



Urban Stormwater Quality

Project 4.2: Stormwater best management practices

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Introduction and Background

In recognising the potential for urbanisation to lead to a degradation of receiving waterways, the stormwater management industry in Australia has adopted a number of structural and non-structural 'best management practices' (BMPs) to minimise these effects. There has, however been insufficient understanding of the efficacy and efficiency of many stormwater management practices in Australian conditions. This project aimed to monitor their performance and review current non-structural measures. Field experiments were used to quantify the treatment processes in common stormwater quality improvement facilities.

Scientific outcomes

This project conducted the most intensive monitoring of stormwater best management practices to date in Australia. Specific outcomes from the project include:

- A review of international literature on performance of stormwater treatment measures (infiltration systems, buffers and grass swales, ponds and wetlands) has provided information on their expected performance
- Results from experiments on wetlands, swales and bioretention systems have been used in conjunction with literature review outcomes to develop, validate and calibrate MUSIC's stormwater treatment algorithms. The experiments have contributed to worldwide understanding of the factors affecting the performance of these systems.
- These results have derived a universal algorithm describing the performance of a range of stormwater treatment measures. This represents a significant scientific breakthrough, and will increase the efficiency of future research activities. The universal stormwater treatment model (USTM) is based on a first-order kinetic decay algorithm that predicts water quality changes through a stormwater treatment system as an exponential decay of rate k , to an asymptote or background concentration C^* . Further work continues to refine the universal algorithm in an attempt to test its assumptions and overcome its limitations.
- Development of methodology for quantifying biofilms on gravel substrate (Larsen and Greenway, 2002).
- In addition to research into structural stormwater management measures, a considerable amount of research was conducted on non-structural measures such as education campaigns, planning controls, and enforcement programs. This research showed that utilisation of non-structural measures is increasing in Australia and provided world-first comprehensive protocols for monitoring non-structural measures.



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For further information see CRC for Catchment Hydrology Technical Reports 02/11, 02/12, 02/13 and 02/14 by André Taylor and Tony Wong. These reports are available for downloading at www.catchment.crc.org.au/publications.

- A comprehensive monitoring and experimentation project was conducted at the award winning Lynbrook Estate development in Lyndhurst, Victoria. The site included widespread adoption of stormwater-sensitive urban design features (bioretention systems in the streetscape, along with a downstream wetland and lake; see Figure 1). The monitoring provided valuable data on the water quality and flow-attenuation performance of the bioretention systems as well as cost-benefit data and information on community response to implementation of stormwater-sensitive urban design within residential subdivisions.

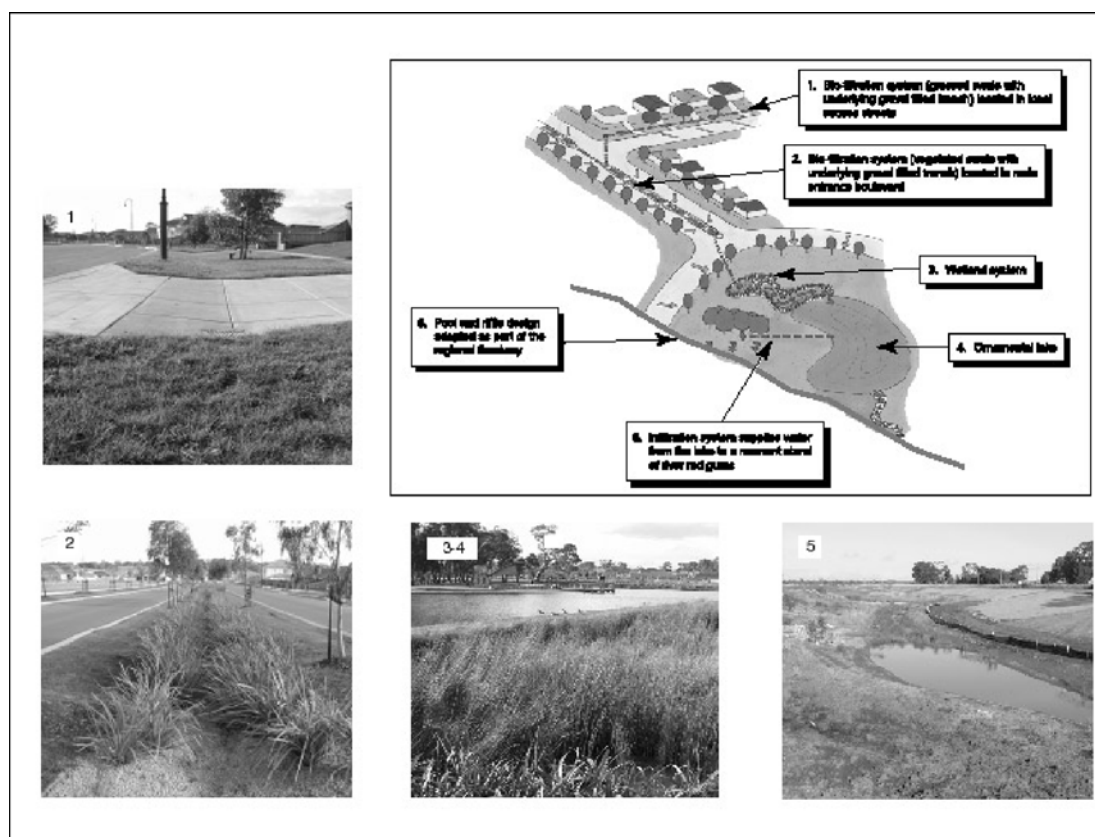


Figure 1. Layout of stormwater-sensitive urban design features at Lynbrook Estate.

Application of findings

Given the reliance of the stormwater management industry on effective performance of stormwater best practices, it is not surprising that results from this project have been rapidly adopted:

- The lifecycle cost analysis, and community acceptance research have provided world-first data and are making a significant contribution to the understanding and adoption of Water Sensitive Urban Design (WSUD) in Australia.
- The success of the CRC's Urban Stormwater Quality Program research work at Lynbrook Estate, both in terms of its research and industry adoption is demonstrated by the subsequent application of Water Sensitive Urban Design principles to all future stages of the development at Lynbrook by the Urban Land Corporation. Many other developers are now pursuing this



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technology resulting in numerous case studies presented at the Second National WSUD conference in Brisbane in September 2002.

- Research conducted within the Urban Stormwater Quality Program is supporting the urban development industry by providing useful design guidance for many stormwater treatment measures.
- Guidelines on both the development and monitoring of non-structural measures are being used by state and local government agencies throughout Australia.

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