

water

NOVEMBER / DECEMBER 2018 ISSUE 207

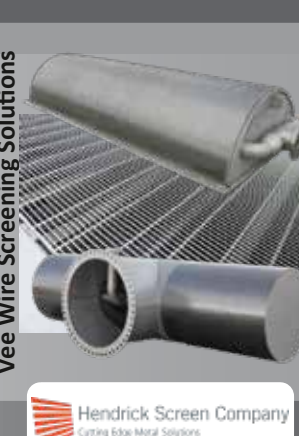
**2018
Conference
coverage**



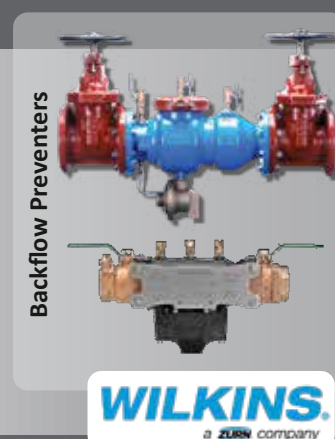
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A consistent approach across the 3 waters sector.



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.

An eventful year and a harbinger of more changes



Kelvin Hill,
President, Water New Zealand

I hope those of you who managed to get to our conference in Hamilton back in September enjoyed our 60th birthday celebrations as much as I did.

There were certainly too many highlights to mention in this column, but I did particularly enjoy the extra special conference dinner function that included a trip down memory lane.

In listening to stories from founding members such as Keith Davis, I couldn't help reflect on how far we've come as an organisation.

Certainly I'm very pleased that hand-writing and typing out meeting minutes and putting them in envelopes to post is no longer the job of board members! It was also a big treat to have a surprise show by the iconic kiwi musician Dave Dobbyn.

Certainly a night of celebration.

Recently, I was trolling through our Water New Zealand archives and came across one of the first newsletters from NZ Water Supply and Disposal Association dating back to 1965. What caught my eye was the reference to the words "to demonstrate a link between our members, and to show something in return for their subscriptions". The reference was made in relation to holding an annual conference and distributing a six monthly newsletter to the members. Fast forward to 2018 and that list of options in touching base with our membership has significantly grown and diversified across the three water sector.

I think I can safely say, in my first column as Water New Zealand President, that 2018 has been one of the more eventful years of the water sector calendar, and continues

to be a harbinger of more changes to come.

Even as we go to print, the government is announcing the direction of the much-heralded three waters reform.

We know that reform can be unsettling, but most of us will agree that the challenges facing us – in terms of improving water quality, providing safe drinking water to all New Zealanders, and the associated costs – are daunting, to say the least. We will need to continue to work with the government to get the best possible outcome for three waters delivery in this country.

In our submission to the government on drinking water regulatory reform we proposed that a new regulator should have the technical and scientific expertise, not just in auditing and assessment, but also to assist and direct suppliers over compliance.

To this end, we suggested it needs to take on a leadership role in the industry – something the Havelock North Inquiry identified as not only missing from the New Zealand industry, but also essential to the provision of safe water supplies. Our preference is that it would also be a stand-alone organisation directly reporting to the Minister.

However, we can see the benefit of locating a new national drinking water regulator into an existing organisation for ease of set up.

We also believe that it should be the role of the new regulator to set new drinking water standards as that is where the level of expertise required to understand and prepare the standards ought to be sitting.

If the estimated \$500-million required to bring our drinking water up to an acceptably safe standard across all

communities sounds like a challenge, then improving waste water quality could be seen as Herculean in comparison.

Recently the GHD/Boffa Miskell report confirmed that the cost of improving the quality of wastewater discharges to meet new regulatory requirements would be in the vicinity of between \$1.4 billion and \$2.1 billion.

That doesn't even include the costs of upgrading infrastructure for discharging to beaches and coastal environments, nor does it take into account the potentially even higher costs of preventing wastewater pollution on beaches and in urban environments through wastewater overflows into stormwater systems.

Local Government Minister Nanaia Mahuta, when releasing the report said that putting this together with other factors such as increasing tourism numbers, and protecting our 'clean green image', the infrastructure requirements associated with population growth, changing consumer expectations, climate change and the need to build in resilience against natural disasters, suggests a "significant funding challenge ahead for councils and communities".


Earlier this year the Minister visited Europe and the UK and it is clear that the Government has been looking at the pros and cons of international models when considering the

“ In our submission to the government on drinking water regulatory reform we proposed that a new regulator should have the technical and scientific expertise, not just in auditing and assessment, but also to assist and direct suppliers over compliance. ”

way forward for our three waters reform – albeit allowing for our unique influences and cultural aspects.

It is clear that 2019 will signal a firming up of the way forward for our sector. Before we get there, however, I certainly hope you will all have the opportunity to spend time relaxing with family and friends over the holiday season.

Wishing you all a very happy festive season,
Kelvin. **WNZ**





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A brief summary of **Essential Freshwater**

The Ministry for the Environment and the Ministry for Primary Industries have recently released
Essential Freshwater: Healthy Water. Fairly Allocated.

This document captures the Government's objectives to stop further degradation and loss of freshwater resources, waterways and ecosystems, and promote their restoration, as well as addressing water allocation issues.

The document is comprehensive and includes a work programme for the next two years. The work will be monitored and measured too, with the ministries saying that in five years, the government expects environmental reporting to show evidence of improved water quality.

Essential Freshwater states that the main cause of the decline in freshwater quality is leaching of nitrogen, phosphorus, sediment and pathogens. It identifies agriculture intensification, increasing ruminant stock numbers and significant deforestation as key problems.

"The estimated amount of nitrogen leached from agriculture increased by 29 percent between 1990 and 2012," the document states.

"By 2013, nitrogen was worsening at more monitored river sites than improving. *E. coli* concentration was 22 times higher in urban areas and 9.5 times higher in pastoral areas compared with those classified as 'native' areas (2009-2013)."

Other concerning statistics include 50 Auckland beaches made unswimmable at times during the 2017/18 summer because of sewage overflow or contaminated stormwater; three quarters of reported on fish threatened with the risk of extinction; and 90 percent of wetlands have been lost to agriculture and urban development.

"Estuaries from Northland to Southland are being seriously damaged by sediment smothering the seabed and shellfish. Between 2006 and 2015 there was twice as much deforestation (120,115 hectares) as afforestation (64,207 hectares)."

In 2017 the OECD *Environmental Performance Review*

of New Zealand recommended accelerating implementation of water management reforms, ensuring water quantity and quality limits are sufficiently ambitious, and expanding the use of economic instruments to encourage more efficient water use and reduce pollution.

To do this, *Essential Freshwater* outlines a work programme, segmented into six workstreams:

- 1. At-risk catchments.** Catchments are already being assessed, with plans for those identified as 'at-risk' to be implemented to stop further degradation and start reversing damage. The ministries will report to government with an overview of at-risk catchments and recommendations on potential interventions by the end of the year.
- 2. National Policy Statement for Freshwater Management amendments.** A new Freshwater NPS will be based on the Sheppard Report, which, in 2008, saw a Board of Inquiry propose principles to address freshwater issues that were not adequately reflected in the 2011 Freshwater NPS. Work has begun on potential amendments and has included discussions with freshwater scientists about the strengths and shortcomings of the Freshwater NPS.
- 3. National Environmental Standard for Freshwater Management.** This is a potential mechanism for prohibiting or restricting activities such as the draining of wetlands or piping of urban streams. It is likely to also regulate intensive winter grazing, hill country cropping and feedlots. Public consultation on the new standard is scheduled for 2019.
- 4. Resource Management Act amendments.** Proposed amendments to the Act will better enable regional councils to review consents, and to more quickly implement water quality and quantity limits as required in the Freshwater NPS. The Amendment Bill is due to be introduced to Parliament in late 2018/early 2019.

5. Allocation of freshwater resources. There are two main elements to allocation – discharge of contaminants and the authority to take and use water. Because the priority is water quality, the initial focus will be on the allocation of contaminant discharges, and because there is already some ability to measure, model or monitor nitrogen discharges at a property level, work will begin there. Issues and options for allocation of discharges will be discussed and consulted on through the coming two years.

6. Future framework. This includes extending good practice across farms, forests and urban water management; investing in solutions, advice and tools to support decision making; and improved nationally-consistent measurement and monitoring.
Essential Freshwater states that our lakes and rivers need

to be protected and restored, which can only happen if all water users and the Government work together. It says the public are behind the effort, with 80 percent committed to improving water quality

A multi-agency taskforce has been set up to advance the work as quickly as possible, along with Kahui Wai Maori – the Maori Freshwater Forum and a Freshwater Leaders Group, made up of representatives from the primary sector, agribusiness, non-government environmental organisations, and community.

There is also a Science and Technical Advisory Group that will provide a robust scientific evidence base for policy options. Regional councils have also been identified as vital partners in improving freshwater quality and; "it is important they have the capability, competency and funding to undertake their functions effectively." **WNZ**

To read *Essential Freshwater* in full, go to:

www.mfe.govt.nz/publications/fresh-water/essential-freshwater-healthy-water-fairly-allocated.

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Meet the new Water New Zealand Board



President – Kelvin Hill

Kelvin is Utilities Manager for Western Bay of Plenty District Council, responsible for the successful delivery of three waters and solid waste services to its community of 46,500. His background encompasses a wide range of professional roles, including engineering consultancy, infrastructure project management and managing contracts within New Zealand and overseas. Kelvin has been

on the Water New Zealand Technical committee for 15 years and been active in the Water Service Managers' Group since 2006.

He recently completed an MBA at Waikato University and is keen to contribute as part of the Water New Zealand governance team in advocating and promoting the benefits of the organisation. This is his second term on the Board.

Helen Atkins

Helen is one of the founding partners of the boutique environment and public law firm, Atkins Holm Majurey. She has worked for a number of years for a variety of private and public sector clients on a range of environmental, local government and public law matters.

Helen has served on both the New Zealand Planning Institute local branch committee (Wellington) and on the Resource Management Law Association National Committee (including as president from 2009



to 2011). She has recently finished an 11 year term as a member of the Hazardous Substances and New Organisms Committee of the Environmental Protection Authority (EPA).

Prior to it becoming the EPA, Helen served as a board member on the Environmental Risk Management Authority (ERMA).

Helen is on her first term as an elected member of the Water New Zealand Board. She was a co-opted member for the previous two years.

John Mackie

John is Head of Three Waters and Waste at Christchurch City Council. He first became involved with Water New Zealand in the early 1980s when he began his work in the water sector while employed at the Te Awamutu Borough Council as assistant and then Borough Engineer.

He has worked as a consultant and contractor in areas which include sewer flow monitoring and water and wastewater maintenance in Auckland and Wellington.

John has also worked in Dunedin where he was employed as council Water and Wastes Manager. In 2013 he joined the Christchurch City Council to assist with the rebuild of the city. He spent more than three years serving on the SCIRT Board, which has just completed the rebuild of \$2.2 billion of horizontal infrastructure.

Currently he is working on the development of a new capital delivery team to replace SCIRT, which completed its scope of work in June 2017. This is his first term on the Board.



Lorraine Kendrick

Lorraine is the Manager Project Delivery (Major Capital Works) at Waipa District Council following her previous position on the council as Manager Water Services.

She is a Chartered and International Professional Engineer and graduated with a BEng (Hons) in Civil Engineering from University of Ulster, Northern Ireland in 1999. Prior to joining Waipa District Council, Lorraine worked as a design and project manager in various engineering consultancies in UK, Ireland and New Zealand.

Currently Lorraine is responsible for leading a team of project managers and engineers to deliver the major capital works programme for Waipa including roading, water services and community facilities. She has chaired the Water Services Managers' Group for the past four years and prior to that was an active member of the group.

Lorraine is looking forward to the future changes in the industry and considers it vital that the sector views are heard and represented, and that there is an understanding and appreciation of what is happening at the coalface, particularly in the rural and provincial areas.

She is keen to contribute to the Water New Zealand governance team with a focus on ensuring the water sector continues to drive improvement. This is Lorraine's first term on the Board.

Garth Dibley – Co-opted member

Garth has extensive experience in the generation, retail, transmission, and distribution sectors of New Zealand's electricity industry. He took up the position of Chief Executive at WEL Networks in September 2014.

Garth has previously held leadership roles at both Transpower and Meridian Energy. Appointed as General Manager Grid Performance at Transpower in 2010, he led operations and asset maintenance functions of the national grid.

Prior to this, Garth was based at Meridian Energy, working as General Manager Markets and Production and then General Manager External Relations.

Garth has a Bachelor of Engineering (Mechanical) from the University of Canterbury and an MBA from Waikato University. He has completed



executive training programmes at Kellogg and INSEAD business schools of management.

Garth was awarded CEO of the Year 2016 at the Westpac Waikato Business Awards.

Iain Rabbitts

Iain has had more than 25 years of experience as a water treatment engineer in New Zealand and overseas including water treatment plant design and implementation.

He was a member of the expert panel providing assistance to the Public Inquiry into the Havelock North Contamination Event. Iain has spoken out publicly about the reforms he believes necessary to ensure that

all New Zealanders have access to safe drinking water. He has met with the government to help develop its thinking on water reform and regulation.

Iain believes Water New Zealand is in an important position to influence the outcome of the reforms and that wastewater and storm water reform is as important as drinking water reform. This is Iain's first term on the Board.



Independence vital for **proposed new infrastructure body**

Water New Zealand says the structure and level of independence of the government's proposed new infrastructure body will be critical to its long term success.

In a submission to the Government, CEO John Pfahlert says the efficacy of the new body would lie in the quality of the work it did and the calibre of recommendations it made. As such, the new body would need to be independent with a Board made up of Cabinet appointees from both the private and public sectors.

The new infrastructure body aims to sort out some of the major infrastructure issues facing our country.

In announcing the proposal, Infrastructure Minister Shane Jones concedes that the Government needs to do better when it comes to long-term infrastructure funding. The new body will provide expert advice, planning and strategy and would support the delivery of major infrastructure projects across the country, he says, and provide "the golden thread" between various pieces of Government work.

John Pfahlert says the new body will need to be available to advise and assist both central and local government.

He says three waters planning down to council level will need to be part of the national infrastructure strategy as billions of dollars are spent every year on three waters assets and operational upgrades.

In its submission, Water New Zealand said that there is a need to

ensure that quality information on the state of infrastructure would be available with information collected and reported on in a consistent manner. The current systems within local government do not allow good comparison between councils, and are not comprehensive.

One example of this is Water New Zealand's annual benchmarking exercise of councils' performance against a range of three waters indicators.

This work is undertaken to highlight areas of concern and allow councils to benchmark themselves against other councils. The voluntary nature of the exercise means that not all 67 local authorities participate and, for those that do report, methods of data collection and capture vary widely making some comparisons questionable.

The Water New Zealand submission said that a key barrier to delivering good outcomes is the fragmented nature of three waters decision-making between the utilities, coupled with guidance structures and priority setting processes that are not fit for purpose when considering infrastructure decisions.

In addition there is a lack of capacity and capability in many small councils, both human in terms of skills and capital in terms of funding. [WNZ](http://www.waternz.org.nz)

- Go to www.waternz.org.nz for the full submission.



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Bid for major international water conference in Auckland

Water New Zealand and the New Zealand branch of the International Water Association are bidding to host the 2023 IWA-ASPIRE Conference and Exhibition in Auckland.

The congress, held biennially, brings together key stakeholders from government, academia and research, utilities, development agencies and industry with a focus on the Asia and Pacific regions.

If the bid to hold the conference here is successful, it would be run concurrently with the Water New Zealand Annual Conference and Expo at the International Convention Centre in Auckland.

Dr Marion Savill, our representative at the IWA, has recently returned from an IWA meeting in Tokyo where she, along with Water New Zealand past-President, Martin Smith and Brendon Green from Kaitiaki Advisory (and Director at Watercare), put forward New Zealand's case.

The proposal would bring together world leaders in water technology and powerhouses of the Asian water world in Auckland and would provide important networking and knowledge sharing opportunities.

Its proposed theme is *One Water*

One Health, combining all water and all people, capturing modern global science and technology with Maori knowledge, to achieve a holistic approach to water matters.

One Water aims to consider all different water uses and include all types of water around the hydrological cycle: From lakes and aquifers, to potable domestic and industrial wastewaters, and oceans and seas.

One Health pulls together efforts to ensure optimal public health across all communities, protecting veterinary health, human health and ecosystem health in one big, single pillar of sustainability.

Dr Savill says the theme of 'oneness' is key. "By working together as 'one' people, New Zealand's population has been enhancing its respect for water and advancing ways to meet water challenges holistically.

"Water is a focal point for most of our activities in New Zealand; economic, social, environmental and cultural because of our geographic location as an island nation, geophysical characteristics, demography and indigenous roots."

She says that to Maori culture the environment and water have a spiritual

meaning. The water resource has been viewed, valued and treated in a holistic way for many centuries.

The New Zealand bid has a steering group made up of 10 national representatives covering all forms of water, industry, council, government, and science along with 12 international members from Asia, US and Europe covering government, industry, policy and the main technological issues of water the world is facing in the future.

"We know we are one of the final top two bids and will be told this month (November) what issues we need to address, says Savill.

This country faces the challenge of tackling water issues that will affect all IWA-ASPIRE members she adds.

"Finding the answers will take collaborative effort, with countries encouraged to share knowledge and technology. ASPIRE will help provide this platform."

We are competing with Australia and the final decision, made by the ASPIRE Governing Committee and endorsed by the IWA secretariat, will be announced at the IWA-ASPIRE Congress in Hong Kong May 2-5 next year.

Farewell to John Fitzmaurice

The water sector lost one of its most eminent members in September with the passing of John Fitzmaurice, aged 89.

John had a career that spanned more than 60 years in the water industry. After completing a Bachelor of Civil Engineering degree in the early 1950s, John began his career as an assistant engineer for the Drainage Board in Auckland before a Fullbright Travel grant took him to study sanitary engineering at Harvard.

John had a long career in consultancy and worked on many projects integral to the sewerage schemes of major towns

throughout the country. Projects included the Hamilton Pollution Control Plant, sewerage schemes in Tauranga and Mt Maunganui, the millscreening plant in Hutt Valley, sewerage projects in Blenheim and Christchurch and the Invercargill sewerage treatment plant.

He also served for six years as deputy commissioner of the Environment Court and as the deputy convener of the audit group for Project Manukau, a position he only retired from in 2013. In this role he was responsible for overseeing the resource consents for the \$460-million Mangere

Treatment Plant upgrade.

John served as chair of the NZ Institute of Engineers (1963-64) and has been involved in Water New Zealand from its very early days. His membership number was 00014 - and he helped draft the association's constitution.

He was a life member of Water New Zealand, the Water Environment Federation (WEF) as well as a member of the Select Society of Sanitary Sludge Shovelers, or 5S as it is known. The society honours 'outstanding, meritorious service above and beyond the call of duty'.

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ADB spend on Asian water challenges

Back in October the Asian Development Bank (ADB) headquarters in Manila hosted the Asia Water Forum 2018.

This forum – the fifth held in the city since 2002 – provides a platform to share knowledge and experiences to help ensure water security for the Asia-Pacific region. This year featured a series of panels, leadership discussions, technical sessions,

and workshops, plus an exhibition of 48 international providers.

Water demand in the Asia-Pacific region is poised to grow by more than half by 2050, leaving up to 3.4 billion people facing water insecurity. Moreover, in 2016, disaster-related losses in Asia totaled US\$87 billion, of which about 25 percent was connected to flooding.

Since its founding in 1966, ADB has spent

US\$45.88 billion on water projects in Asia, and its sector operations amount to nearly US\$14 billion and another US\$14 billion in investments is planned between now and 2020.

The bank is owned by 67 members; 48 from the Asia region. In 2017, ADB operations totaled US\$32.2 billion, including \$11.9 billion in co-financing.

Aurecon's new head of water

Aurecon has taken on Kevin Werksman as its new Global Water Markets leader, to deliver and build water smart and water sensitive cities strategies across the world.

In his new Canberra-based role, Kevin will provide leadership to global water market teams, helping Aurecon build presence and strategic advice capabilities across the group in Australia, New Zealand, Africa, Asia and the Middle East.

He brings extensive international experience, having worked in the water industry for 20 years across Australia, Hong Kong, China, Japan, Korea and South East Asia.



False water technology claims taken to task

Water filter company HRV has been fined \$440,000 after pleading guilty to making unsubstantiated claims about the benefits of its water filters, and for making misleading claims about the quality of this country's domestic water supply.

These unsubstantiated claims were made by HRV (which was bought by Vector in March 2017) on its website between July 2014 and October 2017 in promotional materials, and to customers and the public at presentations.

Commerce Commission commissioner Anna Rawlings says HRV did not have reasonable grounds to claim its filter could soften water through its magnetic process.

"HRV relied heavily on the information provided by the supplier without getting this verified by an expert.

"Although HRV had some testing done, the results did not provide a reasonable basis for the various claims it had made – and continued to make – about the

benefits of using the filters," she said.

HRV also misrepresented the state of our domestic water supply, including the claim that 90 percent of our water ways are polluted below swimming standards, yet this is where we source our water from.

The fine was issued by Judge John Macdonald in the Auckland District Court in October after the company admitted that the information available to it when it made the claims did not provide reasonable grounds for claims about the performance of its water filters, particularly in relation to the ability of a magnetic "ionizer" in its water filter systems to soften water and provide benefits such as reducing skin irritations and conditions.

"The onus is on traders to ensure that they have the information they need to back up the claims they make, and that they do not overstate the need or potential benefit of their products or services," says Rawlings.

World's longest waterslide for mental health

Jimi Hunt and Dan Drupsteen are rolling out the world's longest waterslide one last time in February, after thousands have enjoyed the 600 metre slide down a long slope at Jonkers Farm, near Bethells Beach on Auckland's west coast over the past couple of years.

The slide has been officially recognised by Guinness World Record's as the world's longest and Jimi and Dan have even appeared on The Today Show in the United States to talk about it.

The pair are also the brains behind registered NZ mental health charity 'Live More Awesome' and they created the waterslide to raise money for mental health awareness initiatives.

The pair say putting the slide in place is a mammoth undertaking and after this event it will be sold to the highest international bidder.

There are only 750 tickets at \$99 each



for the three-day event on February 8-10. Tickets are R16 restricted for health and safety reasons and the number is limited

to ensure that people have a full day of unadulterated sliding fun without having to queue for too long.



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Australia's first large-scale thermal waste to energy plant

Acciona is set to construct an innovative new thermal Waste to Energy plant in Western Australia, helping reduce landfill while producing renewable energy. A first of its kind in Australia, the A\$700 million project will be located in the Kwinana

Industrial Area 40 kilometres south of Perth. It will process up to 400,000 tonnes of waste a year using best practice technologies and processes, exporting an estimated 36MW of electricity to the grid – enough to power around 50,000 households.

Acciona's Engineering, Procurement and Construction (EPC) contract with the project developer – a Macquarie Capital and Phoenix Energy Joint Venture – includes a 36-month construction period that started last month.

Tenders for Central Interceptor project

Watercare's Central Interceptor project reached a milestone recently with tenders handed in from four short-listed contractors that were chosen back in March.

The contractors are: CPB Contractors; Ghella-Abergeldie Harker Joint Venture; Pacific Networks, made up of McConnell Dowell, Fletcher Construction and Obayashi; and VINCI Joint Venture, comprising VINCI Construction Grands Projets, HEB Construction and Soletanche Bachy.

The 13-kilometre Central Interceptor wastewater tunnel will run deep below Auckland – 110 metres at its deepest point – from Western Springs to a new pump station at the Mangere Wastewater Treatment Plant.

At 4.5 metres diameter, it will be Auckland's largest wastewater tunnel and the biggest wastewater project ever undertaken in this country.

A lot of the flows currently going into the Eastern Interceptor will be diverted to the Central Interceptor, which will free up capacity for development in east Auckland. These flows are significant – equivalent to the volume produced by over 30,000 houses.

"In addition to providing for growth, it will also reduce the volume of overflows into the harbour," says Watercare chief executive, Raveen Jaduram.

"Parts of the old Auckland City Council area have no stormwater system, so when it rains the stormwater goes into the wastewater pipes and then overflows into streams and beaches.

"It was designed to do that in the early 1900s because it was acceptable back then.



Watercare chief executive, Raveen Jaduram and Central Interceptor executive programme director, Shayne Cunis with some of the tender documents.

But Aucklanders' expectations have changed – we want a clean and swimmable water environment."

The Central Interceptor will address wet-weather overflows by collecting the wastewater and stormwater from these overflow points and transporting it to Mangere for treatment.

"It's expected to reduce the volume of overflows by at least 80 percent," Raveen

says. "It also provides time for Auckland Council to install stormwater pipes in areas where there are none."

The project has been on Watercare's agenda for many years, and its funding is already catered for in the company's pricing plan, Raveen adds.

"It's part of the \$5.8 billion we will be spending on upgrading and expanding our infrastructure over the next decade."

Standards funding clarified

By John Pfahler, CEO Water New Zealand

The Ministry of Business Innovation and Employment has recently concluded its review of the funding of joint standards development with Australia.

This review was requested by a number of industry parties, including Business NZ and the Engineering Leadership Forum – of which Water New Zealand is a member. They were concerned that relying substantially on industry to fund the

continued existence of Joint Australian/New Zealand Standards would lead to many joint standards being de-jointed over time, and perhaps difficulties for Trans-Tasman trade.

Following a review, the Ministry plans to recommend to Government that, where a joint standard is referenced by the regulator, the relevant regulator will pay for any review or updating of the document.

Where a joint standard is not referenced by a regulator, it is proposed industry should pay for any updating of the document.

There are some 2500 joint AS/NZS Standards on the Standards New Zealand catalogue. I suspect that 100 or so of those standards are referenced by a regulator.

As I said some time ago in this magazine, this country will increasingly become a Standards taker from Australia.

I predict the vast majority of the 2500 joint standards with Australia will become Australian-only standards in due course. In 2017 there were 95 standards de-jointed.

Expect this process to continue.

Stand-alone sanitation system expo

International Standards are key to the progression of new sanitation technology and developing an industry that saves lives, says ISO Secretary-General Sergio Mujica at the *Reinvented Toilet Expo* held in Beijing this month.

The expo was a three-day summit for governments, development banks and private-sector leaders wanting to accelerate the adoption of innovative sanitation technologies in developing regions around the world.

Mujica was speaking on a high-level panel as part of the opening plenary that featured Bill Gates, co-chair of the Bill & Melinda Gates Foundation, and Dr Jim Yong Kim, president of the World Bank, as well as other leading representatives from industry and government. The panel discussed

commitments to non-sewered sanitation and actions required to develop the industry, including standardisation.

Reinvented toilet technology is all about stand-alone sanitation systems that safely treat waste without the need to be connected to a traditional sewerage system. It is designed to revolutionise the lives of billions of people around the world who lack sufficient clean sanitation systems, saving lives and improving well-being.

Keynote speaker Bill Gates said the expo showcased, for the first time, radically new and pilot-tested approaches to sanitation that will provide effective alternatives for collecting, managing and treating human waste.

"The technologies you'll see here are the most significant advances in sanitation in

nearly two hundred years."

This technology can be supported and further developed with the launch of the world's first dedicated International Standard. ISO 30500, Non-sewered sanitation systems – Prefabricated integrated treatment units – General safety and performance requirements for design and testing, provides safety and performance requirements that will not only enable their effective manufacture, but the development of the sector as a whole.

"We look forward to China adopting a high-level standard (ISO 30500) for the non-sewered sanitation industry, which will further accelerate its leadership of a new commercial sanitation sector," Gates added, commenting on China's 'toilet revolution' and action plan for progressing safe sanitation.



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Saving pipes from wipes

How do you start a discussion with a community around an issue that no one wants to talk openly about? Cathy Davidson, Team Leader Operational and Business Services, Tauranga City Council, explains.

This was one of the key questions that Tauranga City's (TCC) Waterline team had to come to grips with when they developed its 2018 wet wipes public awareness campaign. What people do in the privacy of their own bathroom is too personal for discussion. In fact, it's become the elephant in the room.

Waterline was set up in 2000 to support the installation of domestic water meters in Tauranga. It proved an effective tool in educating customers about wise water usage and as the first step of a new water demand management strategy for TCC.

One of Waterline's objectives is to raise awareness of the customer's influence on wastewater blockages and overflows. This was something that TCC had been engaging with the community about for some time, but due to the growth of wet wipe usage the problem has continued to grow. There is now a battle with increasing wet wipes products available, and the marketing of these products as 'flushable'.

And so the wet wipes campaign became a priority. That, and the fact that one of Tauranga's main beaches, Pilot Bay, was closed to swimmers at the height of summer because of a wastewater overflow caused by a wet wipes blockage.

It became evident that a different approach needed to be taken.

Water New Zealand has been working with our Australian counterparts on the development of joint Australian-New Zealand Flushability Standards that will help enforce correct labelling on wipes.

This follows the recent publication of new international flushability specifications (PAS 3) <http://iwsfg.org/iwsfg-flushability-specification/>.

New Zealand's representatives on the standards group are Noel Roberts from Water New Zealand, and Wally Potts from Tauranga City Council.



The traditional channels being used to engage with the community were not achieving the right results. A wide level of change wasn't going to happen by itself, and TCC's 'targeted' education wasn't 'cutting the mustard'.

Hannah Sherratt, TCC's Water Education Specialist, connected with Sydney Water who generously shared the research that it had undertaken on this environmental issue. Sydney Water had itself launched a Citywide campaign back in 2014, in response to research. Its findings were surprising, given that the main flushers were identified as males between the ages of 15 and 44.

So the big question for TCC was – how do we get a message out into our community?

It was decided that it was time to seek the services of some seasoned campaigners, people who really understood how to reach a community and who could talk dirty with them in such a way that we would not offend them. The relationship with Wave Creative Communications began. It shared its own market insight and, from the combined information and knowledge, the campaign

'Save our Pipes From Wipes' came to life.

The focus of this campaign was to create a 'call to arms' and to generate a conversation in such a way that it wasn't offensive. The campaign shifts the message away from Council telling the public what to do, to an appeal to our residents to save our pipes and to save the environment. It is largely a social media campaign, supported by more traditional channels such as bus-backs, radio, billboards, and print media.

Launched on October 15, a very cute elephant embarks on a journey through our city's network. That journey relates to the elephant-sized problem that we have in our community, and it draws the analogy to the scale of it – two tonnes of wet wipes every week. After all, "it's an elephant sized problem".

At the time of writing this article, data is still being captured to measure the success of this social media campaign approach. Success will first be measured in the volume of material that is transported to landfill, but the ultimate goal is a reduction in wastewater overflows.

For more information, see Council's website, www.tauranga.govt.nz/council/water-services/wastewater/save-our-pipes-from-wipes, or email Hannah.sherratt@tauranga.govt.nz

Watercare's new training facility

Watercare Services has opened its award-winning training centre where maintenance staff master the ins and outs of working on Auckland's water and wastewater networks.

The training centre in Mangere was the recipient of the Veolia Health and Safety Innovation Award at the Water New Zealand Awards in September.

Built on an existing Watercare site near the Mangere Wastewater Treatment Plant, the facility includes a training ground complete with a live water reticulation network, mini wastewater network, a residential façade, and typical streetscape.

Watercare chief executive Raveen Jaduram says, "Our in-house maintenance team and our contractors at Downer and Citycare are responsible for maintaining more than 17,000 kilometres of water and wastewater pipes in Auckland.

"When pipes burst, they fix them. When we have wastewater overflows, they clear the blockages and clean up the mess. It's work



that is vital for the health of our communities. And sometimes, working in streets with traffic hazards and underground power services, can be risky work.

"To have a purpose-built training facility, where new recruits can master the core skills of the job without any fear of disrupting services

to our customers, is a wonderful improvement."

Previously, new staff were paired up with a colleague and trained on the job. They now take part in a 10-day intensive training course at the centre, which focuses on the company's safety culture and how to perform the work safely, using a wide range of equipment.

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Kapiti Council shines in drinking water report

By John Pfahlert, CEO Water New Zealand.

The Kapiti Coast District Council has emerged as a star performer in a recent Auditor-General report on drinking water supply.

The report looked in detail at three district councils (Horowhenua, Kapiti Coast and Manawatu District Councils) as well as Palmerston North City Council, to understand the challenges they face in supplying drinking water to their communities.

Of the four councils, Kapiti faced the biggest challenges and this is a story of how meeting adversity head-on improves performance across a wide spectrum of measures.

In the late 1990s and early 2000s, the Kapiti Coast District Council was facing water shortages. It had exceeded its assigned water intake and an application to expand supply was refused. In response, it embarked on a comprehensive water strategy that included a multi-year programme of investigations, research, and intermediary measures ahead of a long term solution to optimise demand and supply.

The result has been that the Kapiti Council now manages water supply very differently from the other three councils and this has led to very different outcomes in terms of priorities, planning, and improving the resilience of water supply.

The key difference with other councils in the region is that Kapiti Council provides drinking water within a demand reduction framework while the other three councils use a more traditional supply management approach. Its residential supply is metered at the house and charged for based on consumption.

Other councils in the region do not view reducing demand as necessary, urgent or economic. That's an understandable position as they all have plentiful water supply with capacity to meet increased demand with increased supply.

The Auditor-General's report says this is a systemic issue; "Under the current system there are stronger incentives for councils to take a traditional supply management approach and relatively weak incentives for councils to carry out demand management by conserving water when managing their drinking water supply."

The report finds Kapiti's plans to secure drinking water supplies within a demand reduction framework has delayed the need for extra supply. At first, Kapiti took a 50-year view, but the council is increasingly looking ahead 100 or more years. It is also considering how to extend its activities to improve



the natural environment around water sources and reduce its 'carbon footprint' for supplying drinking water.

In the other three councils, the traditional supply management approach has led to a lower priority given to water demand management including leak reduction and water conservation.

The councils recognise that an increased focus on demand management could be needed in the long term (10 years or longer) when population growth means that current patterns of water are unlikely to be met by existing resource consents. The demand management methods these councils provide include water-saving tips to their communities and limited leak detection, repair and pressure management.

Significant capital investment and competition with other priorities for funding provide a barrier to improving water efficiency through leak detection, repairing pipes and increasing pipe renewals. There are no national outcomes that support prudent water use or national requirements to be water efficient.

The Auditor-General's report also looked at how councils were working with local iwi to recognise the cultural value of water and water bodies to mana whenua. It found Kapiti has been working closely with Maori to prepare and implement its strategy, while the other councils were in the early stages of establishing effective working relationship with local Maori over water management.

Kapiti also came on top in its investment in IT for drinking water and is working to get better integration with financial management and human resources systems to provide a full overview of drinking water management resources. The report says the investment in IT helped with decision making and meant that the council was more likely to identify and fix leaks than other councils.

Kapiti's district plan requires new buildings to have alternative water supplies for non-potable uses and provides water conservation advice and a retrofit service including financial support to install alternative sources for non-potable use and water conservation measures.

The Council has specialist staff working with the community, including a water meter field officer, water education officer, green gardener and eco-designer. It has a plumber directory online and provides video tutorials to show people how to

find their water toby, read a water meter, repair dripping taps and find leaks.

Finally, in what was the most controversial decision, Kapiti introduced volumetric water charging in 2014.

But despite the public protestations and a concerted campaign against the new charging, the results have been good news for most consumers.

Drinking water demand has dropped by 30 percent and 75 percent of ratepayers pay less for water than would they would if the council had stayed with its previous approach. Plus the council estimates that the need for a new dam has been deferred for about 40 years.

Peak daily water use decreased by about 25 percent in the two years after universal metering was put in place. Of this about 20 percent was saved by fixing leaks on private property; and five percent saved by consumers using less water.

As well, the council has not needed to impose summer water restriction since universal metering was introduced.

The report found that all four councils audited faced challenges and funding constraints. It found that in the absence of national outcomes and decisionmaking principles and standards, that councils are responding to challenges in ways that they consider prudent and responsible.

It reported that crisis and regulation appeared the only

sure ways to achieve more comprehensive planning and management of drinking water supply under the current arrangements. Incentives to stay with a traditional supply management approach and to make short term decisions remain strong, coupled with political pressure to keep rates and rates increases low.

Councils reported that regulation is necessary as it is easier to get agreement to fund compliance than discretionary activities. Political incentives to minimise cost to voters such as limiting rates increases and financial constraints because of debt caps or competing priorities do not support a long-term and sustainable approach to drinking water.

The report also pointed to fragmentation in the sector as another weakness and listed a range of gaps in the system over consistency, setting national outcomes and access to centralised services or support to achieve economies of scale, especially around access to specialist skills and national guidelines.

In his overview, the Auditor-General said that while the report focused in detail on four councils, it was likely that other councils are facing similar challenges and funding restraints.

In that, John Ryan is certainly not wrong. Many of the findings echo what we've been hearing and certainly back our view that there is a need for a more consistent approach across the sector. **WNZ**

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Three Waters and the case for change

A precis of Local Government minister Nanaia Mahuta's speech to Water NZ Conference, which provides an insight into the direction the Government will take with water reform.

LGNZ and the entire local government sector have a vital role to play in how we go forward together on the challenges facing our three waters system, and in promoting the necessary related conversations.

Today I want to update you on where the Government is heading in relation to the Three Waters Review. Much of what I am about to say will sound familiar and that's because of the country-wide workshops that Water New Zealand members and other stakeholders have hosted canvassing the issues I am about to present. I said very early on in this work-stream that in order to work through the range of challenges we will need to work collaboratively to have the 'right conversation', and Water New Zealand has been constructive in that approach.

We are also working with local government and the water infrastructure and engineering sectors and the Review is working across many agencies and government departments with overlapping interests and responsibilities for water. This includes the Ministry of Health and the Ministry for the Environment.

The Government sees water as a foundational infrastructure and it has become apparent that the status quo is not sustainable. With the Three Waters Review we aim to have our water system provide safe, clean water from the source to the tap, and back again in a way that is efficient and affordable for most New Zealanders, while improving our environmental responsibilities to our marine and freshwater bodies.

The challenges

I am leading a group of senior ministers through this Three Waters Review, as they all have interests that relate to water infrastructure. Our deliberations have revealed the complexities and scale of the challenges in meeting safe drinking water standards, waste and stormwater systems, including service delivery arrangements.

The main challenges relate to: Regulation; funding and financing; and capacity and capability.

Regulatory shortcomings

A picture is emerging of regulatory shortcomings in different parts of the three waters system.

The Havelock North campylobacter water contamination tragedy was a wake-up call.

In relation to drinking water safety, the Havelock North Inquiry identified "a widespread systemic failure among water suppliers to meet the high standards required for the supply of safe drinking water to the public".

Key recommendations included a dedicated water regulator, and dedicated and aggregated water suppliers.

Taken together, the Inquiry's recommendations amount to a step change in the way that drinking water is supplied and

regulated in this country. This is a critical juncture at which local government could have resisted any move for change and, to their credit and cautious leadership, they have leaned into the struggle of trying to work through a solution.

The Government has been working through the issues associated with the Inquiry recommendations.

The Ministry of Health's latest Drinking Water Standards update shows that in too many parts of the country, particularly with smaller supplies, compliance with drinking water standards by registered suppliers is unacceptably low.

Across all such suppliers, almost 20 percent of people are exposed to water that does not meet all the safety standards.

In terms of the environment, a draft report on wastewater commissioned by the Department of Internal Affairs has found there are weaknesses in our environmental regulation and to get on top of wastewater will be much bigger than for drinking water.

It is clear that, as the National Policy Statement (NPS) for Freshwater Management comes into effect, the significant rise in standards required will impact most heavily on small towns.

Then, there is the question of economic regulation.

Without it, there is no authoritative way of knowing: What we are paying for water services; whether we are getting safe, high-quality water; whether the service is value for money; and whether providers are making sensible water-related investments.

Under the current system, the information is simply not available.

To achieve the outcomes we are seeking, we will need to strengthen our regulatory regime so that we have; high standards and effective compliance, monitoring, and enforcement for safer drinking water; better environmental performance; and the ability to meet efficiency objectives and consumer expectations, including cost.

What this regime might look like and the potential options for change are part of the work officials are now progressing.

Funding challenges

Our three waters system faces significant funding challenges.

A Beca report commissioned by the Three Waters Review found the costs of upgrading infrastructure to meet key recommendations made by the Havelock North inquiry is in the region of \$500 million, and thought to be more like double that by some industry leaders.

The draft report on wastewater infrastructure costs to meet NPS Freshwater criteria indicates upgrade costs may be up to \$2 billion.

This does not include discharge to marine and coastal environments, or replacement of ageing underground pipes, so that figure can safely be significantly extrapolated.

Added to this there is acceptance by industry leaders that significant reduction of sewage overflows is the single biggest challenge facing the wastewater system – in terms of infrastructure and funding.

When we begin to look at stormwater and meeting the challenges of sewage overflows, the anecdotal feedback is that this raises costs onto another level altogether; when these are

considered with future population growth and climate change impacts, they are likely to be prohibitive, if we do nothing.

Given the interconnected nature of our water systems, it is difficult to see how we can meet future regulatory requirements and consumer expectations without also making changes to service delivery arrangements, including infrastructure provisions.

So, while fixing the regulatory arrangements for water is a priority, we also need to look at how we arrange water service delivery to be able to fund infrastructure.

How do we manage this in the high-growth areas of Auckland, Hamilton, and Tauranga, for example?

And, at the opposite end of the spectrum, how do we manage those areas with declining populations and growing service delivery and infrastructure challenges?

As a Government, we are committed to the continued public ownership of existing water infrastructure assets. This is a bottom line.

We do not see a conflict between public ownership and the ability to structure water services in such a way as to finance and deliver the necessary infrastructure.

Our firm view is that the funding issue can be addressed within the public ownership model.

Overseas experience

My recent trip to England, Scotland and Ireland provided useful insights into how other countries have approached their water-related challenges.

It was very instructive to learn and observe directly what has worked well, what mistakes have been made, and how this might influence the approach to water reform here. The candid discussions and insights were invaluable, and we have much to learn.

However, any options the Government decides to progress must work for our circumstances and our own communities.

In general, as many of you may know, in the United Kingdom and Ireland they have: Much stronger regulation and more capable and better funded services; independent drinking water and environmental regulation leading to safer drinking water and better environmental performance; economic regulation that provides a level of assurance that the right level of investment is being undertaken in the three waters; and economic regulation that drives a focus on customers and efficiencies.

It is particularly instructive to note that Scottish Water has achieved 40 percent savings, while Ofwat in England has achieved a 30 percent savings on consumer water bills.

Reflecting on water reforms in the United Kingdom and Ireland, my view is that a strong coordinated regulatory regime will not be enough on its own to deliver all the outcomes we are seeking here.

The costs of upgrading the system to meet expected standards will fall on already heavily burdened ratepayers, and will take a very long time to accomplish.

This is something we will need to consider as we consider options for service delivery here, as is the need for professional skilled directors in any new options. **WNZ**

Minister Nanaia Mahuta's opening address.



Award winners 2018

RONALD HICKS MEMORIAL AWARD

The 2018 Award recipient was Nick Marquez of Beca (Sydney) for the paper, presented at the 2017 Water New Zealand Annual Conference, entitled: *Challenges in developing a treatment solution for Poly-fluorinated Alkyl Substances – an emerging contaminant*.

PFAS have very low limits for human and eco-toxicity and have also been hard to reliably sample and analyse. Only recently has New Zealand discovered the large scope of its own PFAS concerns.

The winning paper summarised an Australian example of managing and treating water polluted with PFAS, in the context of standards and guidelines that apply in both New Zealand and Australia. In making the award, the judges said the paper was comprehensive with a strong analysis of the problems and also a thorough evaluation of treatment trials.

It dealt directly with the efficacy of treatment options and advanced a solution to a water pollution problem in a significant way. The judges said the paper was timely and will be of wide and long-lasting interest in New Zealand.

The Ronald Hicks Memorial Trust Fund was established in 1984 to recognise the contribution that Ron Hicks made to water and wastewater management in New Zealand from the mid-1950s until his death in 1983.

WATER NEW ZEALAND TRAINEE OF THE YEAR

This award went to Shaun Devlin. Shaun is a Network Operator for Veolia Water where he has been employed for nearly three years. Shaun has been described by his supervisor as a valuable team member and a natural leader. He is a person who can work with anyone in the team without conflict and who always makes sure jobs are completed to a high standard.

PIPELINE & CIVIL PROJECT AWARD

The award was won by CH2M Beca for the design and building of the \$144 million Biological Nutrient Removal facility at the Mangere Wastewater Treatment Plant. The judges said that this was a clear example of a cost-effective and well-executed project (featured in the September-October edition of *Water New Zealand* magazine).

The new facility provides capacity for the treatment plant to service an additional 250,000 people, and its advanced processes treat the wastewater more effectively than standard processes by removing greater amounts of nitrogen, phosphorous and carbon. The facility also contributes to the on-going programme to rehabilitate the Manukau Harbour and foreshore.

PIPELINE & CIVIL PROJECT AWARD HIGHLY COMMENDED – CHRISTCHURCH CITY COUNCIL – DUDLEY CREEK FLOOD REMEDIATION

This \$52M project was delivered in a very short timescale of less than three years from the design phase through to completion of construction. The successful delivery of the project was due to a strong collaborative approach by all members of the project team and a strong desire from the very beginning to deliver the project to a very high standard, to programme and within budget.

VEOLIA HEALTH & SAFETY

This award was won by Watercare for its new technical training centre. The purpose-built centre provides a safe and consistent facility for training its Maintenance Services Networks team which looks after Auckland's 17,000 kilometres of water and wastewater pipes.

The new technical training centre gives employees a place to learn and master the best practices for daily operations without impacting on customers. It includes a training ground set up to closely replicate what field crew would find when working in the streets, such as a two-lane road, berms and footpaths, and a residential façade. It means that staff can receive comprehensive training in a consistent and safe environment.

IXOM OPERATIONS PRIZE

This was won by Sharon Danks and the Triangle Road Pumpstation Commissioning Team at Watercare.

The commissioning of the Triangle Road pumpstation is an important part of Watercare's ongoing asset improvement programme to meet forecast growth in the north of Auckland. This project was extremely successful due to the detailed and rigorous planning undertaken by Sharon Danks and the team involved.

HYNDS PRESENTATION OF THE YEAR

Was won by *A Utilities' guide to starting up Anammox* by Octavio Perez-Garcia from Watercare Services.

This engaging presentation described the work being undertaken by Watercare to identify, cultivate and develop "home grown" anammox bacteria as part of the wider journey towards energy neutrality. Octavio presented highly technical information in a way that was easy to understand.

They confirmed the presence of native anammox bacteria, a New Zealand first. This presentation clearly described the process undertaken, the analytical methods, the results and set out a path for Watercare moving forward.

HYNDS PAPER OF THE YEAR

Was won by *Innovative Energy Opportunities for Water Utilities* by Lupe Suniula and Laurence Jenner from Watercare Services.

This paper provided an excellent description of the drivers behind energy saving for a large utility. It describes the operational challenges faced by Watercare and looks beyond just plant and equipment into partnership with government and the energy suppliers.

The paper describes how lowering reliance on the electricity grid improves resilience and reliability, as well as reducing energy costs. Technologies for reducing energy use are also identified making this paper a complete and thorough pathway for energy self-sufficiency for larger water utilities.

TRILITY YOUNG AUTHOR OF THE YEAR AWARD

Was awarded to Olivia Philpott from Watercare Services for her paper *Responding to Climate Change Challenges Facing The Water and Wastewater Industry*.

The judges said that this was a very well written paper on a very topical subject. The paper gives a good description of the issues facing Watercare and how it plans to respond to them. The approach is clearly one which can be used by other utilities who are facing the same issues, albeit in a different geography.

WATER NEW ZEALAND POSTER OF THE YEAR

Won by 'The Real Deal – IOT', by Hugh Blake-Manson and Logan Stephens.

The poster provided excellent examples of how the "internet of things" could be applied to improve information that could be used in asset



management. The examples provided, although simple, demonstrated how cost savings and timely decisions could be made.

BECA YOUNG WATER PROFESSIONAL

The Beca Young Water Professional of the Year award went to Troy Brockbank – a young professional, who has shown leadership and passion about combining and applying a Maori view – to water sensitive urban design challenges and opportunities. See page 44.

ASSOCIATION MEDAL

The winner was Garry Macdonald, a veteran of the water sector, who has had a stellar career and has been a tireless and highly successful promoter of Water New Zealand and our water sector capability, as well as promoting water sanitation and health, and wellbeing in the Pacific region.

The judges, in making the award, said Garry was a very worthy recipient.

Among his many achievements over a 40-year career, Garry has been a Past President of Water New Zealand and Engineering New Zealand (formally IPENZ). He is an Honorary Life Member of Water New Zealand and a leading member of the NZ 5S Chapter. He has been a member of the Board of Directors of the Water Environment Federation, including representing the Asia-Pacific Region and a period of Chair of the Board's Global Committee. He is currently Co-Chair of Oxfam.

Garry has been a Principal and Business Director of Beca since 1989 and has led many of New Zealand's major wastewater projects and scores of smaller projects throughout New Zealand and Australia.

He has written or co-authored in excess of 50 technical papers and presented these papers to conferences in New Zealand, Australia and the USA. He has regularly presented papers at the annual WEFTEC Conference.

Many of his papers have been published in prestigious international technical publications and have been recognised for their excellence through a range of professional awards.

Profile on page 42.

BEST EXHIBITION STAND

Best Single Stand – The Plant People (2006).

Best Multi Stand – Schneider-Electric (NZ) Ltd. [WNZ](http://www.wnznz.org.nz)

Water New Zealand Conference in pictures



- 1 Every Water New Zealand conference starts with a rousing powhiri.
- 2 The Operation's challenge that is designed to showcase teamwork and collaboration.
- 3 Outgoing and Incoming Presidents: Dukessa Blackburn-Huettner and Kelvin Hill at the Downer Gala dinner.
- 4 Plenary keynote speakers included Cindy Wallis-Lage, president of Black & Veatch, who spoke on 'prioritising water to drive sustainable, resilient communities'.
- 5 Emily Afoa, recipient of the CH2M Beca Young Water Professional of the Year 2017 award.
- 6 Sam Johnson from the Student Volunteer Army spoke on the Community Guardian Scheme, in Christchurch.
- 7 Premier conference sponsors (l-r): Tim Macintosh (Hynds); Raveen Jaduram (Watercare); Mark Christison (Fulton Hogan); Tim Gibson (City Care); Alex Lagny (Veolia); and Anthony McFadden (Broadspectrum).
- 8 Delegates represented a number of sectors with water interests. Nick Dempsey and Julie Plessis from Mott MacDonald NZ.
- 9 Photographic display of Water New Zealand past presidents.
- 10 Young water professionals gave two-minute presentations on assigned 'hot-topics'. Chairing the first round was: Joan Davidson and George Beveridge from WSP Opu.
- 11 Dave Dobbyn performing at the Gala Dinner.





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A conversation about green stormwater

Troy Brockbank, Deputy Chair of the Stormwater Group Committee, talks to **Tracy Tackett** from Seattle Public Utilities.

Earlier this year, Troy Brockbank travelled to the USA and was impressed with the many examples of green stormwater infrastructure (GSI) in the Pacific Northwest.

During his trip, he caught up with local GSI champion, Tracy Tackett who gave Troy an insight into the city of Seattle's GSI initiatives.

Troy caught up with Tracy again at the Water New Zealand Conference, where she was an International Thought Leadership speaker, and asked her about her experiences with GSI, and where it's headed in the future.

What was your inspiration for getting into green infrastructure?

I've always had a strong connection to water, and early in my career focused on how to decrease the impacts of stormwater on the environment. My first job working in stormwater was in the city of Seattle, and my interest naturally transited into green infrastructure.

In Seattle, we have a lot of streets that need roadway improvements, that don't have drainage infrastructure and so this led to our first retrofit project where we put in bio-retention to hold the water back, to slow it down and then treat it. The city was also open to allowing staff to innovate the right solution set, and it really liked the product so kept going from there.

So there were a lot of problems in Seattle with the roads and run off, as in flooding and pollution?

Yes, a third of our city is lacking formal roadway improvements, so in 2000 we put a pilot project forward to show what it could look like in terms of providing improvements, without making things worse downstream.

There's still a lot of infrastructure needs and we don't have the money to do all the streets that need improvement, but project data and the research on the impacts has been much more positive than even we thought it would be, and has provided the basis for going forward.

Can you explain what green stormwater infrastructure looks like?

Green stormwater infrastructure (GSI) is a nature-based tool for managing stormwater in a way that provides multiple benefits. So instead of the just a pipe to convey water quickly

and efficiently away, we use practices to slow and clean the water.

The GSI toolkit is designed to mimic nature by using nature's toolset of soil to slow the water and clean it, and by using vegetation to maintain soil infiltration, provide water quality treatment, aesthetic amenities, habitat, open space, air filtering, and jobs for people doing the maintenance.

It helps the general public become more interested in integrated cityscapes.

So knowing the environmental impacts and what needed to be done, what did you find along the way? What have been the pitfalls or the challenges from a design perspective, a construction perspective, and also an operation & maintenance perspective?

There have been challenges in every aspect along the way. I frequently relate the work to an onion – each time you find a challenge, work it out and peel that layer off, you find there's another one.

I've been working on green infrastructure for 20 years now, and we're not at the end of working through all the layers, and they're very different.

Some early challenges concerned transport agency safety standards and what is allowable in terms of vehicular and pedestrian safety – side slopes, standing water depth, roadway shoulders, etc. Those have all mostly been addressed. (Best national guidance available is NACTOS Urban Street Stormwater Guide, and Seattle GSI design Manual.)

Challenges have now moved into the complexity of working in dense urban environments and prioritising nature-based solutions within all the competing needs for space.

How did you work with residents and the public?

We started initially with design and plant pallets, working with homeowners wanting a really creative plant palette and a lot of diversity.

Then there was the realisation that aesthetic maintenance was often overwhelming for people. So we shifted to a more simple plant palette that's easier to maintain and at a lower cost. We especially focused on plants with low irrigation demands because of the cost of water spikes in drought years.

Our public engagement has advanced to more deeply engage the public in prioritising locations for GSI improvements.

There's a lot of emphasis on education and the education process and can you comment on how the public perceive these devices?

A lot of Seattle GSI projects have been placed in areas that the public perceived as part of their private property, as frequently the boundary of the public right-of-way isn't clear. So a lot of the public engagement involves working through change.

Once a site is selected through involvement of a larger community base, education for adjacent property owners focuses on two different fronts. One is around expectations of what it should look like. We would initially show pictures of what the projects will look like at the end of vegetation establishment.

One step is educating about the phasing, so people understand that it takes a while for the plants to become established. It's a case of in the first year there's creep, second year it sleeps, and the third year it leaps, so be patient. It takes three years for plants to grow, so we use signage to educate about that.

The other major part of education is helping people understand why the change is necessary. People are generally disconnected about the pollutants that are generated by them driving their cars, and the impact on the waterbodies that they cherish and love. Seattle is incredibly environmental, but there was very little connection between actions and the roadway pollutant impacts. So some of the signage is just to help raise awareness and to say "hey there are pollutants, this is helping."

As a whole, there is no quick and easy way to public engagement. It's a lot of meeting people where they are, and finding places where they are gathering, and setting up a time to talk about stormwater.

It seems such an obvious win-win for everyone. Are you surprised at the amount of time for these ideas to get through to city officials or public right around the western world?

I'm not surprised because all our policies have been about getting water to go away as quickly as possible so there's been a big shift in the past 15 years from the thinking that "oh wait, that just means flooding downstream", or "that just means moving the water quality from downstream."

So, the fundamental basis of green infrastructure requires somebody inside each municipality digging into a lot of policies and procedures on land use codes and the related rules to change base information, and revise or write new documents.

And anything retrofit is expensive. Stormwater management requires money, and there are a lot of demands on what we spend that money on so people have to be committed to making an improvement.

I'm a big fan of regulations that say you have to do something because then we as the municipal government have a tool to tell our rate-payers that we have to do this. Regulations are one thing that helps people understand how important something is.

Are you optimistic about the way green infrastructure is moving?

I feel like green infrastructure is solidly there as a scientifically proven great tool in the toolbox, so I don't think we're still pushing that rock up the hill. I don't know about here, but in



Tracy Tackett; Seattle Public Utilities with Troy Brockbank; Deputy Chair of the Stormwater Group Committee.

the States, I think we're there.

There's the data to support it, so there might be politics in each jurisdiction you might have to get through. However, there's lots of data, so I'm not worried about it not being a valid tool used by everybody who wants it.

I think it's just the willingness of who's the champion inside each place to make it happen, so it's more about needing the support network of champions, which we have through a couple of low impact development conferences and a green infrastructure exchange for information sharing for when you're stuck.

There are different traditional fights that happen along the way. It might be between the stormwater engineers and the water department or the transportation department, things on the technical side, on your budgeting people, finance people saying you're not allowed to spend money on that.

There are lots of silos of people who don't know who else has already worked through these issues. So you need a network of people to share how you can use the tool. I think somebody has dealt with almost every issue and gotten through it, so it's really more the champion and doggedness to keep going. It's not a field for the faint of heart.

What would be your advice to us in New Zealand in terms of adopting and implementing GSI?

Enlist high-level management like elected officials through "making it sexy". There are reasons why programmes succeed, and it's often nothing to do with stormwater.

It's what else do you get. In Philadelphia they got urban revitalisation, in Detroit they're getting urban revitalisation,

and in Seattle we're getting green space in a dense urban environment.

There are things that politics want – it has nothing to do with stormwater, but if you can fit it in and make it go together, it makes all the difference. Once elected officials are pushing staff to implement GSI work, it makes the work of the lower level staff go a lot more smoothly. It's way too exhausting to do it at a staff level without support.

You need both, you need a political champion and a staff level champion. Just working as a committed environmentalist at a low level is too exhausting. So my advice is to engage politics.

From what you've seen here in New Zealand and what you've heard here at the conference do you think we're on the right track?

Seems like it. I've only been here today, but it does seem like there is a growing awareness of the impacts of stormwater and the need to do something.

And there's already a principle around three waters, it seems like a great foundation and knowing you can pull from other places.

Maybe you guys already have these resources, but there's a lot of technical nitty-gritty the States have hammered out, so I suggest you build on that base foundational information. And if you don't already have it, a regional information sharing network among each other to make sure you're developing information, like your soil specs, and the information is shared allowing other folks to prioritise time on another needed GSI 'onion' layer.

Are there any initiatives for implementing/introducing art into GSI?

Yes, as part of our capital budget we have a one percent per art programme. So, one percent of our capital budget goes towards art.

For projects that have a high potential for interaction, such as something that's going to be visible or along a path, we work with the arts commission to explore developing something. We do this with our arts department which hires the artist, and we identify the general scope of where art would fit well into the project.

And so landscape architecture would be the really important part underneath that?

Well, this is literally physical art. But landscape architecture staff are embedded in our teams for many projects. We have a lot of just plain old pipe underground projects but the ones that have surface elements almost always have landscape architects.

LAs have a great ability to optimise the project design to be an amenity for the public.

With predictions in the increase of rain and sea levels, do you see the use of green infrastructure to complement failing infrastructure, without the need to upgrade pipes?

Yes, that is the current focus for one of our projects, we're working on a climate resilient approach to a large part of town that's likely to be underwater in 50 years. So how we use our

green infrastructure strategy to also be our seawall strategy is our next project.

We are also looking at how GSI can be part of our strategy for peak rainfall intensity increases that will increase localised flooding and sewer backups as our pipes become unable to convey those higher intensity storms.

So instead of just digging them up and making them all bigger and upsizing pipes for miles downstream, we're looking at how we do surge control in the upstream, and that's peak flow detention with a nature-based solution.

And volume reduction, and flood management?

Yes, using bio-retention or low impact development tools as a way to temporarily hold the water in spaces we can infiltrate, then complete volume reduction. Super important. Things we built five years ago are already, with the shift in the climate change intensity, and completely changed performance based off of really solid modelling. The shift has been really drastic for us.

Floodable parkland is a super important tool in our toolbox that we're moving into. For instance, where we are putting the floodable spaces is next. Green infrastructure is a lot about the flooding for climate intensity while also doing all the other stuff.

There are two sets of evaluation around precipitation intensity; there's the one as you're doing projects making sure you're planning for future climate scenarios, rainfall intensity but then there's where is it going to be flooding even more, and where will sea level get ahead of everything? We're just getting started on the latter, but we need to do both.

What's the next innovative thing for green infrastructure?

Our biggest shift is going bigger. So, we have neighbourhood scale projects that are going beyond just working in the municipal, in the city family, to working on the partnerships and funding partnerships with job initiatives, and green space initiatives, and outside the partnerships that we have though built environment.

Anything else to share?

How you define the problem is the critical aspect of whether the solutions that work to solve the problem(s). If you define your problem in a very set silo of performance – such as just handle combined overflow reduction – that will lead you to a different answer than a watershed-based framing of the problems – what is the right thing for addressing community DWW needs in this basin, including conveyance capacity and the best thing for water quality in the sewer.

It's really important to step back to make sure we frame things the right way – not just one of our business needs but about multiple solutions.

Also, not just for green infrastructure per se but because green infrastructure solves multiple kinds of problems; it is inherently a better tool when you have a bigger set of problems that you're solving. It's our job to be stewards of our ratepayer dollars, and thinking holistically is the best way to do that. [WNZ](#)

• Some other resources to share from Seattle are available at 700milliongallons.org and seattle.gov/util/greeninfrastructure

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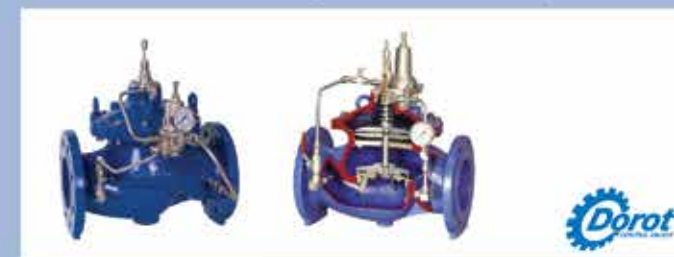
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This paper won the Hynds Paper of the Year Award at the 2018 Water New Zealand Conference.

INNOVATIVE ENERGY OPPORTUNITIES FOR WATER UTILITIES

Lupe Suniula and Laurence Jenner (both from Watercare Services).

ABSTRACT

Watercare Services is a significant user of electricity from its water and wastewater treatment processes, consuming 165GWh in 2016/17. Of this, 30 percent is currently generated from biogas (cogeneration) and hydro, leaving some 115 GWh supplied from the national grid.

This represents a significant operational cost and provides opportunities for Watercare to explore alternative energy sources including enhanced cogeneration, solar PV and battery storage. Benefits are reduced costs to serve customers, improved system resiliency and wider environmental benefits for New Zealand.

The full paper (see link below) highlights the challenges of reducing operational energy costs at a large water utility and the exciting possibilities presented by ever more affordable distributed electricity generation technologies, such as solar PV and battery storage, as well as next-level wastewater treatment technologies that optimise the production and use of biogas.

Starting with a new Energy Policy in 2016, several initiatives are now underway to improve energy conservation and investigate the financial benefits of self-generation, in particular photovoltaic (PV) solar panels.

Several pilot projects are looking to confirm real-world benefits including reduced electricity costs. The initiative will create new revenue streams from the export of surplus solar electricity back to the grid and pairing with battery storage.

Although in its infancy, battery storage complements green energy technologies, such as solar, hydro and biogas, by storing generated power and controlling the release of that energy.

This can be optimised to maximise revenue by exporting to the grid when tariffs are high, reduce imported electricity costs by offsetting demand and avoiding high tariff peak periods, and possibly support wider community electricity infrastructure.

Water utilities require security of supply to ensure pumping and treatment processes continue during power outages. Battery storage technologies can provide this security in lieu of using traditional diesel generators that can be operationally complex.

Security of supply is also a shared common interest with electricity

network companies in areas where there are known power supply issues and population growth pressures. Partnerships are being formed where there is a shared interest to jointly fund, co-locate, or prioritise use of the battery storage solution by the water utility.

There is significant potential for large electricity users, such as water utilities, to become more energy-independent using green energy and realise a sea change in approach where electricity supply is not simply seen as an outsourced service but becomes a fundamental part of the business that can be channelled to drive efficiency and innovation.

OPPORTUNITIES

REDUCE RELIANCE ON GRID

Green energy technologies guided by a solid policy framework are enablers for innovation that allow water utilities to reduce costs, maximise asset performance and improve service delivery.

One of the biggest potential gains is to reduce reliance on the grid from using commercial-scale onsite generation. Distributed generation has numerous benefits ranging from improved resilience, lower operational costs, better return on investment from land and other assets, and environmental and public perception gains. Solar PV is rapidly becoming an attractive and affordable option.

The cost per Watt for PV panels is now around 70 cents. This means that a 200kW solar PV system delivering 275MWh output per annum and occupying 1,700 square metres can be procured for ~\$150,000 (excluding installation costs).

When combined with battery energy storage systems (BESS) solar PV can be used to power infrastructure assets during the night as well as during the day, and opens up further opportunities to shift loads and costs to off-peak times that can deliver material gains for Watercare's bottom line.

Watercare has recently initiated three pilot projects to test the real-world benefits of solar PV and battery storage. A total of 370kW of solar PV and ~230kWh of battery storage will be deployed at Redoubt Road Treated Water Reservoir, and the Pukekohe and Wellsford Wastewater Treatment Plants (WWTPs) that will help inform any future investment decisions by Watercare in these technologies.

Redoubt Road Reservoir handles up to two-thirds of Auckland's treated water each day. The pilot projects are expected to be implemented within the next six months.

By utilising the available space provided by under-utilised land, lake surfaces, disused UV treatment ponds and roof tops, there is potential for Watercare to deploy up to 88MW of solar PV covering 100ha, generating up to 130GWh of electricity per annum and enabling us to become 79 percent self-sufficient in electricity.

MANAGE ELECTRICITY CHARGES

Water utilities can also seek to better manage their electricity consumption profile and charges. Watercare's usage profile is made up of sites that have the following supply types:

- Time of Use (TOU) – electricity tariff monitored half hourly with tariffs based on four-hour blocks where annual usage is typically larger than 200,000kWh;
- Non Time of Use (NTOU) – electricity usage traditionally read monthly where annual usage is between 3000kWh and 200,000kWh; and
- Unmetered sites – such as water quality monitoring sites which have low usage and are charged on a fixed monthly fee where annual usage is less than 3000kWh.

TOU sites are typically the larger sites, production facilities and large pump stations, and account for approximately 88 percent of Watercare's electricity expenditure. NTOU and unmetered sites are smaller sites, and although they only account for 12 percent of expenditure, they comprise the largest volume of bill handling effort.

Ways to reduce the electricity charges begin with understanding the TOU pricing. Fixed price variable volume TOU tariffs typically

range from five cents per kWh from 0000-0800 hours to 11 cents per kWh from 0800-2400 hours. Shifting energy use to partial-peak and off-peak hours could save up to six cents per kWh.

There is limited flexibility around changing the operation of the wastewater network due to limited storage capacity in the network and the amount of storm water infiltration. Solar and BESS can be used to reduce electricity imported from the grid during the daytime.

REDUCE PEAK DEMAND CHARGES

TOU sites are subject to demand charges imposed by the electricity network companies to cover the costs of providing enough energy to their customers. Network companies have to maintain enough generation plants "just in case" they need to supply all that energy at once. This requires them to keep and maintain a large range of expensive equipment on constant standby, including wires, transformers and substations.

Demand charges encourage customers to:

- Size the equipment appropriately to do the job – electricity demand can increase unnecessarily when equipment is larger than is required;
- Reduce power usage during peak hours; and
- Shift energy-intensive loads from peak to non-peak hours if possible.

In the Vector network, this is calculated as the average of the 10 highest kVA demands (twice the kVAh half-hourly reading) between 0800-2000 hours (8am to 8pm) on weekdays including public



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holidays in any one month. The lines company demand charge is about \$0.30 per kVA per day so users can end up paying for that peak demand every day of that month.

Due to limitations in the water and wastewater systems, it is very difficult to move the energy-intensive loads outside the 0800-2000 hour period charged by the lines company.

An alternative power supply, such as diesel generation, solar PV and BESS, could potentially supplement the grid electricity supply for the site and therefore 'shave' the peak demand and cost.

For large sites with existing installed standby diesel generators that are synchronised to the grid, running the generator during peak demand times can replace the scheduled run time that prevents the generator fuel from settling.

There is also the potential to explore capacity reductions for sites whose load reduces significantly during the night time.

MAXIMISE GENERATION & REVENUE POTENTIAL

Watercare currently has 9.4MW renewable energy capacity installed for electricity generation at the water supply dams and wastewater treatment plants.

The cogeneration engines at Mangere WWTP generate both electricity for the plant and heat for the digestion process and are capable of supplying up to 30 percent of the plant's electricity needs.

Most of the hydro generation at two of the four dams is surplus to the site's needs. There is an opportunity to explore partnerships with local lines companies to store that power in batteries to provide resilience for their customers and / or sell to an electricity retailer. There is also the opportunity to store the hydro generation in a BESS and control the timing of the release of energy to the grid to maximise revenue opportunities, including during times of high spot-market electricity prices.

DEMAND RESPONSE PROGRAMME

Transpower confronts similar challenges to Watercare with ageing infrastructure and the pressures of increasing demand and peak demands on the system, especially in the Auckland region. Its demand response programme is one way to manage the peaks and help defer and spread the burden of major capital upgrades.

While there may be challenges in reducing demand through operational changes to our business, Watercare can still benefit financially from participating in the programme by coupling onsite solar PV generation with non-grid electricity supplies like battery storage or diesel generation to offset and shave peak demand on the grid.

PARTNERSHIPS

Watercare has facilities, such as pump stations, all over Auckland to service its customers and in some areas faces power supply issues, particularly during storm events.

The Kawakawa Bay wastewater vacuum pump station was identified as having recurring power supply issues due to its remoteness, which can greatly affect the local community because of the way the system operates.

Typical pump stations will receive sewage through pumping or gravity, and the station will pump sewage away towards the treatment plant. This vacuum system uses pressure to pull sewage

collected at multiple cesspits located around the community towards the station and then pump it to the treatment plant.

During power outages, the cesspits can overflow, necessitating a major clean-up to get the entire system operational again.

Alternative power supplies were investigated for Kawakawa Bay pump station. The site already had a diesel generator connection, but due to its remoteness and sporadic inaccessibility during storms, getting a generator to site in time and refuelling proved problematic.

Watercare approached the local electricity network company for a proposal regarding solar PV generation and battery storage. Vector responded with a proposal to co-locate a MWh-scale battery storage solution for the entire Kawakawa Bay community, which included reserved battery capacity for the Watercare vacuum pump station.

Vector will own and maintain the batteries and Watercare will own and maintain the solar PV. This project is currently being implemented and will deliver cost-sharing and security of supply benefits for both parties.

REAL-TIME MONITORING & CONTROL

Real-time monitoring and control of solar PV and BESS is critical to leveraging these technologies and enables participation in schemes, such as the demand response programme.

Online monitoring and control systems, either via SCADA systems or by the vendor's web applications, provide real-time consumption data, status alerts and programmed reserve capacity control. Integrated monitoring and control via Watercare's SCADA system is an important part of the three pilot projects being deployed.

ENHANCED WASTEWATER TREATMENT TECHNOLOGY

Reductions in energy demand at WWTPs can be achieved through process and technology changes as well as increase biogas yield and therefore self-generation.

As part of its work with EECA, Watercare has developed five work streams to achieve energy neutrality at Mangere and Rosedale WWTPs. These are: aeration reduction; biochemistry optimisation; carbon harvest; biosolids and biogas production; and wet weather treatment.

EQUIPMENT

Equipment procurement and selection methodology are another tool water utilities can use to drive savings across the business. Whole-of-life cost assessments as part of price-quality methods of evaluation should be used to identify solutions that deliver the best combination of functional effectiveness, reliability, capital acquisition cost and ongoing operational cost.

This approach can realise benefits across a range of equipment, such as pumps, ultrafine bubble diffusers (used in aeration), blowers and UV treatment systems. The selection of next-generation UV treatment systems at Mangere WWTP is expected to reduce electricity consumption by ~3GWh and save up to \$300,000 per annum. [WNZ](#)

• To read the full paper go to: bit.ly/HyndsPaperofYear_2018

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A Canadian view of our drinking water safety

By **Laith Furatian**, Water Master planning Engineer, City of Kamloops, British Columbia.

This year, I was honoured to be invited to the Water New Zealand Conference and Expo in Hamilton where I presented on the history, rationale, merits and limitations of maintaining a chlorine residual to protect drinking water in the distribution system.

Notable themes included the recent deadly outbreak of campylobacter in Hawke's Bay. The inquiry that followed modelled Canada's response to the 2000 Walkerton Ontario outbreak.

As with the Walkerton Inquiry, Havelock North has also had a profound impact on drinking water practice in New Zealand. *The Report of the Havelock North Drinking Water Inquiry: Stage 2*, was released in December 2017 and its list of recommendations includes sweeping reforms to a wide range of drinking water issues.

At the time of writing, your Government had not announced any significant decisions based on those recommendations, though change has already begun.

Among the inquiry recommendations are the abolishment of the secure well classification that has allowed widespread use of untreated groundwater, mandating universal treatment, including the maintenance of a disinfection residual in distribution, the creation of dedicated and aggregated drinking water suppliers and the establishment of an independent regulator.

The Christchurch situation

At the conference, Mike Thorley, a hydrogeologist with the consulting firm Beca, presented on the recent wellhead remediation efforts in Christchurch.

The city of Christchurch supplies water to residents via 139 wells and 53 pump stations. Until recently, all wells were classified as secure, and all water was distributed to residents untreated. In late 2017, the routine inspection of 25 well heads, most of them below ground, revealed significant deficiencies at all sites when new criteria based on the Stage 2 report were used, and secure status was revoked.

With great reluctance, Christchurch City Council decided to initiate continuous chlorination as a temporary measure for up to 12 months until well head remediation could be completed

and secure status restored.

Knowing that the Stage 2 report recommended abolishing secure status and mandating universal treatment, it was hoped by the council that high-quality infrastructure improvements would provide compelling evidence to merit an exemption from potential future mandatory treatment.

A vote by the council established the long-term objective to distribute untreated water. Local public opinion in Christchurch is strongly opposed to chlorination, the most likely treatment requirement. Work is currently in progress to raise and remediate the vulnerable below ground wellheads to above ground installations with full annular grout seal.

Detailed investigations are being conducted for more problematic wells that may require replacement. UV disinfection is planned for the city's largest pump station, which draws from the shallowest aquifer, and is actively being considered for other select pump stations.

The combination of widespread misunderstanding and public opposition makes it difficult for politicians to take a courageous stance in defence of public health, especially if they themselves are unlikely to be held personally responsible in the event of another disaster.

Such an environment surely must cause anxiety and discord for municipal staff responsible for public health protection. In the event of an outbreak, their only defence for knowingly not following best practice or recommendations by health authorities, could be that they were simply following orders.

Wellington Water

The situation in Christchurch is in contrast with that of Wellington Water. Shortly following the Kaikoura earthquake and a period of heavy rainfall, concern emerged when a sample from one of the wellheads returned positive for both total coliform and *E. coli* for the first time in nearly three decades of operation (see page 56).

The fear of a Havelock North type incident in a much larger community motivated immediate action. Emergency chlorination was converted to continuous use and UV disinfection capabilities were quickly installed. A run-to-waste bypass of UV treatment from the wells to a nearby river was

built, dubbed the "first flush" pipeline, to respond to potential periods of excessive turbidity.

These improvements were conducted rapidly in an attempt to beat the high summer demand season. This experience and the release of the Stage 2 report recommendations resulted in a significant change in organisational thinking and pre-emptive abandonment of the concept of secure well classification within the organisation.

In Wellington, the trusted advisor model allows the opportunity for better separation of technical and political decision making. Decisions taken at Wellington Water are therefore slightly more removed from political influence, though ultimately decisions remain with the local councils that it serves.

Back in Canada, the problem of political influence was addressed by the Walkerton Inquiry in Recommendation 45: *Given that the safety of drinking water is essential for public health, those who discharge the oversight responsibilities of the municipality should be held to a statutory standard of care.*

Since 2013, this recommendation has been incorporated into Ontario's Safe Drinking Water Act in *Section 19: Standard of care, municipal drinking water systems*. It states that anyone with "decision-making authority over the system" must meet the standard of care.

This means, for instance, that the mayor of a small town in Ontario is much less likely to vocally oppose chlorination





Laith Furatian (City of Kamloops, British Columbia, Canada) and Laurence Edwards (Wellington Water).

against the recommendations of health authorities than their counterpart in New Zealand.

If local politicians are held to a statutory standard of care, then the learning curve for newly elected officials will be significantly greater. **WNZ**

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2. Theresa Fanene from Stormwater360 and Chris Macek from WSP Opus.
3. Kirtina Ismail (left) and Carissa Makea from Hynds.
4. Tim Carlton from Contur.
5. Best Single Expo Stand prize-winner – The Plant People.
6. Kerstin Frazer from Activated Carbon Technologies (New Zealand).
- 7 & 8. There was plenty of cool equipment on display including this UV filter by Berson and another by Trojan UV Swift.
9. On the Applied Instruments stand (the company also sponsored the coffee cart in the trades hall): Colin Hooper; Deborah Hall; and Janine Godfrey.
10. Best Multi Expo Stand prize-winner – Schneider Electric.



A life-long dedication

In recognition of his tireless contribution to the water sector, Garry Macdonald was awarded the Association Medal at this year's conference. **BY MARY SEARLE BELL.**



Association Medal Winner Garry Macdonald with ex-president Dukessa Blackburn-Huettner.

Garry Macdonald has been working in the industry for more than 40 years. Talking with him, it's clear water engineering is more than a nine-to-five job, more than a career even; it seems almost every waking hour is given to the industry, whether it's in the office or on site, serving on industry boards and committees, writing and presenting papers, or promoting water sanitation and health.

His interest in water began as a child growing up on the West Coast, where, for its weather alone he "saw a lot of water".

"I am the son of a Catchment Board engineer. Together, in his Land Rover, we drove the length and breadth of the West Coast. I got to see a lot of flooding, naturally, and learned through that how water worked."

Following in his father's footsteps, he studied civil engineering. In his final year, for his master's thesis, he looked at wastewater. Namely, the pumping of waste – "pretty much untreated" – into the tidal stretch of the Waimakariri River.

"The research went quite well. My thesis was published in the journal of the American Society of Civil Engineers – the first of what is now over 50 published papers."

As a newly qualified engineer, he got chatting one day to Leicester Steven, of Steven & Fitzmaurice (now Beca), and was offered a job on the spot in their Christchurch office. He began working on the Christchurch Wastewater Treatment Plant and continued his investigation of whether waste should continue to be pumped into the river.

"I did a lot of bobbing around in boats," he recalls. "We would release a radioactive isotope into the water and trace it out to sea. It was quite advanced back then. These days we'd use dye."

From the Christchurch office, he worked nationally; "from Invercargill to south of the Bombay Hills".

After two years, he won a two-year CBI (Confederation of British Industry) scholarship, which allowed him and his wife Meg to have an OE. It was quite the coup, with only a few recipients selected each year.

He asked Leicester if he could re-join Steven & Fitzmaurice when he came home. Leicester readily agreed, not only granting a leave of absence, but paying him a small stipend each month to guarantee his return.

In the UK he worked for John Taylor and Sons, undertaking both water and wastewater engineering. The company was doing quite a lot of work in the Middle East, so in addition to travelling extensively through Europe with his wife, he spent three months in Bahrain, surveying the route of a major water pipeline.

The couple returned in 1980 and Garry started working on the Timaru wastewater scheme, his first major New Zealand wastewater scheme. However, as before, his role had him travelling the country. As a gregarious chap, he made a lot of friends along the way.

"We were a friendly consultancy – our clients were our friends. When I travelled away, I'd stay with them, and when they came to Christchurch, they'd stay with Meg and me."

In 1989, Steven & Fitzmaurice, of which Garry was now a director, had a watershed moment: "We saw ourselves competing with Beca a lot, so decided to approach them to

see about merging. They were delighted. They got a ready-made water and wastewater division and a strong South Island presence, and we got a lot more opportunities to work on a wider range of projects."

The merged firms were rebranded as Beca Steven, and Garry headed up the Christchurch office. This was to change in 1993, when managing director Sir Ron Carter invited him to check out the Auckland office.

"It was supposed to be a two-year stint, but I'm still here," Garry laughs.

These days he has two roles within Beca: that of water market leader and business director, which sees him identifying opportunities and technical and legislative drivers in the water sector, both nationally, regionally and globally; and as technical and project director for most wastewater projects delivered from the company's Auckland office, which includes work won in Australia, SE Asia and the South Pacific.

Throughout his career, Garry has been heavily involved in various professional associations. His hours of work for Water NZ is coupled with his service as the New Zealand representative of the Water Environment Federation (WEF), a board member (and currently co-chair) of Oxfam, and many years on the board of IPENZ (now Engineering NZ), including a year as president.

"In the gap between school and university, I was a VSA school leaver volunteer in Tonga. That was the genesis of a life-long interest in development programmes, humanitarian aid and water, sanitation and hygiene (WASH).

"I have a strong interest in 'giving back' to my profession and to society at large."

He says his time with these associations was equally good for building a great network of friends. Overseas conferences and technical tours, plus annual trips to the USA with WEF and WEFTEC, has ensured an extensive group of international friends as well – although they are often non-plussed about this convivial Kiwi habit of staying at each other's houses!

Because of the time and service for the industry, it was no surprise that Garry was awarded the Association Medal in September.

As Anthony Wilson said in his presentation speech; "It can be seen that Garry's contribution to the association has been immense, covering technical, governance, leadership, international representation and advocacy."

His latest gong joins an impressive list of accolades, including the Richard S Engelbrecht International Activities Service Award from WEF and the Angus Award (IPENZ's supreme technical award for engineering achievers), plus 10 technical and project awards from Water NZ, IPENZ and IPWEA(NZ).

He's a life member of Water NZ, a fellow of IPENZ and a Sanitary Sludge Shoveler (of not only the New Zealand chapter, but Nevada and Texas too).

So where does he get the time for all this?

"When you're having fun, you make time."

"It's great to get to 65 and find I still have the energy to continue my passion for the water environment." **WNZ**

Looking after tomorrow's water

Combining his twin passions of his engineering career with his Maori culture, Troy Brockbank is set to make changes to the water industry. **BY MARY SEARLE BELL.**

Troy Brockbank hails from Pukepoto in Northland and grew up on the edge of his ancestral waterbody, a huge natural wetland, which he holds responsible for shaping his career.

"I grew up playing in it. We could see it from the hill – the streams that went into it, the farmland around it.

"When I was young, I didn't really understand what it was, or what it was doing, in fact, I didn't think much about it, but it must have triggered my interest in the environment."

While studying engineering at the University of Auckland, Troy was a member of the South Pacific Indigenous Engineering Students (SPIES) Association.

"Being a member of this Maori-Pasifika group exposed me to a world where culture and engineering were united.

"I consider my experience with SPIES, and now as a member of their alumni counterpart, South Pacific Professional Engineering Excellence (SPPEEx), to be the foundation of my professional career as an engineer of indigenous descent."

Interestingly, for someone who has just been named the Young Water Professional of the Year, he studied structural engineering, with a focus on multi-storey building design. However, it only took one month of working with structural assets for him to realise it wasn't right for him.

"Fortunately, Opus, my employer at the time, realised this too. They said they had a MSQA contract for the construction of the Northern Busway that required a structural engineer to supervise the installation of multiple bridges, and asked if I'd like to visit the site and potentially move to that project."

Troy soon found himself underground, overseeing the installation and renewal of culverts, and he loved it from day one. Within a few short months he had experienced working on manholes, pipes, swales, and the design and redesign of wetlands for stormwater runoff.

It was only once he'd begun to work with water that he started to understand the significance of the wetland he had grown up next to.

"I haven't looked back," he says.

Although a young professional, Troy has accumulated a

pretty broad range of experience in his career so far. After spending a couple of years with Opus after completing his degree, he travelled to Wales with his Welsh wife Sophien to meet her family, and the couple spent two years living and working there.

"There weren't a lot of jobs available at the time, so I had to take what I could and ended up doing the hard yards as a drainlayer. That experience has been amazing, and I now understand how to make things easier for the guys on site, as I learnt the importance of designing for installation.

"I also learnt a lot about stormwater management for flood control – the UK is ahead of us in that respect. I learnt a lot about water quality treatment in built-up areas: green roofs and SUDS (sustainable urban drainage systems)."

Before returning home, Troy secured a role with Stormwater 360 as its stormwater engineer. During the subsequent seven years the company grew, and Troy was soon managing a team of engineers.

"I loved my time at Stormwater 360. It's a small company, very family focused, warm and welcoming. And as it is small, we got to do a lot of work outside our own areas of expertise – we were jacks-of-all-trades.

"It was a good company for expanding and sharing knowledge. I got to travel the country and world and present at conferences about our research, technologies and developments, and more recently about the New Zealand perspective; integrating Maori values into stormwater management.

"I was surrounded by very knowledgeable people – especially [founder and director] Mike Hannah, I learned so much from him.

"For the past five years I was mentor to Kevin Jonathan, who joined us as a graduate. I taught him everything Mike had taught me, and more I'd gathered myself. Now he's taken over from me at Stormwater 360."

Beca Young Water Professional of the Year winner,
Troy Brockbank with Clive Rundle of Beca.





Troy's recent return to WSP Opus completes one circle, however another is also being drawn. The wetland of his childhood is now featuring in his professional life.

Tangonge (the name given to this wetland) is made up of 700 acres of local Maori-owned land plus about 800 acres of Crown land that has been returned to Te Rarawa and Ngai Takoto iwi.

Over the years, the wetland had been heavily modified, damaged and diminished, due to drainage and farm development. Under the stewardship of the local iwi, the area is being restored, based on research around hydrology, flora and fauna, restoration, maintenance and land use. Key among these is the goal of revitalising kaitiaki practices that will reinstate and regenerate ecosystems.

It's a project Troy is thrilled to be involved in as environment and three-waters advisor for Te Rarawa iwi.

"We're developing a 100-year plan for the wetland. We're in year four at the moment and are still trying to figure out what it will look like and who will use it.

"Ten-year plans are all well and good, but we want to future proof the wetland for our children and the generations after them."

Troy is passionate about his Maori heritage and is incorporating his culture into his work and the wider industry. It is for this he received his accolade at the recent Water conference – for showing leadership and passion about combining and applying Te Ao Maori (Maori worldview) to water sensitive urban design challenges and opportunities.

As he writes in the abstract to his presentation at this year's Stormwater Conference: "Maori culture recognises that environmental management has integral links with

Troy Brockbank was supported by family members when presented with his award.

the mauri (well-being) of the environment and concepts of kaitiakitanga (guardianship).

"Te Ao Maori further promotes stewardship and protection of these resources, through the intrinsic relationship of people to water, and the natural environment.

"Integrating core stormwater management values with matauranga Maori (indigenous knowledge) and principles of tikanga Maori (traditional indigenous practices) will provide a holistic culturally enhanced approach to water management."

He is about to start a new role with WSP Opus – that of kaitohutuhu matua taiao/senior environmental consultant with a mandate to integrate te reo Maori into the business and industry. This also covers both iwi liaison and environmental matters.

It's an uncommon role for the engineering industry, but fits right in with Troy's love of both his culture and the environment.

"I can see there's a place for a role like this in any engineering company, especially with Auckland Council's engagement with Maori on infrastructure and environmental projects. I'm lucky to be able to combine my two passions."

It's also another step towards his dream of representing the industry he loves.

"I'm currently the deputy chair of the Stormwater Group, and I'd like to influence the industry as a whole," he says.

"I would then like to work on policy – to help shape the future of New Zealand with my technical experience and culture." **WNZ**



The drought risk

How well prepared are drinking water suppliers?
By Lesley Smith, Technical Co-ordinator, Water New Zealand.

With our abundance of freshwater (we rank fourth out of 30 OECD countries for renewable freshwater on a per capita basis), and regular deluges causing flooding up and down the country, it is fair to say drought is not often front of mind for many Kiwis – especially urban-dwellers.

So a recent report by Victoria University and NIWA that was commissioned by Treasury estimating ‘drought’ as number one in climate change-related costs may come as a surprise.

The report found that climate change-related floods have cost our economy at least \$120 million for privately insured damages while droughts over the past decade (mid 2007-2017) have cost us around \$720 million.*

The Treasury report, *Estimating financial cost of climate change in New Zealand*¹ cautions us against reading too much into the results, which they note are approximate and a significant underestimation, as we have only a limited number of studies which attempt to quantify the role of climate change on specific weather events.

The financial impact of drought is quantified based on a reduced growth in gross domestic product, pointing to the primary sector as bearing the brunt of the impact. Nonetheless, the significance of the finding should give us, as drinking water suppliers, cause to question how well prepared we are to manage future drought.

Future drought

Since 1909 (according to NIWA), the average annual temperature in New Zealand has risen by one degree Celsius. It is estimated that, as a result of greenhouse gas emissions, temperature will continue to rise this century with another 0.8 degrees of warming expected by 2040.

These findings and the impact on drought are summarised in a recently released report *Drought and Climate Change Adaptation: Impacts and Projections*² from the Economic and Public Policy Research group, Motu following a dialogue on drought and climate change as part of the Deep South National Science Challenge.

1. Estimating financial cost of climate change in New Zealand – An estimate of climate change-related weather event costs, Aotearoa Climate Change Research Institute and NIWA, 21st April 2018

2. Drought and climate change adaptation: impacts nad projections, Motu #30 – October 2018

The report notes that 20 percent of the 30 sites measured across the country have soils that have become progressively drier since the early 1970s and the volume of glacier ice has decreased by 25 percent in the last 20 years. This has had significant consequences for summer flows in some South Island glacier-fed rivers and aquifers, a number of which are used for drinking water supplies.

Successive projections from NIWA of how climate change will affect drought in New Zealand paint a consistent picture. These show that the severity of drought is likely to increase in most areas, with both the frequency and intensity of meteorological drought in already drought-prone regions expected to increase. Predictions worsen in models with higher future levels of carbon emissions.

Impacts of drought on drinking water supplies

The impact of drought on drinking water is a focus area for the Deep South Challenge-Motu report, which includes the following impacts:

- The availability of water supplies: the report draws on a project looking at the sustainability of water supply in isolated Maori communities in Northland, where reticulated mains are non-existent, and rainfall is the main source of drinking water supply. Projections suggest that future floods and droughts could compromise water quality and water shortages are likely. Reticulated supplies, however, are not immune from drought impacts – the report also points to a 2013 drought which threatened water supplies to the entire Wellington region.
- Water quality impacts: In times of drought, water (particularly stored water) experiences decreased assimilative capacity. Together with other factors (reduced flushing inputs and increased temperatures), this can lead to increased algal contractions and toxins, including potentially toxic blue-green algal blooms. Water Research Australia has also been looking into climate change impacts on reservoir water quality³, finding the following water quality risks are likely to impact stored water supplies:
 - Cyanobacterial blooms resulting from increased average temperature;

3. Final Report – WaterRA 1050 Assessment of the Impacts of Climate Change on Reservoir Water Quality

- Increased pathogen loads due to greater variability in inflow events and increased temperature;
- Increased turbidity;
- Changes in dissolved oxygen and chemistry;
- Increased frequency of wildfires and resulting impacts on water quality.
- Operational impacts: Water quality changes caused by drought can, in turn, have operational impacts, such as reduced filter operating cycles and increased susceptibility to toxic bypass. The flow on of such operational impacts, in turn, increases costs, as was the case in Cape Town, where increased operational costs were passed on to consumers.
- Increased waterborne diseases: Evidence is growing that climate change could increase the burden of water-related

* Floods and droughts have always been the country’s most damaging and costly natural hazards since the country was settled in 1840, with a river flood taking out the first settlement of Wellington. More recently, the 1984 Southland floods and 2004 Manawatu floods are estimated to have cost the economy over \$100 million each. The Canterbury drought of 1987–88 had an estimated cost of \$360 million, while the 1998–99 Otago drought probably cost the economy \$600 million. *Source: Tearar.govt.nz*

diseases that can infiltrate our water supplies. Drought reduces water flows and levels, leading to increased concentrations of pathogens from contaminated effluent discharges. Droughts can also lead to increased runoff from unsaturated land. Combined with higher effluent pathogens, this means when drought is followed by periods of intense rainfall, the flushing out can result in increased disease.

Measures to address drought

As with all water supply risks, drought should be a consideration in all water safety plans. The consequences of insufficient water supply can be dire. Conversely, with appropriate forethought, there is an opportunity to mitigate risks. The water demand management toolkit available to water authorities is a large one.

For an example of an effective demand reduction framework, see our story on page 20 on the Kapiti Coast District Council. The report shows that facing the challenges of water supply shortages head on not only leads to more resilient water supply but also deferred infrastructure costs and reduced consumer bills. Kapiti’s response to drought reminds us of the ancient Chinese proverb; that “a crisis is an opportunity riding the dangerous wind.” **WNZ**

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Where does our water come from?

In any given year, around 500 billion cubic metres of fresh water falls as precipitation throughout the country, which receives most of its precipitation as rain, with the rest as snow, plus occasional hail and sleet. Unfortunately, it is not always in the areas it is needed. Edited by Alan Titchall.

The Southern Alps have some of the highest annual rainfalls in the world – on average, more than 10,000 millimetres each year. This is caused by the moist airflow from the Tasman Sea being blocked by the mountains.

The Southern Alps cause a rain-shadow effect to their east, and, remarkably, annual rainfall in Central Otago, within 100 kilometres of the alps, can be as low as 400 millimetres per year.

North Island rainfall tends to be around 1000 millimetres per year, with less in the eastern regions, and more in the west and north. Because the North Island is less mountainous than the South Island, rainfall levels tend to be more even across the island.

Snow and ice

Snowfall occurs mainly in the alpine areas, but occasionally down to sea level. Most seasonal snow is concentrated in the Southern Alps and on the volcanic cones of the North Island. In winter, up to 35 percent of the South Island is snow-covered. The permanent snowline is above 1500 – 2200 metres.

In alpine areas, river flows reduce in winter when snow falls, and increase during spring and summer thaws. Many hydroelectric schemes rely on snowmelt to fill storage lakes.

A glacier is a mass of snow and ice, and we have about 3140 glaciers – only 18 are in the North Island, and all of those are on Mt Ruapehu.

The Tasman Glacier near Aoraki/Mt Cook is New Zealand's largest, with an area of nearly 10,000 hectares. Almost 50 percent of all our ice is contained in the 10 largest glaciers. Our glaciers, like those worldwide, have been shrinking since the late 1800s and around 25 percent of New Zealand's ice cover has been lost over the last 150 years, as we climb out of a mini ice-age.

To better understand the annual variation and long-term change in our glaciers, the Deep South Challenge (one of the Government's national science challenges) has funded a group of people, from a number of agencies, to improve our ability to 'quantify' our frozen reservoirs, and to assess how snow will fare into the future. This project is called 'Snow, ice and glaciers in our changing climate: The impact of climate change on New Zealand's frozen water resources'. Project details and updates can be linked to from the deepsouthchallenge.co.nz homepage.

Aquifers

Around one-third of the water used in New Zealand comes from groundwater where we have an estimated 612 billion cubic metres.

Dams and reservoirs

The country is dotted with storage reservoirs (artificial lakes, or natural lakes with raised water-levels), ranging in size from small farm dams, through to the 7500-hectare Lake Benmore.

Many of the larger reservoirs have been created for generating hydroelectricity. There are three main hydroelectric storage lakes in New Zealand, which hold 70 percent of the water used to generate electricity. Lake Pukaki has the largest storage (around 35 percent of the national storage), followed by nearby Lake Tekapo (around 21 percent) and Lake Taupo (14 percent).

Hydroelectricity provides 70 percent of our electricity generation capacity, and this power generation uses around 114 cubic metres of water per person per day (with all of this water returned to natural systems).

More common now are large storage reservoirs used for irrigation. Almost 80 percent of the water extracted in New Zealand is used for irrigation for viticulture, horticulture, dairying, beef and sheep farming, and cropping. There is approximately 500,000 hectares of irrigated land in New Zealand, almost one-third of which is used for dairying. In recent years, dairying has expanded into drier areas, such as Canterbury, requiring considerable amounts of water for irrigation.

The annual value of irrigation water in terms of increased agricultural production is estimated to be around \$800 million.

Rivers

We have around 426,000 kilometres of rivers, with South Island rivers holding the top five positions, and only two North Island rivers make the top 10 (Waikato and Whanganui). Four drain to the Tasman Sea (Buller, Grey, Taramakau and Haast), and, although relatively short, carry enormous volumes of water from the heavy rain band along the Southern Alps.

Taking water for domestic and agricultural uses has led to many small rivers in drier eastern parts of New Zealand

– such as the Pareora in South Canterbury – becoming shadows of their former selves.

Our country sports a huge variety of river types, including boulder-filled mountain torrents, braided rivers on coastal plains, meandering lowland spring-fed channels and concrete-lined urban waterways. Each river's character is a product of climate, catchment geology, water source and vegetation characteristics.

Monitoring and managing rivers

The Ministry for the Environment and the National Institute of Water and Atmospheric Research developed the River Environments Classification system, to aid the monitoring and management of rivers.

Rivers can be immensely powerful agents of change in the landscape, through flooding and changing path.

To protect against this, river engineers have, in many places, modified riverbeds and banks to limit potential floods and control the river's path. For example, around 1000 years ago the Waimakariri River flowed through the current

location of Christchurch. Without extensive stopbanks on the lower Waimakariri and gravel extraction on the riverbed, changes in the course of the river during floods might have catastrophic consequences for Christchurch. [WNZ](http://www.wnz.org.nz)

Source: Teara.govt.nz.

The latest govt information

More contemporary statistics and full data sets are available, and can be down-loaded, from the Statistics New Zealand website: <https://bit.ly/2CpWbQk>

Here the Government's **environmental-economic accounts** provide an authoritative source of information on water inflows, outflows and changes in storage levels.

And the **water physical stock** is a subset of the environmental accounts that provides data broken down by region from 1995 to 2014.



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A new beginning for wetlands



A record 215 delegates attended the National Wetland Trust Restoration Symposium in Napier in September. **Vijesh Chandra** (Trustee/GHD) filed this report.

Notable organisations and industry groups that were represented at the symposia included DoC, MfE, Fish and Game NZ, Forest and Bird, Dairy NZ, NIWA, Manaaki Whenua Landcare Research, Universities, power companies, regional and local councils, consultants, trusts and community groups and Maori iwi representatives from across NZ.

Some 50 presenters showcased their work and efforts on a wide range of environmental and ecological topics, demonstrating the momentum and support for restoring existing wetlands and constructing new wetlands.

It was very evident that wetlands present a solution to address the many environmental challenges we have here.

This was supported by the Minister of Conservation, Eugenie Sage, who in her opening address confirmed the Coalition Government's commitment to addressing water/water quality issues and support for wetland environments.

She conveyed both a natural interest and a genuine understanding of the threats to wetlands and wetland flora and fauna from intensifying land use, poor land use practice, and a range of introduced species. This was substantiated by the increased funding for the Department of Conservation to advocate for the protection of natural resources including wetland environments.

The commitment from government on wetlands wasn't without reflection of past efforts and leadership to achieve this.

Martin Taylor, the chief executive of Fish & Game NZ, in his key note provided a very revealing summary of the 'dirty dairying' campaign, largely orchestrated by the association

over recent years and the government response to it.

And that response is a very sad indictment of how the past government viewed the environment, and in particular how water and water environments should be managed. Martin also shared Fish and Game goals for the future – a key one being a national goal to double the extent of wetlands in our country, an ambitious goal, but a range of presentations at the symposium on some great initiatives, however, if realised, would make this goal very achievable in the near future.

A summary of some of these presentations:

Aslan Wright-Stow (Dairy NZ) presented on the development of a national approach to quantifying contaminant attenuation performance for constructed wetlands, and riparian buffers to better quantify their environmental performance and benefits, and promote their adoption by landowners and facilitate regulatory compliance.

Chantal Whitby presented on establishing wetlands on farms and her thesis research on the barriers to, and the opportunities for, establishing wetlands on privately-owned farms.

Her study revealed that economic factors had less influence on farmer's decisions on restoration of the environment and ecology – and that land characteristics and personal characteristics were major influences.

Don Scarlet (Trustee/Mercury) presented on Mercury's partnerships and delivered many wetland restoration projects in the Waikato.



Far left: Field Trip at Pekapeka Wetland, once a rubbish dump.
Top left: Minister Eugenie Sage delivering her Key Note speech.
Above: Mercury and its Waikato Partners Group hosted at Pukemokimoki marae.

Mercury arranged for a number of its partners to travel together from the Waikato, stay at the Pukemokimoki marae, attend and participate in the symposium, including Waikato Tainui, Ngati Rangi Trust, Ngati Haua Mahi Trust, Ngati Tahu Ngati Whaoa, Maniapoto Maori Trust Board and members of DoC, NIWA and Landcare Research demonstrating partnerships, collaboration and working together.

Tony Roxburgh (NWT Trust Chairman/Waipara District Council) in his closing address talked about some of the other key elements and themes; the power and ability of communities to tackle a huge range of wetland conservation projects, understanding and balancing landowner and conservation needs, and the need for engagement and commitment of all sectors of the community – but not necessarily agreement of all individuals.

After all, he says, we do live in a democracy.

Since 2004, the National Wetland Trust has organised biannual symposia to bring together all wetland restoration enthusiasts, practitioners and researchers to share their stories and knowledge, build networks and gain inspiration.

The National Wetland Trust aims to get 'Kiwis' into wetlands, through education, information and providing a platform for networking across New Zealand.

The Trust will be launching its new website and is seeking partnerships with organisations that are interested in supporting the Trust's work. **WNZ**

- Please contact vijesh.chandra@ghd.com for more details.
- Current website: www.wetlandtrust.org.nz/Site/Why_Wetlands.ashx.

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Fresh water's deadly flu

Last year saw a spike in the cases of Leptospirosis (Weil's disease) not seen since four decades ago when farm herd vaccinations started. By **Alan Titchall**.

Our country already has one of the highest rates of Leptospirosis among OECD countries. While typically seen in farmers and meat workers, because it can be picked up through cow urine, there have been more cases here that are not linked to animals.

Figures also point to a rise in the number of females contracting Leptospirosis. While it used to be predominantly 95 percent men; new figures are about 20 percent women.

The spike last year was linked to flood clean-ups, after the Ministry of Health recorded 91 people contracted the disease in the first six months of 2017, with more than two-thirds of these hospitalised. This figure is three times that of cases reported the year before.

The Waikato region reported the highest number of cases, with 33 within that period that were a consequence of floods and cyclones last year.

Leptospirosis feels like the worst flu you have ever experienced (without the respiratory and blocked nose problem), and can progress to kidney and liver failure, and sometimes death. A third of those diagnosed with Leptospirosis also suffer long-term health problems, like muscle pain and depression.

Also known as 'dairy farm fever', the number of sufferers here was around 800 cases a year (mostly in rural communities), until the disease was brought under control with the vaccinations of

pigs and dairy cattle in the late 1970s. Most cases are occupational related and associated with farming and meat processing. Vets are also at risk, along with hunters and those exposed to rural environments – including fresh water lakes and streams.

Those at risk are advised to wash urine splashes off their skin and face, and keep their skin dry. Authorities are now warning people to take care around flood waters, and wear gloves and gumboots.

Overseas, fresh water lakes and waterways contaminated with rodent urine, have taken their toll on recreational sports such as paddle boarding, kayaking, outdoor swimming, fishing and boating. **WNZ**

At a glance

Leptospirosis is one of the most common diseases transmitted from animals to humans.

Some strains of *Leptospira* have adapted to certain mammalian hosts that shed large amounts of infectious bacteria via their urine into the environment, such as cows and rodents.

Leptospira can survive for extended periods of time in damp soil and can be spread rapidly in flood conditions.

The bacteria invade either through the body's mucus membranes or through cuts and abrasions.

While in New Zealand the disease is linked to farm animals; overseas, Leptospirosis has also been linked with outdoor recreational pursuits.

Two different *Leptospiral* species (*L. borgpetersenii* and *L. interrogans*) have been isolated from animals in our country. *Leptospira* are also commonly classified by their serological characteristics (serovars). In this country these are *L. borgpetersenii* serovars Hardjobovis, Ballum, Balcanica and Tarassovi and *L. interrogans* serovars Pomona and Copenhageni.

Here, serovars Hardjobovis, Pomona and Ballum are currently those most commonly identified with disease in humans; while Hardjobovis and Pomona are the types most significant in livestock. Although much less common, dogs can also become infected and may pose a risk to their owners. While there is no vaccine for humans, there is one for dogs.

Source: leptospirosis.org.nz/Leptospirosis/NewZealand.aspx



UK lesson in treatment energy

Severn Trent's new Thermal Hydrolysis Plant (THP) is starting to become operational, with 100 tonnes of sludge being processed on a daily basis.

The £60 million scheme changes the way the company treats waste before generating power and will make the process more efficient – increasing generated energy by almost a third.

More than half of the plant is now up and running, and the company, which serves eight million people across the Midlands and mid-Wales, hopes to see it fully operational by about now.

Severn Trent is the UK's second biggest water company, serving 4.5 million homes and business customers in England and Wales. The company delivers almost two billion litres of water every day through 49,000 kilometres of pipes. A further 94,000 kilometres of sewer pipes take waste water away to more than 1000 sewage treatment works.

Minworth is the company's largest sewage works, treating waste water from more than 1.6 million homes and businesses across Birmingham and the Black Country. The site already generates enough electricity to power the equivalent of 11,000 homes and enough gas to heat 4800 homes every

year, and that's set to increase with THP coming online.

The process works by heating sewage sludge to 170°C before putting it under pressure. The combination of heat and pressure sterilises and shatters the cell structure of the bacteria in the sludge. The treated sludge is then fed into large digesters that biodegrade the volatile solid matter within the sludge and produce methane.

Once that part of the process is complete, the sludge is then passed forward to the dewatering process where it is thickened, ready to be recycled as fertiliser for agricultural land. The thermal hydrolysis process has an additional benefit as the leftover solids can be classified as 'enhanced' status fertiliser that can be used in the production of crops for human consumption.

The power generated is injected into the national grid. The company claims it has the lowest combined average domestic water and sewerage bill in England and Wales. **WNZ**

• www.stwater.co.uk

Wellington's battle of Waterloo

At the 2018 Water New Zealand Conference and Expo, Laurence Edwards and Rob Blakemore from Wellington Water, made a fascinating presentation on handling a water quality crisis after a positive *E.coli* result in Lower Hutt, two weeks after the Kaikoura earthquake and subsequent heavy rainfall. By **Alan Titchall**.

Wellington Water was formed in 2014 to provide three waters (water, wastewater, and stormwater) services for five councils, including the Hutt City Council and the Greater Wellington Regional Council (GWRC), which supplies treated water to each of the city councils.

As a jointly Council Controlled Organisation, Wellington Water is tasked as an advisor to these councils, and has a role managing their water assets and providing safe and healthy drinking water.

Wellington is supplied with water from three main sources: The Hutt river at Kaitoke; the combined flow from the Wainuiomata and Orongorongo rivers; and the Waiwhetu aquifer, which extends beneath Lower Hutt and Wellington Harbour.

The aquifer supplies up to 70 percent of the region's drinking water during summer and is distributed to about 155,000 people in Lower Hutt and Wellington, via the Waterloo Water Treatment Plant (WTP).

Eight supply bores drawing from this aquifer were installed along Knights Road in Lower Hutt between 1980 and 1989, and supply the Waterloo WTP via a single collector main. These bores are situated in an urban environment with bore heads below ground level, and all are double cased. Their construction complies with the requirements of NZS 4411.

While the other main treatment plants (Te Marua in Upper Hutt; and Wainuiomata) benefit from protected forest catchments managed by the GWRC, the Waterloo WTP itself is located in a highly developed area bounded by train tracks, a railway station, and busy roads, and the Waiwhetu aquifer runs beneath an urban environment.

The Waterloo plant has a capacity of 120 million litres per day. Prior to 2017, chlorine dosing to treat for waterborne pathogens was done only on an emergency basis for the water supplied to Lower Hutt, because the aquifer's natural filtration processes and confined environment were relied upon to remove or inactivate them. Water supplied to Wellington City has been chlorinated for some time by the GWRC and, prior to 1980, the Wellington Regional Water Board.

The Waterloo WTP is split into twin streams, in which the raw water is aerated and dosed with lime to adjust its pH and reduce its aggressiveness to pipework and fittings. The two

streams allow one stream to be taken offline for maintenance while continuing to supply via the other stream, although at reduced capacity.

Historically, artesian water from the bores supplying the Waterloo WTP has been regarded as very good quality and secure.

Laurence Edwards, the chief advisor – Potable Water, at Wellington Water, says these bores had secure status under the DWSNZ, and have held similar status under the previous drinking water standards that have applied in New Zealand.

In fact, the residents of Lower Hutt were very proud of their 'pure' unchlorinated aquifer water, he says, and residents were often seen filling bottles from the unchlorinated water bore in Buick Street.

Prior to December 2016, a significant water quality issue occurred in 1991 when a seagull 'committed suicide' at the Waterloo plant and sent *E.coli* levels through the Hutt Valley to significant levels, he adds.

However, at the time, there was no report of anyone getting sick, but a local 'boil water notice' continued for around six weeks. Yet, the Hutt City Council remained against chlorination.

Mother Nature changes the situation

The Kaikoura earthquake around midnight on November 14, 2016, caused significant shaking in the Wellington region, including Lower Hutt.

The following day, a huge rainfall event hit the Wellington region and resulted in severe flooding in Lower Hutt, including areas around the Knights Road bore field.

"Around two weeks later, on December 1, 2016, we had a positive *E.coli* result from a routine water sample taken from the Colin Grove wellhead," says Laurence.

"This positive *E.coli* result was the first received from water taken from the well-field since the bores were established in 1980.

"The Hutt City Council network was chlorinated for three consecutive days and samples were collected and tested for *E.coli* in accordance with DWSNZ drinking water standards. The bore where the original positive result came from remained offline.

"At that time there was a real sense of disbelief from a lot of



people that had worked on the water supply for many years."

The investigation escalated to a number of tasks that included a review of the potential for cross-contamination; inspection and air pressure testing of the wellheads and vents; and a review of historical water quality test results from the bores, among other work.

"All these investigations were inconclusive as for the probable source of the contamination," says Laurence.

Then, in February 2017, a routine water quality sample taken from the inlet of the Naenae reservoir returned *E.coli* positive.

"This result was significant as it was taken from the bulk supply main that is immediately downstream of the Waterloo WTP.

"Yet, as was the case for the Colin Grove investigations, no conclusive evidence was found pointing to any potential sources of contamination," says Laurence.

"This was particularly challenging, as no specific issues were identified to mitigate the risk, and the risk of contamination remained."

Another positive *E.coli* result from a sample taken from the Mahoe Street bore in April was the third positive result from assets associated with the Waiwhetu aquifer within a five month period. This bore was immediately shut down and retesting at key locations was completed before initiating chlorination of the reticulation network and the Waterloo WTP. "Chlorination continued indefinitely pending completion of investigations and discussions with relevant stakeholders regarding the level of risk from the aquifer source."

Frustratingly, retesting at the remaining operational bores, Waterloo WTP, within the reticulated network and at service reservoirs, all returned negative results for *E.coli*.

"Again, initiated investigations did not identify a probable cause of the contamination."



1. Laurence Edwards, the chief advisor – Potable Water, at Wellington Water, speaking at the 2018 Water New Zealand Conference and Expo.
2. (See over page) Bird's eye view of the Waterloo Treatment Plant (WTP) with new treatment facilities.



Coliform detected

Laurence says positive total coliform bacteria test results were detected in the public unchlorinated water supply wells at Buick Street and the Dowse, which received no treatment, as well as other community supply wells.

While not normally a cause of serious illness, their presence indicates other pathogenic organisms of faecal origin may be present.

“This led to the decision to shut down the unchlorinated wells at Buick Street and the Dowse, as well as GWRC’s Willoughby

Street South bore and, subsequently, the Penrose Street South bore.”

At this point, capacity to supply the Waterloo WTP was severely restricted.

“Fortunately, this period coincided with winter demand conditions and high flow available from the other surface sources to meet regional demand, though there was a pressing need to be able to return to full treatment plant capacity prior to the peak summer demand period.”

Laurence says a lot of decisions had to be made and

staff stress levels were very high.

“We were committed to communicating with our stakeholders and councils. We also recognised that need to separate technical decisions from political decisions where possible, with technical decisions being made through our three waters decision-making committee.”

The decision – making process was complicated by financial implications, political influence, and public opposition to treatment, particularly residual disinfection, he adds.

Yet the solution, he says, was simple.

“We had to put multiple barriers in place to protect public health.”

They gathered all stakeholders together, including council mayors, and briefed them with technical options and recommendations.

“And they agreed to them. We took the bores of concern out of action and started to chlorinate, and also considered what other work needed to be done to ensure we provide safe and healthy water.”

The public and other stakeholders were updated through

Wellington Water's webpage and through media releases. Independent third party inspections of bores were commissioned and outside expert advice sought, which pointed to permanent chlorination and ultraviolet (UV) treatment.

"UV and filtration equipment was installed at each of the unchlorinated supply bores, meeting bacteriological and Protozoa protection requirements," says Laurence.

Chlorination of the Hutt City network was a sensitive subject, he adds, and regular meetings were held with key stakeholders around the need for its continuation.

"We recognised there was a grieving process for the public; and the need to recognise this and talk about it openly, and recognise the loss they experience."

The GWRC, in consultation with Hutt City Council, voted in favour of the permanent chlorination of the Lower Hutt drinking water supply and the fast-track installation of UV treatment at the Waterloo Water Treatment Plant.

The Waterloo treatment design

"The realisation that there were surface influences on the bore water, as evidenced by the increasing total coliform results, indicated a need to provide additional treatment barriers to ensure we could continue to provide safe and healthy water," says Laurence.

"Our focus quickly turned to fast-track installation of a treatment solution for Protozoa protection at the Waterloo Treatment Plant.

"Three options were considered, Ultra-violet (UV), Ozone and Chlorine Dioxide. Filtration was not considered due to the lack of available space for installation. Ozone and Chlorine Dioxide were discounted as options due to feasibility, time to supply, and/or additional technical complications. UV treatment was the only remaining option for rapid procurement and installation."

Fast-track design, procurement and installation of two UV units were initiated, but there was a need for a run-to-waste facility to avoid potential non-compliance through possibly exceeding DWSNZ UV turbidity limits.

To avoid significant delay to commissioning of the first unit they identified an opportunity to use one stream of the treatment plant for this purpose, and run a permanent run-to-waste pipeline to the Hutt River.

Extensive public communication on the need and urgency of this pipeline was initiated, and the project was even renamed as 'first-flush diversion pipeline' to avoid negative connotations associated with a 'waste' pipeline discharging to the Hutt river, as the turbid water is still of high quality.

Due to the constrained nature of the Waterloo WTP site, the location of inlet and outlet pipelines, and the need to install and commission at least one UV unit in the shortest possible timeframe, a design was developed allowing for containerisation of the first unit to be located close to the existing inlet pipework. This concept also allowed for a second UV unit to be installed in another container above the first UV unit and, again, in a relatively short time frame.

Each unit would provide for up to 60 MLD flow capacity to meet the region's summer demand.

"Our early planning identified the need to have full capacity restored to the Waterloo WTP prior to the peak summer demand period," says Laurence.

Unfortunately, he adds, November 2017 was a very dry month, with regional demand increasing dramatically at the same time as availability of river supply plummeting and, as a result, they had to start using the storage lakes at Te Marua much earlier than normal.

Unusually for Wellington, a sprinkler ban had to be put in place.

Race to the river

The first-flush diversion pipeline had to be completed prior to the peak summer demand to allow the second UV unit to operate within compliance limits, and restore the treatment plant to full capacity.

The pipeline was constructed along Knights Road and through the Hutt Central Business District to an outlet chamber located at the Hutt River, connecting to each of the eight wells along the route.

"It was apparent from the first expressions of interest meeting with available contractors that no individual local contractor could possibly complete the work within the required time frame, and three local contractors teamed up to meet the challenge."

Work started in September and was completed by the end of December 2017.

"A tremendous result from our suppliers," adds Laurence.

Lessons learnt

Aquifer modelling during investigations indicated that the negative gradients induced by hydraulic drawdown in the Waiwhetu aquifer were more extensive than anticipated; suggesting that a larger number of private bores and building piles located further afield than initially thought could be potential sources of contamination.

"The condition of Wellington Water's bores and assets are unlikely to have been the source of the *E.coli* contamination", says Laurence.

"And the impact of the Kaikoura earthquake and subsequent heavy rainfall events remains uncertain.

"We continue to assist GWRC with an aquifer study seeking to investigate changes to water quality in the aquifer, improve our knowledge of the aquifer, and recommend potential improvements to decision-making and resource management practices to protect the source water.

"This includes participating in the resource management hearings for the proposed Natural Resources Plan, and providing submissions on the importance of protection of the Waiwhetu aquifer as a drinking water resource."

Laurence says knowledge and understanding of any 'secure' aquifer source can change very quickly and without warning.

"Accordingly, we now regard the concept of 'secure' bore water in the DWSNZ as being fundamentally flawed."

It is also much easier, and less stressful, to take early action in a well-planned approach to minimise water risk, rather than having to act under urgency, he adds. **WNZ**

The Government and water quality so far



By **Helen Atkins**, partner, and **Rowan Ashton**, solicitor, of Atkins Holm Majurey.

In this article we detail: The Coalition Government's latest water quality announcements; the Environment Court's decision on an application for an enforcement order to prohibit a 1080 drop in the Hunua Ranges catchment; and the Office for the Auditor-General's report on irrigation and water metering.

On 7 October 7, 2018 Minister Parker announced the Coalition Government's approach to improving the state of our waterways. Dubbed "The Essential Freshwater Programme" it has three objectives:

1. Stopping further degradation as soon as possible, so that we see material improvements in water quality within five years.
2. Reversing past damage so as to restore all our freshwater ecosystems to a healthy state within a generation.
3. Addressing water allocation issues to achieve efficient and fair allocation of freshwater abstraction and nutrient discharges, having regard to all interests including Maori.

A cross-government taskforce has been established with senior officials representing a range of entities¹ to help deliver on these objectives. While the Minister's speech was predominantly aspirational, some details of specific measures were also provided:

1. Amendments will be undertaken to the Resource Management Act 1991 within the next 12 months to review consents in order to more quickly implement water quality and quantity limits; and to strengthen enforcement tools for improving environmental compliance.
 2. Targeted action and investment in at-risk catchments will be undertaken, including accelerating the implementation of Good Farming Practice Principles and identifying options for tree planting through the One Billion Trees programme.
 3. A new National Policy Statement for Freshwater Management will be in place by 2020, to ensure all aspects of ecosystem health are managed, and address risks, for example by providing greater direction on how to set limits on resource use, and better protection of wetlands and estuaries.
 4. A new National Environmental Standard for Freshwater Management will be in place by 2020, to regulate activities that put water quality at risk, such as intensive winter grazing, hill country cropping and feedlots.
- Public consultation on the new national direction will begin next year. The Government will be working with a range of vested interests in establishing its water plan, including environmental NGOs, Maori, farming leaders, scientists and regional council experts.

The Government's plan also sets out a new approach to the Maori/

1. Ministry for the Environment, Ministry for Primary Industries, Treasury, Maori Crown Relations: Te Arawhiti, Te Puni Kokiri, Department of Internal Affairs, Department of Conservation, Ministry for Business Innovation and Employment, and Regional Councils.

Crown relationship. Minister Parker spoke of the need to achieve fairness between developed and underdeveloped land, the latter of which is disproportionately owned by Maori. For the first time, the Government is expressly stating that fairness to Maori requires enabling the future development of underdeveloped land that needs water and nutrient discharge permits.

To address Maori desires for access to and use of freshwater resources, three options have been considered by the Government:

1. Impose a royalty/charge on the use of freshwater (payable to the Crown), and distribute under-used water permits (or discharge capacity) that could be relinquished, and the revenue from the charge;
2. Find a mechanism to more equitably share the resources over time through a 'regulatory' route: in scarce catchments this proposal could require the generation of 'headroom' between the total allocated quantum of 'use rights' and the sustainable limit in order to give Maori (and other new users) the opportunity to obtain a share of those use rights;
3. Allow disputes regarding Maori rights and interest in water to unfold through the courts and Waitangi Tribunal.

The Government is pursuing option 2, the 'regulatory route', because this focuses the debate on solutions that meet Maori concerns rather than opening up a contest about 'ownership'. The Government sees that option 2 also allows for meaningful development of Maori-owned land, and is likely to provide more certainty than an exploration of rights in the Courts. Option 2 does not preclude option 1 also being pursued at a later date.

Only time will tell whether this approach will prevent litigation in relation to Maori rights and interests in water.

Enforcement order application to prohibit 1080 drop

The Friends of Sherwood Trust and the Ngati Paoa Trust Board applied for enforcement orders under the Resource Management Act 1991 (RMA) to prohibit an imminent aerial drop of sodium fluoroacetate (1080 poison) in the Hunua Ranges catchment planned by the Department of Conservation (DOC) and Auckland Council.

Enforcement orders were sought on the basis of alleged risks of contamination of Auckland's drinking water supply. The Environment Court convened an urgent teleconference on September 6, 2018 where the Friends of Sherwood Trust obtained an interim order preventing the planned drop until a full hearing was possible a week later. The full hearing in fact occurred about two weeks after the planned drop.

At the hearing, the Court addressed difficulties with the admissibility of most applicants' evidence as to potential adverse effects for the 1080 drop. The Court found this was non-expert opinion evidence and there was insufficient information about the context of the alleged adverse effects or historical events.

The Court therefore detailed the general concerns of the applicants

against the evidence brought by the respondents – Auckland Council, Watercare Services, DOC, and the Auckland Regional Public Health Service.

The Court detailed the need to control animal pests, the importance of the forests of the Hunua Ranges and an understanding of the nature of 1080, why it is used, and how it is regulated. The details of the proposed operation were then addressed in terms of: how the 1080 would be applied; what the potential risks were and how the operation would be managed.

Regarding concerns that 1080 dust would enter private water supplies, the Court accepted the respondents' argument that there is no risk of any dust from the pellets travelling near any private water supply, and that the concentration of the poison in the dust is incredibly low.

A 180-metre setback between the operational area and the nearest private property boundary was found to be sufficient. The Council also offered to supply drinking water and monitoring of private water supplies if concerns continued.

The effect of pest carcasses on the Hunua water supply was also assessed. A Mr Ward, general manager of Parks, Sports and Recreation within the Operations Division of the Council, gave evidence that pest control is an everyday risk that is actively managed by Watercare Services, and additional monitoring would be undertaken immediately following the 1080 drop.

Water quality is further managed by the regime of project design and the protocols put in place under the permissions regime by the Public Health Service. Concerns were raised that poisoned animals would be more drawn to water and therefore increase the risk of contamination. These concerns were found to be unwarranted on the evidence of Dr Fairweather, the National Technical Advisor for DOC. The Court was also inclined to the view that consultation with mana whenua was adequate.

The Court found that it was bound by the decision of the High Court in *Brook Valley Community Group Incorporated v Trustees of the Brook Waimarama Sanctuary Trust and Ors* [2017] NZHC 1844 which held that s 13 RMA (which prohibits the deposition of substances in the bed of any lake or river, unless allowed by a resource consent or a rule in a plan) did not apply to aerial drops as they were covered by s 15 RMA (discharges) and permitted under the Exemption Regulations.

These regulations specifically allow the use of 1080 provided that the discharge of the poison is for the purpose of killing vertebrate pests and the operator notifies the Regional Council prior and after any drops. These conditions were found to have been met.

The Court concluded that the information provided by the Council showed that the discharge of 1080 pellets was necessary, would not be indiscriminate, and had been carefully planned. The risks involved with the use of 1080 had been made clear by the Council.

However, the Court considered the methods proposed to manage those risks were appropriate and the necessary precautions were adopted to allow the use of 1080.

The Court found that there was no evidence of risk of irreparable or serious damage to the applicants or others if the 1080 drop occurred because of the conditions which must be met to protect public health.

In contrast, the Court held that the risk to the Council and DOC were significant if the drop did not take place, costing some \$679,229.00 in capital already spent for the drop.

Lastly, the Court was satisfied that there had been an extensive consultation programme undertaken by the Council and DOC to engage with those people who had the potential to be adversely affected

by the proposed operation.

The Court therefore refused the application for enforcement orders, allowing the 1080 drop to begin.

Office for the Auditor-General report on irrigation and water metering

With water resource management continuing to be a major issue, discussions have become more frequent regarding the largest users of water.

The Government introduced regulations in 2010 requiring the measurement of fresh water usage for the largest users by installing meters. The Office for the Auditor-General (the Office) has recently released a report commenting on the findings of those measurements, specific to irrigation purposes. The report focused on the six councils that make up the majority of water usage for irrigation (around 90 percent), noting that these councils also covered various and diverse regions around the country. This report is the first of seven proposed audits.

The data collected will be useful for many stakeholders. Some councils with smart meters installed allow users to review their usage over certain periods or areas and even receive notifications when they are coming close to their allocation limit. Smart readers also allow data to be easily accessible and available.

With wider availability of the data, it is hypothesised that a better educated conversation between environment groups, local iwi, government and the general public can be facilitated about how fresh water is being used nationally.

However, there are concerns that large amounts of the data may be compromised due to inefficient collection methods.

The majority of councils utilise manual meters which allow for more human error in the readings, especially due to misreading handwritten readings or erroneously recording them in the first instance.

The current regulations also only require that the data be submitted to councils annually and the report comments that there is certainly more scope for better co-ordination between councils as well as between the councils and permit-holders. Marlborough Council, which phased out the manual meters in 2014, was praised for its foresight of these issues.

This Council is now able to collect more reliable and comprehensive data through the data-loggers installed and this approach has been recommended by the Office to the Ministry for the Environment as part of a general review of the regulations. It is hoped that an amendment to the regulations would ensure that data is automatically submitted far more regularly and accurately.

Water metering is seen as part of a wider technology-based change in agriculture and embraced as a means for more efficient practices. Some councils have been more effective with implementing these meters and have illustrated how useful the data alone can be, as well as when integrated with data from different sources such as climate, soil, or water usage of neighbouring regions.

These audits hope to encourage more efficient use and allocation of freshwater resources in New Zealand and, while there is certainly room for improvement, the monitoring of large water-users has been claimed as a success overall.

The next steps are to update the current regulations and involve the smaller users to gather a more comprehensive picture of any given region and of water usage overall. [WNZ](#)

Hope for Rohingya refugees thanks for your support



Eight year-old Mohammad washes with water from one of the many Oxfam pumps provided by supporters.

“We used to have to collect water from a well really far away,” says Marium, Mohammad’s mother. “This is so much better as we can wash. We used to visit the other well three times a day but now we can use this one freely as it is near our house.”

One year on from when Rohingya refugees started to arrive in huge numbers at Cox’s Bazar – now the world’s largest refugee camp – refugees are bracing for cyclone season.

Living conditions in the camp are always difficult and sometimes dangerous, but especially during Bangladesh’s long monsoon and cyclone season, which lasts until the end of the year.

Despite the hardships faced by many families there is hope. Two months into the season a large scale outbreak of waterborne disease has so far been avoided, not in the least because of generous donors such as you.

With the support of generous donors Oxfam has been able to provide essential hygiene kits, clean drinking water and ensuring

women and girls have access to sanitary facilities in the camp.

These may seem like small improvements, but in Cox’s Bazar they often mean the difference between life and death. It is the very starting point from which displaced people can start to rebuild their lives.

Your support means the prevention of malnutrition, improved sanitation and a more secure environment for women and girls who are at risk of sex-trafficking, but also means so much more than that.

With your support you are sending a message of hope to refugees. They know they have your support and that of many people around the world. It sends refugees a powerful message that no matter what happens they are not alone.

What you as an individual have done through your support with Oxfam is humbling.

I hope you take a moment today to remember the plight of Rohingya people, and take pride in what you have done to help them. [WNZ](#)



You can help restore coral reefs in the Pacific

A group of 18-20 year-olds, who live on the Tahiti island of Moorea, are determined to preserve the coral ocean around them and the marine life within it.

Named *The Coral Gardeners* and having grown up on Moorea, the teenagers have seen how rapidly the coral reef has changed for the worse.

All surfers, free-divers, and fishermen – and with salt water running through their veins – these teenagers aim to change the future of the ocean's well-being, starting with the island's reefs.

As the largest and most complex ecosystem on the planet, coral reefs are rich habitats and home to more than 25 percent of marine life, including over 4000 species of fish, 700 species of coral, and thousands of organisms.

Not only of enormous value to the ocean, coral reefs provide humans with food, jobs, protection from storms, sea level surges, flooding and erosion, and offer huge opportunities for biomedical research.

The islands of Tahiti have reduced in size by 50 percent, and *The Coral Gardeners* say they are on a mission to teach the world more

about the threat on the world's coral reefs and to restore the Moorea reef through their conservation programme.

Through conferences with the general public, visitors, and schools, the gang is educating adults and children of all ages about the coral's health and what they're doing to restore the reef surrounding Moorea.

These teens also plant healthy coral fragments back onto the reef to encourage growth and to rebuild habitats.

The idea is to transplant coral cuttings into threatened areas of the reef, which will help to recreate the reef environment so that marine wildlife can prosper and strengthen the health of the surrounding ocean.

The planting of healthy coral is where the general public can help with immediate effect.

Anyone, from anywhere in the world, can adopt a piece of coral that *The Coral Gardeners* will replant and take care of until it can survive and flourish on its own.

Already supported by well-known ambassadors, such as surfer Teiva Joyeux and Olympic swimming champion Florent Manaudou, you can contribute anything from A\$40 to help restore the Moorea coral reef and help change the health of coral reefs all around the world. **WNZ**

• More information: <https://www.mooreacoralgardeners.com/> | <https://www.instagram.com/moorea.coral.gardeners/>





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