

Drainage for liveability

Managing small rainfall events at source

Purpose

This note outlines some of the objectives and benefits of managing small rainfall events at source. Managing stormwater 'at source' is undertaken for water quality and ecological protection purposes as described in the *Decision process for stormwater management in Western Australia* published by the Department of Water and Environmental Regulation in 2017. This approach will also help to reduce the need for large areas to accommodate stormwater management, and prevent the collection and transport of pollutants to receiving water bodies.

Background

Managing small rainfall events 'at source' means lot runoff is managed within lots and road runoff is managed within road reserves and does not enter a piped or lined channel conveyance system.

This approach helps to mimic pre-development hydrology. The Drainage for Liveability Program advocates this approach because it benefits ecology and reduces impacts on receiving water bodies. The program supports the *Decision process for stormwater management in Western Australia* criterion to manage (retain and/or detain, and treat if required) the stormwater runoff from constructed impervious surfaces generated by the first 15 mm of rainfall at-source as much as practical.

This criterion was determined through a review of the rainfall depth used by other Australian and international jurisdictions for water quality management. It is based on the depth of rainfall that leads to the mobilisation of contaminants. The criterion aims to reduce the frequency at which urban stormwater reaches receiving environments. Variations to this criterion may be required based on site-specific investigations, conditions and constraints.

Objectives

- Increase water residence time within the catchment by retaining pre-development hydrological parameters and recharge to the superficial groundwater aquifer where suitable. This increases the effectiveness of natural attenuation processes for nutrients and other contaminants.
- Preserve natural vegetation and limit impervious areas to help reduce; runoff management requirements, runoff volumes and areas and infrastructure required for downstream treatment.
- Maintain pre-development runoff travel times by using lengthened overland flow paths, reducing reliance on pipes and lined conveyance systems to manage small rainfall events, and by conserving natural drainage and depression storage.

How to meet these objectives

- Determine 'at source' stormwater management requirements using the *Decision process for stormwater management in Western Australia*, Figure 2: Stormwater management process and criteria for urban developments and retrofit projects.



- Identify opportunities to manage small rainfall events at source using predevelopment hydrology and aim to replicate how water moves in the natural landscape.
- Convey stormwater runoff from lot or road reserve via overland flow paths wherever possible.
- Incorporate vegetation wherever possible within stormwater management systems. This includes gardens designed to receive stormwater runoff, tree pits, biofilters, vegetated swales.
- See Figure 7 from the *Decision process for stormwater management in Western Australia* for further examples (attached).

Benefits

By implementing these objectives, positive outcomes include:

- The prevention of soluble materials, fine dusts and silts, oils, grease and other non-volatile hydrocarbons from being transported downstream to receiving environments.
- Opportunities for vegetated overland flow paths that provide increased habitat, biodiversity and resilience to dry seasons resulting in lower urban temperatures. Additionally Overland flow paths slow down and reduce the volume of runoff, improving water quality and protecting people and property from minor and major rainfall events.
- Allowing for superficial aquifer recharge, processes representative of the pre-development hydrology.
- Maximising opportunities for multiple use spaces that would otherwise be solely used for traditional stormwater management.
- Reducing capital and maintenance costs that would otherwise be transferred to systems managed by local governments.
- Fit-for-purpose water supply opportunities at property lot level, including rain water tanks for stormwater harvesting and rain gardens.

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Figure 7

Example management options for estate scale – small rainfall event runoff

Regular tree pits to manage road runoff generated by up to 15 mm rainfall depth.

Groundwater treated before entering subsoil system e.g. amended soils/filter media.

Small vegetated swale to manage road runoff generated by up to 15 mm rainfall depth.

Multiple-use corridor to connect green spaces and provide opportunity for overland flow and water treatment.

Pervious paving used to create more areas for infiltration.

Median and POS vegetated swale/biofilter swale to manage road runoff generated by up to 15 mm rainfall depth.

Vegetated swale on non-active frontage for direct road runoff.

Native vegetation retained in POS.

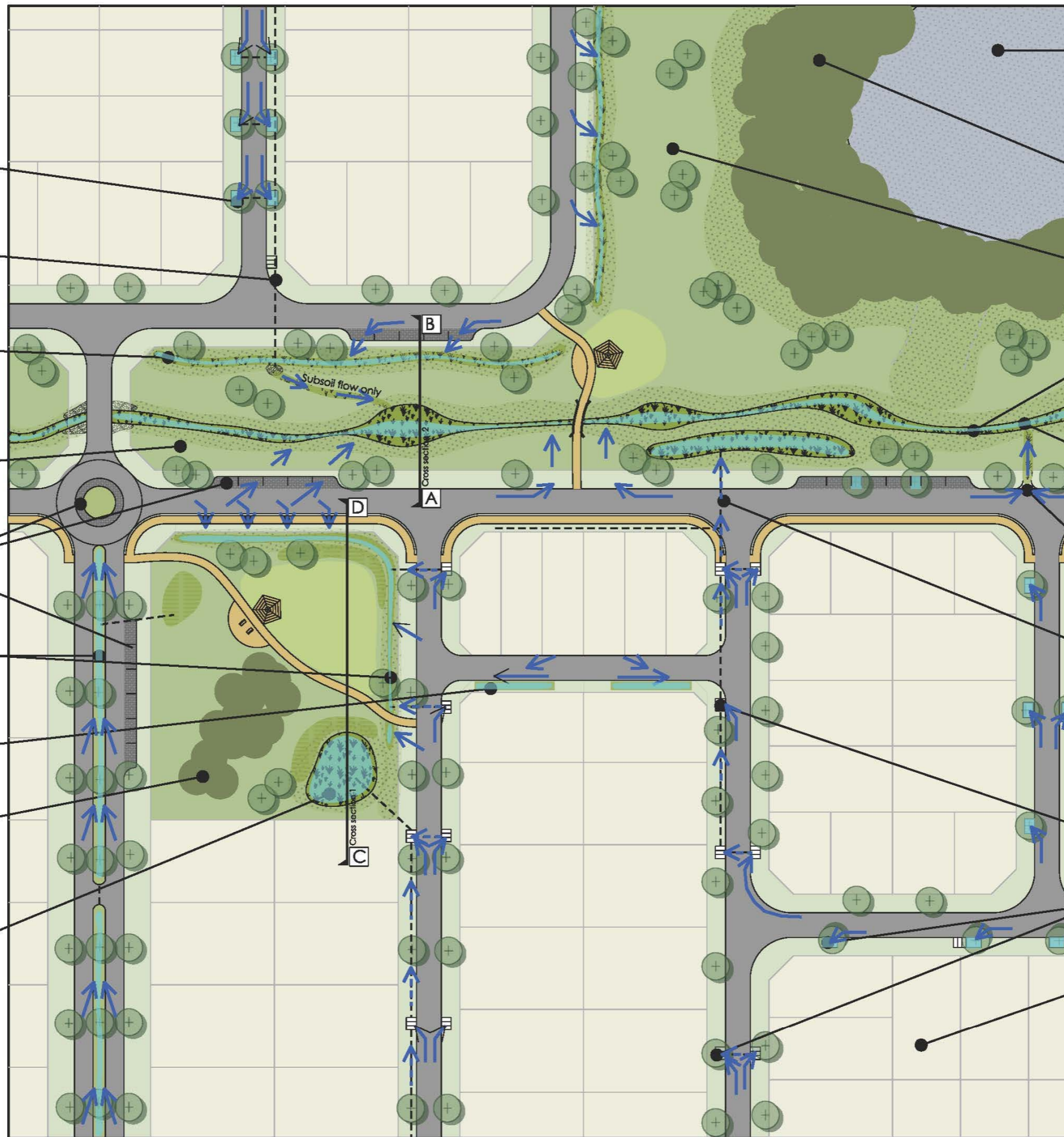
Biofilter/constructed wetland for treatment of piped road runoff generated by up to 15 mm rainfall depth and groundwater subsoil outlet.

 SURFACE WATER STORAGE AREA

 GENERAL SURFACE FLOW

 GENERAL PIPE FLOW

Not to scale



Wetland/waterway.
Note: Surface water is not present in some wetland types.

Wetland/waterway protected through vegetation retention and revegetation of buffers and foreshore areas.

POS to retain native vegetation and replant in keeping with fire regulations.

Stormwater management system located outside of waterway foreshore areas and wetland buffers.

Living stream/vegetated swale to provide habitat and water quality treatment through overland flow.

Concentrated flows from road discharged through kerb opening with erosion protection.

Subsoil and piped flow outlet to biofilter/ constructed wetland for treatment.

Road runoff directed to POS and landscaped verges, medians and roundabouts via flush kerbs or kerb openings.

Side entry pits linked to pipe network.

Infiltration cells/leaky side entry pits/tree pits.

See lot diagrams for small rainfall event management on lots.

Diagrammatic to represent a variety of options. Not all options need occur in one site. Apply site-responsive design.