

Drainage for liveability

Stormwater integration into open space areas

Purpose

This guidance note outlines the objectives sought by the Department of Water and Environmental Regulation (DWER) and the Water Corporation in public open space planning, to promote water sensitive urban design principles.

Scope

This note applies to Water Corporation stormwater infrastructure in open space areas that is planned for and assessed under the [Better urban water management framework, 2008](#), and requires Water Corporation's approval for works as part of its drainage asset. It will help developers to design stormwater infrastructure in drainage reserves and linear parklands that allows for passive transport and recreation. Please note that local government guidelines apply in addition to this note.

Background

The DWER and the Water Corporation promote stormwater management systems that integrate with the urban landscape, enhance land use function, improve urban micro-climate and provide amenity. Public open space is used by the community for recreation, but often, stormwater infrastructure is integrated within it to meet hydrological and ecological functions and land requirements. The functionality of public open spaces needs to be maintained, but at the same time, we need to promote better environmental and liveability outcomes.

Integrating stormwater infrastructure within public open spaces should consider the function and size of the area early in the development planning process using the *Classification framework for public open space* published by the Department of Sport and Recreation in 2012. In fact, the Western Australian Planning Commission requires new urban developments to contribute public open spaces for recreation while incorporating water sensitive urban design principles.

Planning

District structure plans should be supported by a *district water management strategy* (DWMS) that:

- identifies pre-development surface water flow direction, drainage lines (arterial drainage and local drainage) and associated upstream and downstream features
- describes floodplains, flood fringes, floodways and water level studies
- estimates land requirements and/or allocation for water sensitive urban design as part of public open space for post-development (note: in flood prone or/or inundated areas and in the absence of a DWMP or flood study, hydrologic and hydraulic modelling may be required to estimate land requirements)
- sets landscape principles concerning public open space and vegetated stormwater systems.



Local structure plans should be supported by a local water management strategy (LWMS) that meets design criteria to:

- restore drains in a manner reflective of natural systems taking account of the landscape principles
- prove that the proposed development does not detrimentally impact the existing 1 per cent annual exceedance probability (AEP) flooding regime of the general area
- describe the 1, 10 or 20 and 50 per cent annual exceedance probability flow paths, storages and treatment areas in relation to open space areas.

Subdivision applications should be supported by an urban water management plan that:

- aligns with the design objectives provided in the LWMS
- provides a detailed description of the size, location and design of drainage systems
- shows the extent of public open space used for management of the 1, 10 or 20 and 50 per cent AEP events.

As part of the planning process, consider the following:

- Regional destination points for passive transport (walking and bicycle paths) along multiple use corridors that include living streams to major waterways or wetlands (Bolleter 2017¹).
- Co-locating varying open space types with living streams to promote diversity of spatial types and accommodate a variety of amenity and park users.
- Avoid constrained linear drainage reserves; instead, favour broader areas of multiple use corridors that include integration of public open space, passive transport and living streams.
- Maximise the visual, educational and recreational amenity of public open spaces by incorporating art, explanatory signs and rain-responsive features into stormwater management systems.
- Retain existing landscape depressions and wetlands to manage runoff from minor and major rainfall events.

^{1.} *Living suburbs for living streams: how urban design strategies can enhance the amenity provided by living stream orientated public open space, Journal of Urban Design, DOI: 10.1080/13574809.2017.1362953.*

^{2.} *Stormwater Management Manual for Western Australia, 2007 Department of Water*

^{3.} *The 20% and 10% AEP flood levels are determined using the Water Corporation's water service operating licence, drains and drainage standards.*

^{4.} *Decision Process for stormwater management in Western Australia, 2017, DWER*

Design

Open space areas for flood control and conveyance should be designed to meet an AEP of:

- 50 per cent flows contained within the bankfull channel²
- 20 per cent flows contained within the drainage reserve and or public open space³
- 10 per cent flows contained within the drainage reserve or public open space, where drainage infrastructure traverses a commercial or industrial area³
- 1 per cent floodplain flows to be contained within appropriate land uses (public open space, roads, road reserves, drainage reserves and waterways)⁴.

Safety

Where public access is uncontrolled, side slopes of 1:8 or flatter are preferred to provide safe access to the water's edge. Slopes with a gradient steeper than 1:6 should be fenced. Fences or barriers should meet the Water Corporation's Design standard no. DS66: *Urban main drainage standard*.

Maintenance agreements may be required where stormwater management and land tenure responsibilities overlap.

Helpful guidelines

The following documents can assist professionals to plan for public open space contributions, achieve multiple use outcomes, integrate water sensitive urban design principles and upgrade existing drainage corridors:

<u>Better urban water management framework</u> Western Australian Planning Commission 2008	This document has been formulated as part of the strategy for implementing water sensitive urban design on the Swan Coastal Plain, with particular regard for the Swan-Canning and Vasse-Geographe catchments.
<u>Classification framework for public open space</u> Department of Sport and Recreation 2012	This describes the function (primary use and expected activities) and catchment hierarchy (typical size and how far a user might travel to visit the site) for public open spaces. It should be used to determine the expected use and consider how stormwater infrastructure may enhance amenity.

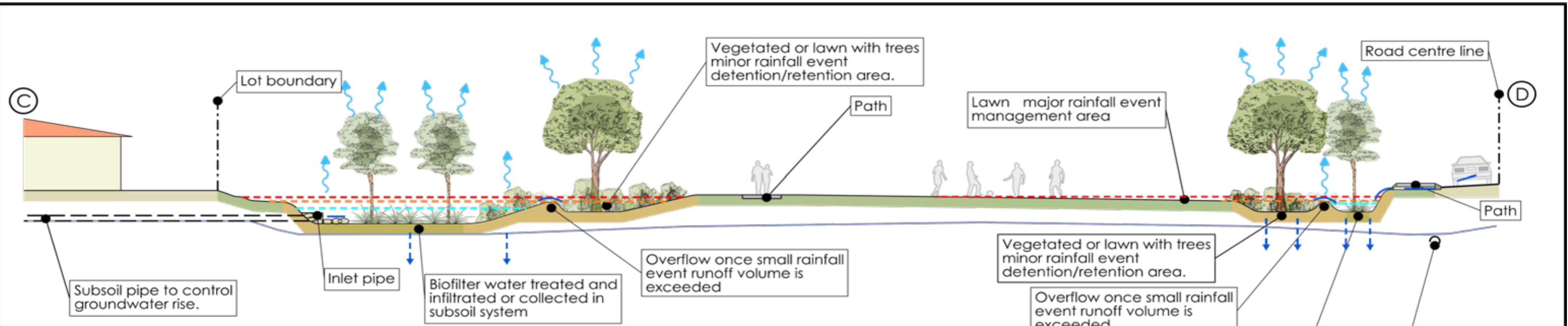
<p><u>Public parkland planning and design guide</u> Department of Sport and Recreation, Department of Water and Western Australia Planning Commission 2014</p>	<p>The stormwater management section outlines factors for integration relating to placement and park functionality, design and maintenance, and other sources of information.</p>
<p><u>Liveable neighbourhoods</u> Western Australian Planning Commission 2009</p>	<p>Includes objectives, requirements and guidance related for Urban Water Management, and seeks to promote opportunities to link water management infrastructure with the urban built form and integrate urban water management with public open space. A revised <u>draft</u> of this document was released by the WAPC for public comment in 2015. Proponents should be aware of the 2015 update when preparing or considering proposals.</p>
<p><u>Decision process for stormwater management in WA</u> DWER 2017</p>	<p>This provides information about land and water planning processes and outlines stormwater management criteria for urban developments and retrofitting projects (see figure overleaf).</p>
<p><u>Water sensitive urban design brochures</u> Department of Water</p>	<p>This brochure series offers information about water sensitive urban design.</p>
<p><u>Drainage for liveability fact sheet: Living streams in Water Corporation assets</u> Water Corporation and Department of Water 2016</p>	<p>This provides basic technical information required to design and construct living streams in Water Corporation assets.</p>

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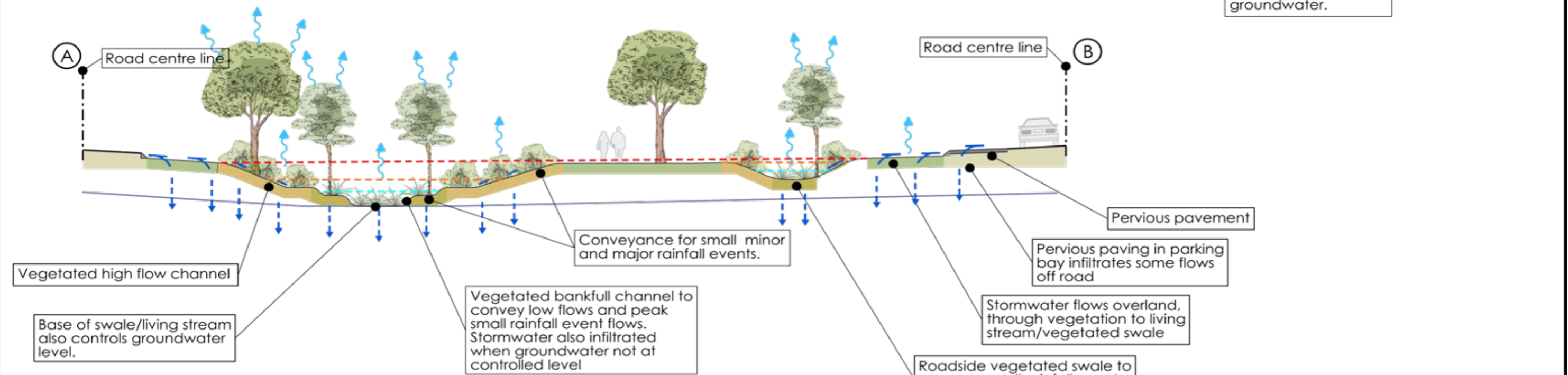
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Section 1 Indicative public open space cross section

NOT TO SCALE



Section 2 - Indicative multiple use corridor cross section

NOT TO SCALE

LEGEND

- Major rainfall event water level
- Minor rainfall event water level
- Small rainfall event water level
- Surface flow
- > Infiltrating stormwater
- ~ Evaporation / transpiration
- Controlled groundwater level

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