

Harnessing the Momentum - Incorporating the Lessons Learnt During Construction, Operation and Maintenance of Bio-Retention Systems, Along with Observations of Natural Templates, Into the Design Process.

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This presentation sets out the framework for improving the design of bio-retention systems through learning the lessons of previous failures and successes, along with observations of local, natural creek formations.

At the precinct planning level, the detail required for practical construction and operation of water sensitive urban design infrastructure is often missed in water cycle management planning. At the other end of the scale, engineering design guidelines often focus too much on fine civil infrastructure detail. This engineered approach does not appreciate that bio-retention systems are attempts to design landscaped features to harness natural pollutant removal processes, requiring tolerances to accommodate variability due to seasonality, inflow rates and concentrations, as well as vegetation health.

The result is that there is no direct connection from the overall precinct scale strategy through to the detailed design, resulting in piecemeal process, with infrastructure designed and operating in isolation.

Bio-retention basins have become the standard water sensitive urban design feature for land development in Australia since the 1990s. A large part of the adoption of these systems are that they are an end of pipe solution that can be conveniently located downstream of a standard pit and pipe urban drainage network.

To date there has been little information published on the overall effectiveness, constructability, maintenance and operation of the basins that is based on practical experience. Assessment of success and failure, and incorporation of lessons learnt into the design process is rarely undertaken by practitioners and designers.

The design of bio-retention features is rarely assessed in terms of hydraulic operation during the range of events, or in terms of ongoing maintenance. This has often resulted in structures that do not operate as intended, create maintenance issues and are visually out of character with the 'natural' landscaped features.

The approach discussed in this presentation involves 'keeping it simple', based on observations of the successes and failures of existing systems.

Another design guide that is considered is assessment of natural systems as a template. Where possible in the locality, natural creek systems, particularly chain-of-ponds and pool-and-riffle creek patterns, should be investigated. Analysis of the

stable features of these systems, such as vegetation, rock type and size, along with how large woody debris sits within a water course can provide key insight into what locally works. This approach is intended to minimise both the construction and maintenance of a system by borrowing from local, stable design templates.