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MARCH/APRIL 2020 ISSUE 213

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Association staff changes
2020 National
Performance Review





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Staff changes, farewells, The NPR and climate issues



Kelvin Hill,
President, Water New Zealand

Working in water has certainly been dynamic in recent years and in this new decade, it certainly looks set to continue to be an exciting and stimulating place to be.

Environmental concerns and much-needed regulatory reform will continue to be key drivers of change.

As I write this, the new Water Services Bill detailing the proposed new regulatory system is poised to be introduced into the House. That will underpin the way we work in the drinking water space and we'll be going through that legislation with a great deal of interest.

Before Christmas the Taumata Arowai – the Water Services Regulator Bill – was introduced into the House. The bill establishes the Water Services Regulator as a new standalone Crown agent – something we're very much in support of. You can go to our website to see our submission on the legislation and also check-out our comments in the legal section in this publication on page 53.

This year there are also big changes at Water New Zealand itself. CEO John Pfahlert has decided to retire after being at the helm for five and a half years. I'd like to thank him for his contribution to the sector and leadership during what has been a time of uncertainty. To celebrate his retirement, John is about to head to Europe for a grand cycling trip with a group of friends.

We also said farewell to our Principal Adviser, Water Quality, Jim Graham earlier this year. Congratulations to Jim, who's gone to take up a new role at the Water Establishment Unit – clearly a pivotal role in helping shape the future regulatory environment.

But we're also growing our team. I'm very pleased to

welcome several new staff members – Katrina Guy who will be providing support for our interest groups, marketing graduate Renee Butler who's going to help us connect with young members and promote the sector as a great place to work. And I'm very pleased that we've appointed Mumtaz Parker who will establish a much-needed training programme. So watch out for more on that throughout the year.

Sadly, we also farewell our long-time advertising manager, Noeline Strange, who, after a very successful 16 years in her role, has also decided to take a well-earned retirement. We welcome on board Debbie Laing who will be stepping into Noeline's shoes. See more details on our comings and goings on page 8.

It's the time of year again when our flagship document, the National Performance Review should shortly be coming hot off the press to participants. Everyone else looking for performance comparisons can check online and through the NPR data portal on our website.

Climate issues are increasingly impacting on the way we all work, so it's not surprising that there's been an enthusiastic response to our latest interest group – the new Climate Change Carbon Zero group. See more on page 12.

There's also interest in forming groups around laboratories and biosolids – so likely to be more opportunities in those areas.

Our organisation provides plenty of opportunities for members to engage with the sector and each other and I strongly encourage you to do it – it's very rewarding.

Nga mihi
Kelvin.

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A very balanced life

Outgoing Water New Zealand CEO John Pfahlert is confident he's leaving an organisation that's in good heart.

After five years of leading Water New Zealand through the uncertainty of reform and the Havelock North inquiry, John's now retiring from full time work to take time out for family and self.

In a nod to his new lifestyle, he and wife Liz recently bought a new home on the Kapiti Coast, just north of Wellington.

"It's a low maintenance lock-up-and-go house that will allow us to have an active lifestyle while we're still young and fit enough to enjoy it," says John.

And this means pursuing a passion for travel and cycling. Already he's about to fly to Europe on his latest adventure, where, with a group of friends, he and Liz plan to spend the northern hemisphere summer cycling from Paris to Berlin and then several weeks canal boating through Holland and Belgium.

His final day at Water New Zealand was March 13 which leaves him, he says, just enough time to get cycling fit for the trip – something he admits he's let slide a little during his years leading the organisation.

While he's had a varied and interesting career, achieving a balanced life has clearly been a priority.

John started at Water New Zealand in 2014, appointed to the role just as he was leaving New Zealand shores for an overland trip through southern Africa.

And that was after he'd taken a year off following his resignation as executive officer of the Petroleum Association to spend five months cycling across Canada.

He admits that when he took on the role at Water New Zealand, he "knew nothing about water". But he had been running trade associations for 25 years – in areas that range from petroleum to mining to fishing.

He jokes that his career could be seen to have been centred around working on the "dark side" for organisations associated with resource extraction rather than the more "caring, sensitive looking-after-the-environment" area of water.

Without doubt the most pivotal event for Water New Zealand during his tenure, and indeed the entire three waters sector, was the Havelock North contamination outbreak in 2016.

Before then, he says, the organisation was much more muted and conservative.

"Havelock North put us on the radar," he says.

"We suddenly gained a lot of media attention and profile for the organisation. It gave us a platform to talk about things."

Then there was the subsequent inquiry to find out what went so wrong. Environmental scientist, Jim Graham, who went on to work for Water New Zealand before being recently headhunted for a new role in the regulator establishment unit, was an expert witness.

But John also felt there was a need for an international perspective, so through Water New Zealand, he brought Canadian expert Steve Hrudehy to appear before the inquiry panel.

"I'd read his book on disease outbreak in affluent countries so simply phoned him, sent him all the media coverage, and asked him to write a submission for us for the inquiry.

"It was about making sure that people in New Zealand realised that (Havelock North) isn't an uncommon occurrence, that disease outbreaks in affluent counties are caused by a whole series of characteristics that we could have learnt from if we'd been paying attention, but apparently we had to keep making that mistake until we had our Walkerton."

The 2000 Walkerton outbreak of waterborne gastroenteritis was the result of a contamination of the water supply of Walkerton, Ontario, Canada with E. coli and Campylobacter. The contamination sickened more than 2000 people and resulted in seven deaths.

Hrudehy's submission went on to form the basis of the inquiry's final report. "They repeated his philosophical principles and used them as the basis for good decision making."

With the attention also came controversy and John doesn't apologise for that.

"You have to accept that with raising your profile in an advocacy role, you're going to upset people from time to time."

Following Havelock North, Water New Zealand found itself offside with several groups over its stance on fluoride and the treatment of water.

And that's why he says it's important to have evidence-based policies, especially in times of change and uncertainty.

He says the new regulator will be the catalyst to drive change in water service delivery through the pressure of meeting new drinking water standards and the new national environmental standard for wastewater

"Providing good service and at the same time allowing communities a sense that the water entity is listening to them, along with struggling affordability will be some of the key challenges the sector will need to grapple with in the future.



John and wife Liz, on an earlier cycling trip in Canada.

"But that's a political debate that will take some time to sort out."

Looking ahead, he's confident Water New Zealand is in good heart.

"Reform will be an important part of the work of the organisation for the next few years and a lot of the work being done now, like the National Performance Review which analyses key comparison data, will provide essential information to the regulator.

"That's a hugely valuable document, and how it's managed into the future is something that will need to be worked through.

"And then there's the ongoing technical documents that Water New Zealand provides for the sector – those are not cheap to produce."

But he says water is certainly having its day and with that so is Water New Zealand.

In the past five years the membership has grown from 1500 to 1900 and the conferences have been achieving record attendances with expo sites selling out within hours. On the back of this success, Water New Zealand has doubled its number of staff – from five to 10.

This means a growing skill set and better membership support.

"We've now got a specialist person looking after the special interest groups and we've employed someone to take charge of training and education, along with extra resource to promote the sector as a great place to work."

He has no doubt that whoever fills his shoes will have no difficulty going forward.

But for him, his focus is clearly on making use of the Kapiti Coast's extensive cycleway system and spending more time with young grandchildren along with more trips to Europe – and importantly, improving cooking skills. A tagine pot has found its way into his new kitchen.

So would he consider a return to work in some capacity?

"Maybe some time in the future on a part time, or consultancy basis."

But definitely not this year – Europe beckons and as he points out – life is short and "the cemetery is full of wealthy people".

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Comings and goings on the staff front

New Ad manager for Water

Water New Zealand's new Advertising Manager, Debbie Laing is excited about getting to know the people and businesses that make up the three waters network.

"I confess to knowing very little about the myriad of businesses that make the water world turn, but I'm looking forward to rectifying that over the coming months," she says.

Debbie has been involved in sales for most of her working life, representing a diverse range of organisations, as well as running her own businesses.

"I started my sales career in advertising though, so this role is coming a little bit full circle."

If you'd like to see your business, and the wonderful products and services you provide, featured in future issues of Water, please give her a call on 027 455 0223 or email advertising@waternz.org.nz



Debbie Laing

Noeline retires

Debbie replaces Noeline Strange who retires after a very successful 16 years as Advertising Manager. For Noeline, the best part of the job, she says, was the great people that she met along the way.

"It was certainly the people that made the job so enjoyable and helped it to be such an interesting position."

However, Noeline is looking forward to a busy retirement that will involve plenty of reading, including becoming a student again. She has enrolled at Auckland University and is looking forward to finally having the time to indulge her life-long fascination of history.

Water New Zealand welcomes more new staff

Special interest group focus

Katrina Guy is Water New Zealand's new Special Interest Group Co-ordinator. She took over the role in November and has been busy in the past few months meeting the growing number of membership groups.

Katrina comes to Water New Zealand after working for more than 14 years at Site Safe NZ as a training co-ordinator. Not surprisingly, she has a passion for bringing health and safety to the forefront of all industries.

"I have seen and read too many stories where lives have been lost or impacted due to lack of knowledge," she says.

Katrina lives in Wellington and shares her house with her partner and three cats.



Katrina Guy

New marketing person

Joining the team as our new Marketing Co-ordinator is Renee Butler.

Renee was born and raised in Whanganui and studied Marketing and Strategic Management at the University of Waikato. It was at university that she found her love for marketing and passion for building relationships and creating innovative strategies.

While finishing her degree, Renee also spent six months



Renee Butler

studying in the Netherlands, gaining an international perspective on marketing.

Outside of work, Renee enjoys travelling and being outdoors as well as reading and attending musical events. She also loves playing a variety of sports and spending as much time as possible by the beach.

One of Renee's key tasks at Water New Zealand will be helping to promote the water sector as a great place to work. So, if anyone has any ideas or suggestions or resources – she'd love to hear from you. Contact Renee. butler@waternz.org.nz

New Training Development Manager

Mumtaz Parker is Water New Zealand's new Training Development Manager. She started in the role in February.

Mumtaz comes to Water New Zealand from the Royal Australasian College of Physicians (RACP) as the Trainee Education Programmes Manager, Education Learning and Assessment New Zealand.

Prior to this Mumtaz worked at WelTec across a number of schools, including construction, built environment, health and social services.

Mumtaz has a passion for Education, Learning and Training and being able to make a positive difference and providing more opportunities for people to learn and grow.



Mumtaz Parker

Jim Graham moves on

In January, Water New Zealand's Principal Water Quality Adviser, Jim Graham resigned to take a position as Principal Technical Advisor with the Taumata Arowai (new drinking water regulator) Establishment Unit in the Department of Internal Affairs.

Jim says he enjoyed his two and a half years at Water New Zealand, particularly the variety of tasks and the opportunity to have input into things that directly affect the water industry. But he was drawn to the challenge of being involved in setting up the new regulator because it provides an opportunity to put in place systems and processes that will underpin drinking water regulation for years to come.

"These situations don't come around very often, and it is an opportunity to ensure the new regulator understands the issues water suppliers face and works with them to ensure everyone has access to safe drinking water," he says.



Jim Graham

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Water New Zealand award winners

As part of our series taking a closer look at some of the award winners from the 2019 Water New Zealand Annual Conference, we focus this edition on the winner of the Poster of the Year Award which went to Hugh Blake-Manson for his poster 'Listening to the reflections in the dark' (see opposite page) and the winning entry in the Site Safe Health and Safety Innovation Award.

Listening to the reflections in the dark by Hugh Blake-Manson.

This paper had a catchy title and made great use of graphics, including diagrams, graphs, and photos. The distributing sensor technology discussed in the poster offers excellent possibilities to provide efficiencies for both cost and time. An exemplar poster.

Site Safe Health and Safety Innovation Award

This was won by Pattle Delamore Partners and Auckland Council for their entry: *Water quality sampling using a drone: a novel method for reducing hazards to staff.*

Collecting water samples can be a dangerous occupation, especially in rivers, lakes or offshore. Samples are collected manually from banks, bridges or boats, especially when rivers are in flood. Obvious risks are falling in and drowning or getting hypothermia. Drowning is the third greatest cause of accidental death in this country, after road accidents and falls and the risks can be difficult to mitigate especially when working around deep or swift water.

Therefore, the best option for eliminating the risk is to avoid approaching or going into the water altogether.

One way of doing that is by using innovative drone technology to collect water samples.

That's a solution that's been adopted by the Auckland Council using a drone system developed by the staff at Pattle Delamore Partners (PDP).

By combining a relatively inexpensive waterproof drone with lightweight sample sleeves, PDP can collect samples from up to one kilometre away.

As well as reducing the risk of drowning,



the drone reduces the risks when working with highly contaminated water, such as at wastewater treatment plants.

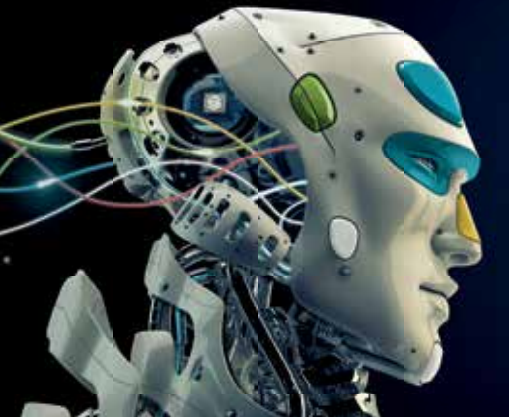
PDP believes that this drone-based method has the potential to transform the way water quality sampling is done in other challenging situations. Already the drone has been used at six popular Auckland beaches to support Auckland Council's Safeswim programme as

well as helping to improve understanding of coastal water quality and risk of wastewater contamination to human health.

The drone technology can also be used in situations such as sampling from flooded rivers, mine and quarry lakes, wastewater aeration ponds or anywhere that accessing the site may pose a risk to staff such as around coastal cliffs and steep or unstable riverbanks.

Listening to the reflections in the dark.

DTS - Distributed Temperature Sensing technology.



Stormwater and wastewater networks operate underground and out of sight. Unseen, unintended discharges from these systems are polluting our rivers and beaches.

Distributed Temperature Sensing (DTS) technology enables us to deliver pinpoint identification of leaks, breaks and discharge points.

Citycare Water has successfully deployed Distributed Temperature Sensing (DTS) technology in over 100km of NZ pipe networks since 2017.



Water infiltration through a pipe defect.

In tech speak.

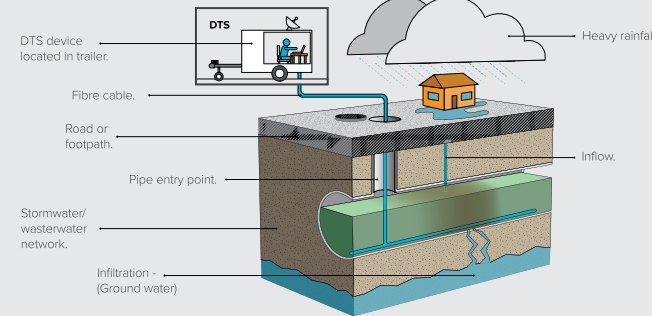
- Distributed Temperature Sensing technology is based on sending a light pulse down an optical fibre and analysing the return signal of backscattered Raman-spectra light at specific frequencies that are either sensitive (anti-Stokes) or not sensitive (Stokes) to changes in temperature.
- Photons returning with frequency shifts are recorded in timed 'bins', which, based on the speed of light, represent a discrete length of cable at a known distance from the detector.
- After calibration to locations of known temperature along the cable, temperatures can be resolved for the entire length of the cable at the desired time interval.
- Typically, the accuracy is to provide a temperature value every 1-2 metres of fibre reporting temperature resolutions to ± 0.1 degrees Celsius.

In plain English.

Fibre optic cable is temporarily installed at the bottom of the pipes where a pulse of light travels along the length of the fibre optic cable. A small amount of light is backscattered and returns to the DTS instrument. The temperature of the optical cable is calculated from changes in wave length of the backscattered light.

By measuring the time it takes the backscattered light to return, it can also measure the location of the event (to within a metre).

How does it work?



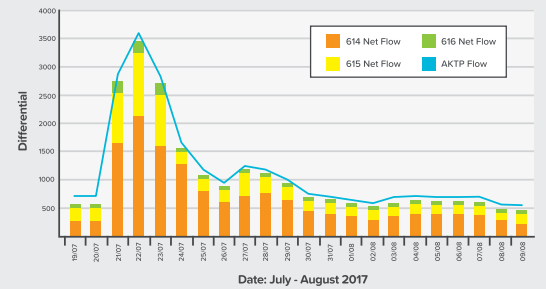
Why is this so unique?

- The data DTS provides enables us to monitor and analyse wet and dry weather inflow and infiltration to accurately pinpoint all I&I sources, i.e.:
 - Inflow (rain and surface water)
 - Infiltration (groundwater)
- This enables us to detect both the transient and chronic water entry points into the network. This has enormous value to the asset owners.
- We can detect wastewater getting into stormwater pipes and vice versa.
- This is the first time we have been able to do this in the Southern Hemisphere.

DTS in Akaroa – Banks Peninsula NZ

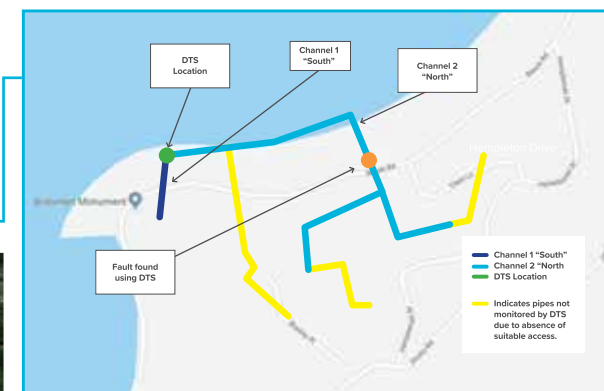
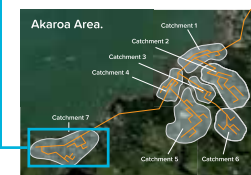
Infiltration in the wastewater network is predominant over inflow, even though inflow is quite large during the rain events.

- 1 in 3 year rainfall event.
 - Providing for a peak flow of around 5500m³ per day - 63 l/sec.
 - Resource consent changes – meeting environmental, cultural and community concerns.
- Therefore they need to reduce inflow and infiltration.



In completing a DTS survey of Akaroa we delivered...

- 10km of fibre cable installed past 800 properties, identifying 176 individual I/I points.
- Laterals, manholes and pipe defects.



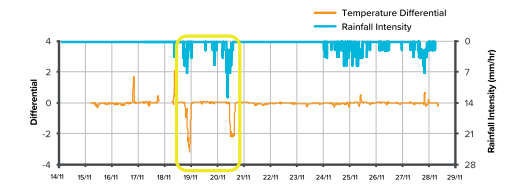
The catchment is split in two channels to reduce the length of the fibre that light must travel.

Source Analysis Summary.

Reference: Source S1 / 213 Location on DTS: 213m
Asset: MH 34824, Pipe 44065, DN150, 12.9m, EW, 1930.

Address: Accessway to 16A Stanley Place adjacent to the boundary of 253 Beach Road.
Description: Drop in temperature differential correlated with rain indicating RDI. Comparing the GIS and DTS data indicates the source of I&I is approximately two metres upstream of MH 34824.

Recommendation: Inspection of the MH checking for signs of deterioration and infiltration. CCTV inspection of pipe checking for signs of deterioration and infiltration.



Things to be aware of.

- Challenges to be aware of when using DTS:
 - The optical fibre is fragile (typical diameter is 125 microns) and must be protected from strain and abrasion when being hauled through wastewater pipes.
 - It is harder to detect inflow points based on temperature changes if sewage temperatures are similar to ground temperatures.

Hugh Blake-Manson
Digital Networks Manager



Climate summit leads to life-changing commitment

Last year, Wellington Water's Rob Blakemore spent three days at AI Gore's Climate Reality Project in Brisbane. He discusses his experience with us. By **Debra Harrington**.

Attending the Climate Reality Project (CRP) was a life-changing experience that has inspired Rob to become one of 20,000 CRP leaders around the globe.

"I always knew that climate change was the biggest global challenge of our time but not unlike many of us, I didn't know what I, as an individual, could do to make a difference," he says.

AI Gore challenged the 700 people who attended the leadership training programme to perform 10 acts a year that help combat climate change.

This was a challenge Rob readily accepted and now he's on a mission to encourage discussion and dialogue about climate change.

"The more we talk, the more opportunities we will have to change the path we're on."

Since the CRP back in August, Rob has talked to many different groups and individuals about what we can do to combat climate change.

These are not 'doomed-to-extinction' discussions. Rob is still optimistic that it's possible to prevent what he calls a 'cataclysmic destruction'.

Whilst he is yet to ditch his petrol-fuelled car for an electric model, he often bikes to work on an e-bike. And the electric car is definitely on the horizon. But that's not the point, he says.

Though he's not become a zealot, his pledge is to talk to people in a positive way and share positive stories about what can make a difference.

"We can all do things like checking our KiwiSaver provider is investing in sustainable companies and not fossil fuel-based organisations.

"Within the water sector there are plenty of opportunities. Technology has brought us closer to being sustainable.

"For instance, the use of smart sensors to manage networks, close attention to energy optimisation and trenchless technologies all contribute to a smaller carbon footprint.

"I'm not proud of the way my profession has engineered a society that treats our atmosphere like an open sewer.

"We know that the real impediments to change stem from resistance by politicians and lobby groups with vested interests, who are reluctant to sacrifice short term financial gain and their existing lifestyle."

He says there isn't time to try to 'convert' the climate change deniers.

"These are the people we must walk around and leave in our wake. It's simply not worth spending valuable time debating with a denier who has self-interest at the core of their values."

Rob tells the story of the Paris Agreement and the initial reluctance of the Indian Prime Minister to sign up to its goals because of his country of 1.3 billion people needing access to fossil fuels. In hearing what the roadblocks were, AI Gore and his team followed up with solutions such as wind and solar power.

The result was that India, the world's fourth largest carbon emitter did sign up to the agreement.

The solutions don't necessarily have to be global or wide-sweeping to be worthy.

"The (AI Gore) sessions made me question what true leadership is. It doesn't have to be about big changes, it's much more about incremental change.

"As a grandfather of four, I don't want to see today's children inheriting an Earth that my generation has helped to destroy."

Proposed climate change carbon zero interest group

There was an enthusiastic turnout for the first meeting in February to discuss the proposed Climate Change Carbon Zero special interest group.

More than 80 members attended the discussion, which was hosted by Beca.

Wellington Water's Rob Blakemore provided a rendition of AI Gore's presentation which set the scene for the day and set the discussion for what the group could do.

It was agreed at the meeting that Jon Reed of Beca would serve as the first chair. He says there was a sense of urgency at the meeting and a strong will to collaborate and share initiatives that could help achieve the zero carbon goal.

"It's clear that the water industry will be affected by the impact of climate change as a result of increased rainfall, higher temperatures and sea level rise.

"We need to adapt to these changes and move towards operating as a carbon neutral (or better) industry.

"We need to be clear about the targets, identify what the roadblocks to change are and, as water professionals, develop solutions collaboratively."

Some of the key issues raised by the audience were:

Collaboration

- Education industry-wide by sharing knowledge and best practice, potentially with training to share the latest information;
- Make sure we share good new stories to motivate the industry to continually improve.

Consistency with Carbon Accounting and analyses

- We need reliable benchmarks to enable us to identify where to focus our effort;
- Consistent methods for measuring performance based on local factors.

Community engagement

- Increasing awareness around the value of water;
- Can we reduce what we need to build if communities value water more highly?



Attending the Climate Reality Project (CRP) was a life-changing experience that has inspired Rob Blakemore (above) to become one of 20,000 CRP leaders around the globe.

If you have the passion and experience to be a member of the proposed Climate Change Zero Interest Group committee please contact Katrina Guy at Water New Zealand or Jon Reed at Beca (jonathan.reed@beca.com, 09 300 9267).



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Time to get snapping again



Last year's winner was Russell Grant, Wastewater Treatment Team Leader, Timaru District Council for his photo of the Timaru Wastewater Treatment Plant Ponds.

Have you got a fabulous water photo you want to share?

The 2020 Water New Zealand Photo Competition is now open for entries. If you've got some great water shots, we'd love to see them.

Entries can include any photos relating to water but we are especially looking for photos that represent the four waters – drinking, storm, waste and fresh.

Go to our website www.waternz.org.nz to upload your photos and see the terms and conditions.

Last year we had an outstanding number of fantastic photos submitted and we hope to see plenty more again this year.

Voting will open on Monday, April 20 where the "People's Choice" will be selected by member and public votes.

Voting will close on May 29 and the winner will be notified by June 5. The winner will receive a free registration for the Water New Zealand Annual Conference & Expo in September.

Bill Bayfield to head new Taumata Arowai establishment unit

Environment Canterbury Chief Executive Bill Bayfield has been appointed to the new role of Establishment Chief Executive for the new Taumata Arowai – the Crown entity drinking water regulator.

Bill will take up the new position in May after nine years at Environment Canterbury where he started just weeks after the February 2011 earthquakes. He has worked with the Government-appointed commissioners as well as the interim Council (2016-19) and since October last year, under the fully-elected Council.

His appointment as establishment Chief Executive of Taumata Arowai is on a fixed-term basis to December 2021.

The Taumata Arowai Board will consider a permanent appointment to this role once it is up and operating. Bill will report to the Taumata Arowai Establishment Board which is expected to be in place by June/July 2020

An establishment Māori Advisory Group will provide guidance to the establishment board and chief executive on tikanga, mātauranga, and Te Mana o Te Wai.

The position of Establishment Chief Executive is key to a successful build of the new Crown entity drinking water regulator, Taumata Arowai, and Bill has both central and local government experience as well as knowledge of drinking water and environmental regulation.

Meanwhile, the Department of Internal Affairs recently pro-actively released further Cabinet Papers on three waters service delivery and funding arrangements. The papers are available on the department's website.

Recent submissions on behalf of members

November 2019

The Resource Management Amendment Act – Water New Zealand generally supported the proposals and noted that the new freshwater management process in the Bill is directly relevant to the Government's freshwater proposals.

January 2020

Health and Safety At Work (Hazardous Substances) Regulations 2017 (Minor Amendments) – We supported the Government's response in making the work environment safer. Our submission highlighted some of the challenges and inconsistent interpretation our members face across the country.

Technology Change and the Future of Work – Water New Zealand prepared this submission on behalf of its members as the water industry is subject to many of the changes outlined in the Commission's draft reports.

Landfill Levy Expansion Consultation 2020 – We supported the Government's proposal to increase and expand coverage of the levy to catalyse much needed change in the waste management sector.

February 2020

The Resource Management Issues And Options Paper – We are generally in support of the objectives of the review of the resource

management regime as set out in the Paper. We also agree that the issues and options set out are, at a high level, the correct ones to focus on.

Taumata Arowai—The Water Services Regulator Bill – Our submission is that we are in support of the general intent of the Bill in its entirety.

Submission On The The Urban Development Bill – We understand the Bill is intended to provide the Crown entity, Kainga Ora – Homes and Communities, with functions, powers, rights, and duties in order to enable its urban development functions. Provision of drinking, waste, and storm waters is a key aspect of the Bill's purpose.

These submissions are on the Water New Zealand website.



UPCOMING EVENTS

| | | |
|--|-----------|----------|
| Australian Water Association "Oz-Water20" | 5-7 May | Adelaide |
| BOINZ Annual Conference | 16-19 May | Auckland |
| Water Industry Operations Group (WIOG) conference 2020 | 20-22 May | Napier |
| Stormwater 2020 | 27-29 May | Tauranga |

Stormwater 2020

27 – 29 May 2020 | Tauranga

2020 Innovations showcase

Opportunity to share your idea or innovation

Do you have an innovative process or idea you'd like to share?

The Innovations Showcase provides a great opportunity to pitch your innovation to a wide audience of stormwater professionals.

Water New Zealand's Stormwater Group is delighted to announce the annual Innovations Showcase is again being held in conjunction with the 2020 Stormwater Conference & Expo, 27–29 May, in Tauranga.

Your pitch will be no more than five minutes long and a panel of judges and the audience cast votes for the Overall Best Innovation.

The event is open to suppliers, research companies, academia, industry, businesses, contractors consultancies and individuals.

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Go to our website stormwaterconference.org.nz for more information and entry criteria

Infrastructure Commission has water in its sights

Kiwis deserve clean, healthy and sustainable water, says Jon Grayson, (pictured) the chief executive of the New Zealand Infrastructure Commission, (Infracom).

The Government set up the independent New Zealand Infrastructure Commission last year to look at all aspects of infrastructure, of which water is critical, and focus on outcomes for consumers. Its chief executive Jon Grayson says better long-term outcomes require bold reform.

“There is already a lot of work underway,” he says.

“Our role is to provide guidance and advice on key projects, while developing over the next 18 months our 30-year strategy.

“Our aim is that the strategy will reflect a consensus between central government, local government, and the private sector on an agreed national roadmap. Water will be one element of a wider plan.”

Infracom will look at ways it can help improve infrastructure outcomes across a variety of sectors and for all communities.

Grayson says that Infracom will engage closely with the Government’s Three Water’s Review, taking a particular focus on service and cost outcomes for consumers and what that may mean for industry structure and economic regulation.

Infracom will start the development of the 30-year strategy with an assessment of the state of New Zealand’s infrastructure system to build an evidence base on the performance of infrastructure networks, including water.

This will be an opportunity, he says, for those managing water assets to highlight where good practice is happening and bring the Government’s attention to the pinch points in the water sector and where improvements – potentially with Government’s help – could be made.

Another key role of the Commission is to publish a phased pipeline of credible public sector infrastructure projects, to provide greater visibility to the contractor and consultant market, he says.

In November last year, Infracom published its second pipeline of more than 500 water, transport, energy and building projects, with a third pipeline scheduled to follow in March this year. It is intended the pipeline will continue to be updated and expanded regularly to include more agencies, including willing private sector infrastructure owners.

Watercare in Auckland and Wellington Water are the first water organisations to share their data, including commitments for reservoir renewals, sewer upgrades, pump station construction, water main replacement, stormwater improvement, and flood protection.

Infracom also provides major project procurement advice to procuring agencies.

“Our Major Projects and Advisory team provides professional



advice and commercial support to existing and upcoming infrastructure projects, from business case, design and procurement through to construction.”

Grayson says as an independent advisory body, Infracom will only be effective by building a consensus on a national direction, and that will require extensive engagement with all key players in the sector.

Guided by the chair, Alan Bollard, Board members have a breadth of skills across the infrastructure ecosystem, he says including deep experience in water systems and management in the form of Watercare CEO, Raveen Jaduram.

Leading the organisation, Grayson says he draws on his strong background in major infrastructure investment management, as chief executive of Prime Infrastructure in Australia, and policy experience drawn from his time as a Treasury Deputy Secretary and as head of Queensland’s Department of the Premier and Cabinet.

“We really see this as a collaborative effort. We are beginning conversations with the key players around the country so we can understand our needs now and in the future.

“We need to consider major trends such as demographic shifts, changing patterns of urbanisation, environmental challenges, and technology developments so we can get to a comprehensive and coordinated approach.”

Infracom will help national and local government agencies, funders, suppliers and regulators to think about what outcomes from our infrastructure system to best serve future generations.

“We want to encourage bold, aspirational thinking and planning, but we need to develop a strategy based on evidence, for which there is broad consensus,” says Grayson.

Infracom needs to engage with a wide variety of stakeholders, which Grayson considers essential to the success of the Commission.

To consult end users, organisations and businesses, Infracom will seek input from infrastructure providers, he says, including water asset owners and operators – to ensure a wide range of views are considered and the opportunities and challenges the sector faces are understood.

“We will be guided by our conversations with peak bodies, providers and users, as well as evidence of best practice here and internationally, in order to get our strategy right. It’s a major opportunity, and I’m excited to be leading it.”

To sign up to the Infrastructure Commission Newsletter or find out more about its work, connect here: <https://infracom.govt.nz/news/newsletter/>



Evidence-based pipe renewals seminars

Many of the country’s water managers, asset managers and consultants took the opportunity to stay up to date with newly developed material, to enable better management of underground piped infrastructure. Throughout February and March, Water New Zealand held workshops in a number of towns and cities around the country. Above: Water New Zealand Technical Manager, Noel Roberts, presenting at the Hamilton workshop.

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What's up with wet-weather wastewater overflows?



Water New Zealand's Principal Data Scientist, Lesley Smith (pictured), has just pulled together the data for our flagship document, the **National Performance Review** – an annual tool for councils and water utilities to track and compare performance. She shares her findings and thoughts about the challenges the industry faces over wet weather wastewater overflows.

Brimbank Park is a hidden gem of Melbourne's west. The Maribyrnong river winds its way through grassy parklands dotted with strands of eucalyptus.

Today the park is mainly visited by picnickers, but in times gone by it had been an important hunting ground for the Wurundjeri people. A sharp bend in the river made an ideal location to trap animals, leaving behind a site littered with ancient artefacts. Fast forward a few thousand years and the same bend is now home to a wastewater pump station and engineered overflow for one of the city's largest wastewater mains.

Wastewater overflows in Melbourne are regulated by the Environment Protection Agency via The State Environment Protection Policy for Water. While the policy does not permit chronic leakages and overflows which occur in dry weather, it acknowledges that the complete containment of sewage in wet weather is not possible, and in heavy rainfall events the capacity of sewerage infrastructure can be exceeded, causing overflows.

To manage this risk, the policy has a containment standard as a benchmark for industry to manage sewerage systems. This requires flows associated with at least an 18.1 percent annual exceedance probability rainfall event to be contained.

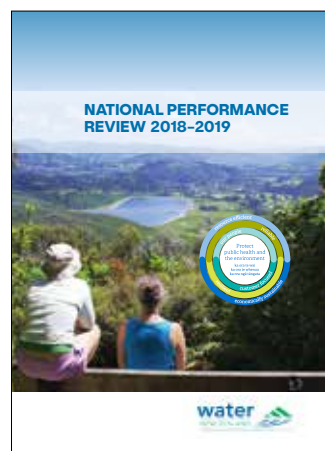
When I worked in Melbourne a few years back, the Brimbank Park pump station was one of a few remaining sites yet to meet the containment standard. The site prevented the utility with a complex challenge. Heritage restrictions presented the expansion of the containment basin. Upstream and downstream network upgrade costs stretched high into the hundreds of millions.

All the while environmental regulators demanded action. I worked as part of a large cross disciplinary team investigating solutions to the trifecta of challenges, work which is ongoing today.

Wet weather overflows in wastewater networks occur when stormwater and groundwater make its way into wastewater pipes during periods of heavy rain, exceeding the capacity of a wastewater network to convey it.

Generally, it's not feasible to eliminate all sources of infiltration, nor to build pipes large enough to contain all the additional load that may occur in wet weather. In a world with finite resources some amount of wastewater flows are inevitable.

Arriving back in New Zealand in 2015 I was excited by the



prospect of finding out how we confront the wet weather overflow challenges at home. I felt certain that with our clean green image, the Maori view of the disruptions wastewater discharges into freshwater bodies cause to Te Mana o Te Wai, and our 'No 8 wire' Kiwi ingenuity, we would have this one nailed.

Taking on a role at Water New Zealand co-ordinating the National Performance Review would provide me with the answers I was looking for. Five years and five reviews later, wet weather wastewater overflows have left me more confused than ever. I am now of the opinion that everybody else is confused too.

The National Performance Review provides an annual performance assessment of New Zealand's drinking water, wastewater and stormwater systems. Central to the review is an assessment of performance of these systems in performing their critical function of protecting public health and the environment.

To this end the review provides metrics that help us understand the nature of overflows in our country; levels of infiltration into the system, the number of wastewater overflows being recorded, and the compliance and monitoring framework.

What we do know:

- More than 1000 overflows of wastewater occurred as a result of wet weather in 2018-19.
- Most wet weather overflows are unconsented. Only seven authorities have in place network consents for wet weather overflows.
- Wet weather overflows are under-reported. Participants who rely on verbal reporting record less than half the number of overflows than those who employ SCADA monitoring.

With wastewater overflows reported in all districts reporting to the National Performance Review, it seems surprising that less than a fifth have consents. I rang Wellington Water's Chief Advisor for Wastewater, Steve Hutchison to ask why. Steve has a lifetime of experience working on wastewater; if anyone had the answers I was after it would be him.

Steve described to me Wellington's challenges with wet weather overflows, and years' worth of efforts to obtain consents for the various overflows. When he describes the process as "difficult and expensive" he is putting it mildly.

The absence of consents does not prevent overflows from happening. In fact, taking a head in the sand approach

creates problems of its own. Wastewater networks are designed without engineered overflow points built, and surcharges will pop manhole covers when the capacity of pipes is exceeded. The absence of consents makes it difficult to assess the level of service currently provided by networks and deny public and officials the opportunity to contribute to decisions about the necessary trade-offs between public health and environmental protection and infrastructure costs.

As an example of how expensive these problems can be to tackle, we need look no further than Auckland. The publicity received by Auckland's wet weather wastewater overflows and resulting beach closures is unique in New Zealand.

In order to reduce the frequency of these spills, Watercare will be working on a super-sized tunnel known as the Central Interceptor. With a budget of a cool \$1.2 billion, and a six-year delivery time frame, the effort is colossal.

Auckland's combined water and wastewater system poses some unique challenges. Last year their combined stormwater and wastewater system overflows accounted for 343 of 421 overflows reported in the region.

Auckland also accounted for the majority of overflows from combined wastewater and sewer networks, a relatively rare occurrence in New Zealand, mainly confined to small pockets of networks in the Grey District, Whanganui and Gore.

However, the wet weather overflow problem is not restricted to combined networks, nor to Auckland. Nearly 800 wet weather overflows were reported in other parts of New Zealand in 2018/19. Hamilton, Wellington and Palmerston North all had in excess of 100

overflows a year. Twenty-eight other jurisdictions reported some wet weather overflows.

Many of those relied solely on verbal reports to identify that they had occurred. Data in the NPR suggests this leads to significant under reporting; where verbal reports are relied on, the number reported is less than half that reported by systems with SCADA monitoring.

The Resource Management Act provides the overarching framework under which wet-weather overflows are regulated. With the government's current review aiming to ensure the processes enable sufficient certainty for major infrastructure, the time is ripe to examine how governance of wet weather overflows can be improved to better serve the environment and our communities.

If you want information on the number of wastewater overflows occurring in your district, you can access this from the National Performance Review data portal.

Data and an associated report from the 2019 fiscal year will go live on Water New Zealand's website this March: www.waternz.org.nz/NationalPerformanceReview.

We encourage all our readers to take a look. The report provides a performance assessment of the critical functions of our drinking water, wastewater and stormwater systems in protecting public health and the environment.

Metrics examining our workforce, customer focus, economic sustainability, resilience, reliability and resource efficiency are also included.

If you want a contemporary snapshot of the sector's performance this is the place to look. Just don't expect to find the answers to our problems with wet weather wastewater overflows.

Lesley crossing the Maribyrnong river just down from the Brimbank park overflow point, on her favourite backroads route to work.



Reports call for improved water performance

The future funding and financing of three waters was one of the many areas canvassed by the recent NZ Productivity Commission's 343 page report on local government funding and financing. **Anne Gray** reports.

The Productivity Commission found considerable evidence of poor performance of the three waters sector in many parts of the country in terms of the impact on human health, the natural environment, productivity and costs to consumers and ratepayers.

However it also pointed to councils and providers already taking tough decisions needed to improve performance, including Auckland's Watercare, Tauranga City Council, Kapiti Coast District Council and the five councils involved in Wellington Water.

Other findings said that the performance of the three waters sector would substantially improve by using an approach that (1) rigorously enforces minimum performance standards; and (2) is permissive about the way councils structure and operate their three waters businesses.

"Without effective economic regulation there is a risk the new approach to health and environmental standards will exacerbate cost increases.

"Independent and effective economic regulation is needed to encourage fit-for-purpose investments to lift the sector's performance and assist with affordability (by minimising costs)."

The report also found that allowing all council-owned and corporatised water providers to directly charge their water customers, under provisions like those currently applying to Watercare, "is essential for enabling councils to sustainably lift the performance of their water businesses.

"Establishing water-service businesses with their own funding sources is an essential first step for establishing independent entities that are able to make their own financing and investment decisions."

It also found that financial assistance to communities will likely be needed to assist 'deprived' communities meet minimum health and environmental standards.

Recommendations included Government legislation to enable any council-owned water provider, incorporated as a council-controlled organisation, to directly charge water users for their services and allow councils to set targeted rates for wastewater on a volumetric basis.

Big challenges facing councils

At the crux of the report are a number of changes that "support councils in dealing with some large and growing pressures".

The report found that the current funding and financing framework for local government has many strengths and commission chair, Murray Sherwin, says, "the current rates-based system remains appropriate for New Zealand".

He says local government has access to a range of funding tools, "and a lot of autonomy in how they use them.

"Councils also have the flexibility to respond to local needs and preferences.

"This autonomy, and the accountability that goes with it, are strengths of our system, and should be preserved."

But it is also acknowledged councils are struggling to deal with some big challenges; including rapid population growth and central government loading councils with more responsibilities and higher environmental standards, and increasing tourism pressures.

"The costs of dealing with the impacts of climate change is also a major and growing pressure on some councils.

"Rising sea levels and more frequent and extreme weather events threaten many communities, and a lot of local infrastructure. These pressures are significant, rising and not evenly distributed around the country," Sherwin says.

Small, rural councils serving low-income communities are also under strain because of limited resources.

The commission says that to help councils deal with these pressures, it has focused on targeted solutions "that do not compromise councils' autonomy or accountability".

It says that payments from central to local government are justified in some circumstances, and that co-funding will be needed

to help some councils deal effectively with the challenges they face.

It recommends central government co-funding to help councils redesign, and possibly relocate, infrastructure at-risk from climate change, as well as to assist small, rural and low-income councils upgrade their three waters infrastructure.

Local governments face financial climate costs

Water New Zealand says the Productivity Commission Report on local authorities financing, highlights some of the key challenges around adapting to climate change and funding for improved drinking, storm and wastewater quality.

The report makes it clear that the central government will need to provide local authorities with increased support to meet those challenges and the increased responsibilities they will face. Water New Zealand chief executive, John Pfahler, welcomed the report's findings.

"It is evident that small, rural and low-income areas will struggle to meet infrastructure costs and the requirements of regulatory reform in the three waters sector."

He added that Water New Zealand wants the Government to take a 'stronger lead on climate change resilience' and provide councils with better tools to regulate development on at-risk land.

"While the funding to rebuild and relocate three waters and roading assets because of sea level rise, or flooding will largely continue to come from local authorities, there is also a role for the Government."

The report suggests the Government provide local authorities with the power to levy volumetric wastewater charges.

"While we see the benefits of volumetric charging for water supply, we would question the practicality and the ability of local

authorities to measure household wastewater usage.

"Currently there is not a practical volumetric measurement tool for household wastewater and that's why we believe it is more feasible to charge households for total water usage.

"Watercare in Auckland is the only council that has a wastewater levy and that is calculated as part of an overall volumetric charge based as a percentage of the total household water use.

"We know that councils that charge for water on a volumetric basis, such as Kapiti Coast District Council, achieve better water efficiency and that is why we generally support volumetric charging for water."



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Central funding for Hawke's Bay

The Government has provided \$1.55 million in funding to assist Hawke's Bay investigate voluntary changes to the region's three waters service delivery arrangements.

"Over the last 18 months, the five Hawke's Bay councils have been collaborating to identify opportunities for greater coordination in three waters service delivery across the region," says Local Government Minister, Nanaia Mahuta.

"We are greatly encouraged by this initiative, and I would like to acknowledge the Hawke's Bay councils' constructive approach towards reform."

The \$1.55m for Hawke's Bay comes following an application from Napier City Council, Hastings District Council, Central Hawke's Bay District Council, Wairoa District Council and Hawke's Bay Regional Council to support their joint three waters investigations. The Government is providing funding on a case-by-case basis to support such initiatives.

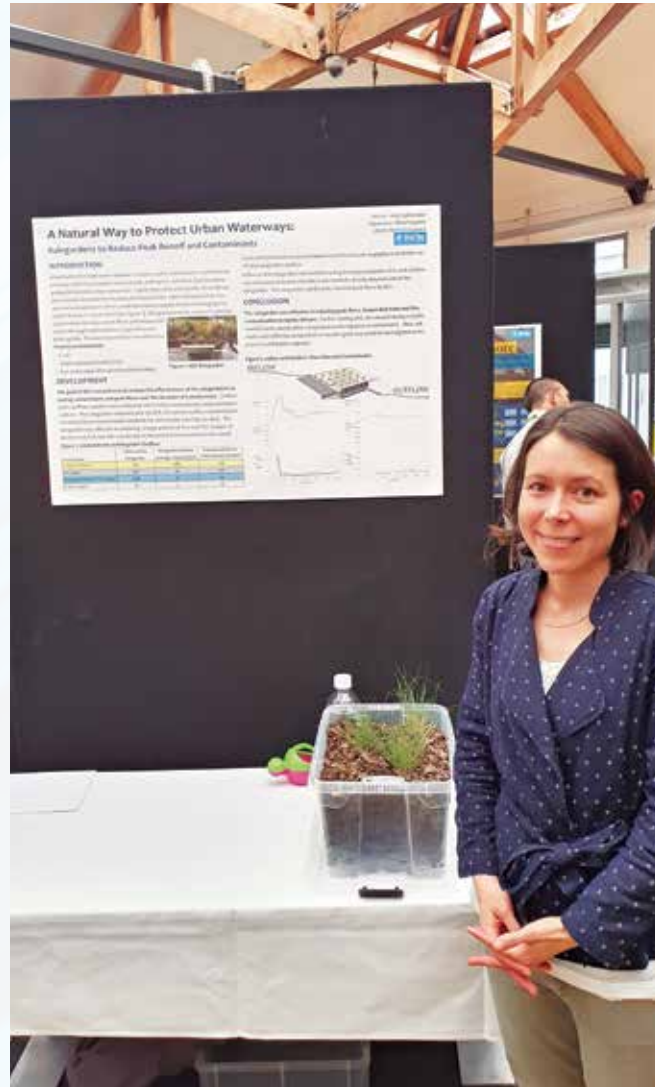
"This Government funding contribution to Hawke's Bay councils has been granted following careful consideration of the relevant criteria," says Mahuta.

Eligible funding applications must show evidence that proposed new three waters

arrangements: have substantial support and commitment from multiple and/or most councils within a region, or across regions; retain public ownership of existing three waters assets; contribute towards the new regulator; and address current and future challenges for the delivery of three waters services.

"We have seen some of the advantages of regional arrangements such as Wellington Water and Auckland's Watercare in providing modern three waters service delivery," says Mahuta.

"It's encouraging to see that other councils are also looking to see whether similar collaborative arrangements might work in their regions."



Amy Southland is one of 51 WelTec Engineering students who exhibited their final year projects on water quality in Petone at the end of last year for the Hutt City Council. Amy's presentation was one of many displays of engineering feats, created by final-year students of the Bachelor of Engineering Technology, Graduate Diploma in Engineering and Diploma of Architectural Technology courses.

GHD's new New Zealand leader

Seeing herself as a 'leader of culture', Van Tang (pictured) is making a move across the Tasman as GHD's Regional General Manager - New Zealand/Pacific.

Van succeeds Al Monro who has taken up a new role as Commercial Manager, New Zealand.

Van has led GHD's operations in South Australia since 2014, doubling revenue and employee numbers while also diversifying the portfolio of clients.

Van says she is passionate about building high-performing and diverse teams. She is a civil engineer with extensive experience in infrastructure, aviation and defence.

"The infrastructure challenges facing New Zealand - from water regulation to transportation and housing - put higher expectations on consultants to challenge current thinking and push the boundaries of what's possible," Van says.

"Our performance is intrinsically linked to the range of skills, and diversity of background and experience we bring to our clients' challenges."

Employing more than 560 people across the country, GHD offers a wide range of engineering, architecture, environmental, advisory and digital services.

GHD's Advisory arm recently provided vendor technical due diligence for the Napier Port IPO, while its architecture and interiors practice, GHDWoodhead creativespaces, has won awards for the Te Aka Mauri library and children's health services hub in Rotorua, and the DDB New Zealand head office in Auckland.

The GHD New Zealand team also serves clients around the Pacific, including working with the Government of the Cook Islands to upgrade Rarotonga's water supply system, the largest single infrastructure project in the history of the Pacific Nation.



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Raising the tide for contractors

Six months into his new role at Infrastructure NZ, Paul Blair talks to **MARY SEARLE BELL** about where he's come from and where he plans to take the organisation.

In August last year, Infrastructure New Zealand appointed a new CEO. And while new to the role, Paul Blair is not new to the industry or organisation.

While his background is banking – he was GM of institutional banking at BNZ for seven years prior to his latest position – he served as a director of Infrastructure New Zealand for four years from late 2014.

“It’s not as big a leap as you may think,” he says.

“In my role at BNZ I looked after the bank’s biggest clients, which included a number of very big contracting firms such as Fulton Hogan and Downer.

“Before that, I was client director – energy, utilities and infrastructure for the bank, so I have a solid background in the sector.

“In the end, it’s all about relationships – building trust and providing thought leadership.”

So, for Paul, while the focus of his work has shifted, the people he’s working with are very much the same. However, his financial knowledge will be put to good use.

“I think my core strength in this role is that I understand the critical issues of the construction sector, in conjunction with the ‘broad church’ of finance, engineering and politics.”

Six months into the role, he has a solid grasp on the goals of Infrastructure New Zealand and understands the challenges and frustrations the construction and contracting sector face.

“Sometimes, constructors are right at the end of the value chain, after the politicking, designing, planning and consenting.

“Our job at Infrastructure New Zealand is to raise the tide for all members, including contractors,” he told *Water*.

“In 2018 we heard from all our members that procurement was a huge issue – that the Government doesn’t understand construction and how the industry works. Ultimately, that the government’s approach to buying services from the industry is unsustainable.

“What the industry needs is longer contracts with sustainable risk and return, as this will provide certainty around future work and therefore allow appropriate investment in people and machinery.

“Our 2018 report *Creating Value Through Procurement* was co-funded by Construction Strategy Group and Civil Contractors. This report ultimately led to the Construction Sector Accord – a shared commitment between government and industry to transform the construction sector.”

The accord, which was signed in April 2019, acknowledges the challenges facing the sector and signals a shared commitment to transform the sector.

This included a commitment to a more visible pipeline of work and procurement practices that are fair, efficient and predictable.

A second key piece of work for Infrastructure NZ has been the formation of the Resource Reform Coalition.

Paul says his organisation, together with the Employers and



Infrastructure New Zealand CEO, Paul Blair.

Manufacturers Association and the Property Council, funded the Environment Defence Society to see whether the Resource Management Act was achieving its core job of protecting the environment.

“The answer was ‘no,’” he says.

“This led to the Resource Management Review Panel, chaired by retired Appeal Court judge Tony Randerson.”

The panel is tasked with producing reform proposals by mid-2020, including drafting of key legislative provisions. So far, it has identified the main issues to be addressed and options for reform. It is currently calling for feedback to inform its final report.

“The aim of the Randerson review is to get a better fit between protecting the environment and the needs of people and the economy,” says Paul.

The association is also working on a ‘pipeline of transactions’, to give clarity for projects at all stages in the process.

“We would like to see the Provincial Growth Fund superseded by a \$6 billion Regional Development Fund – this will be available to all regions of New Zealand to accelerate economic development.

“We envisage a collaboration between central and local governments.

“This bottom-up approach to projects will mean more community buy-in and will bring projects together faster and get quicker results.

“Local councils will group together to make a spatial plan for what makes most sense for their region. The central government will then provide funds to implement this regional spatial plan.

“For example, there may be a good port, but adequate roading links are needed, or there could be a significant housing development which needs schools.

“What’s good for the region – if aligned with central government goals – is good for the country.

“The Regional Development Fund will stitch together local government, which has land use powers, with funding from central government, to achieve the top-down results for the government.”

However, Paul does say that if the government does give a funding grant, best practice procurement and demonstration of local government capability is imperative.

“More power needs to be given to local and regional government. At the same time, they need to show capability and capacity.

“To this end, we suggest they undergo Treasury’s Investor Confidence Rating in the same way that public sector agencies do. The rating each council receives could dictate the level of funding sign-off it gets.

“We want to grow capacity and provide certainty for the whole

industry – not just the big guys. One idea is that the grant could stipulate, say, 30 percent of the work is to be undertaken by local contractors.”

This very much ties in with Infrastructure NZ’s strategy to strengthen and futureproof both the industry and NZ Inc.

Signed off in December last year, the strategy focuses on thought leadership, stakeholder influence and exceptional member mobilisation. The strategy is to change policy to get better infrastructure outcomes for the country.

“New Zealand has \$300 billion of assets in the infrastructure space – 18 percent is privately owned, 44 percent owned by central government, and 38 percent by local government.

“However, local government only gets 10 percent of the total tax revenues to fund these assets,” Paul stresses.

“We’re under-funding local infrastructure.”

With an election looming in 2020, Paul’s association has set a list of its top five priorities.

“The first is to establish a national vision – a ‘top-down’ campaign to set out what we want the country to look like in 2050. Slotting in behind this is the ‘bottom-up’ regional spatial plans to boost growth.

“Priorities three to five focus on urban development, mobility (transport for both people and freight), and urban water, each with the aim to improve affordability, quality, and economic and environmental outcomes.”

Sounding rather like a politician on the campaign trail, “Let’s get New Zealand moving again,” says Paul.

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Lisa Mace

One of water's trailblazing women

Lisa Mace talks to **Mary Searle Bell** about becoming an engineer, her career at Beca and her focus on drinking water.

Born in Boston, USA to scientist parents, it is no wonder Lisa Mace (pictured) has a keen analytical brain. Where she got her passion for safe drinking water is less clear.

She came to New Zealand when she was 13. As a schoolgirl, she always enjoyed science and maths, and was nonplussed when, after asking the librarian for a book on engineering, she was told; 'We've not had that question before; this is a girls' school'.

"I visited Beca as part of a careers day and saw some really cool, sustainable building design and, in that moment, decided to become an engineer."

"It's always stuck with me that, in the space of a few short hours, a career can be set. I now try to get involved in things like school days to help get more people into STEM careers."

However, even though it was a building that stimulated her career choice, rather than pursuing structural engineering, Lisa studied chemical and process engineering at the University of Canterbury.

"I kind of fell into it," she says. "I could see that it could lead to a huge range of things and I didn't really know what I wanted to do."

A choice of a Summer holiday placement between an energy efficiency consultancy or water consultancy was the tipping point.

"I chose to go with BTO (now Cardno) as I thought it would offer the level of support in the role that I wanted. Also, I thought working with water sounded interesting – I could have a big impact on people and the planet."

After graduating, Lisa joined Beca's water team and is still there seven years later, currently in the position of senior process engineer.

"My role here is very varied, I do a huge number of different things," she says.

"My work has included projects for breweries and the dairy industry, along with wastewater and drinking water treatment plants throughout the southern region."

"I enjoy the 'front end' of projects – looking at the different options and doing risk assessments to help find the best solution."

Recently, Lisa has become more focused on drinking water; "To a point that it's now become my thing."

"From a technical aspect, drinking water is very interesting. Safe drinking water is taken for granted but it's not actually always the case, especially in small towns here and throughout the Pacific."

"Tackling that particular challenge is hugely appealing to me."



Lisa acknowledges the current change in drinking water regulations here and says these reforms are stimulating thinking in the industry to find new ways to do things.

"When I talk about drinking water at parties there's always lots of questions."

While Lisa's work mostly has her looking at small water treatment plant upgrades around the South Island, she has also recently been working on a project for Solomon Water in Honiara, Solomon Islands.

"This is a very significant project for the community."

"Currently, water is sourced from a spring and the only treatment is chlorination. Turbidity can be high, which results in boil water notices and turning off the supply. Illegal logging in the catchment isn't helping the issue."

Detailed design for a new water treatment plant is currently being completed and it should be put out for tender early this year. The new plant will be a huge step up in providing reliable and continuous supply for Solomon Waters' customers.

"I would love to be involved in the training and commissioning of this plant."

"At the very least, I will plan a holiday over there to check it out."

Lisa's passion for drinking water hasn't gone unnoticed. Last year she was recognised by NAWIC (National Association of

Women in Construction) at their annual awards.

She was named as a rising star for not only her commitment to her work, but also her determination to develop herself further as an engineer.

NAWIC also acknowledged her focus on growing her leadership skills through her completion of the Rotary Young Leadership Award and her active promotion of the engineering profession to school students.

Lisa was one of the founding members of the Beca School Days events in Christchurch and currently works with Engineering New Zealand as a Wonder Project ambassador, a programme designed to get young Kiwis excited about science, technology, engineering and maths.

"A lot of good people have helped me shape my career; I want to do my part. I enjoy mentoring and helping develop young people," she explains.

"A few technical experts have really fostered my interest in drinking water, and Beca has a good culture around the office – there's lots of social activity and I have lots of friends at work."

"I have also had a number of successful female superiors who have provided both support and inspiration. For me, they have normalised women succeeding in a male-dominated field."

Looking ahead, Lisa doesn't have a set 10-year plan, but says her focus going forward is to cement her technical expertise. The many challenges and changes ahead for the industry will provide plenty to keep her busy throughout the rest of her career.

"Globally we're facing issues around water scarcity which may make water reuse more common. So far, we have generally been lucky here in New Zealand with the quantity of water available," she says.

"However, things are changing. I am interested to see how people's perceptions of water reuse evolve as it becomes a necessity."

"Another big challenge that we are facing is having enough people with the expertise and the funding to maintain, design and construct our infrastructure."

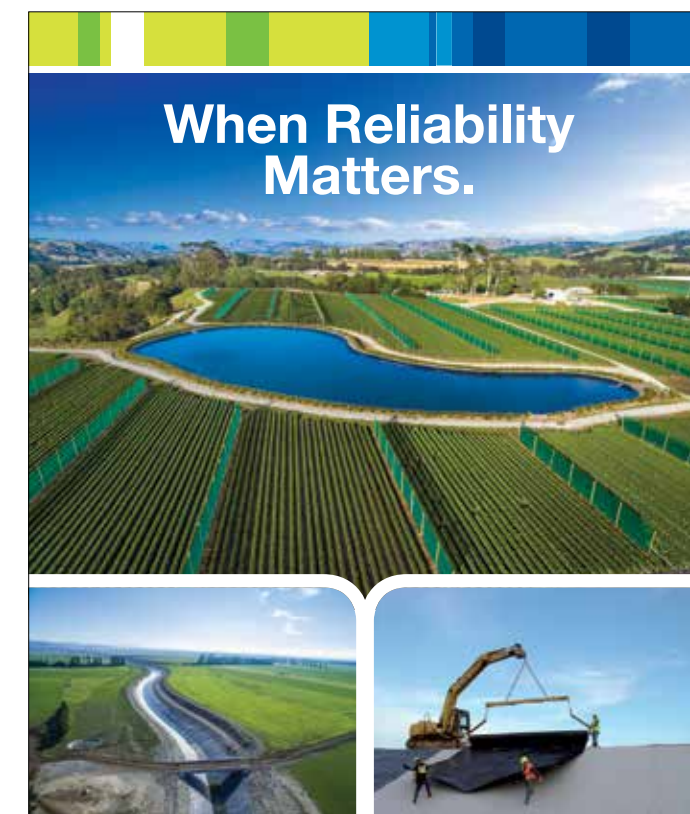
"Many small towns have neither the money to pay for water treatment nor the people to run those treatment plants."

"On top of that there are issues around climate change that must be considered, as well as the problem of nitrates and other pollutants in our water supplies – the costs of treating these can be prohibitive."

"It is also important that we bring the general public along with us on this journey, so they understand why we're making the changes we are."

"Currently, I don't believe they understand the risks around unsafe drinking water. If they understand the risks, then they will be more amenable to things like rate increases to pay for infrastructure," she says.

"It's impossible to predict how things will unfold but I know, as engineers, we need to stay on top of the technology as it develops and be ready and able to adapt as solutions come along."



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Chesapeake Bay

– a leading river revival case study

Rich Batiuk is the former associate director for Science, Analysis and Implementation, at the United States Environmental Protection Agency Chesapeake Bay Program Office. A keynote speaker at last year's Water New Zealand Stormwater Conference, he explains the enormous task of saving a vital estuary in the US.

Since our formation in 1983 with the signing of the first Chesapeake Bay Agreement, the Chesapeake Bay Program (CBP) has been fueled by science and driven by partnership.

By sticking to these values, the CBP has made significant accomplishments in our efforts to restore and protect the bay, becoming a regional, national and international leader in eco-system science, modeling and restoration partnerships.

In our effort to restore the bay and its rivers, we engage with hundreds of organisations, including federal and state agencies, local governments and academic institutions.

The CBP Partnership includes:

- Some 19 federal agencies with responsibilities ranging from agriculture to fisheries to national defence to habitat restoration.
- Nearly 40 state agencies and programmes across the six watershed states – Delaware, Maryland, New York, Pennsylvania, Virginia, West Virginia – and the District of Columbia.
- Approximately 1800 local governments, represented through the Partnership's Local Government Advisory Committee.
- More than 20 academic institutions represented through the Partnership's Scientific and Technical Advisory Committee.
- Over 60 non-governmental organisations, including businesses, non-profits and advocacy groups, represented through the Citizens Advisory Committee as well as a diverse array of committees, teams and workgroups.

During our long history, a series of written agreements and science-based goals have guided our work, helping our partners track changes in the health of the Chesapeake Bay.

By working together, our partners promote a more complete

understanding of Bay issues and use limited resources more effectively. Our partnership model has been recognised and emulated worldwide.

Through the CBP, leaders and experts from a vast range of groups work across political boundaries to restore the Bay, showing that a cooperative approach is an effective way to achieve environmental results.

Partnerships form the foundation of the CBP because they achieve better environmental results and save time and money, by:

- Bringing together expertise, authority and resources from a broad range of organisations;
- Encouraging involvement among stakeholders;
- Promoting a comprehensive understanding of Bay issues;
- Consolidating and coordinating the efforts of many groups;
- Allowing organisations to complement and learn from each other while avoiding duplication;
- Providing opportunities for collaborative decision and policy making on issues crossing multiple jurisdictional boundaries.

Our science community is a pioneer of numerous cutting-edge scientific efforts that are advancing eco-system restoration in the Bay region and throughout the world. The original scientific study that first identified excess nutrients as the main source of pollution in the Bay was conducted by the EPA with strong support from the Bay states.

Partners and other stakeholders use a suite of computer models that are among the most sophisticated, studied and respected in the world. The models provide a comprehensive view of the Chesapeake eco-system from the depths of the Bay to the upper reaches of the watershed, the land to the air.



Left: Tangier Island in Accomack County, Virginia. Above: Wild rice at Jug Bay Natural Area on the Patuxent River.

The partnership uses Chesapeake Decisions as a guide for the Strategy Review System; a structured process that applies adaptive management to our work toward the Chesapeake Bay Watershed Agreement.

Since our establishment in 1983, the CBP has coordinated efforts to restore the Bay. In that time, our focus on science and partnership has enabled us to bring about a wide variety of measurable improvements in the health of the Bay eco-system.

Here are some of the incredible milestones we've accomplished over the past 37 years:

- Establishing numeric goals and deadlines for environmental restoration was unprecedented when the Bay Program first included them in the 1987 Chesapeake Bay Agreement. The practice has now become a Bay Program hallmark and a common way for restoration programmes across the country to measure progress;
- In the early 1990s, the CBP worked with both EPA and NOAA researchers to establish that airborne nitrogen was a contributor to pollution in the Bay and other estuaries;
- In 2000, CBP partners signed the historic Chesapeake 2000 agreement, which established 102 goals to reduce pollution, restore habitats, protect living resources, promote sound land use practices and engage the public in Bay restoration. At the time, Chesapeake 2000 was considered the most comprehensive large-scale eco-system restoration blueprint in the nation;
- Since Chesapeake 2000, the CBP has been using a mix of short-term and long-term goals in an effort to improve its accountability and accelerate Bay restoration;
- In 2014, CBP partners signed the Chesapeake Bay Watershed Agreement, a landmark agreement that includes 10 interrelated goals and 31 outcomes that work toward advancing the restoration and protection of the Bay, its tributaries and the lands that surround them;
- CBP partners completed the largest oyster restoration project in the world in Harris Creek, on Maryland's Eastern Shore, now home to 351 acres of oyster reefs;
- Based on data submitted by Delaware, Maryland, New York, Pennsylvania, Virginia and West Virginia and the District of Columbia, the CBP partnership fell short for nitrogen, but exceeded its halfway goal for reducing phosphorus and sediment as measured under the current suite of modeling tools;

- While the size of the Chesapeake Bay's no oxygen dead zone varies year to year, scientists have seen a long-term trend of decline in the duration of the dead zone due to the progress the partnership has made in reducing nutrient pollution;
- The Chesapeake region is home to more than 18 million people – as more individuals and organisations direct their time, talents and resources toward protecting the environment, we continue to build a larger and more diverse community of stewards to support our conservation goals;
- In the 2014 Chesapeake Watershed Agreement, the CBP partners adopted a goal to reflect that diversity in our workforce, and particularly in our leadership;
- To help understand and increase engagement, the CBP partners created the 2017 Citizen Stewardship Index, the first comprehensive survey of stewardship actions and attitudes in the Chesapeake Bay watershed;
- According to data from the Maryland and Virginia winter dredge survey, an estimated 371 million blue crabs lived in the Bay in 2018;
- Last year, we saw the largest amount of underwater grasses in the Bay in our three decades of collecting data – an estimated 104,843 acres – surpassing our 2017 restoration target;
- Recently, the CBP partners signed a memorandum of understanding with the Chesapeake Monitoring Cooperative focused on incorporating more citizen science into the partnership's work.
- Restoring the Chesapeake Bay and its 64,000-square-mile watershed is an enormous undertaking. Human population growth over of the past four centuries has taken its toll on the Bay eco-system, resulting in polluted waterways and dwindling natural resources.
- After more than 35 years of restoration efforts, long-term pollution trends from the Bay's major rivers generally appear to be decreasing.
- While that's good news, a clean Bay is the ultimate restoration measure and our partners are working harder than ever to fully restore the estuary.

Discover more about how we've engaged and involved our many partners in helping us work toward a healthier Bay through the Partnership's website at: <http://www.chesapeakebay.net>.

Huge water infrastructure project gears up

On March 14 2019 Watercare, owned by the Auckland City Council, and the Ghella Abergeldie Joint Venture, signed the contract to construct Watercare's Central Interceptor, a \$1.2 billion wastewater tunnel with associated infrastructure.



Construction of Watercare's Central Interceptor started site works in August and the project is expected to be completed by 2025.

This 13-kilometre tunnel is a vital infrastructure project for Auckland and is part of Watercare's wider wastewater long-term infrastructure strategy.

Watercare's chief executive, Raveen Jaduram, says that in older parts of central Auckland, wastewater and stormwater flow into a combined network of pipes. When it rains, stormwater overwhelms these pipes, which are designed to overflow into waterways, and a mix of wastewater and stormwater can flood urban streets.

"The Central Interceptor will run underground from Western Springs to the Mangere Wastewater Treatment, collecting wastewater along the way via link sewers and drop shafts."

While the Central Interceptor is being built, Watercare will deliver further projects in the area such as separating the stormwater and wastewater pipes. The largest of these projects is the Grey Lynn wastewater tunnel which is a two-kilometre extension of the Central Interceptor.

"The Grey Lynn wastewater tunnel has been included in our construction contract with Ghella Abergeldie Joint Venture," says Jaduram.

"Together, the Central Interceptor and our western isthmus projects will reduce overflows in the area by at least 80 percent."

Back in 2005, the company carried out the largest rehabilitation project in our history by removing the oxidation ponds from the Manukau Harbour and upgrading the Mangere Wastewater Treatment Plant to improve the quality of treated wastewater.

More recently, Watercare built a large wastewater tunnel that runs from Parnell to Orakei, referred to as Project Hobson, using the same tunnelling boring technique that will be employed for the Central Interceptor. This allowed the removal of an old sewer that bisected Hobson Bay and reduced overflows.

Jaduram says the Central Interceptor is Watercare's largest project to date: "Because it is a key part of our region-wide wastewater strategy, it was important to find the best company in the world to construct it."

"So after a vigorous tender process we chose Ghella Abergeldie Joint Venture with over 150 years' experience working on major tunnelling and wastewater projects across the globe."

New Zealand's Ghella representative, Francesco Saibene, says: "We have been very impressed with Watercare's process. They kept to the intended timing, were clear with requirements and the evaluation process."

"Plus, the probity measures in place were very robust. One key factor was the extreme dedication and professionalism Watercare has demonstrated on the project. This was an ideal situation for our joint venture, which had an international component that needed those certainties."

Watercare will fully-fund the Central Interceptor using revenue from its water and wastewater service charges on



Front row from left: Abergeldie Executive Chairman Mick Boyle, Ghella Vice President Lorenzo Ghella, Watercare Chair Margaret Devlin, Watercare Chief Executive Raveen Jaduram. Back row from left: Ghella Abergeldie Joint Venture Representative Francesco Saibene, Head of Consular Affairs and Trade for the Italian Embassy in New Zealand Nicola Comi, Auckland Mayor Phil Goff, Federico Ghella, Watercare Executive Programme Director for the Central Interceptor Shayne Cunis.

Auckland’s residents and businesses, infrastructure growth charges, and borrowings.

The project has been included in the Asset Management Plan since at least 2010 and is built into the price path. The Funding Plan projects price increases over the 10-year period to 2028 of an average of 2.5 percent per year for water supply and an average of 3.3 percent per year for wastewater services.

This represents an overall average annual price increase for combined water and wastewater of three percent per year for a typical household.

As Watercare operates on a self-funded model, it doesn’t receive any money from Auckland Council towards this project.

Project update

Watercare’s Central Interceptor executive programme director Shayne Cunis says a 38-metre hydrofraise machine has been excavating an almost 50-metre deep structural support in the ground, known as a Diaphragm wall (D wall): “Five out of 29 panels have been dug, so we’re making good progress,” he says.

“This is a very complex, highly specialised form of construction and we’ve sourced experts from around the world to operate this machinery.”

The hydrofraise cutterheads weigh 36 tonnes and burrow slowly into the ground. Bentonite slurry (fine clay) is pumped into the hole simultaneously.

Once it has reached the required depth, reinforced steel cages are lowered into the trench. Concrete is then pumped to the bottom of the trench to begin filling the D wall around the cages. As the concrete rises in the trench, the bentonite is drawn off.

The desanding plant at the surface separates the bentonite from the spoil and recirculates the bentonite to be used again into the excavation.

The top of the yellow and black hydrofraise crane is visible from Mangere streets bordering the site, whose entrance is in Greenwood Rd. Ghella Abergeldie Joint Venture, the contractor building the Central Interceptor imported the crane from Germany, which is believed to be the largest ever seen in New Zealand – even bigger than the one used to build the City Rail Link.

Preparatory work at another two sites at May Road, Mt Roskill and Keith Hay Park, Hillsborough also began in the new year.

A giant Tunnel Boring Machine (TBM) will be used to construct the Central Interceptor. It was designed in Germany and is currently being assembled in China. It will arrive by boat towards the end of this year.

Fast facts

- Central Interceptor:
 - 13 kilometres long, 4.5 metres in diameter
 - Large capacity: the tunnel can store 200,000 m³ of wastewater which enables Watercare to control the flow rate to the treatment plant
 - Connects to two link sewers, both 2.4 metres in diameter
 - Connects to 16 drop shafts, up to 80 metres deep
 - Connects to one pump station at the Mangere Wastewater Treatment Plant
 - The TBM is expected to progress at a rate of 15-20 metres per day.
- Grey Lynn Tunnel:
 - This will be a two-kilometre-long extension of the Central Interceptor tunnel (15 kilometres total)
 - Included in the construction contract
 - Essentially, 15 per cent more tunnel for the same total project budget.
- Project build from 2019 to 2025.
- Ghella Abergeldie Joint Venture has over 150 years’ experience working on major water and wastewater projects and has successfully completed numerous projects of this scale across the world.



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Flood alleviation and stormwater project

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

In 2018, the first steps in the massive Takanini Integrated Stormwater Solution infrastructure upgrade project delivered the Artillery Drive Tunnel and the Grove Road Box Culvert.

These engineering feats will increase capacity to the stormwater network, reduce flooding and open the way for developing the liveability and appeal of the Papakura-Takanini-Manurewa area in line with the Auckland Unitary Plan.

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

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

Stormwater tunnel

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

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

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

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



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

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

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

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

Above: Infographic representation of Takanini Integrated Stormwater Solution infrastructure upgrade project. Left: The Artillery Drive Stormwater Tunnel. Below: Construction of the Grove Road Box Culvert.

Box culvert

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

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

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

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



Project highlights

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

as the Awakeri wetlands are re-created.

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

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

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

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

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

Wetlands project

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

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

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

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

Hundreds of millennia-old kauri stumps have been uncovered.



Project cost: \$110 million

| | | |
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| STAGE 1: 2018-2020 Construction of 2.3km T-shaped stormwater channel from Grove Road to Cosgrave Road and to Walters Road. | STAGE 2: 2019-2021 Construction of Cosgrave Road culvert. | STAGE 3: 2021-2023 Construction of the remaining channel and structures between Cosgrave Road and Old Wairoa Road. |
|--|---|--|

COMPLETED WORK
 Artillery Drive Tunnel: 1.1 km long and the Grove Road Culvert completed.

Above: Awakeri Wetlands Project is the final piece in this flood alleviation project and another step in enabling development of a new community connecting people to nature.

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

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

You can get a birds-eye view of the size and scale of the first largescale open wetland channel that is being built at: <https://bit.ly/2mvY8ED>

Stormwater 2020

27 – 29 May 2020 | Tauranga

The Water New Zealand Stormwater Group is pleased to announce that the 2020 Stormwater Conference is to be held in Tauranga on 27 – 29 May 2020.

The conference will provide a forum to participate in the industry and share the knowledge, experience, emergent technology and research, which in turn will ensure that we as a collective rise to the challenge of providing the best environmental outcomes for our waterways.

In 2020 the objective of the Stormwater Conference is to provide delegates with an opportunity to:

- Cultivate technical knowledge
- Hear new and cutting-edge stormwater information
- Upskill in various areas of stormwater science and management
- Keep up to date with the latest innovations
- Create business opportunities
- Build their corporate profile
- Network with peers

With a projected attendance of more than 350 attendees, the Stormwater Conference is targeted at the following audiences:

- Regional Council and TLA staff
- Professionals from related disciplines
- Procurement Managers
- Academia
- Infrastructure providers

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stormwaterconference.org.nz

Celebrating a fortuitous and satisfying career

Mary Bell Searle looks back at the life and career of one of Rotorua's most influential waterwaste pioneers.

Joseph Gielen was just four years old when, in 1951, he migrated with his family to New Zealand, switching effortlessly, as he says, from his native Southern Dutch culture to the post British colonial culture of his adoptive country.

"To me, the transition to the New Zealand culture held no trauma of identity crisis," he told *Water*. "This in no small part was due to my parents who, from the outset, were active in speaking English to us all the time."

His father was a coalminer and a devout Catholic, so Joseph and his siblings grew up in the Waikato mining township of Pukemiro, but didn't attend the local school.

"Instead, we walked a kilometre to catch the coal train from Glen Afton to Huntly to attend Saint Anthony's convent school 17 kilometres away," Joseph says.

"Though my parents could ill afford it, I, as their eldest, boarded at Saint Paul's Marist College in Auckland when I was 13 and, in the following two years, caught the bus to attend Saint John's Catholic Marist College in Hamilton – some 45 kilometres there and back each school day."

In 1962, when he was 15, Joseph applied to the New Zealand Defence Force's elite Regular Force Cadet School (RFCS). Less than three percent of applicants were accepted and Joseph was one of the select few.

While in the RFCS, he started a plumbing, drain laying and gas fitting apprenticeship. At 18, he graduated, moving into the Royal NZ Engineers Corps, where he completed a 10,000 hour apprenticeship with One Construction Squadron, located in the Papakura Military Camp.

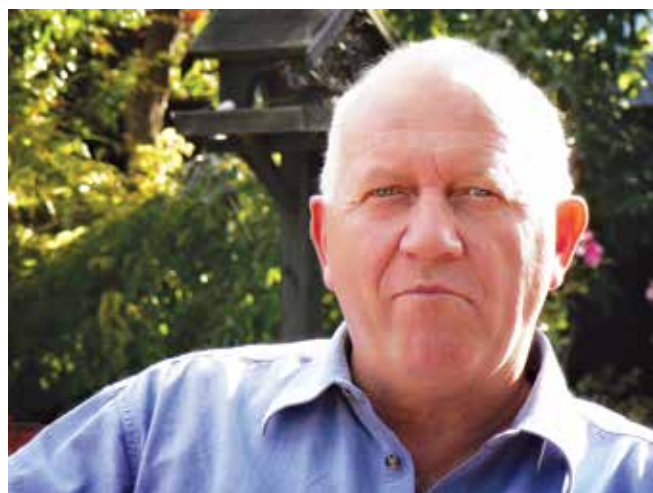
While in the army, he married a "nice local Ngaruawahia lady", he bumped in to while visiting his parents. It was around this time that he developed a passion for wastewater treatment.

"After being made redundant from the closure of Glen Afton Coalmine, my father got a job operating the sewage treatment plant at the Te Rapa air force base and then the Justice Department's one at Waikeria," he says.

"During this time I visited him at work and thought, 'this is a bit of me'."

After leaving the army in January 1971, Joseph got a job as a wastewater treatment plant operator in Waiouru. He began his sewage treatment plant operator training in Trentham through the Ministry of Works.

Back then there were very few municipal treatment plants in



After leaving the army in January 1971, Joseph got a job as a wastewater treatment plant operator in Waiouru. He began his sewage treatment plant operator training in Trentham through the Ministry of Works.

the country but smaller communities were beginning to build them. Rotorua City Council was one.

Historically, the residents of Rotorua discharged their settled septic tank waste directly into the lake's catchment groundwaters and directly into the lake through the city dump on the lake's foreshore's 'sanitary reserve'.

This needed to change, and in 1969 work had begun on the design and building of a new wastewater treatment activated sludge and anaerobic digestion plant.

"I got the position of plant superintendent shortly before it was commissioned in April 1973 and so we moved. I loved Rotorua. My family loved it. It was the right place at the right time," says Joseph.

He says the Rotorua plant was initially developed in three stages.

"As the plant was extended to cope with the growth of the city, I was part of the team giving input to its design and construction,

while also managing the day-to-day staffing and operations."

Around this time, concerns around eutrophication in Lake Rotorua had led to a Waitangi Tribunal hearing, with the council's consultants recommending Bardenpho biological treatment to remove the nitrogen and phosphorus nutrients out of the treated effluent that was being discharged into the lake via the Puarenga stream tributary.

"I got to go on a three-week jaunt around the world to look at existing Bardenpho treatment plants – their design, construction and operation – to help decide which one would suit Rotorua best."

"That international study tour was one of the many highlights in my career," he says gleefully.

"I travelled with council engineer Gordan Roberts, consultant Jim Hodges, and MOW engineer Gordan Fox to gauge the effectiveness of the proposed then state-of-the-art nutrient removal process which was to be a first in our country.

"One of our site visits was to Zimbabwe's sewage works in Harare, which incorporated a less-sophisticated BNR technology with simultaneous nitrification and denitrification," he continues.

"We also went to the Kelowna nutrient removal plant in British Columbia, Canada, which incorporated innovative features, such as pre-fermentation of primary sludge for providing the volatile fatty acids (VFA) required for improved phosphorous removal.

"All these technologies were incorporated into the ultra-modern BNR plant in Rotorua."

Joseph was the treatment plant superintendent for 19 years before being promoted to water and wastewater utilities superintendent in 1992.

As an operator, Joseph says he met many interesting and interested characters.

"These men were mostly trained by the government's water and sewage-wastewater operator training school and subsequent annual training courses run by the ministry.

"We always said, you can take the operator out of their treatment plant but you can't take the treatment plant out of these operators."

Fittingly, he was awarded the William D Hatfield prize in 1990 for his sterling work as the treatment plant operator in Rotorua.

However, Joseph also contributed to the wider industry, and says the operators' cause was central and foremost in the formation of the Sewage Works Managers Institute, of which he served a term as president.

"It was a time of change, organisation and rationalisation. In the 1990s, we amalgamated with various similar groups to become the Water and Wastes Association that has since morphed into Water New Zealand.

"I wanted to help operators become more professional, and I was keen on making the association more accessible to operators."

In 1996 he was made a life member of Water New Zealand. This honour, according to a letter by then-association CEO Murray Gib; "Capped a long period of active but quiet involvement in the organisation's affairs and as the champion of operators everywhere."

A year later he achieved his 5S shovel for his contribution to the industry, something he is still chuffed about.

In the latter part of his career, Joseph was 'kicked upstairs' to look at pollution control and trade waste. From 1993 until his retirement in 2011 he focused on what went into the treatment plant, setting up a database and regulatory regime, with some 1200 businesses to be licenced and educated.

"Looking back after seven years of retirement, I can say that I was a historical part of a giant step in the treatment of Rotorua's sewage waste stream into the environment," he says.

"I've had a very enjoyable working life – I grew along with the technical advances in the industry. It was a fortuitous and very satisfying career."

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Correcting a legacy of coastal mismanagement



Tom Simons-Smith, Dunedin City Council's Coastal Specialist and a professional geomorphologist, explains how his council is reaching out to the community before remedial works start on Dunedin's city coastline.

Dunedin's St. Clair to St. Kilda coastline is a dynamic frontier between the greater South Dunedin area and the South Pacific Ocean.

Only a narrow strip of infrastructure, sand dunes and greenery separates the sea from the low-lying inland area. This strip of land is shaped and impacted by storms that lower the beach by several metres, attack the seawall with strong winds and waves, and erode the sand dunes.

The erosion undermines infrastructure, reduces public access and amenity value. These issues largely have their origins in the decisions made over a century ago when large areas of the beach and sand dunes were drained to create sports fields, a coastal landfill, the St. Clair Esplanade, and other amenities.

The challenge facing Dunedin is deciding what exactly should be done with this inherited landscape. In recent decades, the management approach at St. Clair and St. Kilda has been reactive and dominated by short-term maintenance of coastal

infrastructure and the sand dunes.

This approach has led to more rock being placed on the beach to protect the sea wall, a significant reno-mattress buried in front of the sand dunes, and a 200 metre geotextile sand-filled structure installed to the east of the St. Clair sea wall.

These actions have addressed immediate issues, but have pushed the coastline further seaward and led to infrastructure being more heavily impacted by coastal processes. With rising seas and increasingly frequent coastal storms, we can expect the coastal frontage of St. Clair and St. Kilda to face further challenges.

The challenge

There are many reasons why local authorities slide into a reactive space, particularly when it comes to coastal management. For instance, a lack of resources can constrain our ability to be forward-thinking. Equally, incomplete understandings of coastal

processes and 'climate change' can make it difficult to make cost-effective short-term actions that transition well into the future.

Proactive coastal management requires an element of risk taking and a strong understanding of what matters most to our communities. What defines coastal management outcomes as 'good' is variable and highly dependent on the individual.

This has been one of Dunedin City Council's (DCC) critical management errors, albeit without them knowing it. A council or any group cannot expect to deliver good coastal management in complex and integrated systems if they lack an understanding of what people truly want.

Compounding these challenges are those that lie inland, in ageing water infrastructure, a high groundwater table and communities with low socioeconomic status.

Overcoming these challenges and avoiding deferring to the next generation requires long-term thinking and a different approach to decision making.

Transitioning to a proactive approach

Many of the obstacles faced by the coastline can be overcome with a long-term plan that considers the processes shaping the whole system along the coast and moves beyond simply responding with temporary fixes.

If we don't make a start now, we will continue to spend money on reactive maintenance: money that would be better invested in laying a foundation for a more sustainable coastline. The community needs a vision for the coast that can be incrementally implemented and is affordable and attainable.

It should be a vision shaped with the community that maintains enough of what the community values, and introduces opportunities for new amenities, safe access, and maintains or improves the natural character of this extraordinary coastline.

Coastal management practitioners understand how to take an adaptive approach to long-term coastal planning, but this is not common practice for councils and it can be hard for communities to understand.

The coastal plan must be flexible, avoid the mistakes of the past and create a more resilient coastline predominantly of natural character. This approach allows the council and the community to change course when necessary, but with a clear understanding of why and how change will be managed.

We are fortunate for having a community that is passionate about our coast and wants to see it thrive. Much of the land along the coast is owned by the DCC, so we have fewer constraints and more opportunities than others.

The DCC is investing in an open and transparent programme of engagement with a diverse range of people who value the coast or might be affected by any future plans.

Founded on the principles of the International Association of Public Participation, and guided by Ministry for Environment's coastal hazard and climate change guidance the engagement programme starts in March 2020.

This engagement will help create the vision and priorities for the coast. After that, there will be opportunities for our community to consider and give feedback on different options for achieving the vision for the coast over time.

The goal is that the council will be able to approve the resulting plan within the next 12 months.

Hydrological versus meteorological drought

When is a drought not a drought? When it's a hydrological drought instead of a meteorological drought.

Confused? You're not alone, but a Northland Regional Council scientist and her manager are investigating the differences between – and local implications of – the two drought types in Northland.

Hoa Pham, council's Resource Scientist – Surface Water, with the support of her manager, Natural Resources Science manager Jean-Charles Perquin, has recently written an article on the issue for the New Zealand Hydrological Society and presented her finding at the society's December conference in Rotorua.

Pham says in very broad terms, the simplest explanation of meteorological drought is what most people understand a drought to be – a lack of rain over a reasonably long time makes things noticeably dry.

"It's pretty easy to measure low rainfall and for how long this has been going on."

But hydrological drought is arguably more complex and is what happens to the region's actual hydrological processes; its rivers, lakes, reservoirs and groundwater, especially over the longer-term.

In some cases, the impacts of meteorological drought are still effectively impacting on local stream flows – which can remain lower than usual – more than a year after the rain comes again and a drought appears to be well and truly over.

The duo is currently investigating the relationship between the two types of drought, including the historical impacts (including severity) of meteorological droughts, their influence on stream flows and how these can be used to model current and future impacts.

Pham says with Northland experiencing a number of droughts in recent years, their research is expected to provide valuable and useful information, noting that over the period studied for the presentation (July 2018-June 2019) the amount of water in some Northland streams had reduced 'dramatically'.

Figures released by the NRC in October showed Mid and Far North areas had typically received a third to 40 percent less rain than usual over the past 12 months.

The problem had been made worse by consecutive dry periods leading up to winter last year.

In the first six months of 2019 Kerikeri and Whangarei were the driest they'd been in more than 80 years (since 1935 and 1937 respectively) and the situation hasn't really improved since then, with lower than average rainfall through winter.



Hoa Pham (right), Northland Regional Council's Resource Scientist – Surface Water, with the support of her manager, Natural Resources Science manager Jean-Charles Perquin, has recently written an article on the issue for the New Zealand Hydrological Society and presented her finding at the society's December conference in Rotorua.

Jean-Charles Perquin says river and rainfall data is available on the regional council's website via: www.nrc.govt.nz/riversandrain

Water restrictions for public water supplies operated by Northland's three district councils are available at www.bewaterwise.org.nz

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Historical groundwater survey anomaly

Survey datum recorded between 1987 and 1991, which was used in groundwater assessments and recent allocation modelling, has proved inaccurate for the NRC.

Work undertaken by the Northland Regional Council (NRC) has revealed inaccuracies in bore survey data used to assess the Aupouri aquifer and set allocation limits to prevent saltwater intrusion into its northern parts.

The NRC's acting CEO Bruce Howse says water levels in north-eastern parts of the aquifer may be up to 2.5 metres lower than thought, but conversely up to 1.8 metres higher in north-western parts.

The issue came to light recently when regional council staff were undertaking preliminary surveys of bores to establish 'trigger' levels for resource consents in parts of the aquifer south of Houhora.

The bore datum was also used to assess the effects of 24 current consent applications by Far North avocado growers seeking groundwater from the aquifer.

"In a nutshell, this discovery potentially means there's less water available in the north-eastern part of the aquifer than previously thought, although there may actually be more available on the northern-western side."

Remodelling based on the new bore datums would be required to understand the full impact of the newly-surveyed datum levels.

The council had already allocated roughly half of the water previously presumed to be available in the aquifer's Houhora

subzone, but to date monitoring indicated the existing use was sustainable.

"This potentially means the allocation limit for the northern subzones near Houhora needs to be reduced."

He says 17 new consents were granted by the Environment Court in July 2019 year to take an additional two million cubic metres of water annually from the aquifer.

Those consents are located south of the key area of concern and have stringent conditions requiring monitoring bores located near the coast and further inland.

"There are also trigger levels to be set under the consents to avoid saltwater intrusion; essentially where salty water moves further inland and mixes with freshwater in the aquifer."

Initial indications by checking all Aupouri monitoring bores datums against new LIDAR levels indicated differences ranging from 2.5 metres lower to 1.8 metres higher.

However, the key bore in the Houhora waterfront bore has the biggest negative difference and consequently has an increased risk of saltwater intrusion.

After an independent survey of all monitoring bores used to manage the Aupouri aquifer, the council will need to review current allocation limits as set out under its Proposed Regional Plan.

Aupouri Water storage field trip.



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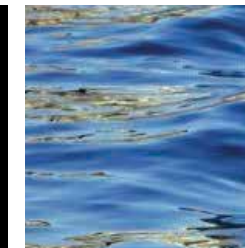


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Sea rise

– lessons from the past

A new Great Barrier Reef study shows how the reef copes with rapid sea-level rises and other environmental stresses by studying three distinct growth phases over the past 9000 years, in the belief that understanding the reef's past will help us predict its future.

The study, which has upended the established model of Holocene-era reef growth, was conducted by the University of Sydney's research station on One Tree Island, in collaboration with scientists from the University of Queensland, Australia; University of Granada, Spain; Nagoya University, Japan; Queensland University of Technology, Australia; University of Tokyo, Japan; and Akita University, Japan.

Using unprecedented analysis of 12 new drilled reef cores with data from more than 8000 years ago, the study shows that there have been three distinct phases of reef growth since the end of the Pleistocene era 11,000 years ago.

"We wanted to understand past reef resilience to multiple environmental stresses during the formation of the modern reef," says lead author Kelsey Sanborn, a PhD student in the School of Geosciences at the University of Sydney.

The study, published in *Sedimentary Geology*, revealed a period between 8000 and 7000 years ago when the reef growth slowed as it was exposed to multiple stresses, including likely increases in sediment and nutrient flux on the reef.

As the ice caps and glaciers melted at the beginning of the

Holocene era, sea level rapidly rose by up to seven metres every thousand years, flooding the continental shelf until about 7000 years ago.

At the same time, it is estimated sea-surface temperatures likely increased several degrees between 8000 and 6000 years ago.

"We are fortunate that the sea level stabilised about 6000 to 7000 years ago. If it had continued to rise as fast as it had been, the reef might not have survived given its slow growth rate," says Sanborn.

Associate Professor Jody Webster, a co-author of the paper and Sanborn's supervisor, says that there are multiple environmental drivers affecting both the historic and modern reef system. "We need to understand the past in order to predict the future."

"This paper and Kelsey's broader research examine how sea level, surface temperature, sediment in the water, nutrient influx and energy inputs into the reef system affect its vulnerability to environmental change," he says.

"The reef system survives because of a delicate balance of these environmental factors. Anthropogenic climate change is threatening to interfere with this balance."



The study shows that there have been three distinct phases of reef growth since the end of the Pleistocene era 11,000 years ago.



Opposite: One Tree Island on the southern Great Barrier Reef. Top: Reef cross section. Above left: Kelsey Sanborn, PhD student in the School of Geosciences at the University of Sydney. Above right: Associate Professor Jody Webster, a co-author of the paper and Kelsey Sanborn's supervisor.

Three phases of growth

Between 1000 and 700 years after the continental shelf was flooded, corals started to grow, rebuilding the reef after a 100,000-year hiatus.

Up to about 8000 years ago, the first corals to grow around One Tree Island were mostly shallow, clear-water and fast-growing, with a vertical reef growth of about six millimetres a year. Between 8000 and 7000 years ago, reef growth slowed as waters continued to rise quickly. Temperatures rose and the quality of the water also changed in this period with an increase in sediment and nutrients.

The types of corals were massive in form, sediment-tolerant and growth was deeper, at times up to five metres below sea level. A slow-down and stabilisation of sea-level rise led to a fast (five millimetres a year) vertical growth until the reef caught up to current sea levels about 6000 years ago. Growth in this period was mostly composed of shallow, branching coral assemblages.

New model of reef growth

A surprising result of the research is evidence that initial reef growth occurred on the low-energy, leeward side of the reef, ahead of growth on the high-energy, windward side.

"This is contrary to established models of reef growth," says Sanborn.

"In those models, the part of the reef exposed to higher energy inputs from waves and wind were thought to have been cleared of land-based ecosystems, clearing the way for reef development."

The paper proposes a new model that needs further testing in other regions of the Great Barrier Reef and reef systems around the world.

What it establishes is that the more protected parts of the reef might have been more suitable for early coral development.

"This provides new constraints on how we understand changes in the environment controlling reef development through sea-level rise and inundation," says Sanborn.

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Good water work in the Pacific

Denise Landow reflects on 18 years' front-line service as an ESR scientist on toilet and hygiene work in the Pacific.

Going to the loo in New Zealand is something we don't give a second thought – but when disaster strikes and there's no water – it's a different story and it's not pretty.

For millions of our neighbours in the Pacific region, this is their daily reality. Not having proper toilet and hand washing facilities directly impacts on infants, communities and takes a significant toll on national well-being.

Globally it's estimated that approximately 4.2 billion people don't have access to safely managed sanitation facilities; and three billion more lack access to basic handwashing facilities.

New Zealand's Institute of Environmental Science and Research, ESR, has quietly built an internationally respected reputation in the field of water and sanitation in the Pacific over the past two decades.

ESR is a partner of NZ Aid and has supported development of strategic frameworks for national-level water, sanitation and hygiene activities. ESR's scientists have been active helping some of the poorest villages in the Pacific region.

Work started out with water supply issues, but now it covers a significant range of environmental and public health issues.

Christchurch-based scientists, Matt Ashworth and Jan

Gregor, spend most of their working lives in both remote Pacific villages and government corridors doing important work to help communities achieve better standards of hygiene.

“Our role is often not visible because we work behind the scenes providing technical and scientific advice to country representatives or as facilitators of regional and country level meetings and development processes,” says Matt.

He and Jan see first-hand the harm done to children due to the lack of clean water.

“At the individual level, early and ongoing exposure to unsanitary environmental conditions caused by inadequate or absent sanitation facilities and knowledge can cause a range of both acute and chronic conditions which impact children for the rest of their lives,” he says.

Such conditions include GI-tract infection, protozoan parasite infestation and disease, and environmental enteropathy (diseases of the small intestine) leading to childhood stunting.

“The burden of ongoing exposure to this by a population may lead to poor school attendance and to lower domestic and economic productivity because of the inability to work because of illness.”



Opposite: Kiribati – the region is working towards changes but there's still a long way to go to create safe and sanitary environments for children and adults alike.
Left: Raised ventilated improved pit (VIP) latrines at a school in Guadalcanal, Solomon Islands. Below: Tippy taps for improving access to hand washing facilities in Guadalcanal, Solomon Islands.



Matt and Jan love their work because they're able to respond and produce positive impacts in areas where there's clear and glaring need.

They're at the forefront of helping people and communities work toward creating safe and resilient water sanitation sectors, particularly in a region so negatively impacted by climate change.

“On the ground, it's great to work with people and partner agencies in collaborative and constructive ways to bring about change that benefits the health and wellbeing of entire communities, while recognising the importance of equitable access for everyone,” he says.

“To undertake work which strives to deliver on sustainable development goals is a tremendous privilege – as well as a tremendous challenge that Jan and I can only do with the support of ESR.”

Some of the biggest issues facing Pacific populations today are climate change, access to safe water and sanitation. There's also a gap developing between the funding available and the lack of people able to support the rate of growth that is needed to keep up, he says.

There are no quick fixes.

“We have 10 years until the end of the UN Sustainable Development Goals period. To look ahead a decade and imagine a Pacific region that ensures sustainability and availability of safely managed water and sanitation would be to dream of great things,” Matt says.

“Without a doubt, the work needs to continue, especially because we must continue developing responses and mitigations to the increasing impacts of climate change on the region.”

ESR's work has reached out across the majority of Pacific Islands, as well as New Zealand.

The organisation provides technical and scientific support to the Water Hygiene and Sanitation Programme (WASH) in Schools, led by UNICEF in Vanuatu.

Matt and Jan simplified governance structures for WASH development, reduced the burden of decision making on school principals, and encouraged national-level coordination between government ministries to be circulated to provincial government and led at local levels.

Matt says that in the Solomon Islands he and Jan provide technical advice for the WASH project in schools via UNICEF, and develop training materials for provincial staff to support schools to establish WASH improvement plans.

Topics cover the selection of the best sanitation facilities for environmental and cultural settings; and developing climate change resilient water and sanitation systems for schools and communities.

This includes producing plans and working to create equitable hygienic environments, for instance, ensuring



ESR Scientist Matt Ashworth working with key stakeholders in a rural school, Guadalcanal, Solomon Islands.

facilities meet the needs of girls and boys and those with disabilities and impairments, as well as communities that are disadvantaged by location or income.

It also ensures girls are able to attend school during their periods because appropriate facilities are available for changing of pads and washing.

Their work includes the wider education of girls, boys and staff so that menstrual hygiene management is understood.

“Our scientific experience allows us to develop effective monitoring and evaluation processes that help track progress of projects,” says Matt.

“ESR’s repository of environmental and public health and social science expertise allows us to provide a balanced and fit-for-purpose approach that works from the highest national levels and filters through to communities.

“More importantly it allows us to demonstrate successful projects and approaches and identify those areas that aren’t delivering as intended.

“We can modify approaches to achieve improved health outcomes for the communities and the country as a whole.”

Access to safe and secure water, sanitation and hygiene facilities and practices are basic essentials of life, he adds.

Along with the UN’s sustainable development goals and human rights conventions, there is also a specific UN Resolution A/RES/64/292 (2010) that recognises the right to safe and clean drinking water and sanitation as a human right that is essential for the full enjoyment of life.

Establishing access to safe and secure water, sanitation and

hygiene resources is of critical importance for many Pacific Island nations.

It’s a fundamental right we take for granted in New Zealand, but the daily reality for many of our Pacific neighbours, is drastically different from our own.

As scientists, the scope for pure research is limited, but ESR has had some success in applied research projects in Kiribati that have looked at the use of coral sands as filter materials for removal of water-borne pathogens.

The study has been taken further in Vanuatu.

“We want to scale up this research and have a pilot project for wastewater management,” says Matt.

“Additional work has been funded using ESR’s internal capability development fund to look at using the same coral sand for removal of chemicals associated with physical and neurological/cognitive development impairment.”

Other scientists and regional partner organisations are watching closely. There’s been interest in the research and ESR has presented findings at international conferences and submitted papers to international peer-reviewed science journals.

ESR works with international and regional agencies; these include the World Health Organization (WHO), United Nations Children’s Fund (UNICEF), United Nations Development Programme (UNDP), and The Pacific Community (SPC).

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New bills and legislation for water sector



By Helen Atkins, Director and Tom Gray, Solicitor, Atkins Holm Majurey.

The recent legal developments in the water sector have largely been the slew of legislation proposed in recent months. The entire Resource Management system is currently under review and water appears to be a significant focus of the reform.

The Resource Management Reform's *Issues and Options* paper was released for public consultation, as was the Urban Development Bill, Infrastructure and Funding Bill, and Taumata Arowai Water Services Regulator Bill.

These make up a cumulative push for more water security and a focus on increased freshwater quality amidst one of our worst droughts.

Resource Management reform Issues and Options paper

Last July the Government announced the review of the resource management system, with a focus on the *Resource Management Act 1991*. The Resource Management Review Panel, chaired by retired Appeal Court Judge, Tony Randerson QC, is tasked with producing reform proposals by mid-2020.

The *Issues and Options* paper was released in November 2019 and the panel sought comments until 3 February 2020. Its purpose is to highlight issues that can be addressed by the review of the resource management system.

The paper first covers what a reform of the resource management system could look like and why it's needed. Then it outlines 14 key issues in reforming the system. These issues range from the legislative architecture, planning, policy, and compliance to climate change, allocation and national direction.

The panel is currently processing all of the feedback received from the paper, including a submission made on behalf of Water New Zealand (WNZ). The next key date for the reform is 31 May 2020, when a final report will be delivered to the Minister of the Environment.

From here the Government will conduct its own engagement with stakeholders before considering any next steps. Changes to the system will require legislative change, which will be open to public scrutiny.

Urban Development Bill

The *Urban Development Bill* follows on from the *Kainga Ora - Homes and Communities Bill* (now an Act), which disestablished Housing New Zealand and set up a Crown entity - Kainga Ora.

The *Urban Development Bill* seeks to provide Kainga Ora with powers to improve the social and economic performance of our urban areas through complex development projects.

The Bill will enable Kainga Ora to facilitate specified development projects (SDPs) to improve urban development outcomes through a mix of housing types, transport connections, employment and business opportunities, infrastructure, community facilities and green spaces.

The provision of drinking, waste, and storm waters is a key aspect of the Bill's purpose. However, the Bill does not specifically provide for the input from water service providers upon whom the ultimate responsibility for water provision falls.

Local authorities and stakeholders are required to be engaged as part of Kainga Ora's assessment. Key stakeholders include owners and operators of nationally significant infrastructure and other infrastructure operators as identified by Kainga Ora.

Nationally significant infrastructure includes state highways, electricity transmission and generation, gas transmission, the refinery pipeline, rail network, airports and ports, but does not cover water and wastewater.

WNZ raised this issue, along with others, in its submission on the Bill.

Infrastructure Funding and Financing Bill

The *Infrastructure Funding and Financing Bill* intends to provide a financial model that can work for the spending constraints of local governments, whilst supporting infrastructure for housing, urban development and functioning urban land markets.

The Bill enables companies, limited partnerships, Crown entities, or other persons to be a Special Purpose Vehicle (SPV).

An SPV can be responsible for both financing and construction of the infrastructure assets, and can service the finance raised to cover the costs of the infrastructure via a multi-year levy. The SPV would have the ability to construct, place, and maintain water services infrastructure on roads and public areas amongst other powers.

The levy applies to a geographic area of land, which will be

identified within each levy order, and is paid by the person that is liable to pay the rates on a property.

Taumata Arowai Water Services Regulator Bill

The *Taumata Arowai - Water Services Regulator Bill* intends to implement the Government's decision to create a new regulatory body, to administer, and enforce a new drinking water regulatory system. This comes after the deadly Havelock North campylobacter outbreak and subsequent enquiry.

The primary goal of the Regulator will be to ensure everyone is provided with safe drinking-water.

In the development of this Bill there was engagement with local governments, the water specialist sector and stakeholders. It comes as part of a reform aiming to take full effect in 2021.

The Bill will establish the Water Services Regulator (Taumata Arowai) as a new Crown agent and provide for its objectives, functions, and operating principles. It will also provide for its governance arrangements, including the establishment of a board and Maori Advisory Group.

This standalone Crown entity will have an organisational structure with a sole focus on drinking water quality. Crown agents are statutory Crown entities that are required to give effect to government policy directions but they are at arms-length from the political decision making processes.

Local Government Minister, Nania Mahuta, who is leading the cross-agency Three Waters Review, added that a complementary Bill to enact the Regulator's detailed functions and enforcement powers will be introduced in early 2020. It is still being worked on by officials and will be known as the *Water Services Bill*.

This Bill complements the regulator legislation to implement the system-wide reforms to the regulation of drinking water and source water and targeted reforms to improve regulation and performance of wastewater and stormwater networks.

Public submissions for this Bill closed on 4 March.

From an operational point of view the interim chief executive of Taumata Arowai has been announced as Bill Bayfield. Bill is currently the chief executive of Environment Canterbury, he is an experienced chief executive who has worked in both central and local government. As such he has a sound understanding of drinking water and environmental regulation. Bill will report to the Taumata Arowai Establishment Board by mid-2020.

The chief executive will lead the establishment of Taumata Arowai and its first six months of 'going live' in 2021 as the new drinking water regulator. The Taumata Arowai board will consider a permanent appointment for 2022 and beyond.

Watch this space for updates over the coming months.

All submissions made by WNZ mentioned in this article are available on the website.

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Cleaning up the Pomahaka River

The New Zealand Landcare Trust has been doing good work in developing water improvement programmes to improve river water quality. By Hannah Blake, NZ Landcare Trust communications manager.

Nostalgia kick-started it all for Lloyd McCall of the Pomahaka Water Care Group. All he wanted was for his grandchildren to be able to swim and splash in the family swimming hole, just as he and previous generations had.

But it wasn't to be, because the family swimming hole was off limits. The Pomahaka River that weaves through the lush countryside of West Otago suffered from bacterial contamination, high sediment loads, and excess nutrient runoff.

Fortunately, the NZ Landcare Trust instigated a catchment project with farmers and landowners around the river and worked with the Pomahaka Water Care Group (PWCG), which was formed in 2013.

"We have about 158 members of the PWCG, and it's great that we have got to the point where water quality is on the agenda when you have a yarn at the pub," says Lloyd McCall.

"It wasn't always that way," he adds, recollecting his first meeting with the NZ Landcare Trust.

"At the start, it almost seemed overwhelming. Once we had seen graphs from the Otago Regional Council showing the acceptable level of water quality for swimming, and we were well below it, that is when it started to get real and we knew we needed to act.

"I went to the regional council and just started looking at anything I could. We started pulling people together to get things rolling and working with the Trust.

"Now, it's more about keeping it going and continuing to make sure people understand the weight of it all.

"It's like peer pressure – positive peer pressure – and it's working.

"It is rewarding work, but it is one hell of a project. When we get those good results though, that is what makes it worth it."

The group has just completed the renowned Pathway to Pomahaka project, designed to improve the Pomahaka River by

promoting good management practices and connecting farmers with industry bodies.

Outcomes included water quality improvement, heightened awareness for what had been achieved, and what was still needed to be worked on for the long term.

And, through this project, Pomahaka Water Care Group was created and ultimately grew a national reputation for its work.

Its Pathway project received great coverage across the country and was awarded *The River Story Award* in the *New Zealand River Awards*, run by Cawthron and set up to draw attention to the state of our rivers, and recognise communities, councils, farmers and industry achievements in improving the quality in local rivers.

Following this, further funding was secured to continue work in the catchment and to set up the Pomahaka Catchment Project. That has allowed NZ Landcare Trust's regional coordinator for Otago, Craig Simpson, to be contracted on a part-time basis to coordinate the project, with McCall moving from chair of the PWCG to its official project manager.

A key issue along the way was that the river contained high amounts of *E. coli* and other bacteria that may indicate faecal contamination from the surrounding farmland.

NZ Landcare Trust has a partnership with IDEXX, which specialises in providing water microbiological diagnostic tests as well as animal health and dairy testing.

Recently, group members came together to learn how to do their own bacterial testing using the IDEXX monitoring kit. This allows the group to set up their own testing to better identify contaminated water and helps guide farmers to identify where they need to focus their attention.

"The monitoring kit makes a big difference," says Craig Simpson.

Lessons gained from the Pomahaka work are many and

varied, he adds. Some are simple, such as knowing that a farmer-led approach works well. Another is that these projects need coordination and independent organisations such as the NZ Landcare Trust to keep things moving along.

"The Pomahaka project's approach is really moving beyond compliance; that's one of the findings from our surveys – it's not about compliance.

"It's about achieving agreed values, and what McCall says about his grandchildren provides an important vision.

"Our current project is looking at many new things that build on previous work, but a couple of key themes keep coming out, such as: How do we reduce contaminants in water runoff?

"What are cost-effective ways to do this? And investigating mitigation measures to improve water quality."

Craig looks back on the multi-project history so far and sees a positive legacy.

"The evolution of this project, and the thinking behind it, has been amazing to be part of.

"Members are working hard to gather their own information on water quality and then bring it all together so everyone can learn from it.

"They are spreading their knowledge wider now, working with schools and community, and taking it back to the grassroots."

While there are still a number of questions unanswered, Craig adds, being able to use technology such as IDEXX's Colilert Test for monitoring means the PWCG has the ability to look for those

NZ Landcare Trust is an independent, non-government, not-for-profit organisation that works with landowners, farmers, community environment groups, and agencies to improve land and water sustainability throughout the country.

This is done through action on the ground, community education, and collaboration. You can find out more at: www.landcare.org.nz.

IDEXX is a specialty diagnostics company that produces a range of microbial diagnostic solutions used in the water industry including the Colilert Test, an MPN-based liquid method that uses bacterial-enzyme technology to specifically detect and quantify total coliforms and *E. coli*.

The test is recognised as a gold reference standard for drinking water testing in New Zealand and can be used in a wide variety of matrices.

More information: www.idexx.co.nz/en-nz/water.

answers and get test results the next day.

"The plan for the upcoming summer is to test local swimming holes each week and provide information to the community, which ties in nicely with the group's vision too," he says.

"Our aim is for the Pomahaka River to be recognised as having the absolute highest water quality so that future generations can enjoy the river as we have."



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Re-building a community

When the Rangitaiki River stopbank breached in April 2017 it caused extensive flooding to the town of Edgumbe damaging property and infrastructure.

The Edgumbe College Road – Breach Site Stop Bank project, was a high priority for the Bay of Plenty Regional Council (BOPRC) to make the town safe from further destructive flooding.

Whakatane-based Waiotahi Contractors was given this task. This contractor had the skilled staff, the plant and equipment, and owned a quarry for supply of materials. Above all, BOPRC was looking for a team of people who could work with sensitivity within the broken community where many residents had lost their homes.

Working beside a river with the constant threat of rain both rising the river level and affecting the fill material – this project required engineering skill, agility and clever planning. Work started on March 23, 2018, with a completion date of November 21 that year.

Waiotahi worked in collaboration with consulting engineers GHD and the BOPRC to get the job done to specified standards and engagement with locals to lessen the disruption for an already traumatised community.

Added complications were that the two dams up-river (Aniwhenua and Matahina) let water out every afternoon to generate electricity which raised the river level. The stopbank

job had to be carefully staged, opening up no more than 50 metres at any one time to enable quick closure if flooding was anticipated.

All machinery had to be carefully placed at times of river level increase while also working in confined spaces, constrained between the river side and the road side. The ground conditions were challenging, with saturated spoil and debris from the original stopbank.

Work took place at College Road, Edgumbe, the main road in this small Bay of Plenty town, that sits alongside the Rangitaiki River. The road features residential housing, two schools, businesses and sportsgrounds, and adjoins SH1 at its southern end.

Planning and control

Engineering aspects of the project included: Stopbank construction earthworks; ground improvement works; road construction; and drainage systems.

A contract-specific Environmental Management Plan (EMP) addressed erosion and sediment controls, dust management, reduction of noise, management of fuels and oil, waste management, stakeholder management, accidental

artefact discovery, auditing, and silt and dewatering.

A GHD Consulting engineer was needed on site almost full time to sign off earthworks hold points during the stopbank construction phase of the works.

The project manager developed the construction programme and made updates throughout the works. As the job held many unknowns and complexities, he was constantly assessing where the team could work smarter and gain some time. It was essential that everything worked like clockwork to take advantage of the suitable fill material when it was available.

Physical works – the risks

Rain posed the main risk. The potential for the river level to rise again while the stopbank was being excavated and rebuilt was ever-present.

Once sections of the ground were opened up there was the risk that machinery could get stuck and sections were at risk of giving way. The area was also built on a clay layer, making it susceptible to vibration.

Part of the scope was the removal of 420 lineal metres of asbestos water pipe – this was handled by specialist contractor Shane Moore Services.

The project took place within a residential area, with

two schools on College Road. Waiotahi had to maintain safe access for residents to their houses and enable school children to safely access the schools each day.

It was essential that this stopbank never failed and the town could feel safe again. Quality control and daily testing were key to determining success in this area.

Waiotahi's project manager worked with GHD, making sure they had a weekly programme for site visits. Every day new plans had to be made in response to the expected weather, and the available fill conditions. In addition, because local interest was high, staff gave people visiting the site special attention and time.

Over the 10 months of delivery, the team experienced all weather conditions. Working in close proximity to the Rangitaiki River posed the risk of drowning, so all machine operators were required to wear inflatable life jackets.

Four king tides throughout the project meant dealing with exceptionally higher than normal river levels and planning works accordingly.

A decision by the engineer to remove the entire old stopbank, and construct a new one, had the potential to extend the programme. So, teams worked 'smarter', taking advantage of times when the weather was good which sometimes meant seven-day working weeks.

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Construction

Planning and programming were complex. More constraints were added to the project when the engineer decided to limit the working area for stopbank works from a full open site to sections of 50 metres at a time.

Quality and the associated checks were a major part of the project with a stringent testing routine in place. Working within a 50-metre section at a time on the stopbank, materials were quality tested six times per sample, and density checks taken every 200mm. Every 10 lineal metres the layer below had to be re-checked.

A qualified engineer was on site at all times, with nuclear densometer testing undertaken by Opus Rotorua lab in the mornings and Opus Tauranga lab in the afternoons working in a ‘tag team’ to keep up with construction.

To mitigate the risk of working in a residential area while managing multiple large truck and machinery movements, the site was fully fenced with a one-way traffic movement system in place. If a visitor came to the site, the procedure was ‘bucket down’ at all times.

Waiotahi used local Edgcumbe businesses wherever possible. Beulah Concrete Services worked on the footpaths, vehicle crossing works and concrete supply – work which equated to eight percent of the total contract value.

Peppers Building Supplies provided the timber for boxing and framing, paint and cement. RD1 supplied pipefitting and hand tools.

And, at every opportunity, contractors bought food at the local College Road Bakehouse.

External relationships

It was important that the community and public were involved with the project wherever possible as work took place within the residential community.

Contact with residents occurred several times a day. The site team knew the homeowners by name and where they lived. They talked with those whose homes had been demolished.

Concerned that the local Bakehouse would lose business due to being located on the closed road, Waiotahi encouraged its team and the truck drivers to buy their lunches there. The firm held its site meetings at the shop and, when targets were met, celebrated with doughnuts purchased from the store.

Contractors retrieved a section of the old stopbank featuring an eel mural. This, and a section of stopbank discovered in the shape of a heart, were both placed in the reserve area as a memorial.

When the footpaths were constructed through the reserve section, the numbers of the houses which had been permanently removed were stamped in the kerbs as a remembrance of where they had been. This was done by the previous house owners and was a very moving occasion.

Many local residents shared with staff their traumatic escape stories; some having had barely minutes to get out of their homes.

Team culture

The area worst affected by the breach of the stopbank was between house numbers 2-68 College Road and 16-18 Rata



Ave. Houses in these areas were so badly damaged that they had to be demolished. The land was then purchased by the BOPRC to make this a reserve area as a memorial for future generations to remember what had happened that day.

Several of the residents still living in College Road and adjacent to the works were disabled, for example two in wheelchairs, and a blind person. The contractors made it a priority to ensure they, in particular, were not inconvenienced by the works.

Waiotahi staff were encouraged to help residents wherever they could. They moved residents’ wheelie bins out for collection when the road was closed, built a gravel pathway to replace a muddy path so a blind resident could safely access the road from their property, and built a ramp for one resident and her wheelchair.

Client satisfaction

The project contained three parts: excavate and remove the existing stopbank; re-build a new stopbank; and reinstate new services and build a new alignment of College Road.

There were two major increases in scope which, through collaboration with BOPRC, Waiotahi managed to incorporate without an increase in budget or in the time it took to complete.

This project was of high importance to BOPRC as part of its wider flood remediation and repair works, and the highest priority in terms of risk and mitigating further damage, and to further add to the recovery for the town of Edgcumbe.

BOPRC engineering team leader Peter Hay says: “Council knew that residents would need an extraordinary level of

Above: Edgcumbe Stopbank completed works. The project contained three parts: excavate and remove the existing stopbank; re-build a new stopbank; and reinstate new services and build a new alignment of College Road.

communication from our contractors; and that’s what Waiotahi delivered.

“In addition to the usual letterbox drops notifying homeowners of the impact of scheduled work, Waiotahi staff identified those residents who needed an even higher level of interaction.

“For some, this looked like one-on-one, at times, daily briefings in addition to other measures the wider council staff were using to support affected residents.

“We know that community engagement is a necessary aspect of modern engineering practice, but the degree to which Waiotahi staff sensitively included this in the delivery of the College Road contract was a leading example.”

A satisfied BOPRC says Waiotahi was the ideal contractor for the work, being Whakatane-based, owning extensive plant and materials, owning two quarries, and being available with skilled staff, with a reputation for working openly with clients.

The Edgcumbe stopbank project also led to the Omeheu Stopbank project being awarded to Waiotahi by the council.

Waiotahi Contractors entered the project into the CCNZ/Hirepool Excellence Awards 2019 under ‘Category 1B’ for projects with a value of less than \$5 million. This article is based on the original award entry.



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Lake depth sewer pipeline – lessons from Austria

Lake pressure pipelines for wastewater have been built in several lakes in Austria since the beginning of the 1970s.

Lake Fuschl is located in the state of Salzburg and a PE sewer pipeline has been in operation on the lakebed since 1975. However, with its service life of 50 years expiring it was replaced with a parallel 4200 metre-long sewage pressure pipeline, that serves as a reserve line that can be put into operation in the event of a problem with the old line.

AGRU Kunststofftechnik supplied the components for the new lake pressure pipeline with a new stress resistant high-tech plastic called PE 100-RC.

This pipeline will cross the entire length of the crystal-clear alpine lake with drinking water and transport the wastewater of the municipality of Fuschl am See, between 600 and 900 cubic metres per day, from one shore to the other, where it will be led via a collector to the wastewater treatment plant.

AGRU Kunststofftechnik supplied 4248 linear metres of polyethylene pipes in OD 280mm and SDR 17 (16mm wall thickness, maximum 10-bar pressure) as well as fittings and a CNC-controlled butt-welding machine.

The black PE 100-RC pipes are characterised by enormous resistance to point loads and stress cracks that ensures additional safety during decades of operation on the rocky bottom of the lake at a depth of 66 metres, where a temperature of 4°C prevails all year. In addition, the material also offers very good resistance to chemicals that are transported in household wastewater (e.g. alkalis and surfactants).

These AGRULINE pipes were welded with a AGRU ST CNC 2.0 butt-welding machine and, thanks to state-of-the-art control technology, all parameters such as pressure, temperature and time were always under control. The machine documents the welding parameters of each individual weld and even the name of each experienced, certified welder.

Weighting represented another important element in modern lake pressure pipelines. Concrete weights prevent the piping system from buoyancy that is intensified by digester gas formation in the pipeline. In addition, concrete has the task of stabilising the lowered pipeline at the bottom of the lake so that it is still in place decades later.

A sub-contractor, PEER, used precast concrete elements consisting of two halves that were placed around the plastic pipe like rings. The halves of each ring were then permanently connected with stainless steel screws. In order to protect the pipe and ensure additional safety against slipping, a foam rubber insert was clamped between the pipe and the concrete.

About 200 linear metres of ready-to-use pipeline were pushed into the lake from the shore every day. After about two months of work it was time to lower the 4.2 kilometre-long lake pressure pipeline to the lakebed.

The complete lowering process took several hours. After successful lowering, a pressure test of the complete pipeline was carried out.



It is evident that upgrades will be required as the latest drinking water standards and receiving water quality requirements take effect in the coming years. The installation of a modular treatment plant is therefore an excellent solution for the smaller water sources and wastewater systems throughout New Zealand.

TRILITY is at the forefront in delivering modular solutions for the water sector. With over 30 experience and now a market leader in delivering projects using this methodology – TRILITY is committed to working with New Zealand clients to develop fit for purpose, cost effective and reliable water and wastewater treatment solutions.

If this is of interest please contact our New Zealand Manager, Steve Jamieson via steve.jamieson@TRILITY.co.nz

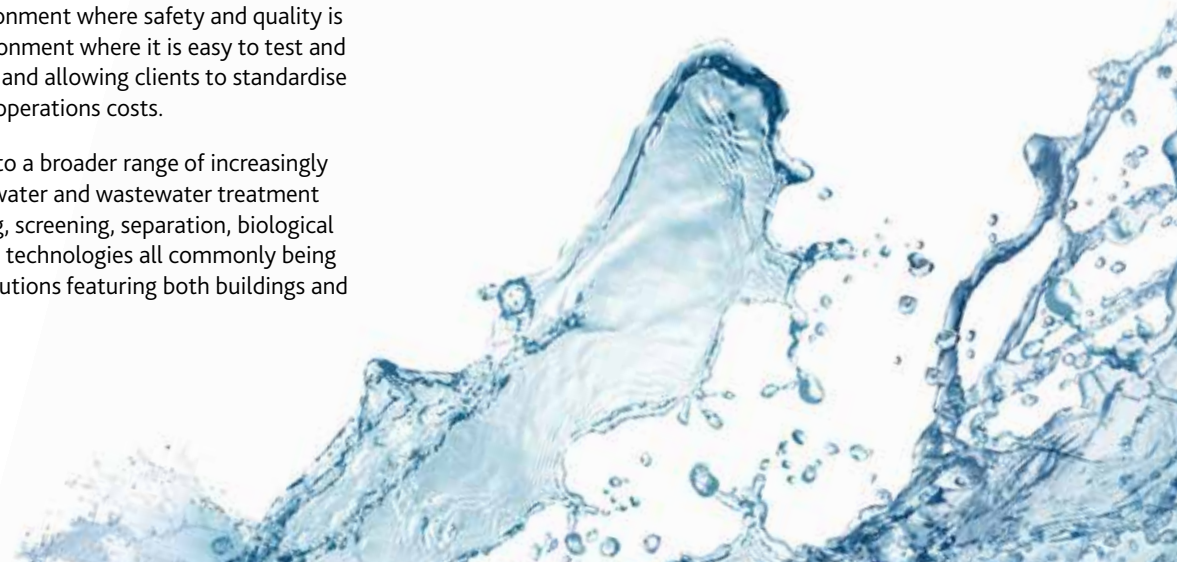


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An example of our expertise came about 30 years ago, when a major Western Australian water utility (WA) rolled out a programme to upgrade the disinfection process units at remote water treatment facilities. Traditionally, these would have been installed within brick and tile building, fully constructed onsite. The problem with WA is that the state is huge and mobilising to undertake construction is costly. This challenge led to a focus on modularised disinfection facilities, with equipment being housed in high quality transportable buildings that could be placed onsite then rapidly integrated and commissioned.

This thinking and approach has since been applied by TRILITY to deliver modular treatment solutions at hundreds of other regional and remote locations. From the success of these initial installations it became evident that there are multiple benefits to producing modular solutions, including; cost savings, condensed project schedules, undertaking the majority of work in a controlled workshop environment where safety and quality is easier to manage, providing an environment where it is easy to test and optimise systems prior to going live, and allowing clients to standardise facilities reducing maintenance and operations costs.

The approach has also been applied to a broader range of increasingly complex process solutions for both water and wastewater treatment with a wide range of chemical dosing, screening, separation, biological treatment, filtration and disinfection technologies all commonly being delivered in high quality modular solutions featuring both buildings and standalone equipment skids.





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