

# water

SEPTEMBER/OCTOBER 2019 ISSUE 211

## Freshwater

Conference keynote line-up

Education & training shakeup

Serious freshwater fish threat



Provider of Water Process Solutions for New Zealand since 1938

**METERING**

**Domestic and Bulk**



**SENSUS**

**Electromagnetic Flow Meters**



**EUROMAG INTERNATIONAL**

**Automatic Meter Reading System (AMRS)**



**SENSUS**

**GSM/GPRS Data Loggers**




**DataCell**

**FILTRATION**


**Innovative Filtration Solutions**



**ARKAL**

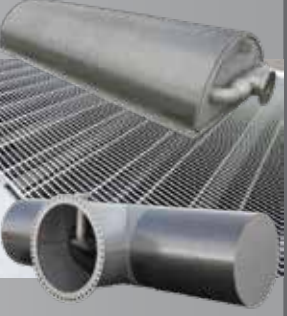


**FILTOMAT**



**AMIAD**

**Vee Wire Screening Solutions**



**Hendrick Screen Company**  
Creating Edge Water Solutions

**VALVES**

**Water Control Solutions**



**BERMAD**

**Backflow Preventers**



**WILKINS**  
a ZURN company

**High Performance Air Valves**



**VENT-O-MAT**



**President:** Kelvin Hill  
**Board Members:** Helen Atkins; Troy Brockbank; Garth Dibley; Lorraine Kendrick; John Mackie and Iain Rabbitts  
**Chief Executive:** John Pfahlert  
**Manager, Corporate Services:** Linda Whatmough  
**Manager, Sector Engagement:** Vicki McEnaney  
**Executive Administrator:** Amy Samuelu  
**Administration Officer:** Pip Donnelly  
**Technical Manager:** Noel Roberts  
**Environmental Scientist, Principal Advisor:** Water Quality: Jim Graham  
**Principal Data Scientist:** Lesley Smith  
**Communications Advisor:** Debra Harrington

**SPECIAL INTEREST GROUPS**  
**Backflow:** Richard Aitken, P: +64 3 366 7252  
**Modelling:** Nadia Nitsche, P: +64 21 576 134  
**Small Wastewater & Natural Systems:** Ulrich Glasner, P: +64 3 450 1721  
**Stormwater:** James Reddish, P: +64 27 705 3139  
**Water Service Managers' Group:** Martyn Cole, P: +64 27 555 4751  
**Young Water Professionals:**  
**AKL:** Joan Davidson, P: +64 21 835 739  
**WLG:** George Beveridge, P: +64 21 718 173  
**CHC:** Jules Scott-Hansen, P: +64 3 363 5400

**WATER JOURNAL**  
**Managing Editor:** Alan Titchall  
 P +64 9 636 5712, M +64 27 405 0338  
 alan@contrafed.co.nz  
 Contrafed Publishing  
**Contributors:** Mary Searle Bell  
**Advertising Sales:** Noeline Strange  
 P: +64 9 528 8009, M: +64 27 207 6511  
 n.strange@extra.co.nz  
**Design:** Contrafed Publishing  
 Suite 2, 93 Dominion Rd  
 PO Box 112357, Penrose, Auckland, 1642  
 P: +64 9 636 5715  
 www.contrafed.co.nz  
**Distribution:** Pip Donnelly  
 P: +64 4 472 8925

**DISCLAIMER:** Water New Zealand reserves the right to accept or reject any editorial or advertising material submitted for publication. The opinions expressed in contributions to Water are not necessarily those of Water New Zealand. The information contained in this publication is given in good faith and has been derived from sources believed to be reliable and accurate. However, neither Water New Zealand, nor any person(s) involved in the preparation of this publication accept any form of liability whatsoever for its content including advertisements, editorials, opinions, advice or information. This extends to any consequences from its use. No part of this publication may be reproduced, stored in any retrieval system, or transmitted in any form or by any means electronic, mechanical, photocopying, recording or ink-jet printing without prior written permission of the publishers.  
 ISSN 1179-2949 (Print)  
 ISSN 2382-1906 (Online)

www.waternz.org.nz

# water

Issue 211 SEPTEMBER / OCTOBER 2019

**INSIDE**

- 4 President's comment - Water reform
- 6 Upfronts - news and events
- 8 Conference 2019 - Keynote speakers
- 13 Three waters regulatory reforms - roadshow
- 14 Maori Language Week - learning together
- 16 A compelling case for change - Murray Sherwin
- 20 Education and training shakeup
- 22 Backflow Group conference
- 24 Mike Petricevich -obituary

**FEATURES**

- 34 Koi carp - a serious freshwater threat
- 40 GI - China's Sponge City Programme
- 44 Water filtering through oysters
- 46 Treading water - flood risk data
- 48 A new approach to recording past climate
- 64 Three waters regulation reform review

**REGULARS**

- 26 Profile - Dr Tim Fisher
- 30 Veteran - Alison Young
- 52 Oxfam - Kiwi art aids Papua New Guinea
- 55 Legal - three waters overview
- 58 Technology - digital use
- 60 Innovation - flood alleviation project
- 68 Innovation - award-winning Wastewater project
- 70 Commercial - managing utility data
- 74 Advertisers' index

*A consistent approach across the 3 waters sector.*



The official journal of Water New Zealand - New Zealand's only water environment periodical. Established in 1958, Water New Zealand is a non-profit organisation.

**Deeco Services Ltd** | Water Process Solutions  
**National Service & Distribution** | 21 Regent Street PO, Box 33-226, Petone  
 Tel: 04 568 5293 | Fax: 04 568 5273 | service@deeco.co.nz | www.deeco.co.nz

Wellington | Auckland | Tauranga | Christchurch

# Water reform



Kelvin Hill,  
President, Water New Zealand

Well clearly the big news has been the long-awaited proposals for water sector reform – three years after the Havelock North contamination event provided a serious wakeup call over the way we deliver drinking water to our communities.

The Government has certainly picked up the mantle from the Havelock North drinking water inquiry and the Cabinet papers reveal that it is prepared to tackle the ongoing systemic problems facing our sector.

The solutions are clearly ground-breaking. The establishment of a regulator with competence and clout, is exactly what we've been asking for, along with a stronger, centralised approach to compliance, monitoring and enforcement.

As drinking water providers, we will be more accountable for ensuring that we supply safe drinking water but I'm optimistic that there will be the opportunity to build capability and capacity – something we've also been asking for.

Of course this does mean there will be some big changes and big challenges for those of us working in the sector but there's no doubt there'll be plenty of opportunities. This is good news for one of our key goals – attracting new young professionals and ensuring that working in the water sector becomes a sought-after career.

At the heart of the reforms are proposals that all drinking water suppliers (except individual domestic self-suppliers) be covered by the regulatory system and required to provide safe drinking water on a consistent basis.

Other core proposals include:

- stronger requirements for the regulator to manage risks to drinking water safety including doing more to protect drinking water sources, taking a multi barrier approach to drinking water safety and improvements to water safety planning.
- the new drinking water regulator will have the opportunity to undertake some wastewater and stormwater functions.

Including wastewater and stormwater in the new regulatory system and establishing new national environmental standards for

wastewater discharges and overflows will help improve water quality.

This is an acknowledgement that the three waters – drinking, waste and stormwater – are inextricably linked, and that to ensure the health and sustainability of our water in the long term, it is important to acknowledge the impact that all water has on the environment.

The reforms also signal that the Government is ready to put significant investment into our long-neglected sector. The new regulator will need to be highly competent and well resourced.

I'm optimistic that we're going to see over the next few years a big improvement in the consistent quality of not just drinking water, but in the long run, the overall management of the three waters.

A five year transition period will give us time to adapt to the new environment in whatever way each organisation needs to.

There will be further opportunities for input into the new Water Services Bill as it goes through Parliament and Water New Zealand will endeavour to work closely with the Government as the legislation is developed.

We also propose to ensure that we get adequate feedback from our membership to help input into the government's consultation process.

As such, we plan to be on the road in November holding workshops in a number of places around the country discussing the impact of the government's decisions. We hope to see as many of you at those workshops as possible.

So make sure you keep an eye out for further information in our Pipeline newsletters and on our website.

These workshops may be especially useful for those of you who are unable to get to our pre-conference Regulation – what you need to know workshop on September 17 (see article page 64).

Speaking of the conference, I'm very much looking forward to catching up with as many of you as possible at our annual conference and expo in Hamilton this month.

Our conference is looking to be every bit as big and bright as in previous years, and this year key Government Ministers David Parker and Nanaia Mahuta, will be speaking, along with an extremely high calibre international experts and technical presenters.

So – another not-to-be missed water sector event.

Hope to see you there,

Kelvin.



## Water New Zealand Conference & Expo 18-20 September 2019, Hamilton

Plus Preparing for Regulation – full day pre-conference workshop on 17 September

If your interest is water, this conference is not to be missed.

Register now for the biggest event on the three waters calendar.

The Minister for the Environment, Hon David Parker will open the conference and guest speakers include the Minister for Local Government, Hon Nanaia Mahuta.



### Premier Sponsors



## California spend on freshwater infrastructure

California is looking at a proposed **Water Justice Act** that will invest US\$250 billion toward upgrading fresh water infrastructure in needy communities and provide assistance for families unable to pay water bills.

Reportedly, this bill will specifically allocate US\$10 billion to offset water costs in low-income and “environmentally at-risk”

communities, with the latter determined by proximity to hazardous or heavily polluted sites.

It will also allocate \$50 billion in emergency funds to communities whose water supplies have been contaminated, such as Flint, Michigan, including funds for communities and schools to test water and replace or fix tainted water infrastructure.



Nigel Bickle, chief executive Hastings District Council, councillor Kevin Watkins, mayor Sandra Hazlehurst, Jim Graham, Water New Zealand, councillor Wendy Schollum, deputy mayor Tania Kerr, and councillor Cr Ann Redstone.

## Hawke's Bay Councillors learn about non-chlorine supply

Water New Zealand's Principal Advisor, **Water Quality, Jim Graham** presented to councillors at Hastings District Council on how chlorine-free water supply is provided in Denmark and what New Zealand suppliers would need to do to replicate their approach.

Jim has recently returned from Denmark and the Netherlands – two countries that do not treat drinking water with chlorine.

He told the councillors attending the workshop that while Denmark does manage safe drinking water without chlorine, it comes at considerable cost.

In Denmark only ground water is used for water supply and chlorine has never been used except for disinfection of new mains, pipe repairs etc. The Danish approach is to find water that is clean, keep it clean and deliver it clean.

Jim says that to do this, infrastructure

needs to be kept in pristine condition.

“If you compare network water losses, in Denmark it is about five percent while in New Zealand it is around 20 percent.

“In Denmark they have begun building reservoirs out of stainless steel and housing them in buildings.

“They continuously monitor pressure and volume across their networks and with smart meters at every connection, are able to easily calculate water or pressure losses.

“All connections have meters and backflow protection devices. People pay for the amount of water they use, about \$3/cubic metre. In Hastings they pay about 70 cents a cubic metre.”

The workshop sparked considerable discussion amongst the councillors about the risks and costs of supplying drinking water without chlorine and what steps would need to be taken to ensure safety.

## Dam safety under scrutiny

The **Ministry of Business Innovation and Employment** is currently undertaking public consultation on dam safety. While most of us appreciate the need for scrutiny of large hydroelectric dams, there exist several thousand dams used for water storage.

The Government has been concerned for many years that we lack a consistent approach to dam safety that manages the risk of failure.

The main risks are flooding and earthquakes affecting a dam's integrity. To date the challenge has been trying to reach agreement on a system that doesn't impose undue compliance costs on owners.

Most of the dams used for water storage are owned and operated by district and city councils, but there are also large number used for agricultural irrigation that are in private ownership.

The proposed regime intends to have a dual classification of dams: At or above four meters in height and 20,000 cubic meters of more in volume; or less than four meters in height, but at or above 30,000 cubic meters in volume.

The assumption is that many council water storage facilities will be captured, as well as an unknown number of waste stabilisation ponds.

The association has made a submission to the document. What has been proposed looks appropriate. There are some definitional issues around “dam owner” that may require clarification, as well as the competencies being required of “recognised engineers”.

The roll out of the new regulations may also cause difficulty for dam owners in obtaining a recognised engineer to do an assessment of their dam – simply due to a shortage of appropriately qualified people.

There is a proposal for dams to obtain an annual dam compliance certificate. This seems a bit onerous and perhaps a longer period between certification is appropriate.

The Government has yet to do a detailed cost benefit analysis on the proposals, so it's likely that any final decisions are 12 months away.

**FILTEC**  
Making Water Safer

**25+**  
years in the  
water treatment  
industry.

# Visit us at the 2019 Water NZ Conference

18-20 September  
Claudelands Event Centre, Hamilton



The TrojanUVSigna™ is a revolutionary advancement in wastewater disinfection with a number of functional benefits for the operator.

Visit us at the Water NZ Conference and see the latest innovation in water technology.

Our team will be at stands **137, 138 and 139.**

09 274 4223  
info@filtec.co.nz  
www.filtec.co.nz

# KEYNOTES



**Opening guest speaker**  
**Minister for the Environment,**  
**David Parker.**

**9.10am – Wednesday 18 September**

David Parker grew up and studied in Dunedin, graduating with a BCom/LLB from the University of Otago. He had a long career in business and law before being elected to Parliament as Labour Member of Parliament in the former electorate of Otago in 2002.

In his earlier years, David was a managing and litigation partner in South Island law firm Anderson Lloyd. He was also involved in many businesses, including innovative bio-tech export start-ups A2 Corporation, BLIS Technologies, Botryzen and Pharmazen, as well as

in more traditional industries. He is an experienced CEO and company director.

David was appointed to Cabinet in 2005 and served as Minister of Energy, Climate Change, Transport, State Services, Attorney-General, and Land Information under Helen Clark's Government.

In Opposition, he served as Deputy Leader, Shadow Attorney General, and in Finance, Economic Development and various other roles. His focus has always been, and remains, on delivering prosperity and fairer economic outcomes for all New Zealanders.

David has three children and spends his time with his partner Barbara between their hometown of Dunedin and Auckland.

**Guest speaker**

**Minister for Local Government,**  
**Nanaia Mahuta.**

**1.30pm – Wednesday 18 September**

As a mother, and a constituent MP with 20 plus years' experience who has come from 'flax-root' politics, Nanaia Mahuta remains connected to the aspirations of people from all walks of life, including those who work hard for a living so that their children can do better, the elderly, trades-people, those who aspire to own their home, those who own small businesses, and those who lead a range of services and organisations including iwi entities.

During her time in Parliament, Nanaia

supported policies and initiatives that built the capacity of communities, especially social service organisations, greater investment in education, employment and training opportunities particularly for young people, supported the continuation of the Treaty Settlement process, and supported specific initiatives that lift the well-being and opportunities for young mums and those who are vulnerable, and victims of abuse.

Nanaia is a member of Waikato-Tainui, Ngati Maniapoto and Ngati Manu, and her parliamentary experience has enabled her to contribute to the collective aspirations of Maori and all New Zealanders.



**International keynote speaker**

**Dr Art Umble – The Circular Economy.**

**8.30am – Thursday 19 September**

With almost 30 years of experience, Art Umble is considered a champion on the global stage of wastewater treatment.

He is helping to change the paradigms of the wastewater industry by transitioning from disposal facilities to resource recovery and product factories.

"The future of municipal utilities requires a great degree of sustainability and resiliency," he says, and that is achievable by embracing

new ways of thinking about treatment and adopting new technology.

As the global lead for wastewater practice, Art's position involves developing strategies and providing solutions for complex wastewater treatment challenges.

His role is to connect his company's global resources in process design to promote collaboration and deliver comprehensive knowledge and expertise to his clients. He is also responsible for pushing scientific research that enables technology adoption in the worldwide marketplace.

**International keynote speaker**

**Mark Gobbie, South Australia Water.**

**9.15am – Thursday 19 September**

Mark has over 35 years' experience as a professional engineer and general manager in infrastructure delivery, with specialist expertise in water and wastewater.

In his substantive role with the corporation, Mark makes sure SA Water's services meet the needs of its more



than 1.7 million customers in the most efficient way. His teams look after asset management, bulk water and wastewater operations, capital works, laboratory services and SA Water's River Murray Operations.

Prior to joining SA Water, Mark was employed with Kellogg, Brown and Root (KBR), including a role as its vice president Water in the Company's Infrastructure Business Unit.

Mark has also been involved in major projects and operated businesses in the water, transport, minerals, oil and gas, environment and buildings areas throughout Australia, SE Asia, Middle East, UK and USA.

**International keynote speaker**

**Tony Wong, CRC for Water Sensitive Cities**

**9.00am – Friday 20 September**

Professor Tony Wong is chief executive of the Cooperative Research Centre for Water Sensitive Cities in Australia, with research hubs in Brisbane, Melbourne, Perth and Singapore.

He pioneered the water sensitive cities approach for concurrently addressing the social, environmental and economic challenges of urban water management. He has led many award-winning projects based around the adaptation of nature-based

solutions for urban water management.

Tony has advanced new understandings of the relationship between the societal and biophysical dimensions of water security and city waterscapes – enabling solutions to be underpinned by creative design through blending bio-mimicry with engineering and architectural knowledge and practices for delivering sustainable urban water outcomes.

In 2010 he received the prestigious Sir John Holland Award as Australia's Civil Engineer of the Year, cited as having defined; "a new paradigm for design of urban environments that blends creativity with technical and

scientific rigour".

A sequence of his achievements in Australia over the past 30 years in research and development, technology, urban design and policy has diffused globally, and increasingly amongst developing nations.

He was elected to the Australian Academy of Technological Sciences and Engineering in 2014, and in 2018, he won the IWA World Water Award.



## ecoflow

### SEWERS MADE SIMPLE



Do you want to...

1. Smooth out peak flows?
2. Better manage storm events?
3. Monitor and eliminate infiltration?

Then come and talk to us about **OneBox**

www.ecoflow.co.nz • info@ecoflow.co.nz  
Auckland 09 447 1793 • Christchurch 03 349 2506



## Ken Mains join's Beca water team

Ken Mains joined Beca back in June as senior principal, based out of its Auckland office.

Ken has practised in the field of drinking water treatment and water supply for over 35 years, leading design teams on the process selection and detailing of plants large and small.

"Ken brings an outstanding international reputation and wealth of knowledge, passion and experience to the role – enhancing an already strong drinking water team," says Garry Macdonald, Beca Water Market Segment director.

"Most previously with CH2M/Jacobs in North America, Ken's ability to find innovative

solutions for projects is well-recognised by industry peers and he is a real leader in his field.

"Throughout his career, he has built up considerable expertise in addressing specific public health challenges and solutions to particulates, trihalomethanes (THMs), and distribution system water quality problems, from a wide range of source waters.

"Ken is also responsible for the design of the world's largest completed Ultrafiltration (UF) membrane design at the Lakeview Water Treatment plant in Ontario, Canada, and the North Bay and Minneapolis membrane facility projects."



Ken Mains



Michael Apeldoorn

## New AWMA office

AWMA Water Control Solutions says the demand for its specialised water control infrastructure in this marketplace over the past five years, has prompted it to set up AWMA New Zealand under Michael Apeldoorn as Regional Manager, based in Christchurch.

## Sri Lanka beckons

The IWA Water and Development Congress & Exhibition is being held in Colombo, the capital of Sri Lanka, December 1-5.

This conference attracts international experts from the water sector providing three water solutions for emerging economies.

More information: [www.waterdevelopmentcongress.org](http://www.waterdevelopmentcongress.org).

## Waikato Watercare deal finally signed

The partnership between the Waikato District Council and Watercare over the Waikato region's three waters was finally signed last month (16 August) and comes into effect in October.

"The journey to get here has been long, but through every bend in the road the focus has been on delivering the best outcome for our communities," says Waikato District Council chief executive Gavin Ion.

Council has been looking for a more efficient and cost effective way to provide water supply, wastewater and stormwater services since 2012. This has included the option of a proposed Council-Controlled Organisation with Waipa District Council and Hamilton City Council. This proposal was ultimately not progressed and Waikato District Council then consulted with the community as part of its 2018-28 Long Term Plan.

Some 86 percent of the community told the council it wanted a change to the status quo, says Ion.

"That direction has today become a reality. Council has been able to establish an independent Waters Governance Board that will oversee the long-term relationship between Council and Watercare going forward.

"The waters assets will remain in the ownership of Council. The contract will over time deliver a better service for our people."

Waters is big business for the council. The first five years of the contract is estimated to cost \$213 million.

"As indicated in the Long Term Plan, this contract is expected to save us \$28 million over the first 10 years," says Ion.

Waters Governance Board chair Rukumoana Schaafhausen says this contract is also a step in the right direction for the country.

"The way local councils deal with their water business will need to change in the future."



**Claudlands, Hamilton**  
**Water New Zealand Pre-Conference Workshop**  
**Tuesday 17 September, 10am – 4pm**

## Water Sector Regulation – What You Need To Know

### New Water Sector Regulator

What will it do, what are the timeframes, what does it mean for water suppliers?

*Presentation by Department of Internal Affairs*

### Wastewater regulation

What would it regulate and how? What decisions have been made and when can we expect to find out more?

*Presentation by Department of Internal Affairs*

### What to expect from regulation

What has the regulation journey been like for Australia, both from an industry and a personal perspective? Hear what happened when the New Zealand electricity industry went through regulatory change? What can be learnt from that experience?

*Australia: Stuart Wilson, WSAA & Nicole Davis, Mackay Regional Council*

*NZ Electricity Sector: Michelle Allfrey, WEL Networks*

**Panel discussion** – the above speakers discuss the ideas presented and open up to questions from the floor.

### Changes to the Health Act and Standards

Changes to the Drinking Water Standards were introduced earlier this year and drinking water amendments to the Health Act are imminent. What are those changes and what do they mean for water suppliers?

*Presentation by Ministry of Health*

### Total coliforms

Total coliforms have been used as indicators of water quality for more than a century and remain a regulated parameter in many countries around the world.

New Zealand has recently reintroduced a requirement to test for total coliforms as part of DWSNZ. Why should water suppliers test for total coliforms, what do they tell us and how should we use the information?

*Prof. Colin Fricker, CRF Consulting-United Kingdom & Iain Rabbits, Lutra*

### Have we got water safety planning right?

Are there better ways to develop and implement WSPS? Dan Deere will showcase some alternative approaches.

The 10 components of the new MOH WSP framework reflect the 12 elements in the Australian Drinking Water Guidelines. How could the components work in practice? Carly Price looks at good (and bad) examples of what is done by water suppliers in regional Australia.

*Dr Dan Deere, Water Futures Pty-Australia & Carly Price, The Questioning Engineer*

**For more information and to register go to:**  
**[www.waternzconference.org.nz](http://www.waternzconference.org.nz)**

*Front photograph: The Washover gravel infiltration gallery, at Rastus Burn is the water supply intake for the Remarkables Ski Area, Queenstown.*

*Photographer: Ken Gousmett, Construction Management Services, Queenstown*

# Watercare project accolades

Watercare wastewater projects have won three major awards already this year.

**A** Pump Station project in Wynyard Quarter, Downtown Auckland and a Wastewater Outfall Pipe project at Army Bay Wastewater Treatment Plant, Whangaparaoa were recognised at the Civil Contractors New Zealand/Hirepool Construction Excellence Awards last month.

The \$144 million upgrade at Mangere Wastewater Treatment Plant (Mangere WWTP) also won the Gold Award at the 54<sup>th</sup> ACENZ Innovate Awards, also held last month.

And the Wynyard Quarter Pump Station project was recognised in the Hirepool/CCNZ awards 'projects under \$5 million category.' The project includes a 10.5-metre tall pump station aboveground and a giant 14-metre deep circular tank beneath it. The pump station has been architecturally designed to reflect the silos commonly seen in the area. While the building has an operational area that's restricted to the public, visitors can take the stairs up to the roof and enjoy stunning views of the harbour and downtown Auckland. The ground floor features a new public toilet.

This new pump station and underground tanks can store 400,000 litres of wastewater, reducing the incident of wet-weather overflows during heavy

rain, when large amounts of stormwater suddenly enters the system.

Contractor Fulton Hogan was commended for "delivering an innovative and technically challenging project involving several main stakeholders."

The Army Bay Wastewater Outfall Pipe was recognised in the 'projects between \$20-\$100 million category.'

Watercare projects manager John McCann stated that the judges were very impressed with the innovation of using Direct Pipe method for a trenchless installation and commended the way the risks were managed.

The project obtained international fame for using the state-of-the-art Herrenknecht Direct Pipe TBM and set world-records for the longest drive using this machine.

Also technically challenging, was floating a section of the pipe from Kaiaua, 40 nautical miles, to the transitional point and installing it in a controlled sink in the Tiri Channel.

McCann also says he was impressed with the collaborative approach practised by the project team especially the workshops at critical stages of the project which helped to refine the construction methodology and led to improved project outcomes.

It was also recognised for being completed on time and within budget. The upgraded wastewater treatment plant operates more efficiently and will support projected population growth in the wider region.

The Mangere WWTP upgrades included the opening of a new Biological Nutrient Removal facility. Earthworks began in late 2013 and at its height, up to 250 contractors a day were on site. CH2M Beca was engaged for the life of this complex multi-disciplinary project from concept through to construction management and commissioning.

The new facility includes two new four-stage treatment reactors, two new 52-metre diameter clarifiers and associated pump stations, pipes and blower facilities.

The project was designed to address current and future population growth and was the largest single-site capital works delivery of wastewater infrastructure in New Zealand since Project Manukau was completed in 2000.

An international team was engaged from June 2013 to September 2014 and delivered more than 40,000 hours of design and procurement work in four countries. The construction phase, from October 2013 to October 2017, involved over 2500 staff and more than a million hours on site. The commissioning phase was completed in March 2018 after six months of testing.

To accommodate the upgrade of the plant, land to the south of Island Road was redeveloped, a two-kilometre section of Watercare Coastal Walkway was relocated as part of the Te Araroa Trail, and a new 530-metre road was built to replace the eastern section of Island Road.

This new road provides access to the public areas of Puketutu Island, public walkways and the coastal walkway.

## Three waters regulatory reforms roadshow

The setting up of a new drinking water regulator will see a major shift in the way drinking water is delivered, while the Government is also signalling long term changes in the operation of our waste and stormwater systems.

This is the biggest reform programme in many years and every

one of us in the water sector will feel the impact of these changes. That's why it's important we all understand the changes and how they will affect us.

Water New Zealand plans to visit a number places in the country, in November, to talk about the reforms and their implications.

Look out for the programme on our website and in our regular Pipeline e-newsletters.

Don't miss out on your chance to come to the Water New Zealand Regulation Roadshow when it's near you. [www.waternz.org.nz](http://www.waternz.org.nz)

**EST. 1909**  
**C&S BRAND**  
**JAMES CUMMING & SONS Pty Ltd**

**C&S Brand Australian Filter Coal**  
The superior alternative to Anthracite Coal for over 30 years.

**C&S Brand Granular and Powdered Coal Based Activated Carbon**  
Our products are manufactured in our Sydney plant from high quality Australian Coal and are delivered on time, in robust packaging, to specification.

**Contact our experienced staff for more information.**  
ph: +61 2 9748 2309  
e: [Info@jamescumming.com.au](mailto:Info@jamescumming.com.au)  
[www.jamescumming.com.au](http://www.jamescumming.com.au)  
319 Parramatta Road, Auburn NSW 2144 Australia



## IO-Link Sensors

ifm have the most comprehensive range of industrial digital sensors and IO-Link connection technology, available today, ex-stock NZ!

ifm technology is used globally in the most advanced Water & WWT Plants. German quality - supported by local engineers. Interested to know more? Give us a call.

Order 24/7

**ifm - close to you!**  
[www.ifm.com/nz](http://www.ifm.com/nz) • Ph: 0800 289 436

# Te Wiki o Te Reo Maori 2019

By Troy Brockbank from WSP Opus and Richie Waiwai from Watercare.

Waiora Aotearoa (Water New Zealand) is proud to once again tautoko (support) Te Wiki o te Reo Maori (Maori Language Week) celebrated this year during the week 9-15 Mahuru (September).

This year's theme is Kia Kaha te Reo Maori. 'Kia Kaha' is well known and used in New Zealand in its correct meaning of 'be strong'. We often talk about languages as if they are people – talking about language health, strength and revitalisation. When we say 'Kia

*‘Ko taku reo taku ohooho, ko taku reo taku mapihi mauria’ – my language is my awakening, my language is the window to my soul.*  
This whakatauki (proverb) is closely associated with language revitalisation, a struggle which is very important in maintaining culture.

*Kaha te Reo Maori* we're saying 'Let's make the Maori language strong'.  
As Te Taura Whiri i Te Reo Maori (the Maori Language Commission) says; 'Strength for an endangered language comes from its status, people being aware of how to support revitalisation, people acquiring and using it and from the language having the right words and terms to be used well for any purpose.'

To help celebrate Te Wiki o Te Reo Maori 2019, Waiora Aotearoa has produced a bilingual poster to highlight the hydrological water cycle (Te Hurihanga Wai) see opposite page.

**He wero – have some fun with these challenges**

- Add some Te Reo Maori into your everyday work ...
- Greet each other with Kia ora (hi/hello), or Mauri ora (cheers, good health).
- Have a conversation about what you think when you hear the kupu (word) "wai" (water).

- Go to [waternz.org.nz](http://waternz.org.nz) to download the bilingual wai poster and pin it up in your office or by your desk.
  - Try to use the Maori terms on the poster in place of English ones.
- Te Wiki o Te Reo Maori is not just for Maori or te reo Maori speakers. It is an official language for all of us. But, more importantly it is to encourage non-speakers to take part, and give it a go 'Kia Kaha ake' - stay strong for ever.
- We can all help with the Kia Kaha te Reo Maori theme by celebrating Te Wiki o Te Reo Maori and strengthening our understanding of 'wai' in Aotearoa.
- Ko te wai te ora o nga mea katoa – Water is the life giver of all things*

**‘Tiakina to tatou taonga, Tiakina to tatou wai’ – protect our treasured waters.**  
Wai (water) is an integral part of Maori well-being and identity. Many of our waterways within Aotearoa are still known by their original Maori names. The significance and intergenerational relationship between Maori and cultural landscapes within a catchment can be reflected in the place names assigned. These place names carry their own whakapapa (genealogical links) and may describe the source of the waterway, its character, or discrete features within the takiwa (catchment).



**GLACIER FILTRATION**

New Zealand's largest range of Pressure Filter Vessels. Constructed from the high grade non-corrosive materials our Vessels are available in Polyamide, FRP, GRP and Steel.

- Suitable for Ion Exchange Resins, Activated Carbon and Filter Medias
- Suitable for High Temperature & Chemical Resistance
- Range of Operating Bed depths Available
- Optional Sight Glass, Dome Access Ports & Lateral Manways
- Operating Pressures up to 10Bar
- UV Resistant
- Specialising in Industrial and Municipal Applications



Te Hurihanga Wai - Water Cycle

**Te Wiki o te reo Māori**  
**Māori Language Week**  
**9 – 15 o Mahuru (September) 2019**





# Our three waters and a compelling case for change

Murray Sherwin, chair, New Zealand Productivity Commission.

The provision of safe drinking water and cleanly disposing of wastewater and stormwater are key responsibilities of local government. Collectively, the three waters account for a significant proportion of council expenditure.

However, the performance of the three waters sector is not meeting public expectations for either human health or environmental outcomes. In many places, minimum standards are not being met.

The Havelock North Drinking Water Inquiry drew national attention to the provision of three waters. But the problem is more widespread than the occasional high-profile incident. The Havelock North Inquiry found that each year, up to 100,000 people become ill from consuming unsafe drinking water. This imposes costs on individuals, as well as the health system and the wider economy, through lost productivity.

Wastewater systems are also performing poorly. Some wastewater plants are degrading freshwater and coastal water quality, and sewage outflows are occurring at a frequency no longer acceptable to communities. Too many wastewater plants are non-compliant with consent conditions – some have been operating on expired consents for several years.

The Government is considering extensive reforms to the regulatory standards and regulatory regime for the three waters sector. Better enforcement of health and environmental standards, and raising those standards, is expected to create additional funding and financing pressure on local government. Some small communities could face very large increases in costs that they will struggle to meet from their existing ratepayer base.

Simply providing more funding is not a sustainable solution. Collectively, local governments need to both lift their performance, and improve their productivity. They need to be making better investment decisions, so that the future costs to communities are minimised.

The three waters sector has therefore been an important focus of the Productivity Commission's inquiry into local government funding and financing.

Our draft report, released on July 4, devotes a chapter to exploring the reasons behind the persistent poor performance. It explores solutions to sustainably lift performance in both health and environmental outcomes. Importantly, it also considers ways to improve councils' governance and decision-making, so that they make better use of existing funding tools and smarter asset management choices.

We found many international examples where three waters services are delivered well. Here in New Zealand, some councils have taken the tough decisions needed to lift their performance, including Auckland's Watercare, Tauranga City Council, Kapiti Coast District Council, and the five councils involved in Wellington Water.

However, the necessary changes are not occurring across the sector.

Most councils continue to retain direct control over their water services, but many also lack the necessary in-house capacity and capability to govern these services effectively.

Efforts to achieve the benefits of scale – such as better use of scarce skills and resources – are being hampered by reluctance to enter into joint venture arrangements with other councils.

And despite the demonstrated benefits of user charging – including reduced demand and deferred asset renewals – volumetric metering and charging is not widespread.

At the heart of the problem is our current regulatory regime. Effective regulation is essential in a situation of local natural monopoly such as reticulated water supply, because the lack of consumer choice reduces the performance incentives on suppliers.

But, the current arrangements impose weak disciplines and incentives on council-led water suppliers to meet minimum health and environmental standards. Supplier costs are not externally regulated.

And to date, there have been no prosecutions for breaches of drinking water standards.

The Commission therefore sees a compelling case for fundamental reform of the three waters sector.

The performance of the three waters sector would be substantially improved through a new approach that both rigorously enforces minimum health and environmental performance standards – and is permissive about how councils meet these standards.

Lifting the performance of the under-performing suppliers requires fit-for-purpose investments, strong incentives and a realistic path to lifting performance over time. It is therefore critical that a regulator has the demonstrated expertise in financial and investment matters.

The Commission's preliminary view is that the new regulatory regime would be administered by an existing, credible and independent regulator such as the Commerce Commission, which already regulates similar activities and has a credible "industry watchdog" reputation.

Alternatively, the Government could establish a Water Commissioner as an adjunct to the Commerce Commission, similar to the Telecommunications Commissioner.

The regime would be permissive and flexible, but a backstop arrangement would be applied to councils that fail by a specified time period to lift their performance sufficiently to meet minimum health and environmental standards.

The backstop would take the form of compulsorily merging water businesses, placing them in Council Controlled Organisation structures and requiring them to move to being fully funded directly from water consumers rather than through council rates.

While significant cost efficiencies should be possible for most council-led water services, some small communities will need financial assistance from government to help them make the transition to achieving minimum performance standards.

Financial support from central government should be restricted to situations where councils have taken measures to sustainably lift their performance and productivity, but these efficiencies cannot offset the higher costs of meeting more stringent minimum standards.

## Waste and stormwater reforms

Following drinking water reform proposals, the Government is also developing a National Environmental Standard (NES) for the treatment of wastewater discharges and the management of wastewater overflows under the RMA.

A technical advisory group (or groups) is expected to be convened to provide advice on the development of this NES.

Plans are to bring in new obligations on wastewater and stormwater network operators to manage risks to people, property, and local environment associated with the operation of their infrastructure networks – and develop national guidance to improve the regulation and design of stormwater services under the new proposed regulator.

The Government says there is a lack of transparency and public reporting on environmental performance and compliance of wastewater and stormwater networks (including their contribution to environmental and public health outcomes) and it plans regulatory requirements for wastewater and stormwater network operators to report annually on a set of nationally-prescribed environmental performance metrics.

The new regulator will specify national environmental performance metrics for wastewater and stormwater networks, and develop suitable methods for collecting, validating, analysing and publishing this information.

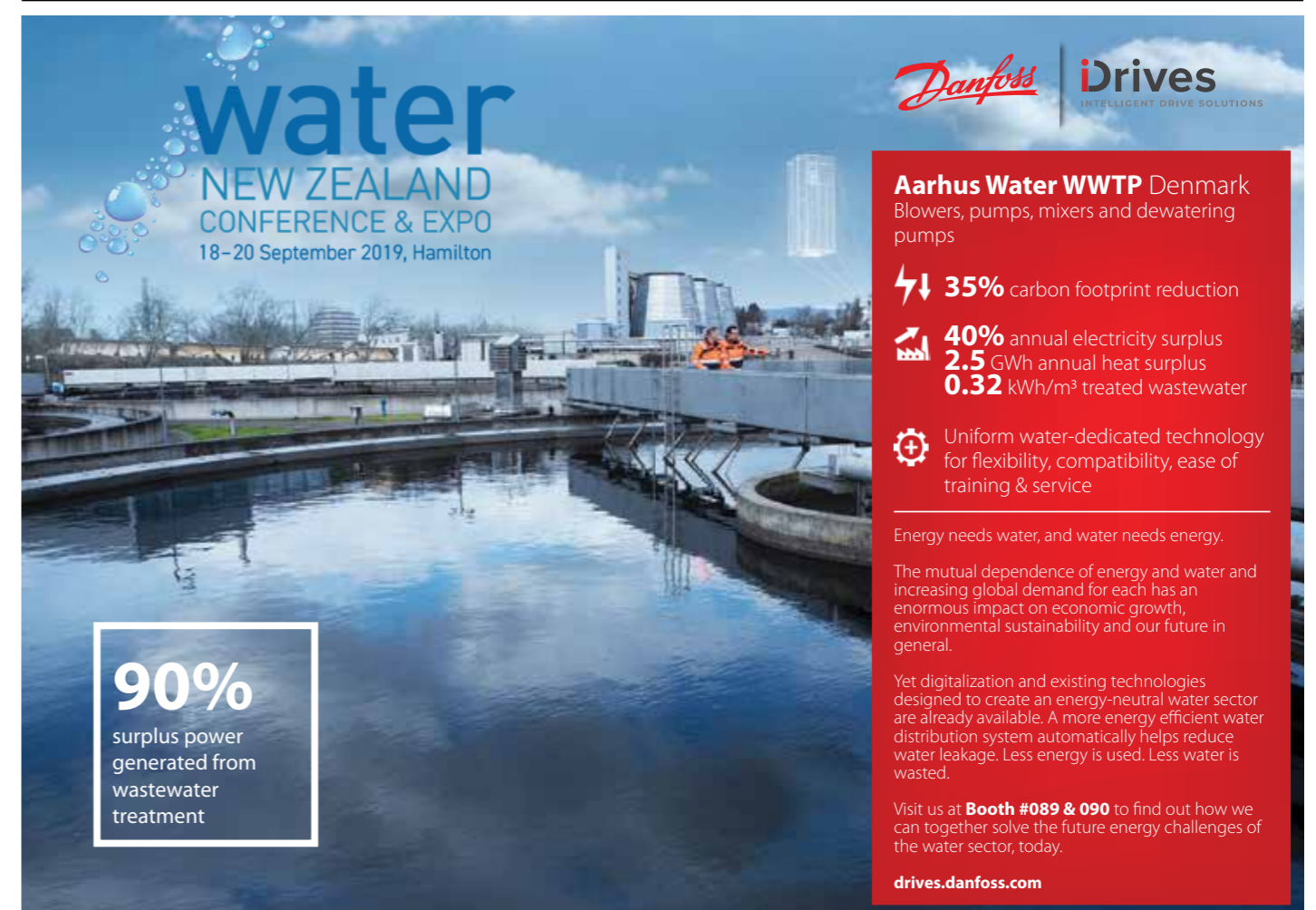
## Improving national-level leadership

The Government says regional councils and service providers require more clarity about what is expected of them, and more support from a central regulatory agency to help them meet these expectations.

To this end it will direct a central regulator to set up and publish guidance information for local authorities regarding the compliance, monitoring and enforcement approaches to be used for wastewater and stormwater network operators.

The central regulator will also identify and monitor emerging contaminants in drinking water, wastewater and stormwater, and coordinate national-level policy responses, both regulatory and non-regulatory.

The regulator will also identify and promote national 'good practices' for wastewater and stormwater network design and management, including the development and dissemination of national guidelines.



**water**  
NEW ZEALAND  
CONFERENCE & EXPO  
18-20 September 2019, Hamilton

**Danfoss** | **iDrives**  
INTELLIGENT DRIVE SOLUTIONS

**Aarhus Water WWTP Denmark**  
Blowers, pumps, mixers and dewatering pumps

- 35%** carbon footprint reduction
- 40%** annual electricity surplus
- 2.5 GWh** annual heat surplus
- 0.32 kWh/m<sup>3</sup>** treated wastewater
- Uniform water-dedicated technology for flexibility, compatibility, ease of training & service

Energy needs water, and water needs energy.

The mutual dependence of energy and water and increasing global demand for each has an enormous impact on economic growth, environmental sustainability and our future in general.

Yet digitalization and existing technologies designed to create an energy-neutral water sector are already available. A more energy efficient water distribution system automatically helps reduce water leakage. Less energy is used. Less water is wasted.

Visit us at **Booth #089 & 090** to find out how we can together solve the future energy challenges of the water sector, today.

**drives.danfoss.com**

**90%**  
surplus power generated from wastewater treatment

## Garry Macdonald named Water Environment Federation Fellow

Garry Macdonald, Beca Water Market Segment director, has been named a WEF Fellow by the Water Environment Federation (WEF).

Founded in 2011, the WEF Fellows Recognition Program celebrates the professional accomplishments, contributions and impact of individuals in the global water environment.

WEF Fellows are recognised in a variety of disciplines and areas of expertise including, but not limited to; design, education, operations, regulation, research, utility management and leadership.

"Garry Macdonald, through his many contributions to the field of civil and environmental engineering is, in my assessment, especially well qualified to receive this recognition," says C. Dale Jacobson, past president, Water Environment Federation.

"I consider Garry to be an outstanding and true citizen of the Water Environment Federation and a distinguished member of the global professional environmental engineering community.

"He has served WEF in multiple capacities and served as a skilled ambassador and an expert diplomat to various international professional water organisations."

Fifteen WEF Fellows and one Honorary



Garry Macdonald

WEF Fellow were named worldwide in 2019, the first time any WEF Fellows have been named in Australasia. This is also only the second year any WEF Fellows have been named outside North and South America, in the nine years the programme has been active.

For many years, Garry has represented Water New Zealand as its Delegate to the WEF governing body, the House of

Delegates, and also spent four years as one of the 11-member Board of Trustees. Garry is also actively involved in the Program Steering Committee, which sets the technical programme of presentations for the annual WEFTEC Conference, with him leading the "Future and Global Issues" symposium.

In addition to his role at Beca, and on top of over 40 years' experience in wastewater and environmental engineering, Garry has a strong interest in giving back to his profession and to society at large. He has been or still is active at governance level in several community organisations and professional bodies, including Oxfam New Zealand, Water New Zealand, and Engineering New Zealand.

Established in 1928, WEF is a not-for-profit technical and educational organisation of 35,000 individual members and 75 affiliated Member Associations, representing water quality professionals around the world.

WEF's diverse membership includes scientists, engineers, regulators, academics, utility managers, plant operators, and other professionals.

WEF uses this collective knowledge to further a shared goal of improving water quality around the world, protecting public health and the environment.

## Does this sound familiar?

Back in June a large waterborne **Campylobacter** outbreak occurred on the island of Askøy in Norway, causing around 2000 cases of gastrointestinal illness and with over 70 people admitted to hospital.

The deaths of a one-year-old child and a 72-year-old woman are being investigated by Norwegian authorities for links to the water contamination. The elderly patient was already seriously

ill, and campylobacter was found in the boy admitted to hospital with a bowel infection.

The outbreak was attributed to animal faecal waste leaking into an underground treated water storage tank that fed into a distribution system serving up to 15,000 people in the southern half of the island. The population numbers over 27,000 and the island is connected to Bergen by the one kilometre-long bridge.

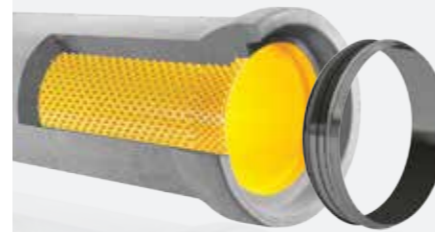
The bacterial pathogen *Campylobacter* was

identified as the causative organism found in the gastrointestinal tracts of hospitalised patients and isolated from several places throughout the local water network.

Reports noted the outbreak "has again highlighted the vulnerability of many Norwegian water supplies to microbial contamination, despite significant improvements in regulation and management over the past 30 years".

PERFECT

PINNACLE



- High calibre lining system – completely leakproof.
- Universal connector system – one system for all geometries.
- Service life – more than 100 years thanks to corrosion resistant HDPE liner.
- Perfect connector allows a plug-in connection – no onsite welding of joints required.
- Available in diameters DN700 – 1200 and lengths of up to 3 metres.

- Superior ring configuration for watertight rubber ring joints.
- Smoother internal bore for increased flows.
- New high-quality moulds ensures greater accuracy for dimensions.
- Available in diameters DN675 – 3000 and lengths of up to 3 metres.

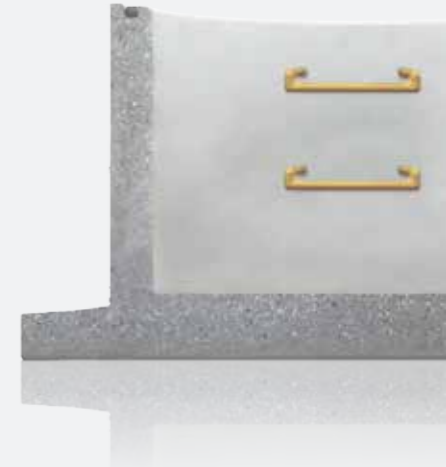


## Pipes



- Pre-benched with superior concrete.
- Better flow characteristics with machine made benching.
- Pre-configured pipe connections.
- Built to custom requirements ensuring faster installation times.
- Available in diameters DN1050 – 1200 and height of up to 2.4 metres.

- Monolithic casting of flange bases.
- New moulds to ensure exceptional finish and consistency.
- New steps engineered for easy fit and safety.
- New universal joint profile applicable with standard mastic and new rubber rings.
- Available in diameters DN1050 – 3000 and heights of up to 2.4 metres.



## Manholes

NEW RANGE  
COMING SOON

0800 93 7473  
hynds.co.nz

HYNDS  
PIPE SYSTEMS

## Employment education and training shakeup

After five months of industry consolidation, the Government is pushing ahead with its big shakeup of work education and training it says will “create a unified vocational education system”.

Around 2904 industry submissions were made after the Government’s Reform of Vocational Education programme was proposed back in February.

Last month (August) the Government released the first of its reforms under its Education Work Programme that will change vocational education and training for the first time in over two decades.

Among seven key moves in the Reform of Vocational Education is the formation of a new mega polytech called the New Zealand Institute of Skills & Technology that will bring together the 16 institutes of technology and polytechnics (ITPs) as a single national campus network.

This new Institute will start on April 1 next year to oversee on-the-job and off-the-job learning, with its charter set out in law.

About four to seven industry-governed Workforce Development Councils will be created by 2022 to replace and expand most of the existing roles of industry training

organisations, and represent regional interests. They will work across education, immigration and welfare systems in each region to identify local skill needs and make sure the system is delivering the right mix of education and training.

Centres of Vocational Excellence (CoVEs) will be set up at regional campuses tasked with bringing together the Institute, other providers, workforce development councils, industry specialists and researchers to provide vocational education and share curriculum and programme design across the system.

## Funding

A ‘unified’ funding system will apply to all provider-based and work-integrated education at certificate and diploma qualification levels 3 to 7 (excluding degree study) and all industry training.

No decisions have been made on exactly how the system will be funded, and the Government concedes that, while it will work closely with stakeholders as its departments design and implement these reforms, a transformation of this size will take a number of years to complete.

Implementation of the changes would not be rushed, it says. And to ensure continuity for learners and employers and to allow time to build new capacity, the transition will take three to four years to get fully underway.

## Skill shortages addressed

The Government says its proposed changes will tackle long-term challenges of skills shortages and the mismatch between training and the needs of employers.

“Industry and employers will identify skills needs, set standards and approve qualifications and credentials, and influence funding decisions.”

Reforms will also ensure trades and vocational education are recognised and valued.

“We want to see more workplace learning, more apprentices and more opportunities for people to earn while they learn,” says Minister of Education Chris Hipkins.

“Vocational education, trades training and on-the-job training have been allowed to drift for too long. These are long-term challenges that this Government is committed to fixing.

“The comprehensive changes we are making will address the widespread skills shortages across most industry sectors. These shortages highlight the limitations of the current vocational educational system.”

National’s Tertiary Education spokesman Dr Shane Reti disagrees and says the proposed changes are a step backwards that will result in job losses and blow-out in costs to double the \$200 million the Government has set aside for implementing the reforms.

The Government has blatantly ignored the concerns of industry and businesses who raised serious issues with polytechnic training, he claims.

“Employers are telling us they will cease to employ apprentices next year if apprentices go back to polytechnics.

“This is a big step backwards especially when our construction sector is crying out for apprentices.”

## What do these changes mean for us?

While the staff of industry training organisations or institutes of technology or polytechnics in the short-term will continue as normal, it’s reasonably clear that ITOs have a short shelf life.

While the transition to the new system will be phased, the water

industry will lose its ITO – Connexis – into one of the new workforce development councils.

It remains to be seen what the uncertainty created by the reforms mean for the delivery of existing programmes, but in theory they should continue.

Future and current students, apprentices and trainees – the Government is encouraging

potential trainees to keep enrolling to study towards qualifications. What the government doesn’t want is the system to grind to a halt.

Employers – the Government is keen for employers to keep hiring apprentices and encouraging people to enrol in training courses.

## Existing training employment and businesses

The Government says that when the Institute comes into being in April next year existing employment agreements will transfer over to a subsidiary operation of its new Institute.

“As with institutes of technology and polytechnics, one of the strengths of the current vocational education and training system is the quality and dedication of the staff of industry training organisations,” it says.

“We acknowledge that change is stressful and that the vocational education reforms will impact on many people working within the sector. The new system of vocational education will be introduced in a managed way.

“Under the changes, ITOs’ current role of supporting workplace learning and assessment for on-the-job vocational education will be transferred to vocational education providers.

“Providers will become responsible for arranging and supporting all vocational education and training, whether it takes place off-the-job or on-the-job. Workforce development councils will become responsible for moderating assessments.

“Transfer of on-the-job training to providers will be carefully managed and will occur progressively from 2020 as confidence is gained that sufficient capability is in place in providers to ensure successful transfer of on-the-job training.

“The use of mechanisms such as creating holding organisations from existing ITOs will be considered to continue current on-the-job training arrangements, with the goal of moving all training to providers by 2022.

“This would give employers who are satisfied with their current support the assurance that the transition will be carefully managed over a three-year period to minimise any disruption to services.

“It would also provide a more structured transition, easing pressure on both ITOs and the new Institute, and would reassure the Government that providers are migrating towards the sort of organisation that can appropriately manage both off-the-job and on-the-job learning, before confirming the final transition.

“A key purpose of holding organisations would be to protect the interests of employers during the transition period. This allows industry bodies to reform to ensure continuity of services.

“They would enable a phased and well-managed transition of ITO functions to workforce development councils and providers. Holding organisations, which would have statutory recognition, would be able to continue to use existing ITO branding.”

## The water sector

The water industry’s problem is that while we have five water industry qualifications, not all of these are currently being delivered.

Work is underway to remedy that situation but the current changes to vocational education make that more difficult.

The Government announced the setup of a water industry regulator the day prior to announcing the above reforms.

One of the functions of the new regulator will be to ensure the industry has sufficient capability to fulfil its responsibilities.

It is possible the regulator will assist in funding the development and review of training material but there is considerable work to do before the regulator is in a position to do this. Of course, this would fit well with their new core role of demonstrating industry leadership.

So, there is to be substantive change in the education and training space over the next few years, driven both by the new regulator and changes to the vocational training system itself. Water New Zealand is currently reviewing the resources required to deliver our education and training programme with the likelihood that greater resourcing will be required.



### WASTEWATER TREATMENT

- Significantly reduce desludging costs
- Improve nitrogen removal processes
- Prevent odour & lagoon turnover
- Quality lagoon sludge surveys
- And more

### STORMWATER POND MANAGEMENT

- Algae control
- Aquatic Weed Control
- Quality sediment surveys
- Water clarity & odour control

Contact us today 06 843 2913 | [info@parklink.co.nz](mailto:info@parklink.co.nz) | [www.parklink.co.nz](http://www.parklink.co.nz)

# BACKFLOW GROUP CONFERENCE 2019

The Water New Zealand Backflow Group held its biennial conference in Christchurch in August. The event was well attended with around 55 delegates from water utilities, product suppliers, backflow practitioners, central government, training providers, and technology providers.

The programme opened with an overview of upcoming changes facing the three water sector by keynote Kelvin Hill, President of Water New Zealand. Richard Aitken gave his outgoing address as Chair of the Backflow Group and in particular thanked the standing committee for its voluntary efforts over the past two years.

Presentation topics ranged through protection of potable water supplies, fire protection, irrigation and chemigation challenges, joint standards development and review, and the role and responsibilities of Independent Qualified Practitioners (IQPs) in the backflow space.

A very informative session was held on the Building Act and central government's ongoing programme reviewing aspects of the Building Code.

Training for backflow specialists was a key topic, and a practical

demonstration of testing backflow devices kept delegates alert outside in the brisk Christchurch temperatures.

Sponsors and exhibitors informed delegates of their products and services, including a new Backflow App, backflow ID tagging devices, and backflow prevention valve testing instruments.

A special thanks goes out to all the companies who sponsored and made the event possible.

As always, the networking and dinner opportunities enlivened the event, with the special *Golden Check* award being presented to Jon Lewis for his ongoing commitment to the backflow industry.

A special spot prize of a drone, donated by Hydroflow, was won by Erica from the top of the south.

Incoming Chair, Jim McGibbon of Watercare, provided a hilarious closing to the conference comparing Neanderthals with Homo Sapiens, with an underlying message that communication and cooperation are the keys to making progress.

To that end, if you wish to find out more or join the Backflow Group networking list, visit [www.waternz.org.nz/backflow](http://www.waternz.org.nz/backflow)



1. The special *Golden Check* award being presented to Jon Lewis for his ongoing commitment to the backflow industry. 2. Stephen Campbell, MC. 3. The event was well attended with around 55 delegates from water utilities, product suppliers, backflow practitioners, central government, training providers, and technology providers. 4. The programme opened with an overview of upcoming changes facing the three water sector by keynote Kelvin Hill, President of Water New Zealand. 5, 6, 7 & 8. Sponsors and exhibitors Hydroflow, Water Supply Products, the BackFlow App and Deeco Services. 9. A special spot prize of a drone, donated by Hydroflow, was won by Erica from the top of the south.



# Farewell to Mike Petricevich

Dedicated water engineer, keen sailor, and good friend to many,  
Mike Petricevich has passed away.

Mike began his studies at Ardmore Engineering School in the 1950s, and while working towards his degree he developed a passion for fluid mechanics – or as he was known to say, he “attempted to conquer fluid mechanics”.

It seems Mike was quite the character during his student days. In a tribute, Ray Ryan, on behalf of the graduating class of 1957, writes of Mike’s propensity to be involved in the many pranks his class of “intelligent, free-thinking” students was wont to pull.

“One of the most audacious pranks of all was the attempted kidnapping of the Governor General Viscount Cobham, who had been invited to unveil a plaque at the [neighbouring] training college.”

Ray described how the engineers had sent an invitation to the Governor General to unveil a hurriedly-concocted plaque at the engineering school. They planned to invite

him to ride in Mike’s opened-topped 1932 Austin 7, unveil the plaque, and then take him onto the training college.

Although amused by the stunt, the Governor General chose to remain in his limousine. However, he did agree to divert from his planned route and consequently entered the training college from the opposite direction to that planned. In his place, a suitably-dress pseudo-Governor General, perched up in the back of Mike’s car, preceded the formal procession into the college, much to the consternation of the college’s administration.

The close bonds Mike formed with his classmates during his student years, living together in the cramped quarters of the barracks, resulted in life-long friendships and a number of class reunions in the past couple of decades.

Student hijinks aside, Ray described Mike as a conscientious studier and worker who held forthright views on any subject he felt confident with.

Mike’s career shows a significant contribution to society through his engineering work, as well as hours and hours of time and energy given to the water industry.

“I plunged right into the deep end, and eventually spent almost my entire work life very close to water, both clean and dirty,” he wrote in a brief autobiography in 2000. “It was first the Auckland City Council and the Metropolitan Drainage Board.”

After graduating, Mike worked briefly with the Whangarei City Council before moving to the Manawatu Catchment Board. There he did river training and control work, along with land drainage improvements for the low-lying coastal areas of Manawatu and Horowhenua.

At that time, the recently enacted Water and Soil Conservation Act had him involved in the preliminary investigation into the water resources of the district’s catchment.

His next stop was with the Palmerston North City Council, where he switched from clean water to dirty. The council’s new sewage treatment plant had a few kinks during commissioning that needed ironing out. At the same time, excessive flows from the sewage system were overloading the plant beyond its design capabilities and Mike was involved in devising methods to control them.

His next career move saw him, along with his wife

Mike’s career shows a significant contribution to society through his engineering work, as well as hours and hours of time and energy given to the water industry.

Colleen and five young children (“Our final count was seven children (one male), but no engineers”), move back to Auckland and a role in drainage works with Worley Consultants. Major projects at this time included the Whanganui sewage scheme final design and contracts preparation; concept and design of sewage and waste treatment proposals for Wairoa, Taihape, and Thames; and meatworks wastewater design work.

Mike has said that he had hoped to learn a lot in this role but had been disappointed. Consequently, he took a position as executive engineer with the North Shore Drainage Board, later becoming the manager. Career

highlights here included the doubling of the North Shore’s plant capacity to cope with a population of 160,000, and the construction of the main sewage system to service the new residential area of Albany.

When the Drainage Board was absorbed into the new North Shore City Council in 1989, Mike remained as a systems engineer until his retirement in 1998.

In addition to his water engineering work, Mike contributed significantly to the wider industry, spending many years on the executive of what was then the NZ Water Supply and Disposal Association (now Water New Zealand). He served two terms as president, first in 1977-79, and then again from 1988 to 1990. For his efforts, he was awarded Life Membership in 1994.

Mike also served two terms as a director on the Board of Control of the Water Pollution Control Federation (USA), which later became the Water Environment Federation.

Away from work and the industry, Mike was never far from the water. A passionate sailor, he sailed a Sunburst yacht for 20 years before moving on to a bigger yacht. He also gave his time to his favoured sport, serving the Wakatere Boating Club and NZ Sunburst Association for many, many years. **WNZ**



Mike Petricevich

ADR introduces



## RTU-32M

RTUs have evolved.

**FEATURES:**

- ✓ Compact and Modular RTU/PLC with future proofed CPU
- ✓ Hot swappable, self-discovering Smart IO cards with self-building backplane
- ✓ SD Card Program and Memory option for quick and easy field replacements
- ✓ Migration of legacy Isgraf code directly into modern IEC61131 Worksuite
- ✓ Blistering performance in the most demanding applications
- ✓ ‘Host managed’ SCADA configuration functionality
- ✓ Redundant CPU and PSU options
- ✓ Huge range of Protocols! (inc. DNP3, WITS, 61850, 60870, EthernetIP, Profinet, Modbus, Omron)
- ✓ Smart device integration with HTML5 web functionality
- ✓ Online RTU Configurator
- ✓ Online Training Videos demonstrating hardware, configuration and embedded HMI setup.

As used by  
**Sydney WATER**





For more information contact  
ADR Control on 04 472 7614 or  
Stephen Dorrington on 021 434 782

[www.adriley.co.nz](http://www.adriley.co.nz)

We’re at the Water NZ Conference 18-20 September.  
Come and see us at stand #53 for a demo.

# Embracing water engineering

Mary Searle-Bell talks to Dr Tim Fisher about his comprehensive career as an engineer specialising in stormwater, water quality, flooding, rivers and sedimentation



Dr Tim Fisher.

Young Tim Fisher was keen to take up the career of one or other of his parents. His mother was a physio, his father an engineer, and both working with people and things scientific appealed to him.

However, his squeamishness at the sight of blood put paid to a medical career, leaving him to follow in his father's footsteps.

He studied civil engineering at the University of Canterbury, focusing on hydraulics and environmental engineering as he enjoyed the mix of physics, chemistry and biology.

"The addition of people, plus the importance of judgement based on knowledge and experience made it more interesting for me, and less codified than other areas of engineering" he says.

"At that time, there was a growing consciousness around the environment and people's impact on it, the issue of climate change was emerging, along with concerns around water resources.

"I could see that water and environmental issues were becoming more important, and that it would be more so in the future."

Tim wanted to continue his education, but on the back of real-world study, so after working as a graduate with Opus, he travelled to Canada to do his Ph.D. with the University of British Columbia.

There he studied environmental fluid mechanics at a remote mine pit lake, some 10 hours' drive from Vancouver, complete with roaming black bears and soaring bald eagles.

"It was a good adventure. And the skiing was great too."

"I could have stayed in Canada as work and life were great, but by the end of my doctorate, I was ready for change. I was recently married, and my wife and I decided to head to London, where I got work with Scott Wilson (now part of AECOM) doing flood studies and general water engineering."

Two years later, with a family on the way, Tim and his wife decided to return to New Zealand.

"We'd both been away from Auckland for over 10 years, so we thought we'd try it again," he says.

Tim soon got work with Tonkin and Taylor, choosing the firm because it was specialist and employee-owned, and also because of its responsiveness through the recruiting process.

"From early on I thought water engineering would provide interesting challenges and allow me to do meaningful work."

"I thought that having a high level of expertise in the field would help, so I actively targeted that through my masters, PhD, and then through project work."

And much like his experience at Opus as a graduate, Tonkin and Taylor empowered the young engineer.

"They gave me a lot of rope," he says of Opus.

"I was able to lead projects and go out and challenge myself. Tonkin and Taylor had a similar approach: plenty of rope, but with the right degree of tethering."

Now in his 15<sup>th</sup> year with the company, Tim is a technical director, specialising in stormwater engineering, water quality, flooding, rivers and sedimentation. He is also on the company's executive leadership team responsible for the engineering division.

"Throughout my career I have worked with clients in multi-disciplinary teams, taking a collaborative approach to projects. As such, they have been very beneficial and enjoyable.

"These days I'm more involved in the planning and policy side of things, where the big outcomes for projects are shaped early on, although I do enjoy working through all stages of a project."

"I especially enjoy the front end of projects and the complex beasts where there's a lot at stake."

"My job is to see where most value can be added."

One standout project of Tim's career was the Northern Gateway Toll Road, where he was a stormwater design lead as part of the Northern Gateway Alliance.

"This was the first roading project in New Zealand to be delivered as an alliance," he says.

"It exposed me to a new collaborative way of working. The community and environmental aspects were key result areas, and the project encouraged innovation, which all lead to excellent project outcomes."

A second memorable project was another behemoth, the Western Ring Route, which included the Waterview tunnels, Waterview Interchange, and raising the causeway carrying State Highway 16 across Waitemata Harbour.

"I was involved with the preliminary design and resource consenting for this project. It was a Road of National Significance and was the first roading project to go through a Board of Inquiry process – it was a one stop shop: we either got consent or we didn't."

"We had one shot to get it right."

Tim was also a design verifier within the Well Connected Alliance.

"It is testament to the work that was put in early on, that the project was built largely as it was designed and consented. The project is a fantastic example of how bold thinking and engineering solutions can create a step change in a community."

"The project was hugely satisfying."

One of Tim's more formidable jobs was as a review expert witness for the Board of Enquiry on the Transmission Gully project.

“There was a large amount of uncertainty in the prediction of sediment loads for construction, and how it would be transported into streams and the Porirua Harbour and Pauatahanui Arm. It was hugely challenging, but we got agreement on suitable resource consents in the end.”

Engineering challenges aside, Tim can see the water sector is facing broader challenges with water regulation and industry reform.

“The world must also adapt and mitigate for climate change,” he says.

“The pathway has become clearer, and the engineering expertise is often there. The challenge is in leadership and adapting to change.

“Water quality is another biggie. We know what to do around point source discharges. However, we need to be working beyond that; helping influence the community and leaders around land use choices at the catchment level. These will have long term impacts on water quality.

“There are competing values around what the community wants, plus economic drivers. The issue is, how do we resolve these? Engineers need to communicate what they know so the technical knowledge, support, and solutions are there, and good decisions can be made.”

A broad knowledge base has certainly helped Tim in his career. He strongly encourages young water professionals to explore wider aspects of water engineering, in order to

**A memorable project was the Western Ring Route, which included the Waterview tunnels, Waterview Interchange, and raising the causeway carrying State Highway 16 across Waitemata Harbour.**

expand their knowledge and build expertise.

“I would also recommend getting involved in the industry outside of working hours. I have been involved in various water and engineering groups, currently as a board member of Engineering New Zealand, and found these roles to be hugely rewarding.”

In 2017, Tim was made a Fellow of Engineering New Zealand for his technical expertise, service to the organisation, and industry leadership.

“There’s the great feeling you get from contributing, and I learned a lot, gained skills and built a network of contacts I wouldn’t have, certainly not at the same rate if I was only doing my day job.

“I got more out of it than I ever expected to.” **WNZ**

**Metrinet from**



**Multi-Parameter Water Monitoring & Data Collection for Remote Sites**



**Controller**

- Monitor up to 8 different parameters via smart sensors.
- Connect to SCADA via cellular modem, Wi-Fi or wired Modbus, Ethernet I/P or Profibus
- Stores over 300,000 values on Micro SD ram.

**Smart Sensors**

- 15 different parameters to select from including Chlorine, pH, Turbidity, Water Pressure, Conductivity
- Calibration data stored internally so calibration can be done anywhere.



For more information please contact...

Telephone: +64 (09) 579 2633  
Email: engineer@applied-inst.co.nz

[www.applied-inst.co.nz](http://www.applied-inst.co.nz)  
Instrumentation for Process Measurement and Control

# Technology for efficient water quality management & control

**Amiad EBS Filters**

The largest automatic self-cleaning filter for fine filtration



**Amiad SAF Filters**

The automatic self-cleaning filter – suitable for more applications than ever



**Krohne Electromagnetic Flow Meters**

Precision German engineering from the pioneers of electromagnetic flow measurement



**Dorot control valves**

State-of-the-art automatic control valves designed for the most demanding water control requirements



**Arkal Spin-Klin filters**

Reliable, effective self-cleaning SpinKlin® disc technology for clean water



**Apollo Backflow Prevention**

Easy to maintain, Watermark approved and made in the USA



**Arad Bulk Water Meters**

Advanced mechanical and ultrasonic technology for maximising water measurement efficiency



**Dorot air release valves**

Optimised design for air release even at very high air flow velocities



For further information contact our industrial sales manager:  
**Mike Stapleton** | P: 09 916 0094 | M: 021 475 601 | [mstapleton@watersupply.co.nz](mailto:mstapleton@watersupply.co.nz)

# A career of commitment

A passion for water and wastewater provided Alison Young an enjoyable and successful career in sales to the industry. She spoke with **MARY SEARLE BELL** not long after her retirement.



Alison Young has enjoyed a long career in the water and wastewater industry, however she has come at it from a different angle to many of our readers. Rather than an engineer or scientist, Alison has spent 30 years in sales, supplying water and wastewater systems to plants and laboratories throughout the country.

“I don’t have a degree,” she told *Water New Zealand* magazine. “When I finished school I began work as a technical trainee at the Levin Horticultural Research Centre for MAF. I was working in a laboratory performing soil and plant analysis for nutrients and trace elements. During this time I completed a New Zealand Certificate in Science, majoring in chemistry.

“But research wasn’t my thing and after about five years I left and joined Smith Biolab, doing customer service and quotations work. However, it wasn’t long before I headed off to do my O.E.

“I’d only been gone 10 months when my boss phoned and asked, ‘do you want a job as a sales rep?’ I did. So I came home.”

Her new role took her around the lower North Island, selling laboratory equipment to water and wastewater plants. Because of her background in chemistry and some microbiology, she started taking a keen interest in the industry.

“I remember going home to dig up my old study notes about water and wastewater – not that they proved to be much help,” she says with a laugh.

But her fascination with the industry and its workings are what made her so good at her job.

“The late Sonny Katae at Kapiti District Council taught me a lot about wastewater. He was an operator at their wastewater plant and he loved his job. He explained to me what he was doing in his role, and what he wanted to achieve. Some of his passion rubbed off on me.”

Within a couple of years, Alison had been promoted to product manager and, because of her interest in water and wastewater, became a specialist for agencies that supplied products to the industry.

“I was sent overseas a number of times to visit manufacturing plants and learn the theory behind what the products did and were used for. I really got to know the industry.

“I also really got to know and understand my customers. I didn’t sell them something they wouldn’t use; I’d say, “I don’t believe this will do what you want it to achieve,” and as a result, operators found me trustworthy.”

With this approach, Alison developed strong working relationships with operators around the country, and many have grown to become good friends.

She also presented at a lot of workshops and conferences. Often, these were held over weekends, but Alison was happy to give up her personal time for the industry.



**When fresh, clean water is needed.**

**Lowara has a full range of premium pumps for all your clean water requirements.**



Contact us today to find out how we can assist with all your water requirements.

**Brown Brothers Engineers Ltd**

Ph: 0508 4 BBENG  
www.brownbros.co.nz

DELIVERING PUMPING SOLUTIONS® since 1908



“The ethos behind my presentations was to educate and provide technical information, not to sell a product.

“I was lucky to have some very good managers who allowed me to pursue my interests – to focus on relationship building and education, even though it wasn’t getting me sales. I guess the fact I was doing it in my own time helped.”

But Alison believes it is important to be interested in learning what the water operator wants to achieve: “Too many people are out there just to sell a product; they’re not interested in the client or in providing service once the sale is made.”

By the time she retired a few months ago, Alison had spent 35 years at the same firm, which is now Thermofisher Scientific, in a role with national and Australian responsibility. She was recognised as a specialist in water and wastewater treatment plants and monitoring.

“I’ve visited a lot of plants in my day,” she says. “I developed close working relationships with a lot of people – customers would often contact me directly rather than one of my team.”

The industry has recognised her passion, with the Water

Industry Operations Group inducting her into the IDIOTS (Inducted as a Delegate of the Inextricably Obstructed Tap Society) in 2008 for her commitment to the vision and philosophies of the group.

“This was a career highlight,” Alison says. “My other stand out was being asked to provide the Ministry of Health, via David Ogilvie and Michael Taylor, my expert opinion on things like turbidity and chlorine measurement for the drinking water guidelines. Particularly what could be achieved around monitoring at low levels – what equipment was out there, at a reasonable price, that could do the job.

“It was a real highlight to see some of my recommendations go into the guidelines; to benefit the industry and the health of the public.”

Speaking on the phone with her, it seems Alison is missing her job and the stimulation of the industry. She only gave up her work as her husband wanted to retire to Katikati.

“There’s only so much golf you can play,” she laments. “I’m a bit bored, so I have my eye out for a part time role.”

So, don’t be surprised if she pops up around a water or wastewater plant near you. **WNZ**



**More than a drain**

For over 70 years ACO has continued to push the boundaries of drainage. Experience the innovation first-hand with ACO Stormbrixx, a new modular infiltration and detention system. Let ACO help specify your stormwater system with unrivaled technical assistance.

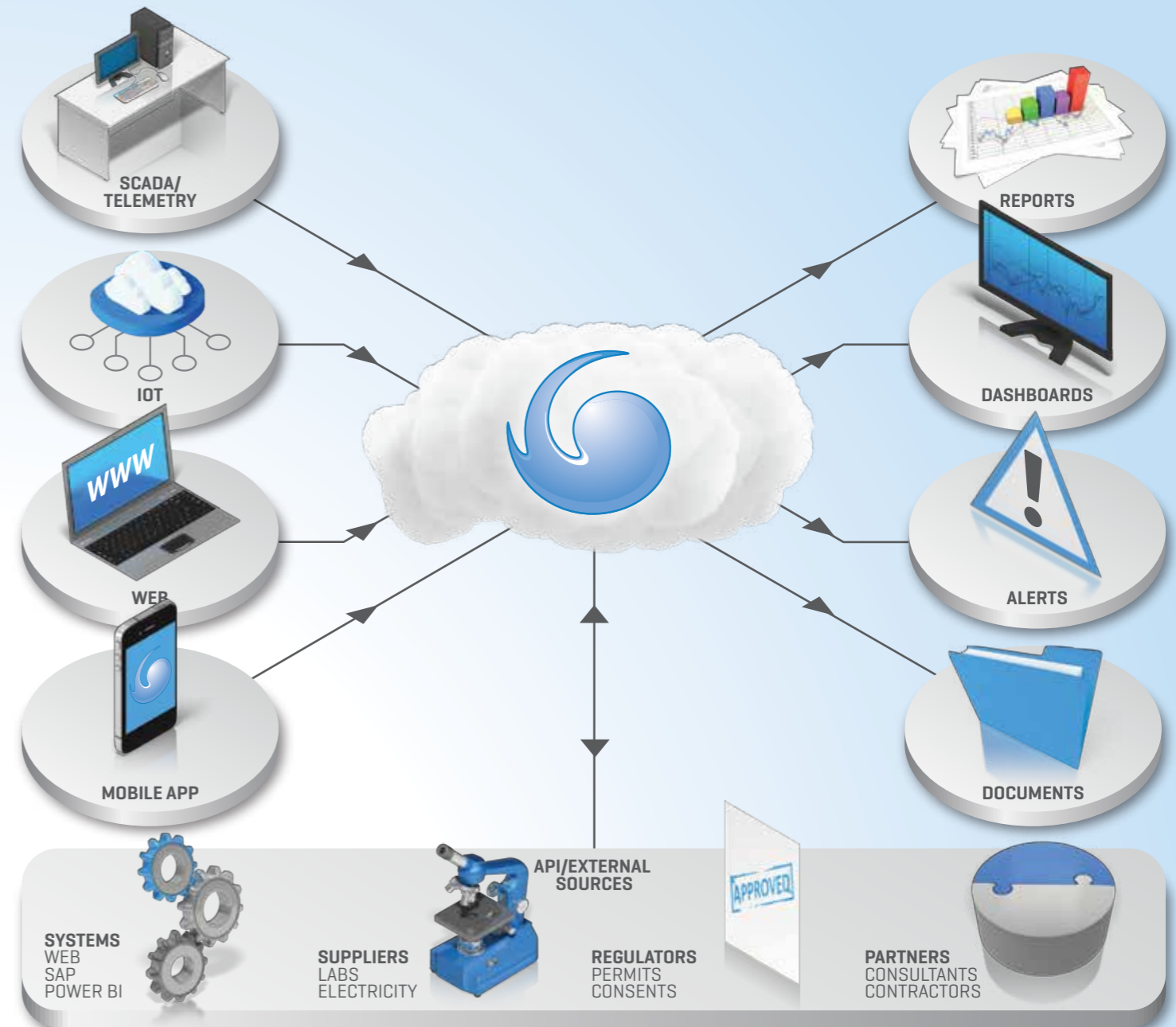


0800 448 080  
www.aconz.co.nz



**The central solution for operations and compliance data**

- Enterprise data management platform
- 4,000 plants in five countries
- 60% NZ local government uptake
- Storing 52 billion data points



**Come and see us at The Water NZ Annual Conference & Expo**

18-20 September 2019 - Booths 151/152

Contact Mark Homenuke

Phone: +64 22 649 9657 Email: mark@wateroutlook.com

www.wateroutlook.com

# Serious fish threat to our fresh water



By **Andy Loader**, co-chairperson,  
Primary Land Users Group

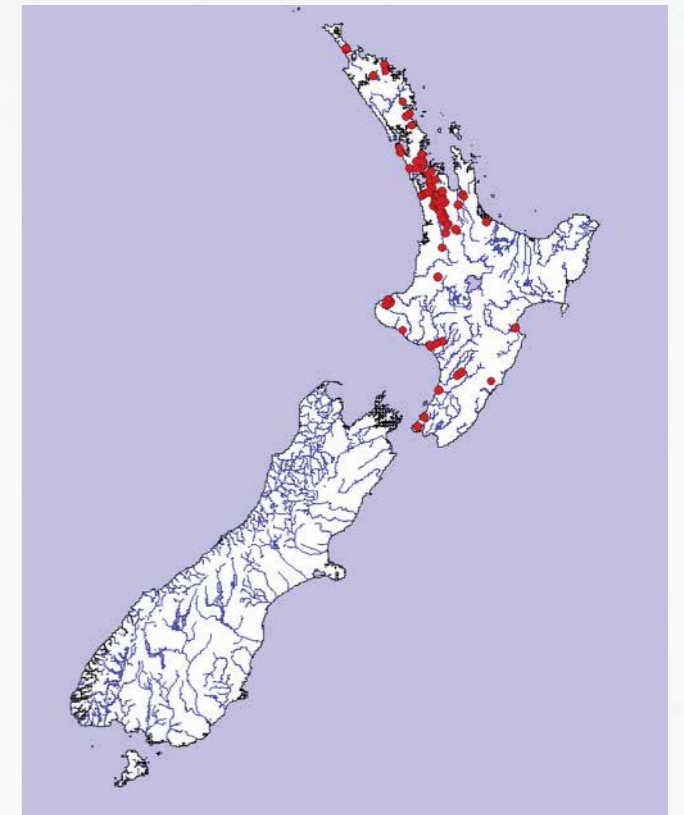
**T**he Waikato region has more than 100 rivers and streams and more than 100 lakes, including our largest – Lake Taupo.

The Waikato River Authority was set up by statute in 2010 as the body responsible for overseeing the implementation of the clean-up of the Waikato river. In 2012 legislation was passed to extend this responsibility to include the Waipa River.

The authority's vision and strategy for these rivers recognises that issues of water quality and water quantity/ allocation are critical to the region.

On a national level Government is encouraging regions to determine their own solutions to fresh water challenges under the direction of the National Policy Statement (NPS) on Freshwater Management.

In the Waikato region available fresh water is nearly fully allocated and demand is growing, says the authority. There is increasing demand on water resources particularly for irrigation, urban growth (including growth in Auckland), agriculture and horticulture.



Left: Koi carp grow into sizable adults and are able to be caught by hand on flooded pasture. Right: Known distribution of Koi Carp.

## Introducing the new EASYPRO Water Analysis Sampling Stations!



Monitors and controls a range of water parameters for your municipal, potable, or aquatics application.

Ready for immediate installation straight out of the box; the Easypro is pre-plumbed with touch-screen technology, and internet connectivity.



Contact WaterPro for further information or a quotation today!  
sales@waterpro.co.nz | 0800 884 886 | www.waterpro.co.nz/easypro





Additional users are now competing for the 'right' to access and use fresh water. This may limit future investment and business expansion in the Waikato, and means the region may be unable to meet its full potential.

Part of the region's water clean-up comes under the Waikato Council's Proposed Plan Change One (PPC1) that has been developed in collaboration with various stakeholders and is now in front of commissioners. It must be noted that the plan attracted about 1200 objections.

Being involved with the Primary Land Users Group, my concern is that the proposed changes do not, unwittingly, stop expansion of rural businesses in the Waikato region and be a disincentive to future investment in rural business ventures.

For instance, the council claims that the main source of nutrient pollution in the Hauraki rivers is from agricultural land which contributes, it says, about 70 percent of the nitrogen load and 46 per cent of the phosphorus.

This leaves at least 30 percent of nitrogen and 54 percent of phosphorus coming from sources other than farming, including natural sources, of course.

If urbanisation trends in the region continue we can add an increase in stormwater and effluent discharge to this freshwater challenge. Which begs the question – why is the PPC1 only focusing on farming as the source of water contaminants?

### The fish pest plague

I want to raise a major contributor to sediment loading of rivers in the Waikato region (and through the rest of the country) that deserves more attention: Koi Carp.

Koi Carp are a serious problem here and in Australia. An ornamental strain of the common carp (*Cyprinus carpio*) native to Asia and Europe, this species is thought to have been imported into New Zealand accidentally in the 1960s as part of a goldfish consignment.

They were probably initially released into the wild accidentally from private ponds during large scale flooding and were found wild in the Waikato River in 1983, by which time they had established a breeding population. Koi Carp prefer still waters in lakes, or backwaters in rivers and are very tolerant of poor water quality to which they contribute.

Through illegal introductions for the purposes of coarse fishing (a traditional British pastime involving the catch and release of certain species including koi carp), and for ornamental purposes in amenity ponds, isolated populations have been progressively discovered throughout the country.

When they feed they stir up the bottom of ponds, lakes and rivers, muddying the water and destroying native plant and fish habitat. Koi carp are opportunistic omnivores, which means they eat a wide range of food, including insects, fish eggs, juvenile fish of other species and a diverse range of plants and other organic matter.

They feed like a vacuum cleaner, sucking up everything and blowing out what isn't wanted. Aquatic plants are dislodged in the process and are unlikely to re-establish. Koi carp cause habitat loss for plants, native fish, invertebrates and waterfowl.

Koi Carp produce approximately 14 times their own body weight of sediment each year through this feeding method.

Koi Carp are now widespread in Auckland and Waikato and are spreading into Northland. They have also been found

## Micron Industrial Fibreglass Filters



Manufactured from the highest grade of non corrosive materials and employing the latest in fibreglass winding technology.

- UV and corrosion resistant
- Hydraulically balanced laterals
- Deep filter bed configurations available for mixed media applications
- Pressure rated at 250kPa (36psi), 400kPa (58psi), 600kPa (87psi) and up to 800kPa (116psi)
- Optional sight glasses and lateral man holes
- Optional vinyl ester tanks for high temperature and improved chemical resistance
- Suitable for commercial and industrial water treatment applications

**WATERCO**  
Water, the liquid of life

7 Industry Road, Penrose,  
Auckland, New Zealand  
Ph: +64 (9) 525 7570

[www.waterco.com](http://www.waterco.com)



Top left: Koi Carp trapped in a farm drain after flood ponding on farmland. Many more escaped. Above: The muddy area was created by huge numbers of the fish thrashing around in decomposing grass. Left: Carp caught at Mercer (photo courtesy of Brendan Hicks).

in isolated places in Whanganui, Hawke's Bay, Wellington and the Nelson/Marlborough area, where they were illegally released.

There is estimated to be approximately 500,000 tonnes of Koi Carp in the Lower Waikato and Waipa River regions below the Karapiro Dam and with no natural predators, which gives them a very high success rate in breeding in our water.

And Koi Carp breed prolifically with a single fish laying between 800,000 to one million eggs. Once established in an area they have a huge and significant aquatic impact on rivers and ponds. As the carp gather for spawning or feeding in the shallow margins of a river, their collective biomass can reach 4000kg/ha.

The discovery of what is thought to be the largest Koi Carp ever caught in Northland is the cause of serious concern for Department of Conservation staff. The fish was released five years ago into a private garden pond that had overflowed into the Kerikeri River system

This enormous fish was caught by freshwater fish expert Mike McGlynn in Kerikeri while undertaking an exotic fish survey. McGlynn says the find is a major worry for conservationists.

The fish was 752 mm in length and weighed nine kilograms. More commonly, they grow to 600mm in length and weigh five kilograms, but are likely to be mature at half this size

"The only thing that kept this from being an environmental disaster was that there was only one fish and no opportunity for it breed," says McGlynn.

The Department is working to determine how widespread these carp are in Northland and is striving to eradicate them

from Northland before they spread out of control.

Pest initiatives have already been set up in the Waikato aimed at Koi Carp infestations. Carp recreational fishing (especially bow fishing) is encouraged in certain lakes and competitions are held annually near Huntly. In the spring of 2010, 8.6 tonnes of koi were caught from a lake in one weekend. Koi carp caught are made into burley for fishing.

The Waikato Regional Council and Waikato River Authority also use gates, traps and digesting machines that turn the fish into fertiliser for riparian planting along the Waikato river and around lakes.

Another pest fish is Perch, which have affected the quality of the Karori Reservoir in Wellington. The water is subject to regular algal blooms. In natural waterways the algae is kept under control by crustaceans that graze on them, but the Perch predate so heavily on the crustacea that this natural control is lost.

An on-going research project by a team of researchers from the University of Waikato has seen large numbers of perch removed from the reservoir. There have been two large-scale removals so far, through a combination of netting and electrofishing (using a specially equipped boat). Both events were followed by marked increases in the number of crustaceans and a decline in concentration of algae (phytoplankton) in the water.

So there is hope, but this country can't lose sight of such water pollution causes while it is beating rural land users around the head over run-off.

And everyone can help. If you become aware of the location of Koi Carp then contact your nearest Department of Conservation office with details. [WNZ](http://www.wnz.govt.nz)



# Field Service, Repair and Maintenance Solutions

## Preventative or emergency service performed by factory-trained technicians

One of the best ways to ensure that your system operates at peak efficiency is to perform preventive maintenance on a regular basis. When it comes to Cla-Val automatic control valves, no one can do a better job at keeping your valves in tip-top shape than our own in-house team of factory trained field service technicians.

## Available Services

- Periodic inspection, maintenance and cleaning of installed valves, without removal from the pipeline
- Complete on-site valve refurbishment, including replacement of rubber goods and change-out of metal parts as needed
- Complete valve rebuilds in the shop
- Field retrofits of a wide array of accessories and components to enhance valve function, including the addition of the following:
  - g8 Series Pressure Management Pilot System to provide pressure on demand
  - KO Anti-Cavitation trim to protect valve from cavitation damage
  - Installation of pressure gauges, position indicators, limit switches, etc.



## Experience the Cla-Val Advantage

Not all valve repair companies are the same. There are many reasons why utilizing Cla-Val Pacific's Field Service team to handle your routine maintenance and emergency repairs is the best choice for maintenance support services.

- Safe work practices performed by confined space certified technicians
- Technical and Engineering Support
- Customer-oriented approach to maintenance and repair
- Backed by the assurance that comes with working with the industry leader and the only control valve company with manufacturing in New Zealand



# China's GI programme



Wuhan, the ancient sprawling capital of Central China's Hubei province.

In 2015, China initiated what it calls a Sponge City Programme to address its urban flood issues based on the concept of managing water on an ecological basis.

In 2015, China initiated what it calls a Sponge City Programme to address its urban flood issues and based on the concept of managing water in an ecological basis.

Basically China's Sponge City Programme concept is traditional and involving rainwater capture, storage and use under a four-mode governance framework.

Over 50 percent of Asia's population now lives in cities. Urban flooding, especially on coastal and low-lying river delta areas is a constant challenge for many cities in the region.

Over 60 percent of 351 cities researched in regards to flooding in China suffered severe floods between 2008 and 2010, and 137 of them were hit more than three times, as flooding became exacerbated with an increase in impermeable surfaces increase and a reduction in green spaces, preventing heavy rainfalls from being naturally absorbed.

China has experienced rapid urbanisation since the 1980s, with the percentage of the population living in urban areas increasing from 21 percent in 1982 to 53 percent in 2012.

Urban flooding and waterlogging in China are also triggered by poor drainage infrastructure, which has failed to keep pace with the expanding development above the surface. Half of China's cities have not met national flood-prevention safety standards.

In April 2015 the Chinese government initiated a Sponge City Programme (SCP), aimed at addressing urban flooding and waterlogging, with the Government pledging billions of dollars to help 30 selected cities facilitate their sponge projects over two three-year periods. The central government expects

this programme to be scaled up nationwide.

The concept of SCP actually goes back another decade in China, as 'green development' and GI (green infrastructure) has been central to China's national development plan for the past 10 years. This official development strategy to move towards a green economy is called Ecological Civilization; a concept introduced by the National Congress in 2007 to become a national development strategy with a range of green programmes nationwide.

## SCP details

The SCP is intended to minimise the influence of urban development on the local environment by improving water permeation, retention, storage, purification, drainage, saving and reuse.

So far, the SCP programme has been implemented at the national level in two waves. The first involved 16 cities selected as pilots in 2015, then 14 more added in the second wave the following year. The central government provided different levels of start-up funding for these pilot cities, with the SCP conditions initiated and evaluated by the central government and implemented at local level.

The nationwide programme has since been expanded to cover 30 cities. The ambitious project aims to have 20 percent of the chosen cities constructed to a sponge city standard by 2020, and 80 percent by 2030.

The Chinese Ministry of Finance has provided initial support ranging from 400 million yuan to 600 million yuan (US\$59.6

million to US\$89.3 million) for 16 pilot cities, since extended to 30.

The sting in the tail is that the Chinese Government plans to cut off its SCP subsidies in 2020. So, any local initiatives after that will need to find funding elsewhere. There's talk of working with private sector developers to monetise the programme.

## Case study, Wuhan City

One of the SCP pilot cities is Wuhan, the ancient sprawling capital of Central China's Hubei province (population 8.5 million), located on a floodplain (Jiangnan Plain), where the Yangtze River and the Han River intersect.

The city is known as the 'river and lake town' and contains many lakes and parks, including the expansive East Lake. The city extends over 8500 square kilometres that is mostly flat and historically vulnerable to flooding, being hit by flooding or waterlogging almost once every three years in the past few decades.

The expansion of the city has resulted in increased flooding and a storm in the summer of 2016 caused serious urban flooding that killed more than 30 people. Water pollution is also a serious issue in Wuhan with some of the city's 11 rivers historically designed with intensified drain outlets from which partially treated industrial and domestic sewage was discharged into the Yangtze and Han Rivers.

As part of the SCP, by 2020 Wuhan must ensure 20 percent

of its urban land includes sponge features and be capable of retaining 70 percent of its stormwater.

For Wuhan that equates to just over 170 square kilometres. Earlier this year it was reported that over 38.5 square kilometres of the city had already been retrofitted. The cost to date? Around Yuan 11 billion (around NZ\$2.42 billion).

Arcadis NV, a global design, engineering and management consulting company based in Holland, was appointed as the principal consultant by Wuhan Water Authority for its Sponge City programme. It has been operating in Wuhan under a government mandate to help designers and developers implement the SCP. It has already performed an initial assessment of the problem areas as the design phase is about to begin, and believes there is potential to improve these designs and move beyond merely coping with rain water.

## Coastal protection

A more definitive example of SPC can be found fortifying coastal areas across the Guangdong-Hong Kong-Macao Greater Bay Area that are susceptible to super typhoons, that could be coming more frequent with catastrophic winds and storm surges.

The Hong Kong Special Administrative Region government has been working on a study of low-lying coastal areas and other districts vulnerable to high winds to assess the impact of wind and waves.

Its Civil Engineering and Development Department is planning

## octopus

**Dictionary definition:** *noun.* /'ɒktəpəs/

A cephalopod mollusc with eight sucker-bearing arms, a soft body, strong beaklike jaws, and no internal shell.



**Bailey definition:** *noun.* /'ɒktəpəs/

An amazing new manhole chamber from Bailey with multiple flexible connections, a unique riser system, strong HDPE construction and guaranteed not to leak.



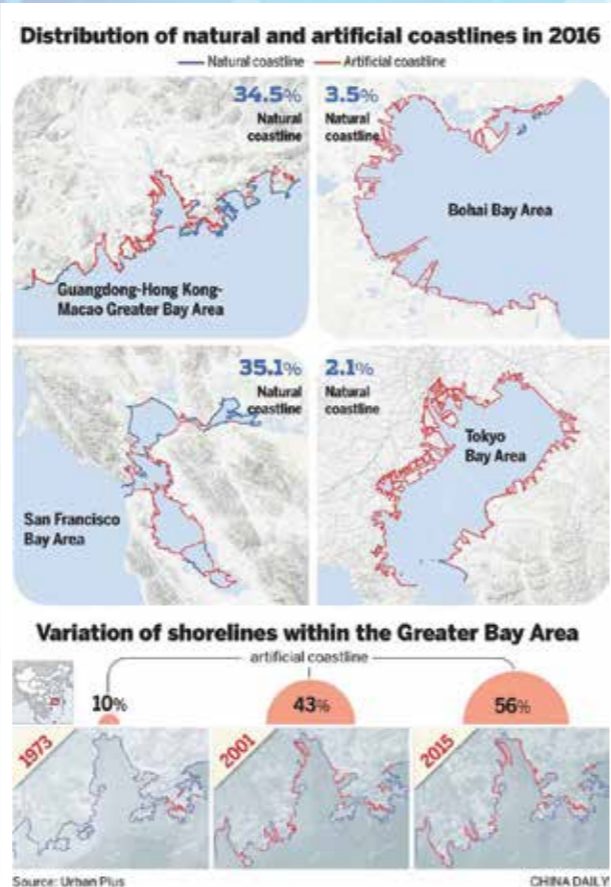
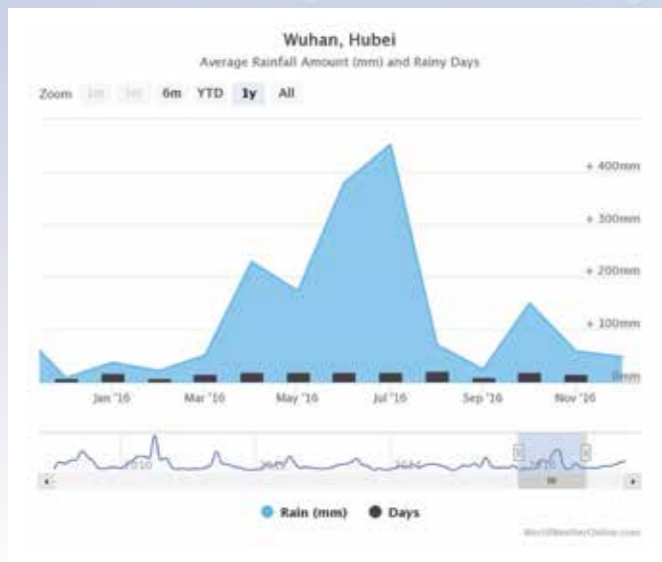
*come to see the octopus at stand 170 & 177*

**BAILEY**  
The number one name in water

TRUSTED AND TRUE  
**45 YEARS**  
WE STAND  
BEHIND OUR TANKS



0800 861 333 [www.tanks.co.nz](http://www.tanks.co.nz)



new environmentally friendly sea walls, while flood-prevention structures will feature mudflats and mangroves to act as natural wave barriers.

Piet Dircke, a specialist in the field of flood protection with Arcadis NV has worked on flood resilience and climate adaptation across five continents, including New Orleans in the wake of Hurricane Katrina and New York after Hurricane Sandy.

Dircke's philosophy is focused on resilience in hard-hit areas. As it is always possible water will breach the highest barriers, structures must be resilient enough to cope with the impact of flooding.

"Wherever you build concrete, nature will fight it and sooner or later, destroy it. Nature always wins. The greener we can make our structures, the longer they may last," he was quoted in the China Daily.

He used the example of the so-called "Sand Engine" in the Netherlands. In 2011, engineers built a sandcastle-shaped peninsula in South Holland to fortify the Delfland coast.

Before the engine was built, refilling was required every five years because the currents carried sand away from the beach. Now, the current brings sand from the peninsula to the beach, meaning no refilling is necessary until 2032.

Another is the reconstruction of the "Sandy area" of New York after Hurricane Sandy struck New York in 2012 leaving 43 people dead and more than 9000 buildings flooded.

As a response, the United States Federal Emergency Management Agency designated 16 kilometres of Manhattan coastline as an area at high risk of flooding, and called for designs to reconstruct the shoreline. That winning design (called BIG U) was built as a public park that provides a substantial and invisible flood protection barrier.

The BIG U design and concept has since served as a model for flood resilience to buttress some of the commercial areas of the

Guangdong-Hong Kong-Macao Greater Bay Area.

This includes a major landscape development under construction along the Tianmu River, which is the main watercourse through the new district of Hengqin in the city of Zhuhai, Guangdong.

This Sponge City initiative started in 2015 and the design, by Earthasia International, a landscape architect in Hong Kong, has dropped the conventional vertical concrete flood defense and drainage systems common in Chinese cities, to use a multilevel flood control system for low and normal tides, while allowing flooding at the level of a once-in-a-half-century storm.

Features include a protective wetland with riverbanks around the flood plain that are also built to absorb and retain water, and even purify it.

If this design proves effective, it may provide an additional model for flood prevention in other Chinese cities.

Another SCP programme demonstrating the 'ecology' element started construction early last year at the Tung Chung East reclamation site on Hong Kong's Lantau Island.

Designed to reclaim 130 hectares of land from the harbour the aquatic ecology faculty at the University of Hong Kong provided the reclamation project with a new 'ecological brick' it developed to provide habitats for marine life around the edge of the reclaimed land.

Traditionally, Hong Kong's sea walls are vertical and built on piers or along navigation channels, but some are built on inclines to act as breakwaters. These surfaces become harmful to marine life at the height of summer, killing aquatic microalgae and shellfish that are essential to the marine food chain.

The ecological bricks replicate natural rocks and store water, offer shade, and are covered in pores where marine organisms can shelter.

The number of species now identified on the bricks is more than double that found on the original sea walls. **WNZ**

# World first in PE 100-RC.

## AGRULINE

fittings & pipes resistant to cracks

**LONGER SERVICE LIFE**  
crack resistant PE 100-RC

**HIGH ECONOMIC EFFICIENCY**  
sandbed-free installation

**LASTING CONNECTIONS**  
better welding results

**ONE STOP SHOPPING**  
complete PE 100-RC piping system

[f](#) [v](#) [in](#) [@](#)  
@agruworld  
www.agru.at



**NEW PE 100-RC FITTINGS**

E-coupler SDR 26



Stop-Off-Saddle

Tee 45° Injection molded



All AGRULINE fittings are made of PE 100-RC

agru Kunststofftechnik Gesellschaft m.b.H.  
Ing.-Pesendorfer-Strasse 31  
4540 Bad Hall, Austria

T. +43 7258 7900  
F. +43 7258 790 - 2850  
sales@agru.at



# The work of shellfish in harbours

Shellfish beds have long been viewed as an indicator of local aquatic health, but they are also used for water quality management.

Oyster reefs, for example, filter water as they eat, removing pollutants like nitrogen, which helps reduce triggers for algal blooms that deplete water of oxygen.

Shellfish reefs (such as our own green and black lipped mussel beds) also protect shorelines from storm damage, and reduce flooding and erosion.

As keystone aquatic species, shellfish also attract other marine life, as oyster reefs increase biodiversity levels, earning them the nickname 'ecosystem engineers'.

## New York's oyster beds revamped

When Henry Hudson, an English sea explorer working for the Dutch, sailed into what is now New York Harbor in 1609 there were 220,000 acres of oyster reefs estimated to be at the base of the estuary in what was a biologically productive, diverse, and dynamic aquatic environment.

By the beginning of the last century, these reefs had been dredged to extinction and the beds covered in silt and in water quality too poor for regeneration.

The water quality gradually improved after the state Clean Water Act was passed in 1972, prohibiting raw sewage and waste being discharged into the harbour.

The Billion Oyster Project was launched in 2008 with the goal to have one billion live oysters filtering the harbour and controlling erosion by 2025.

New York Harbor School, a maritime high-school located on Governors Island, is the flagship school of the Billion Oyster Project, and its students contribute to the scheme as part of their Career and Technical Education (CTE) experience – growing oysters, designing and building oyster reef structures, diving to monitor reefs,

operating boats, performing marine biology research, and more.

The New York-based non-profit organisation behind the Billion Oyster Project also tapped into public education, restaurants and volunteers to help breed new oysters in a hatchery using larva attach to recycled oyster shells collected from local restaurants.

The collected shells are left to naturally 'cure' until they are sterile and become home for 10 to 20 oyster larva in the hatchery.

The growing oysters are 'conditioned' in tanks that hold about 600 bags of shells containing about 10 million baby oysters that feed on micro algae until big enough to be distributed around the harbour.

Well over 28 million oysters have already been planted across 12 reefs in New York Harbour, using one million pounds of recycled shell from 75 volunteer Big Apple restaurants and the help of 70 schools, 7000 students and 9000 volunteers, as part of a plan to add 1 billion oysters to the waterway by 2025 to aid in water filtration, erosion control and storm protection.



**JACOBS**

Thinking differently to solve the world's most complex water challenges.

As global supply and demand for water intensifies, solving the world's most complex water challenges demands different thinking – and that's where we come in. At Jacobs, our engineers, scientists, and planners collaborate with clients to deliver projects across the entire water cycle, focused on balancing social, economic, and environmental priorities.

Whether it's treating, distributing, or storing water, we mobilise our local and global resources to deliver smart, sustainable solutions.

We're exhibiting at the Water NZ Conference - visit us at **booth 113** to engage with our global water experts.



[www.jacobs.com](http://www.jacobs.com)

### GET IN TOUCH:

**Chris Wrathall**

Water Business Leader,  
New Zealand  
+64 021 755 323  
Chris.Wrathall@jacobs.com

**Ian Garside**

Director of Operations –  
Water, New Zealand  
+64 027 202 5933  
Ian.Garside@jacobs.com

**Kate Simmonds**

Senior Project Manager  
+64 022 354 3154  
Kate.Simmonds@jacobs.com

**Becky Macdonald**

Principal Wastewater Engineer  
+64 021 299 8052  
Becky.Macdonald@jacobs.com

# Treading water

Regional councils, property owners and insurers remain stuck over how best to document and respond to data on high-risk flood areas. **Patrick Walsh** from Landcare discusses issues around gathering and sharing comparable flood risk data.

**W**hen it comes to flood management there are no easy answers, says Patrick Walsh, senior economist and capability leader at Landcare.

The authority and responsibility to manage flood risk is currently delegated to regional councils. However, they are not obliged to publish flood risk data for property owners, or insurers.

Currently, some, but not all, regional councils provide data online detailing flood plains or other hazards, he says and citing Auckland as one of the better councils for sharing such data.

Yet, even when councils release flood data online, there is a high degree of variation in how they report this information.

“If you go to Auckland’s website and see a flood hazard layer, it might be a one-in-500-year flood risk layer. In other places, there could be a one-in-100-year risk of flood layer. So, it’s hard to compare across regional councils.”

Patrick spoke at the Urban Futures New Zealand Conference in Auckland earlier this year, where he presented a snapshot of

his work to date in a paper titled *Deep South Challenge: Flood management in rural areas – the location and effectiveness of flood schemes*.

He says he hopes to release the full paper around October this year.

Full and consistent data will be helpful for environmental Crown Research Institutes and regional councils compare policies on flood mitigation.

Importantly, it will also help to make informed decisions about flood risks to a property, where that data improves upon relying on LIM reports for evaluating flood risk.

In the US, the Army Corps of Engineers releases nationwide flood plain data so anyone can clearly see if a property is at flood risk. This information dovetails with subsidised flood insurance programmes and means property owners on a flood plain pay a higher insurance premium.

“There is a general trend in New Zealand to be moving in that direction whereby you will be paying more for insurance

Contractors, the Defence Force and NZTA put in an 18-day effort to rebuild and reopen the Waiho River Bridge at Franz Joseph after it was taken out by floods. The bridge is a vital link for the tourism-dependant West Coast.

in the future if you live in a flood plain,” notes Patrick.

Patrick says cost considerations discourage, or even prevent, some regional authorities from collating and publishing flood risk data online.

Relevant data may need to be collated from a wide range of sources, from satellite imagery to oral histories of floods. This data then has to be mapped into searchable files that can be shared online.

And some regional councils are less well equipped than others to analyse whether a specific area may be a one-in-100 or a one-in-500-year flood risk or otherwise, he says.

“There are also potential legal reasons why they might not want to do that,” says Patrick.

“If someone moves into a house where the regional council has said there’s no flood risk and they are getting flooded every few years, the council could be liable.”

Many think the issue should be a central government responsibility, he says.

“The Ministry for the Environment has been saying they’re going to release more structured policy on this. And some regional councils are waiting for more working groups to get together to try to motivate this.

“That want to know what an agreed definition might be.

“So, there are potentially things in the works but nothing concrete so far.”

Meanwhile, our country remains out of step with insurance practices in many other parts of the world where people living in an area characterised by higher flood risk pay correspondingly more for their insurance.

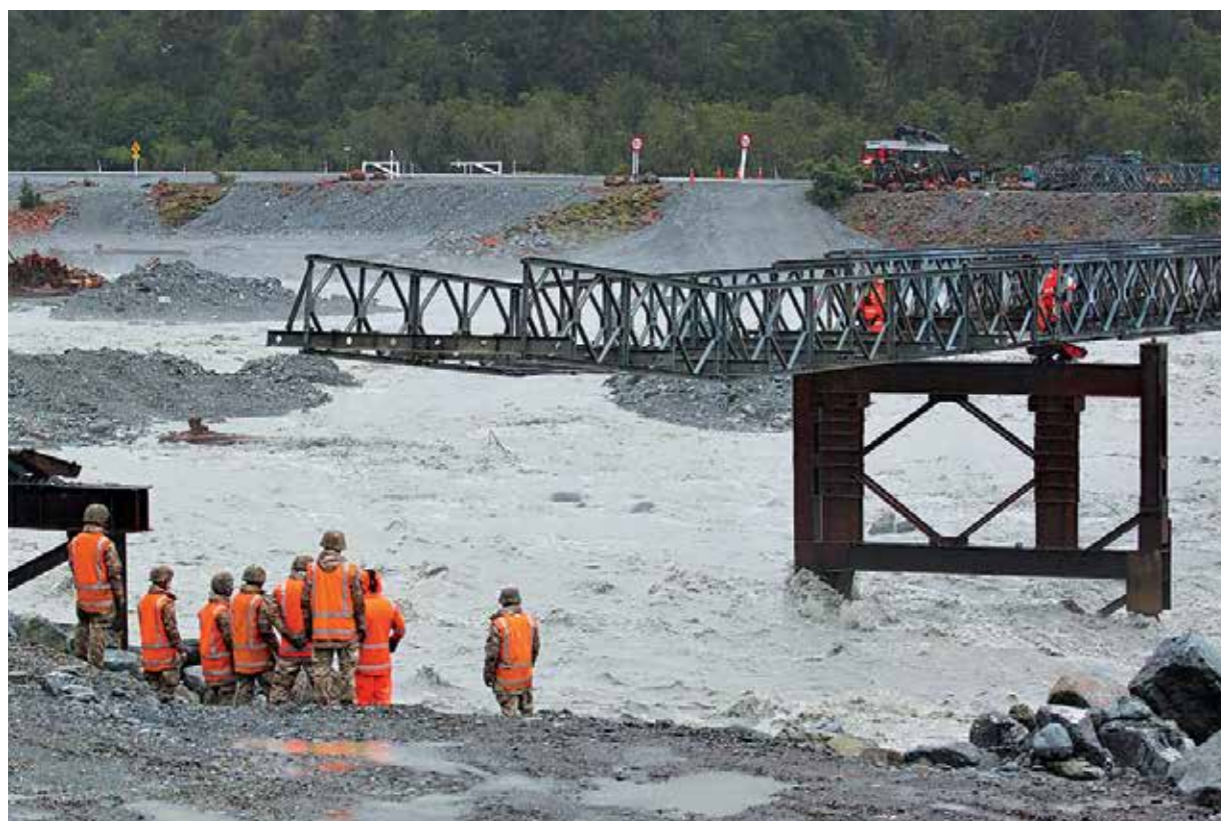
“There is this equity concern,” he says between insurances for properties in high and low risk areas. At one end of the scale hi-value coastal properties that could be at risk are subsidised by non-risk property owners. At the other end of the scale a large number of lower-income people live in our country’s less desirable, lowlying, damp, and flood-prone inland areas, who can least afford higher premiums.

“If we were to move to a new regime where people were paying for flood insurance there would have to be some sort of graduated way to accommodate that.”

Patrick says one of the main, but “very preliminary”, results of his paper is that in mesh blocks with flood schemes where a targeted rate is used to help finance flood infrastructure, Earthquake Commission (EQC) claims are tens of thousands of dollars below claims in other areas.

“The exact figure is still a little bit up in the air – we are working on our models – but we find a negative and significant effect of flood schemes on EQC claims.

“And since EQC claims are only a small proportion of total private insurance claims, we find these flood schemes do have a significant effect.” **WNZ**



For a 5% discount off your Waste Water job – quote “Waste Busters” when you call!

[www.hydrovac.co.nz](http://www.hydrovac.co.nz)

**Do you have a Waste Water or Septic System?**  
Whether it’s at your home or business, we can help you keep it squeaky clean and healthy with regular servicing!

- Residential • Commercial • 24/7 service • 7 technicians with 50 years collective experience
- Largest independent Waste Water service company in NZ • Approved service agent for major system manufacturers • Bioprene Retailer • Environmentally Friendly Servicing • Septic Tanks

Servicing Wairarapa, Greater Auckland area, Waikato & Kawaihi, Coromandel, Waikato to New Plymouth

**HydroVac**  
ENVIRONMENTAL SUPPORT  
**0800 HYDROVAC**  
or  
**09 973 4866**  
wastewater@hydrovac.co.nz



# A new approach to RECORDING PAST CLIMATE

Researchers in Australasia have produced a 500-year climate atlas with a focus on droughts through the centuries in New Zealand and Australia.

The full discussion paper is available as an open access Environmental Research Letter published at [ioscience.iop.org](https://ioscience.iop.org). <https://bit.ly/2PfCUrY>

It is titled: *Drought variability in the eastern Australia and New Zealand summer drought atlas (ANZDA, CE 1500–2012) modulated by the Interdecadal Pacific Oscillation.*

The authors are: Jonathan Palmer and Chris Turney, Climate Change Research Centre; Edward Cook, Columbia University, NY; Kathy Allen; University of Melbourne; Pavla Fenwick, Gondwana Tree-Ring Laboratory, Canterbury NZ; Benjamin Cook, Columbia University and NSAS; Alison O'Donnell, The University of Western Australia; Janice Lough, Australian Institute of Marine Science; Pauline Grierson, The University of Western Australia; and Patrick Baker University of Melbourne.

## ABSTRACT

Agricultural production across eastern Australia and New Zealand is highly vulnerable to drought, but there is a dearth of observational drought information prior to CE 1850.

Using a comprehensive network of 176 drought-sensitive tree-ring chronologies and one coral series, the authors say they have developed the first Southern Hemisphere gridded drought atlas extending back to CE 1500.

“The austral summer (December–February) Palmer drought sensitivity index reconstruction accurately reproduces historically documented drought events associated with the first European settlement of Australia in CE 1788, and the leading principal component explains over 50 percent of the underlying variance.

“This leading mode of variability is strongly related to the Interdecadal Pacific Oscillation tripole index (IPO), with a strong and robust antiphase correlation between eastern Australia and the New Zealand North Island and the South Island.”

Knowledge of natural long-term hydroclimatic variability is essential for water-resource and land-use management and to manage risks associated with extreme events such as drought, they say.

However, there is a dearth of reliable high-resolution (temporal and spatial) records of past rainfall patterns prior to the late 19th century in Australia and New Zealand and for much of the Southern Hemisphere (SH), which limits our ability to estimate long-term hydroclimatic variability.

“This lack of long-term hydroclimate data poses great challenges for managing water resources, which have been largely focused on short-term response rather than proactive planning and mitigation strategies.”

Droughts in Australia and New Zealand can have significant

ecological, social and economic impacts. For example, the 2013 drought in New Zealand was estimated to have caused GDP to fall by 0.6 percent.

There is thus an urgent need to quantify and improve understanding of past natural climatic variations, through accurate, quantified, and absolutely-dated reconstructions that capture variation over annual, decadal and multi-decadal timescales, which in turn can be used to test and refine global climate models.

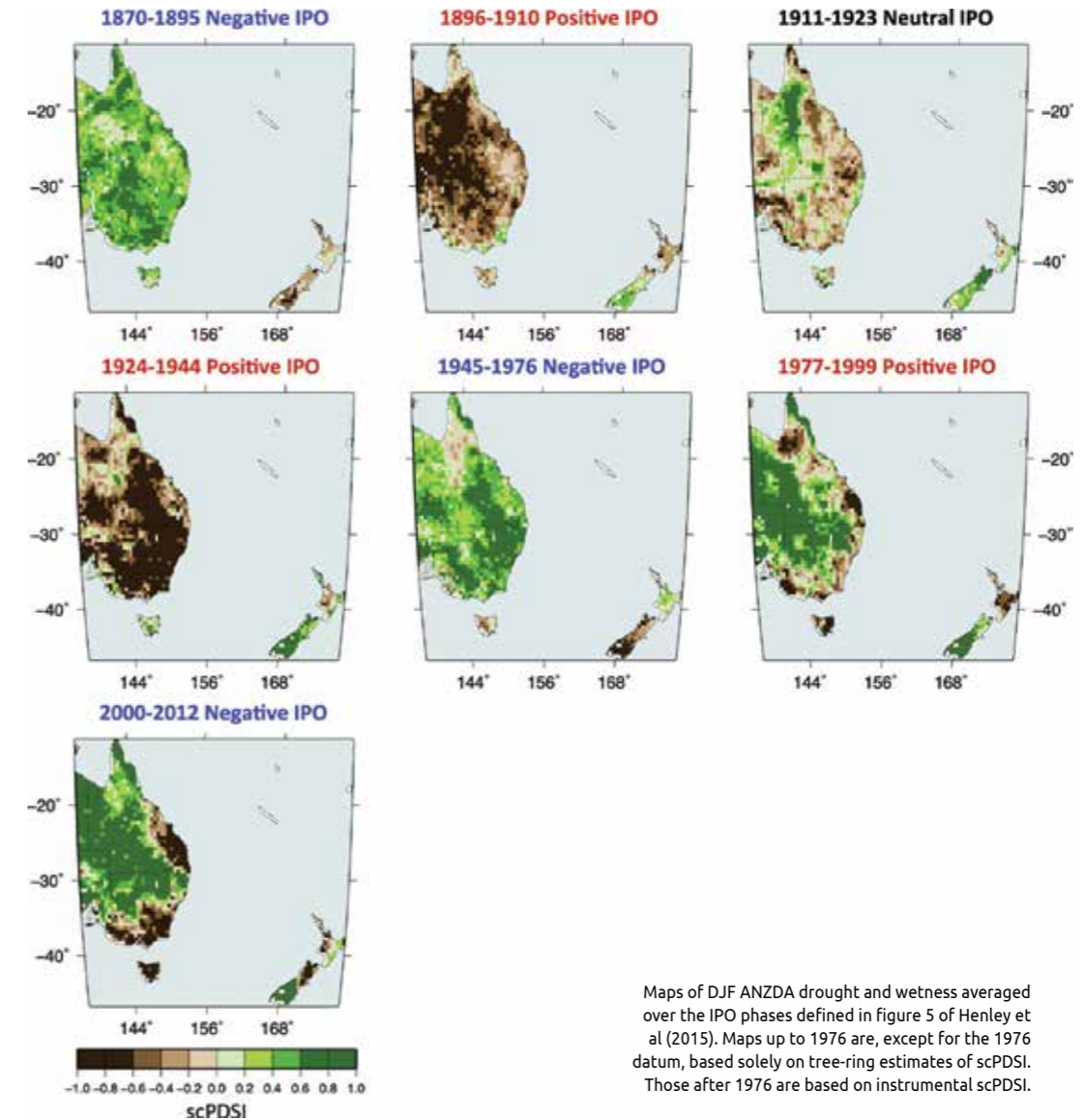
The authors report the development of an eastern Australia and New Zealand Drought Atlas (ANZDA), a seasonally resolved gridded spatial reconstruction of drought and wet periods over the past 500 years, derived from a network of 176 tree-ring chronologies from both countries and Indonesia as well as a coral record from Queensland (177 records in total).

The region in general was chosen due to common climate influences linked to droughts – predominantly the interdecadal Pacific oscillation and El Niño-Southern oscillation (ENSO) events.

The ANZDA aims to provide spatiotemporal details of known historical Australian and New Zealand drought events and to reveal the occurrence, severity, and fingerprint of previously unknown droughts, with their close linkages to large-scale patterns of tropical Pacific sea surface temperatures (SST).

The authors say the ANZDA will thus provide a long-term context for recent drought variability that informs climate modelling, prediction and attribution.

Australia and New Zealand are fortunate to have a range of long-lived tree species with clear annual rings. This has enabled annual growth patterns to be matched (cross-dated)



Maps of DJF ANZDA drought and wetness averaged over the IPO phases defined in figure 5 of Henley et al (2015). Maps up to 1976 are, except for the 1976 datum, based solely on tree-ring estimates of scPDSI. Those after 1976 are based on instrumental scPDSI.

### GT SERIES

A non-corroding, non-metallic bow spring centralizer for applications such as soil nails, rock bolts, anchors, small diameter drop pipe and other data collection devices.

### HD SERIES

A non-corroding, non-metallic heavy duty bow spring centralizer for vertical applications such as production wells, gravel packed well screens, pump torque arrestor, water well casing, coal seam methane casing, pump riser/submersible pump installation, and piling plus horizontal (PIP) applications such as wastewater and sewer pipelines, slip lining and cased crossings.

### 155 SERIES

A non-corroding, non-metallic bow spring centralizer for applications such as gravel packed screens, water well casing, monitor wells, drop pipe, and pump installation plus Ground Engineering related applications such as piles, soil nails, anchors and sheathing installations.

### HDX SERIES

A non-corroding, non-metallic casing spacer for Pipe-in-Pipe (PIP) applications such as slip lining and cased crossings for all medium to heavy weight pipe materials.

Contact [sales@kwikzip.com](mailto:sales@kwikzip.com) or  
 NZ Distributor [Blick Industrial](http://www.blick.co.nz) at [www.blick.co.nz](http://www.blick.co.nz)  
kwik-ZIP® is a registered trademark of kwik-ZIP Pty Ltd Certified to ISO 9001: 2015

between different trees to produce a year-by-year account of past environmental conditions (i.e. dendroclimatology).

Since the pioneering regional tree-ring studies of LaMarche *et al* (1979) more than 150 tree-ring chronologies have been developed from over a dozen different tree species in Australia and New Zealand with most of the data archived at the International Tree-ring Data Bank.

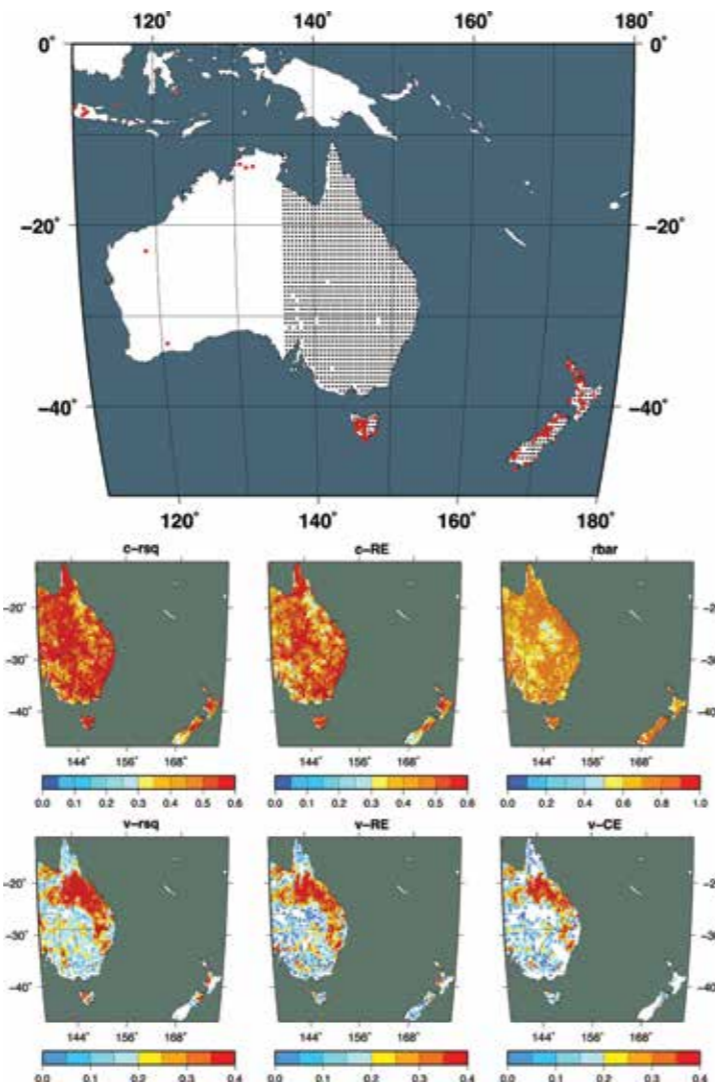
In this study, 176 tree-ring chronologies were drawn from the ITRDB repository or other unpublished tree-ring data archives from current research programmes of the authors plus a hydroclimatically sensitive coral luminescence record from the Great Barrier Reef.

They used 94 tree-ring series from New Zealand, 68 from Tasmania, three from the Northern Territory, nine from Indonesia and two from Western Australia; a network broadly encircling the eastern Australian region.

The actual methodology, calibrations and verification used is described in detail to prove the reliability of the ANZDA scPDSI reconstruction.

An example they use is the detection of the 1791 to 1792 drought (the so-called 'settlement drought') in NSW. Heavy rains in February 1790 were followed by a recorded draught in Sydney from June to November and a partial failure of the wheat harvest. Then the following January and February of 1791 there were several weeks of excessive heat during which 'birds dropped dead from the trees'. The summer of 1793 also suffered drought conditions. This weather pattern between 1791-93 is associated with an El Nino event that threatened the success of the First Fleet settlement and agricultural development in the nascent colony. Research demonstrates this event was more extreme than previously recorded and experienced across all of eastern Australia and was not restricted to the immediate Sydney region.

In another example the ANZDA-EOF1 reconstruction clearly shows that the summer drought conditions during the Australian millennium drought (1997-2008) was not as severe as either the Federation drought (1895-1902) or the World War II drought (1937-1945) as previously recorded.



Location of the tree-ring and coral-proxy network and scPDSI grid-points (upper) along with the associated ensemble calibration/verification statistics (lower) for the 177 tree-ring and coral-proxy point-by-point regression to 1375 scPDSI indices for 0.5° grid-points covering Eastern Australia and New Zealand.

**CONCLUSIONS**

The authors say their network of tree-ring and coral records has successfully reconstructed a 0.5° gridded drought atlas for eastern Australia and New Zealand since CE 1500 – the first such drought atlas for the SH.

“The ANZDA not only reproduced the oldest known extreme drought in the historical record that directly impacted on the first European settlers in New South Wales in CE 1791-2, but provides a broader spatial context for the scale and intensity of that drought across

eastern Australia.

“The comparison with a compilation of 45 instrumental rainfall records from southeast Australia extending from CE 1860 was highly significant. Principal components analysis highlighted the large amount of common variance accounted for by the ANZDA.

“Confidence in the robustness of the ANZDA was further enhanced by the strong positive relationships with climate indices known to modulate the regional climate.

“The strongest correlations were with the tripole index of the IPO and modelling calibration/verification tests

showed the scope for reconstruction of this index back to CE 1500.

“Overall the results also demonstrate the potential of the ANZDA to overcome a common limitation in hydroclimatic risk assessment by providing a long record with which to assess decadal to multidecadal variability.

“Finally, the production of the ANZDA highlights the need for extending existing records (both further back in time and forward to the present day) as well as increasing the spatial coverage of the proxy network.”

# Process, Laboratory and Portable Solutions for Turbidity Compliance



**TU5 Series Lab & Process Turbidimeters**

With 360°x90° detection, these instruments deliver unprecedented confidence that a change in your reading is a change in your water.



**2100Q Portable Turbidimeters**

Easiest calibration and verification—with accurate results every time.

Contact us today to learn more about making turbidity compliance easier.

[www.nz.hach.com](http://www.nz.hach.com) | 0800 50 55 66



Be Right™



# The slow-down in climate warming unpacked

This is a redaction of a story published in *Nature* and written by James Risbey from the Oceans and Atmosphere Commonwealth Scientific and Industrial Research Organisation, Hobart; and Stephan Lewandowsky from the School of Experimental Psychology and Cabot Institute, University of Bristol and the School of Psychological Science.

Short-term climate trends are sensitive to definitions, data and testing. This sensitivity underlies an alleged pause in global warming, and highlights the need for meaningful definitions to sustain claims that it was real.

Although fluctuations in the rate of warming are expected, there has been much research into the characteristics and causes of the most recent period of slower-than-average warming, which occurred from about 1998 for a decade or so.

The results of this research have sometimes seemed inconsistent. Conventionally, research on climate change has not focused on short-term trends (a decade or so in length) because such periods are dominated by natural climate variations, rather than by slower changes in greenhouse-gas concentrations, and therefore don't address larger climate-change issues. However, with some claiming that climate change has somehow 'paused' or entered a 'hiatus', part of the research focus shifted to these short-term trends.

This has posed challenges for climatologists because

**Studies by Risbey and his colleagues** looked at a set of 18 climate models featuring data on the Pacific Decadal Oscillation (PDO), or the seesawing temperature pattern that determines whether a given period is dominated by El Niño or La Niña conditions.

They then looked only at those models whose PDO settings matched those in the real world and found that these models gave a much more accurate reconstruction of temperature trends – including the slowdown in warming seen over the past decade and a half.

This study found that El Niño has a strong influence on temperature trends over relatively short timescales such as 15 years. Because Pacific temperature patterns flip back and forth every few decades, not all climate models reflect the real-world state of El Niño at a given time. That means that, when many models are averaged together, climate models have tended to overestimate the rate of post-1998 warming.

Choosing only those ones with accurate settings for Pacific Ocean temperatures for each 15-year period meant they did a better job of recreating temperature trends during those periods, says Risbey.

conventional climate metrics (such as the global-mean surface temperature; GMST) and tools (such as climate-model projections) are not well-attuned to such short time frames.

Trends measure rates of change and are sensitive to any uncertainty in the data, as well as to the assumptions used to model the trend. For example, because the rate of Arctic warming seems to have been high (compared with the global average) in the past few decades, the determination of these sensitive short-term trends depends on whether or not the Arctic is included. The role of Arctic warming in GMST trends was highlighted as early as 2008 (see [go.nature.com/2q7jnhv](http://go.nature.com/2q7jnhv)).

In short, some data, tools and methods that were good enough when looking at longer-term climate change proved to be problematic when they were focused on the problem of explaining short-term trends.

Small differences in GMST data that are inconsequential for climate change are amplified when short-term trends are calculated. Climate-model projections are blunt tools for the analysis of short-term trends.

Perhaps the most salient lesson to be learnt from work on the pause is the need for clarity of definition and for quantifiable, generalisable accounts of the alleged phenomenon.

Across the hundreds of papers written on the pause, it is hard to find clear definitions that can be usefully generalised. Too often, the pause period defined is so short that a generalisation would imply that warming is paused for about one-third of the time.

The Intergovernmental Panel on Climate Change (IPCC) defines the pause as the reduction in GMST trend during 1998–2012 in comparison to 1951–2012, which offers no basis for generalisation.

For instance, it does not tell us how to quantify such a reduction. If the IPCC definition is to be generalised beyond the nominated 15 years (1998–2012), then we would need to test for all 15-year periods that have a trend below the long-term trend.

Because the GMST warming rate fluctuates, the 15-year warming rate will, on average, be paused for about half the time, which is not a useful generalisation.

Our definitions, like our tools, need sharpening if they are to sustain claims about unusual climate events. **WNZ**

# Water – a legal perspective



Helen Atkins and Tom Gray from Atkins Holm Majurey review the full gambit of legislature, planning documents, and case law impacting on water use in New Zealand.

The Government announced a new set of regulations, complete with a new central regulator, as part of the three waters programme. We explain what this means for water suppliers and stakeholders and how the current structure will change.

A new National Policy Statement has also been opened for submissions. This seeks to protect highly productive land from inappropriate use and will feature discussions around the country.

An Environment Court case on Plan Change 10 in the Bay of Plenty addresses issues in determining which allocation method is more suitable and appropriate for use. Overseer is considered and recommendations are given to develop the tool further in later stages of the plan change.

## Three waters update

New regulations, complete with a new central regulator were confirmed by central government, which largely stemmed from the Havelock North incident and subsequent Inquiry Stage 2 Report.

A key recommendation of the inquiry, as Minister of Health David Clark notes, was to, "establish a dedicated water regulator who will ensure New Zealanders can have confidence their drinking water is demonstrably safe".

The new regulator will be centrally located and have complete oversight around drinking water, with further Cabinet consideration later this year determining whether this will also extend to storm and waste water.

The new regulations have a clear focus on drinking water with a wide-reaching drinking water system. Local Government Minister Nanaia Mahuta says; "For too long, oversight of water has been split between a number of agencies and legislation, and as a result, responsibility has been fractured and ineffective."

While various key elements have been confirmed, it is expected that the full details and policies of the project will be revealed in a Water Services Bill to be introduced later this year.

The system will be implemented over the next five years and will strictly require drinking water providers to comply with standards, rather than the lesser requirement to take 'all practicable steps'.

## Powers of the Regulator

The enforcement powers that are currently split across authorities would be aligned under the central regulator, with the regulator

undertaking the immediate registration of all drinking water providers.

A provider must register and prove compliance with regulations, with the regulator dealing with serious cases of non-compliance first.

After the central regulator implements the core components of the regulatory system, a staggered approach will be taken to fully implement the new system. After three years, the regulator will be actively monitoring larger suppliers (those providing drinking water to over 500 people) and ensuring compliance.

This would also be when smaller providers were being brought further under the system.

At the end of the five-year period, all drinking water providers would be required to be fully compliant with regulations and the regulator will enforce all instances of non-compliance.

The regulator will enforce regulations with a fair amount of discretion, having a general power of exemption for some cases.

Assistance and grace periods will be provided where necessary to allow providers to become compliant with regulations. This will be particularly applicable to small providers and marae in a way that is appropriate, taking into account the supplier's capability, complexity and the risk posed.

However, compliance must be achieved except for exceptional cases.

The specific enforcement powers have not been confirmed but could include fines, personal liability for responsible parties, and even appointing an appropriate person to take over management of the water supplier's operations until a sustainable arrangement is in place.

## Powers of district and regional authorities

Local authorities' roles will largely involve water source protection in terms of drinking water. Suppliers will need to lodge a water risk management plan for source waters with the central regulator, but implementation and compliance of those plans will first fall to local authorities.

Councils will also be required to share information regarding source water risks and report annual trends in source water quality and quantity.

Regional councils will also remain as the regulator of wastewater

and stormwater discharges. This will involve the same powers of developing objectives, policies and rules; granting resource consent applications; monitoring and enforcing compliance; and reporting.

However, the central regulator will set national expectations for compliance, monitoring and enforcement approaches.

### Non-council suppliers

The new regulations will only have legal effect over council suppliers of drinking water.

However, there will be obligations on territorial authorities to inform themselves about all drinking water suppliers in their districts, to identify problems with suppliers and work collaboratively to find a solution, and, if a solution cannot be found, the authority would be obliged to provide safe drinking water to those being supplied by the unsafe supplier.

The central regulator will also be involved in assisting councils and suppliers in this process.

### Overall aim

The key aim of the new regulations and central regulator is to improve the drinking water to a high standard and ensure incidents such as Havelock North do not recur. The staged approach will see the central regulator work with drinking water suppliers to achieve compliance with new regulations and enforce non-compliance.

Central government acknowledges that there may be serious cost involved for some suppliers to become compliant but this will not relax enforcement where risk remains.

Minister of Health David Clark, who spearheaded the Government's response to the Havelock North incident, says that public safety is a non-negotiable priority – deeming access to safe drinking water “a birth-right for New Zealanders”.

The new regulator will also be required to specify national environmental performance standards for wastewater and stormwater networks, and publish and promote best practice advice and guidance to councils and suppliers.

### Elite soils protection

A new National Policy Statement (NPS) has been announced to prevent the loss of more productive land and promote its sustainable management.

Submissions are currently being sought on the NPS which is part of a discussion document, *Valuing Highly Productive Land*, from the Ministry for the Environment and the Ministry for Primary Industries.

The NPS will require councils to put more weight on the value of highly productive land in their land-use planning and decision-making and seeks to improve the way highly-productive land is managed under the Resource Management Act 1991 (RMA).

Agriculture Minister Damien O'Connor says; “We have a well-earned reputation for producing some of the best food in the world.”

The Minister also notes the full range of values and benefits associated with elite soils, stating that highly productive land brings; “significant economic benefits including employment for nearby communities, and adds significant value to New Zealand's primary sector.”

The NPS is proposed as future-proofing primary production for future generations. The Minister raises his concerns, noting; “One of the greatest challenges facing the world right now is the need to feed a growing population.”

The management of highly productive land under the RMA will change to be more protective against inappropriate subdivision, use, and development with the Minister acknowledging; “Once productive land is built on, we can't use it for food production, which is why we need to act now.”

Consultation is open to the public until 10 October and the Ministry for Primary Industries and Ministry for the Environment will host public meetings around the country to answer questions on the NPS as well as other general work being done regarding the national direction of the RMA.

## NITROGEN DISCHARGE CASE STUDY

*The case: Federated Farmers of New Zealand Incorporated V Bay of Plenty Regional Council (2019) NZENVC, Environment Court, Judge Kirkpatrick.*

This case addresses the appeals to Proposed Plan change 10: Lake Rotorua Nutrient Management (PC10) and focuses on determining which allocation method is more suitable and appropriate for use in the catchment: A sector range approach proposed by Bay of Plenty Regional Council (Council) or an Alternative Natural Capital Approach (ANCA) proposed by CNI Iwi Land Management Limited (CNI). The scope of PC10 is limited to the consideration of nitrogen discharges from pastoral farming within the Lake Rotorua catchment.

The Court noted the unique circumstances that exist in the catchment and that the approach taken to reducing the nitrogen discharges into Lake Rotorua may not be easily transferable to other catchments.

ANCA uses the Land Use Capability (LUC) system as a proxy for natural capital. Only two other regional plans in New Zealand use a natural capital approach, being the Horizons One Plan and the Hawke's Bay Regional Plan Change 6.

However, there are no other plans in New Zealand, or overseas, that appear to use LUC in the way proposed by CNI.

The biggest concern that the Court had regarding LUC was the relationship between LUC and nitrogen losses below the root zone needing to be established more reliably.

The Court found that there was a lack of certainty created by using LUC as a proxy for natural capital as a method to reduce nitrogen from existing land uses in the catchment, and therefore not reliable enough to use as an allocation method in PC10.

Ultimately, the Court found that the sector range approach was a more appropriate method of allocating nitrogen discharges on most bases of comparison, including the effects on the natural environment, social effects, the robustness and reliability of the process and land use change.

ANCA was more effective in mitigating cultural effects.

The decision also discusses the limitations and use of Overseer as a regulatory tool, including the uncertainty of the results between different versions of the software. For example, Version 5.4 and Version 6.2.0 differ in their nitrogen loss predictions in the Lake Rotorua Catchment by approximately 88 percent, with Version 6.2.0 giving a higher figure.

The Court's decision reflects similar comments made about the

limitations of Overseer by the Parliamentary Commissioner for the Environment in December 2018 which identified the need for greater transparency and a comprehensive and well-resourced review of the model.<sup>1</sup>

With specific regard to the Lake Rotorua catchment, the Court noted that Overseer had not been calibrated for the conditions prevailing in the catchment, meaning that uncertainty in the predicted nitrogen losses could exceed ±30 percent.

The Court also noted that the uncertainty regarding Overseer as a regulatory tool is reflected in its own experiences gained from cases which have been presented to it over several years.

However, there is no evidence of a realistic alternative to Overseer; its use as a regulatory tool was noted by the Court as being “a work in progress” which would likely need modification in the future.

The Court established eight specific requirements which should be incorporated into PC10 by Council to ensure that Overseer is acceptable to be used in a regulatory context, including:

- A consistent and accurate approach to model input data;
- The use of best management practices appropriate for the local environmental conditions such as soil types and weather patterns;
- Using the model to predict trends and relative changes in farm management systems, rather than absolute values;
- Calibrating model outputs with field measurements;

1. Overseer and regulatory insight: Models, uncertainty and cleaning up our waterways, 12 December 2018, Parliamentary Commissioner for the Environment.

- Using appropriately qualified and experienced experts to run the models for compliance purposes;
- Establishing a process to review and update model outputs and management practices at appropriate intervals;
- Appropriate on-site verification that modelled inputs and outputs are being complied with, in addition to independent peer review of performance; and
- A compliance mechanism that is certain, reasonable, practical and legally enforceable.

### Where to from here?

As explained above, the selected method for the allocation of nitrogen discharges is to be the sector range approach, as proposed in PC10 by the Council.

The Court has recognised that details of the allocation method need to be addressed more fully at the Stage 2 hearing and has set out several matters for the Council to address.

Going forward, it seems unlikely in the foreseeable future that an alternative tool to Overseer for pastoral farming will be found to be as effective or detailed.

However, the Court has addressed how to reduce the uncertainties and limitations of Overseer as a regulatory tool which will hopefully be incorporated into other plans and decisions. **WNZ**

# „FULL SERVICE IN PLACE“

offers you many advantages



## NETZSCH

*COMPLETE PUMP SERVICE  
without removing the  
pump from the system*

- LONG SERVICE LIFE
- RAPID DISASSEMBLY/ASSEMBLY
- EASY MAINTENANCE & CLEANING
- EASY ACCESS TO ALL WEARING PARTS
- ROBUST
- UPGRADEABLE & COMPATIBLE
- ECONOMICAL



0800 PUMPING

www.macewans.co.nz

# Digital revolution or evolution



By **Michael Howden**, Beca, Senior Associate Digital.

The digital revolution promised to make our jobs easier through shiny new technologies, or even to automate our work with artificial intelligence.

In the water sector, asset management tools are becoming increasingly sophisticated; smart meters offer more usage data than we have had before; while Building Information Management (BIM) has the potential to transform the way we build and operate assets.

And yet, in reality, our jobs are getting busier and busier as we have to manage more and more systems and meet increasingly complex compliance and reporting requirements. We need to take a smarter approach if we are going to realise the full benefits of digital technologies.

## Drowning in the digital deluge

Despite the progress that has been made in digital technologies over the past decades, many common problems continue to persist: Too much data and not enough information.

Although we now have more data than ever before, this does not always mean that we have the information we need to make informed decisions.

In our rush to record data, we can lose track of its purpose and how we need to aggregate and analyse the data to make it meaningful. Data we have might be inaccurate, eroding the trust we have in it.

Systems are complex for users: Our teams bear the burden of using the digital technologies we adopt, which require training and ongoing support. When these systems are cumbersome to use, this burden is increased.

Propagation of technologies: Research has shown that people use an average of 56 different apps and websites each day.

To address these issues and make digital technologies work for us, we should consider the following approaches while implementing digital solutions:

### Have a clear purpose

Every digital solution must offer a clear business value, whether it is improved efficiency and effectiveness or managing risk and compliance.

Some will promise that digital technology can do anything (for a price!), but it certainly cannot do everything. Information Technology (IT) projects commonly fail when an unclear scope is allowed to grow to an unmanageable size. So while it may be tempting to use an upgrade to your financial systems to improve your asset management solution, it may be better to plan this as a separate initiative.

Clarity about the value being delivered will help to define the scope of a digital initiative. Tools like Investment Logic Maps can help to define problems, benefits, responses and solutions.

### Put people at the centre

A digital solution is a combination of technology, processes and people. Once we know what value a digital initiative will deliver, we can identify the people who will be involved.

Some of these people will be direct users of the system, while others may benefit indirectly, for example, through receiving new reports. Additional stakeholders may be responsible for funding the solution or continuing to maintain it. All of these people need to be engaged in a successful digital



initiative, from initial consultation, defining requirements, design, training and support. Digital solutions should allow our teams to do things more easily, but only if we bring them along on the journey.

### Make incremental progress

Most organisations already have several major business digital systems in place, e.g. financial management, customers relationship management (CRM), asset management, human resources and document management. Future benefits can be gained through smaller incremental initiatives.

Low-code application development platforms like Microsoft PowerApps and QuickBase and other cloud services are making it easier to build, test and implement new solutions.

Data visualisation and analysis tools like Power BI and Tableau allow us to generate new insights and reports from existing data and systems. Automation tools like Microsoft Flow, Zapier and FME can integrate these systems and automate tasks. Initiatives to support users, improve data quality and streamline business processes can add as much value as new technologies.

If this progress is made with a holistic, systematic view, initiatives can incrementally build on one another. Leveraging existing technologies, applying lessons about what works and not re-inventing the wheel can lead to significant improvements over time.

### Your ongoing digital evolution

Despite what technology vendors may have told you, there is no single solution to all of your problems.

But there are ways we can work smarter, through having a clear purpose, keeping our people in mind and looking for incremental value.

By bringing together water experts who understand how water service organisations operate, with digital experts who know what is technologically possible, there are many more benefits we can realise. [WNZ](#)

• For more information, get in touch at [Michael.Howden@beca.com](mailto:Michael.Howden@beca.com).



## Elegant solution to an age-old problem

By **Glenn Jowett**, senior associate, Beca, BIM Delivery Lead.

The Hamilton City Council Pukete Wastewater Treatment Plant Asset Information Model project focuses on the complex problem of collecting, integrating and maintaining information about existing asset stock.

The plan was to build a BIM system utilising the plant's existing data, update the data and upload the results to a cloud-based platform.

The challenge that confronted the Hamilton City Council and Beca

at the beginning of this project centred on accessibility, reliability and completeness of asset information and as-built records.

The solution proposed and implemented by Beca was to break down the problem into smaller, palatable chunks and address each component individually using a range of technologies. This included the use of drones to capture site-wide geometry, while laser scanners were deployed to capture building and asset geometry.

The team used 3D modelling tools to develop a 3D model, and a web-based integration tool helped create the asset information model. Mobile devices were used to link the digital assets to barcodes on their physical

asset counterparts. This project used an unconventional application of BIM technology that paired the 3D model containing asset data with live SCADA information in a web-based environment – so the client could digitally walk through the plant and identify areas of slow performance or identify where any issues may be located.

The successful outcome of this project was due to the development of a high level of trust and collaboration between the consulting team and Hamilton City Council, along with the clever way the data is now collated, presented, and used.



Too much data and not enough information?

Get the right insights to all your people, all the time.



[www.beca.com](http://www.beca.com)  
[/beca-digital](http://beca-digital)

make everyday better.



# Flood alleviation and stormwater project

Auckland Council is investing around \$100 million to unlock what was once flat, flood prone, peaty rural land around Takanini for housing development and transforming the area into a new, eco-friendly urban community. Supplied by Healthy Waters.

In 2018, the first steps in the massive Takanini Integrated Stormwater Solution infrastructure upgrade project delivered the Artillery Drive Tunnel and the Grove Road Box Culvert. These engineering feats will increase capacity to the stormwater network, reduce flooding and open the way for developing the liveability and appeal of the Papakura-Takanini-Manurewa area in line with the Auckland Unitary Plan.

The council says it has a unique opportunity to collaborate with partners and stakeholders to create a connected wetland for residents and apply innovative and environmentally sensitive solutions to manage what have been serious flooding and stormwater overflows.

The project will eventually see up to 15,000 people living in an integrated community connected to the natural habitat in the revitalised part of Takanini.

## Stormwater tunnel

The Artillery Drive Stormwater Tunnel was project managed by Pradip Baisyet and Dietmar Londer from Healthy Waters; the designer was Jacobs New Zealand and the contractor McConnell Dowell Constructors.

The tunnel is over one kilometre long and the pipes that run its whole length are 2.5 metres in diameter and laid up to 13 metres underground.

It has the capacity to convey large volumes of stormwater from the McLennan Park Wetland to the Pahurehure Inlet. Its construction will decrease flooding and allow residential development in parts of the Takanini Greenfield Area. This includes Housing New Zealand homes.

Five 6-13 metre shafts were sunk. The team had to work fast, driving in new piles to reinforce the soft walls against

rising groundwater to then lay the concrete platform for the hydraulic jacks and boring machine to travel along.

The tunnel sections were constructed using a Pipe Jacking machine with massive cutterheads to drive through often hard rock – and yet no one heard a sound above ground.

The 2.5 metre pipes were installed to exacting accuracy using computerised systems and no settlement or dislocation along the alignment occurred.

This technology is now being used by Healthy Waters on other projects.

## Box culvert

Construction of the Grove Road Box Culvert, under Project manager Tony Morley, was carried out by contractor HEB within a very challenging timeframe and involved co-ordinating with Housing New Zealand’s development on the site.

Key challenges to construction of the 0.5-kilometre-long concrete culvert were managing the high-water table and soft peat soil that was prone to collapsing.

The culvert runs underneath Battalion Drive and connects the Awakeri Wetlands, now under construction, to the McLennan Wetland channel through Housing New Zealand land which has now been developed to provide new homes.

It is a vital component in the big picture flood mitigation plan for Takanini and also importantly, provides a fish passage

as the Awakeri wetlands are re-created.

What you see today is a landscaped open channel and increasingly attractive community wetland, but this was a major construction project that took place in a bog.

Due to the sheer size of the culvert, the ground was unable to support the weight of a crane lifting pre-cast culvert sections, so the culvert had to be built in place.

The team excavated to around seven metres below ground to build the sheet piled trench, stabilise the ground and stem the tide of rising ground water.

Once stabilised, the trench was ready to start the process of building the concrete culvert in situ.

The team, by working from both ends of the trench, completed 24 metre sections each month to come in on time and on budget – and without injury in these difficult and potentially hazardous conditions

## Wetlands project

Now underway, across the road, is the first stage of the four-stage Awakeri Wetlands Project. This is the final piece in this flood alleviation project and another step in enabling development of a new community connecting people to nature.

Stage One of the Awakeri Wetlands Project, costing some \$45 million, is focused on construction of a t-shaped,

SEE US AS THE WATER NZ  
CONFERENCE & EXPO  
STAND 140



## 1919 - 2019: bursting with 100 years of tradition & innovation

Carl Kaeser opened his machine shop in Germany in 1919. 100 years later and KAESER is now a global supplier of compressed air solutions that remains true to its origins. In fact a rich history of tradition and innovation to this day allows us to continue to push the boundaries of compressed air technology!

maintenance, with an energy savings potential of up to 30 percent\*. And, all KAESER products are ready to take advantage of the future-orientated benefits of Industrie 4.0. The result; more compressed air and more savings!

You can be assured that when you choose a KAESER rotary or screw blower, from design to manufacture, it has been developed for optimum efficiency, reliability and ease of

Let us help you optimise your compressed air systems energy efficiency today, just phone 0800 447 820. \*Savings may vary depending on utilisation

**KAESER COMPRESSORS** 0800 447 820  
nz.kaeser.com

Keep up-to-date with our global centenary celebrations on LinkedIn and Facebook. Just search #kaeser100





Above: Stage One of the Awakeri Wetlands Project, costing some \$45 million, is focused on construction of a t-shaped, 2.3-kilometre-long wetland stormwater channel running from Grove to Cosgrave to Walters Roads which will enable more new housing developments in this area. Below: Awakeri Wetlands Project opening the way to eco-friendly communities.



## Project highlights

- A 2.3 kilometre channel from Grove to Cosgrave to Walters Road
- First large scale, open stormwater channel in New Zealand
- 90,000 cubic metres of peat, equivalent to 6000 truckloads removed
- A seven-metre-deep trench and impervious underground wall built to hold back groundwater from seeping into the wetland
- One road culvert
- Nine weirs and fish passages
- 20 stormwater outlets
- 3.3km of footpaths
- Seven boardwalks
- 150,000 native plants
- The project will see up to 15,000 people living in the revitalised area, which includes the Takanini Strategic Housing Area.

2.3-kilometre-long wetland stormwater channel running from Grove to Cosgrave to Walters Roads which will enable more new housing developments in this area.

The channel is scheduled to be fully operational by 2021-2022 and the entire project completed by 2023.

Tens of thousands of tonnes of peat have been excavated to complete the massive wetland stormwater channel. A trench, up to seven metres deep in places, surrounds the entire development and an internal retaining wall stops groundwater entering and compromising the wetland's ability to deal with stormwater

Hundreds of millennia-old kauri stumps have been uncovered. Some have been selected by iwi for carving and creating artwork in the urban wetland, but many of the bigger stumps which cannot be moved by man or machine are being left in situ to form part of the channel's natural eco-system.

The project is being developed using 'Te Aranga' design principles in collaboration and consultation with local Maori. These principles are guiding every element of the design of the waterway, including the physical design and the materials used for the walkways, boardwalks, bridges, weirs and fish passages, wayfinding signs and the native plantings, all with the aim of connecting people to place and to nature.

You can get a birds-eye view of the size and scale of the first largescale open wetland channel that is being built at: <https://bit.ly/2ZelMHI> **WNZ**





**RENDETECH**

**TANK CONNECTION**  
AFFILIATE GROUP

**Steel storage tanks for speed and simplicity.**

Steel tanks are a proven alternative to concrete for potable water and wastewater storage. They are quick and easy to erect, more cost effective, and have real design flexibility.

As the regional agent for Tank Connection – premium, bolted steel storage tanks and aluminium domes – we design solutions for even the largest applications.

POTABLE WATER TANK – NEW ZEALAND – 10,000m<sup>3</sup>

RENDETECH.CO.NZ



# Strengthening three waters regulation

The need for better drinking water regulation and protecting source water is the key driver in the Government overhaul of three waters regulations and it is expected that it will implement most policy decisions through a new Water Services Bill later this year.

Here is a summary of the key elements of these reforms.

## Securing safe drinking water

The Government believes our drinking water regulatory system is currently failing to provide the necessary assurances that supplies are safe and reliable; that some suppliers are not regulated effectively, while many others are not regulated at all.

It proposes all drinking water suppliers be covered by the drinking water regulatory system, except for individual 'domestic self-suppliers'. Basically, this means everyone except those supplying water only to themselves.

Going forward, all drinking water suppliers will be required to provide safe drinking water and comply with drinking water standards on a consistent basis. To help clarify this new approach, the lesser requirement to take 'all practicable steps' to comply will no longer feature in drinking water legislation.

## A central regulator

The Government will set up a centrally located regulator responsible for overseeing the entire drinking water regulatory system that will be implemented over a five-year period.

This regulator will be in charge of: Sector leadership and setting standards and compliance; monitoring and enforcement; capability building; accreditation and licensing; information, advice and education, including being a centre of technical and scientific expertise; and performance reporting.

Because of significant synergies between drinking water regulatory functions and those relating to the wastewater and stormwater regulation – aligning these functions will result in a better integrated approach to three waters regulation and a regulator with greater capability and capacity, says the Government.

These functions include:

- Reviewing, and recommending changes to, national standards for wastewater discharges and overflows;
- monitoring and auditing the risk management practices of wastewater and stormwater network operators, including consent renewals;
- collecting, analysing and publishing the information provided by wastewater and stormwater operators, in accordance with nationally-prescribed environmental performance metrics;
- identifying and promoting national guidelines and good practices, including for setting consent conditions for discharges from stormwater networks, and approaches to wastewater and stormwater network design and management;
- setting national expectations for compliance, monitoring and enforcement approaches for wastewater and stormwater network operators; and/or
- identifying and monitoring emerging contaminants in

drinking water, wastewater, and stormwater.

With respect to drinking water, from the date of enactment all drinking water suppliers will have to register with the regulator and ensure any water they provide is 'safe' to drink.

Suppliers that provide drinking water to 500 and more consumers will be required to prepare/update drinking water safety plans will have to include all elements of international best practice; be proportionate to the scale, complexity and risks of supply arrangements; be subject to risk-based audit and monitoring by a central regulator; and be operating in accordance with those plans within one year following enactment.

The regulator's initial focus will be implementing the core components of the regulatory system, working with suppliers to build capability and understanding, and investigating and addressing serious cases of non-compliance.

By the end of the third year following enactment, the regulator will actively monitor the performance of all suppliers that provide drinking water to 500 or more consumers, and take enforcement action where appropriate and work with smaller suppliers to bring them into the regulatory system.

By the end of the fifth year following enactment, all drinking water suppliers will have to comply with regulatory requirements, and the regulator will take 'action' to deal with non-compliance.

The Government acknowledges that it may be challenging for some suppliers to comply with their new obligations, but says this will be 'managed' by allowing for assistance and time to achieve compliance, and in a way that is proportionate to the supplier's capability and the complexity and risks of their water supply systems.

Further work is needed to determine the phasing of implementation for suppliers that are not currently covered by the regulatory system, particularly very small suppliers, and to ensure regulatory requirements are designed in a way that reflects proportionality, with specific consideration to be given to the implications for marae, particularly those in remote locations.

The regulator will have a general power of exemption for cases where some, or all, of the requirements in the regulatory system are impracticable or unreasonable (such as back country huts) and will work with affected parties to identify supplies and agree to exemptions.

Some suppliers may struggle to comply with new or enhanced regulatory requirements and consider ceasing their operations. There is, of course, no legal obligation on non-council suppliers to maintain their supplies, but that risk can be managed by giving local authorities clear responsibilities to ensure communities have access to a reliable source of safe drinking water.

This approach will involve the following provisions:

- An obligation on territorial authorities to educate themselves about the supplies of drinking water to communities across

their districts – including all non-council supplies, except those owned/operated by the Crown, and domestic self-suppliers;

- a requirement that if problems are identified with a non-council supply the territorial authority would notify the regulator, and work collaboratively with the supplier, its consumers, and the regulator to identify a sustainable solution;
- if a solution cannot be agreed within a specified timeframe, or if the supplier exits, the territorial authority will be obliged to ensure safe drinking water continues to be provided, but that this does not necessarily mean becoming the supplier directly, or that the supply would have to be provided via a reticulated network

## Protecting drinking water sources

An important principle of drinking water safety is water protection at source. As such, there are deficiencies in the current arrangements for protecting sources of drinking water that need to be addressed.

The Government will introduce new and enhanced obligations on regional councils, territorial authorities, and water suppliers for managing risks to source waters, including requiring water suppliers to develop and implement a source water risk management plan, which will be lodged with a central regulator for auditing and compliance monitoring purposes.

Regional councils and territorial authorities will be required to contribute to the development and implementation of source

water risk management plans and, periodically, monitor source water quality at the point of abstraction, and share information with each other related to source water risks.

This will include the location of drinking water abstraction points and the results of monitoring of source water quality and quantity.

Regional councils will also be required to report annual trends in source water quality and quantity, and to periodically assess the effectiveness of actions taken to manage risks to source waters.

These additional obligations are to be given effect through revisions to the National Environmental Standard for Sources of Human Drinking Water. Expect to see the Ministry for the Environment active in this area later this year.

## A multi-barrier approach to safety

The Government expects all drinking water suppliers to adopt a multi-barrier approach to drinking water safety.

This involves: Preventing hazards entering raw water; removing particles and hazardous chemicals from the water by physical treatment; killing or inactivating pathogens in the water by disinfection; and maintaining the quality of water in the distribution system.

The details of multi-barrier approaches adopted by each supplier are to be given 'effect' through water safety plans, or other instruments agreed by the regulator, and the regulator will be empowered to monitor and enforce compliance.

## Lifting waste and stormwater system performance

The Government decisions around drinking water are complemented by a series of decisions about how to improve wastewater and stormwater regulation. The current regulatory system does not provide assurances that wastewater and stormwater systems are delivering outcomes that are acceptable for communities and the environment.

The Government has therefore decided to develop a National Environmental Standard (NES) for the treatment of wastewater discharges and the management of wastewater overflows under the RMA. A technical advisory group (or groups) is expected to be convened to provide advice on the development of an NES.

It plans to introduce new obligations on wastewater and stormwater network operators to manage risks to people, property, and the environment associated with the operation of their infrastructure

networks – and to the development of national guidance to improve the regulation and design of stormwater services.

Because there is a lack of transparency and public reporting on the environmental performance and compliance of wastewater and stormwater networks, including their contribution to environmental and public health outcomes, the government plans to introduce a regulatory requirement for wastewater and stormwater network operators to report annually on a set of nationally-prescribed environmental performance metrics.

The new regulator will be required to specify national environmental performance metrics for wastewater and stormwater networks, and develop suitable methods for collecting, validating, analysing and publishing this information.

Improving leadership, oversight and support

The Government believes regional councils

and service providers require more clarity about what is expected of them, and more support from a central regulatory agency to help them meet those expectations. It has agreed to direct a central regulator to set and publish guidance for local authorities regarding the compliance, monitoring and enforcement approaches to be used for wastewater and stormwater network operators.

The central regulator will also identify and monitor emerging contaminants in drinking water, wastewater and stormwater, and coordinate national-level policy responses, both regulatory and non-regulatory.

The regulator will be required to undertake functions relating to identifying and promoting national good practices for wastewater and stormwater network design and management, including the development and dissemination of national guidelines.

The regulator will have the ability to exempt suppliers from requirements to use residual treatment in a distribution system if they can demonstrate, to the regulator's satisfaction, that risks to the safety of the water are being managed appropriately.

### Improving water safety planning

Taking a preventative approach to risk management is a principle of safe drinking water. Effective water safety planning strengthens the focus on preventative measures across the drinking water supply system. Expect more emphasis by the regulator in this space.

A centralised approach to compliance, monitoring and enforcement

The Government says the regulator needs to have a wide range of appropriate powers and resources to undertake its compliance, monitoring and enforcement functions effectively. These powers will include:

- Providing assistance and advice to suppliers;
- requiring suppliers to provide information;
- the ability to issue instant fines and infringement notices for low-level offences;
- civil enforcement, such as the power to issue an enforceable compliance notice, with an appropriate penalty attached to failure to comply, and the ability for suppliers to make undertakings to the regulator on actions they will take to comply, with an agreed penalty for failure to do so;
- criminal enforcement;
- developing and implementing a scheme for accrediting drinking water suppliers, and requiring certain suppliers to participate in this scheme,
- developing and implementing a scheme for the registration and licensing of certain people who are involved in water supply operations.

There may yet be a wider range of penalties available for offences, including fines and the possibility of personal liability for specific persons with responsibilities for water safety.

The Government says there may be circumstances where the regulator considers these enforcement tools are ineffective, or inappropriate, for dealing with persistent or serious cases of non-compliance or poor performance by a drinking water supplier.

The regulatory framework will therefore include the power of the regulator to identify drinking water suppliers that are performing poorly, at risk of failure, or already failing to meet their statutory obligations.

In situations where the regulator is dissatisfied with the corrective actions taken by a supplier, or has determined that the supplier is not capable of improving its performance, or carrying out its statutory functions or duties, the regulator be able to appoint a statutory manager or accredited provider to temporarily manage a drinking water supplier's operations until a sustainable arrangement is put in place – or require a drinking water supplier to transfer the management of its operations to another supplier on a long-term basis. **WNZ**

# Future-proofing Dunedin's freshwater supply

When the Dunedin City Council set out to improve the security of its freshwater supply it was also embarking on the preservation of its city heritage.

**T**he Ross Creek Reservoir and associated reserve has been part of Dunedin's heritage for the past 150 years. Some four kilometres from central Dunedin, this special part of the city is a popular recreational area for the community.

The reservoir has become many things to many people. To the Dunedin City Council it is a vital water retaining structure that has played a number of different roles in the city's water supply over its 150-year life span.

To Heritage New Zealand it is the home of several Category 1 historic structures. To the Dunedin Amenities Society it is an important heritage, recreation and conservation area for the city that *"provides significant feeding, roosting and breeding habitat to many bird species and is an important part of the biological connectivity of the wider landscape"*.

To the local schools it is a stunning locality on their doorstep for hosting school events such as cross-country races and educational excursions.

To the surrounding neighbours it is an extension of their backyards providing endless entertainment for young and old and to the wider Dunedin community it is a favourite and beautiful spot for people of all ages to run and walk – providing varying terrain suitable for wheelchairs, prams, and dog walking.

This legacy was foremost in the council's Ross Creek Reservoir Refurbishment 150 year upgrade project, which is part of the city's Security of Supply Strategy. Dunedin's two principal water supply pipelines travel over aging pipe bridges, leaving them vulnerable to failure.

Physical works started in mid-February 2017 with construction taking 23 months followed by a year of re-commissioning. Works involved in excess of 38,000 hours of complex work, including over 2000 hours of confined space work in the tunnel and valve tower.

A collaborative approach by client Dunedin City Council, WSP Opus International Consultants, and Downer was essential to this project's success, especially given the high-risk nature of the structure, the complexity of the work, the wide range of stakeholders (including schools), the unique and unforeseen challenges faced and an associated significant increase in scope.

### Category1-heritage dam

Construction of the original dam structure and the iconic masonry valve tower date back to 1860's. Given its significance, being the oldest earth dam still in service, the dam structure and

valve tower both hold a Category1-heritage listing.

The contractor undertook onsite reviews and meetings with Dunedin Amenities Society and Heritage NZ and their designated archaeologists. This liaison continued throughout the project with advice and agreement sought. A collaborative approach was essential to get this project over the line, especially with its wide variety of stakeholders.

The dam structure was in an early state of failure – a failure that had potential to cause damage/fatalities in the communities downstream, including the heavily populated sections of Dunedin surrounding the waters of the Leith stream running through the Northern City and University.

As the Ross Creek site is situated in the centre of a key public reserve, vehicle access to the site is only possible via a narrow windy section of Burma Road cutting through the dense native bush of the reserve. Hazard assessments undertaken prior to construction commencement indicated that due to the combination of 3000+ truck movements being

required to complete the earthworks and the width of the road being no more than a single highway lane in places, that a section of Burma Road would have to be closed for the duration of the project.

The contract initially allowed 12 months for construction. The quantum of change resulting from unforeseen conditions and associated redesign, resulted in the contract period being extended by 11 months (the project scope grew to around 150 percent of the original).

Numerous archaeological discoveries were made during the physical works and the processes put in place for the contractor to liaise with a project archaeologist when such finds were made.

The project was completed in October last year at a cost of \$6.5 million and achieved its purpose to re-enable full utilisation of the available storage capacity, increase resilience of the wider urban water supply, and leave a lasting legacy for the city. **WNZ**

## Interflow®

**Come and see us at Booth 149  
at the WaterNZ Conference**

Delivering infrastructure renewal through  
world leading innovations

Your local delivery partner



Follow us



interflow.co.nz  
mail@interflow.com.au

Locations throughout New Zealand and Australia



# Creating world records

Watercare's award-winning Army Bay Wastewater Treatment Plant Outfall Replacement at Shakespear Regional Park north of Auckland city makes a big improvement in the treatment of effluent from this facility and is noted for its innovations.

The original project to increase outfall capacity at the Army Bay Wastewater Treatment was bid as a Design Build contract by Watercare, with an upgrade to the existing UV plant, an outfall with a two kilometre Horizontal Direct Drilled land section connecting to a 950 metre marine section providing disposal in the Tiritiri Matangi channel.

The winning contractor McConnell Dowell offered an alternative to this design with a new UV plant and a tunnelled land section, using a Herrenknecht Direct Pipe TBM, with a 1200 ID steel carrier pipe and an 1100 ID HDPE liner to meet Watercare durability concerns.

This treatment plant upgrade project has been recognised around the world for its innovative extension of Direct Pipe tunnelling technology that went far beyond anything previously achieved and made a world record of 1929 metres.

Two temporary shaft receiving pits up to 48 metres beneath ground surface were also required for cutterhead tool replacement. The adoption of this "new to New Zealand" technology required Watercare and the contractor to be convinced of its success, but the opportunity provided greater capacity, a new UV treatment plant, and with a smaller footprint in the Shakespear Regional Park (SRP).

The project's location at the end of the Whangaparaoa Peninsula created challenges, including the resource consent limiting truck movements to 10 per day along the single road access to a constrained site. SRP is a pest-free enclave, so extensive environmental mitigation was required. Nor could works impact the operation of the existing wastewater treatment plant being upgraded, which had to remain at full capacity.

The project also involved a broad range of stakeholders including the NZ Defence Force and the Auckland Council's Parks' team.

The complex nature of this project required a contractor team

of skilled and experienced tunnellers and marine specialists. Most were drawn from McConnell Dowell's recent major tunnelling projects, such as the Waterview Connection and Artillery Drive. Although not required to operate the project under tunnelling regulations, the contractor opted to do so.

The project won Category Three (projects with a value of between \$20m-\$100m) in the 2019 CCNZ/Hirepool Construction Excellence Awards through its string of construction achievements that involved close to 200,000 manhours in difficult conditions over 23 months without a single person being hurt.

In addition to the longest drive (1929m) using Direct Pipe technology, a technique was developed that allowed the TBM to intersect and pass through the narrow receiving pits while maintaining pipe seal. The TBM was recovered underwater.

The project also developed a pushing technique from the landward end for the insertion of two kilometres of 1100 ID HDPE liner into the steel drill pipe.

The CCNZ award judges said this project has achieved much in furthering the frontiers of TBM utilisation and acceptance in New Zealand and is a tribute to the benefits to be achieved by cooperation between client and contractor. Watercare has now adopted this method of outfall construction for future outfall expansion projects

The project was completed in February of this year and cost \$32 million.

Since completed, the upgraded wastewater treatment plant operates more efficiently and will support projected population growth in the wider region. The previous system had experienced discharges into the local creek and bay in very heavy rain events.

Says Dirk Du Plessis, Watercare Project manager; "It was delivered under budget due to McConnell Dowell's contributions to innovations and no significant risk was realised. Watercare is very happy with the outcome and we thank McConnell Dowell for their outstanding contribution." **WNZ**



Opposite: Towing the pipestrings into position along the Thames Coast.

Left: McConnell Dowell offered an alternative to the design with a new UV plant and a tunnelled land section, using a Herrenknecht Direct Pipe TBM, with a 1200 ID steel carrier pipe and an 1100 ID HDPE liner to meet Watercare durability concerns.

Below: The Herrenknecht Direct Pipe TBM being assembled.



## A century of innovation in the pipeline

Dig beneath the surface and you'll find Steelpipe's high quality spiral welded steel pipe throughout the length and breadth of New Zealand. Our NZ made products are used in a wide variety of applications including, water and sewage transmission, outfalls and high-spec pipelines.

Our manufacturing facility is S-Mark accredited to New Zealand and Australian water pipe standards, which means that Steelpipe products are fit for purpose and will continue to perform for decades to come.

[www.steelpipe.co.nz](http://www.steelpipe.co.nz)




# Managing utility data to reduce cost

By **Simon Bunn**, CTO Suez Smart Solutions.

Energy consumption at water and wastewater utilities is up to three to four percent of the entire energy consumption of the United States (US EPA, 2012).

It is a major cost, typically second only to labour in operational expenditure, yet very few utilities monitor or analyse their energy consumption.

In 2018 the Water Research Foundation commissioned a report on *Managing water and wastewater utility data to reduce energy consumption and cost (#4668)*. Stantec and Suez were the joint authors of this report, which identified many processes, data requirements, standardised KPIs and data issues.

A total of 63 participants with expertise in energy management, data management, water and wastewater treatment, and other related fields were invited and attended two workshops.

While 12 case studies were included, the report noted that the application of energy monitoring solutions and especially dashboards at water/wastewater utilities is still very limited. At one workshop with 26 utilities all present due to express interest in this subject, only two reported that they had energy dashboards; both were Excel spreadsheets.

A key focus of the study was: what are the requirements to achieve a successful energy dashboard project; what are the KPIs that should be used; and what are the expected outcomes and benefits?

Sub sections of the report covered data security, data storage, and data analytics. Utilities that started a dashboard process relying on their existing vast data lakes of SCADA values reported immediate issues.

Thames Water reported at the time of implementing an advanced energy monitoring solution that 80 percent of the data required was either incorrect, incomplete or not of sufficient sampling rate to be useful. (OSIsoft, 2017).

Clearly a more structured approach is required.

The key requirements to achieve a successful project fall under three broad categories:

- Define the data sets of value to reduce energy consumption and cost of pumping operations and treatment processes;
- Define data acquisition, transmission, communication, and storage requirements from various information technologies and energy management systems; and
- Define the data analytics, platforms, and display methods that will support energy management decisions and provide business intelligence insights.

These make up the core elements of a Data Management plan, summarised in Figure 2.

The first step is identifying the data sources and data availability. Sources include a mix of on-premise written (log sheets etc) or electronic records (e.g. SCADA or Historian) through to ancillary providers such as the electricity company, laboratories and regulatory authorities.

A good starting point is to consider what reports are currently generated and where this data is sourced. Starting with something that is currently created and useful helps clarify the process required to make a compelling dashboard while maintaining the good-will of those required to both provide the data and use the outcomes.

Having identified the data sources, data cleaning, integration, transformation and other data pre-processing methodologies are critical and laborious steps to allow accuracy, completeness, consistency, timeliness, and interpretability of energy data acquired from water and wastewater operations (Cabrera et al., 2011).

Cleaning improves data quality through correcting of detected errors and omissions, filling in missing values, unifying data format, converting nominal to numeric data, identifying outliers, smoothing noisy data, etc.

Missing data may be caused by equipment malfunction,

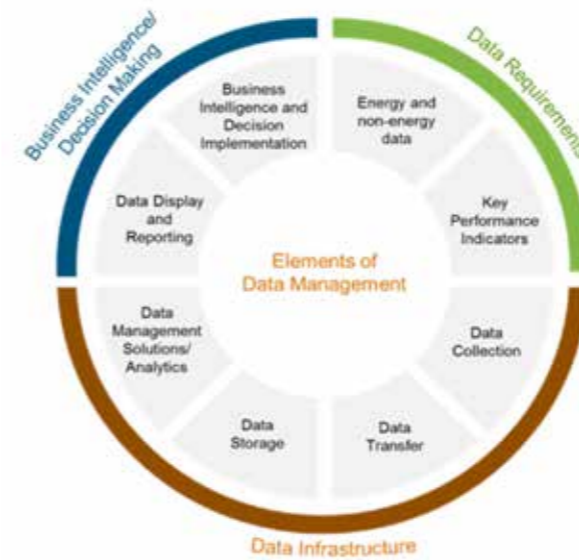


Figure 2: Relevant elements of data management.

A successful data collection plan should include, but not be limited to, a data needs assessment based on the following: data to collect, frequency of collection, data collection priorities, use or application of the data, approaches used to generate insights and to sustain energy benefits, funding available, and what type of resources to be allocated.

The data collection plan should be aligned with the end goals of supporting the organisational business strategy and objectives, particularly those in relation to energy management.

In addition, data loss (missing data due to communication failure), data accuracy (difference between a measured value and the actual value), data precision/repeatability (ability to reproduce the same value), data turn-down ratio (the range over which a certain accuracy and repeatability can be maintained), data resolution (the smallest increment of data collection), data time stamps, data granularity and frequency, as well as data format issues should be addressed through internally accepted data validation methodologies and protocols.

Once this is completed a significant benefit arises, what is often called 'the single version of the truth', where instead of conflicting and unreliable data on multiple datasets, the utility now has a consistent and verified data source.

This opens up significant opportunities for staff in the organisation to access this data lake for a multitude of purposes such as hydraulic model calibration, capex planning, or to set up their own reports and metrics.

inconsistency with other recorded data, lack of data entering and unregistered history or changes of the data. Data normalisation and aggregation is useful where multiple measurement units and timescales are employed e.g. settling on m<sup>3</sup>/hr for flow when values in gallons/s, litres/s, ML/day etc exist.

Finally, data reduction techniques are useful to reduce unnecessary data volume, i.e. do you really need kW values every second or are 10 minute averages sufficient?

This data reduction step needs to be considered early in the process as bandwidth can be restricted e.g. where RTUs report over radio links, or battery powered devices need to conserve energy.

With the rise of IoT-based low power devices, alternative communication paths exist which can have significant limits e.g. LoRa with 51 bytes per message typical at SF12.

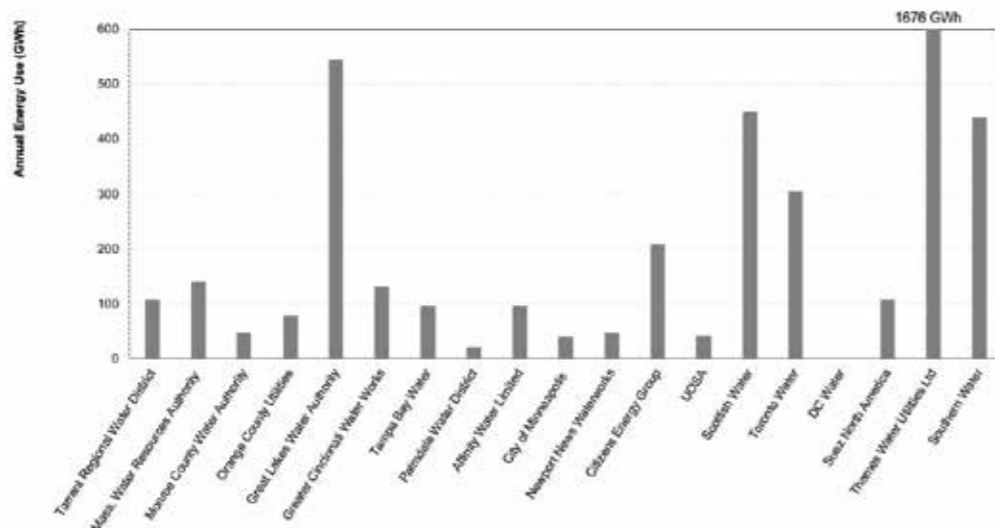


Figure 1: This sub-set of water utilities active in the study shows they are major energy users.

## we can help you turn data into actionable insights

## are you ready?

The term 'Data Rich, Information Poor' is all too common in the daily operations of water, wastewater and stormwater systems. The growing number of available sensors and monitoring technologies are only meaningful to water system managers if they have the right tools to convert data into actionable insights. Our **Aquadvanced<sup>®</sup>** and **OnConnect<sup>™</sup>** solutions transform data from various sources into valuable insights that enables Utilities to optimise their system performance. Whether it is monitoring water quality, reducing water losses, avoiding wastewater overflows, enabling customer participation or doing more with existing assets, SUEZ helps operators to evolve from traditional to smarter 'Three Waters' management.

[suezsmartsolutions.com](http://suezsmartsolutions.com)

ready for the resource revolution **suez**

A set of clearly defined key performance indicators (KPIs), connecting energy data (e.g., kWh, Therms) and non-energy data (\$, ML, pressure, BOD<sub>5</sub> load, etc.) should be identified for energy optimisation. Metrics for tracking the energy performance over time are typically developed at a facility level, but a more granular level (e.g. assets and processes) of matrices is needed to allow a fast and frequent check of the performance of critical infrastructure.

The groups created the following metrics for water utilities and similar tables were created for wastewater collection and treatment.

Progresses have been made over the past decades in data technologies for improved data analysis and management, which have been progressively incorporated into water and wastewater facility operation and planning.

It was estimated that the spending on digital and smart solutions for 2016 were \$17.7 billion and that the global market for control and monitoring systems in the water sector is worth \$30.1 billion in 2021 (Global Water Intel, 2016).

The tools for data processing in the water industry have evolved from sensor-based knowledge to more recent optimisation-based data mining techniques and to new approaches based on predictive analytics that allow for actionable real-time system control (Poch et al., 2014).

The study noted that the adoption of easy-to-use and easy-to-implement operational data management digital platforms, the use of enterprise cloud-based systems to store data and the improved connectivity through the 'internet-of-things' (IoT) environment are leading the path for efficient energy performance. In such context, traditional and spreadsheet-based approaches used for basic energy data management have been replaced by new smarter digital solutions with intelligent systems and controls.

These solutions and the use of enterprise cloud-based systems

have been widely applied in other industrial sectors to reduce energy-related cost and improve efficiency of production processes.

For example, the automobile, mining, food and beverage, and manufacturing sectors have successfully implemented process- and enterprise-energy data management solutions to reduce environmental impacts from production.

However, despite the technological, analytical and computational speed improvements made in relation to management of energy data, and the lessons that are available from experience of other industrial non-municipal sectors, the implementation of the multitude of business and engineering systems now available for a meaningful

## Recommended Practices

### Key Performance Indicators for Pumping Systems

- KPIs for pumping systems should be developed after a comprehensive collection of data, with accurate instrumentation and reliable telemetry
- Frequent pump testing is critical to generate high accuracy results on pump flow, energy, suction and discharge pressure
- Validation of data generated by SCADA systems should be conducted through field testing
- A combination of different KPIs should be considered for energy benchmarking of pumping systems, including normalization of relevant pump performance data
- The use of Pump Performance Indicators gives a complete information on pump performance and give opportunity for comparative benchmarking.

data accessing, interpretation, optimisation, benchmarking, and visualisation at water and wastewater utilities is still very limited.

Given the vast amounts of data already available at utilities and the surfeit of tools available in the market for data collection, data cleaning and data visualisation it seems likely that the uptake of dashboards and particularly energy dashboards will accelerate.

An energy dashboard is a natural first step, it is easy to understand and targets one of the largest marginal costs for any water or wastewater utility.

### References

Cabrera (Jr), E., Dane, P., Haskins, S. & Heimo, T.-F. (2011). Benchmarking Water Services: Guiding Water Utilities to Excellence. IWA Publishing, London.

Global Water Intel (2016). Water's Digital Future: The outlook for monitoring, control and data management systems. September 30th, 2016. Available online at: [www.globalwaterintel.com/market-intelligence-reports/waters-digital-future](http://www.globalwaterintel.com/market-intelligence-reports/waters-digital-future)

OSIsoft (2017a). Smart Water: Saving Millions and Cutting Energy by Combining IT and OT with the PI System. Available online at: [www.osisoft.com/customer-stories/Thames-Water-Customer-Story.pdf](http://www.osisoft.com/customer-stories/Thames-Water-Customer-Story.pdf)

Poch, M., Comas, J., Porro, J., Garrido-Baserba, M., Corominas, L., Pijuan, M. (2014). Where Are We In Wastewater Treatment Plants Data Management? A Review and a Proposal. International Environmental Modelling and Software Society (iEMSs) 7th Intl. Congress on Env. Modelling and Software, San Diego, CA, USA.

U.S. EPA. 2012. State and Local Climate and Energy Program: Water/Wastewater. Available: [www.epa.gov/statelocalclimate/local/topics/water.html](http://www.epa.gov/statelocalclimate/local/topics/water.html).

# Emerging new contaminants and health hazards

**Matt Ewen**, CEO of Filtec sheds light on PFAS, which have become an emerging concern around the world.

In Australasia and around the globe, chemicals that had not previously been detected, or were previously found in minute concentrations, are being discovered in our environments.

These chemicals are known as "emerging contaminants" and how they pose a risk to human health and the environment is not yet fully understood.

One of these groups of compounds is called PFAS, which is an acronym for per/poly-fluoroalkyl substances that are part of a group of persistent organic pollutants (POPs) that have received a lot of attention lately.

There are over 3000 compounds classed as PFAS with PFOS (perfluorooctane sulphonate) and PFOA (perfluorooctanoic acid) being the most commonly known of these and are of concern,

PFAS are used in a broad range of applications and products such as furniture protectants, cleaning products, polishes and so on. They are commonly found in fire-fighting foams and fire retardants.

It is now understood that, because of their resistance to all normal

forms of degradation, together with their resistance to both water and grease, they aren't easily dispersed.

We are exposed to small amounts of PFAS in everyday life through different channels like water, dust, air, food and use of products that contain these compounds.

Recent offshore studies have proven PFAS to have adverse effects on human health as well as severe adverse effects on animals, once they bioaccumulate in the tissues. The effects vary depending on what research paper you look at, but all are of significance.

Our Ministry of Health has issued a memo with the interim guidance values advising levels of 0.07 µg/l for PFOS and 0.56 µg/l for PFOA in drinking water. This is based on Food Standards Australia New Zealand (FSANZ) total daily intakes (TDIs) with an uncertainty factor (UF) of 30, 70kg body weight, two litres per day, with 10 percent from drinking water.

Treating PFAS contaminated water supplies is relatively complex. However, it can be done by removing the contaminants and achieving the levels required within the interim guidance values.

Filtec is currently undertaking the design and construction of seven package treatment plants into the state of Victoria to ensure contaminated supplies are in line with the Australian Drinking Water Guidelines (ADWG).

Filtec has opted to use a non-regenerable, selective ion exchange resin because it enables the contamination to be contained by the resin and then disposed of to a secure facility once exhausted.

Other processes such as granular activated carbon (GAC) and reverse osmosis (RO) were explored, but neither process alone provided results as good as using ion exchange resin.

GAC was found to be less efficient to get to the levels prescribed, and RO would produce a liquid concentrate stream that would still be difficult to deal with.

For more information on PFAS, visit the Ministry for the Environment website. [www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances](http://www.mfe.govt.nz/land/pfas-and-poly-fluoroalkyl-substances).

For options to treat a contaminated supply, please contact Filtec at [info@filtec.co.nz](mailto:info@filtec.co.nz), or call 09 274 4223.



**BACKFLOW PREVENTION LIMITED**

- Repair, test & maintain backflow prevention devices
- On site surveying for Backflow prevention, cross connection control
- Specific design and manufacture of boundary control units to suit your individual needs

**Jon Lewis**  
 Mob: 0274 974 271  
 E-mail: [jon@backflowprevention.co.nz](mailto:jon@backflowprevention.co.nz)  
[www.backflowprevention.co.nz](http://www.backflowprevention.co.nz)



**CIWEM HAS A NETWORK OPERATING IN NEW ZEALAND.**

It is the only Royal Chartered professional body dedicated to water and the environment sector.

If you'd like to explore how to become a chartered professional in NZ go to: [www.ciwem.org](http://www.ciwem.org)

The Chartered Institution of Water and Environmental Management | Contact Dan Stevens: [dan.stevens@beca.com](mailto:dan.stevens@beca.com) or Peter Brooks: [Peter.Brooks@greenscenenz.com](mailto:Peter.Brooks@greenscenenz.com)

**WATER LEAK DETECTING EQUIPMENT**

We supply water leak detectors, leak correlators, pipe & cable locators and associated equipment to councils and contractors.

We also offer a water leak detecting service.

**DETECTION SOLUTIONS**

P.O. BOX 38-061, HOWICK, AUCKLAND  
 Ph: 0-9-576 8000. Fax: 0-9-576 4641

**Ammonia Removal From Sewage Ponds**



Product: For Earth Bio®



- Nitrifying bacteria in liquid form
- Simple application – inlet dosing.
- Reduces odours and improves discharge results
- Ensures correct bacteria present
- Suitable to activated sludge & lagoon system
- Stocked in New Zealand

Proven results in Sewage Treatment Process

E: [info@forearth.co.nz](mailto:info@forearth.co.nz) web: [www.forearth.co.nz](http://www.forearth.co.nz)



**AGRU New Zealand Ltd**  
  
 The Plastics Experts.  
  
 Specialisation in PP, PE, fittings & piping systems  
[www.agru.co.nz](http://www.agru.co.nz)  
 Ph: 09 299 3640 Mob: 021 329432 @: r.gruen@xtra.co.nz

**Huerner Welding Technology Ltd**  
  
 SCHWEISSTECHNIK  
  
 Specialisation in Butt Welding, Electro-fusion equipment & tools  
[www.huerner.co.nz](http://www.huerner.co.nz)

  
 • Waste Treatment Ponds  
 • Marinas • Dams  
 • Lagoons • Lakes

◆ DESLUDGING  
 ◆ DESILTING  
 ◆ EXCAVATING

07 868 1129  
 admin@hydracare.co.nz

**Aeration, Mixing, SBRs, Dewatering**

- Aeration Blowers
- Aeration Diffusers
- High Efficiency Mixers
- Sludge Conditioning

- SBR Process Systems
- Thickening Systems
- Dewatering Systems
- Consultancy



**JONASSEN INDUSTRIAL PROJECTS LIMITED**  
 Process, Design & Environmental Engineers

P: 09 479 3952 E: info@jipl.co.nz www.jipl.co.nz

**THE MIGHTY GRIPPER COMPANY LIMITED**

Specialist suppliers of water grab sampling equipment for environmental monitoring

**Patricia Bolton**  
 Manager



P O Box 541, Whangarei New Zealand  
 E-mail: patriciab@orcon.net.nz

Telephone: New Zealand 09 556 1400  
 Website: www.mightygripper.co.nz

ACO Limited	32
Acuflo	IBC
ADR/Brodensen	25
Agruline	43
Applied Instruments Group Ltd	28
Arthur D Riley	OBC
Bailey Tanks Ltd	41
Beca	59
Brown Brothers	31
Cla-ValPacific Ltd	39
Combined Technologies Ltd	53
Danfoss	17
Deeco Services	IFC
Ecoflow	9
Filtec	7
Glacier Filtrations	14
Hach Pacific Pty Ltd	51
Hydrovac Limited	47
Hynds Pipes	19
ifm Electronics	13
Interflow	67
Jacobs	45
James Cumming & Sons Pty Ltd	12
Kaeser	61
MacEwans Pumping Systems Ltd	57
Parklink	21
Rendertech	63
Steelpipe	69
Suez Smart Solutions	71
Water Supply Products	29
Waterco (NZ) Ltd	37
Wateroutlook Ltd	33
Waterpro	35
ZwikZip	49
<b>CLASSIFIEDS</b>	
Backflow Prevention Ltd	73
CIWEM	73
Detection Solutions	73
For Earth Pty Ltd	73
Huerner Welding Technology Ltd	74
Hydra-Care	74
Jonassen Industrial Projects Ltd	74
The Mighty Gripper Company Ltd	74

**YOUR AD HERE**

for just **\$140.00** plus GST **BLACK AND WHITE**  
 or **\$220.00** plus GST **COLOUR**

**CONTACT:**  
 Noeline Strange  
 Tel: 027 207 6511, Direct: 09 528 8009  
 Email: n.strange@xtra.co.nz

# ACUFLO.

NZ OWNED & NZ MARKET COMMITTED  
 PROVEN PRODUCTS & PERFORMANCE



## MANIFOLDS

New Zealand 20 year industry favourite.  
 Meter, Backflow, Flow Control, Strainer.  
 Full range. DR Brass or Composite Materials

## WATER METERS

Full range of models and sizes.  
 OIML R49 and ISO 4064 listed  
 Sensus - Maddalena - Acuflo models





## BOXES

Full range of sizes. Superior polypropylene material. Customised lids, boxes and bases.

## BACKFLOW

Full range of models and sizes.  
 AS/NZ 2845 and ICNZ listed.  
 Febco - Wilkins - Acuflo models



### PERFORMANCE TESTED

All Acuflo products are performance tested against pressure loss and accuracy.



**ACUFLO INDUSTRIES LTD**

31 Reeve Street, Levin, New Zealand | Phone 06 368 4996 | Fax 06 367 9201  
 PO Box 660 | sales@acuflo.co.nz | www.acuflo.co.nz



# When every drop counts

For over 90 years ADR has been there for New Zealand water authorities and Councils with our fieldsmart technology.

From metering to control systems to pump controllers, we offer insight and expertise in the technology that helps you manage water and waste water to a high standard, with resources that are always limited.



[www.adriley.co.nz](http://www.adriley.co.nz)