually a single or series of best management practices) is to apply.

Runoff from constructed impervious surfaces generated by up to the 1-year, 1-hour average recurrence interval (ARI) events should be retained or detained as close to the source as possible. Additionally, pre-development peak flow rates and total volume runoff from the whole sub-catchment should be maintained at outlets from the site for the critical 1-year ARI event. Generally, detention systems should keep the critical 1-year ARI peak flow rate and discharge volume for the catchment at the levels they were prior to urban development. This helps to protect ecological values.

Systems designed for the 1-year ARI peak discharge also treat over 99% of annual runoff volume.

Runoff from the whole catchment generated by events greater than the critical 1-year average recurrence interval event and up to the critical 5-year ARI event should be managed within landscaped areas in road reserves, public open space or linear multiple use corridors. Flows from 5-year events will use the retention and detention capacities of 1-year sized systems before they flow into 5-year sized systems.

During major storm events (in excess of 5-year and up to 100-year), structural controls, roads, public open space and natural waterways and wetlands may all be inundated to varying levels. Flows from 100-year events will use the retention and detention capacities of 1-year and 5-year sized systems before they flow into 100-year sized systems. This will reduce the detention volume required in 100-year sized systems.

Management objectives and system performance outcomes related to rainfall design events

Up to 1-year ARI event

- Retain or detain storm-water runoff from constructed impervious surfaces generated by up to the 1-year, 1-hour ARI event at its source, preferably in lots and road reserves.
- Reduce the area and connection of impervious surfaces.
- Maintain pre-development peak flow rates and total volumes runoff from the whole sub-catchment at outlets from the site at the critical 1-year ARI event.
- Control pollutants at their source.
- Improve water quality, via soil and vegetation filtration.
- Protect ecological values and maintain hydrological regimes.

Greater than 1-year ARI and up to 5-year ARI events for residential and rural-residential, and 10-year ARI events for commercial and industrial areas

- These flows use the ‘minor system conveyance’ (road gutters, overflow pipes, verges, swales and living streams) and detention or retention areas.
- Attenuate critical 5-year event flows to the capacity of downstream natural channels or constructed drainage infrastructure.
- Maintain serviceability of roads and infrastructure.
- Manage flow rates to prevent erosion.

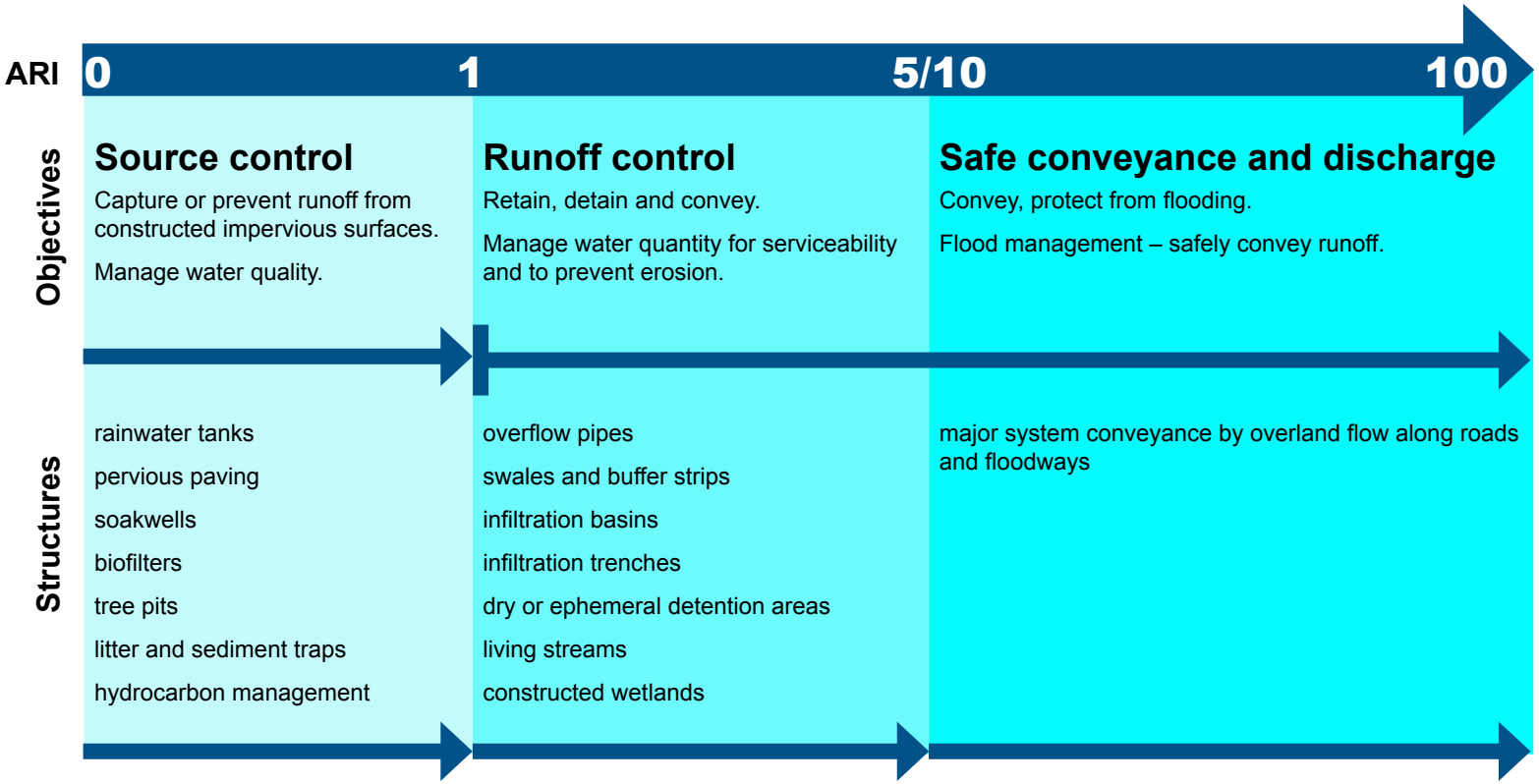
Up to the 100-year ARI event

- Flow paths need to be identified during urban design.
- Contain flows within ‘major system conveyance’ - roads, verges, public open space, living streams, waterways and wetlands.
- Protection of people and buildings – establish or confirm design flood levels.
- Reduce risk of flooding and manage flow rates.

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Managing flows from storms



Required reading

Australian rainfall and runoff – a guide to flood estimation, 2001, Engineers Australia.

Australian runoff quality: a guide to water sensitive urban design, 2006, Engineers Australia, available at <www.arq.org.au>.

Better urban water management, 2008, Western Australian Planning Commission.

Interim guidelines for the preparation of local water management strategies, 2008, Department of Water, available at <www.water.wa.gov.au>.

State planning policy 2.9: Water resources, 2006, Western Australian Planning Commission.

State water plan, 2007, Department of the Premier and Cabinet.

Stormwater management manual for Western Australia, 2004–07, Department of Water, available at <www.water.wa.gov.au>.

Urban water management plans: guidelines for preparing plans and for complying with subdivision conditions, 2008, Department of Water, available at <www.water.wa.gov.au>.

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