

# WATER LINES



**Dr Andrew McCowan**  
Director

## Update from MD

Welcome to the second issue of our company newsletter, Water Lines. It provides an opportunity to showcase our achievements and to discuss news and events. From all the positive feedback we have received, our first issue of Water Lines has been a great success.

As industry demands have increased, Water Technology has continued to grow steadily. This growth has been aimed both at broadening the range of our capabilities and at increasing the capacity of our existing capabilities.

Adam Rasmussen joined the team in February. He was previously with Melbourne Water and has a range of practical experience in development issues related to floodplains, waterways and water quality.

## Climate Change Threats on the Gippsland Coast

Sea level rise and altered weather patterns due to global climate change, together with land subsidence, has the potential to significantly impact the 700 kilometre long Gippsland coast. In association with Ethos NRM and Environmental Geosurveys, Water Technology is conducting an investigation of the impact of these climate change related threats. The study is being undertaken as a partnership with the Gippsland Coastal Board.

A regional study was completed by CSIRO to quantify the projected effects of possible changed coastal wind and weather patterns, changed storm surge conditions and changes in extreme sea levels along the Gippsland coast. This investigation builds on the CSIRO work to assess the potential impact to the Gippsland Coast's geomorphological features and processes, to its natural values, and to built assets such as roads, bridges, jetties and water/sewerage/power services in low lying township areas. As well, the study will provide information to assist coastal managers in their long-term decision making and strategic planning.

About 80% of the Gippsland Coast, from San Remo to the NSW border, is sandy beaches and barrier islands backed by dune systems

Brett Anderson joined us in March. He has recently completed a post doctoral fellowship at the University of Melbourne and has experience in a wide range of consulting projects. Brett brings particular expertise in assessing environmental flow requirements. A profile, presenting his skills and expertise, is included on page 2.

We are also pleased to welcome Elise Lawry back to Water Technology. She first joined us in 2001 and has extensive experience in both flooding and coastal engineering investigations. Elise returns to us after two years of overseas travel, including one year of international consulting experience based in London.

Water Technology will soon be celebrating seven years of successful operation. By maintaining our commitment to excellence and delivering innovative solutions, I am confident that we will continue to develop as a leading provider of water related consultancy services both within Australia and overseas.

To all our clients and partners, thank you for your continued support.

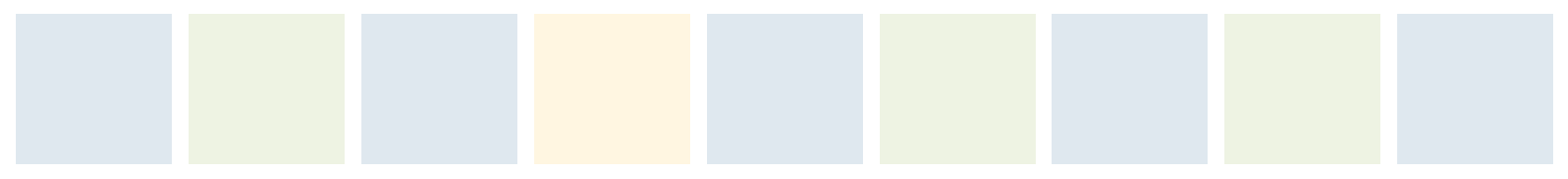


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## News:

- Find us on the web at [www.watech.com.au](http://www.watech.com.au). You will find the latest news and can download a copy of Water Lines.
- Steve Clark is now a qualified Water Efficiency Assessor.
- Over 75% of staff continue to be involved in the Red Cross Blood Service's Club Red donor program – well done. [www.donateblood.com.au](http://www.donateblood.com.au)
- Staff donate their casual day proceeds to Water Aid. [www.wateraid.org/australia](http://www.wateraid.org/australia)



## Martha Cove

Martha Cove is a water-based residential development that is currently being constructed at Safety Beach on the southeast coast of Port Phillip Bay. The development includes four marina basins (with a total capacity for up to 1,000 boats), and a series of inland canals and residential islands. The development is connected to the sea by a dredged entrance channel that is protected by rubble-mound training walls.

Water Technology has been responsible for a wide range of investigations required for obtaining Coastal Management Act consent for the coastal and water-based components of the project. This has included:

- Determination of operational and design metocean (wind, wave, tide and current) parameters
- Coastal process assessment
- Conceptual breakwater design
- Water quality and circulation studies
- Dredging investigations and application for consent for dredging
- On-going water quality and monitoring investigations

The breakwaters were designed to protect the entrance channel from wave action, to minimise their impact on navigation and to help manage the alongshore transport of sand, thereby minimising the need for maintenance dredging.

The functionality of the breakwaters was optimised through a series of numerical and physical model tests.

A range of state of the art two and fully three-dimensional models was used to investigate the fates of stormwater inflows to the marina/canal system, and to investigate water circulation and residence times. A pumped recirculation system has been included to ensure good water quality could be maintained within the inland waterways. With this system, "clean" sea water from close to the marina entrance is pumped to enhance mixing in the marina basins and canal ends. The operation of the recirculation system is to be optimised through a series of pumping trials and on-going monitoring.



For further information please contact  
Andrew McCowan, [amc@watech.com.au](mailto:amc@watech.com.au)

## Staff Profile



**Dr Brett Anderson**  
Senior Engineer

*Hydrology & hydraulic modelling  
Geomorphology & stream rehabilitation  
Environmental water requirements (FLOWS)*

Brett is a fresh Water Technology recruit having found his desk at the start of March. Brett has a strong background in both scientific research and consulting engineering practice. He worked as an Aerospace Engineer for three years, including time at British Aerospace where he was officially a 'rocket scientist' (aerodynamic modelling and systems design).

Brett returned to study a PhD at the University of Melbourne in 2000. This work took him on a journey discovering fluvial geomorphology, catchment hydrology and most particularly the hydrodynamics of flow through riparian vegetation. At the end of it all, his whole-of-catchment analysis overturned a century-old belief - demonstrating that vegetation does not necessarily lead to higher flood peaks (please ask him how!).

Brett joins us following two post-doctoral projects and a range of independent consultancies. In particular he brings specialist skills in assessing the environmental water requirements of river networks using the FLOWS Method. Having delivered innovative investigations on the Werribee and Barwon river systems, Brett is now working on assessments of Gunbower Creek and conducting pilot trials on the estuarine reaches of the Werribee and Gellibrand rivers.

## Environmental Water Requirements of Victorian Estuaries



*Mouth of the Gellibrand Estuary, Victoria*

Estuaries are dynamic environments that include some of the most biologically productive ecosystems on the planet, with 123 found along the Victorian coastline. They provide sheltered nursery and spawning environments for birds, fish and other wildlife. Also, they host a diverse array of plant communities (including mangroves, salt marshes and sea grass beds) which act as buffers against shoreline erosion, provide habitat and help to filter and process pollutants. Australians also tend to cluster around coastal waterways, with increasing numbers of people opting for a 'sea change'. As a society we have recognised that it is vital to preserve and protect these productive and precious environments.

The Victorian approach to protection recognises the need to provide our river networks with adequate environmental flows (amongst other things). In 2002, as an integral part of the water allocation process, a methodology was developed called: 'FLOWS - A method for determining environmental water requirements in Victoria'. Since that time the FLOWS method has been used extensively to investigate river systems across the State. The vast majority of river reaches assessed so far have been freshwater reaches, although more recent studies have included an estuarine segment: the Yarra, Barwon, Werribee and Gellibrand in particular. Investigations on these estuaries highlighted the need to develop a specific estuarine assessment methodology as an extension to the FLOWS framework.

Water Technology is part of the expert panel to develop an estuarine assessment methodology and to test it by completing pilot studies of the Werribee and Gellibrand estuaries.

Our role is to develop an approach that maximises understanding of the complex hydrodynamics and salinity structures in an estuary making best use of resources sufficient for 'rapid appraisal'. We aim to achieve this by carefully balancing the field measurement campaign with simulations using an appropriately simplified model.

For further information please contact  
Brett Anderson, [bga@watech.com.au](mailto:bga@watech.com.au)

## Properties at increased risk of urban flooding

A recent media report in The Age highlighted the flooding risks to urban properties in Greater Melbourne. This report stemmed from the release of the Melbourne Water Flood Management and Drainage Strategy for the Port Phillip and Westernport Region. The strategy notes that more than 100,000 properties are at risk of flooding in a 100 year flood event with some 40,000 properties potentially suffering over floor flooding. Further, Melbourne Water warns that this assessment may be conservative as detailed flood mapping across Greater Melbourne is incomplete. Increasing urban development and the potential for higher rainfall intensities with climate change underscore the need to address urban flood risks.

In the past, determination of flood runoff from urban catchments has often relied on simplified techniques such as the Rational Method. As pressure increases on urban waterways, more rigorous techniques provide a greater understanding of the urban hydrologic process and subsequently a more reliable estimation of flood risk. Water Technology is pioneering the

integration of hydrologic and hydraulic analysis through the application of direct rainfall in two-dimensional hydraulic models. Also, recent enhancements to the industry standard runoff-routing model, RORB, enable the use of local rainfall data to assess rainfall temporal patterns. Application of local rainfall temporal patterns to studies in Ballarat and Melbourne has provided further insight to catchment behaviour.

Sophisticated hydraulic analysis has enabled the simulation of flood behaviour within the complex urban environment. Linking stormwater pipes to floodways to overland flow paths in a seamless modelling framework reduces the uncertainties and assumptions of the traditional approaches. Water Technology has applied such hydraulic analysis in numerous urban flood risk assessments including Glen Waverley and Acacia Street Main Drains (Melbourne Water) and the Donga Road Catchment (City of Greater Geelong). With these and other studies, Water Technology is a leader in the application of innovative technologies to the understanding of urban flood risk.



*For information about our capabilities in urban flooding and waterways please contact Warwick Bishop, [wab@watech.com.au](mailto:wab@watech.com.au)*

## The Living Murray

In November 2003 the Murray-Darling Basin Ministerial Council announced that it would focus on achieving outcomes for six significant ecological assets, known as "Icon Sites" along the River Murray, spending \$500 million over 5 years on water recovery and \$150 million over 8 years on environmental works and measures. Water Technology has been closely involved in the Living Murray program at three of the six Icon Sites, Barmah-Millewa Forest, Gunbower Forest and Lindsay, Mulcra and Wallpolla Islands.

Water Technology has worked closely with the Goulburn-Broken, North Central and Mallee Catchment Management Authorities to better understand the dynamics of these floodplain systems. The major issue facing these flood dependent ecosystems is the reduction in the magnitude, frequency and duration of flooding due to river regulation. Un-seasonal flooding of

wetlands is a major concern in the Barmah-Millewa Forest, whilst permanent inundation of previously ephemeral anabranches and billabongs due to static weir pools is a significant issue on the Lindsay River.

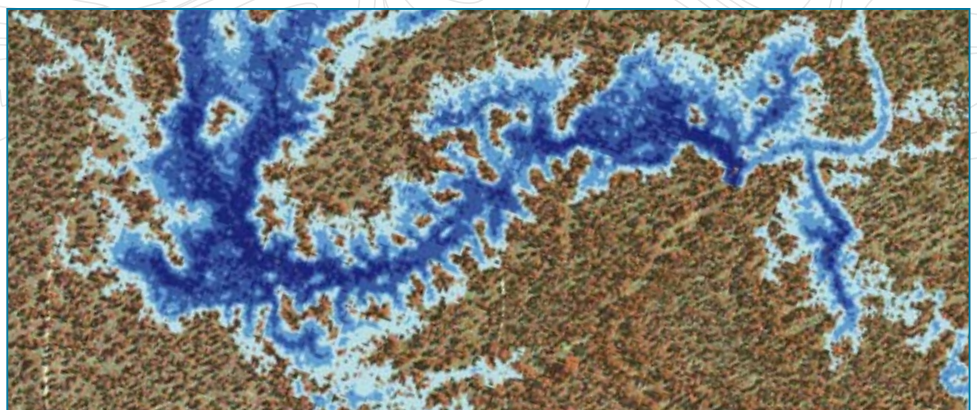
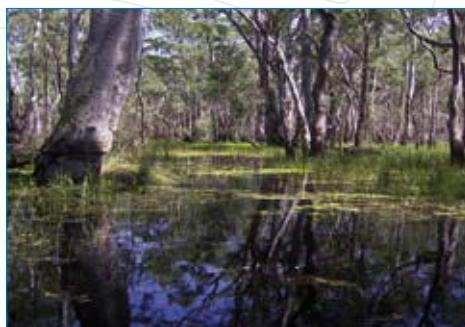
Each of the Icon Sites has ecological objectives to ensure the biodiversity of these ecosystems is maintained. Water management options will be formed on the basis of achieving the ecological objectives.

Through the development of coupled one and two-dimensional hydrodynamic models the complex behaviour of historical events have been modelled and future potential water management options have been trialled. The benefit of using these complex hydrodynamic models is that

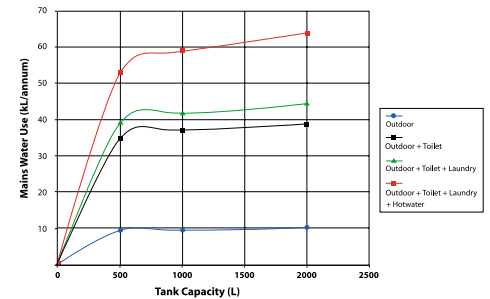
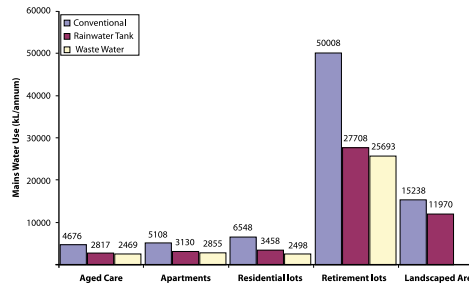
the water management options can be fully tested prior to implementation, ensuring that the options are optimised to maximise the environmental benefit delivered to the Icon Sites. Water Technology has developed a suite of GIS compatible result processing techniques to report on depth, discharge, velocity and duration of flooding enabling comparison against ecological objectives.

Water Technology's work to date under the Living Murray program has significantly improved the outlook for the Icon Sites, with a much greater understanding of the dynamics of these flood dependent ecosystems.

*For further information please contact Warwick Bishop, [wab@watech.com.au](mailto:wab@watech.com.au)*



*Simulation of environmental flooding*



## Water Cycle Management at Wightsands Retirement Development

With increasing pressures placed upon our water supplies coupled with the recent drought conditions, Local Governments are increasingly mindful of the potential impact of increased water use associated with proposed developments. In Victoria there are no specific requirements at present, whereas medium to large developments in South-East Queensland now require Water Efficiency Plans to be lodged with the proposal to assess the potential impact of development on dwindling water supplies. In this light, Water Technology have developed and maintain a sophisticated suite of modelling tools to simulate all stages of the water cycle at time scales from minutes to decades, and spatial scales from individual lots up to entire catchments. This capability enables us to further assist our clients in meeting the water-related challenges of urban development.

This expertise was recently applied in creating a Water Efficiency Management Plan (WEMP) for a proposed development at Cowes, Phillip Island, Victoria. Westernport Water is currently applying Stage 4 Water Restrictions in the area of the proposed Wightsands development and, understandably, the community and authorities are concerned about any additional demand on the already limited water resources of the region. As part of the planning submission, Water Technology

provided a detailed investigation of the proposed water use of the development. This included potential options and modelling of possible efficiencies:

### Alternative Water sources

- Rain water tanks probabilistic volume over 100 years of generated rainfall
- Sizing of Rainwater tanks for cost efficient installation
- Rainwater tanks probabilistic use over 100 years of generated climate
- Recycled Wastewater demand management modelling.

### Water Efficiencies

- Suggested water efficient device selection
- Water demand and losses associated with landscaping
- Water demand and losses associated with on site pools.

Following this investigation, Water Technology was able to provide detailed water use predictions to assist both developers and local planning officers to make informed decisions regarding the viability of the development. The recommended measures for this project included proposed water-use savings of up to 60% on conventional water use.

This highlights the community benefits from this type of investigation in both allaying community fears over water-use and providing developers and planners with options and knowledge regarding possible water-use, savings and efficiencies.

The tools and skills used in this example can be widely applied to all water demand management categories giving our clients the best possible advice regarding their water use activities. Other projects may include:

- Development rainwater tank or dam sizing
- Water demand management plans and detailed water use reports
- Water Efficiency Management Plans.

*For further information on water cycle management please contact Warwick Bishop, [wab@watech.com.au](mailto:wab@watech.com.au) or Steve Clark in Brisbane at [sqc@watech.com.au](mailto:sqc@watech.com.au)*



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