

# WATER LINES



**Dr Andrew McCowan**  
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Wangaratta Manager



**WATER TECHNOLOGY**  
WATER, COASTAL & ENVIRONMENTAL CONSULTANTS

[www.watech.com.au](http://www.watech.com.au)

## Update from MD

The six months since our last Water Lines have seen some significant changes occurring at Water Technology. This has included continued growth of our Melbourne office, consolidation of our Brisbane office, and the big news, the opening of our new office in Wangaratta.

With continued steady growth in Melbourne, our office at 15 Business Park Drive was becoming a bit cramped. Rather than move to larger premises, we negotiated with one of our neighbours to take over the lease next door at No. 13. We now occupy the first floor of both 13 and 15 Business Park Drive. The main entrance remains at No. 15, while No. 13 (the West Wing) is connected via a large opening in the dividing wall.

In Melbourne, Søren Anderson has recently joined us after completing a Masters degree from the Technical University of Denmark. Søren's speciality is in coastal engineering and sediment transport. Other new recruits include: Leah Hutchins who has just completed her degree in Geomatic Engineering; Richard Connell and Ben Hughes, two of our part-time students, who have now completed their studies and will be joining us full-time; and Eleanor Lim who will be managing our IT.

Brisbane office has been continuing with water efficiency studies, a major water management study and, more recently, a major salinity intrusion study for the sewer system in Ballina. This last study has developed from an initial desktop review to include field testing and monitoring, with more detailed analysis to follow.

We are proud that Dean Judd and his team have chosen to join Water Technology and open our new office in Wangaratta. The Wangaratta Team provides us with a strategic presence in Regional Victoria, and further broadens our skills base to include fluvial geomorphology, stream management and ecology.

On a sadder note, we have recently said farewell to Allan Charteris. During his time with us, Allan has made an enormous contribution to Water Technology and has played a significant role in getting us to where we are now. Allan has decided to take a break from consulting and spend more time with his family. We wish him well with his new endeavours.

## New Office in Regional Victoria

It is with great pleasure that we announce the opening of the Wangaratta office of Water Technology. Complementing the growing offices in Melbourne and Brisbane, the new regional presence will bring Water Technology closer to clients across regional Victoria and southern New South Wales and further expand services into the fields of river management, ecology and fluvial geomorphology.

As many of you are aware, having completed PhD research on channel formation processes and a stint of post doctoral research, I've returned to river management consulting in the past 18 months, undertaking geomorphic projects across Victoria, New South Wales, Queensland, South Australia and Tasmania. With the support of a talented group of specialists in Wangaratta and the technical excellence of Water Technology's existing staff, I'm looking forward to further developing our services to the river management industry.

Our team in Wangaratta is focussed on the management of river systems, with James Kaye heading up our ecological business and Tim Loffler leading our waterway management business, both ably supported by Michelle Townsend. Tim and I are supported by the skills of Julian Martin and Sally Day, and as a team we provide excellent hydraulic and hydrologic design capabilities and expertise in strategic planning and field assessment for waterway rehabilitation and implementation.

James and Sally provide extensive experience in riparian and terrestrial vegetation condition assessments and management. They are skilled in the production of vegetation management plans, investigations into riparian Crown land and vegetation monitoring. They are skilled in the production of costed activity plans, 'Net Gain' assessments and high quality mapping outputs.

We are excited to have joined the motivated group of specialists at Water Technology. In particular, the expertise of Water Technology in determining flow conditions and distributions across riparian environments greatly compliments our understanding of the dependence of geomorphic and ecological processes on flow. This provides great opportunities to our clients for an enhanced understanding of river systems.

## Inside:

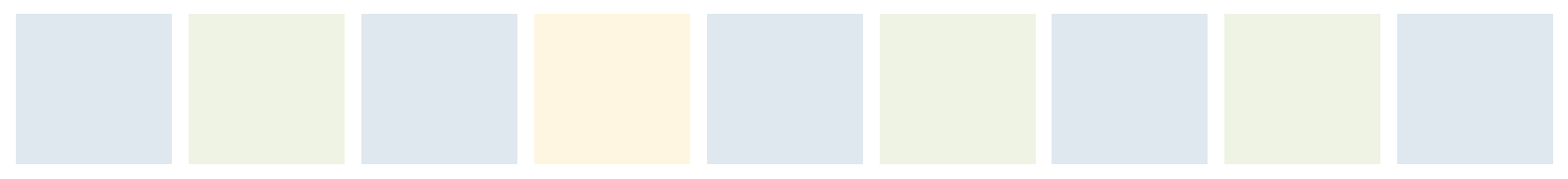
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## News:

- Chris Fagan is currently travelling and working in New York to broaden his experience.
- Three papers were presented by our team at the 5th Victorian Flood Management Conference in Warrnambool, Victoria:
  - » Impacts of Climate Change on Floodplain Management in Coastal Communities
  - » Making the best of what you have – Design Flood Estimation for Catchments with Limited Observed Data
  - » The Influences of Riparian Vegetation Roughness on Flood Routing.



**Wangaratta team.** From left to right: Dean Judd, Sally Day, Tim Loffler, Andrew McCowan (visiting from Melbourne), Michelle Townsend, Julian Martin and Jamie Kaye.



## Staff Profile



**Tim Loffler**  
Senior Engineer

*Hydraulic modelling \* Topographic design \* Civil design \* Wetland and waterway design \* Hydrology \* Works implementation \* Stakeholder negotiation \* Condition assessment \* FLOWS*

Tim is a Civil Engineer by training and an Environmental Engineer by experience and inclination! With over 13 years of consulting experience in water and natural resource management, Tim brings a multi-dimensional approach to his work in waterway assessment and management.

Tim specialises in the assessment, design and implementation of waterway management works focussed on improving river health in both urban and rural environments. He has excellent analytical, data processing and planning skills and the practical experience of design and construction supervision and management of multi-disciplinary teams for major projects.

With diverse project experience in hydraulic modelling, wetland and waterway rehabilitation design and waterway condition assessment, Tim recognises the importance of full integration of all relevant areas of scientific and community knowledge in determining appropriate management actions.

Outside of the work environment, Tim spends his time bushwalking, kayaking and cycling in the great outdoors. Tim has a passion for projects that combine these pursuits for environmental benefit.

## Austral Bricks Water Efficiency Management Plans

South East Queensland is currently experiencing the worst drought on record with the region's major water supply storages at historic lows. As part of a wide ranging response to the drought, an extensive set of demand management strategies have been introduced by the Queensland Water Commission (QWC).

South East Queensland residents will be aware that Level 5 restrictions have been in place since April 2007. The preparation of Water Efficiency Management Plans (WEMPs) is now mandatory for high volume business, industry and non-residential users. A key aim of the preparation and ongoing review of these plans is to either reduce water consumption by 25% compared to the 2004/2005 water year or to achieve best practice.

Austral Bricks, Australia's largest manufacturer of Pavers, Bricks, Building Materials Façade Systems and Landscaping products approached Water Technology to assist in the preparation and endorsement of WEMPs for their Rochedale and Riverview plants.

The potential for constructing storages to collect runoff from the extensive roof area of both plants had already been identified by Australbricks. Through consideration of the process demands and likely runoff (utilising 100 years of historic rainfall data) Water Technology has assisted in sizing and layout of the constructed storages to maximise the reliability of supply.

Through implementation of this rainwater harvesting system, it is anticipated that Austral



*Aerial view of Austral Bricks' Rochedale Plant showing the 2ha of roof area to be used for stormwater harvesting*

Bricks is likely to reduce their consumption of mains water by up to 90%, well in excess of the 25% target.

As part of the WEMP preparation process, applications to assist in the implementation of these projects were made as part of the Queensland Government's Business Water Efficiency Program (BWEP).

We are pleased to advise that funding applications for both the Rochedale and the Riverview plants were successful and funding for approximately 50% of the anticipated implementation costs has been secured through the Queensland Governments BWEP scheme.

For further information, please contact Steve Clark, [sqc@watech.com.au](mailto:sqc@watech.com.au), or Sean Curtin, [sean.curtin@australbricks.com.au](mailto:sean.curtin@australbricks.com.au)

## Improving Catchment Management for Corner Inlet

### Water Technology and University of Melbourne partner to provide Catchment Management Tools

Corner Inlet is listed as a nationally and internationally important wetland under the Ramsar convention. It is also of national and international significance for shorebirds and is listed as an East Asian-Australasian Shorebird Network Site. The Ramsar site covers an area of around 67,100 hectares and supports a range of complex habitats and vegetation communities including mangroves, mudflats, salt marsh communities and sea grass meadows and has the only extensive beds of Posidonia seagrass in Victoria. The white mangrove *Avicennia marina* is the only species of mangrove present in Victoria and, within Corner Inlet, is at the southern extent of its range in this state. Mangrove forests are mainly dominant along the northern shoreline of Corner Inlet, however isolated stands do occur within the southern section of the Marine National Park. Corner Inlet also supports a number of rare and threatened flora and fauna species listed under the FFG Act 1988 (Vic) and the EPBC Act (1999).

The Corner Inlet Environmental Audit was undertaken by the CSIRO (2005) in response to growing concern from natural resource managers and the community about the health of Corner Inlet. The Audit recommended undertaking a detailed assessment of the nutrient and sediment loads being delivered to the estuary by modelling the Corner Inlet catchments. Importantly, they highlighted that the assessment should consider both the spatial and temporal variation in loads and the relationship with land-use through the catchment. The need for targeted monitoring of event-based water quality parameters through the catchment was also recommended. A project to complete 'Development of Modelling and Decision Support Systems for Nutrient and Sediment Reduction in Corner Inlet' will meet these objectives.

In partnership with the University of Melbourne, Water Technology has been commissioned by the West Gippsland CMA to prepare an integrated



and comprehensive catchment (E2) and receiving waters (MIKE21) model. Results from the integrated simulations will be encapsulated into a Decision Support System that will be used to guide the development of improved management strategies aimed at protecting the Corner Inlet Ramsar site, and then as an ongoing tool to guide condition monitoring throughout the 2100km<sup>2</sup> catchment.

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

## Improved Understanding of Flood Risk in Beaufort



*Typical Winter Floodplain Inundation*

The Beaufort Flood Study, being undertaken by Water Technology for the Glenelg Hopkins CMA and Pyrenees Shire, is nearing completion. The outcome of this study will be a vastly improved understanding of flood risk for the Beaufort township area. Beaufort is located on the western highway some 40 km west of Ballarat and, like much of regional Victoria, is experiencing increased development pressure both internally and along the town fringes.

## Geomorphic Impact of Regulating Chowilla Creek

The Chowilla Floodplain is one of the six 'Icon Sites' designated under the Living Murray Initiative. These locations have been identified for their unique ecological diversity and landscape characteristics. The outlook for Chowilla's floodplain ecosystems looks bleak unless the region can be flooded more frequently, for longer, and with more extensive inundation than recent overbank events have achieved (regulation of the Murray has reduced natural flooding). In order to facilitate such an outcome the construction of an 'environmental' regulator on the downstream end of Chowilla Creek has been proposed. This regulator would back water up in the extensive network of anabranching creeks that traverse the Chowilla Floodplain. It would provide the capability to inundate the floodplain at Entitlement flow levels, or to enhance the spread of a naturally occurring River Murray flood event.

Water Technology is working with Dr Chris Gippel of Fluvial Systems to evaluate the potential geomorphic impact of the proposed Chowilla Creek regulator. There are two key aspects to the investigation. Firstly, on the two main inlet channels, Pipeclay and Slaneys Creek, weirs are to be upgraded and operated independently of Chowilla Weir to introduce flow variability and flow pulses into the channels. Thus there is a focus on in-channel flow rates to evaluate the impact on bed sediment mobilisation and on drawdown rates which have ramifications for bank stability. Secondly, the more general focus is to identify

Previous flood maps for the town were based on anecdotal information and rudimentary hydraulic analysis that was considered outdated and unreliable for the purposes of setting planning controls, hence the need for the present study.

As with most flood studies, Beaufort has its own unique circumstances and challenges that make determination of accurate flood predictions an interesting exercise. The township is located at the confluence of a number of small streams which vary in area from 2 to 27 km<sup>2</sup>. There is no flow gauging on any of the waterways through the town, which was an obstacle for the hydrologic model calibration. In order to overcome this limitation, a regional approach to the hydrology was undertaken. An hydrologic model of a nearby gauged catchment was developed and calibrated, with the parameters then scaled to apply to the Beaufort catchment streams. Similarly there was very limited observed flood information for calibration of the MIKE FLOOD 1D-2D hydrodynamic model. Subsequently,

experience from other flood studies was utilised along with verification of flood behaviour by local authority staff as well as interested members of the community.

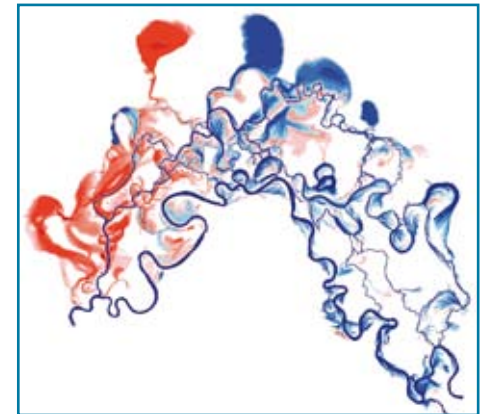
Due to the varied nature of catchment sizes contributing to flooding in Beaufort, an "envelope" approach to flood mapping was required in which the maximum flood heights from a number of different duration storms were combined to develop a consistent representation of flood risk across the whole study area. Detailed floor level survey is presently being integrated into a flood damages assessment in order to quantify the level of annual tangible flood damages for the township. This will assist in the development of flood awareness and the formulation of any future floodplain management plan (including mitigation options) for Beaufort.

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

differences in the sediment budget for Chowilla Floodplain for a natural flood event and a 'weir-assisted' flood event. The geomorphic analysis of this work involves examination of inflowing versus outflowing suspended sediment, deposition rates on floodplain surfaces and internal sediment sourcing via scour and bank slumping.

An existing suite of two-dimensional hydrodynamic simulations were available from earlier design work. Water Technology reconfigured these models to provide a more efficient tool for investigating the operation of the environmental regulator and the impact on both in channel flows and flood inundation patterns. A series of targeted simulations were run to quantify the in-channel discharge regime, especially to identify changes to velocity and shear stress fields, and predict differential fields of flood extent, inundation duration and water depth. This flow information is being used in conjunction with vegetation cover, soil type and morphologic data to estimate the marginal change in geomorphic process rates. The analysis will evaluate, for example, if and where floodplain deposition rates are likely to rise and whether bed sediment mobilisation rates will be more or less frequent.

For further information, please contact Ben Tate, [bt@watech.com.au](mailto:bt@watech.com.au), or Chris Gippel, [chris.gippel@bigpond.com](mailto:chris.gippel@bigpond.com)



*Simulation results showing the inundation extent of a 60 GL/day (peak) flood with Chowilla Weir operating (red) overlain by the same flood without the weir (blue).*



*Typical location on Chowilla Creek with a stand of macrophytes on the near bank against the backdrop of a dry floodplain.*



Harbour Layout



Dredge Simulation

## Wyndham Harbour

Wyndham Harbour is a combined marina and residential development to be located at the southern end of Duncan's Road, Werribee South. The harbour will have up to 900 wet berths with associated shore-based service, parking and club house facilities. The harbour is to be protected by a 900m long main rubble mound breakwater to the south and east, and a 300m long secondary breakwater to the north.

The development will also include new beaches to the south and north of the harbour, and a rock groyne is to be constructed approximately 350m north of the harbour to stabilise the coast in this area. A sand by-passing system is to be incorporated to maintain the existing southwest to northeast alongshore transport of sand.

Water Technology has been responsible for a wide range of investigations required for obtaining EES approval for the coastal and water-based

components of the project. This work has included:

- Determination of operational wind, wave, tide and current conditions
- Coastal process assessment
- Conceptual breakwater design
- Water quality and circulation studies
- Dredging investigations

Creation of the harbour basin will require dredging of approximately 320,000 m<sup>3</sup> of bed material. This material consists mostly of silty and sandy clays overlain by a thin layer of silty sand. Dredging is to be carried out by a large barge mounted excavator dredge, or by land-based excavators located on temporary causeways. Spoil disposal is to be to land, where it will be dewatered and used for landscaping, or treated to provide engineered fill.

A state of the art MIKE 21 Mud Transport (MT) model has been used to simulate the likely effects of turbidity during dredging. The model uses concentration dependent settling rates to describe flocculation effects, and has been used to assess a range of dredging scenarios and mitigation options.

An innovative two-layer breakwater concept has been developed in association with Vantree Pty Ltd. This approach uses a wider grading of rock sizes and is cheaper and easier to construct than the more traditional three-layer approach. The suitability of the concept has been confirmed through physical model tests undertaken by the Water Research Laboratory. The model tests were also used to optimise the crest elevations of the breakwaters, and to optimise the weight of the armour rock required.

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



### Melbourne team

Back, left to right: Brett Anderson, Steve Duggan, Søren Andersen, Tim Womersley, Andrew McCowan, Ben Tate, Ben Hughes, Richard Connell.

Front: Margaret Miller, Warwick Bishop, Lesley Sincock, Claire Wade, Sarah Law, Elise Lawry, Steve Muncaster, Chris Beardshaw, Amelinda Mack, Adam Rasmussen.

Absent: Eleanor Lim, Leah Hutchins, Yafei Zhu.

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