



Summer 2024



Decentralized Engineered Water Cycle at the Woodford Folk Festival Page 14 Inside: Stories from Down Under

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2024 Mega-Conference Preview, page 22

ADVERTISER INDEX

American Manufacturing Co., Inc	4
Arris 18	8
BioMicrobics 29	9
Clearstream Wastewater Systems, Inc	8
Eljen Corp IF(С
Geoflow2	3
Infiltrator Water Technologies7, IB	С
Inspector Cameras 2	5
JET 13	3
PolyLok 2	1
Roth2	7
Tuf-Tite, Inc	9
WaterColor Management12	2



INSIDE THIS ISSUE

Message From the Executive Director	. 4
A Note From the President	. 5
State Affiliate News	. 6
NOWRA Board of Directors 2023-24	. 8
Legislative Update	11
Decentralized Engineered Water Cycle	
at the Woodford Folk Festival	14
TradeMutt — You Never Walk Alone	20
What to Expect at the	
2024 Mega-Conference	22
NOWRA Online Learning Academy	26
Corporate Members	28
Help Us Educate Homeowners	30

Front cover photos:

Festival photos courtesy of the Woodford Folk Festival.

TradeMutt photo: Sara Heger and Ben Kele (Arris) attended the Infiltrator Annual Sales Meeting in May, where they shared TradeMutt's shirts and presented on ways to start positive conversations about mental health in the onsite trades.



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National Onsite Wastewater Recycling Association

Thomas Groves, Executive Director P.O. Box 982 Westford, MA 01886 Phone: 978-496-1800 Fax: 703-997-5609 Email: info@nowra.org

Kale Connerty, Editor Anish Jantrania, Technical Editor *The Onsite Journal* To advertise in this publication, contact: Thomas Groves NOWRA Executive Director info@nowra.org

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MESSAGE FROM THE EXECUTIVE DIRECTOR

elcome to the summer issue of NOWRA's Onsite Journal. This is our second of three issues for 2024. Inside, we preview our 2024 Onsite Wastewater Mega-Conference being held in Spokane, Washington in October (page 22). What makes the selection of Spokane so special for 2024 is that this year marks the 50th anniversary of the World's Fair in Spokane in 1974. That World's Fair was the first to have an environmental focus. It also revitalized this special city with many features and tourist attractions that are still there today. Our conference hotel and convention center abuts Riverfront Park and the old fairgrounds. We are looking forward to a great conference and hope that you will be able to join us.

This spring was a very active time for NOWRA and our affiliates. Many of NOWRA's state affiliate organizations held their annual conferences in the late winter/early spring. It was great to see these conferences doing well as attendees return to in-person events. Our online training is continuing to grow and expand as well, but there is something about networking with fellow professionals at a conference while taking in technical sessions, or just networking over a cup of coffee in the morning, or an evening social event.

In early May, NOWRA representatives went to Washington, D.C. to attend a national conference on

water and sanitation needs. While in D.C., we spent some time catching up with our federal partners – EPA and USDA Rural Development. These were great, informal meetings to help chart the course for NOWRA for the rest of 2024 and for NOWRA to offer our memberships' expertise to these agencies as they reach out with funding opportunities for our industry. One example of this is the Closing America's Wastewater Access Gap project for which NOWRA has assisted with spreading the word to our affiliates and membership on this funding opportunity. For more details on the latest legislative activities, check out the Legislative Update on page 11 prepared by our advocacy firm.

There are two hot new topics that NOWRA is currently monitoring and moving forward. One is the issue of septic tank and lid safety. There have been too many accidents that could be prevented with simple new secondary-safety devices. Watch for a technical article on this topic in the fall issue of The Onsite Journal. The other issue is the lack of adequate septage disposal facilities nationwide. We are currently working with two of our national partners (NAWT and PSIA) on ideas to elevate and address this issue. Watch for some sessions at our Mega-Conference on this topic.

If you have not done so lately, please check out our Online Learning



Academy with many new courses added recently. Last fall we added 22 new courses to the Design and Technical Session categories. We also added a FREE Homeowners Education course online (page 30). Please spread the word about this course to vour customers who need to learn how to care for their onsite system. We are also excited to announce the launch of our business courses for members. These courses have been developed by many in the onsite industry to specifically instruct small companies on how best to manage and run their small business while planning for the future.

As I state in every issue, this organization is only as strong as its members and volunteers. Much of the great work that you will read about inside of the publication is due to the dedicated committee members and volunteers. As you read about NOWRA's activities, please consider joining a committee or task force. It's a great opportunity to expand your horizons, network with like professionals, feel good about yourself and the industry that we have chosen, and make friends for life.

Thank you for allowing me to serve as the executive director of this great organization.

— Thomas Groves

A NOTE FROM THE **PRESIDENT**

As I write this in mid-May, the summer of 2024 is on the horizon and the temperature is rising. Hopefully NOWRA's good fortune as an organization stays on the rise too!

Through our continued efforts in Washington, we are seeing money being funneled to the decentralized industry through grants that are put out by the EPA. Almost \$14 million was put out for grants that will go to provide technical assistance for decentralized projects and workforce training and mentorship for decentralized system practitioners. This is technically separate from the congressional funding NOWRA continues to fight for to match the level of infrastructure we provide to this country as an industry. It happened, at least in part, because of the work we have done, and that means your voice is being heard. NOWRA will continue these efforts to make sure positive things continue and that what we do means more work for you, more money in your pocket, more skills and knowledge, and a strong sense of pride in what you do!

The first new business class should now be up on NOWRA's online learning platform for you to take at no cost. Two more are in the works. Thank you, Tom Fritts (Residential Sewage Treatment Company), for putting this together. Remember, these no cost classes are not available for CEU certificates, they are to help you do business better, plan for retirement, and cover your business adequately for the unknown.

A new basic regulator class is also going to be offered for anyone to take at no cost as well. The class is meant to cover things like the meaning of some common regulatory words which can help with interpretation. Also, dealing with people is an everyday challenge for regulators and they are often put in the middle of some difficult situations. This presentation acknowledges gives some tips on what to expect and some thoughts on how to handle altercations/conflicts. Thank you to Ashli Badders of Kerr County Texas, Chris LeClair (VP of NOWRA) of Ottertail County, MN, and Bob Sweeney (NOWRA Board Member) of Oregon for helping me put this together.

By the time you read this, or shortly thereafter, you will be getting notice of a new benefit. We have partnered with a group that offers deep discounts on things we hope you and your family can use in your business and in your personal life. There will be occasional emails from NOWRA to highlight these benefits and remind you that before you buy anything of consequence, look and see if



this offer can save you money. If you are an online shopper and you love a good deal...this is for you. I personally can't wait!

NOWRA is growing and changing because of the efforts of many, and I want to thank Tom Groves, our Executive Director, the Executive Committee, the entire Board of Directors, and the taskforces and committees who all keep this ship moving forward. It is not easy. In fact, sometimes this volunteer work is difficult. We represent a wide range of professions and businesses, all in different states which all have their own challenges and objectives, so we want to keep that in mind as we make tough decisions. Most of us are deeply passionate about this industry and take our obligations to make good decisions for our members seriously. Most of our members are in the trenches, sometimes literally, and we know you have thoughts and opinions. Any time you want to share them please feel free to do so. We would like to know what you think about what we have done and the direction we can go. Recognizing our broad range of customers, we might not be able to accommodate every idea, but your idea could lead to a great idea that can change the industry!

Finally, the conference committee is doing a great job of planning the biggest onsite and decentralized wastewater event of the year. It is going to be a great time and I hope to see many of you in Spokane!

- Allison Blodig, R.E.H.S.

5

Tell NOWRA what we can do for you!

Send us an idea or benefit that you would find helpful as a member of NOWRA and/or your state affiliated organization.

Email us at info@nowra.org.



STATE AFFILIATE NEWS

CPOW (**Colorado**) — Colorado Professionals in Onsite Wastewater held a successful member appreciation education event in May, hosted by Front Range Precast Concrete. Dr. Sara Heger spoke about design and management considerations for systems serving vacation-home rentals as well as inspecting and troubleshooting soil treatment systems. Doug Jatcko of Front Range Precast spoke about dosing siphons and provided a great live demonstration of siphon function. CPOW is back to hosting some in-person NAWT courses and is gearing up for 2024 soils classes.

MSO (MISSOURI) — Missouri Smallflows Organization has been diving into educating real estate professionals about onsite wastewater treatment systems. Some states have tackled this topic and MSO has seen the need too. There have been two classes hosted in the state and they were well-received by the professionals in attendance. Many even stated that the course was a "breath of fresh air" from their typical continuing education classes. Now that the class is approved by the Missouri Real Estate Commission, realtors can earn CEs for the course too. The course is planned to be offered two to three times



a year to begin with and will likely be expanded upon demand.

00WA (Ohio) — Greetings from the Buckeye State! The Ohio Onsite Wastewater Association is already busy planning the 2025 OOWA Annual Conference. It is set to take place on January 7-8, 2025 at the Cherry Valley Hotel in Newark, OH. We are looking to continue to grow on the success of the 2024 Annual Conference and Backhoe ROE-D-HOE Competition! OOWA is also excited to be co-hosting the 2025 Onsite Wastewater Mega-Conference in Sandusky, OH in October 2025.

TOWA (Tennessee) — The Tennessee affiliate of NOWRA proudly hosted the 27th annual Onsite Wastewater Conference in February at the newly renovated Montgomery Bell State Park Lodge in Burns, TN. Attendance and enthusiasm appear to be surpassing pre-COVID levels!

Board members and officers are actively working to renovate our outdated website and streamline the dissemination of pertinent information throughout the year. Efforts are also being made to eliminate paper registration for future events and "Tennessee Waltz" us into the modern age of electronic transactions! Major regulatory changes are on our horizon state-wide as Tennessee will begin allowing third-party water resource engineers to design, submit permit packages for, and conduct final inspections in lieu of what has traditionally been the task and responsibility of state-employed environmentalists. According to the new law that will take effect on October 1, soil scientists will be afforded the same latitude with systems under 750 gallons per day.

YOWA (New England) — In February, the Yankee Onsite Wastewater Association held an election to vote in new members to their Board of Directors. The association's bylaws allow for a board consisting of 5 to 25 members; the board is now comprised of 12 members, including 7 newly elected individuals. These board members began their terms on March 1, 2024, and will serve three years in this role.

The Education Committee put together an agenda for "Nitrogen and the Effect on Onsite Wastewater Systems", an in-person training on June 25 about the nitrogen cycle and the effect on onsite wastewater systems. Presentations will also address new Cape Cod and Island regulations and I/A technologies.

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8



The Onsite Journal | Summer 2024

9



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LEGISLATIVE UPDATE

NOWRA Elevates its Profile as Decentralized Wastewater Thought Leader Among Federal Policymakers

By Tim Perrin, Polsinelli

here's an old adage in Washington, D.C.: "If you're not at the table, you're on the menu." A top goal of NOWRA's federal government affairs function is to ensure that we are at the table. And the best way to ensure that is by educating policymakers of the benefits of decentralized wastewater systems. That education, combined with input from constituents and sound policy solutions, makes a difference and wins friends for NOWRA. As we navigate through the challenges of an election year, the association's advocacy efforts are bearing fruit and securing NOWRA a seat at the table when policy discussions occur. Below are a few ways this has been happening over the past few months.

President's Budget. This spring President Biden sent his Fiscal Year (FY) 2025 proposed budget to Congress. The release of this document officially kicks off the FY 2025 budget and appropriations cycle and outlines the Biden Administration's federal government funding priorities. For the forthcoming fiscal year, which begins Oct. 1, the Biden Administration is calling on Congress to allocate \$5 million to the U.S. Environmental Protection Agency (EPA) to implement the Decentralized Wastewater Grant program. This program was created in the 2021 Investment in Infrastructure & Jobs Act (IIJA) after a successful advocacy campaign spearheaded by NOWRA. Specifically, the President's budget states, "This new grant program will provide grants for the construction, repair, or replacement of individual household decentralized wastewater treatment systems; or the installation of larger decentralized

wastewater systems designed to provide treatment for two or more households with low or moderate income." The inclusion of this language in the President's budget is significant because Congress has yet to fund this program. With the FY 2025 appropriations cycle underway on Capitol Hill, NOWRA is actively pointing Members of Congress to the President's budget to illustrate the Administration's support for the program.

The President's proposed budget framework receives a lot of attention from policymakers and the stakeholder community. But it only represents the President's priorities, not necessarily Congress' priorities. As the part of the government that holds the purse strings, Congress expresses their funding priorities in the form of the annual appropriations the House and Senate will consider later this summer and fall. However, the EPA decentralized wastewater grant program being included in the President's budget is a tremendous victory for NOWRA and something for decentralized advocates to highlight as they engage with policymakers.

EPA and USDA Meetings. NOWRA government affairs leaders attended the 2024 U.S. Water and Sanitation Access Convening, which brought together leaders and WASH (water, sanitation, and hygiene) stakeholders to Washington, D.C. in May to discuss opportunities, challenges, and potential solutions for closing the clean water and sanitation gap for the more than 2 million people in the United States who live without these services. Water and decentralized wastewater stakeholders attended the

convening, as did personnel from the EPA's Office of Wastewater Management and the Water and Environmental Programs within the U.S. Department of Agriculture (USDA).

In addition to engaging these federal officials at the convening, NOWRA met with them separately to discuss NOWRA-specific priorities. In both meetings. NOWRA leaders discussed ways the association can serve as a resource to federal policymakers, especially regarding NOWRA members' technical expertise. NOWRA also encouraged the agency officials to be more transparent about the amount of federal resources supporting decentralized wastewater programs and to more prominently promote funding opportunities so that more NOWRA members, and related decentralized stakeholders, can take advantage of federal resources. These meetings were incredibly successful and resulted in two key takeaways:

- 1. The EPA and USDA officials recognize NOWRA as an emerging thought leader in the decentralized wastewater policy arena.
- 2. The EPA and USDA officials consider NOWRA to be a valued partner in helping them fulfill their missions.

Interacting with these policymakers at both the convening and in their respective offices effectively elevated NOWRA's profile, which we trust is an investment that will produce future dividends.

2024 Farm Bill. The U.S. House and Senate Agriculture Committees recently unveiled their respective versions of the legislation that will reauthorize federal agriculture, rural continued on page 12

LEGISLATIVE UPDATE continued

development, and nutritional support programs for the next five years. Commonly referred to as the "Farm Bill," Congress must pass this legislation by Sept. 30. A summary of the Senate Agriculture Committee's bill notes that Congress will renew for five vears the USDA decentralized wastewater grant program – a top NOWRA advocacy priority. For FY 2024, Congress funded this grant program at \$5 million and tacked on an additional \$1 million specifically designated to "provide subgrants to eligible individuals for the construction, refurbishing, and servicing of individually owned household decentralized wastewater systems."

Further, the Senate summary includes this key NOWRA victory: "[The program] allows eligible entities to use up to 10% of the grant to provide technical assistance and support relating to the maintenance and support of household decentralized water and wastewater systems." Advocating for this technical assistance provision in the Farm Bill has been a multi-year advocacy priority for NOWRA because it underscores the expertise possessed by association members. We expect the House and Senate to consider and approve their respective versions of the Farm Bill this summer and pass a House-Senate compromise package before Sept. 30. NOWRA is working now to ensure that the Senate version of the bill that includes these pro-NOWRA provisions is included in the final bicameral agreement.

Each of the examples above demonstrate the success NOWRA has had this year in promoting the decentralized wastewater industry. As our education-advocacy campaign continues, we seek to win more champions for the industry on Capitol Hill and within the executive branch with the goal of ensuring greater support from federal sources.

Tim Perrin is a Policy Advisor with Polsinelli PC.

ADVOCACY

The following companies and organizations are supporters of NOWRA's Advocacy efforts for 2024 and comprise our Lobbying Board of Governors. We thank them for their efforts and support.

- American Manufacturing, Inc.
- BioMicrobics, Inc.
- Eljen Corp.
- Florida Onsite Wastewater Association
- Geoflow
- Infiltrator Water Technologies
- Jet, Inc.
- Missouri Smallflows Organization
- National Association of Wastewater Technicians (NAWT)
- Norweco, Inc
- Orenco Systems, Inc.
- Residential Sewage Treatment Co.
- Roth North America
- Virginia Onsite Wastewater Recycling Association (VOWRA)

BECOME INVOLVED!

We would welcome your participation on the Board of Governors if you are able to make that commitment. You are also welcome to contribute at a lower level. All of the funds raised go directly to supporting our advocacy efforts. To find out more about NOWRA's Advocacy activities, visit our <u>Advocacy website</u> to get more involved or <u>contact the NOWRA office</u>.

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DECENTRALIZED ENGINEERED WATER CYCLE AT THE WOODFORD FOLK FESTIVAL

By Ben Kele, Tony Kodel, Jim Kelly, and Tim Woods

Introduction

The Woodford Folk Festival (www. woodfordfolkfestival.com) is the largest music event in the southern hemisphere and has been held at the Woodfordia site (see Figure 1) since 1994. The Woodford Folk Festival is held between December 27 and January 1 every year, during the Australian summer months. There are approximately 130,000 people who attend the festival over the weeklong event. The majority of patrons, performers, and workers camp at the site during the festival. There are around 25,000 people on site per day during the event with more than 500 different performances held over the course of the week.

The engineered water cycle at Woodfordia is completely decentralized. The site has its own dam, drinking water treatment plant, sewer system and associated pump stations, sewage treatment plant (STP), and recycled water scheme. There are more than 60 permanent amenities blocks (i.e., bathrooms) and 20 miles of gravity sewer. No water is brought to the site and no water leaves the site. Even the sewage sludge is dewatered, composted, and reused at site.

The STP was not installed when the site first opened in 1994. Up until



Figure 1. Location of the Woodfordia site

2008, all of the wastewater used to be trucked off site and disposed of at municipal facilities. Trucking the wastewater off site was a large cost, (approx. \$200,000 per year in 2008), accounting for 11% of the total carbon emissions from the festival. It was also a major concern to the insurance company due to the number of truck movements occurring amongst the patrons. Woodfordia required a decentralized STP, but due to the wastewater generation pattern, normal biological treatment solutions were not viable.

Wastewater Generation Volumes and Pattern

Each Woodford Folk Festival produces approximately 2.1 million gallons (8 million liters) of wastewater over the week. There are two smaller camping events held at the site every year. These two smaller events are located around the site's Lake Gkula. a 3-million-gallon (12 million liters) swimming lagoon constructed by Waterscapes Australia (www.woodfordfolkfestival.com/lake-gkula/). The Lake Gkula Easter event produces around 100,000 gallons (400,000 liters) of wastewater over the Easter school holidays and the September camping event creates around 95,000 gallons (360,000 liters) of wastewater. During the other 47 weeks of the year, Woodfordia produces a total of about 200,000 gallons (760,000 liters) of wastewater.

The comparison of wastewaterproducing activities and the number of days involved for each activity per year can be seen in Figures 2 and 3.

For most of the year, just over 600 gallons (2,200 liters) of wastewater



Figure 2. Wastewater production per activity type at the Woodfordia site



Figure 3. Number of days per year for each wastewater producing activity at the Woodfordia site

are produced per day, whereas during the Woodford Folk Festival, the site produces around 300,000 gallons (1.1 million liters) of wastewater per day. This is a very large variation on wastewater generation volume and most standard on-site and decentralized wastewater treatment technologies cannot manage differences of this magnitude. The vast majority of on-site treatment technologies rely on beneficial microorganisms for the treatment of wastewater. At the Woodfordia site, the timeframe is too short for beneficial microorganisms to be able to handle the variation in wastewater volumes.

In 2009, Woodfordia examined the feasibility of a pipeline to the nearest

municipal STP. This was not economically feasible, with the pipeline costing \$2.6 million and the capital improvements required at the municipal STP costing \$6.5 million. They also assessed the possibility of installing a large holding tank (2.5 million gallons) and feeding a small amount of wastewater per day (around 10.000 gallons) to commercial on-site wastewater technology. But no on-site treatment company would provide a warranty for their technology to be used in this manner. This is because the wastewater stored in the holding tank would be anaerobically digesting over time and the biologically available carbon would be removed relatively early in the year [1].

Our company, Arris Pty Ltd, (www. arris.com.au/) proposed a batching decentralized sewage treatment plant costing \$600,000 for the Woodfordia site. This proposal was accepted in June of 2009 and the system was put into operation in December of 2009, before the start of the festival that year.

Decentralized Treatment Chain

Arris designed, built, and now operates and maintains a batching sewage treatment plant for the Woodfordia site. To treat the wastewater, the system uses physical separation, chemical treatment, ion exchange, absorption, aeration, and, only as a final stage, biological processes (see Figure 4).

The primary screen is designed to remove coarse solids, such as wet wipes, diapers, etc. The multi-baffled primary tanks are in an anaerobic digestor configuration. The holes in the baffles are at different heights and they aim to reduce the concentration of total suspended solids. They also slow the velocity of the water. The aerated balance tank has a 400,000-gallon (1.5 million liters)



Figure 4. The batching treatment chain developed for the Woodfordia STP

capacity and it is used to control the flow of the batches through the rest of the treatment chain. The tank has odor control vents and air is added so that water is aerobic as it passes through the rest of the treatment chain.

The water flows from this tank into a 5,000-gallon (22,000 liters) pump well which is also an ozone contact tank. A Primozone ozone system is used to oxidize the water. Ozone disinfects (bacteria, viruses, and some protozoa), decreases BOD and COD, breaks down pharmaceuticals and personal care products, and reduces odor and colors [2] [3] [4]. Ozone also acts as a micro-flocculant. The ozone is generated on-site from concentrated atmospheric oxygen. After the ozonation, the water is pumped through natural zeolite filters. There are six zeolite filter tanks, containing 120 tons of media. The filters are configured in an up-flow arrangement. The natural zeolite removes ammonia from the water via a cation exchange process [5]. They also surface absorb some forms of phosphorus and act as a physical filtration process that further reduces the total suspended solids.

After this filtration process, the water enters another 5,000-gallon (22,000 liters) pump well where it undergoes another oxidation process via hydrogen peroxide. The hydrogen peroxide oxidation process also disinfects, reduces BOD and COD, decreases colors and odors, and breaks down

continued on page 16

long-chain chemicals (personal care products and pharmaceuticals). The amount of ozone and hydrogen peroxide dosed into the pump wells can be controlled by the operator and varies depending on the volume and type of wastewater being treated.

The water is then pumped through sand filters to further reduce the total suspended solids. After the sand filtration the water flows through granulated activated carbon (GAC) filters. These filters treat the water by absorbing potential contaminants of concern and also reducing colors and odors. The water then undergoes ultraviolet (UV) disinfection which is effective against bacteria, viruses and protozoa. The water is then treated by Clearflow Group Gel Flocculants, which are designed to remove phosphorus, suspended solids, and most metals [6].

This water flows into an aerated waste stabilization lagoon, called the Bonny-Doon, where biological processes can begin (see Figure 5). This lagoon is also the main irrigation storage lagoon. If required, further treatment can occur via two constructed wetlands (one deep and one shallow). The treated water is irrigated onto a bamboo plantation.

Treated Water Quality

As part of the regulatory approval from the Queensland State Government, the Woodfordia sewage treatment plant is required to meet certain treated water quality objectives. The parameters that the Woodfordia STP are required to meet and its average results since 2009 can be seen in Table 1.

The multiple disinfection barrier approach of ozone, hydrogen peroxide, and UV has meant that the treated water has had very few fecal coliforms in the 15 years since it was built. The virus and protozoa test were only conducted as part of the commissioning process and the 5-log reduction was achieved. The two forms of chemical oxidation have meant that the BOD_5 limit has also been easily accomplished.

Achieving the total nitrogen limit was more challenging. The zeolite cannot cation exchange ammonia out of the water indefinitely; it does reach saturation and become exhausted. The 120 tons of zeolite in the media filters were replaced in 2022. The old media was kept on-site and used as a compost/potting mix amendment.

The total phosphorus requirement of under 10 mg/L has been the hardest water quality objective to attain. The Clearflow Group Gel Blocks are a relatively recent but worthwhile addition to the treatment chain for their ability to remove phosphorus from solution.

The electrical conductivity (salinity) of the water has never been a concern. The Woodfordia drinking water is typically under 250 µS/cm and the STP has not required a technology to adjust the salinity. The sodium adsorption ratio (SAR) is a measurement that assesses the sodicity risk of the treated water, typically if it was irrigated onto a clay soil [7]. It is a ratio of the sodium ions to the calcium and magnesium ions in the water. The natural zeolite we have chosen for this site can also exchange sodium ions out of solution and put calcium and magnesium ions back

Table 1. Woodfordia STP treated water requirements and the average results achieved

Parameter	Units	Limit/Guideline	Average Result
Fecal Coliforms	cfu/100 ml	<1000	<1
Virus & Protozoa	Log reduction	5 log reduction	5 log reduction
Biological Oxygen Demand (BOD ₅)	mg/L	<10	<5
Total Nitrogen	mg/L	<10	7.3
Ammonia	mg/L	<1	0.2
Total Phosphorus	mg/L	<10	8.1
Total Suspended Solids	mg/L	<30	7.4
Electrical Conductivity	μS/cm	1000	687
Sodium Adsorption Ratio (SAR)		<6	3.9
рН		6-to-8.5	7.2
Turbidity	NTU	<5	2.4



Figure 5. Full waste stabilization lagoon at the end of the Woodford Folk Festival

into the water. We have used this cation exchange mechanism to meet the SAR requirements.

The pH of the treated water has been kept within the required ranges without the need for external chemical adjustment. We can adjust the pH of the water via the manual addition of caustic soda or citric acid, but this has not been necessary. The treated water has been very clear and the turbidity averaging well under the required regulatory limit, due to the multiple oxidations, physical filtration, Clearflow Group Gel Block flocs, and the GAC. The Woodfordia batching STP produces a very good treated water that is fit-for-purpose for recycling as irrigation water.

Recycled Water Use

The treated water at the Woodfordia site is 100% recycled as irrigation on a bamboo plantation. The Woodford Folk Festival uses over 60 tons of bamboo poles every year for sculptures, fencing, and other structures (see Figure 6). The bamboo poles used to be bought from various bamboo suppliers across Australia.

After the STP was built, it was logical for Woodfordia to start growing their own bamboo and to irrigate it with recycled water. Australia is an old continent and its soils, especially the clays, are often at risk from sodicity. The Australian on-site and decentralized wastewater regulations focus on protecting the soils in the dispersal and/or irrigation areas. Decentralized schemes often are required to monitor the soil health in an irrigation area for long-term sustainability in regards to salinity and sodicity risks. The monitoring results for the soil in the Woodfordia bamboo plantation can be seen in Table 2.

These results show that irrigating the bamboo plantations with recycled water has had non-adverse sodicity or salinity impacts on the soil. We do compost any bamboo waste from the



Figure 6. (Left) Woodfordia Bamboo Plantation; (Right) Bamboo Sculpture in Festival precinct

Table 2. Soil results from the Woodfordia bamboo plantation 2023

Parameter	Units	Bamboo 1	Bamboo 2	Bamboo 3
pH 1:5 in water		6.09	6.17	6.17
Electrical conductivity	μS/cm	107	116	135
Salinity Hazard		Non-saline	Non-saline	Non-saline
Exchangeable calcium	mg/kg	1671	967	975
Exchangeable potassium	mg/kg	235	387	403
Exchangeable magnesium	mg/kg	465	464	359
Exchangeable sodium	mg/kg	69	106	124
Cation Exchange Capacity (CEC)	Meq+/100g	13.3	10.2	9.7
Exchangeable Sodium %		2.3	4.5	5.6
Sodicity		Non-sodic	Non-sodic	Non-sodic
Calcium to Magnesium ratio		2.2	1.3	1.6
Field texture		Loam	Loam	Loam
Base Saturation %		98.2	96.1	96.7

Table 3. Results from the Woodfordia bamboo irrigation area groundwater monitoring bores

Parameter	Units	2023 Bore 1	2023 Bore 2
Escherichia coli	MPN/100 ml	<1	<1
Heterotrophic plate count	cfu/ml	>3000	>2000
Electrical conductivity	μS/cm	2000	1500
pH		7.1	7.3
Total Kjeldahl Nitrogen	mg/L	<0.2	<0.2
Total Nitrogen	mg/L	0.3	0.4
Total Phosphorus	mg/L	0.11	0.18

pole harvesting and add that to the soil in the irrigation area. The decentralized regulations also require groundwater monitoring bores on the aquifer under the recycled water irrigation area. This is to ensure that the underlying aquifer is not being contaminated with recycled water. The 2023 results from the ground water monitoring bores can be seen in Table 3.

The groundwater monitoring bores show no leaching of the recycled water into the aquifer under the bamboo irrigation area. Nutrient levels and *E. coli* levels are very low. Aquifers in Australia are typically more saline than many in North America, so the electrical conductivity level is not unusual. The batching nature of the treatment process allows us to undertake a relatively small daily irrigation rate across the year and this helps us avoid problems associated with over-irrigation. The recycled water scheme at the Woodfordia site is sustainable and grows a product that the site uses

continued on page 18

and no longer has to externally purchase, so it saves Woodfordia money.

Research Conducted at the Site

The Woodfordia STP and recycled water scheme have not only been analyzed for regulatory purposes. Woodfordia and Arris have allowed access to post-graduate students from the Central Queensland University, University of Queensland, University of the Sunshine Coast, and the Queensland University of Technology. Their research has looked at the cation exchange capacity of the zeolite [8], the impact of hydrogen peroxide on the sub-surface drip irrigation tape [9], the carbon emissions of the treatment chain, and the feasibility of using the treatment chain on other festival sites with intermittent flows.

The most impactful research conducted at the site was by Dr. Jake O'Brien during his PhD study [10]. O'Brien investigated the pharmaceuticals, both legal and illicit, in the untreated wastewater entering the STP. O'Brien found that the patrons of the Woodford Folk Festival were using relatively few illicit drugs and that most pharmaceuticals used at the site were legal and related to the aging demographic of the folk festival crowd, such as cholesterol and blood pressure medications, Viagra, and Prozac. It is interesting to note that during O'Brien's study, the site was rented to a modern music festival, with acts such as Coldplay and Kanye West, and relatively large concentrations of cocaine and other party drugs were found in the untreated wastewater at that event. Woodfordia was the first site in Australia to give O'Brien access for his research. O'Brien's research has been very successful and implemented Australia wide, with every major municipal treatment plant tested monthly, and regional STP's tested every three months. The majority of municipal STPs in Australia are also tested for legal and illicit pharmaceuticals every census night. The major funder for O'Brien's research has been the Australian Federal Police (equivalent to the FBI).

Maintenance and Operational Costs

There is no such thing as maintenance-free in the engineered water cycle, and the Woodfordia STP does require regular maintenance. Prior to each Woodford Folk Festival the tanks are desludged and the sludge is dried out on-site via a Geo-tube sludge bag (see Figure 7). Each sludge bag lasts approximately three years before it is full. Once a bag is full the sludge is removed, composted at the Woodfordia nursery, and reused as part of the site's native endemic plant species revegetation program.

Each part of the treatment chain is serviced and checked for its operational status. Multiple spares are kept of many of the key service items. The Woodford Folk Festival is held between Christmas and New Year,



Figure 7. Sludge dewatering bag at the Woodfordia STP

which is the main summer holiday period in Australia. Most industrial suppliers are shut during this period. Because of this we have several fabrication tools including a lathe, drill press, welders, crane-truck, etc. at the site so we can fabricate and install our own spare parts if required.

The batching treatment plant runs 24/7 during the week of the Woodford Folk Festival and we always have an operator on shift. If this was a continuous flow treatment plant it would be relatively expensive to operate, but because it only runs for a couple of weeks per year, it costs on average \$130,000 per annum to operate and maintain. This is significantly less than the trucking and municipal STP receival cost (\$200,000) for offsite disposal in 2008. Off-site disposal costs in 2024 would be around \$400,000.

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Conclusions

The decentralized batching sewage treatment plant and water recycling scheme at the Woodfordia site has been very successful since it was built in 2009. The large variations in

wastewater generation volumes at the site required a specialized treatment chain that used chemical, physical, and absorption treatment technologies with minimal biological processes. The decentralized STP has proven to be cheaper to operate than trucking the waste off-site and the recycled water has been used to irrigate a crop that is useful to the owners. The fit-forpurpose treatment chain has proved to be both environmentally and economically sustainable.

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Author Bios

Ben Kele (Contact Author, bkele@arris.com.au), is a director of Arris Pty Ltd. He tends to focus on 'interesting' effluents from difficult on-site and decentralized sites. His research has focused on managing the issues of salinity and sodicity in recycled water. He has delusions of eventually handing in his very overdue PhD thesis on this topic. He is the current chair of Wastewater Education and is on a variety of other committees, such as the AWA's Regional, Rural, & Remote Water SIG; Operators Without Borders; and the committee for Australia's On-site Wastewater Conference in November 2025.

Tony Kodel is Arris's lead technology troubleshooter. He reads all the manuals and commissions, calibrates the equipment, and fixes things when they break. Tony is an educator who is qualified to teach both school children and college students. He is passionate about science education. He is also burdened by being the good looking one of the authors, and has more hair products than all the other authors put together.

Jim Kelly is the managing director of Arris Pty Ltd. He is a soil scientist with a fondness for mathematical modelling. He used

to focus on large-scale municipal water recycling projects, but over the last decade or so has turned his attention to on-site and decentralized projects. He enjoys having battles of wits with regulators (although, he may enjoy these discussions more than the regulators).

Tim Woods is the managing director of Hydroscape (www. hydroscape.com.au/) and works closely with the Arris team. He is a fully qualified plumber and has a university degree in public health. He is on the Environmental Health Association (SA branch) wastewater special interest group (SIG) committee. He has worked as a regulator but currently focuses on designing and installing nature-based treatment solutions. He is obsessed with even-pressure dosing in soil- and sand-based on-site treatment and dispersal systems. He has developed and patented his own chamber and pipe holding system. We are aware that there is a similarly named Tim Wood in the American On-Site Wastewater Industry. They even look alike, and both have worked with chambers and Fuji Clean (we find it freaky too).

TradeMutt — You Never Walk Alone | By Sara Heger

was fortunate to travel to Australia in November of 2023 for septic system related work, including a tour of interesting onsite wastewater systems near Brisbane and Adelaide and to attend a related conference in Perth. Australia is a large and diverse country nearly the size of the continental U.S. One of our tour's stops included visiting the treatment system for the Woodford Folk Festival. This treatment system, designed by Arris, is quite unique as it was designed for up to 300,000 gallons per day when the festival is held between Christmas and New Years, with very little usage the rest of the year. To make this feasible they do not utilize the natural biological process most of our systems rely upon, because there is no time to get them up to speed. Instead, they rely upon settling, hydrogen peroxide, activated carbon, sand filtration, ion exchange filtration, and UV disinfection, before storing the treated wastewater onsite for irrigation to grow bamboo used during the festival (more details about the system on page 14).

It was quite an impressive site to see but what really caught my eye during the tour was Ben Walk, managing director of Fluro Fab Pty Ltd, wearing the most colorful, cool, high-vis shirt I



Sara Heger and Ben Walk at the Woodford Wastewater Treatment System

had ever seen. I went up to Ben to give him a compliment and got the full story on his shirt. He told me the shirt was made by TradeMutt and turned around to show me the text on the upper back: "THIS IS A CONVERSA-TION STARTER." Ben was true to the shirt, and we started a conversation and became friends, building a connection because we know we have shared values. By wearing this shirt and signaling to everyone around you that you are up for a conversation, you take on responsibility to act with authenticity and empathy, and to take a non-judgmental approach to conversation. Also, the TradeMutt shirts are not just eye-catching, they are also high quality and comfortable!

TradeMutt was started by two guys in Australia, Dan and Ed, who met working on a construction site in 2014. In 2015, Dan was devastated by the news that one of his best mates had tragically and unexpectedly taken his own life. This tragic event motivated them to create their company, aiming to make workers look and feel great at work, and in doing so, reduce the rate of blue-collar suicide. TradeMutt is a social enterprise workwear company by tradies for tradies. In Australia, the term "tradie" is used to describe anyone who works with their hands.

They make funky, eye-catching workwear designed to start conversations about mental health, making an invisible issue impossible to ignore. The topic of mental health is a serious one and the tone of the conversation can often feel too heavy for some. These shirts help to reframe the conversation and hopefully make it more helpful and optimistic. Half of the profit generated by the sales of these shirts goes to support the services of TIACS, which is designed to support those working in the trades, truck drivers, farmers, and blue-collar workers.

Have a chat, lift the flap. Under the pocket flap of each shirt is a QR code that can be scanned to connect to mental health professionals for



free. For many, seeking mental health support is costly and inaccessible. These shirts help to make the link between someone with a problem and an available free resource. And one of the best ways to help someone else open up is to do so first. TradeMutt's goal is to foster a culture where it is okay to discuss when you are having a bad day or might need help. Every conversation you have with another person is an opportunity to positively impact their life and possibly save a life.

TradeMutt has yet to expand to the U.S. market so there is not yet a U.S. QR code for shirts. There is still a huge benefit to shirts as sometimes a coworker may just need a friend to talk to. If they could benefit from professional support, you can recommend they call or text 988 to connect with Lifeline, which provides 24/7 free and confidential support for people in distress. Arris and the Clearflow Group thought the shirts were so eye-catching and positive that they sported them at the 2024 WWETT show, where they were effective at getting attention and sparking conversations about mental health.



TradeMutt at the WWETT show.

You can find Dan's TedX talk about how the company came to be on their website: www.trademutt.com

Dr. Sara Heger is a researcher and instructor at the University of Minnesota in the Onsite Sewage Treatment Program where she is faculty in the Water Resources Science program. She is the past president of NOWRA.



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What to Expect at the 2024 Mega-Conference

The onsite event of the year is just a few short months away!

The 2024 Onsite Wastewater Mega-Conference will take place October 20 to 23 in Spokane, Washington. With dozens of technical sessions to choose from and decentralized wastewater professionals attending from all across the country (and, increasingly, from across the globe), the Mega-Conference offers the highest quality education, training, and networking available to grow your career and business.

Join us as early as Saturday, October 19 to take part in a golf tournament that will support NOWRA's Emerging Professionals Scholarship Fund. The conference will open with detailed updates on EPA activities, NOWRA's current research initiatives, NOWRA's lobbying activities before Congress, and perspectives from industry thought leaders. The conference will feature multiple tracks of technical sessions with potential to earn continuing education credits, a busy exhibitor's hall, an oral and poster presentation contest for emerging professionals, an evening social event, and a field trip on the last day.

The conference planning committee is in the midst of reviewing presentation abstracts and setting the agenda. Registration for attendees and exhibitors will open in early July.

Visiting Spokane

Perhaps the most exciting thing about this year's conference is the happy coincidence that we will be in Spokane, Washington, during the 50th anniversary since the city hosted the World's Fair.

Once a mill city and later a hub for railway transportation, Spokane now boasts a beautifully revitalized downtown with the powerful Spokane River at its center. Much of that revitalization

continued on page 24



Aerial photo of downtown Spokane

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2024 Mega-Conference Preview (continued)

was achieved when Spokane hosted the World's Fair in 1974, four years after the first Earth Day celebration and just two years after the passage of the Clean Water Act. Spokane was, at the time, the smallest city to host the World's Fair and was the first to infuse the traditionally technological exposition with a reflection on our relationship with nature. The theme of Expo '74 was "Celebrating Tomorrow's Fresh New Environment." The city opened the fair by releasing trout into the Spokane River, commemorating efforts to restore the river after decades of industrial pollution. The fair was held in the heart of the city in what is now the beautiful Riverfront Park, attracting more than 5 million visitors from around the world.

As a tribute to Spokane's history, the theme for this year's Onsite Wastewater Mega-Conference is "Celebrating Tomorrow's Environment: Clean Water for the Future." We invite you to reflect back on the progress we've made to protect our water resources over the last 50 years, and to envision the next 50 years for the onsite industry.

The conference will be held at the Spokane Convention Center, overlooking the Spokane River and within walking distance of Riverfront Park. Our hotel room block at the Double-Tree by Hilton Hotel Spokane City Center is open and will remain so through September 19. More details are on NOWRA's website. In addition to visiting Riverfront Park, you may also want to check out the Expo '74 exhibit at the Northwest Museum of Arts and Culture. The Visit Spokane website (visitspokane.com) has many ideas for enjoying your stay, including dozens of restaurants and bars to choose from and other interesting city sights.

The 2024 Onsite Wastewater Mega-Conference is a collaborative effort between the National Onsite Wastewater Recycling Association (NOWRA), the National Association of Wastewater Technicians (NAWT), the State Onsite Regulators Association (SORA), the Washington On-Site Sewage Association (WOSSA), and the Oregon Onsite Wastewater Association (O2WA).

We look forward to seeing you in Spokane this October!



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Advocacy Successes

- NOWRA worked with Congress on the Infrastructure Investment and Jobs Act (H.R. 3684) that was signed into law by President Biden on November 15, 2021. The water infrastructure bill creates a Decentralized Wastewater Grant Program for the repair or replacement of failing or non-existent septic systems owned by low-income homeowners. The Act authorizes \$50 million of funding for each of the Fiscal Years 2022–2026, for a total of \$250 million.
- 2. NOWRA is working with EPA on implementation of legislation we sponsored which was passed into law as part of the 2018 Water Bill (America's Water Infrastructure Act of 2018) requiring EPA to create a Decentralized Technology Clearinghouse and to share information about the cost-effectiveness of decentralized systems with local governments and other groups. EPA must regularly report back to Congress about how they are supporting the increased use of decentralized systems.
- 3. NOWRA is monitoring the U.S. Census Bureau's efforts to include a "sewer or septic" question added to the Annual American Community Survey (ACS). This question was removed from the decennial Census after 1990. NOWRA worked with EPA to get them to submit a request to have this question included on the survey. In October 2018 the U.S. Census Bureau accepted the EPA proposal and the question is moving forward to the next stage of approval. This is on track for addition to 2025 ACS.

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The Homeowner's Education Course was developed through a U.S. EPA grant and in partnership with the Rural Community Assistance Partnership (RCAP).

This course is free but users must create an account on NOWRA's Online Learning Academy

Questions about this course should be directed to NOWRA at info@nowra.org.

SAVE THE DATE! SepticSmart Week Sept. 16-20, 2024

MORE INFO HERE



A Great Resource for SepticSmart Week

Now's the time to start thinking about your outreach plans for SepticSmart Week, which will take place from September 16 to 20 this year. Help spread awareness for homeowners and public officials about the importance of onsite wastewater treatment!

NOWRA's Homeowner Education Course is just one of many great resources to promote.

Visit the EPA's SepticSmart program website for more ideas and education materials.

- And don't forget to share these key messages:
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 - 2. Think at the Sink!
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 - 7. Keep It Clean!

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