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Issue 187. November 2014

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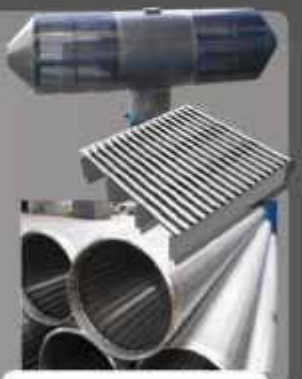

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The next issue of *WATER* will be published in March 2015.

WATER

On the Cover

Water New Zealand News

Features and Articles

Cover photo: Table setting at Water New Zealand's Annual Conference Dinner

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

Brent Manning

Introducing the New *Water New Zealand* President, Brent Manning

I have now had three years (one term) on the Board, and enter my second term as President. I would like to thank Past–President Steve Couper for his leadership and governance of your Board for the past two years. I would also like to welcome David Simpson, who is newly elected to the Board.

Currently I am the Group Manager for Engineering Services at South Taranaki District Council. I am responsible for the overall management and conduct of the Engineering Group of Council, covering infrastructural assets; water supply; wastewater collection, treatment and disposal; collection and disposal of solid waste and recyclable materials, and for ensuring that the engineering groups' customers receive high quality service. My experience has included engineering and management roles with New Plymouth District Council, at an engineering consultancy, and as a contractor. I am keen to see the New Zealand water industry become a world exemplar, while advocating for water supply authorities and advancing the recommendations of the Land and Water Forum.

Additional to the above, I have had 27 years in the New Zealand Army as a reservist, with one of those years on full time engagement as a United Nations Military Observer (UNMO) in Israel, Syria and Lebanon (1997/98). I have also participated in exchange exercises in Australia and represented New Zealand in attending a military professional development course in Canada in 2008.

I graduated with a BE Civil from the University of Canterbury in 1993, and worked initially for the Waimakariri District Council for four years as a graduate roading engineer before taking the overseas military role noted above. One interesting experience I had while in the Middle East was to take on project responsibility for construction of a protective bomb shelter for UNMOs in southern Lebanon, primarily as a result of a number of close calls with mortar bombs landing near their permanent accommodation.

On return to New Zealand (mid-1998) I worked for about a year in Christchurch with an engineering consultancy, specialising mostly in urban subdivision design and construction, before coming 'home' to Taranaki to take up a role as Contracts Manager with a medium sized roading contract firm.

> "I am humbled to be considered worthy by the Board of election to President. I look forward to continuing the good work of the Board..."

After that, I worked with an engineering consultancy which was a Local Authority Trading Enterprise in New Plymouth, primarily helping project manage a large water expansion programme of capital works for New Plymouth District Council, before transferring to a project manager role with the Council. In that capacity I was also double-hatting as the Water Supply Manager for South Taranaki District Council for two years from 2002–2004.

From 2004 to 2012 I was the Manager of water and wastes for New Plymouth District Council. Particular achievements by my team during this period were the $14M upgrade to the New Plymouth water treatment plant to comply with drinking water standards and future-proof capacity, and the $23M Oakura sewerage scheme, both of which were mostly managed and commissioned in-house by water and wastes staff.

Through my water-related roles with New Plymouth District Council and South Taranaki District Council I joined the Water Service Managers Group (WSMG) of *Water New Zealand* in 2002, attending my first Annual Water Conference in 2003. I volunteered for the WSMG committee and got involved with the drafting of the guidelines for the Above Ground Assets Grading Manual, and participated in the standards review committee for NZS 4515 and 4517 (Fire Sprinkler systems for life safety in sleeping occupancies and fire sprinkler systems for houses respectively). I was the WSMG Committee chair from 2009–2011 and was first elected to the Board at the AGM in September 2011.

A 'highlight' (I say this hesitantly) was assisting in restoring water supply to residential areas of Christchurch in the immediate post-earthquake aftermath of February 2011. While this natural disaster was a tragedy for all of those directly impacted, I was able to see first-hand the importance of water supply and its essential nature for sustenance, hygiene and public health.

In my current role I maintain an overview of all water related infrastructure and service delivery for South Taranaki District Council, as well as roads, parks, cemeteries and solid waste. I am married to Jacqui and we have three children and live in the Taranaki countryside near Egmont Village.

I am humbled to be considered worthy by the Board of election to President. I look forward to continuing the good work of the Board, principally in advancing the strategic direction which was reviewed and refined earlier this year. In particular we are committed to enhancing the technical support and extending the services we provide to members. *Water New Zealand* has recently employed a new technical coordinator (Lesley Smith) to work alongside technical manager, Nick Walmsley, and we have engaged Lisa Snow in a communications role to improve our engagement with members. We have set some ambitious membership growth targets for the next five years.

We also welcome John Pfahlert as our new CEO. John, will replace Murray Gibb from December. He comes with much experience having worked previously as Chief Executive of industry membership organisations, notably the New Zealand Contractors Federation (1999–2003); NZ Building Industry Federation (2003–2006); and, more recently, the NZ Petroleum Exploration and Production Association (PEPANZ).

I would also like to take this opportunity to acknowledge the service of Murray Gibb for the past six years, and thank him on behalf of our Association for his commitment to advancing the case for improved water service delivery and quality in New Zealand, particularly his advocacy on our behalf, his leadership and his contribution to our associated water related organisations. ■

Brent Manning,
President, Water New Zealand

Murray Gibb

Reflection on the Water Journey

This is my last column so it provides an opportunity to reflect on the journey water policy has taken over the past six years in New Zealand.

At our recent annual conference the Hon Karlene Maywald, Chair of Australia's National Water Commission gave an overview on the journey taken in improving management of the resource in that country over the past 20 years. She argued that debate on water policy is continuous and that despite significant gains during that period, the journey towards better water governance will never end.

How has the journey gone in New Zealand?

By 2008 the previous Government's sustainable water programme of action had produced one environmental standard – for sources of water for human consumption. A draft NPS on freshwater management had been developed but not implemented.

The then Opposition's blue-green policy proposing a revised approach was on offer. Arising from the Environmental Defence Society's annual conference that year the Sustainable Land Use Forum was formed. Additionally in 2008, *Water New Zealand* fostered, Turnbull Group, was working on a policy offering. In July 2009 it released proposals in a publication called *Governance of Water*.

The Government was launching its '*Fresh Start for Freshwater*' work programme in mid-2009. It contained three elements; a collaborative forum of interest groups charged with proposing new policies for water, a parallel officials' work programme, and a separate discussion between senior Ministers and iwi on iwi/Maori interests in water.

The Land and Water Forum assembled with *Water New Zealand* being part of its small group.

In 2009 the Government also decided to implement most of the recommendations of the Royal Commission on Auckland Governance. Bills were put before Parliament to allow for rationalisation of the existing Councils. Watercare's role as a wholesaler was expanded to include taking over retail supply of water and wastewater services to the entire population of the newly created Auckland Council, while the Auckland Council was given responsibility for stormwater management. These reforms were implemented in late 2010.

Reform of the Local Government Act in 2010 was aimed at bringing more transparency to the provision of Council services including water utilities, with requirements for reporting on a range of performance measures along with planned verses actual expenditure. These are now mandatory.

Also in 2010, the Government settled a Treaty of Waitangi claim by Waikato/Tainui over the Waikato River. $210 million was allocated towards cleaning up the river.

The Land and Water Forum produced its first report in August 2010. Entitled *A Fresh Start for Freshwater* it provided a blueprint for improved management of the resource. The Government asked the Forum to road test their proposals with interested parties throughout New Zealand over the next six months. This occurred. The general feedback was that the Forum had things about right and it advised the Government accordingly in April 2011.

The Government responded with four proposals in June 2011. A long overdue

> "For the first time New Zealand has a national objectives framework for water management and some bottom lines. The returned Government now has sufficient Parliamentary support to implement its RMA reform package."

National Policy Statement on Freshwater Management was produced. $400 million was earmarked in future budgets for Crown investment in irrigation infrastructure. An irrigation acceleration fund was set up to help bring irrigation proposals to the consenting stage. A dedicated fresh water clean-up fund was set up, thus continuing the policy of successive administrations to recognise legacy issues associated with pollution of water bodies and funding accordingly.

A National Infrastructure Unit was formed in Treasury in 2009 to improve performance for infrastructure services. The first National Infrastructure Plan was produced in 2010. A second plan produced in 2011 highlighted water infrastructure as the worst performing sector against six measures.

Implementation of amendments to the Health Act regulating drinking water, scheduled for 2009, were put back till 2012 allowing time for the costs and benefits of these reforms to be analysed. The costs were quantified at $300 million. The benefit analysis suggested up to 35,000 human cases of water borne gastrointestinal disease annually from reticulated supplies.

Regulations requiring measurement and reporting of consented water takes were introduced in 2010.

Continues over page...

New Members

Water New Zealand welcomes the following new members:

THOMAS CHABANNE
MARK JEFFRIES
CHRIS THORPE
AYNSLEY GRIFFITH
ADRIAN KNIGHTS
WARWICK ROBBINS
JANET MCKINNON
SERGIO CALDERON
GEOFFREY STEPHENS
YEO KENG SOON

TAN KOK TIAN
BRETT MARAIS
RICHARD AITCHISON
TIM LOCKIE
THOMAS FRITZ
MARK BAKER
ROB EVANS
SIMON BOWLES
TIM LOTT
HARALD ULLRICH

LINDA DANEN
ADAM DONALDSON
GERALDINE MCHAFFIE
WARREN LADBROOK
KEVIN WILLERS
CAI EDGE
PAUL GAYDON
STEVE MCDONALD
MARC PHILLIPS
PETER ROACH

GRAEME INGLIS
GREG HALDANE
DEBORAH MORLEY
KONRAD HIENMANN
MATTHEW HANCOCK
STEPHEN SCARD
THIEN YET LIEW
LAETETIA ROELOFSE
NEIL JOHNSTONE
ROB HOLMES

BRENDON RICHARDS
JAMES OAKLEY
MATTHEW SHEPPARD
ANDY WELLS
ANDREW EDWARDS
ANDREAS ZAUGG
SARAH STEVENSON
GARETH GREY
ABBIE FOWLER

The second and third reports of the Land and Water Forum came in 2012 proposing ways of setting limits on water quality and quantity and working within them. The Government responded with proposals to reform the Resource Management Act to, amongst other things, allow for collaborative processes to be used to develop rules for water.

The RMA reform package stalled for want of Parliamentary support but a revised National Policy Statement for Freshwater Management was implemented in August this year. For the first time New Zealand has a national objectives framework for water management and some bottom lines. The returned Government now has sufficient Parliamentary support to implement its RMA reform package.

A water directorate has been established in the Ministry for the Environment to coordinate water policy development across government departments.

Councils will be required to consider the most cost efficient ways to deliver water services including regionalisation and placement at arm's length from local political control.

An Environmental Reporting Bill is currently before Parliament and will require regular reporting on the state of the water environment free at arm's-length from the Government of the day.

Taken as a whole this is a significant body of work.

The most significant have been the revised NPS-FM, amendments to the Local Government Act, the irrigation initiatives and national infrastructure planning. I hand across the reins to my successor, John Pfahlert, confident of a continuing pathway towards sustainable management and development of the water environment.

Finally, I thank successive Presidents and Boards, our Special Interest Groups, all of our other forum committees, all members and lastly, but by no means least, Water New Zealand staff for your support over the past six years. Being part of the water journey with you during this period has been a privilege. ■

"The RMA reform package stalled for want of Parliamentary support, but a revised National Policy Statement for Freshwater Management was implemented in August this year. For the first time New Zealand has a national objectives framework for water management and some bottom lines."

The *Better Local Government* initiative in 2012 included an expert panel looking at local government provided infrastructure including water services. By this time the economic gains achieved by scaling up water services in Auckland were evident.

Some of the panel's recommendations were picked up in an LGA Amendment Act passed just before the recent election.

Murray Gibb
Chief Executive, Water New Zealand

Last Issue of *WATER* for 2014

This is the last issue of *WATER* for the year. *Water New Zealand* would like to thank all those who have taken the time to contribute articles, images and ideas over the past year.

The next issue of *WATER* will be with readers in March 2015

If you wish to contribute next year please contact the editor, Robert Brewer, at editor@avenues.co.nz

Contributing to this industry publication is a valuable way to share knowledge across the water infrastructure sector.

To advertise, contact Noeline Strange at n.strange@xtra.co.nz

The themes and deadlines will be confirmed in December – to view them visit waternz.org.nz and use the drop down links PUBLICATION/*Water New Zealand* Journal.

AGM Notices

2014–2015 *Water New Zealand* Board

Congratulations to David Simpson for his election to the Board.

The 2014/2015 Board Members are:

Brent Manning – President
Hugh Blake-Manson
Adrian Hynds
Kelvin Hill
Dukessa Blackburn-Huettner
David Simpson

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IMPLEMENTING REFORM

Water New Zealand's Annual Conference & Expo

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Implementing Reform – *Water New Zealand's* Annual Conference Report

With a sold out exhibition, seven presentation streams, and well over 1,000 bodies in attendance, this year's conference was a record in every sense of the word.

Starting with a rousing powhiri from Tainui and opening remarks from Hamilton's Mayor Julie Hardaker, delegates embarked on three days of stimulating keynotes, interesting presentations and fun filled social events.

The conference plenary keynote was delivered by the Hon Karlene Maywald, Chair of Australia's National Water Commission. In an interesting and well received address Karlene reported on the history and rationale of the reforms in Australia to date. In her concluding remarks she advised that moving forward there would be a stronger focus on the urban agenda with an emphasis on solid long term planning that would include all options for future augmentation and a move toward nationally consistent independent regulation.

The opening keynote was well complemented by a following presentation from Mike Brewster, CEO of the relatively recently created TasWater. Mike outlined how, prior to 2009, Tasmanians had water and sewage supplied by 29 councils and three bulk water authorities, and this for a population a little over 520,000. Over recent years this delivery system had progressively evolved to one water entity, TasWater. Mike stressed that success depended on the ability to effectively engage with communities and to build trust with owners. Communication and transparency were key elements and must be ever present and ongoing.

Highlights of the technical presentations included dedicated modelling, operations, IWA/Science, SWANS and ASST streams. Of particular note was the introduction of four specialty workshop sessions – one on SCIRT considering the lessons from Christchurch, another addressing the increasingly crucial area of how to plan for and fund the renewals "bow wave", a third one discussing what was required in terms of *Water New Zealand*'s technical work programme, and the fourth discussing water science. The workshops were well received and are likely to be an ongoing feature of *Water New Zealand*'s conferences. The Technical Committee, under the astute chairmanship of Ian Garside, once again played a crucial role in developing the technical streams, marking the papers, and deciding on those worthy of formal acknowledgment.

Thursday's keynote featured Mark Enzer, from Mott MacDonald in the UK, who offered an interesting perspective on the global water picture. A forum was again featured on the Friday morning and this year debated the often contentious issue of water pricing. One speaker noted the conclusive efficiency gains that water metering had brought to the country's largest urban conurbation, while others argued the pros and cons of rural water pricing.

Outside the lecture rooms, delegates enjoyed several social events including the Modelling and Operations dinners, and corporately sponsored events. The Conference Dinner and Awards evening, generously sponsored by Hawkins, featured this year the award of the Association Medal to Boyd Miller. Also of note was the passing of the gavel to incoming President, Brent Manning, and a tribute to outgoing CEO, Murray Gibb.

"...none of it would have been possible without the support of our suite of sponsors, in particular our premier sponsors, Applied Instruments, City Care, Downer, Hynds, Leighton Contractors and Xylem."

Our conference organisers, Avenues, again delivered a seamless event and none of it would have been possible without the support of our suite of sponsors, in particular our premier sponsors, Applied Instruments, City Care, Downer, Hynds, Leighton Contractors and Xylem. This notwithstanding, it is the delegates and exhibitors that made the conference the success that it was and all congratulations to them.

The 2015 conference will be held 23–25 September in Rotorua so let's all work together to see if we can make it even bigger and brighter than this year's one. ■

Peter Whitehouse – Manager Advocacy & Learning, Water New Zealand

Thank You

We would like to thank the six premier sponsors for their continued support for *Water New Zealand's* Annual Conference & Expo. *Water New Zealand* is grateful for their tangible support, advice and input in planning the Conference & Expo.

Representatives for the six premier sponsors are (from left to right): Simon Bowles – Leighton Contractors; David Simpson – Downer; Adrian Hynds – Hynds; Tim Bourke – Xylem; Tim Gibson – City Care; and Colin Hooper – Applied Instruments.

We are also appreciative of the generous support from the sponsors of our awards and social functions.

Thanks to ProjectMax for supporting the Welcome Function, Jeff Booth Consulting Ltd for their support of the Modelling Dinner and Applied Instruments Group for supporting the Operations Dinner. Our Awards enjoy the support of CH2M Beca for the Young Water Professional of the Year Award, Opus for the Trainee of the Year Award, Orica for the Operations Prize, Mott MacDonald for the Poster Competition, ProjectMax for the Young Author of the Year Award and Hynds for the Paper of the Year Award.

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Water New Zealand Awards 2014

Orica Operations Prize
Marcus Coley, Downer

Mott MacDonald Poster of the Year Award
Winner: Ondrej Janku, DHI New Zealand for his paper on *Waste Water Pumping Stations – an Emergency Assessment*
Runner up: Jonathan Cuff, ERGO Consulting – *Chlorine Dosing Container*

Ronald Hicks Memorial Award
Rob Fullerton

Opus Trainee of the Year Award
Karl Warner, Downer

CH2M Beca Young Water Professional Award
Nicola Smalberger, Harrison Grierson

ProjectMax Young Author Award
Alistair Hancox for his joint paper on *The Use of Hydraulic Transient Modelling in the Design of Resilient Pipelines*

Hynds Paper of the Year Award
Gold: John Monro, Interflow Pty Ltd – *Design of Liners for Deteriorated Sewers – Latest Research to Make it More Efficient*
Silver: Philip McFarlane, Opus International – *Is That Liner Thick Enough?*
Bronze: Alistair Hancox and Grant Pedersen, Harrison Grierson – *The Use of Hydraulic Transient Modelling in the Design of Resilient Pipelines*

Exhibitors Best Stand
Multi Stand Winner: Austeck
Runner Up: Applied Instruments
Single Stand Winner: Teltherm Instruments Ltd
Runner Up: Oceania Tanks

Association Medal
Boyd Miller

Modelling Awards
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2nd: Anna Marburg & Ryan Orr

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Murray Gibb during the recent *Water New Zealand* Annual Conference & Expo

Staff Announcements

Murray Gibb

Murray Gibb joined *Water New Zealand* as Chief Executive in September 2008 bringing a strong scientific background coupled with extensive experience in the development of public policy. He brought an understanding of the interrelationship between New Zealand's urban and rural communities at a critical time when increasing demand for water resources had started to create polarised positions and attitudes. It was also a time when, after decades of indecision, the government was prepared to address competing interests.

Murray's first initiative was to rename the Association from New Zealand Water and Wastes Association to *Water New Zealand*. He quickly gained an understanding of the water sector, not only the technical issues, but also its policy and institutional deficiencies. He has been an effective leader and has significantly raised the profile and respect of the Association in both the elected and officials' side of government. The Association is now positioned as an independent adviser direct to Ministers. It has continued to grow and develop across all areas: membership, reserves, the scale and scope of the annual conference, and the policy programme, growing even through the difficult times of the global financial crisis.

On an operational level, Murray has instigated changes that will set a strong foundation for *Water New Zealand* looking forward. He embraced the importance of special interest groups and employed a technical coordinator to strengthen the technical publications that underpin our organisation's credibility. He is an advocate for technical development and learning and has been very active in setting a path for NZWETA.

Murray has developed strong relationships for *Water New Zealand* with both influential individuals, and other water related organisations. One of *Water New Zealand*'s most significant relationships is with the Land and Water Forum, whose groundbreaking work will underpin public policy for the foreseeable future. When the 2011 National Infrastructure Plan graded water infrastructure 'red' and the worst across six challenge areas, he took the initiative to commission a pilot study jointly with PwC, GHD and NZCID to identify factors critical to improving performance. This work was followed by a think piece commissioned directly by the Minister of Finance covering economic regulation options for the sector.

Murray has been a conscientious CEO, committed to a goal of raising the profile of *Water New Zealand*.

The Board and Staff of *Water New Zealand* acknowledge and thank Murray for his leadership of the Association for the past six years and wish him well for his retirement.

John Pfahlert

John Pfahlert has been appointed Chief Executive of *Water New Zealand* to replace Murray Gibb who is retiring at the end of the year.

John brings to this role over 20 years' experience managing industry trade associations. He is also experienced in advocating industry positions to Members of Parliament. John is currently Chairman of St Joseph's Home of Compassion in Upper Hutt, Wellington.

The Board and staff of *Water New Zealand* look forward to working with John.

Lisa Snow

Lisa Snow has recently joined *Water New Zealand* in the newly created part-time role of Communications Co-ordinator. This role is responsible for managing *Water New Zealand*'s written communications, media coverage, social media presence, and website.

Lisa has worked in the not for profit sector for almost 20 years. Her first role was with UK charity WaterAid and since her return to New Zealand in 2003, Lisa has worked for Mary Potter Hospice, Parkinson's New Zealand, and Wellington SPCA.

If you haven't yet connected with *Water New Zealand* on LinkedIn or liked us on Facebook, Lisa encourages you to do so. She is also keen to hear from members on what you would like to see on our website. ■

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Boyd Miller is awarded the esteemed *Water New Zealand* Association Medal for outstanding contribution to the water industry and the Association

Water New Zealand Association Medal – Boyd Miller

The *Water New Zealand* Association Medal is awarded at the discretion of the Board to a New Zealand citizen who has made an outstanding contribution to the water industry and the Association. In order to retain its exclusivity and esteem, there are only a very limited number of living holders at any one time. The medal has only been awarded three times in the past. At the recent *Water New Zealand* Conference Boyd Miller was the fourth person to receive this award.

Boyd Miller graduated as an engineer in 1970 and spent the vast majority of this career working for the Auckland Regional Authority which later became Watercare. He was responsible for much of the water infrastructure that services Auckland today. His work on sewer ventilation gained him recognition as a specialist in odour management. His experience has been drawn on by consultants and local government as a project peer reviewer.

> "The *Water New Zealand* Association Medal is awarded at the discretion of the Board to a New Zealand citizen who has made an outstanding contribution to the water industry and the Association."

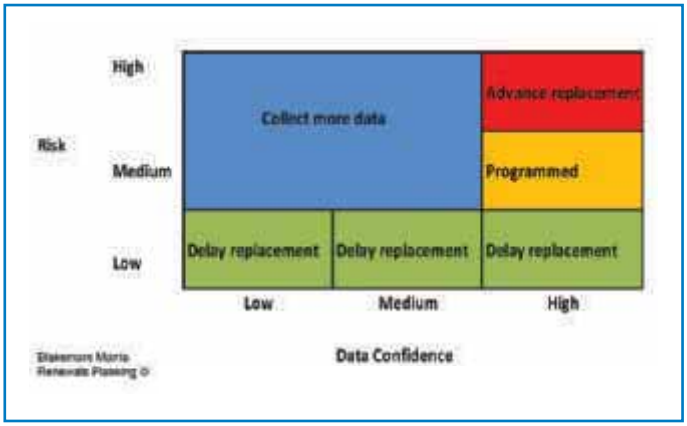
In the early 1990s Boyd Miller led the merger of the IPENZ Technical Group on Water with the then New Zealand Water Supply and Disposal Association to create what has now become *Water New Zealand*. He wrote the constitution of the New Zealand Water and Wastes Association (NZWWA), developed practice guidelines and had a close involvement with NZWWA publications, and led NZWAA from a volunteer run organisation to that of a professional association with full time staff. He was Chair of the IPENZ Technical Group on Water, Vice President of the New Zealand Water Supply and Drainage Association and subsequently President of the NZWAWA for four years from 1994 to 1997.

Boyd Miller was elected a Fellow of the Institute of Professional Engineers New Zealand in 2004. He was elected an honorary life member of NZWWA in 2007 for his sustained and significant contribution.

For the high standard of professionalism he has demonstrated throughout his career, his outstanding contribution to the water and wastewater industry, his professional achievements and his community contributions, Boyd Miller has demonstrated qualities and commitment that eminently fits the criteria to be awarded the Association Medal. ■

September Issue of Water: Erratum

On page 28 of the September issue of *WATER*, some errors occurred in the graph accompanying the article *Addressing the Renewals Bow Wave – Water NZ is Getting the Oars Out*. The x axis should be titled Data Confidence. The y axis should ascend from low to high. The editor takes responsibility for the errors and apologises for the confusion caused. The original and correct copyrighted figure is pictured here. ■



Obituary: Mark Ford

Mark Ford, CNZM, died at his home on Monday 13 October 2014.

In mid-September this year, Mr Ford stepped down as Chief Executive of Watercare Services Limited due to ill health. He was first appointed Chief Executive in 1994, a role he held until June 2009 when he resigned to become the Executive Chairman of the Auckland Transition Agency, the body responsible for planning and managing the local government reorganisation. Upon the completion of that assignment in November 2010, he rejoined Watercare and continued to serve as Chief Executive until his retirement.

Mr Ford had an exceptional knowledge of the water industry and under his stewardship Watercare became recognised as an example of best practice in the provision of water supply and wastewater services. Auckland's water and wastewater infrastructure became more resilient and able to cope with both the demands of the growing population and increasingly strict environmental standards.

"Mr Ford had an exceptional knowledge of the water industry and under his stewardship Watercare became recognised as an example of best practice in the provision of water supply and wastewater services. Auckland's water and wastewater infrastructure became more resilient and able to cope with both the demands of the growing population and increasingly strict environmental standards."

He attached great importance to fostering strong relationships. As a result of this, large and complex projects were delivered on time and within budget. Under his leadership Watercare grew to become a company holding more than $8.4 billion of assets and supplying services to over 1.4 million Aucklanders.

Mr Ford's legacy includes many complex and significant projects including:

- The $500-million upgrade of the Mangere Wastewater Treatment Plant and associated restoration of Manukau Harbour wetlands and surrounds
- The commissioning of the Waikato River water pipeline and treatment plant along with resolution of complex resource consent and tangata whenua issues
- The $120-million construction of a high-capacity tunnel and pump station to replace an aging sewer pipe that bisected Hobson Bay and a pump station that overflowed during wet weather
- The transformation from a bulk water supply company to an integrated bulk and retail service provider for all of Auckland
- The delivery of a $116-million project to connect the townships of Franklin to the metropolitan supply, overcoming long-standing quality and supply issues

Mr Ford is survived by his wife Merelyn and sons Ben and Luke. ■

Reflection: The Meaning of Water and its Impact on the Law

Helen Atkins – Partner; Vicki Morrison-Shaw – Senior Associate; and Phoebe Mason – Law Clerk,Atkins Holm Majurey

Freshwater represents a wide range of meanings for New Zealanders – culture, beauty, recreation, economic development. There are tensions between these meanings, and this can affect how our law is developed, and how the law is applied. In this article, we look to what the implications of the Government's resource management reform may be. We also have a look at the new National Policy Statement on Freshwater Management in action, and give an overview of an important case regarding riverbed ownership and Maori land. Finally, we look at some sentencing principles for water-related offences in light of three recent cautionary tales – those for whom discharges into water resulted in the imposition of significant fines.

National's Next Three Years

The strange sequence of events which made up New Zealand's national elections is now over, and focus turns to how the Government will proceed in its next term. Resource management reform has been in the pipeline for National for a long time, having been thwarted by loss of the support of the Maori Party and United Future in late 2013. Although the National party has lost its outright majority, with the support of ACT's David Seymour the Government will be able to push through the reforms.

The reforms proposed changes to increase efficiency of plan change and resource consenting procedures, and also, controversially, to merge two of the sections which make up the Act's Purpose and Principles, namely section 6 "Matters of National Importance" and section 7 "Other Matters".

Federated Farmers considers that the Government has a clear mandate for reform of the RMA, with Federation President Dr William Rolleston stating "National put its plans to reform the RMA to the electorate and the electorate have comprehensively responded, yes. There is no ambiguity or room for conjecture on this." However, some are concerned that the reforms could bulldoze environmental concerns. Paula Southgate, chairwoman of the Waikato Regional Council, has summed the tension up – "We are all very keen to see economic development here – it's [the Waikato] the next big economy of New Zealand. But we still have to ensure natural resources are protected."

We also note the change in Cabinet. Dr Nick Smith has replaced Amy Adams as Minister for the Environment, and Maggie Barry has taken on the Minister for Conservation role from Dr Smith. We'll report back on any legislative developments.

Implementation of the NPSFM 2014

By Gazette Notice on 4 July 2014 the NPSFM 2011 was superseded by its big sister, the NPSFM 2014. In our last article we outlined some of the new features of the NPSFM 2014 such as the National Objectives Framework, and the 'attributes' for which water is to be managed.

The new NPSFM is now starting to be implemented in regional planning documents, as Policy Statements and Plans come up for review. The consequential question is, in light of the changes made between the 2011 and 2014 versions, what does the NPSFM 2014 mean? Given that this issue of *WATER* focuses on water quality issues, we have decided to focus on one specific aspect of the NPSFM, namely the meaning of Objective A2.

Objective A2 requires that "[t]he overall quality of fresh water within a region is maintained or improved while:

a) Protecting the significant values of outstanding freshwater bodies
b) Protecting the significant values of wetlands
c) Improving the quality of fresh water in water bodies that have been degraded by human activities to the point of being over-allocated."

The question is what does "overall quality of fresh water" mean for councils seeking to implement the NPSFM 2014, as councils are required to do as soon as practicable. This is a pertinent question as, for many industries and activities, economic growth may necessitate some further (albeit minor) degradation of water quality.

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Essentially, two schools of thought exist. One is that maintaining the overall quality of fresh water requires councils to permit no decrease in water quality in any part of the region. The other is that councils have the choice to permit some degradation in water bodies which are above the national bottom line so long as this is mitigated by improvements in other sub-catchments of the region.

On a review of the Policy Statement as a whole, it is our view that councils appear to be provided with a degree of flexibility in the application of the NPSFM, which extends to the intensity of objectives set for water quality. The NPSFM does not require that no decline in water quality occurs in any water body. Rather, the NPSFM requires that goals are set to improve overall, that is catchment-wide, water quality over time. It would be the active (political and policy) choice of the council to set an objective that no degradation is permitted, rather than any legal requirement following on from central government's national direction in the NPSFM.

In a Cabinet paper published in August 2013, during the consultation process on freshwater reform, Cabinet stated that "Councils will continue to have flexibility to trade-off water quality between waterways across a region, provided that national bottom lines are not breached." The paper also stated that the freshwater accounting system provides councils with the flexibility to choose the scale at which they manage the water bodies, whether at a sub-catchment level or the catchment as a whole. Categorically, the paper stated that "freshwater objectives (at or above national bottom lines) will apply at the scale of the management unit, rather than individually to each component part of that unit (i.e. not to every tributary individually)."

The Regulatory Impact Statement ("RIS") on the new NPSFM identified three problems with setting freshwater objectives in regional plans, one of which was that the objectives would be ineffective. The RIS stated: "Environmentally conservative objectives

may lead to unnecessary constraints on resource use and impede opportunities for economic growth, while objectives that are set too low to safeguard the life-supporting capacity of water impose clean-up costs on future generations, or compromise the functioning of the water body." The concern that objectives could hinder economic growth has been part of the development of the NPSFM.

While councils have an obligation to manage all water bodies to meet the national bottom lines set in the NPSFM 2014 there is no obligation to exceed these national bottom lines – ie to provide for a greater level of water quality.

However, councils cannot simply manage all water bodies in their regions down to the national bottom lines. The NSPFM 2014 has the improvement of water quality as its central theme. This requirement would obviously not be met by managing all water bodies down to the bottom lines. In simply terms the NPS allows an element of overs and unders with the overall goal of improvement over time.

Riverbed Ownership: Paki v Attorney-General [2014] NZSC 118

This case is the final word in a line of litigation concerning the ownership of the bed of the Waikato River. The appellants were the descendants of owners of the Pouakani Block, a property which adjoined a section of the Waikato River near Mangakino. In the late 17thC the Block was subdivided in the Native Land Court and then acquired by the Crown from the Maori owners, all except for one piece. Two Mighty River Power hydro-dams now stand in the relevant section of the river, creating Lakes Whakamaru and Maraetai.

The appellants sought a declaration that the Crown held the riverbed on constructive trust for their benefit. This was asserted on the basis that the Crown had breached fiduciary duties to the iwi as land-owners. The Crown had gained ownership usque ad medium filium aquae – to the median point of the adjoining river, under a presumption of the common law. However the appellants argued that as this occurred without ensuring that the Maori owners understood what they were giving up, particularly as the Waikato River was essential to the iwi's identity and way of life, the riverbed was not owned by the Crown but was held on constructive trust for the iwi.

The appeal was dismissed on the basis that the Court could not properly infer that the Maori owners of the Pouakani Block had owned the river to the medium point before the land was acquired by the Crown. Rather, in these circumstances, the Supreme Court held that the Crown owned the riverbed by the operation of s 14 of the Coalmines Act Amendment Act 1903 (now found in s354(1)(c) of the RMA), under which the Crown owns the beds of all navigable rivers in New Zealand.

However, the Supreme Court left open the possibility that, depending on particular Maori customs, in other regions the arguments put forward by Paki and the other appellants could succeed. That is, "[i]n the case of major tribal resources and natural features of value to the tribe whether the riparian owner takes title to the riverbed or lakebed requires investigation of the status of the land beyond the boundaries of the title."

Sentencing on Water-Related Offences

A number of sentencing decisions have recently been delivered by the District Courts in regards to water-related offences. After a defendant has been found guilty, the Courts have a wide discretion in how the convicted party is sentenced. The Court's exercise of its discretion depends on a wide range of circumstances, generally

related to moral culpability and the seriousness of the consequences of the offending.

In general, the factors relevant to sentencing are set out in *Machinery Movers Ltd v Auckland Regional Council* [1994] 1 NZLR 492 (HC) and the principles of the Sentencing Act 2002 are also relevant. In respect of individuals the relevant factors are:

- The nature of the environment affected;
- The extent of the damage to the environment;
- The deliberateness of the offending;
- The attitude of the defendant;

In respect of corporations committing environmental offences, the Court will consider:

- The size, wealth, nature of operations and power of the corporation;
- The extent of attempts to comply
- Remorse;
- Profits realised by the offence;
- Criminal record or other evidence of good character.

In *Taranaki Regional Council v Mullan* CRI-2014-043-000604, Mr Mullan pleaded guilty to two charges of unlawfully discharging partially treated dairy effluent caused by the overflow of an oxidation pond onto land on a farm near Opunake. Mr Mullan was convicted and ordered to pay a total fine of $30,000 as well as Court and solicitor costs. The offence was described by the Judge as "almost entirely predictable" in that a near-overflowing effluent pond overflowed.

There was no evidence of direct damage to the environment from the overflow. The overflow was also not deliberate, however given that Mr Mullan had been specifically warned by abatement notice that there could well be a problem with the system, that no consent had been sought until after this abatement notice, and the farm manager had been left without a lawful means of disposing of the effluent, the Judge held "overall, for a man who is a substantial farmer of considerable experience, that is a pretty poor performance, it has to be said – bluntly." The Judge noted that although the offence could be seen as a one-off, "for an experienced and, as I say, substantial farmer, this sort of outcome of a weather event causing an overflow where there was no arranged discharge process through proper piping to an authorised outlet was predictable and preventable by taking the compliance issues much more seriously than seems to have been the case."

In the interests of deterrence, the Judge took a $40,000 fine as the starting point for the charges. A 25% discount was permitted for Mr Mullan's early plea, so Mr Mullan was fined $30,000 total, $15,000 for each charge.

In *Otago Regional Council v Christensen* CRI-2014-017-000132 Mr Christensen pleaded guilty to two charges of unlawfully discharging dairy herd effluent onto land in circumstances which might have resulted in those contaminants entering the Waipahi River on a farm at Waipahi Station Road, near Gore. Mr Christensen was convicted and ordered to pay a total fine of $16,800 as well as Court and solicitor costs for each charge and a Council analyst fee and disbursements.

The offences were described as unintentional one-offs occurring as a result of systems failure, with little or no proven effect on the environment. This put the offending in the lowest band as set out in *Waikato Regional Council v GA & BG Chick Ltd* (2007) 14 ELRNZ 291 (DC). The offending was at the higher end of that lowest band as the effluent actually entered the river, and there was an element of carelessness in the irrigation occurring in very wet conditions on unfamiliar paddocks, which unbeknownst to Mr Christensen had tile drains. The starting point for the offending was $25,000, and in recognition of Mr Christensen's co-operation and honesty with the Council officer, the immediate steps taken to mitigate the damage, and his lack of previous convictions, the fine was reduced by 10%. A further 25% reduction in recognition of an early guilty plea brought the fine down to $16,800 total, as well as Court and solicitor costs and a Council analyst fee.

In *Wellington Regional Council v Collings* CRI-2013-096-000610, Mr Collings pleaded guilty to a charge of unlawfully discharging or permitting the discharge of a contaminant, namely sediment, into water, namely a tributary of the Mangaroa River in the Whitemans Valley. Mr Collings had been clearing the water feed system of the community dam which served several farms and households in the area. Every four to five years the feed system would clog with sediment and it had always been cleared as a matter of course, without thought of the necessity of resource consent. On this one occasion a Council officer had happened upon Mr Collings on a digger in the waterway, and upon asking for his resource consent and finding that Mr Collings had none, had laid a charge.

Mr Collings was discharged without conviction under s106 Sentencing Act 2002. This is available where the gravity of the offence is outweighed by the consequences of conviction. Judge Thomson held that "by a very narrow margin" this was the case. Mr Collings had not been doing the work for his own benefit nor for financial reward, but to assist his neighbours in having their water supplies continued. There was a potentially significant effect on the ecosystem of the stream, but not a long-lasting one. Judge Thomson commented "Mr Collings might perhaps, in a perfect world, have realised that working in a stream with a digger was something that might just need resource consent but the history of the work in the stream was such that presumably that thought did not occur to him and he can hardly be morally blamed for that." Mr Collings was fined $5000 for court and council costs. ■

Water Quality Analysis in Nasese Bay, Suva, Fiji

Upaka Rathnayake – Assistant Professor in Civil Engineering, School of Building and Civil Engineering; D.M Suratissa – Visiting fellow in Museum Science and Curation; and Deepak Chand – Technical & Field Assistant, Fiji National University

Abstract

Fiji is a country blessed with natural scenic beaches. These scenic beaches bring a significant amount of income from the tourism industry. However, whether there are rules and guidelines to protect these beaches or not, the beauty of these beaches is threatened daily. Even though it is not sandy like many other beaches, Nasese beach is one of the others to witness pollution. Starting from ANZ stadium and three kilometers along the Queen Elizabeth road to Suva city centre, about 16 point sources of pollution can be identified. The majority of them are natural water creeks, however, they seem polluted. This paper analyses the quality of water of these 16 point sources of pollution and presents the state of the water quality. Initially, several water quality parameters, including pH, dissolved oxygen level and turbidity were measured. Initial investigations show that the dissolved oxygen levels are slightly above the minimum limits. In addition, the turbidity levels show that they are well above the limited values. The results show that the water quality in the Nasese bay is at a concerned level. In addition, the dead corals at Nasese shore give another indication of presence of high concentrations of inorganic nitrogenous compounds and phosphate substances. However, a detailed water quality analysis is proposed from the outcome of the initial investigation.

Keywords

Corals, dissolved oxygen, Nasese bay, pH, turbidity

Introduction

Fiji is a country in the South Pacific Ocean and surrounded by several neighbouring sister islands, including Tonga, Niue, Samoa, Vanuatu and New Caledonia. Fiji is well known for its sugar production, garments and tourism industries. These are the three major industries which drive the Fijian economy (Narayan and Prasad, 2003). In addition, the Islands are blessed with natural scenic beaches. These scenic beaches bring a significant amount of income from the tourism industry. However, whether there are rules and regulations to protect these beaches or not, the beauty of these beaches and their faunal and floral diversity are threatened daily.

Suva is the capital city of Fiji and the second most populated municipality. The city has around 88,000 residents (as of 2009) and the urban area dwells more than 175,000 people. Nasese beach is in the downtown of Suva and it is more to the south eastern side of the city. Even though it is not a white sand beach like many others, Nasese beach is one to witness pollution. Rapid urbanisation and an increase in population in the Suva area have caused many environmental problems. There were some attempts to develop a management strategy to protect the environment; however, (as of 1991) these attempts were not successfully completed due to lack of funds, underestimation of requirements, and lack of concern of timely implementations (Naidu et al. 1991). Even though it is more than 20 years from the UNEP report (Naidu et al. 1991), things haven't changed much. Starting from Suva ANZ stadium and three kilometers along the Queen Elizabeth road to Suva city, about 16 point sources of pollution can be identified. The majority of them are natural water creeks. However, it was not identified whether they were contaminated by domestic or industrial effluents upstream. These creeks look polluted. This is due to the adding of plastic bottles, polythene and other garbage.

"Rapid urbanisation and an increase in population in the Suva area have caused many environmental problems. There were some attempts to develop a management strategy to protect the environment; however, (as of 1991) these attempts were not successfully completed due to lack of funds, underestimation of requirements, and lack of concern of timely implementations (Naidu et al. 1991)."

Figure 1 – Witnessed pollution at Nasese beach on 18 June 2014

Figure 1a shows a pollution intake to the sea whereas 1b shows the accumulation of these pollutants along the coastline. Even though the quality of the water cannot be visually justified from the figures, the aesthetic damage can easily be identified. The damage to the aquatic life is severe and the aesthetic damage is unmeasurable. Therefore, this paper analyses the quality of water of these 16 point sources of pollution and presents the potential damage to the aquatic life. Initially, several water quality parameters, including pH, dissolved oxygen level and turbidity are measured. This is due to the lack of resources and support. However a detailed water quality analysis and its role of faunal and floral diversity are proposed from the outcome of this initial investigation.

Review of the Previous Work

The first recorded work on water quality for the Nasese bay was from Campbell et al. (1982). However, the authors were unable to find the reference for a detailed discussion. Naidu et al. (1991), however, has compared or even implemented the Campbell et al. (1982) work. In March 1987, Naidu et al. have identified 20 sampling sites in Nasese Bay and Suva harbour to carry out the water quality testing (10 for Nasese Bay and the other 10 is for Suva harbour). However these 10 sampling points for Nasese Bay were the same as those used by Campbell et al. (1982), so that a comparison can be made over the 6 – 7 years. Naidu et al. have conducted several sets of experiments from July 1987 to December 1988. Salinity, temperature, total nitrogen, inorganic nitrogen, total phosphorus (dissolved phosphate), trace metals, and some other important water quality parameters were tested for their report. Total nitrogen was found in the range of 0.04–6.8 mg/L; however, the inorganic nitrogen (nitrite, nitrate and ammonia) were found in the range of 10–5000 µg/L. According to their analysis, this range is well above the coral safe inorganic nitrogen, which is in between 90 – 120 µg/L. In addition, Naidu et al. (1991) were able to find low phosphorus concentrations (6–305 µg/L) similar to Campbell et al. (1982). However, the dissolved phosphate levels were higher than the safe levels for corals. These phosphate levels can harm the corals. Corals in high phosphate levels have low skeletal density and therefore, they are weak in strength. In order words, corals can easily die and break. Furthermore, the trace metal studies were carried out by Naidu et al. (1991) for copper (Cu), cadmium (Cd), chromium (Cr), led (Pb) and mercury (Hg). Copper values were above the detection limit and ranged in between 2–39 µg/L. In addition, the cadmium levels were found to be one third of the values above the detection limit. More importantly, the common mangrove oysters (Crassostrea mordax) around Nasese Bay were found to have these trace metals and fecal coliforms form Naidu et al. (1991) experiments.

Conclusions drafted from Naidu et al. (1991) are very interesting. However, it was carried out almost 25–26 years ago. During this time, many things have changed and it is important to know the state of of the water quality in Nasese Bay. Singh and Aung (2008) show some recent results on the Nasese Bay. However, it was only for the salinity, temperature and the turbidity.

Mosley and Aalbersberg (2003) have presented the importance of carrying out water quality analysis along the shores. However, their experiments have targeted the Sigatoka area or the 'Coral Coast'. Mosley and Aalbersberg (2003) have obtained the nitrate and phosphate levels along the Coral Coast and drafted the possible damage to the corals. In conclusion from the above cited papers, it can be clearly seen the importance of water quality testing in any part of the coastal zone in the world. However, because Nasese beach is one of the important beaches in Suva, this paper targets to fill the gap of research work from 1988 to 2014. They have further stated the different water quality parameters to measure for different water types. For example, Fecal coliform, pH, temperature, turbidity, conductivity, total suspended solids, ammonia, nitrate, nitrite, phosphate, hardness, biochemical oxygen demand (BOD), chemical oxygen demand (COD), metals and pesticides should be measured for the surface water. However, this list is changed for the marine water. Total suspended solids, pH and COD are out of the list for marine water.

"The damage to the aquatic life is severe and the aesthetic damage is un-measurable. Therefore, this paper analyses the quality of water of these 16 point sources of pollution and presents the potential damage to the aquatic life. Initially, several water quality parameters, including pH, dissolved oxygen level and turbidity are measured. This is due to the lack of resources and support."

Study Location and Sample Sites

Figure 2 – Identified point pollution sources

"It was observed that there are some direct discharges to the sea from this settlement. Therefore water samples from near shore environment were collected for the analysis."

Figure 2 shows the identified study locations in Nasese Beach. Around the location 1, a small settlement can be found. It was observed that there are some direct discharges to the sea from this settlement. Therefore water samples from near shore environment were collected for the analysis. However it was only possible to collect the samples during the high tide periods. Location 2 (Figure 3) is the (natural?) drain just in front of the ANZ stadium. Even though, Figure 3 shows some organic materials in the drain, we were able to visualise some lively small fish. This gave us a rough indication of the dissolved oxygen level of the drain, which is better for the life of certain species of fish.

Figure 3 – Location 2 on 12th August 2014 at 14:28 hours

Location 3 is a natural creek which flows aside the Buckhurst (Bidesi) park. Three manmade canals at Nasese Park were selected as the locations 4, 5 and 6. The water seems to be from natural creeks. Location 6 is just in front of the Turner House, Nasese.

"Three manmade canals at Nasese Park were selected as the locations 4, 5 and 6."

Figure 4 – Locations 4, 5 and 6 on 14th August 2014 at 14:04 hours

4A) LOCATION 4 | 4B) LOCATION 5 | 4C) LOCATION 6

Location 7 is a manmade drainage just at the starting point (walk from ANZ to Suva city center side) of the Cathedral Secondary School. However locations 8 and 9 are again drainages, which are places at the edge of the Cathedral Secondary School. Location 9 is just in front of the Corpus Christi Teachers College. Drainage in front of the Veiato Primary school is location 10. There is a small hotel (to the left of road from ANZ to Suva city center), located as location 11. It is always better to identify if there is any direct discharge from this hotel to the sea. Therefore, samples were collected from the near sea (just underneath the hotel) and analysed. Drainage along the Suva Primary school is the location 12. There is a natural creek just along the Pacific Theological College and that is location 13. Location 14 is just in front of the Fiji National University's Nasese Campus. There is a bridge near the Kumi road facilitates to walk / drive over the wider natural creek. This natural creek is our location 15. Drainage to the sea shown from Figure 5 in front of the Chinese Embassy is the last identified location. This drainage is from a commercial club. It was found that the water from the drainage is treated by the club.

Figure 5 – Location 16 on 14th August 2014 at 14:51 hours

Water Quality Analysis

Due to lack of resources (laboratory facilities and sufficient funds) and support, the authors were only able to use the "Horiba Multi Water Quality Checker U50 series" instant water quality meter (Figure 6) to measure the several water quality parameters at the above stated locations. Temperature, pH, conductivity, turbidity, dissolved oxygen level (DO), total dissolved solids (TDS), and salinity were among the measured water quality parameters. These tests were carried out during both low and high tides starting on 12th August to 15th August as initial water quality tests.

Figure 6 – Instant water quality testing meter

The water quality meter has to sink in the water at the locations and within 1–2 minute times, the water quality parameters start to record. These data can be safely stored in the meter for later usage. This instrument is quick compared to conducting laboratory experiments for the collected water samples. However it has several limitations, including the limitation that most of the important water quality parameters cannot be measured from this instrument.

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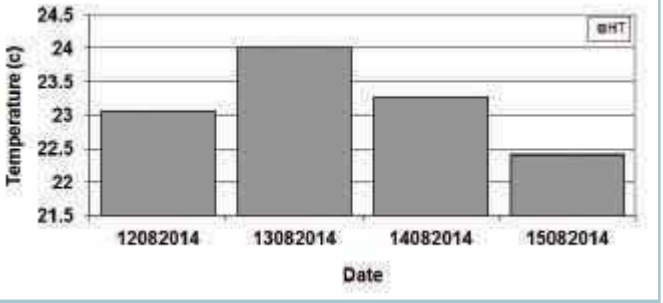
Results and Discussion

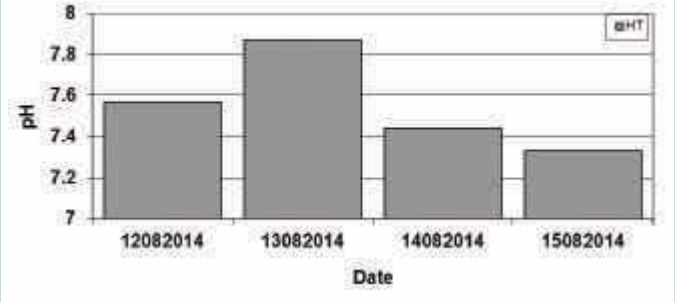
Location 1 was selected to represent the water qualities from the settlement near ANZ stadium. Water quality tests were only carried out during the high tide (HT) and they were for the marine water. Figure 7 shows the water quality data for location 1. During the low tide (LT), it was unable to conduct the water quality tests. During the low tide time, the sea was considerably away from this settlement.

"Water quality tests were only carried out during the high tide (HT) and they were for the marine water. Figure 7 shows the water quality data for location 1."

Figure 7 – Water quality data for location 1



7A) TEMPERATURE



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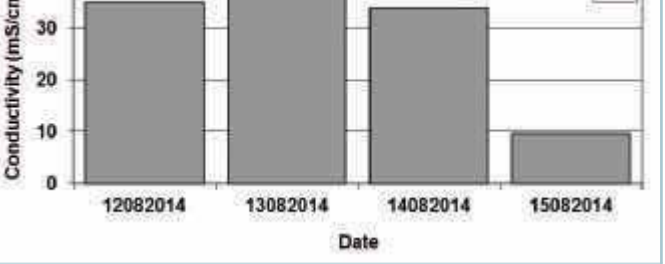

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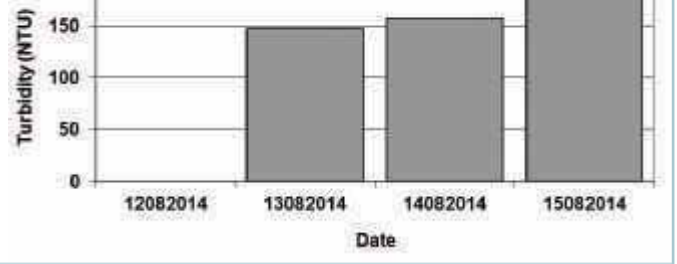
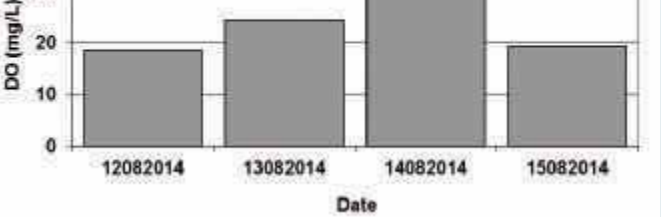
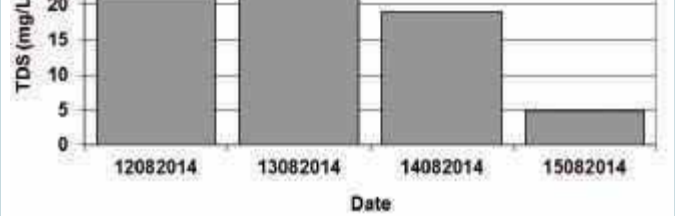


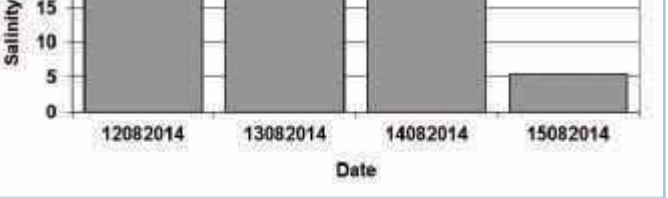
7D) TURBIDITY



7E) DO



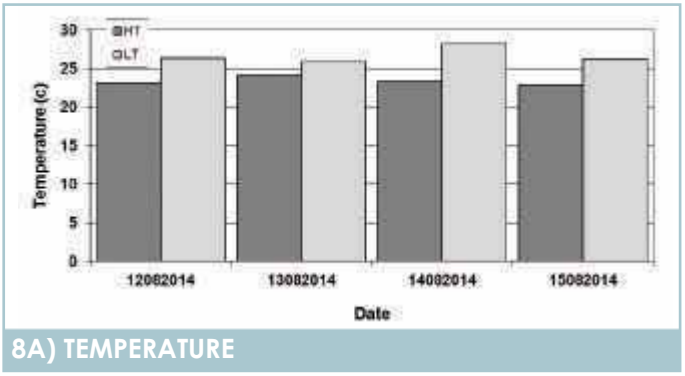
7F) TDS



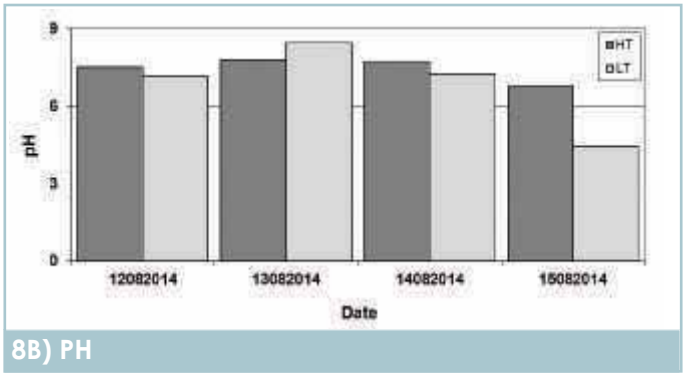
7G) SALINITY

Water quality analysis shows that the pH values for the marine water is well in between the range of 6–9 (Table 4.4.2 NWQMS, 2000). Turbidity levels should be in between 1–20 NTU (Table 3.3.5 NWQMS, 2000) for the estuarine and marine water. However, location 1 shows increased levels of turbidity in the order of 100 NTU. This result would show that the water quality is at a concerning level. However, TDS values are well below the levels that should maintain in the fresh surface water. The upper limit for the fresh surface water is less than 3000 mg/L (Table 4.4.2 NWQMS, 2000) and the values here in Figure 7 are even less than 25 mg/L. The DO levels are higher. DO levels more than 5 mg/L are good for the aquatic lives.

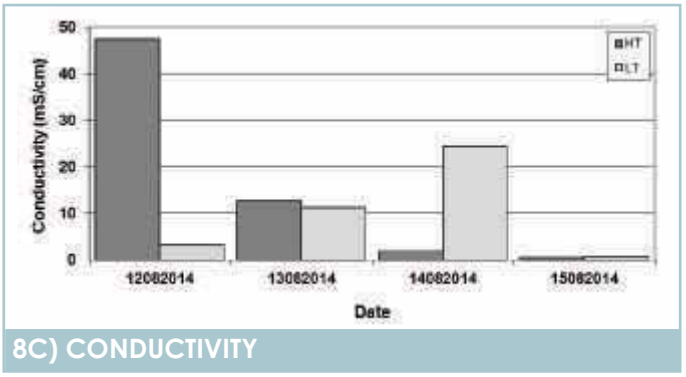
Figure 8 – Water quality data for location 2



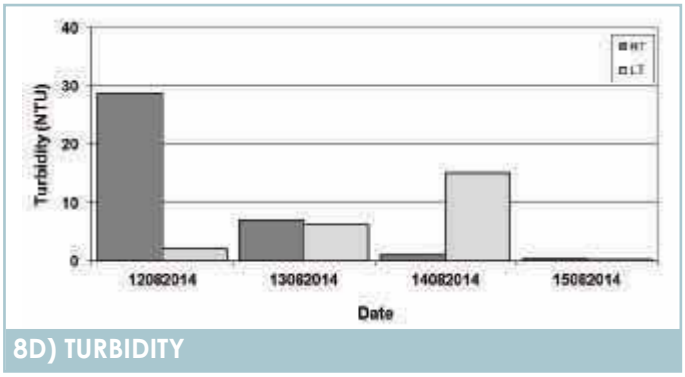
8A) TEMPERATURE



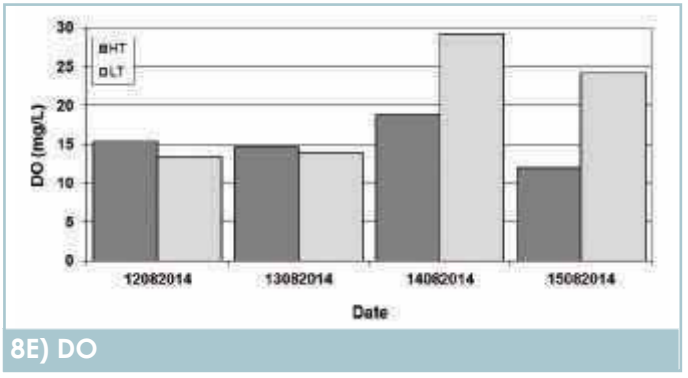
8B) PH



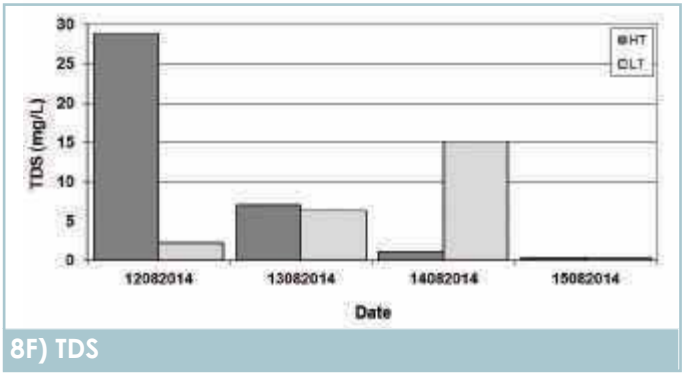
8C) CONDUCTIVITY



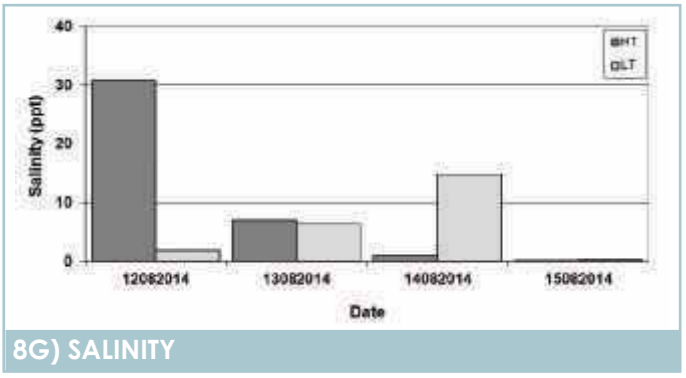
8D) TURBIDITY



8E) DO



8F) TDS



8G) SALINITY

Figure 8 illustrates the water quality data at the drainage in location 2. Apart from one odd reading (pH = 4.45) the pH readings are inside the allowable limits for recreational water. Even though the color of the waste was not pleasant and it was smelly, the DO levels are quite good for the aquatic life. It was observed that one species of fish was living in this water. This is a good practical example for the raised DO levels. However, due to the effects of high tide, increased salinity levels can be observed in the drainage. Figure 9 shows the water quality data for the drainage shown in Figure 5. pH values do not show a considerable variation.

"Even though the color of the waste was not pleasant and it was smelly, the DO levels are quite good for the aquatic life. It was observed that one species of fish was living in this water. This is a good practical example for the raised DO levels."

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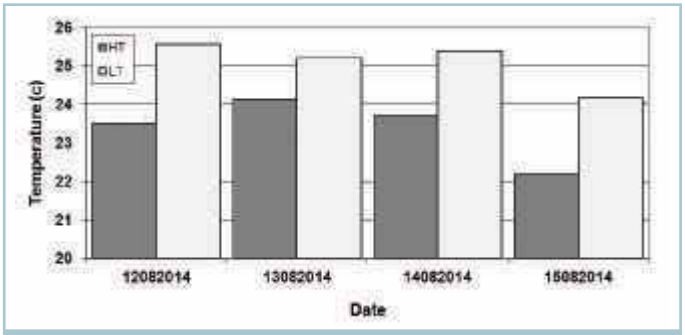
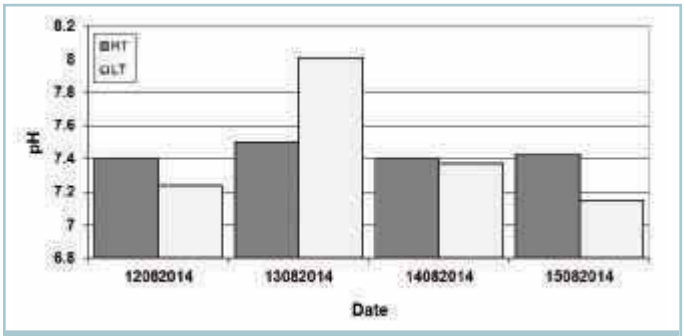
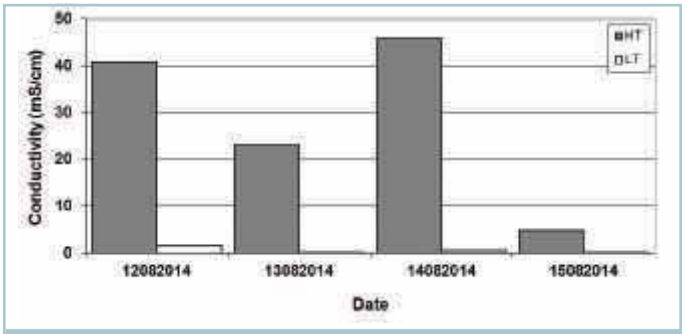


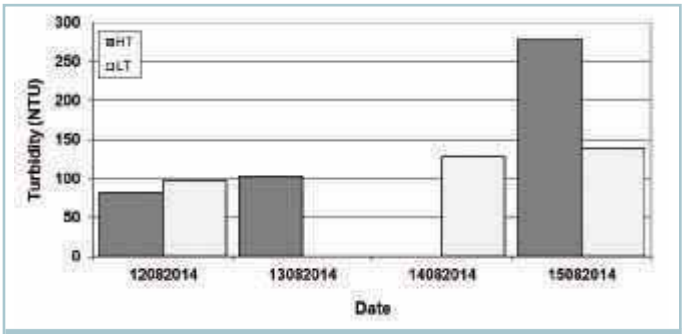
9A) TEMPERATURE



9B) PH



9C) CONDUCTIVITY



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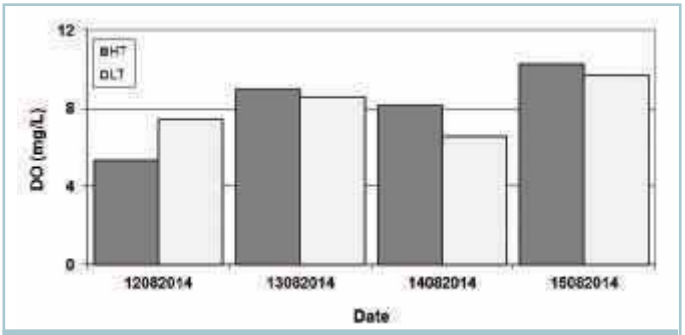
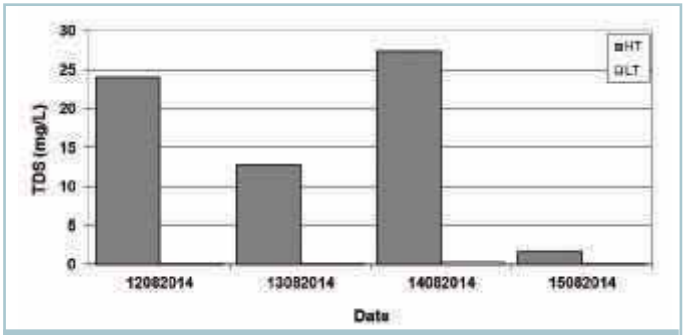
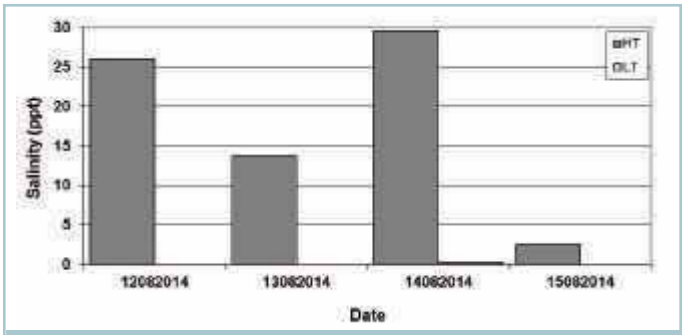


9E) DO



9F) TDS



9G) SALINITY

Figure 9 – Water quality data for location 16

However, the conductivity has a great effect from the high tides. Conductivity variation can be seen in the high tide and low tide from the Figure 9c. DO levels are higher than 5 mg/L (Figure 9e). However, they are towards the lower side (5–10 mg/L). As it was stated above, the water from the commercial club is said to be treated; however, the quality is concerned. Even though, (from these results) it is not possible to draw a sound conclusion on the efficiency of the treated water, it is always better to conduct a detailed water quality analysis to this location. TDS and Salinity levels again reflect the high tides and low tides.

"These corals were naturally broken (due to tidal effects) and washed to the shore. This will indicate the strength of the corals in Nasese Bay."

Furthermore, Figure 10 shows the dead/broken corals near location 16. These broken corals can be easily seen around one kilometer to the sea during the low tide time. Five major types of hard corals were observed. In addition to the hard corals, there were two species of soft corals among the broken corals (Terrence et al., 1996). These corals were naturally broken (due to tidal effects) and washed to the shore. This will indicate the strength of the corals in Nasese Bay. As it was stated in the "review section", high inorganic nitrogen level and phosphate levels can weak the strength of the corals. Figure 10 may be an outcome of such a high inorganic nitrogen or phosphate levels in the sea.

Figure 10 – Broken coral near location 16 (12/08/2014 15:39 hours)

During the low tide, more than 1km towards to the sea is observed. It was found that this site was the most abundant faunal diversity site at the Nasese shore. The diversity of Echinodermata was very high in location 16. Four types of sea urchins, four types of sea cucumbers, two types of star fish and sand dollars were identified (Coleman, 2002&2007, De Bruyne, 2003, Wye, 2007). Apart from them, diversity of gastropods was very high compared to other locations.

On average for the 16 locations, the water quality measurements show that the quality is at acceptable levels. However the water quality data presented here do not provide detailed analyses. BOD, COD, Nitrogen and Phosphates are compulsory for a detailed analysis. In addition, it would be better to conduct the tests for fecal coliforms. It is always better to understand the water qualities in this sensible area and to compare these data with the previously conducted experiments (those were in year 1987).

In addition, 'Mudskippers' were heavily seen at location 3 and 6. Mudskippers usually live in brackish water. Availability of these mudskippers in these two sites suggests that the fresh surface water is contaminated by the sea water due to tidal effects. Furthermore, they are able to live in the polluted water, where most of the other fish would not be able to live (Al-Behbehani and Ebrahim, 2010). They can stay in high ammonia concentrations. Even though these two locations have averagely low DO levels (5–8 mg/L) these mudskippers can survive since they take oxygen from the air. The presence of mudskippers leads the environmentalists to conduct a detailed analysis in the surrounding area. However, the water quality data gathered from this research work are not enough to carry out a good statistical analysis for the water quality at different locations. For a good statistical analysis, it would be better to consider the data sets at least for a year. However, given that there are enough resources and the support, this task would not be in the difficult side.

Conclusions and Recommendations

The DO levels at the checked locations were acceptable for the living aquatic creatures. Phytoplanktons may be readily available and the photosynthesis process may lead to increase the high DO levels. Most of the water quality tests carried out during the high tide were around noon and where the highest photosynthesis rate can be observed. Turbidly, pH and TDS levels suggest that the surface water and marine water have quite acceptable qualities. However, the measured water quality parameters do not provide more details. It can only be concluded that the water quality seems to be at an acceptable level, unless the quality is assured by a detailed laboratory experiments under the standards. Therefore, a detailed water quality analysis for an extended period is highly recommended.

Acknowledgements

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1) Members of Tanui iwi setting down their challenge at the powhiri, 2) A VERY young Murray Gibb being serenaded by the one and only Frankie Stevens, 3) Welcome Reception sponsor Steve Apeldoorn, 4) Murray Gibb giving another one of his speeches! 5) Keynote Mark Enzer starting off the conference sessions, 6) The Stunning *Silhouette* performing at the Conference Dinner, 7) Mark Enzer, Keynote speaker, 8) President Steve Couper opening address, 9, 10 & 11) Delegates enjoying a drink and an opportunity to network at the Welcome Reception, 12) Murray Gibb's final task at the conference, 13) Delegates fully engaged in the topic at hand, 14) Friday forum panel, 15) Opening powhiri, 16) Delegates brainstorming at one of the workshops, 17) Exhibitors and delegates discussing the latest

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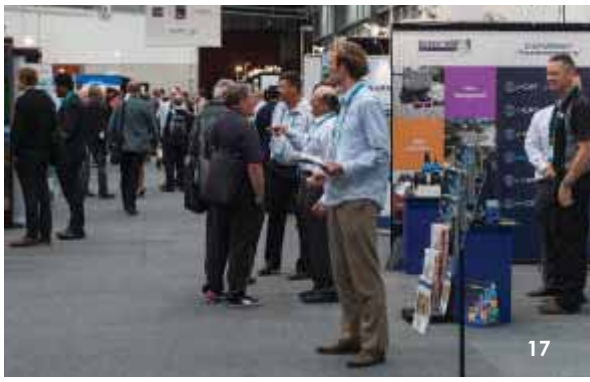
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technology, 18) Members of our hard working Technical Committee, 19) President-elect Brent Manning receives the President's gavel from Steve Couper, 20) The *Water New Zealand* Beauties surrounding the Beast! 21) Keynote Hon Karlene Maywald addressing delegates, 22) The lucky winner of the Surface2 receiving his prize

Drinking Water Fluoridation in New Zealand

Andrew Watson and Lisa Mace, CH2M Beca Ltd

Over the last couple of years fluoridation of drinking water has been in the news a lot. It is a controversial subject, with the battles mainly between the oral health fluoridation advocates and the implacably opposed. For those in the industry responsible for drinking water, it is easy to feel caught in the middle. In this article, we describe some of the background facts about the practice of water fluoridation, summarise the recent significant events surrounding the science and politics of fluoridation, and introduce the responses of the water industry to ensuring that it is practised in a safe way.

Introduction

Fluoridation is the process of adding the micronutrient fluorine to drinking-water (in the form of the fluoride ion) to raise its concentration above the level it occurs naturally in the source water. New Zealand source waters tend to have relatively low levels of natural fluoride.

The Ministry of Health recommends the adjustment of fluoride to between 0.7 and 1.0 mg/L (parts per million) as the most effective and efficient way of helping prevent dental caries (tooth decay) in communities receiving a reticulated water supply.

Fluoride is usually added during the final stages of water treatment. There are three chemicals used for the fluoridation of drinking water. These are:

- Fluorosilicic acid (FSA) – formerly known as hydrofluorosilicic/ hydrofluosilicic acid (HFA), and also known as hexafluorosilicic acid
- Sodium fluoride
- Sodium fluorosilicate (SFS) – also known as sodium silicofluoride

Sodium fluoride and SFS are supplied as powders that are dissolved in water to make a solution that is then added to the water supply, while FSA is supplied as a liquid.

Fluoride is added to the water at a controlled rate relative to the flow through the treatment plant to achieve a target concentration in the treated water. The fluoride concentration in the water that leaves the treatment plant needs to be closely monitored.

Legislation and Standards

There is no legislation in New Zealand that requires the addition of fluoride to a water supply. Fluoridation is undertaken by drinking-water suppliers at their discretion. There are a few acts and standards that impose regulations on drinking-water suppliers that choose to fluoridate.

The *Drinking-water Standards for New Zealand 2005 (revised 2008)* (DWSNZ) specifies a Maximum Acceptable Value (MAV) of 1.5 mg/L for fluoride. Fluoride is classified as a Priority 2 determinand in the DWSNZ. This means that fluoridated drinking water supplies must be sampled at least weekly to monitor the fluoride levels in the water leaving the treatment plant.

The Health Act 1956, as amended by the Health (Drinking Water) Amendment Act in October 2007, aims to protect public health by improving the quality of drinking water provided to communities. The Act requires drinking-water suppliers to take all practicable steps to ensure they provide an adequate supply of drinking water that complies with the DWSNZ and that they introduce and implement water safety plans (WSPs).

WSPs document what can go wrong in the water supply (source, treatment plant and distribution system) and present a risk to public health, what might cause them, what measures should be in place to reduce the likelihood of them happening, and what actions should be undertaken if something does go wrong.

Fluoridated Supplies

There are currently 46 water treatment plants in New Zealand that add fluoride to the water supply and these plants supply 2,133,434 people with fluoridated water (ESR, 2013[1]). This means that approximately 48% of New Zealand's population has access to fluoridated water[2].

Fluoride Sources

All three of the chemicals used for fluoridation (FSA, sodium fluoride, SFS) are used in New Zealand, but FSA predominates.

FSA (chemical formula of H_2SiF_6) is a co-product from the manufacture of superphosphate fertiliser. It is generally not economic to produce in its own right, and so is only manufactured when there is production of fertiliser.

Superphosphate is manufactured by mixing finely ground phosphate rock and sulphuric acid. There are gases given off in this reaction, which are mainly steam and carbon dioxide, but there is also a small quantity of silicon tetrafluoride released. To control the release of this gas to atmosphere a gas scrubber is used as an integral part of the manufacturing process.

Silicon tetrafluoride reacts readily with water, so it is removed from the other gases by a gas scrubber that is essentially a means of

contacting the gas stream with finely divided droplets of water. The reaction with water hydrolyses the silicon tetrafluoride according to the equation:

$$3\ SiF_4 + 2\ H_2O \rightarrow 2\ H_2SiF_6 + SiO_2$$

Impurities in the FSA arise from trace metals present in the phosphate rock and the acid.

All FSA used in New Zealand is manufactured here.

Selection of Fluoridation Chemical

The three chemicals available for fluoridation have advantages and disadvantages. A water supplier has to balance a number of factors when selecting the chemical to use:

- Supply cost of chemical
- Availability and security of supply of chemical
- Capacity of plant (i.e. how much chemical needs to be dosed)
- Capital cost of fluoridation system (different for each chemical)
- Capital costs of providing reception facility for chemical (if one does not already exist)
- Capital costs of providing building to house the system (modifications to existing or new)
- Health & safety of operational and maintenance personnel

The nature of the health & safety risks for the liquid and powder systems are different. The systems present different challenges for effective mitigation of those risks. For example, operators are likely to wear personnel protective equipment (PPE) more often and for longer periods for powder systems because of the greater handling required and the hazardous nature of the dust. If reactive maintenance is required, this is also true for maintenance personnel.

To mitigate the corrosive risks of FSA a greater emphasis needs to be placed on proactive maintenance of FSA systems: the tanks, piping, dosing pumps, electrical and control systems.

Fluorosilicic acid is a Class 8 (corrosive) dangerous good which can cause severe injury if mishandled. Protective clothing is dependent on specific health & safety requirements, but would typically include a face shield, impervious coveralls, full length butyl gloves and boots. Due to the ability of the acid to form corrosive vapours, safe work practices need to be developed for safely dealing with all vapours and spills. Respiratory protection must be worn if there is an inhalation risk.

> "While both district health boards and local authorities have responsibilities for the health of the populations they serve, the decision to adjust the level of fluoride in water supplies is made by local authorities."

Sodium fluoride and sodium fluorosilicate are both Class 6.1 (toxic) dangerous goods. Protective clothing is again required, and would typically include overalls or apron, goggles, impervious gloves and boots. Both chemicals are supplied in powder form and pose a dust hazard. All equipment must be fitted with dust extraction systems, and a dust respirator must be worn if there is a risk of dust inhalation.

Community Decision-Making

While both district health boards and local authorities have responsibilities for the health of the populations they serve, the decision to adjust the level of fluoride in water supplies is made by local authorities. The requirements are set out in the Local Government Act 2002 and the Health Act 1956. Specifically, under Section 23 of the Health Act, territorial authorities have a duty to improve, promote and protect public health, and under Section 25, to provide sanitary works including drinking water supplies.

"The discussion and debate around the value of community water fluoridation is an on-going issue for local government in New Zealand."

The Local Government Act 2002 also provides a framework for local authority decision-making and community consultation. It contains a greater emphasis on community involvement in decision-making than the 1974 Act it replaced and requires councils to take account of:

- Diversity of the community, and the community's interests, within its district
- Interests of future, as well as current communities
- Likely impact of any decision on each aspect of well-being (social, environmental, economic and cultural)

Most areas in New Zealand with fluoridated water supplies commenced fluoridation prior to the Local Government Act 2002.

Under the Local Government Act, decision making by a council can be influenced by persons living outside the city/district as s.78 of the Act requires "A local authority .... [to] give consideration to the views and preferences of persons likely to be affected by, or to have an interest in, the matter". In relation to fluoridation, this means that the views of people outside the water supply area who have neither a financial or public health stake in the water supply system have to be considered. A referendum seems to be the only way to confine influence to those directly affected as outsiders can make submissions to hearings, Annual Plans or other decision making processes. It is important, however, that there is good quality information available to inform the referendum process.

The discussion and debate around the value of community water fluoridation is an on-going issue for local government in New Zealand. Various community engagement techniques have been used to assist in the decision-making process including:

- Council's Annual and Long Term Plan consultation processes – community participation is traditionally low and the views expressed may therefore not be representative of the community as a whole
- Telephone interviews using specialist market research organisations – targets the users within the area of benefit
- Tribunal hearings – community participation is low and process is usually driven by lobby groups, both for and against - provides a platform for non-affected parties to participate in the discussion
- binding and non-binding referendum – there is often a low voter turnout and results may therefore not be representative of the community as a whole

Table 1 summarises the various decision-making processes that have been recently used by a number of local authorities when considering the fluoridation issue (compiled from material sourced from the National Fluoridation Information Service and media releases).

Table 1 – Summary of Recent Decision-Making Processes

Local Authority: Water Supply	Status	Process
Whakatane District Council: **Whakatane & Ohope**	Currently fluoridated	District wide non-binding referendum held in conjunction with 2013 local body election in response to submissions during the Annual Plan process. About 60% voted in favour of fluoridation.
Ruapehu District Council: **Taumarunui**	Fluoridation ceased in 2011	Responses to submissions on the draft 2011–2012 Annual Plan were 16 for and 18 opposed. During the Council hearings the majority of Councillors were in favour as were the Council management, but after an impassioned plea from one Councillor the Council voted to discontinue fluoridation.
Hamilton City Council: **Hamilton City**	Fluoridation ceased in June 2013, recommenced in March 2014	Council decided in December 2012 to hold a tribunal style hearing. Submissions were received during March 2013 and subsequently heard during May and June. In June 2013 Council voted 7 – 1 to cease fluoridation, but when a referendum on the issue was held in conjunction with the October local body election just under 70% of the voters supported the addition of fluoride. A decision to recommence fluoridation was deferred until the outcome of the South Taranaki case was known (refer below). In March 2014: Council made the decision to re-commence fluoridation.
Thames Coromandel District Council: **Thames**	Currently fluoridated	In response to submissions during their 2012–2022 Long Term Plan process and after extensive community consultation the Council voted to continue fluoridation.
New Plymouth District Council: **New Plymouth, Waitara, Lepperton and Urenui**	Fluoridation ceased in 2011	Fluoridation ceased in 2011. Fluoridation budget now being used to fund a community dental health education programme throughout the District.
Central Hawke's Bay District Council: **Waipukurau**	Fluoridation ceased in 2012	In response to submissions during their 2012–2022 Long Term Plan process the Council voted to cease fluoridation.
Hastings District Council: **Hastings, Havelock North and Flaxmere**	Currently fluoridated	In response to presentations to Council from an international anti-fluoride campaigner, and the District Health Board (in support of continuing fluoridation), a binding referendum was held in conjunction with 2013 election. 63% voted in favour of fluoridation.
Hutt City Council: **Lower Hutt (excl. Petone/ Korokoro)**	Fluoridated	In response to submissions to Council, and presentations from an international anti-fluoride campaigner, and the District Health Board (in support of continuing fluoridation) the Council has voted to continue fluoridation.
South Taranaki District Council: **Patea and Waverley**	Currently fluoridated	New Health New Zealand took South Taranaki District Council to the high court arguing that fluoridating water in Patea and Waverley was illegal. Justice Rodney Hansen rejected this and ruled that fluoridation does not constitute medical treatment.

"A referendum seems to be the only way to confine influence to those directly affected as outsiders can make submissions to hearings, Annual Plans or other decision making processes. It is important, however, that there is good quality information available to inform the referendum process."

The referenda in Whakatane, Hamilton and Hastings in conjunction with last year's local body elections showed that when the public are presented with the scientific evidence about the risks and benefits of fluoridation, rational outcomes do result.

South Taranaki District Council was taken to court by an anti-fluoridation organisation called New Health New Zealand. They argued that adding fluoride to drinking water is illegal as they believed that it is in breach of the right to refuse medical treatment. In March of this year Justice Rodney Hansen ruled the fluoridation does not constitute medical treatment. He likened it to adding iodine to salt or chlorinating water. As a result, South Taranaki District Council has continued to fluoridate its Patea and Waverley water supplies.

In July this year Local Government New Zealand (LGNZ) voted to urge the Government to amend the legislation so that the addition of fluoride to drinking water supplies is a decision made by the Director-General of Health rather than a local authority. LGNZ is currently advocating for this change to government.

Currently, New Health New Zealand is seeking a judicial review to force the Ministry of Health to treat fluoridation of drinking water as a medicine and regulate the amount added to tap water.

The Royal Society of New Zealand

In August of this year, The Royal Society of New Zealand and the Office of the Prime Minister's Chief Science Advisor released a major review titled *Health Effects of Water Fluoridation: a Review of the Scientific Evidence*. This document summarised an assessment of the scientific evidence for and against fluoridation of drinking-water. The review found that the levels of fluoride used in New Zealand create no health risks and is beneficial in the prevention of dental decay.

It was also found that there are cost savings that can be achieved particularly in communities of more than 1,000 people with a high prevalence of dental caries. Evidence has shown that drinking-water fluoridation is most cost effective in communities with a high proportion of children, Maori, or people of low socio-economic status. The study concluded that water fluoridation is a good use of taxpayer funds as the savings in dental costs are likely to be more than the cost of fluoride addition.

Good Practice Guide for Supply of Fluoride for Use in Water Treatment

With the help of Ministry of Health funding, Water New Zealand published the third edition of the Good Practice Guide titled *Supply of Fluoride for Use in Water Treatment* in May of this year. The aim of the guide is to provide purchasers, manufacturers and suppliers with minimum physical, chemical and testing requirements for the three fluoride chemicals used for drinking-water fluoridation in New Zealand. The principle for setting limits in treatment chemicals is that

no contaminant in a particular chemical should add more than 10% of that allowable under the maximum acceptable value for that contaminant by the DWSNZ, based on the expected maximum dose of the particular chemical. It covers good practice procedures and equipment use to do with delivery, safety, test methods and quality assurance. The guide can be referenced when providing specifications for the purchasing and receiving of the fluoride chemicals.

Code of Practice for Fluoridation of Drinking Water Supplies in New Zealand

A Water New Zealand produced *Code of Practice for Fluoridation of Drinking Water Supplies in New Zealand* is currently being prepared, with funding once again provided by the Ministry of Health. The document will detail best practice for addition of fluoride to drinking-water to help prevent dental caries, while also minimising the risk of overdosing. It has been predominately based on the *Code of Practice for Fluoridation of Drinking Water Supplies* which is published by the Department of Health, Victoria. In August the draft Water NZ document was circulated for review by fluoride chemical suppliers, equipment suppliers and the larger councils who fluoridate drinking-water. The response from this consultation process was significant and the responses are currently being incorporated into the final version.

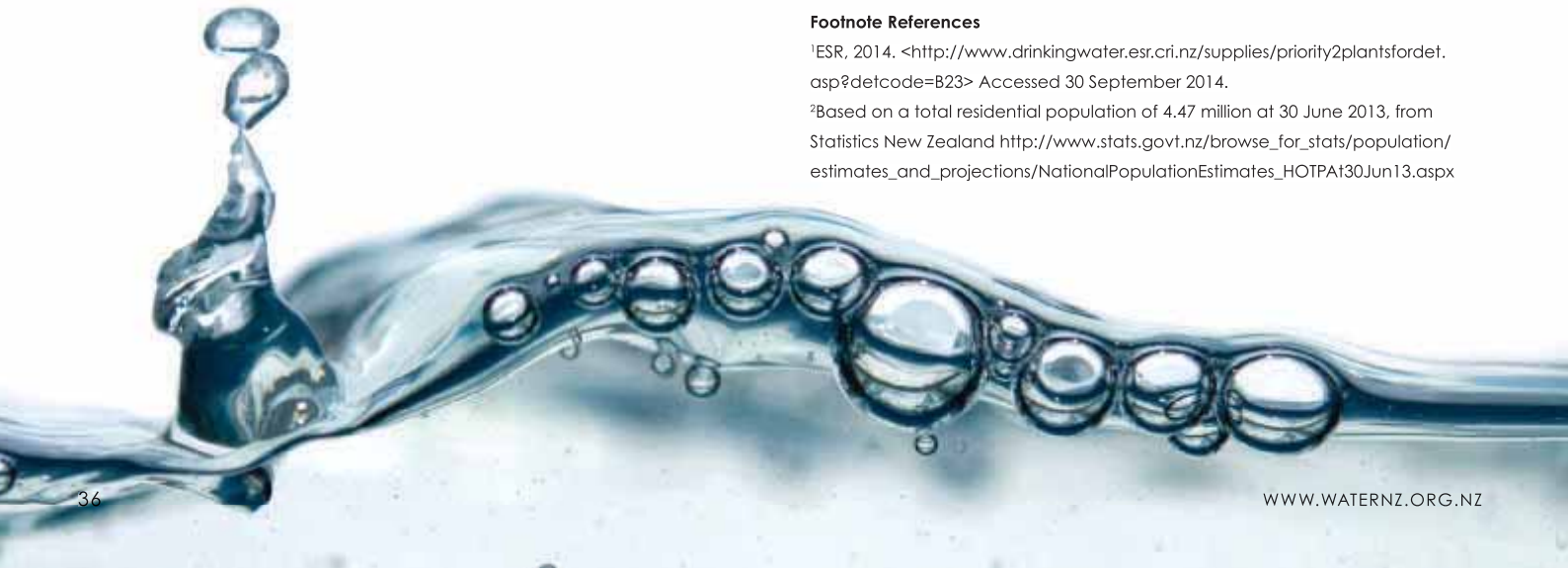
The Code will apply to new and upgraded fluoridation plants. It provides a guideline to the legislative requirements, safety-in-design, design, operation and maintenance, documentation as well as reporting and auditing. It includes the introduction of a system of independent checks which are used as a method for monitoring the fluoride addition. This system allows smaller suppliers to use a simplified and lower cost system, while suppliers that serve a larger population must have a more rigorous monitoring system.

The Code will be published and available for use by the end of the year. ■

Footnote References

[1]ESR, 2014. <http://www.drinkingwater.esr.cri.nz/supplies/priority2plantsfordet.asp?detcode=B23> Accessed 30 September 2014.

[2]Based on a total residential population of 4.47 million at 30 June 2013, from Statistics New Zealand http://www.stats.govt.nz/browse_for_stats/population/estimates_and_projections/NationalPopulationEstimates_HOTPAt30Jun13.aspx



Hey, We Need to Talk

Water New Zealand Backflow Special Interest Group

Unless you have addressed the potential cross connections within a building then installing a boundary backflow device is only half the job done. If the water supplier is unaware of the potential risks within the building and/or the cross connections have not been addressed correctly, then installing a boundary backflow device could in fact place the people within the building at greater risk. If there is only a boundary device installed, the contaminant is kept inside the boundary flowing through smaller pipes and can't be diluted compared to if it had escaped out of the property into the much larger towns mains.

Since the introduction of the Drinking Water Amendment Act, clause 69ZZZ, we have seen a focus on boundary protection by the water supplies. Some may argue, that inaction by local authority building regulators to protect the water as close as possible to the potential contamination, further encouraged the Ministry of Health to develop clause 69ZZZ. As a result, the water suppliers now have a better understanding of backflow. There is no doubt, more and more boundary devices are being installed, this is great. However, there has not been the same level of change noticed with enforcement within the boundary. Water supplies work under the Health Act, while the Building Act is responsible for inside the boundary. In some cases the water suppliers are not fully aware of what is happening within the boundary. This might be because they are only focused on their responsibilities up until the boundary.

Water suppliers and local councils must interact with each other to get a clearer understanding of what is happening within the property and the consequences that are at stake. In doing so we lower the risk and help make the unknown become known. Say no to just going with the flow. Break down any perceived barriers to ensure everything is covered for individual, zone and boundary protection.

Kiwis Leading the Way

Following on from its success with the Testing Standard and the Code of Practice the *Water New Zealand* Backflow Special Interest Group (SIG) now focuses its attention on the importance of an industry standard for backflow surveying. Surveys help eliminate the unknown.

"Water suppliers and local councils must interact with each other to get a clearer understanding of what is happening within the property and the consequences that are at stake."

It is expected that the survey standard will be referenced in G12 – Water Supplies of the NZ Building Code. The survey standard will be of interest to a wide range of people within the industry, in particular council staff members seeking assistance during the consent stages of new connections. The standard will give detailed information on what to be mindful of regarding potential cross connections. Solutions will be offered to ensure the town's mains and the people within the property are protected. To the SIG's knowledge, this will be the first of its kind - certainly in this part of the world.

Residential Risk

For many people the workplace can be considered a second home. Commercial sites are often considered a higher risk than the average residential home. Many backflow incidents are reported in and around commercial properties. Residential homes are also at risk and they too need to be addressed.

"Residential homes are also at risk and they too need to be addressed."

For many years the occurrence of backflow in residential homes was unknown. The American Water Research Foundation, in association with the US Environmental Protection Agency, America Water and the University of Southern California, has completed a report, Determining Vulnerability and Occurrence of Residential Backflow. A very brief summary below is extracted from the report:

"Backflow of water from residential homes into distribution systems is probably more widespread than currently thought and is thus a potential public health concern for the water industry. Analysis of data from backflow sensing water meters has shown that backflow events occurred at a rate of 1.6% of residential services each month, with 5% of homes registering a backflow each year."

Do not underestimate the amount of potential cross connections within a residential home. Bidets, outside hose taps feeding swimming pools or spas, shower hoses that can reach below the flood rim, pull out hoses in sinks or laundry basins are some common risks that we certainly need to be mindful of. It is important that we make every effort to protect the town's main and the water supply within any property.

For more specific details about the American Water Research Foundation report please contact the *Water New Zealand* Backflow SIG.

Theft

Backflow performance standards are designed not only to protect our health but also help eliminate water theft. Council money is the people's money. Many water authorities are in some form or another associated with the council. Water theft is evident. Particular backflow devices are designed to register unwarranted use of unmetered water supplies. These are often referred to as detector assemblies. These detector assembly backflow devices are specifically designed to detect low flows normally associated due to theft from an illegal connection on a fire line. It is not the only purpose of the detector assembly but certainly an important one. Strict performance parameters must be met by the manufactures.

The common way to ensure these low flows are detected is by use of different spring tensions between the main line backflow device and the small backflow device on the bypass line. The bypass line has a water meter whereas the main line does not. Low flows are registered on the meter allowing the council meter readers to become aware of what is happening and address it accordingly.

It is, however, fairly simple to put all this effort to waste and cheat the system. It is as simple as turning off the isolation valves on the bypass line. All flows then go through the main line valve. Turning off the isolation valves on the bypass is made harder when they are locked open. The standard calls for lockable isolation valves and yet for years it has been overlooked. Time we sharpened up.

2015 NZ Backflow Training Seminar

The *Water New Zealand* 2015 Backflow Training Seminar will be held 23 – 24 of April at the Mercure Resort in Queenstown. The event will have international guest speakers and will offer a number of CPD points. The new backflow survey will be discussed in detail. It will be the perfect forum for local council, installers, testers, suppliers and backflow industry experts to come together and discuss a number of important topics. **Registrations are now open** and a discount applies to *Water New Zealand* Backflow SIG members. Now is a good a time as any to become a member and receive all the various benefits of being a member. Please visit the *Water New Zealand* website to view the draft program for the seminar.

There is still time to send the Backflow SIG any specific topics you would like to see covered. We pride ourselves on listening to our members so please send any suggestions to the Backflow SIG Liaison amy.aldrich@waternz.org.nz ■

The information above briefly illustrates the progress the backflow SIG continues to have within the industry. Please continue to interact with the Backflow SIG via the *Water New Zealand* website including the Backflow forum, Facebook page and their liaison Amy Aldrich using one of the following search engines: http://www.waternz.org.nz/MainMenu, http://forum.waternz.org.nz, bsig.nz@facebook.com, or amy.aldrich@waternz.org.nz

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WATER MAIN REHABILITATION

Consider an Alternative – More for Less: Trenchless Southern Water Main Renewal Project in Porirua City

Desmond Scrimgeour – Principal Operations Engineer, Wellington Water Ltd

Introduction

Porirua City Council like many councils, has had the renewal of core infrastructure at the heart of its decision making and it will be a continuing focus for the foreseeable future.

In terms of renewing infrastructure, "Wellington Water" is a unique CCTO formed from collaboration between four Local Authorities and one Regional Authority which are Hutt City, Upper Hutt, Wellington City, Porirua City with Greater Wellington Regional Council to manage the 3 Water networks of Sewer, Water and Stormwater.

Wellington Water is tasked by way of an outcome based model by the client Councils of getting the best value for the rate payer dollar and ensuring it is at the forefront of technology.

This has resulted in Porirua City and Wellington Water, who manage the water assets, being the first in the New Zealand to introduce a structural, stand alone, water main re-liner. The product was Aqua Pipe supplied from Canada and installed by ANZEL Ltd (Aqua Pipe New Zealand Environment Limited)

Background

The original water main considered for relining was laid in the 1950s. It operates at a 1000Kpa, and was required to take a shock loading of 1350kg per lineal meter where it ran 1.7m beneath the rail line. This 250mm line is one of the main trunk lines to the Porirua CBD and western side of the city. As time has marched on, it is now a far different place in terms of access availability than in the 50s.

These days the water main crosses underneath a much larger and busier State Highway 1, passes beneath KiwiRail land and the main Northern trunk line, through Regional Council flood stop banks and

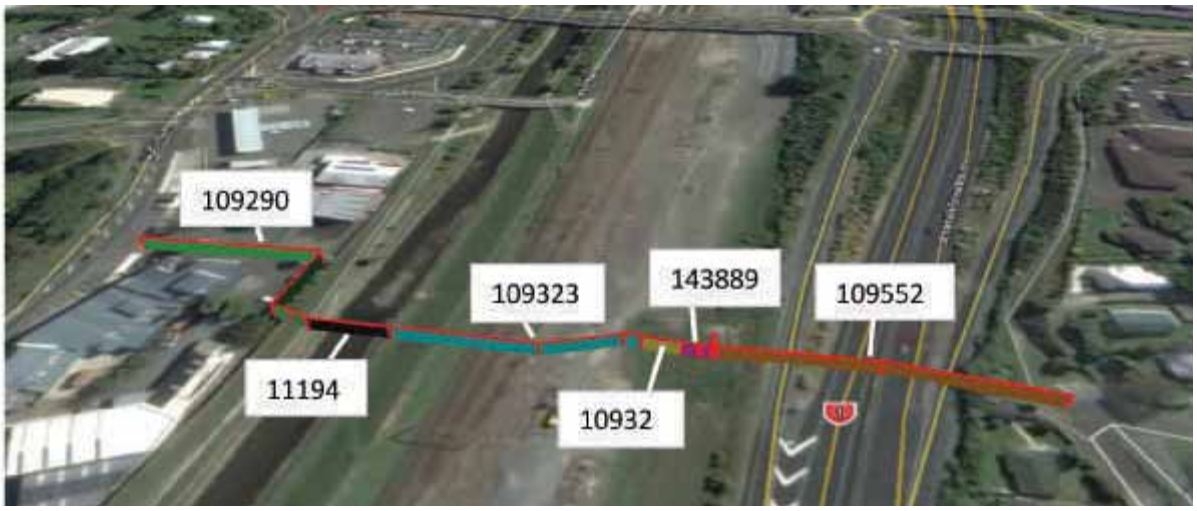
underneath the Porirua Stream. It is one of three vital water feeds to the western side of the city including the Kenepuru Hospital.

The main was a mixture of 250mm AC , cast iron bends, and 250mm concrete lined steel.

A portion of the main within the stop banks ruptured in December 2011 and due to the complexity of the site, the journey began to find an alternative and cost effective structural repair method that did not involve dig and lay.

"In terms of renewing infrastructure, "Wellington Water" is a unique CCTO formed from collaboration between four Local Authorities and one Regional Authority which are Hutt City, Upper Hutt, Wellington City, Porirua City with Greater Wellington Regional Council to manage the 3 Water networks of Sewer, Water and Stormwater."

Stretch of Pipeline to be Relined



From the access pits within the orange and white safety barriers, half of the reline required can be seen. The photo shows the reline underneath State Highway 1 before it continues on under the rail lines, the regional council stop banks and Porirua Stream

Desmond Scrimgeour (right), who managed the water and stormwater networks for Porirua, explaining some of the ever increasing challenges facing the city in terms of renewing its aging infrastructure to Mayor Nick Leggett

"The evaluation consisted of looking at the feasibility of conventional methods of dig and lay and finding a new route where possible by investigating thrusting, slip lining, pipe cracking and directional drill."

New Technology Replaces Old Methods

The conventional methods of dig and lay are fast becoming a redundant and costly form of renewal

Don't think so? Consider the ever increasing costs and time associated with resource consent approvals, design, gaining site access, the unacceptable disruption of the cutting up of roads and carriageways, the increasing costs incurred with finding alternative routes in already congested streets, locating and possibly hitting other utilities, and the large costs incurred with traffic and site management. In addition, the overall disruption of services to residents and commercial businesses due to the conventional construction timeframes it takes to complete such weather dependant projects meant a new alternative was required.

With the option of the old dig and lay in many cities and places now a non-realistic approach or option, yet an ever increasing focus by cities on renewal programmes and upgrading aging infrastructure, new technologies and methods such as structurally relining old pipes has become widely accepted.

Aquapipe structural re-liner, which is used extensively in over 400 cities worldwide, has become one of the most acceptable and economical forms of water main renewal over the last 15+ years. For this project Wellington Water and Porirua City adopted the structural Aqua Pipe lining to upgrade its aging pipes.

The relining process is trenchless and results in a new high quality structural water pipe formed inside the old host pipe.

Some of the benefits Council associated with internally relining old mains with a structural liner compared with the old dig and lay method include:

- Lining pipes that are ever increasingly difficult to access;
- Minimal requirements and costs associated with resource consents if required at all
- Minimal traffic management and disruption
- No future maintenance required with joints
- Little excavation when compared to traditional open cut
- No disturbance of adjacent infrastructure or utilities by work
- Utilising existing infrastructure rather than abandoning mains
- Large sections of roads not compromised
- Less disruptions and complaints from residents and commuters during work period and little to no disruptions to retail businesses;
- Work time frames dramatically reduced
- Cost can be as much as 30–40% cheaper than traditional methods
- Increased pressure and flow capacity
- Corrosion resistance
- Regained structural capacity
- Life span of 50+ years guaranteed, with an expected life of 70+ years
- Little loss of internal diameter, with the liner just 4.5 and 6mm thick
- Mayor, Nick Leggett noted: the end result by introducing this technology means we can do a lot more, for a lot less money, quicker and with less disruptions and end up with high quality renewed water infrastructure

Evaluation and Costings

Two independent consultancies were engaged to evaluate and carry out the tender process. The evaluation consisted of looking at the feasibility of conventional methods of dig and lay and finding a new route where possible by investigating thrusting, slip lining, pipe cracking and directional drill. They were also asked to evaluate the resource consents and access permissions that would be required from the three main parties, NZTA, KiwiRail, and the Regional Council, and then compare that process with a relining option.

The conventional method was costed out at approximately $1.2 million, with a two year planning timeframe to gain resource consents and a new route, and an estimated four month construction period. This estimate did not include any additional longer term costs that would be binding with any conditions of resource consent.

The structural relining proposal was started with requests for expressions of interest, where four parties responded. Three parties formally submitted through the tender process , with the winning tender and contract being awarded to ANZEL Ltd at $324,000 (less than 2/3 of the estimated costings for the traditional method) with a

construction timeframe reduced to three weeks including preparation and off site works.

Construction

Construction started in April 2014 and was complete in May.

The Porirua Works Business Unit, which carriers out the day to day maintenance of the network was also heavily involved in the project, first to learn and understand the process, secondly to access the valve sets and create the access pits for the liner and oversee the day to day servicing requirements to residents.

The main section of liner was pulled through in two sections. First was the Highway from the Eastern side to the middle access pit and then across under the railway line, stop banks and stream.

The liner was pulled, formed and cured in one day and left over night. The main was cured and disinfected and brought back into service without any problems. The lining technique and process proved to be a very effective solution.

Learnings

As with the application of any new technology or technique, there were learning curves all along the way, ensuring that next time the process could be streamlined and further reduce construction timeframes and external costs.

The initial process included finding a cost effective and long lasting new structural pipe renewal alternative to conventional methods. Identifying and fully evaluating a number of available water main relining options in use worldwide, accessing each for its applicability to the local situation, and then working through the full preparation and construction process with all its twists and turns.

Onsite preparation was the key, ensuring once the project got underway, everything and everyone was ready and knew their specific roles.

The process of continuing to provide an uninterrupted service to customers through the works proved problematic at times, but was worked through and overcome by the Works Unit.

Working within the water industry for Wellington Water/Porirua City, there is always a keen interest from client councils, customers, and the much wider industry in getting more for less.

This technology has resulted in many benefits to Porirua City Council including, reduced overall costs, reduced construction timeframes, reduced disruption to residents and commercial businesses, reduced design in finding alternative routes, resource consents and reduced chance of utility strikes.

Formed liner is the white extending out of the old AC pipe.

Most importantly, it proved a cost-effective alternative and enabled the renewal of ageing and critical infrastructure in places where conventional methods would have seriously struggled.

Having worked through this exercise, it is clear that this technology, a well proven method of structural renewal (and used in over 400 cities throughout the world for the last 15 years +) resulting in a structurally new pipe, can become a very cost-effective mainstream renewal option. ■

Performance Ranking of On-Site Domestic Wastewater Treatment Plants

Ian Gunn, On-Site NewZ[1]

Background

The Bay of Plenty Regional Council (BOPRC), Waikato Regional Council (WRC) and Rotorua District Council (RDC) began testing ex-factory on-site domestic wastewater treatment units in 2005 to assess their total nitrogen reduction performance. The objective was to certify treatment performance capabilities for systems to be installed in the Rotorua Lakes (15g/m^3 Tot-N) and Lake Taupo (25g/m^3 Tot-N) catchments. Manufacturers were making unproven claims as to Tot-N reduction performance and with over 30 plus systems on the market the councils needed to be certain that treatment units installed in developments around the lakes would achieve their effluent quality requirements.

Early Testing Trials under BOPRC Management

The first two testing trials [Trials 1 and 2 (2005 to 2007)] were carried out at an unsecured testing facility set up at Rotorua Wastewater Treatment Plant (Figure 1). However, problems with the dosing system and the lack of site security initiated a re-design of the testing facility at the end of Trial 2. Following a major upgrade carried out by RDC in 2007 (Figure 2) a new on-site effluent treatment testing facility (OSET TestFac) was commissioned for Trial 3 (2007/2008).

The OSET NTP

During 2008 SWANS-SIG (the Small Wastewater and Natural Systems Special Interest Group of *Water New Zealand*) negotiated with BOPRC and RDC to utilise the new TestFac for an On-site Effluent Treatment National Testing Programme (OSET NTP). Funding grants from the Ministry for the Environment and the Water Managers Group of *Water New Zealand* facilitated the development and publication of testing procedures. An approach was then made to all local government authorities throughout New Zealand for funding grant support during which some 13 Regional and Territorial Councils were recruited as Funding Partners. OSET NTP operations then commenced with Trial 4 (2008/2009).

Manufacturers/suppliers pay a testing fee, and funding grants cover management and audit costs. The oversight and management structure is shown in Figure 3. SWANS-MAG is the specialist Management and Audit Group appointed by SWANS-SIG which provides oversight of the operations team and audits and reports on all testing results.

Systems Tested

Twenty companies and one council agency (BOPRC) have participated in Trials 1 to 8 from 2005 through to 2013. Some 35 OSET systems have been tested (Figure 4)

- 18 during Trials 1 to 3 under BOPRC oversight and
- 17 during Trials 4 to 8 under OSET NTP oversight.

BOPRC Trial 3 testing results were used to prove the OSET NTP auditing and reporting methods.

The OSET NTP has audited and reported on test results for 21 systems over Trials 3 to 8 (see Table 1 below).

Testing Procedures

Trial 4 testing procedures (the first under OSET NTP oversight) involved:

- 2 month settling in period (biological media development)
- 3 month pre-benchmarking period (nitrification and denitrification development period)
- 3 month benchmarking period
- 1 month high flow test period (with a doubling of flow over one week followed by three weeks recovery)

Samples are taken on a six day cycle so as to cover all days of the week. Dose loading is a 1,000L/day controlled discharge to represent daily flow increments from a typical household.

Table 1 – OSET Units Tested Trials 3 to 8 (2007 to 2013)

Company	OSET Unit	Treatment Process	Abbreviation
Trial 3 (2007/2008)			
Biocycle Holdings, Napier	Biocycle 6300 [development model not available commercially]	SAF	Biocycle
Innoflow Technologies Ltd, Auckland	AdvanTex AX-20 Mode 3	rPBR-T	AdvanTex
Oasis Clearwater Systems, Christchurch	Oasis Clearwater S 2000	SAF	Oasis
Waipapa Tanks, Kerikeri	Waipapa Tanks Maxi-Treat MV-C 3000 (superseded by Econo-Treat)	SAF	Maxi-Treat
Trial 4 (2008/2009)			
Humes Pipeline Systems, Auckland	Humes FR1 [model not currently available commercially]	SAF	Humes
Hynds Environmental, Auckland	Hynds Advanced Lifestyle	SAF	Hynds
WaterGurus (NZ) Ltd, Christchurch	WaterGurus NovaClear	MBR	NovaClear
Waipapa Tanks, Kerikeri	Waipapa Tanks Econo-Treat VBB C-2200 2	SAF	Econo-Treat
Trial 5 (2009/2010)			
Devan Group, Tauranga	Devan Green [model not available commercially]	SAF	Devan
RX Plastics Ltd, Ashburton	Airtech 7000	SAF	Airtech
Innoflow Technologies Ltd, Auckland	AdvanTex AX-20 Mode 3	rPBR-T	AdvanTex
Trial 6 (2010/2011)			
Bay of Plenty Regional Council, Whakatane	BOPRC AWTS NI [Council evaluation of bark-bed denitrification system]	AWTS-NI	AWTS-NI
Quantum Waste Water Systems, Levin	Quantum Eco System	SAF	Quantum
Trial 7 (2011/2012)			
Allflow Equipment Ltd, Nelson	Allflow Klaro 9000 10PE	SBR	Klaro
Trial 8 (2012/2013)			
Aqua Nova NZ Ltd, Auckland	Aqua-nova	SAF	Aqua-nova
Aqua Nova NZ Ltd, Auckland	Aqua-nova NR	SAF-NR	Aqua-nova NR
TechTreat Ltd, Kerikeri	TechTreat SS10	SAF	TechTreat
Ecological Technologies, Auckland	BIOROCK-S	Passive Media	BIOROCK
Findlater Construction Ltd, Nelson	Findlater PA 5x5	SAF	Findlater
Super-Treat Systems NZ Ltd, Kerikeri	Super-Treat NZ12	SAF	Super-Treat
EcoSewerage, Coromandel	Eco Sewerage	Worm-Wetland	EcoSewerage

Treatment Process Key:			
SAF	Submerged aerated filter	**AWTS-NI**	Submerged aerated filter & bark bed denitrification
SAF-NR	Submerged aerated filter & nitrogen reduction	**Passive media**	Gravity dosed patented media layers
MBR	Membrane aerated bioreactor	**Worm Wetland**	Worm based primary treatment & wetland
SBR	Sequencing batch reactor		
rPBR-T	Textile recirculating packed bed reactor		

Performance Evaluation

There are two phases to performance evaluation. First, BOD and TSS results are assessed against AS/NZS 1547 secondary effluent quality requirements [90% samples <20/30g/m^3 BOD/TSS]

Second is benchmarking involving 16 test results from 3 months operation for six effluent quality parameters plus power consumption. Benchmark letter grade ratings are based on median values for effluent quality as per Table 2 below:

Test Results

Of the 21 systems Trials 3 to 8 which the OSET NTP has audited and reported on, three have been withdrawn from the market, one has been superseded by a new model and a fifth is a non-commercial system (BOPRC bark filter unit). Reports are provided to individual manufacturers and Funding Partner Councils and one page "performance certificates" are posted on the OSET NTP web-pages on the SWANS-SIG website for use by members of the public.

Table 2 – Benchmark Rating Indicators

Rated indicators for median value	Rating letters and corresponding effluent quality				
	A+	A	B	C	D
BOD (g/m^3)	<5	<10	<20	<30	≥30
TSS (g/m^3)	<5	<10	<20	<30	≥30
Total nitrogen (g/m^3)	<5	<15	<25	<35	≥35
Ammonia nitrogen (g/m^3)	<1	<5	<10	<20	≥20
Total phosphorus (g/m^3)	<1	<2	<5	<7	≥7
Faecal coliforms (cfu/100ml)	<10	<200	<10,000	<100,000	≥100,000
Energy (kWh/d)	0	<1	<2	<5	≥5

"Of the 21 systems Trials 3 to 8 which the OSET NTP has audited and reported on, three have been withdrawn from the market, one has been superseded by a new model and a fifth is a non-commercial system (BOPRC bark filter unit)."

Meeting AS/NZS 1547 Requirements

Of the 17 commercially available systems audited and reported on during Trials 3 to 8, only 47% met 100% of the BOD_5 and TSS requirements (that is 8 treatment units out of 17) with the other 53% (9 treatment units) meeting only the 90% requirements. This demonstrates that treatment systems at the scale required to handle daily household wastewater flows can exhibit variable performance, even under controlled conditions as at the testing facility.

Two of the 4 commercially withdrawn systems did not meet the AS/NZS requirements and one system did not submit for AS/NZS review

Performance Ratings under Benchmark Testing

The following Charts are derived from the rating tables within the performance certificates available from the website.

Table 3 – Sample Rating Table

Indicator Parameters	Median	Std Dev	Rating	Rating System				
				A+	A	B	C	D
BOD (g/m^3)	7.2	4.7	A	<5	<10	<20	<30	≥30
TSS (g/m^3)	4.5	7.2	A+	<5	<10	<20	<30	≥30
Total nitrogen (g/m^3)	18.4	2.5	B	<5	<15	<25	<30	≥30
NH_4- Nitrogen (g/m^3)	2.91	1.14	A	<1	<5	<10	<20	≥20
Total phosphorus (g/m^3)	4.23	0.55	B	<1	<2	<5	<7	≥7
Faecal Coliforms (cfu/100mL)	75,500	29 x 10^3	C	<10	<200	<10,000	<100,000	≥100,000
Energy (kWh/d) (mean)	1.55	--	B	0	<1	<2	<5	≥5

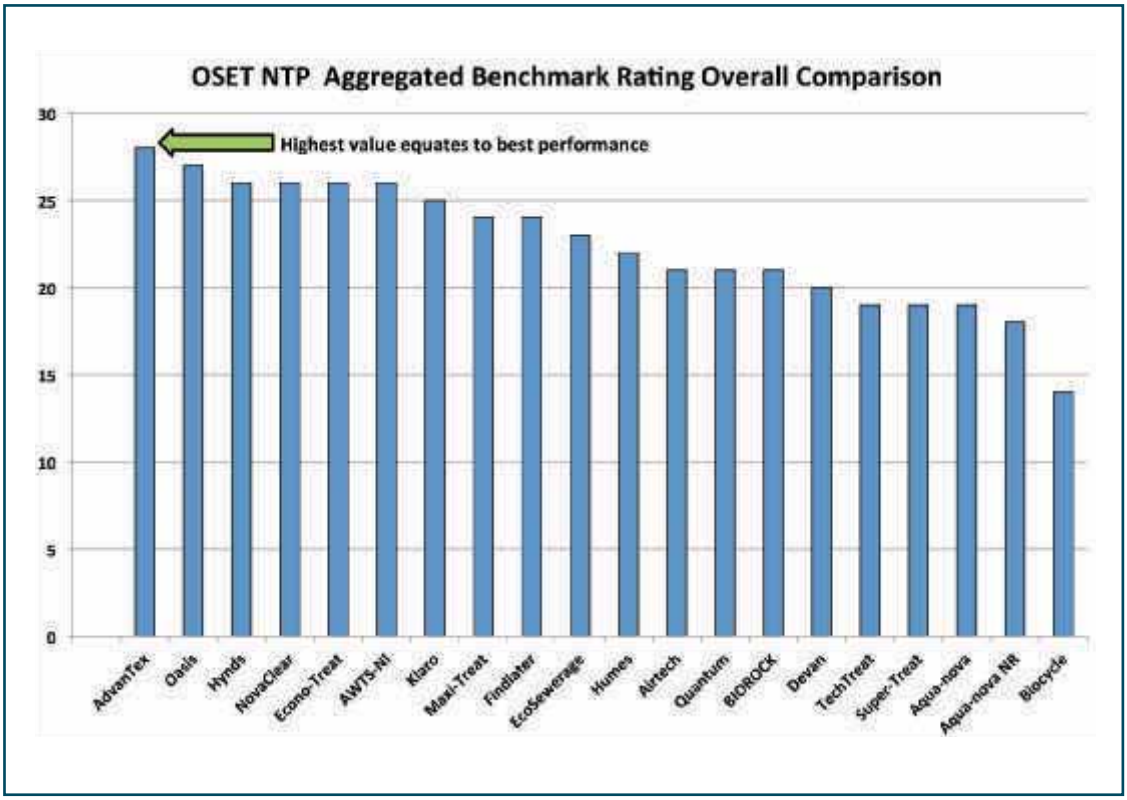
Aggregated benchmark rating

The aggregated benchmark rating overall comparison (Chart 1) is based on scoring A+ at 5, A at 4, B at 3, C at 2 and D at 1. For example the sample rating table below (Table 3) has a score of 24.

This aggregated benchmark rating can also be converted to a "Performance Star Rating" as set out in Chart 2.

Chart 2 shows that the AdvanTex recirculating packed bed reactor textile filter and the Oasis submerged aerated filter are the top performing treatment units at a Five Star Plus rating.

Chart 1



Treatment performance stability

The median values of benchmarked parameters have been used in Chart 1 to rank the aggregated performance. However it is the standard deviation which indicates the variability of results. The higher the standard deviation the less stable the treatment performance related to an individual parameter. If the standard deviation values are summed for each of the five chemical parameters then a comparison between the summed values can be made. This comparison is set out in Chart 3.

Chart 2

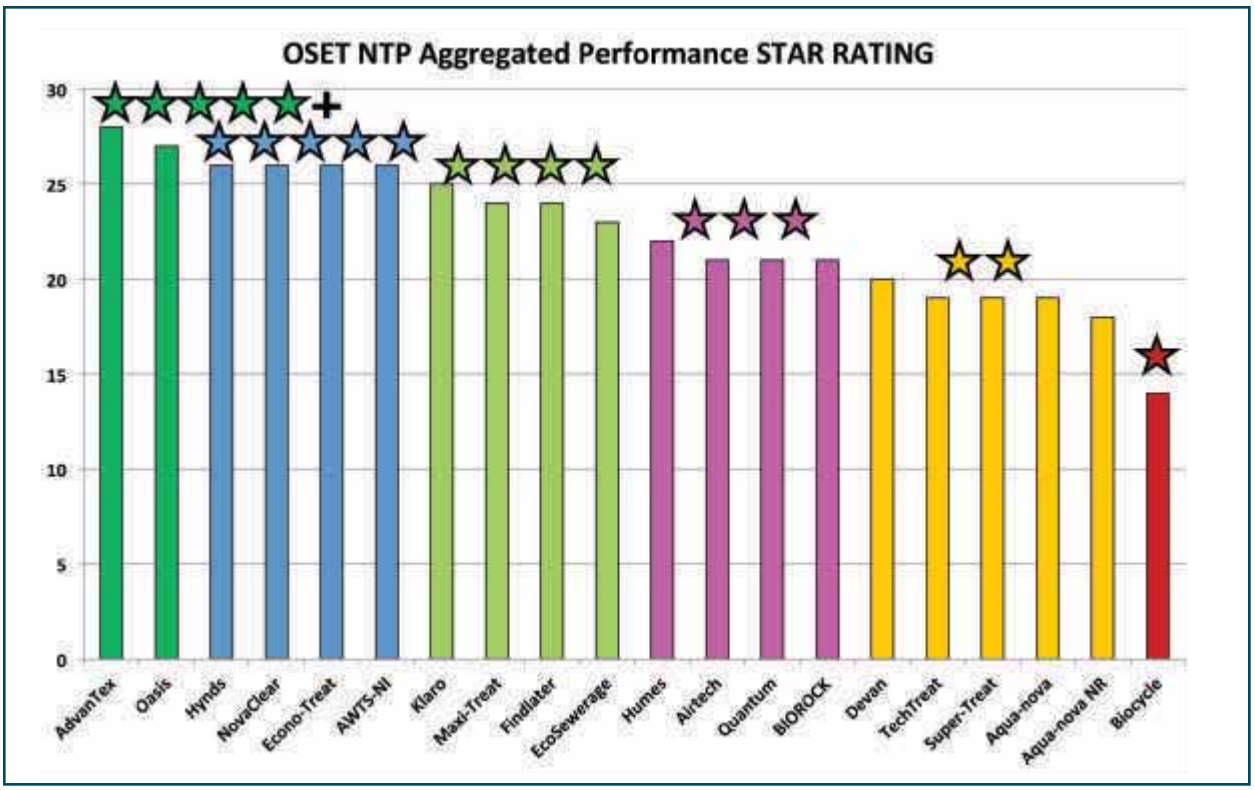
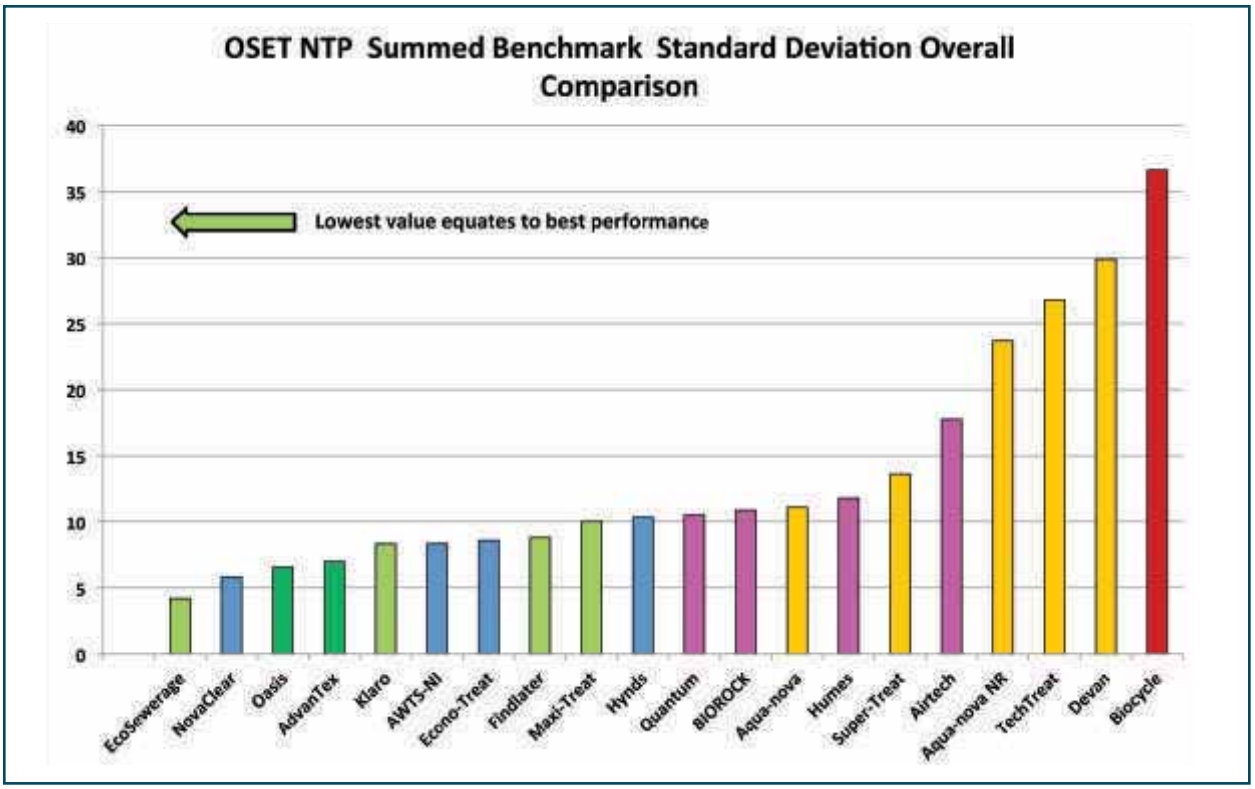


Chart 3



The EcoSewerage worm-wetland and the NovaClear membrane bioreactor are the most stable ahead of the two Five Star Plus treatment units.

Aeration performance

The effectiveness of aerobic treatment (as supported by the aeration system) is best assessed via the ammonia oxidation (nitrification) performance of a treatment unit. This is indicated by the treated effluent ammonia concentration, with low NH_4-N values indicating high aeration performance. Chart 4 compares the benchmark effluent NH_4-N values for each treatment unit.

The six best aeration performance systems in terms of ammonia reduction involve four submerged aeration filter units (Oasis; Hynds; Maxi-Treat; Findlater), a sequencing batch reactor (Klaro) and a textile recirculating packed bed reactor (AdvanTex).

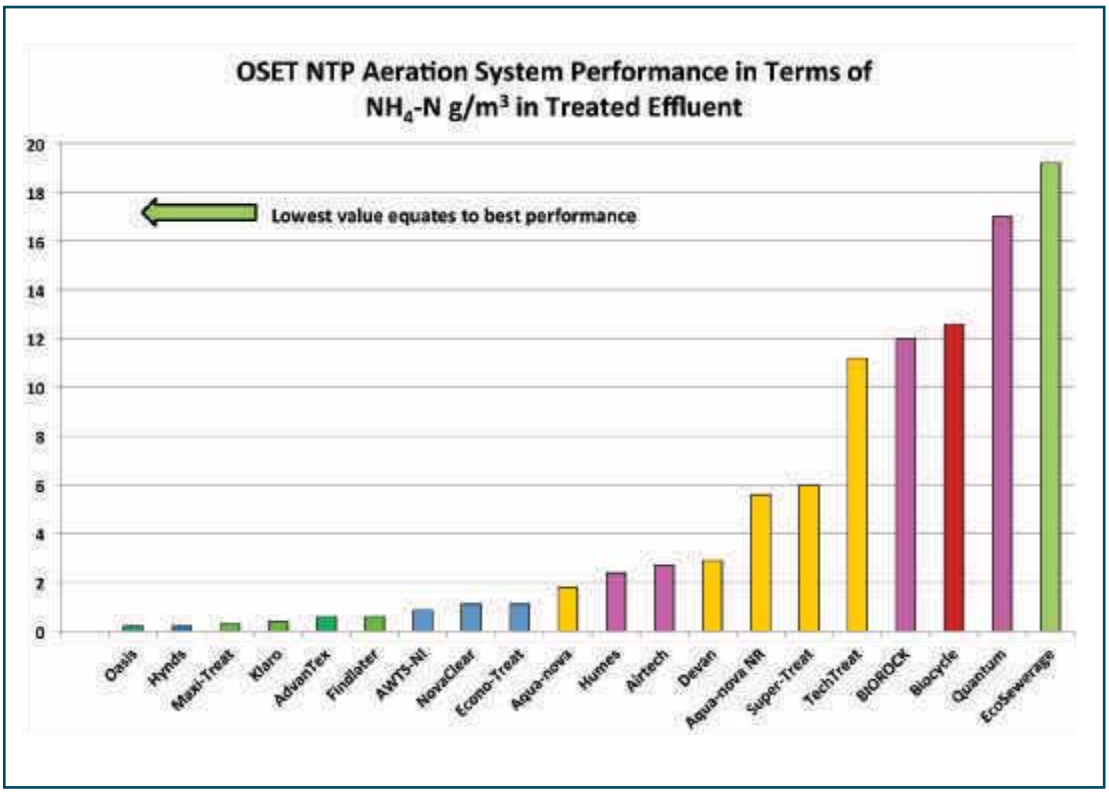


Chart 4

Those treatment units with very high aeration performance need to be checked out as to their energy use as they may in practice be "over-treating".

"The median values of benchmarked parameters have been used in Chart 1 to rank the aggregated performance."

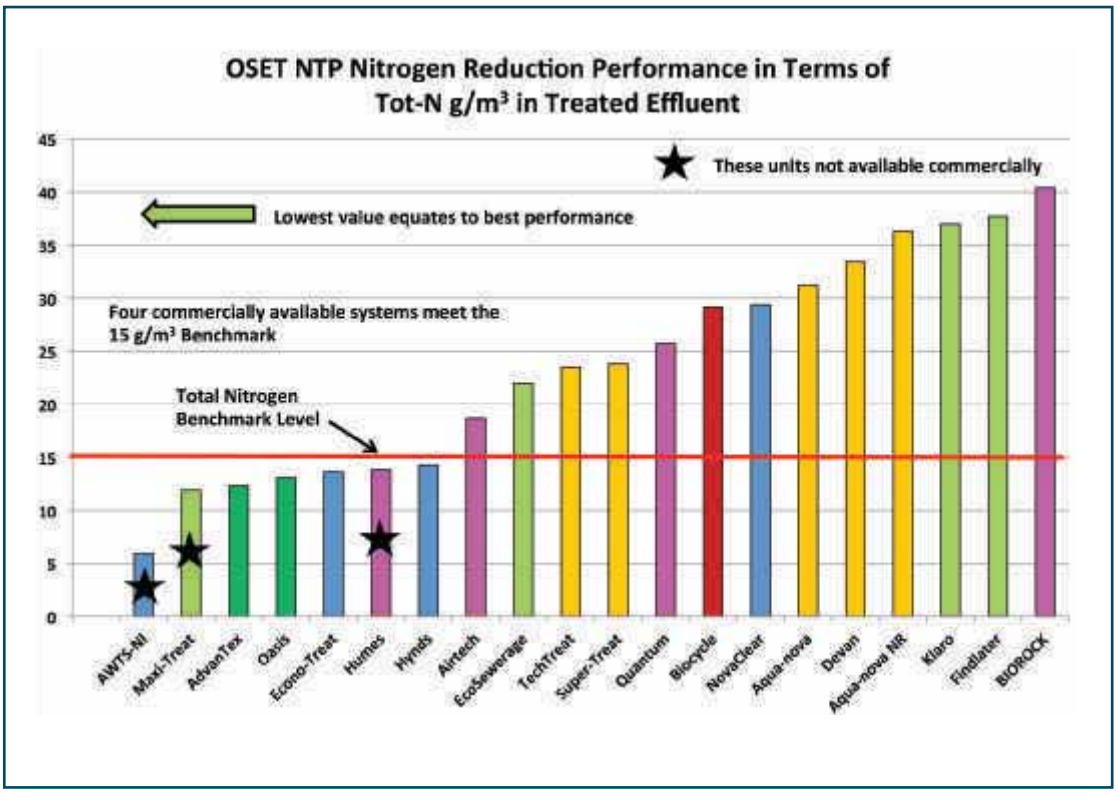


Chart 5

Nitrogen reduction performance

The nitrogen reduction performance is important for some councils in implementing nutrient management practices for rural residential development. For example only those treatment units with a total nitrogen rating of A or A+ meet the BOPRC 15g/m³ TN limit for installation of OSET units in the Rotorua Lakes areas. Currently only four commercially available systems achieve this treatment level (as shown in Chart 5 for Advantex, Oasis, Econo-Treat and Hynds).

Energy use

In selecting an OSET system for their property a key element in homeowner evaluation of alternative treatment systems will be capital cost, along with running cost. The OSET NTP testing results assist in evaluating running costs via the average daily energy benchmark value. It is important to recognise that the kWh/day benchmark values do not indicate likely field performance. The overall energy rating of a treatment unit reflects conditions at the test facility – power consumption for effluent pumping under field conditions will be specific to the irrigation distribution system as installed.

Chart 6 compares the benchmark kWh/day average daily energy use for each system. The five lowest energy use units include two with passive ventilation systems (BIOROCK and EcoSewerage) a textile recirculating packed bed reactor (AdvanTex), a sequencing batch reactor (Klaro) and a submerged aerated filter (Quantum).

Overall energy consumption needs to be compared to aeration performance since over-aeration will result in high consumption without necessarily achieving the most appropriate effluent quality level. Chart 6 shows that of the two Five Star Plus units, Oasis (the SAF system) uses twice as much energy as the AdvantTex (textile filter). The Five Star AWTS-NI has high energy use due to the aeration system over-treating to achieve high nitrification (ammonia reduction) prior to nitrogen stripping in the bark filter. The other Five Star high energy use system is the NovaClear MBR unit.

The lowest energy use systems are the BIOROCK passive media system and the EcoSewerage worm-wetland which use gravity flow through media to achieve treatment. Their energy use relates mainly to the irrigation pump for treated effluent.

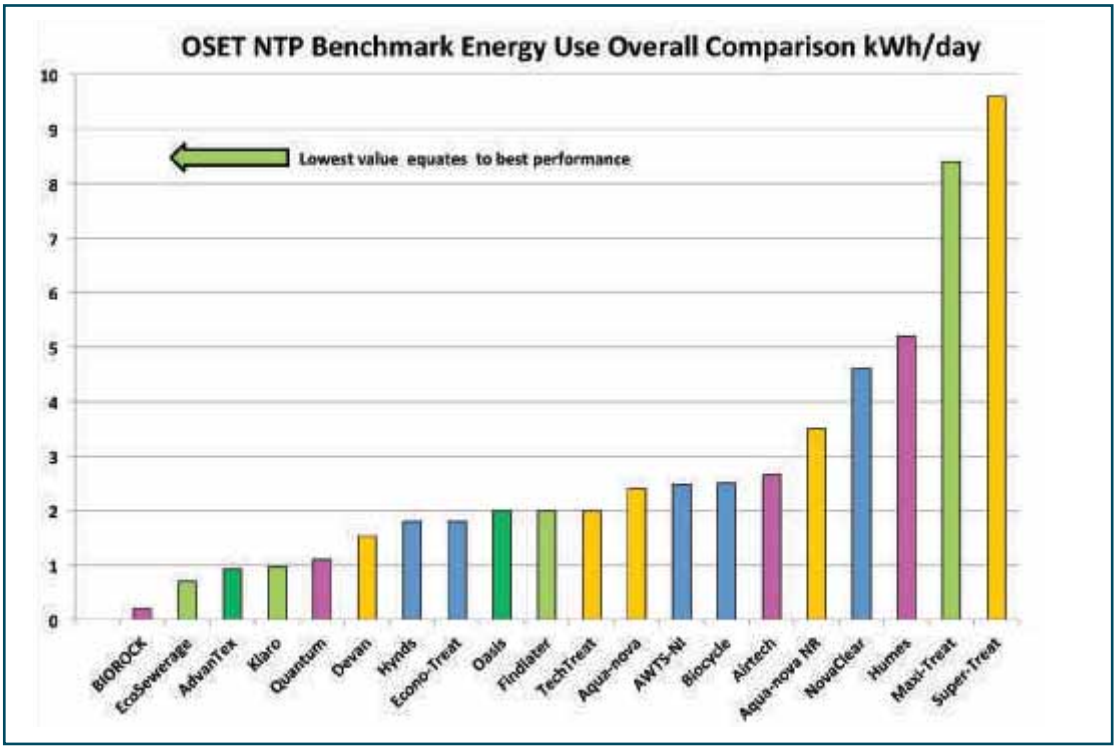


Chart 6

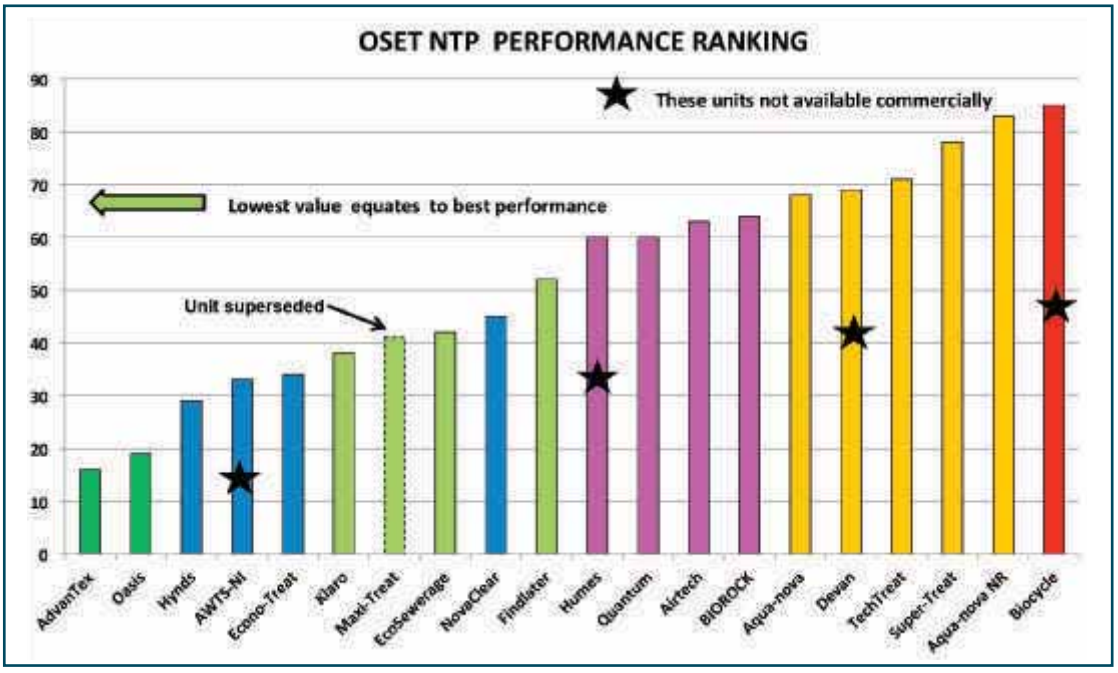


Chart 7

Overall Performance Ranking

It is not feasible to say which of the tested units is the "best" as many factors will influence overall selection for a specific application. Cost is important to homeowners who want to ensure a durable system which provides consistent treatment performance throughout the life of the unit. Lifecycle cost including for capital, operating and maintenance expenditure is important, but it must be recognised that the overall performance of the on-site wastewater system includes not only the treatment unit but the land application system into which the treated effluent is distributed.

However, an overall performance ranking can be derived based on scoring the individual units for each of the parameters in Charts 2 to 6 (aggregated benchmark rating; treatment stability; aeration performance; nitrogen reduction; energy use) by taking the place in each chart and scoring a 1 for first place down to 20 for last place, and summing the place scores for each unit. The result is an OSET NTP Performance Ranking as in Chart 7 below.

"The key to the future success of the testing programme lies in recruitment of more Regional and District Council funding partners."

The Five Star Plus units confirm AdvanTex as highest performance ranking over Oasis due to the Oasis higher energy use. The Five Star NovaClear has moved to a much lower ranking due to the high energy use inherent in this MBR process.

Conclusion

The operational procedures and benchmark auditing processes of the OSET NTP are proving most valuable in evaluating the performance of ex-factory and custom built on-site domestic wastewater treatment units available in New Zealand.

The current success of the NTP is due to the voluntary input of the SWANS-SIG members participating in the operations team and the management and auditing group. The whole OSET NTP programme is a "bottom-up" process driven by members of SWANS-SIG with no funding base other than the testing fees paid by manufacturers and the voluntary contributions from council Funding Partners.

The key to the future success of the testing programme lies in recruitment of more Regional and District Council funding partners. The information coming out of the testing programme as made available to funding partners is invaluable to council consenting officers in assisting their evaluation of treatment units for which consent is required, and assessing what monitoring and maintenance conditions need to be set on specific units relevant to their OSET NTP performance outcomes.

Ideally if all councils throughout NZ with significant numbers of on-site domestic wastewater systems join up as Funding Partners adequate funds would be available to move the OSET NTP operations to a secure professional basis and enable development of additional programmes including field testing, holiday load testing and product integrity testing. ■

Footnote Reference

[1]On-Site NewZ is an Information Service for the NZ On-site Domestic Wastewater Industry www.onsitenewz.wordpress.com

Top – Figure 1 – Trials 1 and 2 Testing Platforms (2005 to 2007);
Above – Figure 2 – New Testing Facility from Trial 3 (2007/2008)
(Note: Figures 3 and 4 shown on page 54)

Figure 3 – OSET NTP Management Structure

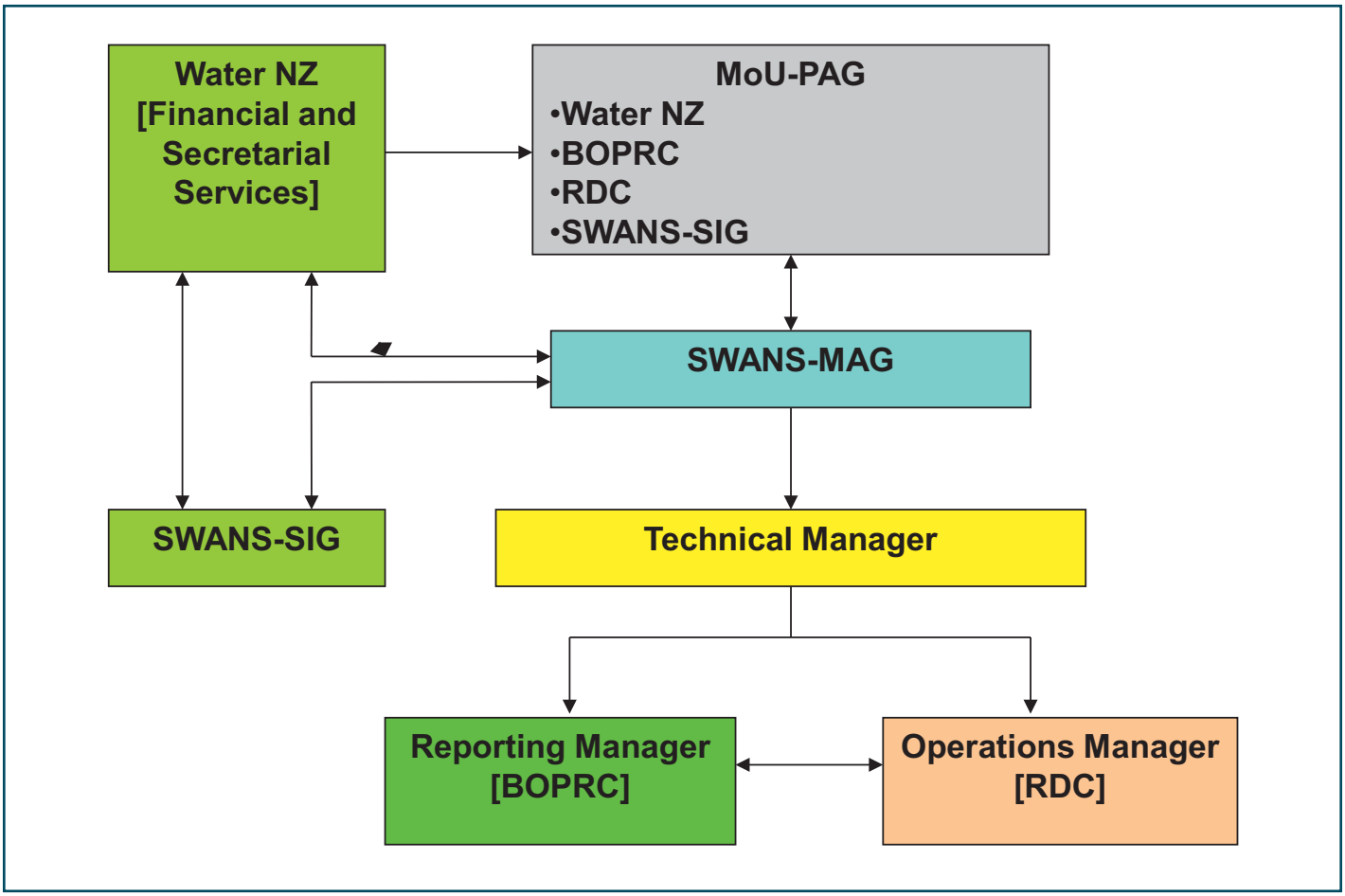


Figure 4 – Systems Tested Trials 1 to 8, 2005 to 2013

Company [and number of units tested]	BOPRC Management			OSET NTP Management				
	Trial 1 2005/06	Trial 2 2006/07	Trial 3 2007/08	Trial 4 2008/09	Trial 5 2009/10	Trial 6 2010/11	Trial 7 2011/12	Trial 8 2012/13
Allflow Equipment [1]							1	
Aqua Nova [2]								2
Biocycle Systems [1]			1					
Biolytix [1]	1							
Bio-Microbics – Smith & Loveless [2]	1	1						
BIOROCK – Ecotechnologies [1]								1
Devan Plastics [3]	1	1			1			
Eco Sewerage [1]								1
Findlater Construction [1]								1
Humes Pipeline Systems [1]				1				
Hynds Environmental [3]	1	1		1				
Innoflow Technologies [3]	1		1		1			
Oasis Clearwater Environmental [2]	1		1					
Quantum Waste Water Systems [1]						1		
Reflection Treatment Systems [1]		1						
RX Plastics [3]		2			1			
Super-Treat Systems NZ Ltd [1]								1
Tech Treat Ltd [1]								1
Waipapa Tanks & Waste Treatment [4]	1	1	1	1				
Water Gurus NZ Ltd [1]				1				
BOPRC [1]**						1**		
Total [35]	7	7	4	4	3	2	1	7

** BOPRC is not included as a "Manufacturer/Supplier" in the NZ Directory of commercial systems.

Mott MacDonald Makes a Splash in the New Zealand Water Market

In March of this year water specialist engineering firm AWT Water joined engineering consultancy Mott MacDonald Group. The merger was driven by a desire to provide a broad range of water services to the Australasian public and private sectors with the ability to deliver on projects of all scopes and scale.

"AWT very much shares our culture of professional excellence and innovation, looking to provide value-added solutions and the best technical, sustainable, and commercial outcomes for their clients."

With over 40 years' experience in New Zealand and Australia, Mott MacDonald is one of the leading global providers of engineering services across a range of industry sectors.

Group Chairman Keith Howells said this experience coupled with AWT Water's innovation and local project delivery track record will provide a combined 60 years' of specialist water industry experience and the shared values of quality and exceptional service. AWT Water and Mott MacDonald's integrated service offering has delivered a successful first six months since the merger.

"AWT very much shares our culture of professional excellence and innovation, looking to provide value-added solutions and the best technical, sustainable, and commercial outcomes for their clients", said Mr Howells.

Mott MacDonald's resources are delivering and realising systems for the benefit of generations to come with specialist water services including:

- Collection
- Conveyance
- Water Treatment
- Reuse and residuals incorporating water
- Wastewater (industrial and municipal) ■

Last Minute Tenders – The Essential Guide to Writing Winning Tenders in a Rush

Caroline Boot, Plan A Tender Specialists

In a perfect world, Requests for Tender (RFTs) arrive when you have nothing else to do, and clients give you lots of time to complete them.

Sadly, most often there's a tight deadline, the RFT is different from previous ones, and you're simultaneously fire-fighting in your day job.

This article gives some guidelines for the best activities to invest your limited time in, to submit compliant, contract-specific, high-scoring bids at short notice.

Get the Structure Right

Make sure your top level headings and your subheadings line up with those in the RFT documents. Write something under each heading, and include all the forms they prescribe.

Write a Strong Executive Summary or Covering Letter

Your covering letter should reassure the evaluators that you understand their priorities; highlight the critical success factors on the contract; and state your case logically and powerfully.

Inject Client Focus Into Key Areas

Make sure you highlight what the client is specifically looking for in this contract for this attribute. That's what they want to hear, not vague generic statements that aren't relevant to this contract's critical success factors.

Make Sure No Previous Bid Names or Irrelevant Material is Left In

Make no mistake – everybody cuts and pastes attribute information – there's no point reinventing the wheel. But leaving the name of the last contract or principal is a red rag and will have you eliminated fast.

Check Your Pricing Carefully

It's up to you to check that your price is complete and accurate, or you risk losing the job or losing money on it. It's that simple.

If that's all you have time for, then throw it all together, submit it on time and cross your fingers that your competitors are worse organised that you are.

However, you can handle short-notice proposals much better, by some simple preparation. Here we suggest some activities to do between tenders, so you're ready to hit the ground running when the next bid lands.

Get Feedback on Your Bids

You should always ask to debrief after the evaluation. Come prepared with specific questions on how you can present a stronger case in your lowest-scoring attributes. If you're not winning much, then get an independent professional who understands the NZ tendering environment to review one or more recent bids, and make recommendations on how to get better scores.

Get Training in Writing Tenders

Even experienced internal bid writers seldom see bids from other companies. Learn about best practice in tendering today, within New Zealand, from professional specialists.

Manage Your Inputs and Reviews Carefully

Most bidders get reviews and inputs from their senior team far too late in the process. By getting their inputs into your strategy session and your executive summary, you'll get real value from their reviews later in your process.

Pull Together Good Base Tender Material

Develop strong base attributes – project descriptions, CVs, methodology statements. Have covers and tabs designed and printed; so next time, you can deliver a strong, competitive bid document in a jiffy. And boost your win rate! ■

Caroline Boot

Tracer wire with SnakeBite connector

Copperhead Copper-Clad Steel Tracer Wire

Locating non-metallic underground services has always been a challenge. Changes in pipe materials and laying methods are set to compound the problems even further. With the introduction of flexible polyethylene piping and directional drilling, straight lines could be a thing of the past unless gravity-fed, pipe depth can change dramatically over short distances.

"With the introduction of flexible polyethylene piping and directional drilling, straight lines could be a thing of the past unless gravity-fed, pipe depth can change dramatically over short distances."

Tracer wire when laid with non-metallic ducts and pipes offers a viable solution for reacquiring service lines for above ground utility mark out. By energising the tracer wire with an electrical signal, the service path can be easily traced.

Available for the first time in New Zealand, Copperhead copper-clad steel (CCS) tracer wire is set to raise the bar on the performance of buried tracer wire. Unlike solid or stranded copper, CCS tracer wire offers significant benefits in costs saving and performance. Copperhead tracer wire is less expensive, lighter in weight, and is available in a range of tensile strengths. These advantages all come without sacrificing electrical performance or signal carrying capability, according to Innes Fisher, Managing Director of Utility Location Services. Coated in High Density Polyethylene (HDPE), Copperhead tracer wire is also manufactured to last.

"There's a Copperhead tracer wire for almost every situation", said Mr Fisher.

"Whether open cut trenching or directional drilling, there will be a tracer wire that fits the situation. Copperhead even caters for the harshest of installation methods with their SoloShot Extreme tracer wire developed specifically for pipe bursting", he said.

The Copperhead product set goes beyond just a range of tracer wires, providing a complete system that ensures long-term and accurate traceability of services. With correct installation, grade-level or above ground test stations, simple 'no strip' connectors, and grounding anodes, the Copperhead system ensures pipes can be easily relocated and tracked years after laying.

"Proper installation of tracer wire is critical to long term traceability." said Mr Fisher.

"It's not just about throwing a wire in the ground now and letting someone else worry about it in years to come. Poor installation of tracer wire is almost as frustrating as not finding any at all." he said.

"Available for the first time in New Zealand, Copperhead copper-clad steel (CCS) tracer wire is set to raise the bar on the performance of buried tracer wire. Unlike solid or stranded copper, CCS tracer wire offers significant benefits in costs saving and performance."

"A professional utility location technician will tell you about the importance of proper tracer wire grounding, assuming of course you can find the end of a wire to connect to." ■

For more information, contact Utility Location Services, +64 7 853 6453 or email sales@utilitylocation.co.nz

Hach Company Acquires BioTector

An Ireland-based affiliate of Hach Company has acquired BioTector Analytical Systems, Limited located in Cork, Ireland. BioTector designs and manufactures Online Liquid Analysers and is a global leader in Total Organic Carbon (TOC) Analysis.

Hach has been a key distribution partner for BioTector since 2010, contributing to the growth of its TOC product line. TOC is an important parameter for municipal and industrial customers globally and BioTector has established a leadership position in this area based on its innovative oxidation system, deep applications insight and outstanding quality record.

BioTector Analytical Systems Limited was established in Ireland in 1995. The founders come from a background of over 30 years in the 'Analyser Service Industry', which included TOC measurement. Based on experience in the industry, the need for a new technology was recognised and this led to the development of the range of BioTector On-Line Analysers. BioTector Analytical Systems' product range now consists of TOC, TN and TP measurement instruments for environmental monitoring, process control and waste minimisation.

The BioTector TOC Analysers provide maximum uptime and reliability due to a patented self-cleaning oxidation technology that easily handles difficult samples and significantly reduces maintenance. Unlike traditional TOC analysers, the BioTector eliminates build up issues from salts, particulates, fats, oils and greases that lead to drift and high maintenance.

With reliable, continuous monitoring and real-time process control, plant operators can optimise their processes to lower overall plant operating costs.

Lance Reisman, President of Hach, said "We are excited about the BioTector product offering because it's capable of detecting a wide range of organic compounds and given our positive partnership history, we feel adding BioTector to the Hach-Lange family is a natural fit."

BioTector has more than 1,500 installations in 48 countries worldwide and its patented technology offers accuracy and reliability in applications ranging from chemical production, airport de-icing to dairy production. ■

Hach Biotector

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New Zealand Trade & Industrial Waste Forum

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Water New Zealand Backflow Group

23 – 24 April 2015
Mecure Hotel, Queenstown, New Zealand

Water New Zealand Asia Pacific Stormwater Conference 2015

20 – 22 May 2015
Pulman Hotel, Auckland, New Zealand

Other Conferences:

NZ LTC Annual Conference 2015

25 – 27 March 2015
Wanaka, New Zealand

Australian Water Association Conference 'Ozwater 2015'

12 – 14 May 2015
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