Retrofitting *coastal* stormwater drains *using* WATER SENSITIVE URBAN DESIGN *principles*

Stormwater infrastructure is essential for quality of life, safety and health in urban environments. It is also increasingly recognised that open stormwater systems can provide environmental benefits and habitat for aquatic plants and animals. Improving the quality of stormwater can also reduce the pollution of downstream receiving waters and improve in-stream habitat for native fish.

This is the third factsheet in a series designed to inform drain managers how stormwater drains can be managed to improve their habitat value and to assist in implementing the National Recovery Plan for the endangered Oxleyan pygmy perch (*Nannoperca oxleyana*), a small native fish which inhabits wetlands in coastal NSW. The other factsheets are:

- Assessing the habitat values of stormwater drains in coastal areas (#1)
- Managing coastal stormwater drains for fish habitat (#2)
- Preparing a stormwater drain management plan in coastal areas (#4)

Water Sensitive Urban Design

Water Sensitive Urban Design (WSUD) is an approach to managing stormwater that integrates land-use planning and water management. It reduces negative impacts on the natural water cycle and protects aquatic ecosystems by collecting, treating and using stormwater as close to where it falls as rain as possible. The key principles of Water Sensitive Urban Design[1] are:

Protect natural systems

Protecting and enhancing natural waterways as assets within urban systems allows them to function more effectively and supports the overall ecosystem.

Integrate stormwater treatment into the landscape

The stormwater drainage system can be utilised for its aesthetic qualities, making use of natural topography such as creek lines and ponding areas.

Protect water quality

Filtration and retention improves the quality of water draining from urban developments into the receiving environment, thus reducing the effect that polluted water can have upon the environment.

Reduce runoff and peak flows

Using numerous storage points instead of large retarding basins and minimising impervious areas reduces the infrastructure required downstream to drain urban areas effectively during rainfall events.

Add value while minimising development costs

The reduction of downstream drainage infrastructure minimises the development costs for drainage, whilst protecting / enhancing natural features.

What this means in practice

- Increase the area of permeable surface to increase infiltration and reduce run-off.
- Retain a site's natural drainage and treatment features (for example, taking advantage of the infiltration properties of sand).
- Use natural systems to treat and reduce stormwater.
- Implement source reduction measures such as rainwater tanks and improved infiltration.
- Protect buffers between urban development and habitat areas.

A site where a rock baffle (foreground) has been used to slow stormwater through a vegetated retention basin, enabling greater capture of sediment and nutrients and enhanced infiltration to groundwater. Photo I&I NSW

A grassy swale associated with a natural drainage line helps reduce the amount and velocity of water exiting a light industrial area. Photo I&I NSW

[1] Victorian Stormwater Committee, 1999 *Urban Stormwater - Best Practice Environmental Management Guidelines*

Treatment trains

A 'treatment train' is a combination of two or more devices in series which consist of (1) primary level treatment (2) secondary level treatment and (3) tertiary level treatment. An example treatment train would consist of removing gross pollutants through gross pollutant traps (GPTs), removing smaller particulates and nutrients using grass swales, then further nutrient removal by a sand filter or constructed wetlands.

Retrofitting a treatment train is expensive.

An example of a 'trash trap' downstream of a reed bed into which stormwater flows. Photo: I&I NSW

A constructed wetland at Evans Head, NSW. Stormwater flows into this area before it enters the creek system. Photo: I&I NSW

For more information and technical advice:

Industry and Investment NSW
Fisheries Conservation and Aquaculture Branch
Wollongbar Primary Industries Institute
Telephone: 02 6626 1200
www.dpi.nsw.gov.au/fisheries

Retrofit options

Quality of water exiting drainages into habitat areas can be improved by:

- retrofitting source reduction
- retrofitting a 'treatment train'.

Source reduction

Source reduction includes rainwater tanks and infiltration trenches. The aim is to reduce or capture pollutants before they enter the stormwater system. Generally source reduction is the most cost effective when retrofitting and it should be undertaken before the treatment train – this will reduce the size of the devices needed to be installed and reduce costs. Source control options include:

Regular street sweeping

Regular street sweeping minimises the amount of sediment, litter and other gross pollutants entering the stormwater system and helps maintain adequate hydraulic capacity of the piped stormwater networks (thereby minimising the potential for localised flooding).

Development Control Plan (DCP) based on WSUD principles

A DCP that requires incorporation of WSUD features into new developments could include stormwater management measures that maximise groundwater infiltration, the use of permeable pavement and the use of infiltration trenches to manage runoff from impermeable surfaces.

Litter baskets

Litter baskets, inserted within outlet pits, capture gross pollutants and sediments during small rainfall events. Larger flows bypass the filter basket to prevent any impact on the hydraulic capacity of the system. Litter baskets do not treat the water or remove the dissolved pollutants and nutrients that impact on water quality. The need for frequent emptying of a relatively large number of baskets makes this a somewhat expensive option.

Rainwater tanks

Retrofitting rainwater tanks to existing buildings reduces the volume of stormwater runoff generated within these urban catchments.

These factsheets are part of ongoing commitment to improving the aquatic habitat values of stormwater drainage systems and to the implementation of the Recovery Plan for the Oxleyan pygmy perch by Richmond Valley Council and Industry and Investment NSW, supported by the NSW Government through its Environmental Trust.