

Optimizing constructed wetland design, management and performance prediction

Constructed
Wetlands
Project B3

The project will support wetlands to be operated in a far more intelligent way, maintaining optimum detention times, depth regimes and vegetation cover, and facilitating the maximum treatment performance.

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Melbourne Water manages >200 constructed wetland systems across the region, with a total asset value replacement cost of around \$550 million. There are major concerns about the treatment performance and sustainability of these wetlands, particularly whether they are achieving SEPP(Waters) load reduction targets entering Port Phillip Bay and Western Port.

The aim of this project is to improve the design and management of constructed stormwater wetlands. Specifically, this project will:

- refine current methods of estimating wetland pollutant load reduction performance for reporting and compliance
- refine current and develop new indicators of treatment performance to help guide asset management
- relate performance with catchment and wetland design features to feed back into design guidelines
- investigate the impact of real-time control on wetland treatment performance

This project will inform revisions to guidelines and practice for the planning, design and construction, modelling and maintenance and renewals of wetlands.

Methodology

The project has evolved over the first two years to incorporate directly practical outcomes (e.g. the review of current design and development of asset management tools), while executing the primary study objectives (e.g. monitoring a large number of sites to develop indica-

tors of performance), and developing novel monitoring and management approaches (e.g. planning for demonstration of low-cost water level monitoring networks and smart-control technology).

The project is now focussing on delivering three work packages:

1. Indicator development: testing cost-effective surrogates of pollutant load reduction performance, focussing on the monitoring methods Melbourne Water already uses at scale: vegetation cover and water level.
2. Driving factors: identify factors that drive patterns in the indicators of treatment performance.
3. Optimisation & automation: develop a monitoring system based on real-time measures of water level and turbidity to identify wetland faults and prioritise works programs; and developing the concept of real-time control on wetlands to optimise treatment performance.

Expected outcomes

- Improved decision-making on capital investment in wetlands.
- Development of indicators as cost-effective surrogates of hydrological and pollutant load performance, e.g. vegetation cover and detention time.
- Design and protocol of low-cost sensors to monitor stormwater wetland performance.

One key **impact** of this project will be improved wetland design guidelines to ensure wetlands function as intended and the need for major rectification works is reduced.