

# SIMPLIFYING URBAN STORMWATER

A MODEL THAT HELPS GOVERNMENT AND OTHER BODIES MANAGE STORMWATER ISSUES IS MUSIC TO THE EARS OF MANY, WRITES **SUE BUSHELL**.

■ There was a time in the not-so-distant past when rain seemed sufficient or – depending where you lived – even plentiful. Ratepayers and councils alike were content to blithely watch as megalitres of water gurgled down the drain on its way out to sea.

These days? Not so much. As population pressures increase and water supplies grow ever more uncertain, governments of all stamps are under tremendous pressure to guarantee water supply security and safely manage wastewater flows and harvest stormwater runoff.

Fortunately, Australian science is in the vanguard of water clean-up and management technologies. With stormwater management now recognised as critical to smart water use and management, those working in the water industry need options for improving stormwater quality.

They have that in *music* (model for urban stormwater improvement conceptualisation), a popular urban stormwater package from eWater CRC designed to help urban water professionals visualise possible treatment strategies to tackle urban stormwater hydrology and pollution impacts.

Already more than 2000 urban stormwater scientists, engineers, planners, policy staff and managers in state, regional and local government, utilities and consulting firms use *music* in their planning process.

*Music v4*, just released, incorporates the latest science from Monash University and the Facility for Advancing Water Biofiltration (FAWB) and is designed to provide the highest level of confidence when modelling urban stormwater solutions.

**SUNSHINE COAST STORMS AHEAD**  
Take the situation within Maroochy Shire on Queensland's Sunshine Coast, where an extensive waterway network adds much to the area's splendour but draws huge numbers of people to the area to live every year.

As migration into the area increases, so does the threat to its catchments and waterways. Today stormwater and agricultural runoff as well as nutrients from treated sewage discharge pose major risks to the health of the Maroochy River estuary.

Authorities have come to recognise

water sensitive urban design (WSUD) is a major part of the solution. A key planning component for many new developments, specialists increasingly recognise that retrofitting WSUD into existing urban areas can help solve urban water quality problems, such as capturing stormwater runoff, removing its contaminants and lessening its amount.

As there are many treatment alternatives, the challenge is to evaluate those many choices to achieve the greatest possible hydrology and water quality improvements at the lowest possible costs.

Engineering and environmental consultants BMT WBM did just that in an existing area close to Maroochydore Library, where the firm worked with the Sunshine Coast Regional Council to retrofit multiple WSUD elements. Using *music* the project team was able to fully assess the range of possible stormwater management devices.

*Music* let the team evaluate and coordinate stormwater treatment measures from a network of related urban catchments and subcatchments simultaneously. They were able to rapidly assess different scenarios then examine the results both for particular rainfall events and for the long term.

They then ranked all the measures according to *music's* estimates of their treatment effectiveness and life cycle costing. This showed the best choices for stormwater were an integrated system of swales, bioretention systems and porous pavements.

The team also installed several types of rainwater tanks, harvesting water for use in toilets and directing overflow from the tanks into a rain-garden to improve run-off through infiltration.

By examining alternatives using *music*, and looking at their costs, BMT WBM could see the minimum requirements for retrofitting a suburb or a subcatchment. *Music* allowed them to showcase much more than the minimum WSUD elements, with aesthetic benefits to the area as well as environmental benefits to the river.

The Maroochydore Library project highlights both the ease of integrating WSUD into existing urban areas and the success of partnerships of industry and government in delivering such projects. As a measure of its success, this project was nominated as a finalist in the 2009 Healthy Waterway Awards WSUD Category.



## FLOODING IN ASHGROVE

At Ashgrove Residential Estate, in Regents Park, NSW, development of a large area of former industrial land features an award-winning stormwater management plan that successfully addresses constraints in relation to the stormwater system.

These constraints included exposure to flooding where the stormwater treatment could not exceed a certain flow rate coming from the site, and quantities were set to peak flow rates. The stormwater treatment system, as well as the stormwater harvesting approach, also had to meet stringent water quality objectives. Adding to the complications, the stormwater system had to be located underground to make room for a community space area that was required as part of the development structure.

Storm Consulting used *music* in this combined stormwater project to resolve the issues of flooding, water quality and the required public open space. It was also used to assist with the design of a centralised stormwater harvesting scheme.

Storm Consulting's award-winning 'exfiltration stormwater treatment system' is an advanced stormwater treatment system where the stormwater goes through a pipe wall, then leaks out through another filter to a sand filter. The stormwater system has been applied in many locations including Ashgrove Residential Estate, Kiama CBD project at Hindmarsh Park and Kinross Business Park, an industrial estate in Newcastle, New South Wales.

Storm Consulting developed the innovation together with a German company, HydroCon. HydroCon makes permeable concrete pipe systems suitable for use in relation to bioretention systems and sand filters. Storm Consulting applied *music* throughout the development and design of the exfiltration stormwater treatment systems.

Mal Brown, Storm Consulting's director and environmental manager, says the exfiltration stormwater treatment system is an effective system that provides stormwater detention, and goes beyond water quality improvement.



A 3D model of Ashgrove Residential Estate

## ALL ABOUT MUSIC

Environmental and engineering consultants around Australia use *music* (model for urban stormwater improvement conceptualisation) every day to design urban development proposals that meet water sensitive urban design standards.

Not a detailed design tool in itself, *music* rather aims to set out the alternatives for improving stormwater quality. The software is allowing planners to assess the pros and cons of various engineering systems for improving stormwater quality – biofilters, swales, wetlands and the like.

*music*, just released, improves realism and increases choices.

It includes major advances to the science and enhances the ability to model new stormwater technologies like porous pavements. It also includes raw rainfall data for 50 major population centres in Australia. Users who take up the 'support' option have access to more than 1000 pluviometer stations across Australia.

the city, into a freshwater reservoir fed by stormwater run-off from a third of the metropolis, with assistance from AECOM, a global provider of professional technical and management support services to a broad range of markets, including transportation, facilities, environmental, energy, water and government.

Professor Tony Wong and colleagues at Design + Planning at AECOM have been advising PUB on the implementation framework for WSUD in the catchment, and the latest science from the Facility for Advancing Water Biofiltration (FAWB) at Monash University and *music* have assisted in its development.

As part of Singapore's Active Beautiful and Clean (ABC) Waters initiative, the PUB has conducted a number of design and *music* training courses to build local capacity for WSUD. In addition, two pilot projects have been completed. One project

is a 240m<sup>2</sup> 'rain garden' designed to collect and filter run-off from a 6000m<sup>2</sup> residential estate. The other is a vegetated bioretention swale (bioswale), 180m long, beside a new arterial road. The installation occupies two sides of Sengkang West Way, and for experimental purposes each side is different. Finished in September 2008, testing of the systems is underway and results will allow the most effective design to be adopted for large-scale use.

Professor Wong is confident that the work, and associated design guidelines and software tool including *music*, will lay the foundations for water-sensitive urban design throughout Singapore, and the PUB efforts will be a forerunner of clean and healthy urban environments in neighbouring jurisdictions. PUB is engaging with other government agencies, and the involvement of the private sector is also a promising aspect. **GN**

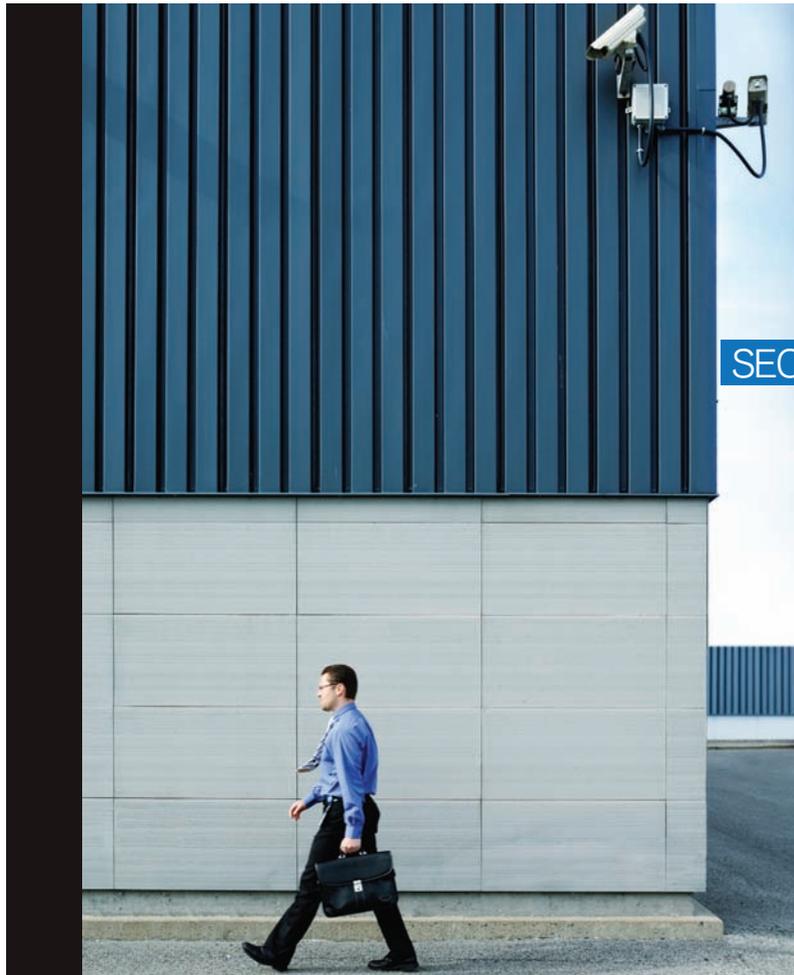
"A significant benefit is that a landscape design can be put on top of the system," he says.

Ashgrove Residential Estate was the winner of the Stormwater Industry Association's Award for Excellence in Stormwater Management in 2008.

### TAPPING INTO SINGAPORE

Meanwhile an ambitious project to turn Singapore's fully urbanised environment into a water supply catchment is attracting attention from around the globe.

Singapore's Public Utilities Board (PUB) is converting Marina Bay, in the heart of



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