W-I-O-A Australia
EXCELLENCE IN OPERATIONS

45th WIOA Queensland Water Industry Operations Conference & Exhibition

Clive Berghofer Recreation Centre USQ

2 & 3 June 2021
TOOWOOMBA

TOOWOOMBA REGION

AUSTRALIAN WATER ASSOCIATION

qldwater

PROGRAM

PRIME SPONSORS

alliance automation

HACH Be Right™

IXOM

xylem Let's Solve Water

Keynote Address: Thinking outside the box - How do we change to deliver processes for the future

Stuart Boyd, Mackay Regional Council &
Damien Sharland, Jacobs

Mackay Regional Council (MRC) recently brought the operation of the Mackay North Water Recycling Facility (MNWRF) back in-house. However, after a few months, there were concerns around high electricity and chemical usage.

On investigation, it was found that to meet regulatory environmental compliance limits, there had to be a trade off by using more energy and chemicals. MRC needed to look at how it could improve the effluent Total Nitrogen while at the same time, minimising costs and reducing the plant's environmental footprint. The only other alternative would be to commence work on a treatment upgrade.

Any treatment upgrades must consider future reef regulations and what this means for MNWRF is that any upgrade will have more stringent effluent quality limits and will push the plant to limits of the current available technology. This comes at a high capital cost, and high ongoing operational costs. The treatment operators and processes engineering team realised and appreciated the scale of this issue. They had to think out of the box for solutions. They researched and found that ammonia-based aeration control (ABAC) could be used to optimise energy, chemical consumption, and effluent quality for relatively minor capital investment. However, with the process at MNWRF, the ABAC technology was not applicable. As a result, the staff required additional technical assistance from consultants, Jacobs.

In the absence of an awareness of new technologies, often the default position is to move towards conventional, high capital engineering solutions. However, in this case Jacobs embraced the problem and developed an innovative solution. Based on global correspondence with Jacobs, this innovative control may be the first to be applied to an SBR system, perhaps in the world.

The result is effluent TN has halved and this reduced the pressure to upgrade the treatment plant. The best result though was seeing the staff understand and appreciate the issue and collaborate to present an innovative but untried solution. They recognised where they needed help and engaged a consultant who shared the vision and was keen to collaborate and together.

Keynote Address: What's culture change got to do with operators?

Narelle D'Amico, Bundaberg Regional Council

Bundaberg Regional Council services communities of approximately 85,000 residents. The Water branch provides water and wastewater services, through a committed, long serving group of staff. The Treatment operators have been identified as an at risk group, as a stable, but aging workforce, that is reporting fatigue and fear for how their assets will operated and maintained into the future.

With long service leave as an indicator, Water Services has started a program of trainee operators and culture change, to build connection and confidence into the future, that aims to support knowledge sharing, retirement transition and a resilient future workforce.

Detection of COVID-19 in wastewater by qPCR.

Dr David Rayner, Thermo Fisher Scientific

Detection of COVID-19 in wastewater by qPCR. An accurate, fast and reliable method for monitoring of pathogens to control community spread.

Wastewater monitoring has been successfully used, across Australia and internationally, to monitor the presence of diverse disease-causing pathogens as well as presence of illicit drugs and monitoring of environmental health.

A significant proportion of COVID-19 cases shed SARS-Coronavirus-2 with their faeces in sewage. Information gained from sewage surveillance for the presence of viral fragments can be used to assist in tracking and identification of regional hotspots to contain and prevent further spread.

In this presentation we discuss how Quantitative PCR (qPCR) has been implemented to target and detect COVID-19 in wastewater, for rapid and accurate detection of the smallest amounts of COVID-19 providing reliable information, improving the speed and effectiveness of response to limit spread of disease.

We will also discuss how this technology may be adapted to test for other biological targets in water systems, such as Blue-green algal blooms, a major hazard to water supplies and potentially dangerous to human, animal and fish health.

As part of our mission to make the world cleaner, healthier, safer, in 2020 Thermo Fisher Scientific, a global scientific organization, led the way on a worldwide scale with COVID-19 testing as the pandemic grew throughout 2020, partnering with government agencies on testing methods.

The Stanthorpe water crisis - Learning of a young water treatment plant operator

Ben Haddock, Southern Downs Regional Council

Due to extended drought, the Stanthorpe raw water supply ran dry. With no alternative water sources, Southern Downs Regional Council embarked on one of the most significant water carting projects ever undertaken in Australia.

Carting 1.5ML/day of water roughly 60km from Connolly Dam near Warwick to be treated in Stanthorpe was a logistical, technical and operational challenge that stretched staff in all areas. Water quality from Connolly was poor and notoriously difficult to treat, containing extremely high levels of Manganese (Mn Total >4.5mg/L, Soluble >3.8mg/L) as well as algae and taste and odour which Stanthorpe WTP was not equipped to treat.

Process investigations were undertaken to specify requirements for new chemical dosing systems, while significant investments were made in new infrastructure for loading-unloading of trucks and providing a storge ad connection pipeline to the Stanthorpe WTPs supply main. The operations team sourced and where necessary built new dosing systems for Potassium Permanganate and Powder Activated Carbon integrating these with the WTPs control system. This paper focuses on the learnings I got from being involved in the investigation and WTP operations through transitioning to the alternative water supply.

Oxley Creek STP mixer energy saving trial

Leah Jones, Urban Utilities

At Oxley Creek RRC (Resource Recovery Centre) we are always trying to find new and innovative ways to save on energy costs.

Our SCADA (Supervisory Control and Data Acquisition) trends showed that our mixer power consumption was under performing, consequently it was decided to trial a new type of mixer to investigate how the energy consumption trends compared to our existing mixers. The trial evaluated the ragging issues with mixers in the hope that the trial mixer to reduce this existing issue.

The type of mixer that was chosen was the Xylem Flygt Adaptive mixer. These are a submersible mixer that have an optimised propeller design, integrated VFD (Variable-frequency drive), permanent magnet motor and intelligent functions that appear attractive.

The outcome was a real game changer. We now estimate that we can save more than $40k per year in energy consumption by replacing all our mixers, when they reach their end of life with the Flygt mixer. This will reduce our energy usage to one tenth of current usage per year and reduce our carbon dioxide emissions by 12.1 tonnes per year (figures based on 1 mixer per cell currently installed). It may also potentially reduce maintenance costs with the anti-ragging function.

How to flog a dead horse - Bringing life to an old WRF

John Holmes & Emma Schmitz
Mackay Regional Council

Mackay Regional Council owns and operates several wastewater recycling facilities. These plants are each at different points of their design life and have varying drivers, so we have employed various technologies to help us achieve our targets.

One of our smaller plants, in Sarina averages around 700 kL/day with stringent licensing by Queensland and Australian Government, has a 5- stage Bardenpho with membrane bioreactor for discharge into the Great Barrier Reef Marine Park. We use online nutrient monitoring (ammonium, nitrogen oxides and phosphate) for feedback aeration control and chemical dosing.

Our largest plant, Mackay South averages16 ML/day uses sequence batch reactors (SBRs) and is one of the largest water recycling facilities in the country. We have also recently upgraded our recycled water storage at our Mirani plant which is over capacity at 1 ML/day and undergoing a plant upgrade to incorporate Intermittent Decanted Extended Aeration, pressurised ultrafiltration and UV. Both sites will use online ammonium monitoring to calculate chlorine dosages for our recycled water.

With a similar design our Mackay North plant averages 3.5ML/day but has tidal discharges to the environment. Daily peaking of residential loading results in this plant struggling each day being overloaded and underloaded through it's SBR cycles. While we wait for an capital upgrade, our operation team have reviewed our processes to improve plant performance:

- Inlet Screen repairs / replacements and SBR cleanout
- Aeration control and chemical dosing for nitrification and denitrification optimisation
- Disc filter maintenance for improved throughput
- Improved digester stabilisation

We invested in digital sensors for ammonium and nitrate ion-selective electrodes (AN-ISE) for our SBRs for continuous feed forward control of our aeration sequences. These sensors are affordable, low maintenance and robust enough for analysis of mixed liquor compared to the other analysers we use (gas selective electrodes for precise online monitoring) for effluent measurement. As a result, we have seen our monthly average of total nitrogen reduce from over 8mg/L to under 5mg/L!

What the changes to the chlorine gas standard AS 2927 mean for you

Chris Howard, Ixom

Communities across Australia rely on effective water treatment to ensure they can drink water and interact with local waterways without the risk of illness. Disinfection using chlorine gas is one of the most common, reliable and effective means of disinfecting municipal water. The Storage and Handling of Liquefied Chlorine Gas standard AS2927 has recently undergone a revision by Standards Australia in consultation with industry users of chlorine, emergency services and regulators. This standard was released on the 20th of December 2019.

The previous revision of this standard was reviewed and released in 2001. Since that time there has been a number of changes to equipment available and used in chlorine installations, and other changes in industry relevant to the operation of chlorine installations. The updated standard incorporates these changes to ensure ongoing relevance and improved safe handling of chlorine gas.

The purpose of this paper is to provide practical guidance on what has changed in the standard and how it impacts water operators' installations. It will also cover the support that is available for water operators and managers to assist them in meeting the requirements of the new standard and continuing to manage their operations safely.

Reseeding the Maroochydore STP digester after refurbishment

Shannon Thomas, UnityWater

The Maroochydore STP has a 2.5ML anaerobic digestor on site. The digestor was last refurbished in around the late 1990's.

The digester had a number of safety and operational issues that needed to be addressed. These included the lid titling and then becoming jammed, preventing it from operating in its normal manner. This caused metal to metal contact on the side of the digester which was a potential ignition source for the gas inside. The jamming was happening more frequently.

Other issues included the need to replace and upgrade the heating system, the monitoring sensors, the paint on the inside and outside walls, all the pipework which become corroded and all the pumps.

The digester refurbishment process was completed between September 2017 and February 2020 and addressed all the issues raised above.

The reseeding process commenced in February 2020 and was completed by late April 2020 with the digester now operating optimally.

This presentation will concentrate on the issues encountered in reseeding and bringing the digester back into full operation. This includes discussing the identification and source of the seed sludge, the seeding process chosen and why, the duration of the refilling and the ongoing monitoring of the digester performance.

The daily sampling and monitoring program including pH, temperature and other gases from within the digester will also be discussed.

Acuario - Demonstration of WIOA's certification portal

Craig Mathisen, WIOA

Acuario is a web-based solution developed by WIOA as the national water industry certifying body, to administer the national certification schemes for drinking water, wastewater and/or recycled water. It is relatively easy to expand to suit a training needs identification and completion processes in other operational fields as well.

The Acuario certification software solution was developed with funding support from the ASU and WIOA.

About Certification

The actions of Operators who treat water, wastewater and recycled water have a direct impact on its quality and, consequently, may impact environmental and public health risks.

Certification provides an assurance to regulators, communities and the users of drinking water and recycled water that Operators are competent to manage drinking water, wastewater and/or recycled water quality, as well as being capable of identifying and responding to drinking water, wastewater and/or recycled water quality risks and incidents.

Operators with the certified status show they have a specific set of knowledge, skills, competence, and experience which is recognised by the employer, the certifying body and the water industry. Water businesses can be comfortable in the knowledge that staff have the skills and qualifications for the job and are committed to excellence in their role.

Ion exchange trial - Sea salt v's rock salt

Craig Smith, Toowoomba Regional Council

Toowoomba Regional Council operates 3 Ion Exchange Water Softening Plants. The softeners remove Calcium and Magnesium ions (Found in hard water) by exchanging them with Sodium or Potassium ions. The ion exchange process lowers total hardness to acceptable levels for consumption within the distribution system.

After a period of operation, the zeolite media in the softener become saturated with Calcium and Magnesium ions, requiring a regeneration. A brine concentration is used to regenerate the zeolite, removing Calcium and Magnesium Ions and replacing Sodium Ions. The brine concertation is made by mixing sea salt with water.

The salt is purchased in 1000 kg bags, where it binds together and sets hard. In order to get the salt from the bag the crane lifts and drops the bag breaking the salt, a steel bar is used to hit the bag to loosen the salt. Lifting1000 kg and dropping it with a crane is dangerous. Hitting the bag with a steel bar is manual, with risks of strains and injuries. Bags sometimes tear open, requiring the spill to be cleaned up. The salt doesn't break up to granular consistency and drops into the brine tank in large lumps, making it difficult to achieve bed of salt on the tank floor for absorption into solution.

While the salt has its own disinfection characteristics, the quality can never be guaranteed. Impurities are often seen in the salt, black discolouration deposits accumulate in the brine tank. The impurities and discolouration put's doubt on water quality and cleaning is time consuming.
TRC is in the process of commencing a trail to use rock salt for the brine concentration. Early indications from suppliers inform us the rock salt will not bind and will remain in a granular consistency, additionally rock salt will not contain impurities or leave the black discolouration experienced with sea salt.

Operational staff are hoping to commence the trial towards the end of 2021, to determine if rock salt will provide safer handling and treatment capabilities compared to sea salt.

Transitioning regional Queensland's resource recovery centre's

Martin Coromandel and Michael Zinn, Urban Utilities

Regional areas in Queensland and especially the Lockyer Valley, Somerset, and Scenic Rim areas have been encountering the effects of drought conditions for many years and it is forcing utilities like ours, and local Governments to change their strategies around environmental preservation. Over the last several years, and due to climate change Urban Utilities is seeing a shift from not only providing a service in wastewater treatment but becoming units of resource recovery centres throughout the regions.

In our investigations and data analysis Urban Utilities has identified several learning points to help improve our recycled water quality and service to our local communities and improve the quality to the receiving environments. Ephemeral creeks or streams is a body of water with low surface flows. Many of our regional resource recovery centres have sensitive receiving environments and Urban Utilities have developed a way to identify high risk areas using a nutrient effects calculator. This calculator will assist planning and project initiatives for future developments.

Recycled water plays an important role by providing a climate-resistant water source. In 2019/2020 we supplied 6007ML of recycled water to customers. Since 2018 Urban Utilities have increase the use from 56% to 69%. Recycled water is a key sewage treatment strategy for the regions whereby minimising effluent entering the waterways reduces the nutrient loads and thereby improving river quality. Some of our treatment plants have gone from 40% recycled water to 90% recycled water supplied using a holistic approach.

Raising the profile of a frontline field operator; the struggles, the triumphs and everything in between….

Kent Weeden & Ben Pennell
Gold Coast Water

The City of Gold Coast is one of the largest and fastest growing local government areas in Australia to provide water and wastewater services. Our diverse group of professionals provide these services 365 days a year, 24/7, rain, hail or shine. This is never more evident than when we reflect on the role of a front-line field operator.

The historical view of a network field operator "dig this hole; fix this pipe; take your time about it" is no longer accurate. A network field operator's role now encompasses a focus on safety, the environment and the customer, all under strict response time commitments. There is a growing and fast changing need to be skilled in the use of a wide range of technical solutions, contractor management, fatigue management, and incident response. All this while still actually repairing the broken asset within a high pressure, reactive timeframe.

How does someone split their attention between so many competing factors? How does someone do this successfully in the middle of the night? How do we provide the opportunity for someone to learn these skills while on the job? What is it really like to perform the role of a front-line field operator?

Anammox at Urban Utilities

Justin Todhunter, Urban Utilities

Biological nitrogen removal via nitrification/denitrification has been mainstay to the treatment of municipal and domestic wastewater in Australia since the establishment of the Australian National Water Quality Management Strategy guidelines. Although effective for nitrogen removal, this process is energy intensive due to aeration requirements and may require carbon supplementation depending on the wastewater composition and/or plant design. In recent years anammox has been viewed as emerging option to conventional nitrogen removal technologies due to its efficient biological ability to short-cut the nitrogen cycle, without the need for an additional carbon source. By taking advantage of this efficient biological process, the implementation of Anammox can provide significant operational costs savings up to 60% due to less air and no carbon requirement.

As part of the plan to increase Luggage Point nitrogen treatment capacity and reduce operating costs, Urban Utilities identified Anammox as an opportunity to significantly reduce the nitrogen load to the mainstream process by treating the sidestream separately. The project commenced after market research options analysis was undertaken to short-list anammox technology options for consideration. This was followed by an option assessment where two side by side anammox pilots (suspended and media), were trailed to demonstrate the suitability of the technology to treat the sidestream recycle. The biomass from the trial was subsequently used to seed Urban Utilities initial bio-farm to initiate the process scale-up. In parallel to growing the seed biomass, Urban Utilities and Veolia embarked on the process of upgrading 4 unused process tanks at the Luggage Point RRC to accommodate the new full-scale sidestream Anammox process.

This paper will focus on the challenges and learnings gained during the up-scaling and operation of pilot-scale anammox systems and the implementation of Australia's first Full-Scale municipal anammox system. This includes dealing with feedwater process impacts, process limitation during seeding, limitations in equipment and reactor monitoring and how Urban Utilities addressed the skills gap within its organisation. It will also explore how the upgrade was achieved, its alignment with Urban Utilities objectives and the expected benefits.

Molendinar backwash system upgrade incorporating the ETSW method

Jesse Stevenson, Seqwater

Seqwater owns and operates the Molendinar Water Treatment Plant, which services a significant part of the Gold Coast Population, the plant was built in 1984 and has a capacity to treat up to 150 Ml per day. The plant is a conventional water treatment plant and has experienced filter media loss problems. Filter media expansion was identified as a contributing factor as the original backwash pumps were deficient and unable to effectively fluidise the beds.

Originally high velocity pumps were installed in the inlet chamber that used 'raw water' to supplement the backwash rate. Seqwater removed these from service in 2008 due to the risk of a possible crypto short circuit to the treated water tank.

A capital upgrade commenced in 2019 with the plant shutting down for eight weeks to do both the backwash and MCC upgrade projects. Three new larger capacity backwash pumps were installed and backwash flow rates were increased from 26 m/h (700L/s) to 45m/h (1210 L/s) and in POPT testing it was identified that a flow rate of 1050 L/s was sufficient enough to achieve the 20% bed expansion across the filters. A ETSW (Extended terminal sub-fluidization wash) mode was also incorporated in the backwash system controls upgrade and was included as part of the backwash regime to help reduce the filter ripening spikes after backwash.

Since the project has been completed we have been achieving longer filter run times and huge improvements in reducing filter ripening spikes. We have also found the ETSW mode would normally require a single filter compartment to be turned over completely (approximately 15 minutes) but we have halved that time to 6-8 minutes and have still achieved the reduction of filter ripening spikes.

Biosolids to bioproducts

Glenn Dale, Verterra Ecological Engineering

Biosolids comprise a rich source of carbon, nutrients and plant growth hormones. Currently, the majority of biosolids produced in Australia are mechanically dewatered to around 20% solids and applied directly to agricultural land.

This requires strict compliance with relevant codes, and often involves long transport distances at substantial cost and energy. Notwithstanding the embodied nutrient value, odour and restricted use product grading (for both contaminants and stability) represent a bar to reducing transport distance and valorisation of biosolids.

Verterra and Unitywater have collaborated on exploring improved approaches to biosolids management since 2013. In 2018, trials were commenced on a novel compositing technology designed specifically to address the high-water content and low aerated porosity of biosolids. The technology involves a highly controlled, active process that converts dewatered biosolids to a Class A (unrestricted) nutrient and soil amendment bioproduct.

Successful small-scale demonstration trials were followed by confirmatory pilot scale trials. These have provided the confidence to establish a demonstration facility with the capacity to produce sufficient product for farmer acceptance trials and market testing. The presentation will review the pathway to technology development, results of or trials to date, and the opportunity to convert a regulated waste into a valuable product.

Cedar Grove Commissioning from an Operator's point of view

William Smith, Logan City Council

Commissioning Cedar grove was a fun and a great opportunity for an operator as most are aware about how important it is to have someone from treatment operation imbedded into the project of a new treatment plant and have a team involved in the design meeting to add input to the project. We Had a team of people at each design phase.

Cedar Grove has a tight EA permit to comply by which was developed by the Department Environmental Science. In order to meet these conditions, we had to construct a MBR plant and constructed wetland for effluent polishing.

Commissioned in June 2020, the wastewater treatment at Cedar Grove Environmental Centre has been achieving some great results in its first few weeks of testing. Wet weather operation has created some issues due to the large length of rising mains leading to the plant.
To commission Cedar we needed to shut down Flagstone WWTP which was a 4000ep MBR plant, flows receiving at the time 610KL/day nearing its capacity of 680KL/day. With the growth of the area increasing.

Seeding the new plant was a great opportunity for value to be added by the operations team during the commissioning phase. The original plan by the design team was to tanker seed sludge from the Loganholme plant which had a large associated cost. The operations team was able to offer a much cheaper alternative, using the existing network to pump sludge from Flagstone WWTP using the effluent lagoon water to chase it through.

During design, we decided to move to the 2018 SCADA version. This version removes a lot of the excess colours and background noise which allows the operators to focus in more quickly on key information and alarms. There was a steep learning curve between the versions and a significant amount of missing information on SCADA during commissioning, however overall the layout has made it far easier to fault find and operate the plant.

As a result of integrating operational knowledge into the design and commissioning phase of the project we were able to achieve significant cost savings and well as improved operability of the final plant.

Practical guide to the risks in accessing Potable Water Storage Reservoirs for routine inspection and maintenance

Sam Magill, Water Infrastructure Services

As Australian water authorities shift their focus back towards a more proactive attitude towards routine inspection and maintenance of potable storage reservoirs, there is a requirement to ensure that asset owners and contractors are following the latest WHS regulations, standards and industry best practices.

This presentation will focus on the specific site risks associated with accessing all areas of water storage reservoirs, while providing education on the legislative and best practise guidelines with relation to the different means of undertaking the inspections and maintenance works. Involving such high risk works as, Working at Heights, Confined Spaces, Diving, UAV's, ROV's and most importantly, ensuring these tasks do not have an adverse effect on water quality.

Freshwater creek WTP filter refurbishment project, road to refurbishment

Jon Ham, Cairns Regional Council

Cairns Regional Council owns and operates the Freshwater Creek Water Treatment Plant. The plant was officially opened in 1980 to supply 80% of Cairns drinking water. It was originally constructed with four dual chamber, multi media filters. The plant was expanded with an additional two filters of the same design in 1988 to achieve a design capacity of 120ML/day.

In 2015 issues were observed with the original four filters which lead Council to undertaken investigation works to determine the root cause of the performance issues. Council excavated Filter 4 and discovered broken filter nozzles and various other issues. Council then tendered a Design and Construction Contract for refurbishment works to refurbish and upgrade each of the six filters, starting with Filter 4, to bring them up to current industry standards. This is the first time since 1988 that the filters have received any major refurbishment or upgrade works

Council has recently completed the refurbishment, upgrade and commissioning of Filter 4. The commissioning component was made extra difficult due to COVID-19 restrictions. The upgraded filter has been in operation for approximately a year and is achieving good performance. Council has learnt several lessons from the refurbishment of this filter which will be used to improve delivery of the remaining 5 filters. Work has commenced on Filter 3 with refurbishment and upgrade schedule to be completed in October 2021.

This project has had its challenges along the way resulting in several lessons learnt for Council. It has also delivered improved operator functionality of the treatment plant along with an upgraded filter. All filters are expected to be refurbished by August 2023, ready to provide another 40 years of high quality drinking water.

Energy reduction in wastewater treatment - What can I do, I am just the operator?

Peter Griffiths, pH Water Consultants

There is a strong desire, and rightly so, to minimise energy consumption in wastewater treatment to both reduce operating costs and reduce greenhouse gas emissions. Numerous projects have been undertaken incorporating energy audits and efficiency evaluations. Not surprisingly, many, if not all of these studies have identified aeration as the major energy usage during wastewater treatment. This has resulted in the replacement of so-called inefficient blowers with high efficiency blowers, replacement of disc diffusers with high efficiency aeration panels or the like. Often these actions are undertaken at considerable expense and often with questionable benefits as they do not address underlying issues.

The key factor to effective and efficient aeration is control. Poor control will result in periods of over aeration (wasted energy) and under aeration (poor performance). Often, the control or control parameters implemented are either poorly selected or simply not appropriate for wastewater treatment applications. Control modifications are often the cheapest and most cost-effective measures that can be implemented at a wastewater treatment plant. The most efficient blower in the world will not overcome poor control.

Case studies are presented on design aspects influencing aeration and aeration control and how operations staff can optimise control to provide improved performance and reduce energy consumption.

Storm and raw water intake screening - A better way!

Peter Ebenwaldner, AWMA

Modern cities and towns have less water absorption due to urbanisation. Greater runoff and unprecedented weather events are applying increased pressure on drainage systems.

Large volumes of water and debris must travel through fixed bar screens to prevent rubbish transfer to natural water ways, wetlands, bays and pump stations. These screens require regular monitoring and manual cleaning to prevent blockage. Manual cleaning presents real OH&S risks, out of hours work and failure to clean results in flood events.

Automating this intake screen cleaning process ensures unrestricted flow, improved efficiencies, higher water quality and the safety of your team. Applications include protection of pumps by filtering debris sizes to allowable limits and removal of heavy seasonal weed build up within water/irrigation networks and build-up of debris within environmental wetlands.

Automated trash screens are quiet in operation and consume minimal power. Screens can be remotely monitored for additional reassurance on critical sites. Run times are controlled by monitoring flow; minimising unnecessary screen operation and maintenance.

The latest screen design options include a raked bar system for bulk debris, travelling belt and brushed wedge wire system for finer filtration, typically allowing for apertures from 100mm to 2mm in size. Finer filtration also improves the viability of recycled water for irrigation which makes life easier for the farmers while protecting aquatic life.

Australian custom designed and manufactured screens meet on-site specifications, for maximum benefits and minimal civil works.

Electrocution whilst working on water services

Grant Waite, North East Water

This paper will be discussing how the electrical network is connected to water services. How the electrical infrastructure can fail and energize the water network. Why this failure goes unnoticed until it's too late and what steps Water Network Operators can take to protect themselves from electrocution.

When working on water services to reduce the risk of electrocution operators are instructed to use bonding straps and plumb guards as part of their operational procedures, particularly when changing out water meters or disconnecting metallic pipework.

Creating a universal rural POE for drinking water using IOT

Martina De Zilva, Water Source

Water Source Australia has been working with PA Consulting to develop an innovative Point of Entry (POE) system that can be used globally to produce safe drinking water for rural and regional communities that otherwise do not have access to a centralised drinking water supply.

The device is Internet of Things (IoT) enabled; a key innovation which allows it to be monitored and controlled remotely from anywhere in the world. This revolutionary addition means real time monitoring and automated fault finding allowing for predictive maintenance and the immediate knowledge of HACCP water quality breaches while using a site-specific Water Quality Safety Plan.

Many Australians do not have access to a safe drinking water source. Globally 2.1 billion people do not have access to safe drinking water, meaning many indigenous and rural communities face preventable water borne disease, reduced lifespans, quality of life and social inequity caused by contaminated water supplies. The founders of Water Source Australia witnessed this in both Australia and Timor Leste and looked to develop a solution that would help these communities without needing large centralised infrastructure.

Water Source Australia began working on a POE system following discussion with water authorities about the difficulty to provide clean drinking water in remote areas. The basis was to develop a robust treatment system using a multi-barrier HACCP based approach that can be remotely monitored. The new system is designed to use IoT for smart asset management and decision making to maintain product quality automatically through sensing, self-testing and self-cleaning or shut the system down so that only safe drinking water is produced.

With continued trial and progress of the PoE system to meet the requirements of the different environments, there is renewed hope in being able to provide safe drinking water to communities that desperately need it to survive.

Enter the matrix: Using virtual reality and 360-degree video to improve stakeholder engagement

Anthony Domanti, Logan Water Infrastructure Alliance

The Logan Water Partnership (Logan Water) is a public and private sector enterprise involving Logan Water and engineering services providers Downer, WSP and Cardno. Under the partnership arrangement, Logan Water delivers new and improved water and wastewater infrastructure throughout Logan City; one of south-east Queensland's fastest growing areas.

In 2020, Logan Water and its private sector partners WSP and Downer conducted the detailed design of a renewal works package for the Loganholme Wastewater Treatment Plant lift station. The lift station comprises a 20m deep dry/wet well arrangement and, over time, has had numerous modifications. The changes have made the lift station well heavily congested, making it difficult for Logan Water operational personnel to operate and access safely. The lift station also suffered reliability issues during wet weather events in early 2020. Hydraulic assessment indicated that the lift station's pumps required replacement. It also recommended a reconfiguration of the old pipework in the dry well to improve reliability and operator safety. This required Logan Water Partnership to commence developing a concept pipework arrangement in consultation with multiple stakeholders including WWTP operators.

Logan Water Partneship used new technologies to obtain critical information during the design process including virtual reality and 360-degree videos. These technologies sparked greater stakeholder engagement (especially from Operations and Maintenance personnel) and efficiency in the design process.

Key lessons learnt from this case study are:

1. Providing a VR experience is a superior way of engaging key stakeholders and obtaining feedback over conventional 2D design review meetings.
2. The cost of VR technology is relatively low in comparison to the value added in understanding complex brownfield infrastructure sites.
3. 360-degree video footage obtainable from a proprietary Go-Pro camera is the way of the future for performing condition assessments in a safe and controlled way, without the need for confined space entry.